

Mission 316 West Specific Plan

Draft Environmental Impact Report

SCH#2019029038

prepared by

City of San Marcos
Planning Division
1 Civic Center Drive
San Marcos, California 92069
Contact: Joseph Farace, Planning Manager

prepared with the assistance of

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2215 Faraday Ave, Suite A
Carlsbad, California 92008

August 2019

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Environmental Scientists | Planners | Engineers
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Acronyms and Abbreviations

AB	(California) Assembly Bill
ADT	Average Daily Traffic
APN	Assessor's Parcel Number
BCLA	Biological and Core Linkage Area
BCE	Before the Common Era
BMF	Bedrock Milling Feature
BMP	best management practices
BRA	Biological Resources Assessment
CAGN	California Gnatcatcher
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CARB	California Air Resources Board
CBC	California Building Code
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CE	Common Era
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFD	Community Facilities District
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon Dioxide Equivalents

CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
CSS	Coastal Sage Scrub
CWA	Clean Water Act
cy	cubic yards
dB	decibel
dBA	A-weighted decibel
DOF	California Department of Finance
DNL	Day-Night Average Level
du	Dwelling Unit
ECOS	Environmental Conservation Online System (USFWS database)
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
ESA	Endangered Species Act
EWPCF	Encina Water Pollution Control Facility
FEMA	Federal Emergency Management Act
FESA	Federal Endangered Species Act
FMZ	Fuel Modification Zone
FPP	Fire Protection Plan
FTA	Federal Transportation Administration
FHWA	Federal Highway Administration
FPA	Focused Planning Area
GHG	Greenhouse Gas
HCM	Highway Capacity Manual
HVAC	Heating Ventilation and Air Conditioning
Hz	Hertz
ITE	Institute of Traffic Engineers
JURMP	Jurisdictional Urban Runoff Management Plan
Ldn	Day-night average sound level
Leq	Equivalent noise level
Lmax	Maximum sound level
Lmin	Minimum sound level
LOS	Level of Service

MBTA	Migratory Bird Treaty Act
MGD	Million Gallons per Day
MHCP	Multiple Habitat Conservation Plan
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
NCTD	North Coast Transit District
NO	Nitric oxides
NO_2	Nitrogen dioxide
NOC	Notice of Completion
NOD	Notice of Determination
NOP	Notice of Preparation
NO_x	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
O_3	Ozone
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Administration
PFF	Public Facilities Fees
PPV	Peak Particle Velocity
PRC	[California] Public Resources Code
RAQS	Regional Air Quality Strategy
RHNA	Regional Housing Needs Assessment
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SANTEC	San Diego Traffic Engineering Council
SB	(California) Senate Bill
SCIC	South Coastal Information Center
SDAB	San Diego Air Basin
SDAPCD	San Diego Air Pollution Control District
SDCWA	San Diego County Water Authority
SDG&E	San Diego Gas and Electric Company
SDSO	San Diego County Sheriff's Office
sf	square foot/feet

SLR	San Luis Rey Band of Mission Indians
SMMC	San Marcos Municipal Code
SMFD	San Marcos Fire Department
SMVGB	San Marcos Valley Groundwater Basin
SO_x	Sulfur oxide
SPA	Specific Plan Area
SR	State Route
SSC	Species of Special Concern
STC	sound transmission class
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TCA	Traditionally and Culturally Affiliated Native American Tribe
TIA	Traffic Impact Assessment
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
UWMP	Urban Water Management Plan
VWD	Vallecitos Water District
WEAP	Worker Environmental Awareness Program
WoS	Waters of the State
WoUS	Waters of the United States

Executive Summary

This document is an Environmental Impact Report (EIR), SCH Number 2019029038, analyzing the environmental effects of the proposed Mission 316 West Project. This section summarizes the characteristics of the proposed project, alternatives to the proposed project, and the environmental impacts and mitigation measures associated with the proposed project.

Project Synopsis

Project Applicant

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Lead Agency Contact Person

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Project Description

This EIR has been prepared to examine the potential environmental effects of the Mission 316 West Project (project). The following is a summary of the full project description, which can be found in Section 2.0, *Project Description*.

The project site is located at 260 East Mission Road at the northeast corner of Woodward Street and East Mission Road in the City of San Marcos. The project would impact 4.02 acres, with development occurring over a 3.7-acre area, identified as APN 220-210-50, and is undeveloped. The topography is diverse and consists of a south sloping hillside containing a number of granite rock outcrops. The southern portion of the project site has been previously graded and contains an unmaintained driveway pad and remnant concrete pads from a previous building that has been removed (Section 4.2, *Cultural Resources*). The site has a General Plan land use and zoning designation of Specific Plan Area (SPA). The site is specifically located in the Heart of the City Specific Plan, which designates the project site as Commercial, and in the Richmar Specific Plan Area. Although the site is designated Richmar Specific Plan no adopted Specific Plan exists for the site. The project site is also adjacent to the Mission 316 Specific Plan. The proposed project would require amendments to the City's General Plan to incorporate the project site into the Mission 316 Specific Plan, which would be updated to incorporate new design standards and development regulations.

Project Characteristics

The proposed project would involve the development of 67 market-rate, two- and three-bedroom units on 3.7 acres (4.02 acres of total project impact area). The 67 residential units would provide for a density of approximately 18 dwelling units per acre. As proposed, residential units consist of three floor plans distributed among nine separate buildings with five building types. Each building is anticipated to include a minimum of two floor plan types, with the bulk of the buildings featuring three floor plan types. Each of the nine buildings would be three stories with a maximum height of 45 feet. Plans for the proposed project are included in Appendix B of this EIR. Table ES-1 summarizes the three proposed floor plans for the residential units.

Table ES-1 Residential Unit Summary

Plan Type	Number of Units	Square Feet per Unit
1: two bedroom/2.5 bathroom	37	1,104
2: three bedroom/2.5 bathroom	17	1,339
3: three bedroom/3.5 bathroom	13	1,646

The 67 residential units would occupy a 40,172 square foot development footprint and cover approximately 25 percent of the lot. The remainder of the project site would consist of common open space, landscaping, and driveways.

There are two types of proposed open space: private and common. The project includes a total of 3,263 square feet of private open space in the form of patios or decks in each dwelling unit. Common open space for residential use includes recreational areas with amenities such as pathways, barbeques, food preparation counters, seating and shade structures, an open turf area, playground area, and recreational courts totaling 33,889 square feet. Common open space would be maintained by a homeowners association or a similar association.

Landscaping and hardscaping throughout the project site would comply with the Mission 316 Specific Plan landscaping guidelines. Hardscaping would incorporate pavers at entry point intersections and provide access through the site and recreational areas. Landscaping guidelines would incorporate the San Marcos Water Efficiency Landscape Ordinance requirements. Plant materials would be drought and pest-tolerant, and would maintain continuity with the Mission 316 East development. Street trees, yard trees, theme trees, shade trees, and accent trees would be used in conjunction with shrubs, groundcovers, and turf throughout the landscaped areas. The project proposes retaining walls and tubular, steel patio fencing. Walls and fences would be visually appealing and add visual landscape treatments to the project site in conformance with the guidelines of the Mission 316 Specific Plan.

Parking and Site Access

The proposed project would include residential and guest parking areas. Each residential unit would have a two-car garage on the ground level, totaling 134 enclosed parking spaces. The project would provide 26 guest parking spaces which would be located on the north side of the main drive aisle. Two guest parking spaces would have EV charging stations and one of which would be ADA compliant. In total, the project would include 160 parking spaces.

Access to the site would be provided from one driveway located along Woodward Street and one driveway along East Mission Road. A new curb cut would be constructed along Woodward Street to

provide access off Woodward Street. Access from East Mission Road would expand and share the existing driveway with the neighboring Mission 316 East development. The main circulation road for the project would be 24-feet wide and connect the two driveways along the northern portion of the project area. Twenty-foot wide internal alleys would connect the dwelling unit garages with the main circulation road.

Utilities

The Vallecitos Water District (VWD) would provide water and wastewater services to the project site. The City of San Marcos Public Works Department (PWD) would provide stormwater utility services to the project site. Electricity services to the site would be provided by San Diego Gas and Electric Company (SDG&E).

Construction and Grading

Construction of the proposed project is expected to occur over approximately 20 months. Construction activities would be separated into four phases. The first phase would include initial site preparation to remove existing concrete debris, rocks, and vegetation from the development area; the second phase would include blasting, grading, and mass excavation to level a portion of the hillside; the third phase would include building construction and painting; the fourth construction phase would involve paving and site landscaping. The building construction phase would occur over 14 months and entail construction of a few proposed residential buildings at a time during the construction phase.

Due to the topography of the site, substantial grading would be required to accommodate the project. Earthwork quantities would include approximately 25,200 cubic yards of cut material, 13,400 cubic yards of fill material, and 11,800 cubic yards of export material. Blasting and rock crushing would be required during grading activities due to existing materials and topography of the site. A grading variance would also be required for slopes and proposed retaining walls, which exceed 20 feet. All construction activities would comply with San Marcos Municipal Code (SMMC) Chapter 10.24.010 and 17.32.180.

Green Building Features

The proposed project's overall design would meet California's Green Building Standards Code (CALGreen; California Code of Regulations, Title 24, Part 11), which requires implementation of energy efficient light fixtures and building materials. Furthermore, the project would comply with the 2019 Building Energy Efficiency Standards (CBC Title 24, Part 6), which requires newly constructed buildings to meet energy performance standards set by the California Energy Commission. Each residential unit would be constructed in compliance with California Building Code standards and be wired for an electric vehicle charging station. In addition, the project would include rooftop solar and would only operate with electricity and not utilize natural gas. With the provided rooftop solar and as the electricity generated by renewable resources increases due to State policies and regulations, the project would become carbon neutral.

Project Objectives

Fundamental Project Objectives

- Incorporate a medium density multi-family residential development into the neighborhood that serves as a transitional residential use to surrounding low-density residential neighborhood and to the Town Center area
- Increase the amount of attainable for-sale housing available in the City by introducing a range of unit sizes and different bedroom counts including two- and three-bedroom units to accommodate a large spectrum of family demographics and growing housing needs
- Strategically locate multi-family housing adjacent to public transportation such as the Rail Sprinter Line and the City's Town Center area to facilitate smart growth

Basic Project Objectives

- Use land resources more efficiently by providing well-planned, infill development on a currently vacant site
- Provide a visually pleasing street scene with medium-density development through architectural design, unified landscape theme, and recreation areas providing continuity along Mission Road
- Create a multi-family community that is cohesive in design with existing adjacent development and consistent with the Mission 316 Specific Plan
- Design a safe and efficient circulation system that adequately supports the anticipated level of traffic in and around the site that is pedestrian safe

Required Approvals

The proposed project would require the following City approvals and entitlements, along with standard building and grading permits:

- **Specific Plan Amendments** to remove the project site from the Heart of the City and Richmar Specific Plans and to include the project site in the Mission 316 Specific Plan area, and to provide for additional standards and regulations for the design and construction of the proposed project
- **General Plan Amendment** to remove the project site from the Heart of the City and Richmar Specific Plan areas and to include the project site in the Mission 316 Specific Plan area
- **Multi-family Site Development Plan** to implement the objectives and guidelines compliant with the Mission 316 Specific Plan
- **Tentative Subdivision Map** to create the required street lots, water quality basin, open space and recreation lots, and air space condominiums
- **Grading Variance** to allow grading of slopes exceeding 20 feet in height
- **Conditional Use Permit** for rock crushing during project construction
- **Environmental Impact Report** to analyze the potential environmental impacts of project implementation

The project would require the following permits from federal and state agencies, as indicated:

- **Regional Water Quality Control Board** to comply with the Municipal Separate Stormwater Permit (Order No. R9-2013-0001) for post construction and operation
- **United States Fish and Wildlife Service** to comply with the Multiple Habitat Conservation Program

The project would require the following consultation processes in order to move forward with the project:

- **Senate Bill (SB) 18 and Assembly Bill (AB) 52**: Pursuant to SB 18, consultation with California Native American Tribes on the contact list maintained by the California Native American Heritage Commission is required due to the proposed General Plan amendment. Also, pursuant to AB 52, the project would be required to notify and consult with local tribes who requested notification from the City for projects subject to CEQA.

Alternatives

As required by the California Environmental Quality Act (CEQA), this EIR examines alternatives to the proposed project. Studied alternatives include the following three alternatives. Based on the alternatives analysis, Alternative 2 was determined to be the environmentally superior alternative.

- Alternative 1: No Project
- Alternative 2: Reduced Project Footprint
- Alternative 3: Live/Work Units

Alternative 1 (No Project) assumes that the project site continues to be designated for commercial pursuant to the Heart of the City Specific Plan and the proposed 67 residential units, 33,889 square feet of common open space, and 27 guest parking spaces are not constructed. Despite many years of designation for commercial uses, the site has remained vacant and undeveloped for commercial purposes. According to the Market Analysis prepared for the proposed project, the retail vacancy rate in the City of San Marcos is fourth highest in any sub-market in the San Diego region. Therefore, under the No Project Alternative, the currently undeveloped site would remain commercially designated and undeveloped, and the site would remain ungraded and unmanaged. The No Project Alternative was determined to be the environmentally superior alternative. However, Alternative 1 would not fulfill any of the project's objectives because the existing site would not provide housing or meet the development and design goals of the Mission 316 Specific Plan. This alternative has no characteristics in common with the proposed project nor any of the alternatives, as no proposed development would occur.

Alternative 2 (Reduced Project Footprint) would reduce the footprint of the project by approximately 50 percent as compared to the proposed project in order avoid all impacts to Diegan Coastal Sage Scrub. Impacts to Diegan Coastal Sage Scrub would be avoided by eliminating at least 2 units per building and potentially all units in westernmost building, in comparison to the proposed project. An approximate 20,300 square foot development footprint could be developed on the project site under Alternative 2. Residential units could consist of multiple floor plans distributed across multiple separate buildings, similar in layout to the proposed project. Under Alternative 2, the development may be permitted to include one driveway, utilizing the existing ingress/egress from East Mission Road, as long as fire truck access is still accounted for. This would further reduce the project impact area by eliminating the driveway access from Woodard Street. Alternative 2 could still include common open space areas with recreational amenities similar to the proposed

project. Alternative 2 could also include private garages in each residential unit and guest parking spaces, which would be located on the northern side of the main drive aisle. The project site would have landscaping and hardscaping, and would comply with the Mission 316 Specific Plan landscaping guidelines. Alternative 2 would fulfill all of the Project Objectives, although it would not satisfy the fundamental project objectives to the same extent as the proposed project. Biological resource impacts would be significantly reduced under Alternative 2 due to avoidance of direct impacts on biological resources, while impacts to noise and cultural and tribal cultural resources would be similar to those of the proposed project. Alternative 2 is determined to be the environmentally superior alternative of the development alternatives evaluated in this EIR.

Alternative 3 (Live/Work Units) would involve the development of 67 live-work residential units on the existing, vacant project site. Live-work units would require a Specific Plan amendment to allow for a mix of residential and commercial uses and change the land use designation from Commercial to Mixed-used within the Heart of the City Specific Plan. Live-work units would provide a commercial component to the site, consistent with the current commercial designation, as well as provide additional housing types in the City. Development under Alternative 3 would have a similar site plan as the proposed project, with structures located along East Mission Road, and parking and driveways in the rear of the site. Commercial areas and uses would be concentrated on the ground levels with residential uses on the second and third floors. The units would be less than 2,000 square feet and parking would be provided at one space per unit, consistent with Chapter 20.340 of the San Marcos Municipal Code. Parking would be located in the rear of the project site. This alternative would meet the objectives of the proposed project, though to a much lesser extent. Impacts to biological, cultural, and tribal cultural resources would be similar between Alternative 3 and the proposed project. Alternative 3 would result in a slightly less impact on noise due to the operational component of the live-work units and associated commercial traffic on and off the project site primarily occurring during day time business hours.

Refer to Section 6.0, *Alternatives*, for the complete alternatives analysis.

Areas of Known Controversy and Issues to be Resolved

CEQA Guidelines requires an EIR to include issues to be resolved by a lead agency. The major issues to be resolved by the City of San Marcos for the project are:

- Whether the Draft EIR adequately describe the environmental impacts of the project.
- Whether the proposed land use change and project are compatible with the surrounding development and character.
- Whether the proposed mitigation measures should be adopted or modified.
- Whether additional mitigation measures need to be applied.
- Whether there are any alternatives to the project which would substantially lessen the environmental impacts and achieve most of the project objectives.

In determining the areas of controversy, the City of San Marcos circulated an Initial Study and Notice of Preparation (NOP) of the EIR for a 30-day agency and public review period starting on February 7, 2019 and ending on March 11, 2019. The City distributed the NOP to the State Clearinghouse, responsible and trustee agencies, and other interested parties. The City held an EIR Public Scoping Meeting on February 27, 2019, which provided information about the proposed project and the CEQA process to members of public agencies, interested stakeholders, and residents/community members.

The City received two letters from agencies, which are included in Appendix A with the Initial Study and NOP. Table 1-1 summarizes all comments from agencies and interested parties in response to the NOP; it also details where each is addressed in the EIR.

Primary areas of concern include project impacts to known and unknown cultural and tribal cultural resources.

Issues Not Studied in Detail in the EIR

The Initial Study (Appendix A) determined no substantial evidence exists that significant impacts would occur with regard to the following issue areas: Aesthetics, Agricultural Resources, Air Quality, Energy, Geology and Soils, Greenhouse Gas, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Mineral Resources, Population and Housing, Public Services, Recreation, Transportation, Utilities and Service Systems, and Wildfire. Section 4.6, *Impacts Found to be Less than Significant*, summarizes the issues determined to have no impact and issues from the environmental checklist determined to be less than significant in the Initial Study. A subsequent sight distance safety concern from the project driveways was raised after the Initial Study process. Therefore, this particular issue was addressed in Section 4.5, *Transportation*.

Impacts to Biological Resources, Cultural Resources, Noise, Transportation, and Tribal Cultural Resources were found to be potentially significant and are addressed in this EIR.

Summary of Impacts and Mitigation Measures

Table ES-2 summarizes the environmental impacts of the proposed project, proposed mitigation measures, and residual impacts (the impact after application of mitigation, if required). Impacts are categorized as follows:

- **Significant and Unavoidable.** An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires a Statement of Overriding Considerations to be issued if the project is approved per §15093 of the CEQA Guidelines.
- **Less than Significant with Mitigation Incorporated.** An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires findings under §15091 of the CEQA Guidelines.
- **Less than Significant.** An impact that may be adverse, but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.
- **No Impact:** The proposed project would have no effect on environmental conditions or would reduce existing environmental problems or hazards.

Table ES-2 Summary of Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure (s)	Residual Impact
Biological Resources		
Impact BIO-1. Implementation of the project would not significantly impact sensitive reptile or mammal species that could reside on site. However, the project would result in direct and indirect impacts to California Gnatcatcher and nesting birds from construction activities during breeding season. Impacts would be less than significant with mitigation incorporated.	**BIO-1. Coastal California Gnatcatcher Surveys** **Preconstruction Surveys.** Presence/absence surveys of the project site and a 500-foot buffer around the project site shall be conducted by a qualified biologist with a valid USFWS 10A 1A permit to determine the presence of CAGN that could be affected by construction activities, including vegetation clearance. A minimum of 3 surveys will be conducted no less than 7 days apart and within 90 days prior to commencement of construction activities. The results of the survey shall be submitted to the USFWS prior to initiation of construction activities. **Pre-Vegetation Clearance Survey**. Vegetation clearing shall only be conducted between September 1 and February 28, outside of the breeding season for CAGN. No more than three (3) days prior to the clearing of vegetation, a qualified biologist shall conduct 1 survey for CAGN to ensure that the vegetation on-site is not occupied by the species. If the vegetation clearance survey identifies the presence of CAGN, the project biologist shall either use appropriate techniques to flush the bird(s) from the project site or delay the removal of vegetation until CAGN has left the project site on their own volition. **BIO-2. Nesting Bird and Raptors Survey.** If site clearing activities are conducted between February 1 and February 28 or September 1 and September 15, a qualified biologist shall conduct a nesting bird survey no more than three (3) days prior to the start of such activities to identify nesting birds within the project site and a 250-foot buffer around the project site. If any nests are found, their locations shall be flagged and an appropriate avoidance buffer, ranging in size from 25 to 50 feet for song birds, and up to 250 feet for raptors depending upon the species and the proposed work activity, shall be determined and demarcated by a qualified biologist with bright orange construction fencing or other suitable flagging. Active nests shall be monitored at a minimum of once per week until it has been determined that the nest is no longer being used by either the young or adults. No disturbance shall occur within this buffer until the qualified biologist confirms that breeding/nesting is completed, and all the young have fledged. If project activities must occur within the buffer, they shall be conducted at the discretion of the qualified biologist and with monitoring and management to ensure that nesting success is not jeopardized. If no nesting birds are observed during the survey, then no further actions shall be necessary. **BIO-3. Worker Environmental Awareness Program (WEAP).** A WEAP shall be developed and implemented by a qualified biologist prior to the start of construction activities. Each employee (including temporary, contractors, and subcontractors) shall receive the WEAP within two weeks of working on the proposed project. Employees shall be advised of the potential impact to the listed species and the potential penalties for taking such species. At a minimum, the WEAP shall include the following topics: occurrence of the listed and sensitive species in the area, their general ecology, sensitivity of the species to human activities, legal protection afforded these species, penalties for violations of Federal and State laws, reporting requirements, and project features designed to reduce the impacts to these species and promote continued successful occupation of the project area environs. **BIO-4. Work Limit Delineation.** Construction work areas shall be delineated and marked clearly, by flagging or temporary orange	Less than Significant

Impact	Mitigation Measure (s)	Residual Impact
	construction fencing, in the field prior to habitat removal, and the marked boundaries maintained and clearly visible to personnel on foot and by heavy equipment operators. Fencing shall be placed on the impact side to reduce the potential for additional vegetation loss within open space. Fencing placement shall be done by a qualified biologist. All temporary fencing shall be removed only after the conclusion of all grading, clearing, and construction. Employees shall strictly limit their activities and vehicles to the proposed project areas, staging areas, and routes of travel. The project site will be kept clean and food related trash items shall be enclosed in sealed containers and regularly removed from the site. The biological monitor shall verify that the limits of construction have been properly staked and are readily identifiable. Intrusion by unauthorized vehicles outside of construction limits shall be prohibited, with control exercised by an on-site foreman. Access routes to the construction area outside of work hours shall be blocked with physical barriers, such as concrete blocks or large equipment. **BIO-5. Biological Monitoring.** A CDFW and USFWS approved Biologist (hereafter, qualified biologist) familiar with CAGN and its habitat shall be present during all vegetation clearing and other activities with the potential to affect CAGN and will monitor the project to ensure that there are no unanticipated impacts to the CAGN and its habitat. The biologist shall have the authority to halt all associated project activities that may be in violation of the protective measures. If CAGN are found to be within the survey area during pre-construction surveys, the following avoidance and minimization measures shall be implemented: a. To reduce potential noise impacts to nesting CAGN, a qualified biologist shall monitor noise levels at the project site to determine if construction activity noise is above 60 dBA, the standard level requested by the USFWS, or if noise levels above 60 dBA have the potential to affect any CAGN nests. b. If/when an active CAGN nest is identified, a qualified biologist shall monitor noise at the edge of construction as directed by the qualified biologist. A noise barrier will be erected to reduce noise levels to 60dBA or less. This noise barrier shall consist of a 10-foot-high, continuous plywood fence, or comparable barrier, supported by posts or an earthen berm located at the site boundary that abuts potential off-site habitat. If noise levels continue to exceed 60 dBA, the acoustician shall consult with the qualified biologist and provide requirements for the construction contractor to make operational and barrier changes to reduce noise levels to 60 dBA during the breeding season (March 1 through August 31). Noise monitoring will occur during operational changes and installation of barriers, as needed, to ensure their effectiveness. If the noise meets or exceeds the 60 dB(A) Leq threshold, or if the biologist determines that the activities in general are disturbing the nesting activities, the biologist shall have the authority to halt construction and shall consult with the Wildlife Agencies to devise methods to reduce the noise and/or disturbance in the vicinity. This may include methods such as, but not limited to, turning off vehicle engines and other equipment whenever possible to reduce noise, installing a protective noise barrier between the nesting coastal CAGN and the activities, and working in other areas until the young have fledged. **c.** All active nests will be reported within 24 hours to the USFWS upon detection.	

Impact	Mitigation Measure (s)	Residual Impact
Impact BIO-2. Two special-status plant species and no federal- or State-listed or MHCP covered species have the potential to occur on-site. Rare plant surveys were conducted and found no special-status or rare plants on-site. Impacts would be less than significant	None Required	Less than Significant
Impact BIO-3. The project would impact 1.43 acres of Diegan Coastal Sage Scrub, which is considered a sensitive habitat. Impacts would be less than significant with mitigation incorporated.	**BIO-4,** as stated above. **BIO-6. Mitigation for Diegan Coastal Sage Scrub.** Prior to the issuance of grading permits, a total of 1.43 acres of Diegan Coastal Sage Scrub shall be preserved at a 2:1 ratio resulting in a 2.86 acre mitigation obligation. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager.	Less than Significant
Impact BIO-4. The project would remove sensitive habitat and existing open space, which could potentially conflict with policies in the Conservation and Open Space Element of the City's General Plan. Impacts would be less than significant with mitigation.	**BIO-6,** as stated above.	Less than Significant
Impact BIO-5. The project site is located within the MHCP for northwestern San Diego County and would impact CSS and potentially impact CAGN, a Covered Species under the MHCP. Impacts would be less than significant with mitigation incorporated	**BIO-1 through BIO-6,** as stated above	Less than Significant

Impact	Mitigation Measure (s)	Residual Impact
Cultural Resources		
Impact CR-1. No known archaeological resources are present on the project site. There is a multi-component tribal cultural resource site within and adjacent to the development envelope of the project. Construction of the project would involve ground-disturbing activities with the potential to unearth or adversely impact previously unidentified archaeological and tribal cultural resources. Therefore, the project would result in less than significant impacts with mitigation incorporated.	**CR-1. Worker's Environmental Awareness Program (WEAP).** Prior to the commencement of any ground-disturbing activities, a Qualified Archaeologist shall be retained to conduct a Worker's Environmental Awareness Program (WEAP) training on archaeological sensitivity and monitor safety for all construction personnel. The Qualified Archaeologist shall meet or exceed the Secretary of Interior's Professional Qualification Standards for archaeology (National Park Service 1983).The training shall be conducted by the Luiseno Native American Monitor and the Qualified Archaeologist. Archaeological and Tribal Cultural Resource sensitivity training shall include a description of the types of cultural material that may be encountered, cultural sensitivity issues, regulatory issues, protocols in the event unanticipated resources are discovered, and safety measures for the protection of the Luiseno Native American Monitor and the Qualified Archaeologist. Only construction personnel who received this training can conduct construction and disturbance activities in sensitive areas. All attendees shall confirm attendance by signing a sign-in sheet to be submitted to the City of San Marcos. **CR-2. Preparation of a Monitoring Agreement**. Prior to the issuance of a Grading Permit, or ground-disturbing activities, the Applicant/Owner shall enter into a Tribal Cultural Resource Treatment and Monitoring Agreement (also known as a pre-excavation agreement) with the San Luis Rey Band of Mission Indians, or another TCA Tribe. The purpose of this agreement shall be to formalize protocols and procedures between the Applicant/Owner and the TCA Tribe for the protection and treatment of Native American human remains, funerary objects, cultural and/or religious landscapes, ceremonial items, traditional gathering areas and other tribal cultural resources, located within and/or discovered during ground disturbing and/or construction activities for the proposed project, including any additional archaeological surveys and/or studies, excavations, geotechnical investigations, grading, preparation for wet and dry infrastructure, and all other ground disturbing activities. The Tribal Cultural Resource Treatment and Monitoring Agreement shall contain terms that are consistent with Health and Safety Code Section 7050.5, Public Resources Code Section 5097.98, CEQA Guidelines Section 15064.5(e) or any other applicable law or regulation. **CR-3. Qualified Archaeologist and Native American Monitor.** Prior to issuance of a Grading Permit, or ground-disturbing activities, the Applicant/Owner or Grading Contractor shall provide a written and signed letter to the Development Services Department stating that a Qualified Archaeologist and TCA Native American monitor have been retained at the Applicant/Owner or Grading Contractor's expense to implement the monitoring program, as described in the Tribal Cultural Resource Treatment and Monitoring Agreement. **CR-4. Monitoring Report.** Prior to submittal of grading and/or improvement as-built plans, or prior to the issuance of any project Certificate of Occupancy, a monitoring report, which describes the results, analysis and conclusions of the archaeological and tribal cultural resource monitoring program shall be submitted by the Qualified Archaeologist, along with the TCA Native American monitor's notes and comments, to the Planning Division Manager for approval. A copy of any submitted monitoring report shall be provided to the San Luis Rey Band of Mission Indians and any other TCA Tribe that requests the report. **CR-5. Monitoring Collaboration.** The Qualified Archaeologist shall maintain ongoing collaborative consultation with the TCA Native	Less than Significant

Impact	Mitigation Measure (s)	Residual Impact
	American monitor during all ground-disturbing activities. The requirement for the monitoring program shall be noted on all applicable construction documents, including demolition plans, grading plans, etc. The Applicant/Owner or Grading Contractor shall notify the Planning Division of the start and end of all ground disturbing activities. **CR-6. Construction Meetings and Monitoring.** The Qualified Archaeologist and TCA Native American Monitor shall attend all applicable pre-construction meetings with the General Contractor and/or associated Subcontractors to present the archaeological and tribal cultural resource monitoring program. The Qualified Archaeologist and TCA Native American monitor shall be present on-site full-time during grubbing, grading and/or other ground disturbing activities, including the placement of imported fill materials or fill used from other areas of the project site, to identify any evidence of potential archaeological or cultural resources. All fill materials shall be absent of any and all cultural resources. The Applicant/Owner or Grading Contractor may submit written documentation to the City to substantiate if any fill material is absent of cultural resources. Should the City concur that the fill material is absent of cultural resources, in consultation with a Qualified Archaeologist and the TCA Native American monitor, then no monitoring of that fill material shall be required. **CR-7. Discovery of Unknown Resources.** The Qualified Archaeologist or the TCA Native American monitor may halt ground disturbing activities if unknown archaeological artifact deposits or cultural features are discovered. Ground disturbing activities shall be directed away from these deposits to allow a determination of potential importance. Isolates and clearly non-significant deposits (as determined by the Qualified Archaeologist, in consultation with the TCA Native American monitor) will be minimally documented in the field, collected and be given to the TCA Tribe so that they may be reburied at the site on a later date. If a determination is made that the unearthed artifact deposits are considered potentially significant, the San Luis Rey Band of Mission Indians, or the TCA Tribe referenced in CR-2, shall be notified and consulted with in regards to the respectful and dignified treatment of those resources. If a determination is made that the unearthed deposits represent tribal cultural resources, Mitigation Measure TCR-1 shall take effect. All sacred sites, significant tribal cultural resources and/or unique archaeological resources encountered within the project area shall be avoided and preserved as the preferred mitigation, if feasible. If however, a data recovery plan is authorized by the City as the Lead Agency under CEQA, the San Luis Rey Band of Mission Indians or the TCA Tribe referenced in CR-2 shall be notified and consulted regarding the drafting and finalization of any such recovery plan. The data recovery plan shall be submitted to the City prior to recovering the artifact. For significant artifact deposits, tribal cultural resources or cultural features that are part of a data recovery plan, an adequate artifact sample to address research avenues previously identified for sites in the area will be collected using professional archaeological collection methods. If the Qualified Archaeologist collects such resources, the TCA Native American monitor must be present during any testing or cataloging of those resources. Moreover, if the Qualified Archaeologist does not collect the cultural resources that are unearthed during the ground disturbing activities, the TCA Native American monitor, may at their discretion, collect said resources and provide them to the contracted TCA Tribe referenced in CR-2 for respectful and dignified treatment in accordance	

Impact	Mitigation Measure (s)	Residual Impact
	with the Tribe's cultural and spiritual traditions. If the Developer, the Qualified Archaeologist and the TCA Tribe cannot agree on the significance or mitigation for such resources, these issues will be presented to the Planning Division Manager for decision. The Planning Division Manager shall make a determination based upon the provisions of the California Environmental Quality Act and California Public Resources Code Section 21083.2(b) with respect to archaeological resources, tribal cultural resources and shall take into account the religious beliefs, cultural beliefs, customs and practices of the TCA Tribe. Notwithstanding any other rights available under law, the decision of the Planning Division Manager shall be appealable to the Planning Commission and/or City Council. **CR-8. Treatment and Disposition of Historical Cultural Resources.** In the event historical cultural resources (non-tribal cultural resources) are encountered inadvertently during ground-disturbing activities, work in the immediate area must halt and the Qualified Archaeologist must be immediately contacted to evaluate the find and develop a plan for treatment of the find/archaeological site. The following procedures shall be carried out for treatment and disposition of the discoveries: 1. Temporary Curation and Storage. During the course of construction, all discovered resources shall be temporarily curated in a secure location on site or at the offices of the Qualified Archaeologist. The removal of any artifacts from the project site shall be inventoried thoroughly by the Qualified Archaeologist and conducted in the presence of the TCA Native American monitor. 2. Treatment and Final Disposition. The landowner(s) shall relinquish ownership of all historical cultural resources (non-tribal cultural resources) collected during the grading monitoring program and, if appropriate, from any previous archaeological studies or excavations on the project site. Mitigation Measure TCR-1 in Section 4.4, *Tribal Cultural Resources* of this EIR details the requirements for treatment and disposition of tribal cultural resources in the event they are encountered during ground disturbing activities. In the event that curation of historical cultural resources (non-tribal cultural resources) is required, curation shall be conducted by an approved facility and the curation shall be guided by the California State Historic Resource Commission Guidelines for the Curation of Archaeological Collections. The City of San Marcos shall provide the developer final curation language and guidance on the project grading plans prior to issuance of the grading permit, if applicable, during project construction	

Impact	Mitigation Measure (s)	Residual Impact
Impact CR-2. No known human remains are present on the project site. However, construction of the project would involve ground-disturbing activities, such as grading and surface excavation, with the potential to unearth or adversely impact previously unidentified human remains. Therefore, the project would result in less than significant impacts with mitigation incorporated.	**TCR-3**, as stated below.	Less than Significant
Noise		
Impact NOI-1. Rock crushing activities during site grading would result in potentially significant impacts from noise levels to adjacent multi-family residences and a nearby library. Impacts would be less than significant with mitigation incorporated.	**NOI-1. Rock Crusher Noise Shielding**. A noise barrier shall be used during operation of the rock crusher to shield the line of sight from the rock crusher to the San Marcos Branch Library. The crusher is expected to be 10 feet in height. To shield the line of sight, the barrier shall be at least 1 to 2 feet taller than the rock crusher (e.g., with a 10-foot tall crusher, the barrier shall be at least 11 to 12 feet in height). The barrier can consist of an earthen berm, 5/8-inch plywood, 1-inch acoustical blankets or any combination of these materials. Figure 4-A of the Noise Assessment (Appendix F) shows the general location of the crusher and placement of the required barrier. Noise measurements of the rock crusher shall be conducted by a qualified acoustician once the final crusher type and location are determined to ensure compliance with the City's thresholds. If noise levels are found to be above the established thresholds of 60 dBA at any existing single family residential use or 65 dBA for any multifamily use, library, or commercial use, then additional mitigation in the form of higher barriers, sound absorbing material, and/or operational limits on the crushers usage shall be incorporated sufficient to reduce noise to levels not exceeding 60 dBA at any existing single family residential use and 65 dBA for any multifamily, library, or commercial use in the vicinity of the project. Noise measurements and any additional mitigation at the noise barrier shall be recorded by the qualified acoustician and provided to the City and the City's request.	Less than significant

Impact	Mitigation Measure (s)	Residual Impact
Transportation		
Impact T-1. Upon further analysis of the sight distance at the Woodward Street and E. Mission Road driveways, it was determined that they would each meet the required intersection sight distance requirements and impacts would be less than significant.	None required	Less than Significant
Tribal Cultural Resources		
Impact TCR-1. There is a multi-component resource site within and adjacent to the development envelope of the project. Additionally, construction of the project would involve ground-disturbing activities such as grading and surface excavation, with the potential to unearth or adversely impact previously unidentified tribal cultural resources. Therefore, project impacts would be Less Than Significant Impacts with Mitigation Incorporated.	**CR-1 through CR-7**, as stated above. **TCR-1. Treatment and Disposition of Tribal Cultural Resources.** The landowner shall relinquish ownership of all non-burial related tribal cultural resources collected during the grading monitoring program and to the extent performed by landowner, from any previous archaeological studies or excavations on the project site to the TCA Tribe for proper treatment and disposition per the Cultural Resources Treatment and Monitoring Agreement. Reburial of any such repatriated items shall be completed within the project area in a location determined culturally appropriate by the landowner and the San Luis Rey Band, or TCA Tribe referenced in Mitigation Measure CR-2, and shall have all necessary protections placed upon the area for avoidance of any future disturbance. Any burial related to tribal cultural resources (as determined by the Most Likely Descendant) shall be repatriated to the Most Likely Descendant as determined by the Native American Heritage Commission pursuant to California Public Resources Code Section 5097.98. If none of the TCA Tribes accept the return of the cultural resources, then the cultural resources will be subject to the curation requirements contained herein. In the event that curation of tribal cultural resources is required by a superseding regulatory agency, curation shall be conducted by an approved facility and the curation shall be guided by California State Historic Resource Commissions Guidelines for the Curation of Archaeological Collections. The City of San Marcos shall provide the developer with standard final curation procedures on the project grading plans prior to issuance of the grading permit, if applicable, during project construction. The applicant shall provide to the City written documentation from the TCA Tribe, the Most Likely Descendant, and/or the curation facility, whichever is most applicable, that the repatriation and/or curation have been completed. Any reburial activities and/or curation activities must be completed in the presence of the Qualified Archaeologist and TCA Native American monitor. **TCR-2. Treatment and Disposition of Onsite Bedrock Milling Features.** Bedrock milling feature(s) that will be impacted by the project shall be relocated prior to the start of construction to a location determined culturally appropriate by the landowner, San Luis Rey Band or TCA Tribe referenced in Mitigation Measure CR-2, utilizing culturally appropriate methods as developed by the San Luis Rey Band or TCA Tribe referenced in Mitigation Measure CR-2, the TCA Native American monitor, the Qualified Archaeologist, and City. The features shall be protected from	Less than Significant

Impact	Mitigation Measure (s)	Residual Impact
	future disturbance and vandalism through a preservation mechanism acceptable to all parties. **TCR-2. Human Remains.** As specified by State Health and Safety Code Section 7050.5, if human remains are found on the project site during construction or during archaeological work, the person responsible for the excavation, or his or her authorized representative, shall immediately notify the San Diego County Medical Examiner's Office. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the Medical Examiner has made the necessary findings as to origin and disposition pursuant to Public Resources Code 5097.98. If such a discovery occurs, a temporary construction exclusion zone shall be established surrounding the area of the discovery so that the area would be protected, and consultation and treatment could occur as prescribed by law. By law, the Medical Examiner will determine within two working days of being notified if the remains are subject to his or her authority. If the Medical Examiner recognizes the remains to be Native American, he or she shall contact the Native American Heritage Commission (NAHC), by telephone, within 24 hours. The NAHC will make a determination as to the Most Likely Descendent. If suspected Native American remains are discovered, the remains shall be handled pursuant to the process described in Mitigation Measure CR-7, which may include keeping remains in-situ, or in a secure location in close proximity to where they were found, and the examination of the remains shall only occur on-site in the presence of a TCA Native American monitor.	

1 Introduction

This document is an Environmental Impact Report (EIR), SCH Number 2019029038, for a proposed multi-family residential development project located at 260 East Mission Road, San Marcos, California. The proposed Mission 316 West Project (hereafter referred to as the "proposed project" or "project") would be constructed on a vacant site. The project would involve construction of 67 two- and three-bedroom market-rate, for-sale multi-family housing units in nine separate buildings.

This section discusses (1) the project and EIR background; (2) the legal basis for preparing an EIR; (3) the scope and content of the EIR; (4) issue areas found not to be significant by the Initial Study; (5) the lead, responsible, and trustee agencies; and (6) the environmental review process required under the California Environmental Quality Act (CEQA). The proposed project is described in detail in Section 2.0, *Project Description*.

1.1 Purpose and Legal Authority

In accordance with Section 21961 of California Public Resources Code and Section 15121 of the California Environmental Quality Act (CEQA) Guidelines provides that the purpose of an EIR is to serve as an informational document that:

> Will inform public agency decision makers and the public generally of the significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project (California Code of Regulations, Title 14).

This EIR has been prepared as a Project EIR pursuant to Section 15161 of the CEQA Guidelines. A Project EIR is appropriate for a specific development project. The CEQA Guidelines state:

> This type of EIR should focus primarily on the changes in the environment that would result from the development project. The EIR shall examine all phases of the project, including planning, construction, and operation.

This EIR discloses the potential environmental consequences from the implementation of the Mission 316 West Project, a proposed multi-family residential development located at the northeast corner of Woodward Street and East Mission Road, in the City of San Marcos, California.

The project would impact 4.02 acres, with development occurring over a 3.7-acre area, all of which is vacant. Development of the proposed project would involve site clearing, rough grading and compaction, pouring of concrete and asphalt, and construction and occupancy of the proposed structures. The project would consist of 67 multi-family residential dwelling units in nine separate buildings, and a recreational area with residential amenities such as barbeques, counters, seating and shade structures, and an open turf area.

This EIR is to serve as an informational document for the public and City of San Marcos (City) decision makers. The process to finalize the EIR includes public hearings before the Planning Commission and City Council to consider certification of the Final EIR and approval of the project.

The City, as "Lead Agency," prepared this EIR in accordance with CEQA (Public Resources Code Sections 2000-21189) and the *Guidelines,* for implementation of the California Environmental

Quality Act (State CEQA Guidelines, 14 California Code of Regulations and Sections 15000-15387). The proposed project considered in this EIR is a "project," as defined by Section 15378 of the State CEQA Guidelines, which states that an EIR must be prepared for any project that may have a significant impact on the environment. The City, as the Lead Agency, has determined the project may have a significant adverse impact on the environment, and, therefore, preparation of an EIR was required for project approval.

1.2 Environmental Procedure

The EIR process typically consists of three parts: the Notice of Preparation (NOP), the Draft EIR, and the Final EIR. Pursuant to *CEQA Guidelines* Section 15060(d), the City initiated the environmental process with the preparation of an Initial Study (Environmental Checklist) for the project to determine if it would have a significant effect on the environment.

The City of San Marcos circulated the Initial Study and a Notice of Preparation (NOP) of the EIR for a 30-day agency and public review period starting on February 7, 2019 and ending on March 11, 2019. In addition, the City held an EIR Scoping Meeting on February 27, 2019. The meeting, held from 6:00 PM to 7:30 PM, provided information about the proposed project to members of public agencies, interested stakeholders, and residents/community members. The meeting was held at the City of San Marcos City Hall located at 1 Civic Center Drive. The City received two letters from agencies. The NOP is included in Appendix A of this EIR, along with the Initial Study that was prepared for the project. Table 1-1 summarizes all comments from agencies and interested parties in response to the NOP; it also details where each is addressed in the EIR.

Table 1-1 NOP Comments and EIR Response

Commenter	Comment/Request	How and Where it was Addressed
Agency Comments		
Native American Heritage Commission (NAHC)	Recommends consultation with California Native American tribes that are affiliated with the geographic area of the project pursuant to AB 52 and SB 18.	Consultation required by AB 52 and SB 18 was carried out by the City of San Marcos as part of this project. Impacts to cultural resources and tribal cultural resources are discussed in Section 4.2, *Cultural Resources*, and Section 4.4, *Tribal Cultural Resources* of this EIR.
	Recommends conducting an archaeological records search, preparation of a final report if a survey is required, contacting the NAHC for a Sacred Lands File search, and including mitigation for unidentified resources.	A Cultural Resources Due Diligence Report was prepared and is included as Appendix E of this EIR. Mitigation measures for discovery of previously unknown cultural resources is included in Section 4.2, *Cultural Resources*, and Section 4.4, *Tribal Cultural Resources* of this EIR.
San Diego County Archaeological Society, Inc.	Concurs with the mitigation measures specified for the project, based on review of the Initial Study.	The Cultural Resources Due Diligence Report is included as Appendix E of this EIR, and mitigation measures for discovery of previously unknown cultural resources is included in Section 4.2, *Cultural Resources*, and Section 4.4, *Tribal Cultural Resources* of this EIR.

1.3 Scope and Content

This EIR addresses impacts identified by the Initial Study to be potentially significant. The following issues were found to include potentially significant impacts and have been analyzed in the EIR:

- Biological Resources
- Cultural Resources
- Noise
- Tribal Cultural Resources

A sight distance safety concern from the project driveways was identified after the Initial Study process. Therefore, an additional sight distance analysis was conducted and the issue was analyzed in the Transportation section in the EIR.

The EIR preparation included use of pertinent City policies and guidelines, certified EIRs and adopted CEQA documents, and other background documents. References are provided at the end of each section.

The alternatives section of the EIR (Section 6.0) was prepared in accordance with Section 15126.6 of the *CEQA Guidelines* and focuses on alternatives capable of eliminating or reducing significant adverse effects associated with the project while feasibly attaining most of the basic project objectives. The alternatives section identifies the "environmentally superior" alternative among the alternatives assessed. The alternatives evaluated include the CEQA-required "No Project" alternative and two alternative development scenarios for the project area.

The level of detail contained throughout this EIR is consistent with the requirements of CEQA and applicable court decisions. Section 15151 of the *CEQA Guidelines* provides the standard of adequacy on which this document is based. The *Guidelines* state:

> An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of the proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection, but for adequacy, completeness, and a good faith effort at full disclosure.

1.4 Lead, Responsible, and Trustee Agencies

The *CEQA Guidelines* define lead, responsible and trustee agencies. The City is the lead agency for the project because it holds principal responsibility for approving the proposed project.

A responsible agency refers to a public agency other than the lead agency that has discretionary approval over the project. Responsible agencies for the proposed project include:

- **San Diego Regional Water Quality Control Board**, which regulates water quality in the region
- **United States Fish and Wildlife Service**, which protects and conserves fish and wildlife resources

A trustee agency refers to a state agency having jurisdiction by law over natural resources affected by a project. Trustee agencies for the proposed project include:

- **California Department of Fish and Wildlife**, which protects and conserves fish, wildlife, plant, and native habitats within the state

Section 2.7 of the *Project Description* details permits required for implementation of the proposed project. All responsible and trustee agencies have been notified of the proposed project and the preparation of this EIR. The Draft EIR will be provided to these agencies for review and comment.

1.5 Incorporation by Reference

This document relies upon previously adopted regional and statewide plans and programs in its analysis. The following documents are incorporated by reference into this Draft EIR.

- **City of San Marcos General Plan.** The City of San Marcos General Plan is a statement of the goals and programs of the City, and a comprehensive plan setting forth a consistent guide to future development in the City. All development plans, zoning and subdivision ordinances, and conditional use permits of the City are required to be consistent with the General Plan. The proposed project must comply with the requirements contained in the General Plan.
- **City of San Marcos Municipal Code.** The City of San Marcos Municipal Code contains provisions and requirements that apply throughout the City. Included in the Municipal Code are provisions pertaining to buildings and construction, onsite wastewater treatment systems, subdivisions, public services, traffic, health, and safety, among others. The proposed project must comply with the requirements contained in the City of San Marcos Municipal Code.
- **City of San Marcos Draft Natural Community Conservation Plan (NCCP).** The City of San Marcos Draft NCCP is the regional conservation effort by the City and although the draft has not yet been approved by the USFWS and CDFG, it is a component of the regional MCHP and is used as a guide for open space design within the City.
- **Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual.** The FTA Manual presents topics including procedures for predicting and assessing noise and vibration impacts of proposed transit projects for various stages of project development and levels of analysis, noise and vibration mitigation measures, construction noise and vibration, and how to incorporate information into environmental documents.
- **Federal Highway Administration (FHWA) Highway Traffic Noise Analysis and Abatement Guidance.** The FHWA Guidance document provides information to apply the United States Code of Federal Regulations Part 722 (23 CFR 772) in the analysis of highway traffic noise, which is based on lessons learned and best practices.
- **San Diego Association of Governments (SANDAG) Multiple Habitat Conservation Program (MHCP).** The MHCP is a comprehensive, multi-jurisdictional planning program designed to create, manage, and monitor an ecosystem preserve in northwestern San Diego County intended to protect viable populations of native plant and animal species and their habitat while accommodating economic development and quality of life for San Diego residents.
- **SANDAG San Diego Forward (Regional Plan).** The Regional Plan from SANDAG serves as a blueprint for how the San Diego region will grow, how SANDAG will invest in transportation infrastructure, and how the transportation system will provide more choices, strengthen the economy, promote a healthy environment, and support a thriving San Diego community.

- **Transportation Research Board Highway Capacity Manual.** The Highway Capacity Manual provides a number of techniques for estimating the capacity and determining the level of service of transportation facilities, including intersections, roadways, transit facilities, and bicycle and pedestrian facilities.
- **Vallecitos Water District Urban Water Management Plan (UWMP).** The Vallecitos Water District UWMP was prepared to support Vallecitos Water District's long-term water resource planning efforts in order to ensure adequate water supplies are available to meet existing and future water demands in accordance with the Urban Water Management Planning Act.

1.6 EIR Format

This EIR has been organized in the following sections:

- **Table of Contents.** Assists readers in locating the analysis of different subjects and issues as required by Section 15122 of the State CEQA Guidelines
- **Executive Summary.** Identifies the project applicant and lead agency, covers the summary requirements of CEQA by providing a brief project description, lists required approvals, discusses the alternatives considered, and summarizes the environmental impacts in a table
- **Section 1 – Introduction.** Describes the scope and purpose of the EIR, lead, responsible, and trustee agencies, provides a brief summary of the CEQA process to date, summarizes the documents incorporated by reference, identifies the parties that provided written and verbal comments in response to the NOP, summarizes the comments provided, and identifies the location in the EIR in which the comments are addressed
- **Section 2 – Project Description.** Details the existing site characteristics and background, provides photographs of the existing site and area, describes the current land use regulation of the site and the surrounding area, and details the various proposed project components including location, size, construction schedule, proposed land uses, project objectives, and required approvals
- **Section 3 – Environmental Setting.** Provides a general overview of the regional and project site setting, including proposed cumulative projects in the area
- **Section 4 – Environmental Impact Analysis.** Discusses the possible environmental impacts of the project for the various environmental issue areas, divided into specific environmental issues where the project was identified as having potentially significant impacts
- **Section 5 – Other CEQA Required Discussions.** Analyzes the growth-inducing and irreversible environmental impacts of the project
- **Section 6 – Alternatives.** Provides a range of reasonable alternatives to the project, as required by Section 15126.6 of the *CEQA Guidelines*, which would attain the project objectives and avoid or lessen at least one of the significant impacts
- **Section 7 – References.** Provides the sources of information used to develop and analyze environmental impacts of the project, including reference material, contact persons, and a list of preparers

1.7 Environmental Review Process

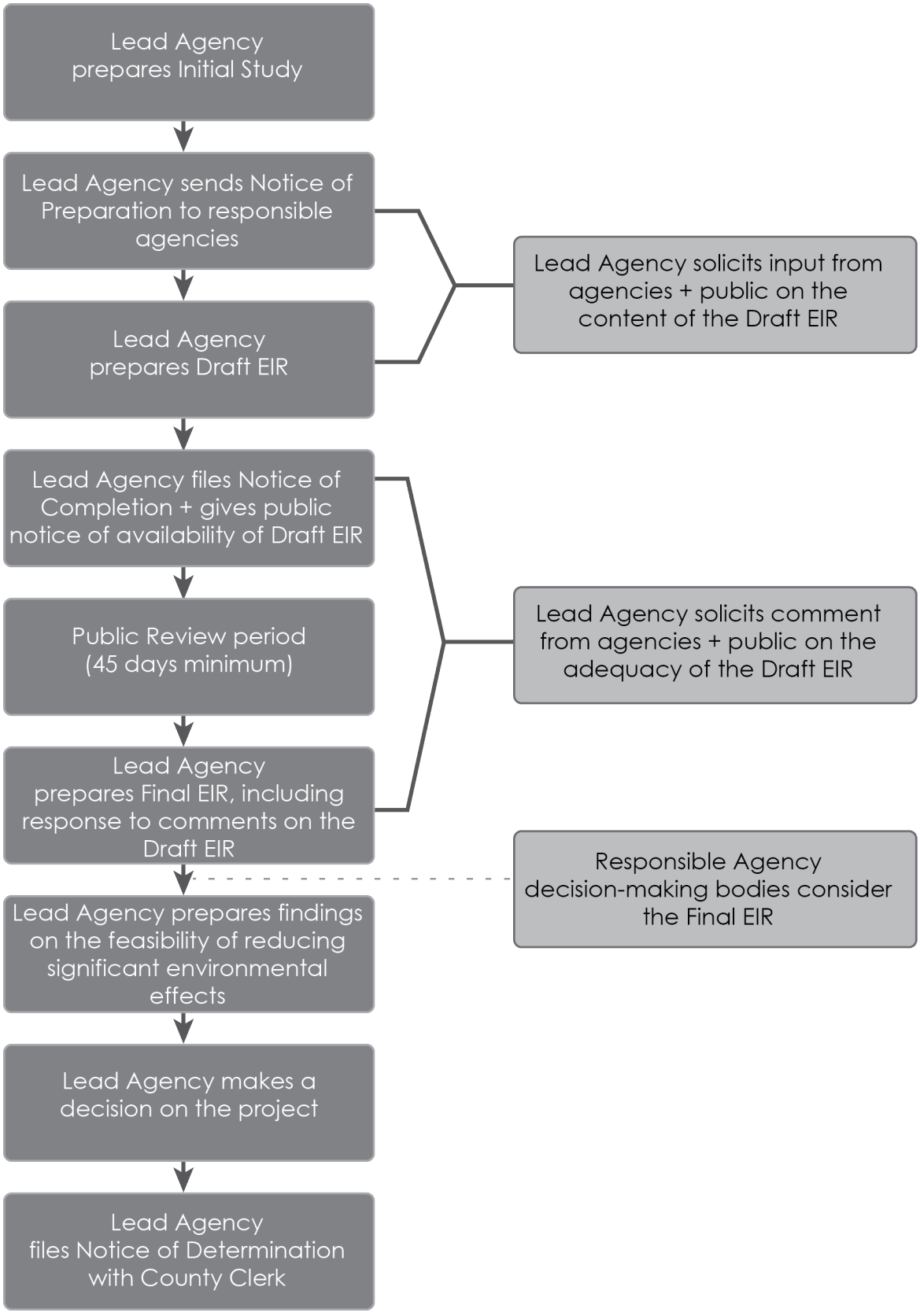
The environmental impact review process, as required under CEQA, is summarized below and illustrated in Figure 1-1. The steps are presented in sequential order.

1. **NOP and Initial Study**. After deciding that an EIR is required, the lead agency (City) must publicly circulate a NOP soliciting input on the EIR scope to the State Clearinghouse, other concerned agencies, and parties previously requesting notice in writing (Public Resources Code Section 21092.2, *CEQA Guidelines* Section 15082). The NOP must be posted in the County Clerk's office for 30 days. The NOP may be accompanied by an Initial Study that identifies the issue areas for which the project could create significant environmental impacts.
2. **Draft EIR Prepared.** The Draft EIR must contain: a) table of contents or index; b) summary; c) project description; d) environmental setting; e) discussion of significant impacts (direct, indirect, cumulative, growth-inducing and unavoidable impacts); f) a discussion of alternatives; g) mitigation measures; and h) discussion of irreversible changes.
3. **Notice of Completion (NOC).** The lead agency must file a NOC with the State Clearinghouse when it completes a Draft EIR and prepare a Public Notice of Availability of a Draft EIR. The lead agency must place the NOC in the County Clerk's office for 30 days (Public Resources Code Section 21092) and send a copy of the NOC to anyone requesting it (*CEQA Guidelines* Section 15087). Additionally, public notice of Draft EIR availability must be given through at least one of the following procedures: a) publication in a newspaper of general circulation; b) posting on and off the project site; and c) direct mailing to owners and occupants of contiguous properties. The lead agency must solicit input from other agencies and the public, and respond in writing to all comments received (Public Resources Code Sections 21104 and 21253). The minimum public review period for a Draft EIR is 30 days. When a Draft EIR is sent to the State Clearinghouse for review, the public review period must be 45 days unless the State Clearinghouse approves a shorter period (Public Resources Code 21091).
4. **Final EIR.** A Final EIR must include: a) the Draft EIR; b) copies of comments received during public review; c) list of persons and entities commenting; and d) responses to comments.
5. **Certification of Final EIR.** Prior to making a decision on a proposed project, the lead agency must certify that: a) the Final EIR has been completed in compliance with CEQA; b) the Final EIR was presented to the decision-making body of the lead agency; c) the decision making body reviewed and considered the information in the Final EIR prior to approving a project; and d) the Final EIR reflects the lead agency's independent judgment and analysis (*CEQA Guidelines* Section 15090).
6. **Lead Agency Project Decision.** The lead agency may a) disapprove the project because of its significant environmental effects; b) require changes to the project to reduce or avoid significant environmental effects; or c) approve the project despite its significant environmental effects, if the proper findings and statement of overriding considerations are adopted (*CEQA Guidelines* Sections 15042 and 15043).
7. **Findings/Statement of Overriding Considerations**. For each significant impact of the project identified in the EIR, the lead agency must find, based on substantial evidence, that either: a) the project has been changed to avoid or substantially reduce the magnitude of the impact; b) changes to the project are within another agency's jurisdiction and such changes have or should be adopted; or c) specific economic, social, or other considerations make the mitigation measures or project alternatives infeasible (*CEQA Guidelines* Section 15091). If an agency approves a project with unavoidable significant environmental effects, it must prepare a written

Statement of Overriding Considerations that sets forth the specific social, economic, or other reasons supporting the agency's decision.

8. **Mitigation Monitoring Reporting Program.** When the lead agency makes findings on significant effects identified in the EIR, it must adopt a reporting or monitoring program for mitigation measures that were adopted or made conditions of project approval to mitigate significant effects.
9. **Notice of Determination (NOD).** The lead agency must file a NOD after deciding to approve a project for which an EIR is prepared (*CEQA Guidelines* Section 15094). A local agency must file the NOD with the County Clerk. The NOD must be posted for 30 days and sent to anyone previously requesting notice. Posting of the NOD starts a 30-day statute of limitations on CEQA legal challenges (Public Resources Code Section 21167[c]).

Figure 1-1 Environmental Review Process



2 Project Description

This section describes the proposed project, including the project applicant, the project site and surrounding land uses, major project characteristics, project objectives, and discretionary actions needed for approval.

2.1 Project Applicant

KB Home Coastal
9915 Mira Mesa Boulevard, Suite 100
San Diego, California 92131
Contact: Kurt Bausback, Director of Planning and Entitlements
(858) 877-4262

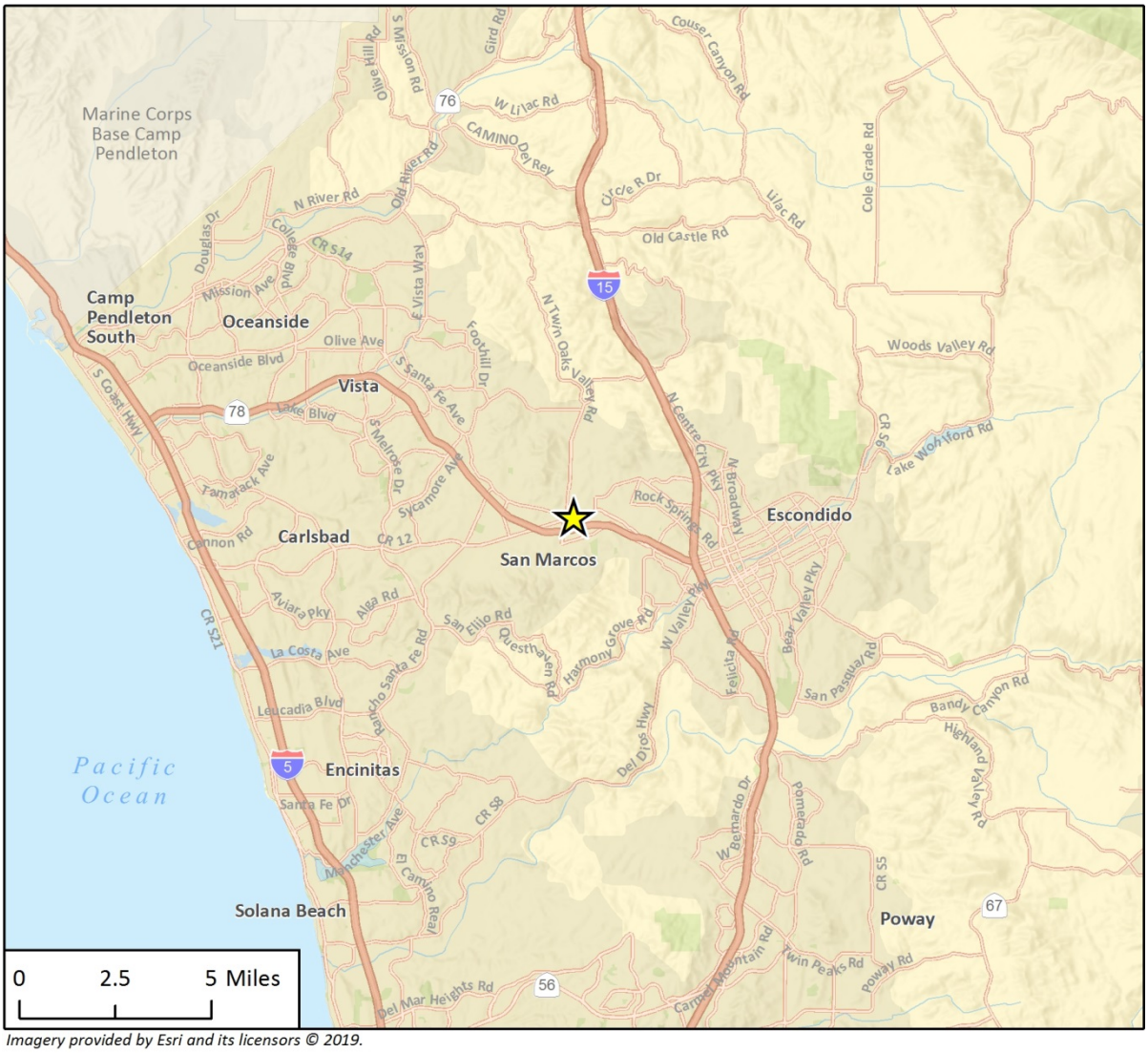
2.2 Lead Agency Contact Person

City of San Marcos, Planning Division
1 Civic Center Drive
San Marcos, California 92069
Contact: Joseph Farace, Planning Manager
(760) 744-1050, ext. 3248

2.3 Project Location

The project site is located at 260 East Mission Road, identified as APN 220-210-50, at the northeast corner of Woodward Street and East Mission Road in the City of San Marcos. Figure 2-1 shows the regional location of the project in northern San Diego County. The project would impact 4.02 acres of land, which has been partially disturbed but is currently undeveloped, with development occurring over a 3.7-acre area as seen in Figure 2-4. The topography is diverse and consists of a south sloping hillside containing a number of granite rock outcrops. The southern portion of the project site has been previously graded and contains an unmaintained driveway pad and remnant concrete pads from a previous building that has been removed (Section 4.2, *Cultural Resources*). Figure 2-2 shows the location of the site in its neighborhood context.

Figure 2-1 Regional Location



Imagery provided by Esri and its licensors © 2019.

Project Location

N



Figure 2-2 Project Site Location



Imagery provided by Google and its licensors © 2019.

2.4 Existing Site Characteristics

2.4.1 Project Site Background

The site is currently vacant, however a building was located on the project site, which has since been removed, except for the original concrete foundation pad (further discussed in Section 4.2, *Cultural Resources*). The site is located adjacent to the Mission 316 Specific Plan area, which established the standards and regulations for the medium-density, multi-family residential development on 9 acres to the east of the project site. The proposed project is intended to complement and be consistent with the residential development to the east, known as Mission 316 East. The proposed development, Mission 316 West, would be developed in accordance with the Mission 316 Specific Plan, which would be updated to incorporate design standards and development regulations for the project. Figure 2-3 below presents images illustrating the existing conditions of the site.

2.4.2 Current Land Use Designation and Zoning

The project site's General Plan land use designation is Specific Plan Area (SPA), which is applied to areas where a specific plan has been adopted by the City. The site is also zoned SPA; specifically the project site is located in the Heart of the City Specific Plan, which establishes the standards and regulations for the site. Within the Heart of the City Specific Plan, the project site is designated as Commercial. The property was also designated as Richmar Specific Plan Area as part of 2012 General Plan Update. However no adopted Richmar Specific Plan exists for the property. The proposed project would require amendments to the City's General Plan to remove the project site from the Heart of the City Specific Plan and Richmar Specific Plan and incorporate it into, and amend, the Mission 316 Specific Plan and establish new standards and regulations for the site.

2.4.3 Surrounding Land Uses

The project is bordered by a mix of land uses, which include residential, public services, open space, and transportation. Directly south of the project site is the San Marcos Civic Center, which contains the San Marcos Branch Library, City Hall, and the San Marcos Veterans Center. The Inland Rail Trail and the Rail Sprinter Line run parallel to the project frontage, south of East Mission Road. The nearest Sprinter line stop is the San Marcos Civic Center stop, at the southwest corner of Woodward Street and East Mission Road. Southeast of the project site is open space with recreational courts, the North County Health Services Center, single-family residences, and the Twin Oaks Valley Mobile Home Park.

North of the site is an undeveloped hillside containing disturbed and native vegetation, as well as an existing low-density, single-family neighborhood. Mission 316 West will serve as a continuation of Mission 316 East, a multi-family residential development east of the site. Areas of open space with sensitive habitats are located near the project site, including land containing coastal sage scrub to the north and a riparian corridor of Twin Oaks Valley Creek to the south. Table 2-1 details the surrounding land uses and the land use regulatory designations.

Figure 2-3 Site Photographs



View of the project site looking east along the southern boundary



View of the project site looking southwest towards the Civic Center from the northern development boundary

Table 2-1 Surrounding Land Use Designations

	Existing Land Use	General Plan Designation	Zoning Designation
Project Site	Vacant Land	SPA – Specific Plan Area (Heart of the City/Richmar)	SPA- Specific Plan Area (Commercial)
North	Open Space and Residential	SPA – Specific Plan Area (Heart of the City/Richmar), Open Space, Very Low Density Residential	SPA - Specific Plan Area, O-S – Open Space, R-1-10 (PRD) – Residential Low (Planning Residential Development)
West	Vacant Land	SPA – Specific Plan Area (Heart of the City)	SPA – Specific Plan Area
South	Public Facilities, Transit	SPA – Specific Plan Area (Heart of the City)	SPA – Specific Plan Area (Town Center)
East	Residential	SPA – Specific Plan Area (Mission 316)	SPA – Specific Plan Area (Residential)

2.5 Project Characteristics

The proposed project would involve the development of 67 two- and three-bedroom units on 3.7-acres (4.02 acres of total project impact area). The 67 residential units would provide for a density of approximately 18 dwelling units per acre. As proposed, residential units consist of three floor plans distributed within nine separate buildings with five building types. As currently planned, each building would include a minimum of two floor plan types, with the majority of the buildings featuring three floor plan types. Table 2-2 details the three proposed floor plans for the residential units. Each of the nine buildings would be three stories with a maximum height of 45 feet.

Table 2-2 Residential Unit Summary

Plan Type	Number of Units	Square Feet per Unit
1: two bedroom/2.5 bathroom	37	1,104
2: three bedroom/2.5 bathroom	17	1,339
3: three bedroom/3.5 bathroom	13	1,646

2.5.1 Proposed Site Plan

Figure 2-4 shows the proposed site plan, including building layouts, parking areas, roadways, and common open space. Figure 2-5 shows the proposed floor plans for each of the three floor plan types, and Figure 2-6 shows the elevation for building type A. The complete project plans are included in this EIR as Appendix B.

The 67 residential units would occupy approximate a 40,172 square foot development footprint and lot coverage of approximately 25 percent. The remainder of the project site would consist of common open space, landscaping, and driveways.

Figure 2-4 Proposed Site Plan



Figure 2-5 Proposed Floor Plans



Figure 2-6 Proposed Building 'A' Elevation



RIGHT



REAR



LEFT



(MISSION RD) FRONT



PERSPECTIVE

MATERIAL SCHEDULE

1	ROOF - CONCRETE FLAT TILE
2	FASCIA - 2 X 6 RESAWN WOOD
3	WALL - STUCCO
4	WALL - LAP SIDING
5	WALL - STONE VENEER
6	TRIM - 2 X STUCCO OVER
7	RAILING - DECORATIVE WOOD
8	DECORATIVE - WOOD SHUTTERS
9	DECORATIVE - OUTLOOKERS
10	DECORATIVE - CORBEL
11	SECTIONAL GARAGE DOOR
12	EXTERIOR LIGHT FIXTURE



PERSPECTIVE

SAN MARCOS, CA
KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST
MAY 23, 2019
SCALE: 0 8 16 24

BUILDING A ELEVATION 'A'
SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198
A-3

2.5.2 Parking and Site Access

The proposed project would include residential and guest parking areas. Each residential unit would have a two-car garage on the ground level, totaling 134 enclosed parking spaces. The project would provide 26 guest parking spaces which would be located on the north side of the main drive aisle. In total, the project would include 160 parking spaces.

Access to the site would be provided from one driveway located off Woodward Street and one driveway off East Mission Road. A new curb cut would be constructed along Woodward Street to provide access off Woodward Street. Access from East Mission Road would expend and share an existing driveway with the neighboring Mission 316 East development. The main circulation road for the project would be 24-feet wide and connect the two driveways. Twenty-foot wide internal alleys would connect the dwelling units and garages with the main circulation road.

2.5.3 Open Space and Landscaping

The project includes a total of approximately 6,915 square feet of private open space in the form of patios or decks in each dwelling unit. Common, recreational open space includes amenities such as a dog park, tot lots, pathways, barbeques, food preparation counters, seating and shade structures, an open turf area, playground area, and recreational courts totaling approximately 9,104 square feet. Additional open space on-site includes the fuel modification zone and drive-isles. Open space would be maintained by a homeowners association or a similar association. Five-foot walls along ground floor patios and the recreational open space and four-foot walls at the second floor balconies and decks would be included to reduce traffic and train noise at these open space areas.

Landscaping and hardscaping throughout the project site would comply with the Mission 316 Specific Plan landscaping guidelines. Hardscaping would incorporate pavers at entry point intersections and provide access through the site and recreational areas. Landscaping guidelines would incorporate the San Marcos Water Efficiency Landscape Ordinance requirements. Plant materials would be drought and pest-tolerant, and would maintain continuity with the Mission 316 East development. Street trees, yard trees, theme trees, shade trees, and accent trees would be used in conjunction with shrubs, groundcovers, and turf throughout the landscaped areas. The project proposes retaining walls and tubular, steel patio fencing. Walls and fences would be visually appealing and add visual landscape treatments to the project site in conformance with the guidelines of the Mission 316 Specific Plan.

2.5.4 Utilities

The Vallecitos Water District (VWD) would provide water and wastewater services to the project site. The City of San Marcos Public Works Department (PWD) would provide stormwater utility services to the project site. Electricity services to the site would be provided by San Diego Gas and Electric Company (SDG&E).

2.5.5 Construction and Grading

Construction of the proposed project is expected to occur over approximately 20 months. Construction activities would be separated into four phases. The first phase would include initial site preparation to remove remnant concrete foundations and miscellaneous debris and vegetation within the development area; the second phase would include blasting, grading, and mass excavation to level the hillside; the third phase would include building construction and painting;

the fourth construction phase would involve paving and site landscaping. The building construction phase would occur over 14 months and entail construction of a few proposed residential buildings at a time during the construction phase.

Due to the topography of the site, the project would require substantial grading to accommodate the project. Earthwork quantities would include approximately 25,200 cubic yards of cut material, 13,400 cubic yards of fill material, and 11,800 cubic yards of export material. Blasting and rock crushing would be required during grading activities due to existing materials and topography of the site. A grading variance would also be required for slopes and proposed retaining walls, which exceed 20 feet. All construction activities would comply with San Marcos Municipal Code (SMMC) Chapter 10.24.010 and 17.32.180.

2.5.6 Green Building Features

The proposed project's overall design would meet California's Green Building Standards Code (CALGreen; California Code of Regulations, Title 24, Part 11), which requires implementation of energy efficient light fixtures and building materials. Furthermore, the project would comply with the 2019 Building Energy Efficiency Standards (CBC Title 24, Part 6), which requires newly constructed buildings to meet energy performance standards set by the California Energy Commission. Each residential unit would be constructed in compliance with California Building Code standards and be wired for an electric vehicle charging station. In addition, the project would include rooftop solar and would only operate with electricity and would not utilize natural gas. With the provided rooftop solar and as the electricity generated by renewable resources increases due to State policies and regulations, the project would become carbon neutral.

2.5.7 Fire Protection Features

All proposed buildings would be built to enhanced ignition-resistant construction standards. Ignition-resistant building materials to be incorporated in the project include two sheets of 5/8-inch drywall or one layer of 5/8-inch type X gypsum sheathing, applied behind the exterior covering or cladding on the exterior side of the building framing from the foundation to the roof of each buildings' wall, facing the north towards the vegetated hillside.

The two proposed driveways are designed to accommodate an aerial ladder truck, which may be operated by the San Marcos Fire Department (SMFD) should the need arise. The project would include a fuel modification zone (FMZ) to reduce fire intensity and flame lengths by providing vegetation thinning, restricted vegetation, and irrigated areas in the perimeter of the fire risk areas. A Fire Protection Plan (FPP) was prepared and approved by the San Marcos Fire Department (SMFD) (Appendix K). Due to site constraints, the FPP concluded that a FMZ of 100 feet would be sufficient along the northern periphery of the project site, along with additional vegetation and structural protection measures, which are consistent with SMFD standards. The FMZ would be a Zone A non-flammable, irrigated zone from the structures outward to a minimum of 100 feet. Components of the Zone A FMZ would include non-combustible surfaces, irrigated wet zone, minimum tree spacing, fire-resistant species, and routine maintenance. Additional fire protection measures, roadway-adjacent defensible space as required under SMFD Fire code, dual-tempered pan window upgrades for building facades facing the natural open space would also be provided. The project would hire a qualified SMFD-approved third party fuel modification zone inspector to complete annual inspections.

2.6 Project Objectives

The objectives of the proposed project are as follows:

Fundamental Project Objectives

- Incorporate a medium density multi-family residential development into the neighborhood that serves as a transitional residential use to surrounding low-density residential neighborhood and to the Town Center area
- Increase the amount of for-sale, attainable housing available in the City by introducing a range of unit sizes and different bedroom counts, including two and three bedroom units, to accommodate a large spectrum of family demographics and growing housing needs
- Strategically locate multi-family housing adjacent to public transportation such as the Rail Sprinter Line and the City's Town Center area, which consists of employment and civic centers, retail stores, restaurants, and schools, to facilitate smart growth

Basic Project Objectives

- Use land resources more efficiently by providing well-planned, infill development on a currently vacant site
- Provide a visually pleasing street scene with medium-density development through architectural design, unified landscape theme, and recreation areas providing continuity along Mission Road
- Create a multi-family community that is cohesive in design with existing adjacent development and consistent with the Mission 316 Specific Plan
- Design a safe and efficient circulation system that adequately supports the anticipated level of traffic in and around the site that is pedestrian safe

2.7 Required Approvals

The proposed project would require the following City approvals and entitlements, along with standard building and grading permits:

- **Specific Plan Amendment** to remove the project site from the Heart of the City and Richmar Specific Plans and to include the project site in the Mission 316 Specific Plan area, and to provide for additional standards and regulations for the design and construction of the proposed project
- **General Plan Amendment** to remove the project site from the Heart of the City Specific Plan and to include the project site in the Mission 316 Specific Plan area
- **Multi-family Site Development Plan** to implement the objectives and guidelines compliant with the Mission 316 Specific Plan
- **Tentative Subdivision Map** to create the required street lots, water quality basin, open space and recreation lots, and air space condominiums
- **Grading Variance** to allow grading of slopes exceeding 20 feet in height
- **Conditional Use Permit** for rock crushing during project construction
- **Environmental Impact Report** to analyze the potential environmental impacts of project implementation

The project would require the following permits from federal and state agencies, as indicated:

- **Regional Water Quality Control Board** to comply with the Municipal Separate Stormwater Permit (Order No. R9-2013-0001) for post construction and operation
- **United States Fish and Wildlife Service** to comply with the Multiple Habitat Conservation Program

The project would require the following consultation processes in order to move forward with the project:

- **Senate Bill (SB) 18 and Assembly Bill (AB) 52**: Pursuant to SB 18, consultation with California Native American Tribes on the contact list maintained by the California Native American Heritage Commission is required due to the proposed General Plan amendment. Also, pursuant to AB 52, the project would be required to notify and consult with local tribes who requested notification from the City for projects subject to CEQA.

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3 Environmental Setting

This section provides a general overview of the environmental setting for the proposed project. In accordance with *CEQA Guidelines* Section 15125, an EIR must include a description of the existing physical environmental conditions in the vicinity of a project, as they exist at the time the Notice of Preparation (NOP) is published. The environmental setting normally constitutes the baseline physical conditions by which a lead agency determines whether an impact is significant. The baseline conditions for analysis of the proposed project are represented by the environmental conditions of the project site and surrounding areas on February 7, 2019, when the NOP for this EIR was published. Detailed descriptions of the environmental setting specific to each environmental issue area can be found in Section 4.0, *Environmental Impact Analysis*, of this EIR.

3.1 Regional Setting

The project site is located in San Diego County, in the City of San Marcos (City), directly north of the City's Civic Center and approximately 2,000 feet north of State Route 78 (SR 78). Figure 2-1 in Section 2, *Project Description*, shows the project's regional location. The City encompasses approximately 33 square miles and is located approximately 40 miles north of downtown San Diego. The City is located approximately six miles inland from the coastline of the Pacific Ocean. The City is bounded by the cities of Vista and Carlsbad to the west, Escondido to the east, and unincorporated areas within the County of San Diego to the north and south. The City has been one of the fastest growing cities in the San Diego region and state since 1980, and has prioritized the implementation of "sustainability" and "transit-oriented development" in balancing population growth, housing and open space needs, and the maturation of California State University San Marcos (General Plan, City of San Marcos, 2013).

The City maintains a roadway system that generally consists of an east-west and north-south grid, including arterials, collectors, and local streets. Roadways around residential areas generally wrap around the varying topography of gentle slopes and hills. East Mission Road forms the southern boundary and Woodward Street forms the western boundary of the project site, and each are major roadways around the project site.

3.2 Project Site Characteristics

The approximately 4.0-acre project site (APN 220-210-50) is vacant, and located at 260 East Mission Road in the northeast corner of Woodward Street and East Mission Road, as shown in Figure 2-2 in Section 2, *Project Description*. The site has diverse topography, with a steep hillside sloping down towards East Mission Road. The project site is surrounded by a mix of land uses. The Inland Rail Line runs parallel to the project frontage, south of East Mission Road. Multi-family residences are located east of the site. Single-family residences are located northeast of the site. The City of San Marcos Civic Center is located to the south, and includes the public library, the Veteran's Center, and City Hall. Areas of open space with sensitive habitats are located near the project site, including land containing coastal sage scrub to the north and a riparian corridor of Twin Oaks Valley Creek to the south.

The project site is disturbed and currently vacant and has General Plan land use and zoning designations of Specific Plan Area (SPA) according to Figure 2-3 in the City's General Plan. The project includes residential and open space land uses within an area designated as "Commercial" in the existing Heart of the City Specific Plan area. The project would expand the Mission 316 Specific Plan area to the west, creating a residential community meant to complement the existing residential site located to the east (Mission 316 East).

Elevations at the project site range from a low of approximately 610 feet above mean sea level (AMSL) fronting East Mission Road and Woodward Street, and a high of approximately 760 feet AMSL in the northern portion of the project site. Natural hillside slopes lie on the south and west sides of the property.

3.3 Cumulative Development

In addition to the specific impacts of individual projects, CEQA requires EIRs to consider potential cumulative impacts of the proposed project. CEQA defines "cumulative impacts" as two or more individual impacts that, when considered together, are substantial or will compound other environmental impacts. Cumulative impacts are the combined changes in the environment that result from the incremental impact of development of the proposed project and other nearby projects. For example, traffic impacts of two nearby projects may be less than significant when analyzed separately, but could have a significant impact when analyzed together. Cumulative impact analysis allows the EIR to provide a reasonable forecast of future environmental conditions and can more accurately gauge the effects of a series of projects.

CEQA requires cumulative impact analysis in EIRs to consider either a list of approved, but not yet issued an occupancy permit, projects (i.e., planned, entitled), and submitted, but not yet approved projects (i.e., pending entitlement) that may contribute to cumulative effects or a forecast of future development potential. Currently planned and pending projects in San Marcos and surrounding areas are listed in Table 3-1. In particular, the Mission 316 East, Lanikai, Corner at 2 Oaks, El Dorado Specific Plan, Villa Serena, and Fitzpatrick are either located in proximity or along the same major arterial as the project site and construction schedules may overlap. These projects are considered in the cumulative analyses in Section 4.0, *Environmental Impact Analysis*.

Table 3-1 Cumulative Projects List

Project No.	Project Name and/or Location	Land Use	Quantity	Status and Buildout Year
1	Corner at 2 Oaks, San Marcos Blvd & N Twin Oaks Valley Rd	Office/Retail Restaurant Multi-family	13,499 sf 6,500 sf 188 du	Condos under construction; 2019/2020
2	University District Block, Campus Way	Multi-family	68 du	Under construction, 2019
3	Kaiser Master Plan, Craven Rd.	Medical Offices	70,000 sf	Approved; N/A
4	Fenton North, Craven Way	Mixed Use Specific Plan	41 acres	Approved; N/A

Project No.	Project Name and/or Location	Land Use	Quantity	Status and Buildout Year
5	Main Square, San Marcos Blvd & McMahr Rd.	Multi-family Commercial	428 du 90,000 sf	Proposed; 2019
6	San Elijo Hills, San Elijo Rd.	Residential	124 du	Condos under construction; 2019/2020
7	Pacific Commercial, Grand Ave. & Pacific St.	Commercial	28,236 sf	Approved; 2019
8	Brookfield Residential, S. Twin Oaks Valley Rd.	Residential Park	566 du 38 acres	Under construction; 2019/2021
9	San Marcos Highlands, N. Las Posas Rd.	Single-family	189 du	Approved; 2023
10	El Dorado Specific Plan, Richmar Ave. & Pleasant Way	Multi-family Commercial Community Center	120 du 7,000 sf 1,850 sf	Approved; 2019
11	Villa Serena, Richmar Ave. & Marcos St.	Multi-family	189 du	Approved; 2021
12	San Elijo Hills Town Center, San Elijo Rd. & Elfin Forest Rd.	Multi-family Commercial	12 du 22,900 sf	Approved; 2020
13	Montiel Road Partners, Montiel Rd.	Single-family	9 du	Approved; 2019
14	Sandy Land Estates, Sandy Ln.	Single-family	9 du	Proposed; 2019
15	Meadowlark Canyon LLC, San Marcos Blvd.	Single-family	33 du	Approved; N/A
16	JR Legacy II, Montiel Rd.	Hotel	132 rooms	Approved; 2019
17	Mariposa II, Richmar Ave. & Los Olivos Dr.	Multi-Family	100 du	Approved; 2019
18	Murai-Sab, N. Las Posas Rd.	Single-family	89 du	Approved; 2021
19	Copper Hills Specific Plan, San Elijo Rd.	Commercial Multi-family	139,000 sf 351 du	Proposed; N/A
20	Pacifica San Marcos, S. Rancho Santa Fe Rd. & Creek St.	Multi-family Commercial	31 du 4,375 sf	Proposed; 2019
21	Fenton South, Discovery St.	Single-family	230 du	Approved; 2021
22	Windy Point Place II, Windy Point Dr.	Light Industrial	52,738 sf	Under construction; 2021
23	Fitzpatrick, Fitzpatrick Rd.	Residential	80 du	Under construction; 2019
24	Southlake Park Phase 1, Twin Oaks Valley Rd.	Parking lot Fishing dock	1.5 acres	Approved; N/A

Project No.	Project Name and/or Location	Land Use	Quantity	Status and Buildout Year
25	MacDonald Group, San Marcos Blvd.	Multi-family Commercial	82 du 5,000 sf	Approved; N/A
26	Mission 24, 1210 E. Mission Rd.	Multi-family	24 du	Approved; 2020
27	Mission 316 East	Multi-family	95 du	Constructed and Occupied
28	Lanikai, Mission Rd. at Woodward St.	Senior housing	115 du	Proposed; N/A
29	Mesa Rim	Commercial	28,000 sf	Approved; 2020
30	Artis Senior Housing, San Elijo Rd. at Paseo Plomo	Senior housing	64 beds	Proposed; N/A
31	Sunrise, Barham Dr.	Multi-family	193 du	Proposed; 2021
32	Jump Ball LLC, W. San Marcos Blvd. at Bent Ave.	Restaurant	3,233 sf	Proposed; 2020
33	Lomas, 1601 San Elijo	Commercial	179,535 sf	Approved; 2019
34	Montiel Commercial, 2355 Montiel Road	Office	32,971 sf	Proposed; N/A
35	California Allstars, Twin Oaks Valley Rd	Industrial	28,137	Proposed; 2022
36	Mercy Hill and Marian Center, Borden Rd	Institution	22,830 sf	Proposed; N/A
37	West Health Pace, 1706 Descanso Ave	Senior housing	20,156 sf	Under construction; 2019
38	C3 Church, 1706 Descanso Ave	Institution	74,938 sf	Approved; 2019
39	San Marcos Creek Infrastructure CIP	Infrastructure Improvements	35 acres	Funded; 2021
40	The Marc, 1045 Armolite Drive	Multi-family Commercial Park	416 du 15,000 sf 1.37 acres	Approved; 2019
41	CIP 88179, Smilaz Rd/ S Santa Fe Ave	Intersection realignment	N/A	Funded; 2020
42	CIP 86002, San Marcos Blvd/Discover St	Intersection improvement	N/A/	Funded; 2020
43	Park CIP, Rancho Tesoro Park	Park	2 acres	Funded; 2021
44	ST006, San Marcos Blvd	Infrastructure improvement	N/A/	Funded; 2020
45	Karl Strass Brewery, Las Posas Rd.	Commercial	10,528 sf	Proposed; 2020
46	Boden Rd 22, Borden Rd	Single-family	22 du	Approved; 2021

Notes: sf = square feet, du = dwelling units

References

City of San Marcos. 2013. City of San Marcos General Plan. https://www.san-marcos.net/work/economic-development/general-plan. Accessed February 2019.

--.2019. Major Development Projects. https://www.san-marcos.net/work/development-projects. Accessed March 2019.

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4 Environmental Impact Analysis

This section discusses the possible environmental effects of the Mission 316 West Project for the specific issue areas that were identified in the Initial Study (Appendix A) and through the scoping process as having the potential to experience significant effects. "Significant effect" is defined by the *CEQA Guidelines* §15382 as:

> "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment, but may be considered in determining whether the physical change is significant."

Section 4.1 through 4.5 of the EIR examines the potential environmental impacts associated with implementation of the proposed project and focuses on the following issues:

- Biological Resources
- Cultural Resources
- Noise
- Transportation
- Tribal Cultural Resources

Section 4.6 of the EIR summarizes the findings from the Initial Study for issue areas determined to have a less than significant environmental impact.

Technical Studies and Reports

Technical studies were prepared to accurately analyzed specific environmental impacts that project would produce. The technical studies and other supporting studies prepared for the project include the following:

- Initial Study (Appendix A)
- Project Plans (Appendix B)
- Biological Resources Assessment (Appendix C)
- Rare Plant Survey (Appendix D)
- Phase I Cultural Resources Due Diligence (Appendix E)
- Noise Report (Appendix F)
- Transportation Impact Assessment (Appendix G)
- Tribal Consultation Notifications (Appendix H)
- Air Quality and Greenhouse Gas Study (Appendix I)
- Geotechnical Update (Appendix J)
- Fire Protection Plan (Appendix K)

- Water and Sewer Study (Appendix L)
- Economic and Market Reports (Appendix M)

These documents were used to prepare this EIR. They are identified in the discussions for the individual environmental issues and are included as technical appendices to the EIR.

Analysis Format

The EIR assesses how the proposed project would impact the areas identified above. Each environmental issue addressed in this EIR is organized into the following subsections.

Setting

Existing Setting

The existing environmental setting outlines the baseline environmental conditions on the project site and surrounding area that relate to the specific environmental topic analyzed and discussed.

Regulatory Setting

The regulatory setting lists and describes regulations and policies that relate to the environmental topic and to which the project would be subject. Regulations are divided into federal, state, and local/regional areas.

Impact Analysis

Methodology and Significance Thresholds

This section identifies the methodologies used in the analysis and the "significance thresholds," or criteria adopted by the City and other agencies, universally recognized or developed specifically for this analysis to determine whether potential effects are significant.

Project Impacts and Mitigation Measures

This subsection describes the impact of the proposed project on each impact area determined to be potentially significant in the Initial Study (Appendix A). Each impact analysis begins with an impact statement in bold that summarizes the analysis and contains a statement of the significance determination. Following the environmental impact discussion, a list of mitigation measures (if required) is provided with the residual effects or level of significance remaining after implementation of the measure(s). In cases where the mitigation measure for an impact could have a significant environmental impact on another issue area, this impact is discussed and evaluated as a secondary impact.

Cumulative Impacts

The impact analysis concludes with a discussion of cumulative effects, and evaluates the impacts associated with the proposed project in conjunction with other planned and pending developments in the area described in Section 3.0, *Environmental Setting*.

Significance Determination

The significance of each impact under consideration is determined as follows:

- **Significant and Unavoidable**. An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures.
- **Less than Significant with Mitigation Incorporated**. An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures.
- **Less than Significant**. An impact that may be adverse but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.
- **No Impact.** The proposed project would have no effect on environmental conditions or would reduce existing environmental problems or hazards.

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4.1 Biological Resources

This section analyzes the effects of the proposed multi-family residential project on biological resources. The analysis is based on site-specific reconnaissance and wildlife surveys conducted on October 24, 2018 and April 12, 2019 and nine Coastal California Gnatcatcher (CAGN) protocol surveys conducted in 2018. Rincon Consultants prepared a Biological Resources Assessment (BRA), which includes the CAGN protocol surveys summary report as an appendix, and is provided as Appendix C. Rincon Consultants also conducted a Rare Plant Survey and prepared a report, which is provided as Appendix D.

4.1.1 Setting

a. Existing Biological Resource Setting

Vegetation

Two vegetation communities and one land cover type were identified on the project site. The southern portion of the site consists of a relatively flat area adjacent to East Mission Road that was previously developed and is now highly disturbed. The northern portion of the site consists of a steep, south-facing slope that supports vegetation communities that are typically grouped together as Diegan Coastal Sage Scrub. Table 4.1-1 details the vegetation communities, and their respective area, found on the project site, and Figure 4.1-1 illustrates the locations of the vegetation communities in relation to the proposed grading area, proposed fuel modification zone (FMZ), and overall project impact area.

Table 4.1-1 Vegetation Community/Land Cover Type On Site

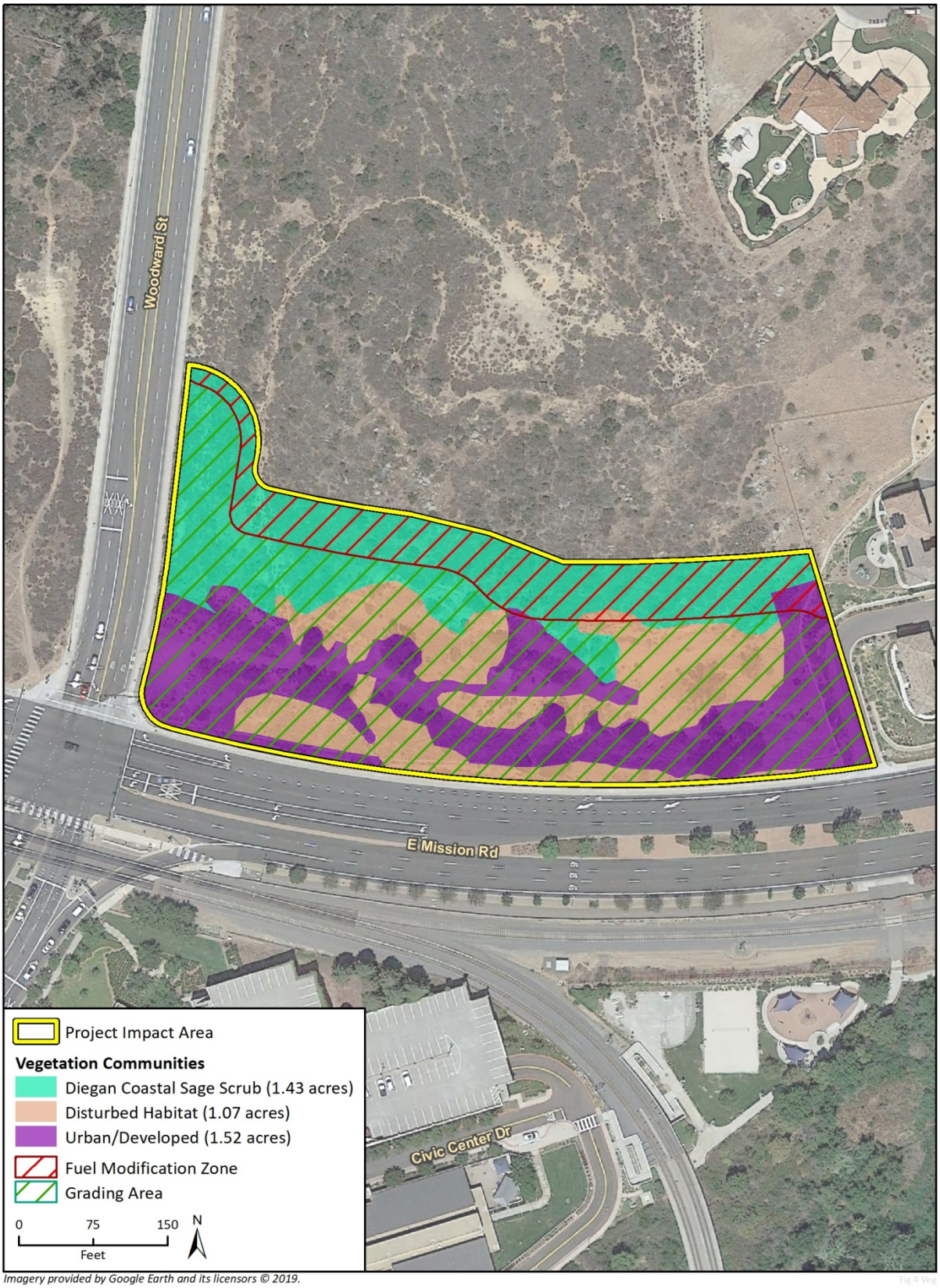
Vegetation Community/Land Cover Type (Holland Code)	Acres	Sensitive
Diegan Coastal Sage Scrub (32500)	1.43	Yes
Disturbed Habitat (11300)	1.07	No
Urban/Developed (12000)	1.52	No
Total	4.02	

Source: Biological Resources Assessment, Appendix C

Diegan Coastal Sage Scrub

Diegan Coastal Sage Scrub is found on 1.43 acres on the slope in the northern portion of the project site. The community is dominated by low, soft-woody subshrubs that are most active in winter and early spring. Diegan Coastal Sage Scrub is typically on low moisture-availability sites. According to the BRA, dominant plant species in Diegan Coastal Sage Scrub include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), deerweed (*Acmispon glaber*), chaparral mallow (*Malacothamnus fasciculatus*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), white sage (*Salvia apiana*), and black sage (*S. mellifera*). There were four types of Diegan Coastal Sage Scrub alliances found on the project site: California Sagebrush-California Buckwheat Scrub, California sagebrush-Black sage scrub, Black sage scrub, and Laurel sumac scrub. Diegan Coastal Sage Scrub is considered a sensitive plant community by the San

Figure 4.1-1 Vegetation Communities and Land Cover



Imagery provided by Google Earth and its licensors © 2019.

Marcos Draft Subarea Habitat Conservation Plan/Natural Communities Conservation Plan (Draft Subarea Plan).

CALIFORNIA SAGEBRUSH-CALIFORNIA BUCKWHEAT SCRUB

California sagebrush-California buckwheat scrub (*Artemisia californica-Eriogonum fasciculatum* Shrubland Alliance) is found on the slopes in the northwest portion of the project site. California sagebrush and California buckwheat are codominant, with each having 30-60 percent relative cover in the shrub canopy, and black sage and laurel sumac also contribute to the structure. Dieback of the shrubs in the community has allowed for the establishment of shortpod mustard (*Hirschfeldia incana*). This community is the main one found on the open space to the north of the project site and is also located in the open space to the west of Woodward Street.

CALIFORNIA SAGEBRUSH-BLACK SAGE SCRUB

California sagebrush-black sage scrub (*Artemisia californica-Salvia mellifera* Shrubland Alliance) is found on the slopes in the northwest-central portion of the project site. California sagebrush and black sage are codominant, with each having 30-60 percent relative cover in the shrub canopy, and California buckwheat, laurel sumac, and coast prickly pear (*Opuntia littoralis*) also contribute to the structure. Some California sagebrush has died back in this area, allowing shortpod mustard to increase. This is the second most common community on the open space to the north of the project site.

BLACK SAGE SCRUB

Black sage scrub (*Salvia mellifera* Shrubland Alliance) is found in the northeast corner of the project site and continues upslope to the north of the site. Black sage is the dominate species, with over 60 percent of the relative cover in the shrub canopy, and California sage brush, laurel sumac, and coast prickly pear also contribute to the structure. Dieback of some of the shrubs has allowed for the spread of shortpod mustard into the interspatial areas between the shrubs.

LAUREL SUMAC SCRUB

Laurel sumac scrub (*Malosma laurina* Shrubland Alliance) is found in the northern-central portion of the project site and continues upslope to the north of the site. Laurel sumac composes 30-50 percent of the relative shrub cover, along with California sagebrush and black sage. Past disturbances within the southern fringe of this community on site, along with the dieback of shrubs, has allowed for the spread of shortpod mustard into the interspatial areas between the shrubs.

Disturbed Habitat

Disturbed Habitat is found on 1.07 acres in the relatively flat southern portion of the project site. Disturbed Habitats are areas that have been physically disturbed (by previous legal human activity) and are no longer recognizable as a native or naturalized vegetation association, but continue to retain a soil substrate. Typically, vegetation, if present, is nearly exclusively composed of non-native plant species such as ornamentals or ruderal exotic species. The primarily non-native plant species which occur in the disturbed habitat on-site include shortpod mustard, tocalote (*Centaurea melitensis*), fountain grass (*Pennisetum setaceum*), and tree tobacco (*Nicotiana glauca*). Some native species are scattered in the Disturbed Habitat, including coyote brush (*Baccharis pilularis*) and Menzies' golden bush (*Isocoma menziesii* ssp. *menziesii*).

Urban/Developed

On the project site, Urban/Developed areas are found on 1.52 acres in the relatively flat southern portion of the project site. Urban/Developed areas are defined as areas that have been constructed upon or otherwise physically altered in such a way that native vegetation is no longer supported. Developed land is characterized by permanent or semi-permanent structures, pavement or hardscape, and landscaped areas that often require irrigation. According to the BRA, the urban/developed areas on site include an unmaintained dirt road and concrete pads which have little to no vegetation (Appendix C). Additionally, ornamental vegetation was planted associated with the structures that includes giant reed (*Arundo donax*), pepper tree (*Schinus* spp.), blue gum (*Eucalyptus globulus*), mission cactus (*Opuntia ficus-indica*), and Mexican fan palm (*Washingtonia robusta*).

General Wildlife

The project site provides habitat for wildlife species that commonly occur in residential, urban areas as well as coastal sage scrub habitats. The majority of the species detected during the biological surveys were birds. Common species observed include western scrub-jay (*Aphelocoma californica*), California towhee (*Melozone crissalis*), house finch (*Haemorhous mexicanus*), Anna's hummingbird (*Calypte anna*), and mourning dove (*Zenaida macroura*). Two common reptiles, western side-blotched lizard (*Uta stansburiana elegans*) and Great Basin fence lizard (*Sceloporus occidentalis longipes*), was observed within the project site. A complete list of the wildlife species observed on site is provided in the Appendix B of the BRA (Appendix C).

Special-status Species and Natural Communities

Special-status species are those plants and animals listed, proposed for listing, or candidates for listing as Threatened or Endangered by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA); those listed as Threatened, Endangered, or Rare by the California Department of Fish and Wildlife (CDFW) under California Endangered Species Act (CESA) or the Native Plant Protection Act; those designated as Fully Protected species by the State; those recognized as Species of Special Concern (SSC) by the CDFW; Covered Species identified in the Multiple Habitat Conservation Plan (MHCP); and regulations and plants occurring on lists 1 and 2 of the CNPS California Rare Plant Rank (CRPR) system per the following definitions:

- **CRPR 1A** = Plants presumed extirpated in California and either rare or extinct elsewhere;
- **CRPR 1B** = Plants rare, threatened, or endangered in California and elsewhere;
- **CRPR 2A** = Plants presumed extirpated in California but common elsewhere; and
- **CRPR 2B** = Plants rare, threatened, or endangered in California but more common elsewhere.

Additionally, CNPS assigns the following threat codes:

- 0.1 – Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat);
- 0.2 – Moderately threatened in California (20-80% occurrences threatened/moderate degree and immediacy of threat); and
- 0.3 – Not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known).

In addition, special-status species are ranked globally (G) and subnationally (S) 1 through 5 based on NatureServe's (2010) methodologies:

- **G1 or S1:** Critically Imperiled Globally or Subnationally (state)
- **G2 or S2:** Imperiled Globally or Subnationally (state)
- **G3 or S3:** Vulnerable to extirpation or extinction Globally or Subnationally (state)
- **G4 or S4:** Apparently secure Globally or Subnationally (state)
- **G5 or S5:** Secure Globally or Subnationally (state)
- **T:** Infraspecific Taxon (subspecies, varieties, and other designations below the level of species)
- **Q:** Questionable taxonomy that may reduce conservation priority

Assessments for the potential occurrence of special status species are based upon queries of the following databases within nine U.S. Geologic Survey (USGS) topographic quadrangles: USFWS Critical Habitat Portal (USFWS 2018a), USFWS Environmental Conservation Online System (ECOS): Information, Planning and Conservation System (USFWS 2018b), California Natural Diversity Database (CNDDB) (CDFW 2018), and the CNPS Online Inventory of Rare, Threatened and Endangered Plants of California (CNPS 2018).

Sensitive Natural Communities

Eleven sensitive natural communities are known to occur in the vicinity of the project site, but none of these communities occurs on the project site, which was verified by the reconnaissance survey (Appendix C). The Diegan Coastal Sage Scrub, mapped on 1.43 acres of the project site, falls in the City's "Coastal Sage Scrub" habitat group and type, which is considered a sensitive habitat group (San Marcos 2001). This community on the project site is part of a contiguous island of Diegan Coastal Sage Scrub that is bounded by East Mission Road to the south, Woodward Street to the west, and residential development to the north and east. This block of Diegan Coastal Sage Scrub measures over 23 acres.

Special-status Plant Species

Many of the species from the database queries with recorded occurrences in the project vicinity are associated with habitats that are not found on the project site, including species associated with vernal pools, which are not present on site. A majority of the project site has been systemically disturbed for over 50 years. This disturbance has altered the vegetation communities and soils, thereby limiting the potential for the species that have associated habitats on site. Two species that are associated with disturbed habitats have potential to occur on site: San Diego ambrosia (*Ambrosia pumila*) and San Diego sand aster (*Corethrogyne filaginifolia* var. *incana.)*

SAN DIEGO AMBROSIA

The federally-listed endangered San Diego ambrosia has a low potential to occur on the project site. The disturbances in the project area have been substantial over a long period of time, which has resulted in non-native herbaceous annuals to dominate the understory in the Disturbed Habitat and within the openings of the Diegan Coastal Sage Scrub on the project area. Marginal habitat for the species is present and there are several recent records from within 10 miles of the project area; however, these occurrences are associated with lower level of disturbances (e.g. grazing). The species occurs primarily on upper terraces of rivers and drainages, and has also been found in association with vernal pools. Within these areas, the San Diego ambrosia is found in open grassland

of native and non-native plant species, and openings in coastal sage scrub, and primarily on sandy loam or clay soils. The species may also be found in ruderal habitat types (disturbed communities containing a mixture of native and non-native grasses and forbs) such as fire fuel breaks and edges of dirt roadways. Non-native grassland and ruderal habitat types provide adequate habitat for San Diego ambrosia; however, non-native plants can out-compete the species for resources in some situations. The species has a low potential to occur in the Disturbed Habitat and Diegan Coastal Sage Scrub portions of the project site.

SAN DIEGO SAND ASTER

San Diego sand aster has been determined to have a moderate potential to occur on the project site due to suitable habitat (Disturbed Habitat and Diegan Coastal Sage Scrub) being present and the species occurrence throughout San Diego County. It has a CNPS CRPR that indicates it is rare, threatened, or endangered in California (CRPR 1B.1).

A rare plant survey was conducted on April 12, 2019 to determine the presence or absence of rare plant species that may occur on the project site. San Diego sand aster, San Diego ambrosia, or any other rare plant species were not detected on-site during the survey (Appendix D).

Special-status Wildlife Species

The queries resulted in 64 special-status wildlife species that are known to occur in the area, including 12 which have been recorded within three miles of the project site as seen in Appendix D of the BRA (Appendix C). During the biological survey, two special-status species were observed on the project site: CAGN and Cooper's Hawk (*Accipiter cooperii*). Three additional species have a high potential to occur on site: orange-throated whiptail (*Aspidoscelis hyperythra*), coastal whiptail (*Aspidoscelis tigris stejnegeri*), and San Diego desert woodrat (*Neotoma lepida intermedia*). An additional 13 wildlife species have a low potential to occur due to the presence of marginal habitat or that the species may temporarily use the site during foraging or overnight roosting. Due to the low probability of occurrence, these species are not discussed further. Table 4.1-2 lists the special-status wildlife species that were determined to have some potential to occur on the project site.

Table 4.1-2 Special-Status Wildlife Species with Potential to Occur on the Project Site

Scientific Name Common Name	Status FESA/CESA/ Other	Habitat Requirements	Potential for Occurrence and Basis for Determination
Plants			
Ambrosia pumila San Diego ambrosia	Endangered/None G1/S1 1B.1	Chaparral, coastal scrub, valley and foothill grassland. Sandy loam or clay soil; sometimes alkaline. In valleys; persists where disturbance has been superficial. Sometimes on margins or near vernal pools. 3-580 m. perennial rhizomatous herb. Blooms Apr-Oct	**Low Potential.** The disturbances in the project site have been substantial over a long period of time, which has resulted in non-native herbaceous annuals to dominate the understory in the Disturbed Habitat and within the any openings of the Diegan Coastal Sage Scrub on the project site. Marginal habitat for the species is present and there are several recent records from within 10 miles of the project site; however, these occurrences are associated with lower level of disturbances (e.g. grazing).

Scientific Name Common Name	Status FESA/CESA/ Other	Habitat Requirements	Potential for Occurrence and Basis for Determination
Corethrogyne filaginifolia var. *incana* San Diego sand aster	None/None G4T1Q/S1 1B.1	Coastal scrub, coastal bluff scrub, chaparral. Most sites are disturbed, so hard to tell. Possibly in disturbed sites and ecotones. 35-115 m. perennial herb. Blooms Jun-Sep	**Medium Potential.** Suitable habitat is present in the project site and the species is widespread throughout San Diego County.
Invertebrates			
Bombus crotchii Crotch bumble bee	None/None G3G4/S1S2 None	Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia, and Eriogonum.	**Low Potential.** Eriogonum fasciculatum is present in the project site, but little is known about the natural history of the species.
Reptiles			
Arizona elegans occidentalis California glossy snake	None/None G5T2/S2 SSC	Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja California. Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	**Low Potential.** Suitable habitat is present in the project site, but the species does not have recorded occurrences within five miles of the project.
Aspidoscelis hyperythra orange-throated whiptail	None/None G5/S2S3 WL MHCP Covered Species	Inhabits low-elevation coastal scrub, chaparral, and valley-foothill hardwood habitats. Prefers washes and other sandy areas with patches of brush and rocks. Perennial plants necessary for its major food: termites.	**High Potential.** This species has previously been observed on the parcel to the east of the project, which has since been developed.
Aspidoscelis tigris stejnegeri coastal whiptail	None/None G5T5/S3 SSC	Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland and riparian areas. Ground may be firm soil, sandy, or rocky.	**High Potential.** The species was observed on the property to the east of the project site.
Crotalus ruber red-diamond rattlesnake	None/None G4/S3 SSC	Chaparral, woodland, grassland, and desert areas from coastal San Diego County to the eastern slopes of the mountains. Occurs in rocky areas and dense vegetation. Needs rodent burrows, cracks in rocks or surface cover objects.	**Low Potential.** Suitable habitat is present in the project site, but the species does not have recorded occurrences within five miles of the project.
Phrynosoma blainvillii coast horned lizard	None/None G3G4/S3S4 SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	**Low Potential.** Suitable habitat is present in the project site, but the species does not have recorded occurrences within five miles of the project.
Salvadora hexalepis virgultea coast patch-nosed snake	None/None G5T4/S2S3 SSC	Brushy or shrubby vegetation in coastal Southern California. Require small mammal burrows for refuge and overwintering sites.	**Low Potential.** Suitable habitat is present in the project site, but the species does not have recorded occurrences within five miles of the project.
Birds			
Accipiter cooperii Cooper's hawk	None/None G5/S4 WL MHCP Covered Species	Woodland, chiefly of open, interrupted or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.	**Present.** The species was observed as a transient on the project site; however, the species' associated nesting habitat is not present on site.

Scientific Name Common Name	Status FESA/CESA/ Other	Habitat Requirements	Potential for Occurrence and Basis for Determination
Aimophila ruficeps canescens southern California rufous-crowned sparrow	None/None G5T3/S3 WL MHCP Covered Species	Resident in Southern California coastal sage scrub and sparse mixed chaparral. Frequents relatively steep, often rocky hillsides with grass and forb patches.	**Low Potential.** The species is typically associated with much steeper hillsides than what is found in the project site.
Artemisiospiza belli belli Bell's sage sparrow	None/None G5T2T4/S3 WL MHCP Covered Species	Nests in chaparral dominated by fairly dense stands of chamise. Found in coastal sage scrub in south of range. Nest located on the ground beneath a shrub or in a shrub 6-18 inches above ground. Territories about 50 yards apart.	**Low Potential.** Marginal habitat for the species is found in the project site.
Polioptila californica californica coastal California gnatcatcher	Threatened/None G4G5T2Q/S2 SSC MHCP Covered Species	Obligate, permanent resident of coastal sage scrub below 2500 feet in Southern California. Low, coastal sage scrub in arid washes, on mesas and slopes. Not all areas classified as coastal sage scrub are occupied.	**High Potential.** The species was observed to the north of the project site during protocol surveys conducted in 2018.
Mammals			
Chaetodipus californicus femoralis Dulzura pocket mouse	None/None G5T3/S3 SSC	Variety of habitats including coastal scrub, chaparral and grassland in San Diego County. Attracted to grass-chaparral edges.	**Low Potential.** The local recorded occurrences of the species are from chaparral habitats.
Chaetodipus fallax fallax northwestern San Diego pocket mouse	None/None G5T3T4/S3S4 SSC MHCP Covered Species	Coastal scrub, chaparral, grasslands, sagebrush, etc. in western San Diego County. Sandy, herbaceous areas, usually in association with rocks or coarse gravel.	**Low Potential.** The local recorded occurrences of the species are from chaparral habitats.
Lasiurus cinereus hoary bat	None/None G5/S4 None	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.	**Low Potential.** Individuals of the species could potentially use the trees in the project for night roosts, but winter and maternal roosting by the species is not expected.
Leptonycteris yerbabuenae lesser long-nosed bat	Endangered/ None G4/S1 None	Arid regions such as desert grasslands and shrub land. Suitable day roosts (caves and mines) and suitable concentrations of food plants (columnar cacti and agaves) are critical resources. No maternity roosts known from California; may only be vagrant. Caves and mines are used as day roosts. Caves, mines, rock crevices, trees and shrubs, and abandoned buildings are used as night roosts for digesting meals. Nectar, pollen, and fruit eating bat; primarily feeding on agaves, saguaro, and organ pipe cactus.	**Low Potential.** Individuals of the species could potentially use the trees in the project for night roosts, but winter and maternal roosting by the species is not expected.
Neotoma lepida intermedia San Diego desert woodrat	None/None G5T3T4/S3S4 SSC	Coastal scrub of Southern California from San Diego County to San Luis Obispo County. Moderate to dense canopies preferred. They are particularly abundant in rock outcrops, rocky cliffs, and slopes.	**High Potential.** Woodrat middens were identified during the surveys of the project site and associated habitat is present.

SSC = State Species of Special Concern

WL = State Watchlist Species

MHCP = Multiple Habitat Conservation Plan

Source: CDFW 2018

COASTAL CALIFORNIA GNATCATCHER

Previous biological assessments of the site conclude that there is the potential for CAGN to occur on site. Therefore, protocol surveys were conducted for CAGN. One pair of CAGN and one individual CAGN were observed during the nine protocol-level surveys for the species (Appendix C). CAGN is federally listed as threatened and is a MHCP Covered Species. None of the observations of the species were within the development envelope of the project site, as shown in Figure 4.1-2. The project site is not within critical habitat for the species and there were relatively few local records of the species that turned up in the queries.

A pair of CAGN was detected during the first five surveys and on the ninth survey. During Survey 1, a fledgling was observed with the CAGN pair. The family group was foraging in coastal sage scrub in the central portion of the survey area. During the following three surveys, the CAGN pair was observed in the central portion of the survey area for a brief period at the start of the survey. Shortly thereafter, the CAGN pair moved east along the south facing slope to a small patch of coastal sage scrub outside of the survey area. This patch of coastal sage scrub receives irrigation from a neighboring residential area and likely provides better foraging opportunities.

On Survey 5, the CAGN pair was only detected outside of the survey area in the irrigated coastal sage scrub. No CAGN were detected during Surveys 6, 7, and 8 which had a later start time than previous surveys. On Survey 9, the CAGN pair was detected in the central portion of the survey area. The pair was in the area briefly prior to making its way east along the south facing slope to the irrigated coastal sage scrub. The fledgling was only detected during the first survey. A CAGN individual was observed in the western portion of the survey area during Survey 1.

COOPER'S HAWK

Cooper's hawk is a CDFW watch list species and MHCP Covered Species. One individual was observed flying over the project site. The species frequents landscapes where wooded areas occur in patches and groves, but it is also found foraging in urban environments. Dense stands of trees with moderate crown-depths are typically used for nesting. The species is not expected to nest on the project site, but it may occur occasionally as a transient during foraging activities.

ORANGE-THROATED WHIPTAIL

Orange-throated whiptail is a CDFW Watch List species. The species inhabits low-elevation coastal scrub, chaparral, and valley-foothill hardwood habitats. It prefers washes and other sandy areas with patches of brush and rocks and feeds mostly on small invertebrates, especially spiders, scorpions, centipedes, and termites, and small lizards. Suitable habitat for this species is present on site and the species was observed on the parcel adjacent to the east of the project prior to its development.

COASTAL WHIPTAIL

Coastal whiptail is a CDFW Watch List species. The species is typically found in deserts and semi-arid areas with sparse vegetation and open areas. It is also found less often in woodland and riparian areas. Suitable habitat for this species is present on-site and the species was observed on the parcel adjacent to the east of the project prior to its development.

Figure 4.1-2 CAGN Observations During Protocol Surveys



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Fig 3 2018 Coastal California Gnatcatcher Survey Results

SAN DIEGO DESERT WOODRAT

San Diego desert woodrat is a CDFW Species of Special Concern. It is a resident of moderate to dense canopy coastal scrub habitats from San Diego County to San Luis Obispo County. The species is particularly abundant in rock outcrops, rocky cliffs, and slopes. Woodrat middens were identified during the surveys of the project site and associated habitat is present; however, there is a range and habitat overlap with the big-eared woodrat in the region.

Jurisdictional Waters and Wetlands

No drainages or wetlands were identified on the project site during the surveys or background research (Appendix C). Waters are expected to infiltrate the soils or sheetflow through the project site without causing substantial erosion.

Wildlife Corridors

Wildlife movement corridors are defined as areas that connect suitable wildlife habitat areas in a region otherwise fragmented by rugged terrain, changes in vegetation, or human disturbance. Natural features such as canyon drainages, ridgelines, and areas with vegetation cover provide corridors for wildlife travel. The project site is a habitat island, with Woodard Street and, farther, Twin Oaks Valley Road west of the site, Mission Road south of the site, and residential development north and east of the site blocking any wildlife movement. The project site and vicinity are not identified as being within or adjacent to a wildlife corridor per Figure 4-2 of the City of San Marcos General Plan (San Marcos 2013). The project area is also not within or adjacent to a Biological Core and Linkage Area (BCLA) as illustrated in Figure 2-3 of the Final MHCP Plan (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b). Finally, the project site is not in or adjacent to an essential connectivity area or natural landscape block as identified by the California Essential Habitat Connectivity Project (Spencer et al. 2010).

b. Regulatory Setting

Federal

Federal Endangered Species Act

The USFWS and the NMFS are responsible for implementing the federal Endangered Species Act (FESA) (16 U.S.C. §1531 et seq.). The Act protects fish and wildlife species that are listed as threatened or endangered, and their habitats. “Endangered” species, subspecies, or distinct population segments are those that are in danger of extinction throughout all or a significant portion of their range; “threatened” species, subspecies, or distinct population segments are those that are likely to become endangered in the near future.

Section 9 of the FESA prohibits the “take” of any fish or wildlife species listed as endangered, including the destruction of habitat that prevents the recovery of a species. Take is defined as an action or attempt “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Section 9 prohibitions also apply to threatened species unless a special rule has been defined with regard to take at the time of listing. Under Section 9 of the ESA, the take prohibition applies only to wildlife and fish species. However, Section 9 does prohibit the unlawful removal and reduction to possession, or malicious damage or destruction, of any endangered plant from federal land. Section 9 prohibits acts to remove, cut, dig up, damage, or destroy an endangered plant species in nonfederal areas in knowing violation of any State law or in

the course of criminal trespass. Candidate species and species that are proposed, or under petition for listing, receive no protection under Section 9.

Clean Water Act

The federal Clean Water Act (CWA) (33 U.S.C. §1251 et seq.) is administered by the US Environmental Protection Agency (USEPA) and the US Army Corps of Engineers (USACE). USACE is responsible for regulating the discharge of fill material into waters of the United States, including lakes, rivers, streams, and their tributaries, as well as wetlands that are navigable or adjacent to a navigable waterway or that have an interstate or foreign commerce connection. In 2008, USACE published the Wetlands Regulatory Assistance Program: Regional Supplements to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0), which provides detailed information for the Arid West Region. Wetlands are defined as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

- Section 401: Water Quality Certification gives individual states the authority to issue, waive, or deny certification that a proposed activity is in conformance with state water quality standards. Environmental Impact Analysis Biological Resources Draft Environmental Impact Report 91 Projects, including those that require permits from the USACE under Section 404 (below) of the CWA, are reviewed by the State's Regional Water Quality Control Boards (RWQCB). The project site is under the jurisdiction of the San Diego Regional Water Quality Control Board (Region 9).
- Section 404: Discharge of Dredged and Fill Materials into Waters of the United States gives the USACE and USEPA the authority to regulate the placement of fill and dredged materials into waters of the U.S., which include lakes, rivers, streams, and their tributaries, as well as wetlands. Wetlands are defined as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The USACE must issue a permit for all discharges of dredged or fill material into water of the U.S., including wetlands, before proceeding with a proposed action.

USACE may either issue individual permits on a case-by-case basis or general permits at a program level. General permits are pre-authorized, and are issued to cover similar activities expected to cause only minimal adverse environmental effects.

U.S. Fish and Wildlife Service

The USFWS implements the Migratory Bird Treaty Act (16 United States Code Section 703-711) and the Bald and Golden Eagle Protection Act (16 United States Code Section 668). The USFWS and National Marine Fisheries Service (NMFS) share responsibility for implementing the federal Environmental Species Act (FESA) (16 United States Code Section 153 et seq.). The USFWS generally implements the FESA for terrestrial and freshwater species, while the NMFS implements the FESA for marine and anadromous species. Projects that would result in "take" of any federally listed threatened or endangered species are required to obtain authorization from the USFWS or NMFS through either Section 7 (interagency consultation with a federal nexus) or Section 10 (Habitat Conservation Plan) of FESA, depending on the involvement by the federal government in permitting and/or funding of the project. "Take" under federal definition means to harass, harm (which includes habitat modification), pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to

attempt to engage in any such conduct. The permitting process is used to determine if a project would jeopardize the continued existence of a listed species and what measures would be required to avoid jeopardizing the species. Proposed or candidate species do not have the full protection of FESA; the USFWS and NMFS advise project applicants the species could be elevated to listed status at any time.

Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act of 1918 was originally enacted between the United States and Great Britain (acting on behalf of Canada) for the protection of migratory birds between the two countries. The MBTA has since been expanded to include Mexico, Japan, and Russia. Under MBTA provisions, it is unlawful "by any means or manner to pursue, hunt, take, capture (or) kill" any migratory birds as defined by the Migratory Bird Treaty Act except as permitted by regulations issued by the USFWS. The term "take" is defined by the USFWS regulation to mean to "pursue, hunt, shoot, wound, kill, trap, capture or collect" any migratory bird or any part, nest, or egg of any migratory bird covered by the conventions, or to attempt those activities.

State

Porter-Cologne Water Quality Act

The State Water Resources Control Board (SWRCB) works in coordination with nine RWQCBs to preserve, protect, enhance, and restore water quality throughout the state. Each RWQCB makes decisions related to water quality for its region, and may approve, with or without conditions, or deny projects that could affect waters of the state. Their authority to regulate activities that could result in a discharge of dredged or fill material comes from the CWA and the Porter-Cologne Water Quality Control Act (Porter-Cologne).

Porter-Cologne broadly defines Waters of the State (WoS) as "any surface water or groundwater, including saline waters, within the boundaries of the state." Because Porter-Cologne applies to any water, whereas the CWA applies only to certain waters, California's jurisdictional reach overlaps and may exceed the boundaries of Waters of the United States (WoUS). For example, Water Quality Order No. 2004-0004-DWQ states that "shallow" waters of the state include headwaters, wetlands, and riparian areas. In practice, the RWQCBs may claim jurisdiction over riparian areas. Where riparian habitat is not present, such as may be the case at headwaters and urbanized areas, jurisdiction is taken to the top of bank. The SWRCB has recently developed a Preliminary Draft State Wetland Definition that addresses numerous policy elements including development of a wetland definition and description of methodology to be used in defining wetlands as part of WoS (SWRCB 2017).

Pursuant to Section 401 of the CWA, projects regulated by the USACE must obtain a Water Quality Certification from the RWQCB. This certification ensures the proposed project will uphold state water quality standards. Because California's jurisdiction to regulate its water resources is much broader than that of the federal government, proposed impacts on waters of the state require Water Quality Certification even if the area occurs outside of USACE jurisdiction.

California Endangered Species Act

California Fish and Game Code (CFGC), Chapter 1.5, Sections 2050- 2116 (CESA) prohibits the take of any plant or animal listed or proposed for listing as rare (plants only), threatened, or endangered. In accordance with CESA, CDFW has jurisdiction over state-listed species (Fish and Game Code 2070).

The CDFW regulates activities that may result in take of individuals (i.e., hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill). Habitat degradation or modification is not expressly included in the definition of take under the CFGC. The CDFW has interpreted take, however, to include the killing of a member of a species as the proximate result of habitat modification.

California Fish and Game Code

The CDFW derives its authority from the CFGC. CESA (CFGC Section 2050 et. seq.) prohibits take of state-listed threatened or endangered species. Take of fully protected species is prohibited under CFGC Sections 3511, 4700, 5050, and 5515. Section 86 of CFGC defines "take" as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, capture, or kill. This definition does not include indirect harm by way of habitat modification.

CFGC Sections 3503, 3503.5, and 3511 restrict the take, possession, and destruction of birds, nests, and eggs. Section 3503.5 of the CFGC protects all birds-of-prey and their eggs and nests against take, possession, or destruction. Fully protected birds may not be taken or possessed except under specific permit (Section 3511).

Species of Special Concern (SSC) is a category CDFW uses for those species considered to be indicators of regional habitat changes or considered to be potential future protected species. SSC do not have any special legal status except that which may be afforded by the CFGC, as noted above. CDFW intends the SSC category as a management tool to include these species into special consideration when decisions are made concerning the development of natural lands.

The CDFW also has authority to administer the Native Plant Protection Act (CFGC Section 1900 et seq.). The Native Plant Protection Act requires the CDFW to establish criteria for determining if a species, subspecies, or variety of native plant is endangered or rare. Under Section 1913(c) of the Native Plant Protection Act, the owner of land where a rare or endangered native plant grows is required to notify the department at least 10 days in advance of changing the land use to allow for salvage of plant(s).

Perennial, intermittent, and ephemeral streams and associated riparian vegetation, when present, also fall under the jurisdiction of the CDFW. Section 1600 et seq. of the CFGC (Lake and Streambed Alteration Agreements) gives CDFW regulatory authority over work in the bed, bank, and channel (which could extend to the 100-year flood plain), consisting of, but not limited to, the diversion or obstruction of the natural flow or changes in the channel, bed, or bank of any river, stream or lake.

California Native Plant Protection Act

The California Native Plant Protection Act of 1977 (CNPPA) prohibits importation of rare and endangered plants into California, take of rare and endangered plants, and sale of rare and endangered plants. CESA defers to the CNPPA, which ensures that State-listed plant species are protected when State agencies are involved in projects subject to CEQA. In this case, plants listed as rare under the CNPPA are not protected under CESA; however, impacts to endangered, rare, or threatened species, including plants, are evaluated under CEQA. The following kinds of activities are exempt from CNPPA: agricultural operations; fire control measures; timber harvest operations; mining assessment work; removal of plants by private landowners on private land for construction of canals, ditches, buildings, roads, or other rights-of-way; and, removal of plants for performance of a public service by a public agency or a publicly- or privately-owned public utility.

Regional Water Quality Control Board

The SWRCB and the RWQCB have jurisdiction over WoS, with federal authority under the Clean Water Act Section 401 and state authority under Porter-Cologne to protect water quality, which prohibits discharges to such waters. WoS are defined as any surface water or groundwater, including saline waters, in the boundaries of the state.

Local

Multiple Habitat Conservation Program (MHCP)

The Multiple Habitat Conservation Program (MHCP) is a comprehensive conservation planning process that addresses the needs of multiple plant and animal species in North Western San Diego County. The MHCP encompasses the cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista. Its goal is to conserve approximately 19,000 acres of habitat, of which roughly 8,800 acres (46 percent) are already in public ownership and contribute toward the habitat preserve system for the protection of rare, threatened, or endangered species (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b). The MHCP identifies a series of Focus Planning Areas (FPA) within which some lands will be dedicated for preservation of native habitats. These areas contain both "hard line" areas, which will be preserved as open space, and "soft line" areas, which will include both development and open space to be determined through the planning process. The MHCP identifies Biological Core and Linkage Areas (BCLA) as those areas determined biologically valuable for inclusion in the regional preserve system. BCLAs were designed to conserve sensitive species and corridors between areas of high-quality habitat and to provide avenues for wildlife movement between these areas. A Covered Species is a species for which take authorization would be provided under the MHCP because long-term viability was determined to be adequately maintained under a particular preserve system design. The federal action addressed in the MHCP is the issuance of incidental take permits from all species on the Covered Species list whether they currently are listed or are to be listed in the future. The MHCP Covered Species include 20 plant species and 30 wildlife species.

City of San Marcos Draft Subarea Habitat Conservation Plan/Natural Communities Conservation Plan

The City of San Marcos Draft Subarea Habitat Conservation Plan/Natural Communities Conservation Plan (Draft Subarea Plan) comprehensively addresses how the City will conserve natural biotic communities and sensitive plant and wildlife species. The Draft Subarea Plan has been prepared in response to direction from the USFWS and the CDFW to meet the applicable requirements of the Federal and state Endangered Species Acts and the Natural Communities Conservation Planning Act of 1992. The City's Draft Subarea Plan is not formally approved and adopted, so all projects are required to obtain applicable permits for impacts to listed species as per Section 4D (for coastal sage impacts, through the I122 process), Section 10(a), or Section 7 of the federal Endangered Species Act. Also because the City does not have an approved Subarea Plan, the mitigation requirements for impacts to the biological resources are based on ratios provided by the approved MHCP (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b). Although the Draft Subarea Plan has not yet been approved, the plan has been used by the City as a policy guide for open space design and preservation.

City of San Marcos General Plan

The Conservation and Open Space Element of the 2013 San Marcos General Plan contains several policies pertaining to the protection of biological resources (City of San Marcos 2013). The following goals and policies apply to the project:

- **Goal COS-1:** Identify, protect, and enhance significant ecological and biological resources within San Marcos and its adaptive Sphere of Influence.
  - **Policy COS-1.1:** Support the protection of biological resources through the establishment, restoration, and conservation of high quality habitat areas.
  - **Policy COS-1.2:** Ensure that new development, including Capital Improvement Projects, maintain the biotic habitat value of riparian areas, oak woodlands, habitat linkages, and other sensitive biological habitats.
- **Goal COS-2:** The City is committed to conserving, protecting, and maintaining open space, agricultural, and limited resources for future generations. By working with property owners, local organizations, and state and federal agencies, the City can limit the conversion of resource lands to urban uses.
  - **Policy COS-2.1:** Provide and protect open space areas throughout the City for its recreational, agricultural, safety, and environmental value.
  - **Policy COS-2.2:** Limit, to the extent feasible, the conversion of open space to urban uses and place a high priority on acquiring and preserving open space lands for recreation, habitat protection and enhancement, flood hazard management, water and agricultural resources protection, and overall community benefit.
  - **Policy COS-2.6:** Preserve healthy mature trees where feasible; where removal is necessary, trees shall be replaced at a ratio of 1:1.

4.1.2 Impact Analysis

a. Methodology and Significance Thresholds

Data used for this analysis included aerial photographs, topographic maps, a CNDDB database query, accepted scientific texts to identify species, previous biological studies, biological and wildlife survey reports prepared for the project site, results of the reconnaissance field surveys, results of special-status plant surveys, and other available literature regarding existing biological resources in and around the project area.

In accordance with Appendix G Section IV (Biological Resources) of the State CEQA Guidelines, the project would have a significant impact on biological resources if it would:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service

3. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites
5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance
6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan

The Initial Study concluded that no potential impact would occur to state or federally protected wetlands (Appendix A). Additionally, the Initial Study concluded there would be a less than significant impact on the movement of native resident or migratory fish or wildlife species and migratory wildlife corridors. Further analysis of threshold 3 and threshold 4 is not warranted; refer to Section 4.6, *Impacts Found to be Less than Significant*. Therefore, impacts associated with threshold 1, 2, 5, and 6 are analyzed below.

Threshold 1:	Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Impact BIO-1 IMPLEMENTATION OF THE PROJECT WOULD NOT SIGNIFICANTLY IMPACT SENSITIVE REPTILE OR MAMMAL SPECIES THAT COULD RESIDE ON SITE. HOWEVER, THE PROJECT WOULD RESULT IN DIRECT AND INDIRECT IMPACTS TO CALIFORNIA GNATCATCHER AND NESTING BIRDS FROM CONSTRUCTION ACTIVITIES DURING BREEDING SEASON. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED.

Sensitive Species

Orange-throated whiptail, coastal whiptail, and San Diego desert woodrat all have a high potential to occur on the project site, primarily within the Diegan Coastal Sage Scrub. The species are all highly mobile and would likely escape direct impacts from vegetation removal and grading activities associated with the project by moving into the undeveloped open space to the north. While some mortality to the three species could occur, project implementation would not have a substantial adverse effect on these species, given the isolated nature of the site and the very small number of individuals likely to be impacted. Therefore, potential impacts to these sensitive species would be less than significant.

CAGN have been identified in the Diegan Coastal Sage Scrub to the north of the project site, as shown in Figure 4.1-2. CAGN are a federally listed species and could be potentially impacted by the proposed project.

The project could result in direct impacts to CAGN through removal of Diegan Coastal Sage Scrub from construction during the breeding season, which could harm occupied nests on the project site. Indirect impacts to CAGN could also occur due to construction noise[1] and dust, which could cause

[1] The USFWS typically considers noise in excess of 60 dBA Leq to constitute a risk of impacting nesting birds.

nest failures due to parental abandonment. Therefore, mitigation would be required to avoid direct and indirect impacts to CAGN. The proposed project will impact 1.43 acres of Diegan Coastal Sage Scrub, which is a habitat type used by CAGN for most of its life history. The Diegan Coastal Sage Scrub within the project impact area is part of a contiguous island of Diegan Coastal Sage Scrub that is bound by East Mission Road to the south, Woodward Street to the west, and residential development to the north and east; as shown on Figure 4-1 of the City's General Plan (City of San Marcos 2013). According to the BRA, the proposed 1.43-acre development area is composed mainly of disturbed/ruderal vegetation and a small amount of CAGN preferred habitat (*Artemisia californica-Eriogonum fasciculatum* shrubland alliance) (Appendix C). In addition, as detailed under Impact BIO-6, the project would be required to preserve Diegan Coastal Sage Scrub at a ratio of 2:1 through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof, compliant with the City's Draft Subarea Plan which would contribute to the regional availability of CAGN habitat.

Implementation of Mitigation Measures BIO-1 through BIO-5 would reduce impacts to CAGN through the implementation of avoidance measures prior to and during construction, implementation of a Worker Environmental Awareness Program (WEAP), the delineation of work areas, and providing a biological monitor for construction activities near sensitive habitat areas.

Nesting Birds

As detailed in Section 4.2.1, *Regulatory Setting*, the nests of most native birds and raptors are federally and state protected. No nests were specifically identified during field reconnaissance, but it is likely birds use the project site for nesting (generally from early February through late August) given the presence of trees and shrubs, as well as the number of bird species and individuals observed during the surveys.

Project implementation has potential to result in direct and indirect impacts to nesting birds, including common passerine species protected under the Migratory Bird Treaty Act and CFGC, if they nest on the project site and/or in the immediate vicinity during construction activities. Cooper's hawk was observed over the project site as a transient, but is not expected to nest on site (Appendix C). Direct impacts from construction activities include ground disturbance and removal of trees or shrubs which could contain bird nests and indirect impacts from noise from construction equipment. Therefore, mitigation would be required to reduce impacts to nesting birds.

Mitigation Measures

BIO-1 Coastal California Gnatcatcher Surveys

PRE-CONSTRUCTION SURVEYS

Presence/absence surveys of the project site and a 500-foot buffer around the project site shall be conducted by a qualified biologist with a valid USFWS 10A 1A permit to determine the presence of CAGN that could be affected by construction activities, including vegetation clearance. A minimum of 3 surveys will be conducted no less than 7 days apart and within 90 days prior to commencement of construction activities. The results of the survey shall be submitted to the USFWS prior to initiation of construction activities.

PRE-VEGETATION CLEARANCE SURVEY

Vegetation clearing shall only be conducted between September 1 and February 28, outside of the breeding season for CAGN. No more than three (3) days prior to the clearing of vegetation, a qualified biologist shall conduct 1 survey for CAGN to ensure that the vegetation on-site is not occupied by the species. If the vegetation clearance survey identifies the presence of CAGN, the project biologist shall either use appropriate techniques to flush the bird(s) from the project site or delay the removal of vegetation until CAGN has left the project site on their own volition.

BIO-2 Nesting Birds and Raptors Survey

If site clearing activities are conducted between February 1 and February 28 or September 1 and September 15, a qualified biologist shall conduct a nesting bird survey no more than three (3) days prior to the start of such activities to identify nesting birds within the project site and a 250-foot buffer around the project site. If any nests are found, their locations shall be flagged and an appropriate avoidance buffer, ranging in size from 25 to 50 feet for song birds, and up to 250 feet for raptors depending upon the species and the proposed work activity, shall be determined and demarcated by a qualified biologist with bright orange construction fencing or other suitable flagging. Active nests shall be monitored at a minimum of once per week until it has been determined that the nest is no longer being used by either the young or adults. No disturbance shall occur within this buffer until the qualified biologist confirms that breeding/nesting is completed, and all the young have fledged. If project activities must occur within the buffer, they shall be conducted at the discretion of the qualified biologist and with monitoring and management to ensure that nesting success is not jeopardized. If no nesting birds are observed during the survey, then no further actions shall be necessary.

BIO-3 Worker Environmental Awareness Program (WEAP)

A WEAP shall be developed and implemented by a qualified biologist prior to the start of construction activities. Each employee (including temporary, contractors, and subcontractors) shall receive the WEAP within two weeks of working on the proposed project. Employees shall be advised of the potential impact to the listed species and the potential penalties for taking such species. At a minimum, the WEAP shall include the following topics: occurrence of the listed and sensitive species in the area, their general ecology, sensitivity of the species to human activities, legal protection afforded these species, penalties for violations of Federal and State laws, reporting requirements, and project features designed to reduce the impacts to these species and promote continued successful occupation of the project area environs.

BIO-4 Work Limit Delineation

Construction work areas shall be delineated and marked clearly, by flagging or temporary orange construction fencing, in the field prior to habitat removal, and the marked boundaries maintained and clearly visible to personnel on foot and by heavy equipment operators. Fencing shall be placed on the impact side to reduce the potential for additional vegetation loss within open space. Fencing placement shall be done by a qualified biologist. All temporary fencing shall be removed only after the conclusion of all grading, clearing, and construction. Employees shall strictly limit their activities and vehicles to the proposed project areas, staging areas, and routes of travel. The project site will be kept clean and food related trash items shall be enclosed in sealed containers and regularly removed from the site. The biological monitor shall verify that the limits of construction have been properly staked and are readily identifiable. Intrusion by unauthorized vehicles outside of

construction limits shall be prohibited, with control exercised by an on-site foreman. Access routes to the construction area outside of work hours shall be blocked with physical barriers, such as concrete blocks or large equipment.

BIO-5 Biological Monitoring

A CDFW and USFWS approved Biologist (hereafter, qualified biologist) familiar with CAGN and its habitat shall be present during all vegetation clearing and other activities with the potential to affect CAGN and will monitor the project to ensure that there are no unanticipated impacts to the CAGN and its habitat. The biologist shall have the authority to halt all associated project activities that may be in violation of the protective measures.

If CAGN are found to be within the survey area during pre-construction surveys, the following avoidance and minimization measures shall be implemented.

a. To reduce potential noise impacts to nesting CAGN, a qualified biologist shall monitor noise levels at the project site to determine if construction activity noise is above 60 dBA, the standard level requested by the USFWS, or if noise levels above 60 dBA have the potential to affect any CAGN nests.
b. If/when an active CAGN nest is identified, a qualified biologist shall monitor noise at the edge of construction as directed by the qualified biologist. A noise barrier will be erected to reduce noise levels to 60dBA or less. This noise barrier shall consist of a 10-foot-high, continuous plywood fence, or comparable barrier, supported by posts or an earthen berm located at the site boundary that abuts potential off-site habitat. If noise levels continue to exceed 60 dBA, the acoustician shall consult with the qualified biologist and provide requirements for the construction contractor to make operational and barrier changes to reduce noise levels to 60 dBA during the breeding season (March 1 through August 31). Noise monitoring will occur during operational changes and installation of barriers, as needed, to ensure their effectiveness. If the noise meets or exceeds the 60 dB(A) Leq threshold, or if the biologist determines that the activities in general are disturbing the nesting activities, the biologist shall have the authority to halt construction and shall consult with the Wildlife Agencies to devise methods to reduce the noise and/or disturbance in the vicinity. This may include methods such as, but not limited to, turning off vehicle engines and other equipment whenever possible to reduce noise, installing a protective noise barrier between the nesting coastal CAGN and the activities, and working in other areas until the young have fledged.
c. All active nests will be reported within 24 hours to the USFWS upon detection.

Significance After Mitigation

Implementation of Mitigation Measures BIO-1 and BIO-3 through BIO5 would reduce potential impacts to CAGN to less than significant by requiring the implementation of CAGN avoidance measures prior to and during construction, implementation of a WEAP to educate construction workers, the delineation of work areas to avoid additional impacts, and a Biological Monitor for activities in and around sensitive habitat areas . Implementation of BIO-2 would reduce impacts to nesting birds by surveying to identify nests in the open space areas surrounding the project site.

Impact BIO-2 TWO SPECIAL-STATUS PLANT SPECIES AND NO FEDERAL- OR STATE-LISTED OR MHCP COVERED SPECIES HAVE THE POTENTIAL TO OCCUR ON-SITE. RARE PLANT SURVEYS WERE CONDUCTED AND FOUND NO SPECIAL-STATUS OR RARE PLANTS ON-SITE. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

As detailed in Section 4.1.1 and in Table 4.1-2, one special-status species, San Diego sand aster, has a moderate potential to occur and one special-status species, San Diego ambrosia, has a low potential to occur. Rare plant surveys were conducted on April 12, 2019, during the flowering period for the potential sensitive plant species. San Diego sand aster, San Diego ambrosia, or any other rare plant species were not detected on-site during the survey. Common plant species observed on-site during the survey include, but are not limited to, shortpod mustard (*Hirschfeldia incana*), black mustard (*Brassica nigra*), California buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), prickly sow thistle (*Sonchus asper* ssp. *asper*), Mediterranean schismus (*Schismus barbatus*), giant reed (*Arundo donax*), tocalote (*Centaurea melitensis*), and red-stem filaree (*Erodium cicutarium*) (Appendix D).

Based on the above, rare plants are not located on-site and implementation of the project would not have substantial impacts to special-status plant species. Impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold:	Would the project result in a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Impact BIO-3 THE PROJECT WOULD IMPACT 1.43 ACRES OF DIEGAN COASTAL SAGE SCRUB, WHICH IS CONSIDERED A SENSITIVE HABITAT. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED.

As shown in Table 4.1-1, implementation of the project would directly impact 1.43 acres of Diegan Coastal Sage Scrub. Diegan Coastal Sage Scrub falls under the City's Habitat Group C definition of Coastal Sage Scrub, which is considered a sensitive habitat. Therefore, impacts to Diegan Coastal Sage Scrub would be considered significant and mitigation is required to reduce impacts. No riparian habitats are located on the project site.

The MHCP has classified vegetation communities and landcover into six classes, as shown in Table 3, based upon rarity and ecological importance (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b). The MHCP has also established mitigation ratios based upon whether or not the affected habitat is within or outside an FPA.

Table 4.1-3 MHCP Habitat Group and Type and Associated Mitigation Ratios

Habitat Group	Type	Mitigation Ratio by Location of Impacted Habitat	
		Inside Focus Planning Area	Outside Focus Planning Area
A	Coastal salt marsh, alkali marsh, freshwater marsh, estuarine, salt pan/mudflats, riparian forest, riparian woodland, riparian scrub, vernal pool, disturbed wetland flood channel fresh water	No net loss goal (mitigation varies by type of replacement habitat)	No net loss goal (mitigation varies by type of replacement habitat)
B	Southern coastal bluff scrub, maritime succulent scrub, southern maritime chaparral, Engelmann oak woodland, coast live oak woodland, native grassland	Maximum avoidance and on site conservation 3:1	2:1
C	Coastal sage scrub coastal sage/chaparral mix	2:1	1:1
D	Chaparral (excluding southern maritime chaparral)	1:1	0.5:1
E	Annual (non-native) grassland	0.5:1	None
F	Disturbed, agriculture land, eucalyptus	None	None

Source: AMEC Earth & Environmental, Inc., et al. 2003a, 2003b

The project site is not located within an MHCP FPA; however, based on discussions with USFWS on December 19, 2018, permanent loss of Diegan Coastal Sage Scrub shall be mitigated at a 2:1 ratio. Section 5.2.1 of City of San Marcos Draft Subarea Habitat Conservation Plan references the preferred order of mitigation to be on-site mitigation, off-site acquisition, in-lieu fees, and mitigation credits.. Therefore, the following mitigation measures shall be required to reduce the direct impacts to Diegan Coastal Sage Scrub to less than significant levels.

Mitigation Measures

Implementation of Mitigation Measure BIO-4 would require the delineation of work limits to ensure impacts to Diegan Coastal Sage Scrub beyond the 1.43 acres discussed herein are less than significant.

BIO-6 Mitigation for Diegan Coastal Sage Scrub

Prior to the issuance of grading permits, a total of 1.43 acres of Diegan Coastal Sage Scrub shall be preserved at a 2:1 ratio resulting in a 2.86 acre mitigation obligation. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager.

Significance After Mitigation

Implementation of Mitigation Measures BIO-4 and BIO-6 would reduce impacts to Diegan Coastal Sage Scrub to less than significant.

Threshold:	Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Impact BIO-4 THE PROJECT WOULD REMOVE SENSITIVE HABITAT AND EXISTING OPEN SPACE, WHICH COULD POTENTIALLY CONFLICT WITH POLICIES IN THE CONSERVATION AND OPEN SPACE ELEMENT OF THE CITY'S GENERAL PLAN. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION.

The Conservation and Open Space Element of the City's General Plan contains policies that relate to the protection of biological resources. Analysis of consistency with applicable policies is provided in Table 4.1-4.

Table 4.1-4 Biological Resources Policy Consistency Analysis

General Plan Policies	Project Consistency
Policy COS-1.1: Support the protection of biological resources through the establishment, restoration, and conservation of high quality habitat areas.	With the exception of on-site Diegan Coastal Sage Scrub, the majority of the project site would not be characterized as a high-quality habitat area. Mitigation for impacts to Diegan Coastal Sage Scrub is identified in MM-6, which would require a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager. Therefore, implementation of the project does not conflict with this policy.
Policy COS-1.2: Ensure that new development, including Capital Improvement Projects, maintain the biotic habitat value of riparian areas, oak woodlands, habitat linkages, and other sensitive habitats.	The project site does not support any riparian areas, oak woodlands, or habitat linkages. On-site Diegan Coastal Sage Scrub is considered sensitive; however, mitigation for impacts to habitat is identified in MM-6, which would require a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager.. Therefore, the project does not conflict with this policy.
Policy COS-2.1: Provide and protect open space areas throughout the City for its recreational, agricultural, safety, and environmental value.	With the exception of the on-site open space that supports Diegan Coastal Sage Scrub, the majority of the project site was previously developed. In addition, the project site is not an existing or planned open space area in the City. Mitigation Measure BIO-6 would require a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager.. Therefore, implementation of the project does not conflict with this policy.

General Plan Policies	Project Consistency
Policy COS-2.2: Limit, to the extent feasible, the conversion of open space to urban uses and place a high priority on acquiring and preserving open space lands for recreation, habitat protection and enhancement, flood hazard management, water and agricultural resources protection, and overall community benefit.	With the exception of the on-site open space that supports Diegan Coastal Sage Scrub, the majority of the project site was previously developed. The project site is not an existing or planned open space area. In addition, the project would preserve impacts to Diegan Coastal Sage Scrub at a 2:1 ratio, as required in Mitigation Measure BIO-6. Therefore, implementation of the project does not conflict with this policy.
Policy COS-2.6: Preserve healthy mature trees where feasible; where removal is necessary, trees shall be replaced at a ratio of 1:1.	While there are nine mature trees on the project site, they are non-native species that were planted as landscaping for the historic development on the project site and are not natural elements of the existing communities in the open space of the region. The proposed project design includes the installation of a number of trees as part of the landscaping plan, which would offset the loss of the nine trees at a ratio of greater than 1:1.

As discussed in Table 4.1-4, implementation of mitigation measures would be required for consistency with various General Plan policies.

Mitigation Measures

Implementation of Mitigation Measure BIO-6 would protect open space and sensitive habitats by preserving Diegan Coastal Sage Scrub at a 2:1 ratio.

Significance After Mitigation

Implementation of Measure BIO-6 would reduce impacts to less than significant.

Threshold:	Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Impact BIO-5 THE PROJECT SITE IS LOCATED WITHIN THE MHCP FOR NORTHWESTERN SAN DIEGO COUNTY AND WOULD IMPACT CSS AND POTENTIALLY IMPACT CAGN, A COVERED SPECIES UNDER THE MHCP. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED.

The project site is located within the MHCP, a comprehensive, multi-jurisdictional habitat conservation plan approved in 2003 for northwestern San Diego County. The project site is not located within a Focus Planning Area (FPA), as illustrated in Figure 2-1 of the Final MHCP Plan (AMEC Earth & Environmental, Inc., et al. 2003b). The project site is also not within a Biological Core Linkage Area (BCLA), as illustrated in Figure 2-3 of the Final MHCP Plan (AMEC Earth & Environmental, Inc., et al. 2003b). There are two MHCP Covered Species with the potential to occur on site: CAGN and orange-throated whiptail, as well as CSS, a recognized ecological community requiring conservation. As detailed under Impact BIO-1, potential impacts to orange-throated whiptail would be less than significant and would not conflict with the MHCP. However, impacts to CSS and CAGN would be significant without mitigation, and would potentially conflict with the MHCP. Therefore, mitigation would be required to reduce conflicts with provisions in the MHCP.

Mitigation Measures

Implementation of Mitigation Measures BIO-1 through BIO-5 would reduce potential impacts to CAGN to less than significant by requiring a biological monitor for activities in and around sensitive habitat areas, the implementation of a WEAP to educate construction workers, the delineation of work limits, nesting bird surveys, and avoidance and minimization measures for CAGN prior to and during construction. Implementation of Mitigation Measure BIO-6 would reduce impacts to CSS by requiring 2:1 mitigation.

Significance After Mitigation

With the implementation of Mitigation Measures BIO-1 through BIO-6, impacts related to conflicts with the MHCP provisions for Covered Species would be reduced to less than significant.

4.1.3 Cumulative Impacts

The following factors are considered with respect to analyzing cumulative impacts to biological resources:

- The cumulative contribution of other approved and proposed projects to fragmentation of open space in the project vicinity
- The loss of sensitive habitats and species
- The contribution of the project to urban expansion into natural areas
- Isolation of open space in the vicinity by proposed/future projects

Cumulative impacts depend on the proximity of cumulative projects to the project site and impacts from past projects in the vicinity. Native vegetation and communities around the project site have been predominantly developed with residential, commercial, and public facilities. Open space and protected areas occur around the project site and on the hillside north of the project site, in the Santa Fe Hills to the northwest, along Twin Oaks Valley Creek, and the San Elijo Hills. Common vegetation communities in the open space areas include Diegan Coastal Sage Scrub, southern riparian scrub, and Coastal Sage and Chaparral Scrub. The planned and pending projects in the project vicinity are listed in Table 3-1 (Section 3, *Environmental Setting*) and include residential, commercial, hotel, office, and recreational land uses.

A large portion of the project site contains developed and disturbed habitat with low, quality and exotic species. Approximately 1.43 acres of Diegan Coastal Sage Scrub, a sensitive habitat, would be impacted by the project. The Diegan Coastal Sage Scrub within the project site is part of a contiguous island of Diegan Coastal Sage Scrub. This block of Diegan Coastal Sage Scrub measures over 23 acres, of which the project will impact less than 10 percent, leaving over 20 acres intact. None of the cumulative projects occur on the 20 acres of Diegan Coastal Sage Scrub. For other developments that would have significant impacts on biological resources, mitigation measures such as pre-construction surveys for sensitive biological resources, mitigation for impacts to sensitive habitats and/or sensitive biological resources, and mitigation bank preservation would be required. Other developments would also be required to comply with all applicable laws and regulations governing biological resources, including all MHCP policies and measures regarding cumulative impacts.

Individual development proposals are reviewed separately and undergo appropriate environmental review when it is determined that the potential for significant impacts exist. If future projects would

result in impacts to sensitive habitats and biological resources, impacts to such resources would be addressed on a case-by-case basis. Furthermore, all projects are required to comply with the MHCP which was created to mitigate cumulative development impacts on biological resources. As such, projects, including the proposed project, would not contribute to cumulative impacts on sensitive habitats and biological resources outside the project site. Therefore, impacts related to sensitive habitats and biological resources would not be cumulatively considerable.

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4.2 Cultural Resources

This section analyzes the effects of the proposed multi-family residential project on cultural resources. The analysis is based on a 2017 pedestrian survey and due diligence report by Helix Environmental Planning, Inc. (Helix), as well as a Phase II cultural resources excavation and report by Rincon Consultants, Inc. (Rincon). The reports are summarized below, and the pedestrian survey and due diligence report is included in its entirety as Appendix E. The Phase II report contains confidential information and is available for review pursuant to Public Resources Code 21082.3(c)(1) and 21082.3(c)(2).

4.2.1 Setting

a. Existing Cultural Resources Setting

The cultural setting for the project is presented in three areas: Prehistoric, Ethnographic, and Historic. The prehistoric and historic overviews describe human occupation before and after European contact, while the ethnographic overview provides a synchronic "snapshot" of traditional Native American culture.

Prehistoric Overview

Early Holocene (ca. 9600-5600 BCE)

Evidence of Paleo-Indian occupation of southern California remains very limited. Approximately 75 sites on the southern and central California coast are known that date to 7,500 years before the common era (BCE) (Erlandson and Colten 1991). The earliest accepted dates for human occupation of the California coast are from the Northern Channel Islands, off the Santa Barbara coast. Daisy Cave, located on San Miguel Island, dates to as early as 9,600 BCE (Erlandson et al. 1996). At the Arlington Springs site on Santa Rosa Island human remains yielded a date of approximately 10,000 BCE (Johnson et al. 2002). San Diego and Orange counties and the Southern Channel Islands have not produced dates as early as these. However, radiocarbon evidence has dated early occupation of the coastal region between circa (ca.) 8,000 and 7,000 BCE (Byrd and Raab 2007).

Traditional models describe California's first inhabitants as big-game hunters roaming North America during the end of the last Ice Age. As the Ice Age came to a close, warmer and drier climatic conditions are thought to have created wide-spread cultural responses. The pluvial lakes and streams in the desert interior began to wane and cultures dependent on these water sources migrated to areas with moister conditions, such as the southern California coast (Byrd and Raab 2007).

The San Dieguito Complex is a well-defined cultural response to these changing climatic conditions in the southern California coastal region and was originally named for the cultural sequence in western San Diego County (Rogers 1929, 1939). Leaf-shaped points and knives, crescents, and scrapers characterize the artifact assemblages throughout the region (Byrd and Raab 2007). San Dieguito sites generally show evidence of the hunting of various animals, including birds, and gathering of plant resources (Moratto 2004).

Middle Holocene (ca. 5600–1650 BCE)

The Middle Holocene is generally viewed as a time of cultural transition. During this time, the cultural adaptations of the Early Holocene gradually altered. Use of milling stone tools began to appear across most of central and southern California around 6,000-5,000 BCE, indicating a focus on the collection and processing of hard-shelled seeds. Environmental changes in the Southern Bight are thought to have been the key factor in these changing adaptations (Byrd and Raab 2007). Occupation patterns indicated semi-sedentary populations focused on the bays and estuaries of San Diego and Orange counties, with shellfish and plant resources as the most important dietary components (Warren 1968). In the San Diego area, this adaptive strategy is known as the La Jolla complex.

Sometime around 4,000 years ago, extensive estuarine silting began to cause a decline in shellfish and thus a depopulation of the coastal zone. Settlement shifted to river valleys, and resource exploitation focused on hunting small game and gathering plant resources (Warren 1968; Byrd and Raab 2007).

Late Holocene (ca. 1650 BCE – 1769 CE)

The Late Holocene witnessed numerous cultural adaptations. The bow and arrow was adopted sometime after 500 CE, and ceramics appeared in the area circa 1000 CE. Populations were sustained by food surpluses, especially acorns (Byrd and Raab 2007; Kroeber 1925). Other exploited food resources include shellfish, fish, small terrestrial mammals, and small-seeded plants. Settlement patterns of the Late Holocene are characterized by large residential camps linked to smaller specialized camps for resource procurement (Byrd and Raab 2007).

Ethnographic Overview

The Luiseño occupied territory along the coast between Aliso Creek and Agua Hedionda Creek that extended inland to Santiago Peak in the north and the east side of Palomar Mountain in the south, including Lake Elsinore and the Valley of San Jose (Bean and Shipek 1978). The population of the Luiseño prior to the arrival of Europeans is believed to be approximately 3,500 people (O'Neil 2002).

The Luiseño language belongs to the Cupan group of the Takic subfamily of languages (previously known as Southern California Shoshonean), along with their northern and eastern neighbors, the Gabrielino and Cahuilla (Bean and Shipek 1978). The Takic subfamily is part of the Uto-Aztecan language family and its origins lie in the Great Basin (Driver 1969). The language of their southern neighbors, the Ipai, is part of the Yuman family of languages, which is related to languages spoken throughout the southwest. Linguistic studies suggest that Takic-speaking immigrants from the Great Basin displaced Hokan speakers sometime after 500 BCE. Unsurprisingly, the Luiseño cultural practices were similar to other speakers of Takic languages, though they did have some things in common with their Ipai neighbors (Bean and Shipek 1978).

Luiseño social structure was more rigid than other Takic-speaking groups, possibly in part because of a higher population density. They were strongly patrilineal and resided in permanent villages of between a few dozen to several hundred people, each of which were politically independent and claimed its own territory, including seasonal camps. In the smaller villages, most residents belonged to a single lineage while in the larger settlements one lineage was dominant but families of many clans were present. Ties between villages were maintained through various economic, religious, and social networks (Bean and Shipek 1978).

Father Boscana, a priest at Mission San Juan Capistrano, recorded his observations of the natives and left a most valuable work. Kroeber (1925) describes Boscana's "*Chinigchinich*" as "the most intensive and best written account of the customs and religion of any group of California Indians in the mission days." Kroeber describes the Juaneño as having well-developed religious, ritualistic, and social customs. The center of the Luiseño religion was *Chinigchinich*, the last of a series of heroic mythological figures. The heroes were originally from the stars and the sagas told of them formed Luiseño religious beliefs. Initiation rites during puberty were practiced for both boys and girls, including a hallucinogenic journey in search of a spirit guide for boys and days of fasting in a heated pit for girls. Luiseño cremated and buried their dead.

Plant foods were by far the largest part of the traditional diet, with acorns representing the most important staple item (Bean and Shipek 1978). In part because of this, villages were located near reliable water sources, as large quantities of water were necessary to process acorn products. The Luiseño ate a wide variety of other plant foods, including grasses, seeds, cactus fruits, yucca, bulbs, roots, tubers, mushrooms, and other items. The Luiseño also hunted and trapped game animals such as deer, rabbit, and birds. The sea was a very important source of protein, possibly providing up to 60 percent of the diet for coastal villages (White 1962). The Luiseño caught sea mammals and fish, and gathered shellfish such as abalone, mussels, clams, and scallops.

Historic Overview

The Post-Contact history of California is generally divided into three periods: the Spanish period (1769–1822), the Mexican period (1822–1848), and the American period (1848–present). These historical periods are described below.

Spanish Period (1769–1822)

Juan Rodriguez Cabrillo in 1542 led the first European expedition to observe what is now called southern California. That year, he landed on Point Loma, approximately 32 kilometers (km) (20 miles) from the proposed project site. For more than 200 years, Cabrillo and other Spanish, Portuguese, British, and Russian explorers sailed the Alta (upper) California coast and made limited inland expeditions, but they did not establish permanent settlements (Bean 1968; Rolle 2003).

Gaspar de Portolá and Franciscan Father Junipero Serra established the first Spanish settlement in Alta California at Mission San Diego de Alcalá in 1769. This was the first of 21 missions erected by the Spanish between 1769 and 1823. The Mission San Diego de Alcalá and its associated presidio were initially built near the Kumeyaay village of *Cosoy*, near the present site of Old Town. However, the water supply at this location was lacking and the soil was not very fertile. Thus, the mission was moved in 1774 to its present location, near the Kumeyaay village of *Nipaguay* (Mission San Diego 2013; City of San Diego 2006). In 1789, Father Fermin Francisco de Lasuen founded Mission San Luis Rey de Francia, approximately 19 km (12 miles) from the proposed project site. The missions were responsible for developing relationships with local Native American groups and converting the population to Christianity (Engelhardt 1927a). Diseases brought by Europeans, however, greatly reduced the Native American population.

During the Mission period, Spain deeded ranchos to prominent citizens and soldiers, though very few in comparison to those deeded following Mexican Period. Presidio commandants were given the authority to grant house lots and garden plots to soldiers. Sometime after 1800, soldiers and their families began to move towards the base of Presidio Hill to receive land grants from the presidio commandants (City of San Diego 2006). To manage and expand their herds of cattle on

these large ranchos, colonists enlisted the labor of the surrounding Native American population (Engelhardt 1927b).

Mexican Period (1822–1848)

The Mexican period commenced when news of the success of the Mexican Revolution (1810-1821) against the Spanish crown reached California in 1822. This period was an era of extensive interior land grant development and exploration by American fur trappers west of the Sierra Nevada Mountains. The California missions declined in power and were ultimately secularized in 1834. By 1835, the presidio and Mission San Diego de Alcalá had been abandoned and lay in ruins (City of San Diego 2006). News of secularization reached Mission San Luis Rey in 1835 and it came under the control of secular administrators, many of whom gained title to mission lands (Hebert 1961; Mission San Luis Rey 2014). Pío and Andrés Pico gained ownership of Rancho Santa Margarita y las Flores after secularization, a property that is adjacent to the project site on the northwest (Hebert 1961).

The Mexican government recognized the newly established Pueblo of San Diego in 1834. The pueblo did not fare as well as other California towns during the Mexican period. Secularization of the missions caused increased hostilities by Native Americans against the *Californios* living in San Diego County during the late 1830s. Attacks on outlying ranchos and an unstable political and economic climate caused the pueblo's population to drop from approximately 500 to 150 permanent residents by 1840. In 1838, San Diego was demoted from pueblo status and made a sub-prefecture of the Los Angeles Pueblo (City of San Diego 2006).

American Period (1848–Present)

The American period in San Diego County began as early as 1846 when the United States (U.S.) military occupied San Diego and effectively ended *Californio* resistance in 1847. The American government assumed formal control of Alta California with the signing of the Treaty of Guadalupe Hidalgo in 1848, in which the U.S. agreed to pay Mexico $15 million for the territory that included California, Nevada, Utah, and parts of Colorado, Arizona, New Mexico, and Wyoming.

During the early American period, cattle ranches dominated much of Southern California, although droughts and population growth resulted in farming and urban professions supplanting ranching through the late nineteenth century. After the U.S. took control of San Diego in 1846, the political and economic situation stabilized and population increased. The discovery of gold in northern California in 1848 led to the California Gold Rush, which resulted in a massive population increase (Guinn 1977). By 1853, the population of California exceeded 300,000. Thousands of settlers and immigrants continued to pour into the state, particularly after the completion of the transcontinental railroad in 1869. By the 1880s, the railroads had established networks throughout southern California, resulting in fast and affordable shipment of goods, as well as means to transport new residents (Dumke 1944).

Local Overview

San Diego County

San Diego County was organized formally in February of 1850 and grew slowly during the 1860s. The mid-1800s saw the urbanization of San Diego thanks to the development and promotion of the area by Alonzo Horton, who offered free lots to anyone who would build a house worth $500. The Santa Fe Railroad began construction in 1880, with the first trains arriving in 1882. After several

population booms, San Diego reached 35,000 residents in 1888. The population fell to 17,000 in 1890 because of a real estate market crash (City of San Diego 2006).

The twentieth century brought further development to San Diego. John D. Spreckels launched a major building campaign to modernize the city. Summer cottage retreats began to develop in the seaside communities of Ocean Beach and La Jolla. Improvements in public transportation allowed development to spread to the areas of University Heights, Greater North Park, and Mission Hills. In 1915, the Panama-California Exposition was held in San Diego in celebration of the opening of the Panama Canal (City of San Diego 2006).

During the 1920s, San Diego's population grew from 74,683 to 147,897, due to the Panama-California Exposition and efforts to attract the U.S. Navy to San Diego. The naval and military presence provided the population and economy that allowed the city further development (City of San Diego 2006). San Diego County continues to be an important military center, and as one of the largest metropolitan areas in California, San Diego County is a popular vacation destination known for its beaches, mild climate, and urban events.

City of San Marcos

The project site is located in the City of San Marcos. In 1875, Gustavus French Merriam relocated his family from Kansas to Southern California, purchasing 160 acres on which he established an apiary and vineyard (Carroll 1975). Within a few years, the location surrounding the Merriam homestead – the first in the area – began attracting European immigrants. In 1887, the San Marcos Land Company had purchased much of the surrounding land in order to partition it into tracts available for purchase by an increasingly large number of families looking to move into the area. The early growth of San Marcos was aided, in large part, by its proximity to the Santa Fe Railroad Line. In 1896, the burgeoning town had a post office, school, blacksmith, and railroad depot (Carrol 1975).

Throughout the early twentieth century, San Marcos was an agriculturally driven community, with many of its residents involved in some kind of farm-related work. By 1956, 2,500 residents lived in San Marcos and in 1963 the community was officially incorporated as a city. The population of San Marcos has steadily expanded from 17,479 in 1980 to over 90,000 in 2018. San Marcos has continued to grow from a farming community serving the greater San Diego area to a city featuring commercial centers, a large business district, recreational activities, and an extensive higher education community with four college and university campuses (City of San Marcos 2017).

Site-specific Survey

Helix archaeologists conducted a records search of the project site and 0.5-mile radius at the South Coastal Information Center (SCIC) at San Diego State University on November 1, 2017, to identify previously conducted cultural resources work at the project site and within a 0.5-mile radius. The search included a review of historic maps and aerial photographs of the property to identify the potential for historic structures and historic archaeological material.

Previously Conducted Studies

The record search completed at the SCIC identified 31 previous cultural resource studies conducted within a 0.5-mile radius of the project site. These consisted of one archaeological monitoring report, 28 cultural resources assessments, one interchange improvements report, and one negative report addendum.

Previously Identified Cultural Resources

The SCIC records search identified nine cultural resources previously recorded within a 0.5-mile radius of the project site, as shown in Table 4.2-1. One resource, CA-SDI-21254 is adjacent to the project area; it is a multi-component site recorded originally as the ruins of a residential structure with historic and modern debris. During construction monitoring in July 2015, two prehistoric cultural deposit loci were identified within CA-SDI-21254. The remaining eight cultural resources consist of five prehistoric sites, one prehistoric isolate, one historic building, and one prehistoric lithic scatter. Due to the sensitive nature of cultural resources, archaeological site locations are not identified in this EIR.

Table 4.2-1 Previously Recorded Resources within a 0.5-mile Radius of the Project Site

Primary Number	Trinomial	Resource Type	Description	Recorder(s) and Year(s)	NRHP/ CRHR Status	Relationship to Site
–	CA-SDI-560	Prehistoric	Village	D.L. True n.d.	Unknown	Outside
–	CA-SDI-749	Multi-component	Pottery camp or village	D.L. True 1959	Unknown	Outside
–	CA-SDI-12095	Prehistoric	Artifact scatter	Pigniolo and Radar 1991	Unknown	Outside
–	CA-SDI-12098	Prehistoric	Lithic scatter	Pigniolo and Briggs n.d.; Bissell 1991	Destroyed	Outside
–	CA-SDI-12210	Prehistoric	Lithic scatter	Joyner 1990	Unknown	Outside
37-014081	–	Historic	Structure	Thornton 1994	Unknown	Outside
37-015578	–	Prehistoric	Isolate	James, et al. 1996	Assume ineligible	Outside
–	CA-SDI-14340	Prehistoric	Temporary camp with milling features and artifact scatter	James et al. 1996	Unknown	Outside
–	CA-SDI-21254	Multi-component	Prehistoric habitation site with possible human remains; Historic-age refuse scatter	Quach and Bowsher 2014; Castells and Piek 2015	Recommended ineligible	Adjacent

Source: Wilson 2017.

b. Regulatory Setting

Federal

National Register of Historic Places

Cultural resources are considered during federal undertakings chiefly under Section 106 of the National Historic Preservation Act of 1966 (as amended) through one of its implementing regulations, 36 Code of Federal Regulations (CFR) 800 (Protection of Historic Properties), as well as the National Environmental Policy Act. Properties of traditional religious and cultural importance to Native Americans are considered under Section 101(d)(6)(A) of the National Historic Preservation Act. Other federal laws include the Archaeological and Historic Preservation Act of 1974, the American Indian Religious Freedom Act of 1978, the Archaeological Resources Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1989, among others.

Section 106 of the National Historic Preservation Act (16 United States Code 470f) requires federal agencies to take into account the effects of their undertakings on any district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP), and to give the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings (36 CFR 800.1). Under Section 106, the significance of any adversely affected cultural resource is assessed and mitigation measures are proposed to reduce any impacts to an acceptable level. Significant cultural resources are those listed in or eligible for listing in the NRHP per the criteria listed below (36 CFR 60.4).

Certain properties are usually not considered for eligibility for the NRHP. These include ordinary cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or use for religious purposes, moved or reconstructed structures, properties primarily commemorative in nature, or properties that have become significant within the last 50 years. These types of properties can qualify if they are an integral part of a district that does meet the criteria, or if they fall within certain specific categories relating to architecture or association with historically significant people or events. The vast majority of archaeological sites that qualify for listing do so under Criterion D, Research Potential.

State

California Register of Historic Resources

The California Register of Historical Resources (CRHR) is a guide to cultural resources that must be considered when a government agency undertakes a discretionary action subject to CEQA. The CRHR helps government agencies identify, evaluate, and protect California's historical resources, and indicates properties to be protected from substantial adverse change (California Public Resources Code [PRC], Section 5024.1(a)). The CRHR is administered through the State Office of Historic Preservation (OHP) that is part of the California State Parks system.

A historical resource is one listed in or determined to be eligible for listing in the CRHR, a resource included in a local register of historical resources, or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant (State CEQA Guidelines, Section 15064.5[a][1-3]). A resource shall be considered *historically significant* if it:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage

2. Is associated with the lives of persons important in our past
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values
4. Has yielded, or may be likely to yield, information important in prehistory or history

In addition to meeting one or more of the above criteria, the CRHR requires sufficient time to have passed to allow a "scholarly perspective on the events or individuals associated with the resource." Fifty years is a general estimate of the time needed to understand the historical importance of a resource, according to the state Office of Historic Preservation. The CRHR also requires a resource to possess integrity, defined as "the authenticity of a historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance. Integrity is evaluated based on the retention of location, design, setting, materials, workmanship, feeling, and association." Archaeological resources can sometimes qualify as "historical resources" (State CEQA Guidelines, Section 15064.5[c][1]).

According to CEQA, all buildings constructed over 50 years ago and that possess architectural or historical significance may be considered potential historic resources. Most resources must meet the 50-year threshold for historic significance; however, resources less than 50 years in age may be eligible for listing on the CRHR if it can be demonstrated that sufficient time has passed to understand their historical importance.

If a project can be demonstrated to cause damage to a unique archaeological resource, the lead agency may require reasonable efforts be made to permit any or all these resources to be preserved in place or left in an undisturbed state. To the extent that resources cannot be left undisturbed, mitigation measures are required (PRC Section 21083.2[a], [b], and [c]).

PRC Section 21083.2(g) defines a unique archaeological resource as an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, the probability is high it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information
2. Has a special and particular quality such as being the oldest of its type or the best available example of its type
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person

The state administers two other programs: California Historical Landmarks and California Points of Historical Interest. California Historical Landmarks are buildings, sites, features, or events of statewide significance with anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other historical value. California Points of Historical Interest are buildings, sites, features, or events local (county or city) significance with anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other historical value.

State Law Governing Human Remains

The disposition of human remains is governed by Health and Safety Code Section 7050.5 and PRC Sections 5097.94 and 5097.98. It falls within the jurisdiction of the Native American Heritage Commission (NAHC). If human remains are discovered, the county coroner must be notified within

48 hours and there no further disturbance to the site where the remains were found should occur. If the remains are determined by the coroner to be Native American, the coroner is responsible to contact the NAHC within 24 hours. Pursuant to PRC Section 5097.98, the NAHC will immediately notify those persons it believes to be most likely descended from the deceased Native Americans, so they can inspect the burial site and make recommendations for treatment or disposal.

PRC Section 5097.5 addresses Paleontological Resources, stating that:

> No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

In this PRC section, "public lands" means those owned by or under the jurisdiction of the state or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, local agencies are required to comply with PRC 5097.5 for activities that include construction, maintenance, and permit actions (e.g., encroachment permits) undertaken by others.

Section 5097.5 of the California Public Resources Code prohibits excavation or removal of any "vertebrate paleontological site or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands." Section 30244 requires reasonable mitigation of adverse impacts to paleontological resources from development on public land.

Health and Safety Code 7050.5 establishes that any person who knowingly mutilates, disinters, wantonly disturbs, or willfully removes any human remain in or from any location without authority of the law is guilty of a misdemeanor. It further defines procedures for the discovery and treatment of Native American remains.

Health and Safety Code 8010-8011 is intended to provide consistent state policy to ensure that all California Indian human remains and cultural material are treated with dignity and respect. The code extends policy coverage to non-federally recognized tribes and federally recognized groups.

Assembly Bill 2461 provides procedures for private land owners to follow upon discovering Native American human remains. Land owners are encouraged to consider culturally appropriate measures if they discover Native American human remains as set forth in California PRC 5097.98.

Local

City of San Marcos General Plan

The Conservation and Open Space Element of the 2013 San Marcos General Plan contains policies which seek to preserve the City's cultural and historic resources.

- **Goal COS-11**: Continue to identify and evaluate cultural, historic, archaeological, paleontological, and architectural resources for protection from demolition and inappropriate actions.
  - **Policy COS-11.1**: Identify and protect historic and cultural resources including individual properties, districts, and sites (e.g., archaeological sites) in compliance with CEQA.

- **Policy COS-11.2**: Prohibit the demolition or removal of a historic structure without evaluation of the condition of the structure, the cost of rehabilitation, and the feasibility of alternatives to preservation in place including but not limited to relocation, or reconstruction offsite, and/or photo-preservation.

4.2.2 Impact Analysis

a. Methodology and Significance Thresholds

Helix conducted a cultural resources site survey on December 1, 2017 and discovered remnant foundations, features, and debris as well as four prehistoric bedrock milling features (BMF) along the project site hillside. On July 11, 2018, Rincon Consultants, Inc. conducted a pedestrian survey of the development footprint to examine and locate the historic and prehistoric features observed by Helix, and to complete a formal site recording of the milling features and extant foundations. Because of their proximity, the resources were recorded as a single multi-component site (RIN-S-1). Rincon Consultants, Inc. conducted a Phase II investigation in order to establish the vertical and horizontal limits of prehistoric site RIN-S-01 and to determine if subsurface deposits associated with the features exist. Results of the site surveys and Phase II testing are used in the analysis herein. The pedestrian survey and due diligence report is included in its entirety as Appendix E. The Phase II report contains confidential information and is available for review at the City of San Marcos.

In accordance with Appendix G of the State *CEQA Guidelines*, an impact to Cultural Resources is considered significant if it can be demonstrably argued that the project would:

1. Cause a substantial adverse change in the significance of a historical resource pursuant to CEQA Guidelines §15064.5
2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5
3. Disturb any human remains, including those interred outside of dedicated cemeteries

Impacts Determined to be Less than Significant

The Initial Study concluded that no potential impact to historical resources would occur since no eligible historic resources are located on site. Therefore, an in depth analysis of Threshold 1 is not warranted, and a summary of this impact is described below.

Threshold 1:	Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

The Cultural Resources study was conducted by Rincon Consultants, Inc. in 2018, which included a site survey. The project site is vacant and does not contain any historic resources reflective of historic events, people, or context as defined in *CEQA Guidelines* Section 15064.5. Therefore, the project would have no impact on historical resources.

Impacts Determined to be Potentially Significant

The Initial Study that the development of the proposed project, including project construction, could potentially impact cultural resources and previously undiscovered human remain. Therefore, impacts associated with threshold 2 and 3 are analyzed below.

Threshold 2:	Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Impact CR-1 NO KNOWN ARCHAEOLOGICAL RESOURCES ARE PRESENT ON THE PROJECT SITE. THERE IS A MULTI-COMPONENT TRIBAL CULTURAL RESOURCE SITE WITHIN AND ADJACENT TO THE DEVELOPMENT ENVELOPE OF THE PROJECT. CONSTRUCTION OF THE PROJECT WOULD INVOLVE GROUND-DISTURBING ACTIVITIES WITH THE POTENTIAL TO UNEARTH OR ADVERSELY IMPACT PREVIOUSLY UNIDENTIFIED ARCHAEOLOGICAL AND TRIBAL CULTURAL RESOURCES. THEREFORE, THE PROJECT WOULD RESULT IN LESS THAN SIGNIFICANT IMPACTS WITH MITIGATION INCORPORATED.

RIN-S-01 is a multi-component site that includes four bedrock milling features and 12 historic-period features including foundations and debris. Subsurface testing completed near the BMFs indicates the site does not contain a prehistoric subsurface component and therefore represents a limited activity prehistoric site. Rincon Consultants, Inc. completed a review of building permits and twentieth century directories and was unable to determine the exact construction date for the built environment features or who may have occupied them. A review of historic aerials indicates that built features were constructed between 1947 and 1980 (NETR 2018) and were razed sometime between 2005 and 2008 (Google Earth 2018).

Based on the Phase II testing and archival research completed by Rincon, RIN-S-01 does not appear to be eligible for listing in the NRHP, CRHR or any local designation. RIN-S-01 is not associated with events that made a significant contribution to the broad patterns of history. RIN-S-01 does not appear to be associated with the lives of persons significant to the past. No elements such as intact structures or rock art are present. Lastly, the current investigation by Rincon has identified RIN-S-01 as lacking a subsurface component. Further, RIN-S-01 does not contain information needed to answer important scientific research questions and there is no demonstrable public interest in that information; have a special and particular quality such as being the oldest of its type or the best available example of its type; and is not directly associated with a scientifically recognized important prehistoric or historic event or person. Thus, the data potential of the resource is limited to the surface expression of the site which was exhausted as part of the current study. Other archaeological resources are not known to be present on-site.

Nevertheless, construction activities on the project site, including ground clearing, grading, and excavation, could have significant impacts on previously unidentified archaeological resources. Based on the preliminary analysis of site conditions and grading plans, grading depth would vary throughout the site, but the project's maximum anticipated depth of excavation would be approximately 37.5 feet near the entrance to the project site on Woodward Street. Pre-construction reconnaissance would be needed due to the possibility for encountering subsurface archaeological resources during construction activities, including site excavation. Previously unrecorded archaeological resources, if present on the project site, could be damaged or destroyed during ground disturbance undertaken for project implementation. Adverse physical effects to or destruction of archaeological resources would result in a significant impact. Implementation of mitigation measures described below would be required to reduce potential impacts to archaeological resources to a less than significant level.

Mitigation Measures

Avoidance or preservation in place of previously unknown cultural or archaeological resources would be preferred in the event that such resources are discovered on the project site during ground-disturbing activities. If avoidance or preservation in place of such resources is determined by

the City to not be feasible, Mitigation Measures CR-1 through CR-8 shall be implemented to reduce potential project impacts to cultural resources to a less than significant level. Mitigation Measure TCR-1, TCR-2, and TCR-3 would reduce potential impacts to tribal cultural resources, as detailed in Section 4.4, *Tribal Cultural Resources*.

CR-1 Worker's Environmental Awareness Program

Prior to the commencement of any ground-disturbing activities, a Qualified Archaeologist shall be retained to conduct a Worker's Environmental Awareness Program (WEAP) training on archaeological sensitivity and monitor safety for all construction personnel. The Qualified Archaeologist shall meet or exceed the Secretary of Interior's Professional Qualification Standards for archaeology (National Park Service 1983).The training shall be conducted by the Luiseno Native American Monitor and the Qualified Archaeologist. Archaeological and Tribal Cultural Resource sensitivity training shall include a description of the types of cultural material that may be encountered, cultural sensitivity issues, regulatory issues, protocols in the event unanticipated resources are discovered, and safety measures for the protection of the Luiseno Native American Monitor and the Qualified Archaeologist. Only construction personnel who received this training can conduct construction and disturbance activities in sensitive areas. All attendees shall confirm attendance by signing a sign-in sheet to be submitted to the City of San Marcos.

CR-2 Preparation of a Monitoring Agreement

Prior to the issuance of a Grading Permit, or ground-disturbing activities, the Applicant/Owner shall enter into a Tribal Cultural Resource Treatment and Monitoring Agreement (also known as a pre-excavation agreement) with the San Luis Rey Band of Mission Indians, or another TCA Tribe. The purpose of this agreement shall be to formalize protocols and procedures between the Applicant/Owner and the TCA Tribe for the protection and treatment of Native American human remains, funerary objects, cultural and/or religious landscapes, ceremonial items, traditional gathering areas and other tribal cultural resources, located within and/or discovered during ground disturbing and/or construction activities for the proposed project, including any additional archaeological surveys and/or studies, excavations, geotechnical investigations, grading, preparation for wet and dry infrastructure, and all other ground disturbing activities. The Tribal Cultural Resource Treatment and Monitoring Agreement shall contain terms that are consistent with Health and Safety Code Section 7050.5, Public Resources Code Section 5097.98, CEQA Guidelines Section 15064.5(e) or any other applicable law or regulation.

CR-3 Qualified Archaeologist and Native American Monitor

Prior to issuance of a Grading Permit, or ground-disturbing activities, the Applicant/Owner or Grading Contractor shall provide a written and signed letter to the Development Services Department stating that a Qualified Archaeologist and TCA Native American monitor have been retained at the Applicant/Owner or Grading Contractor's expense to implement the monitoring program, as described in the Tribal Cultural Resource Treatment and Monitoring Agreement.

CR-4 Monitoring Report

Prior to submittal of grading and/or improvement as-built plans, or prior to the issuance of any project Certificate of Occupancy, a monitoring report, which describes the results, analysis and conclusions of the archaeological and tribal cultural resource monitoring program shall be submitted by the Qualified Archaeologist, along with the TCA Native American monitor's notes and

comments, to the Planning Division Manager for approval. A copy of any submitted monitoring report shall be provided to the San Luis Rey Band of Mission Indians and any other TCA Tribe that requests the report.

CR-5 Monitoring Collaboration

The Qualified Archaeologist shall maintain ongoing collaborative consultation with the TCA Native American monitor during all ground-disturbing activities. The requirement for the monitoring program shall be noted on all applicable construction documents, including demolition plans, grading plans, etc. The Applicant/Owner or Grading Contractor shall notify the Planning Division of the start and end of all ground disturbing activities.

CR-6 Construction Meetings and Monitoring

The Qualified Archaeologist and TCA Native American Monitor shall attend all applicable pre-construction meetings with the General Contractor and/or associated Subcontractors to present the archaeological and tribal cultural resource monitoring program. The Qualified Archaeologist and TCA Native American monitor shall be present on-site full-time during grubbing, grading and/or other ground disturbing activities, including the placement of imported fill materials or fill used from other areas of the project site, to identify any evidence of potential archaeological or cultural resources. All fill materials shall be absent of any and all cultural resources. The Applicant/Owner or Grading Contractor may submit written documentation to the City to substantiate if any fill material is absent of cultural resources. Should the City concur that the fill material is absent of cultural resources, in consultation with a Qualified Archaeologist and the TCA Native American monitor, then no monitoring of that fill material shall be required.

CR-7 Discovery of Unknown Resources

The Qualified Archaeologist or the TCA Native American monitor may halt ground disturbing activities if unknown archaeological artifact deposits or cultural features are discovered. Ground disturbing activities shall be directed away from these deposits to allow a determination of potential importance. Isolates and clearly non-significant deposits (as determined by the Qualified Archaeologist, in consultation with the TCA Native American monitor) will be minimally documented in the field, collected and be given to the TCA Tribe so that they may be reburied at the site on a later date. If a determination is made that the unearthed artifact deposits are considered potentially significant, the San Luis Rey Band of Mission Indians, or the TCA Tribe referenced in CR-2, shall be notified and consulted with in regards to the respectful and dignified treatment of those resources. If a determination is made that the unearthed deposits represent tribal cultural resources, Mitigation Measure TCR-1 shall take effect. All sacred sites, significant tribal cultural resources and/or unique archaeological resources encountered within the project area shall be avoided and preserved as the preferred mitigation, if feasible.

If however, a data recovery plan is authorized by the City as the Lead Agency under CEQA, the San Luis Rey Band of Mission Indians or the TCA Tribe referenced in CR-2 shall be notified and consulted regarding the drafting and finalization of any such recovery plan. The data recovery plan shall be submitted to the City prior to recovering the artifact. For significant artifact deposits, tribal cultural resources or cultural features that are part of a data recovery plan, an adequate artifact sample to address research avenues previously identified for sites in the area will be collected using professional archaeological collection methods. If the Qualified Archaeologist collects such resources, the TCA Native American monitor must be present during any testing or cataloging of

those resources. Moreover, if the Qualified Archaeologist does not collect the cultural resources that are unearthed during the ground disturbing activities, the TCA Native American monitor, may at their discretion, collect said resources and provide them to the contracted TCA Tribe referenced in CR-2 for respectful and dignified treatment in accordance with the Tribe's cultural and spiritual traditions. If the Developer, the Qualified Archaeologist and the TCA Tribe cannot agree on the significance or mitigation for such resources, these issues will be presented to the Planning Division Manager for decision. The Planning Division Manager shall make a determination based upon the provisions of the California Environmental Quality Act and California Public Resources Code Section 21083.2(b) with respect to archaeological resources, tribal cultural resources and shall take into account the religious beliefs, cultural beliefs, customs and practices of the TCA Tribe. Notwithstanding any other rights available under law, the decision of the Planning Division Manager shall be appealable to the Planning Commission and/or City Council.

CR-8 Treatment and Disposition of Historical Cultural Resources

In the event historical cultural resources (non-tribal cultural resources) are encountered inadvertently during ground-disturbing activities, work in the immediate area must halt and the Qualified Archaeologist must be immediately contacted to evaluate the find and develop a plan for treatment of the find/archaeological site. The following procedures shall be carried out for treatment and disposition of the discoveries:

1. **Temporary Curation and Storage.** During the course of construction, all discovered resources shall be temporarily curated in a secure location on site or at the offices of the Qualified Archaeologist. The removal of any artifacts from the project site shall be inventoried thoroughly by the Qualified Archaeologist and conducted in the presence of the TCA Native American monitor.
2. **Treatment and Final Disposition.** The landowner(s) shall relinquish ownership of all historical cultural resources (non-tribal cultural resources) collected during the grading monitoring program and, if appropriate, from any previous archaeological studies or excavations on the project site. Mitigation Measure TCR-1 in Section 4.4, *Tribal Cultural Resources* of this EIR details the requirements for treatment and disposition of tribal cultural resources in the event they are encountered during ground disturbing activities. In the event that curation of historical cultural resources (non-tribal cultural resources) is required, curation shall be conducted by an approved facility and the curation shall be guided by the California State Historic Resource Commission Guidelines for the Curation of Archaeological Collections. The City of San Marcos shall provide the developer final curation language and guidance on the project grading plans prior to issuance of the grading permit, if applicable, during project construction.

Significance After Mitigation

With implementation of Mitigation Measures CR-1 through CR-8, the project's potential to cause a substantial adverse change in the significance of an archaeological resource as defined in State CEQA Guidelines Section 15064.5, would be reduced to a less than significant level.

Threshold 3:	Would the project disturb any human remains, including those interred outside of formal cemeteries?

Impact CR-2 NO KNOWN HUMAN REMAINS ARE PRESENT ON THE PROJECT SITE. HOWEVER, CONSTRUCTION OF THE PROJECT WOULD INVOLVE GROUND-DISTURBING ACTIVITIES, SUCH AS GRADING AND SURFACE EXCAVATION, WITH THE POTENTIAL TO UNEARTH OR ADVERSELY IMPACT PREVIOUSLY UNIDENTIFIED HUMAN REMAINS. THEREFORE, THE PROJECT WOULD RESULT IN LESS THAN SIGNIFICANT IMPACTS WITH MITIGATION INCORPORATED.

No known human remains are present on the project site based on the findings of the SCIC records search and cultural resources surveys completed for the project site in the Phase I Cultural Resources Due Diligence (Appendix E) and Phase II Cultural Resources Study. Due to ground disturbing activities during construction, the potential exists for the discovery of previously unknown human remains. If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the county coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. Implementation of mitigation measures described above and referenced below would be required to reduce potential impacts to human remains.

Mitigation Measures

Adherence to State of California Health and Safety Code Section 7050.5, as well as Mitigation Measure TCR-3, as detailed in Section 4.4, *Tribal Cultural Resources,* would reduce potentially significant impacts to human remains on the project site in the event that previously unknown human remains are discovered during ground disturbing activities.

Significance After Mitigation

With adherence to State of California Health and Safety Code Section 7050.5, as well as implementation of Mitigation Measure TCR-3, the project's potential to disturb any human remains, including those interred outside of formal cemeteries, would be reduced to a less than significant level.

4.2.3 Cumulative Impacts

The planned and pending projects in the project vicinity are listed in Table 3-1 (Section 3, *Environmental Setting*) and include residential, mixed use, and industrial land uses. The proposed project, in conjunction with other planned and pending projects in the project vicinity, would cumulatively increase the potential to encounter sensitive cultural and archaeological resources. In the event that cultural and archaeological resources are discovered, each individual project would be required to comply with the applicable regulatory requirements and mitigate any potential impacts to resources on the individual project site. Potential impacts of the proposed project would be reduced to a less-than-significant level due to implementation of mitigation measures that would protect cultural and archaeological resources. Compliance with CEQA requirements, including the implementation of recommendations provided in project-specific cultural resource studies, on all new development would ensure that the proposed project would not be cumulatively significant. Such recommendations may include site avoidance, in-situ preservation, site salvage and documentation, and/or other measures determined to be necessary based on the resources identified. Therefore, cumulative impacts would be less than significant.

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4.3 Noise

This section addresses potential noise impacts that may result from construction and/or operation of the Mission 316 West Project. The following discussion includes a description of the existing noise conditions in the project area, identifies applicable regulations, evaluates the project's consistency with applicable goals and policies, identifies and analyzes environmental impacts, and recommends measures to reduce or avoid adverse impacts anticipated from project implementation as applicable.

The analysis in this section is based on noise measurements and modeling completed by Ldn Consulting, Inc. (2018). The project Noise Assessment is included in Appendix F of this EIR.

4.3.1 Setting

a. Overview of Sound Measurement

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment (Caltrans 2013a).

Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels so that they are consistent with the human hearing response, which is most sensitive to frequencies around 4,000 Hertz and less sensitive to frequencies around and below 100 Hertz (Kinsler, et. al. 1999). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used to measure earthquake magnitudes. A doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; dividing the energy in half would result in a 3 dB decrease (Crocker 2007).

Human perception of noise has no simple correlation with sound energy: the perception of sound is not linear in terms of dBA or in terms of sound energy. Two sources do not "sound twice as loud" as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA, increase or decrease (i.e., twice the sound energy); that a change of 5 dBA is readily perceptible (8 times the sound energy); and that an increase (or decrease) of 10 dBA sounds twice (half) as loud ([10.5x the sound energy] Crocker 2007).

Sound changes in both level and frequency spectrum as it travels from the source to the receiver. The most obvious change is the decrease in level as the distance from the source increases. The manner by which noise reduces with distance depends on factors such as the type of sources (e.g., point or line, the path the sound will travel, site conditions, and obstructions). Noise levels from a point source typically attenuate, or drop off, at a rate of 6 dBA per doubling of distance (e.g., construction, industrial machinery, ventilation units). Noise from a line source (e.g., roadway, pipeline, railroad) typically attenuates at about 3 dBA per doubling of distance (Caltrans 2013a). The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site, such as a parking lot or smooth body of water, receives no additional ground attenuation and the changes in noise levels with distance (drop-off rate) result from simply the geometric spreading of the source. An additional ground attenuation value of 1.5 dBA per doubling of distance applies to a soft site (e.g., soft dirt, grass, or scattered bushes and trees)(Caltrans 2013a). Noise levels may also

be reduced by intervening structures; the amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain features such as hills and dense woods, and man-made features such as buildings and walls, can significantly alter noise levels. Generally, any large structure blocking the line of sight will provide at least a 5-dBA reduction in source noise levels at the receiver (Federal Highway Administration [FHWA] 2011). Structures can substantially reduce exposure to noise as well. The FHWA's guidelines indicate that modern building construction generally provides an exterior-to-interior noise level reduction of 20 to 35 dBA with closed windows.

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important factors of project noise impact. Most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors have been developed. One of the most frequently used noise metrics is the equivalent noise level (Leq); it considers both duration and sound power level. Leq is defined as the single steady A-weighted level equivalent to the same amount of energy as that contained in the actual fluctuating levels over time. Typically, Leq is summed over a one-hour period. Lmax is the highest root mean squared (RMS) sound pressure level within the sampling period, and Lmin is the lowest RMS sound pressure level within the measuring period (Crocker 2007).

Noise that occurs at night tends to be more disturbing than that occurring during the day. Community noise is usually measured using Day-Night Average Level (DNL), which is the 24-hour average noise level with a +10 dBA penalty for noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours; it is also measured using Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a +5 dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a +10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. (Caltrans 2013a). Noise levels described by DNL and CNEL usually differ by about 1 dBA. The relationship between the peak-hour Leq value and the Ldn/CNEL depends on the distribution of traffic during the day, evening, and night. Quiet suburban areas typically have CNEL noise levels in the range of 40 to 50 dBA, while areas near arterial streets are in the 50 to 60-plus CNEL range. Normal conversational levels are in the 60 to 65-dBA Leq range; ambient noise levels greater than 65 dBA Leq can interrupt conversations (FTA 2018).

Effects of Noise on People

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise, but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over 8 hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

Vibration

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent structures. The number of cycles per second of oscillation makes up the vibration frequency, described in terms of Hz. The frequency of a vibrating object describes how rapidly it oscillates. The normal frequency range of most groundborne

vibration that can be felt by the human body starts from a low frequency of less than 1 Hz and goes to a high of about 200 Hz (Crocker 2007).

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings, such as from nearby construction activities, may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as groundborne noise. Groundborne noise is usually only a problem when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz), or when foundations or utilities, such as sewer and water pipes, physically connect the structure and the vibration source (Federal Transit Administration [FTA] 2018). Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern from vibration is that it can be intrusive and annoying to building occupants and vibration-sensitive land uses.

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations diminish much more rapidly than low frequencies, so low frequencies tend to dominate the spectrum at large distances from the source. Discontinuities in the soil strata can also cause diffractions or channeling effects that affect the propagation of vibration over long distances (Caltrans 2013b). When a building is impacted by vibration, a ground-to-foundation coupling loss will usually reduce the overall vibration level. However, under rare circumstances, the ground-to-foundation coupling may actually amplify the vibration level due to structural resonances of the floors and walls.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS) vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (Caltrans 2013b).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2018).

Damage to structures occurs when vibration levels range from 2 to 6 in/sec PPV. One half this minimum threshold, or 1 inch per second PPV is considered a safe criterion that would protect against structural damage (Caltrans 2013b).

Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second (FTA 2018). The general human response to different levels of groundborne vibration - velocity levels is described in Table 4.3-1.

Table 4.3-1 Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception for many people
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable
85 VdB	Vibration acceptable only if there are an infrequent number of events per day

Source: FTA 2018

b. Existing Noise Setting

Major noise sources in San Marcos include vehicular traffic on State Route (SR) 78 and major arterials throughout the City (such as San Marcos Boulevard and Mission Road). Train traffic along the North County Transit District (NCTD) Sprinter rail line, which generally runs parallel to SR 78, is another major source of noise in the City (City of San Marcos 2013). Train traffic is mainly limited to daily passenger transit on the North County Transit District Sprinter rail line, with some periodic freight use.

The City of San Marcos General Plan Noise Element provides an existing noise contour map (Figure 7-1, Existing Noise Contours), describing the noise source characteristics of the City. The project site lies within the 60 dBA CNEL contours according to Figure 7-1 in the City's General Plan Noise Element. The general noise environment of the project site and the vicinity is characterized by freeway and roadway traffic noise, as well as train traffic noise. The proposed project site is adjacent to East Mission Road, a major arterial route, which generates the site's proximate noise source. SR 78 lies approximately 1,500 feet to the south of the project site, and traffic along SR 78 also contributes to the ambient noise. Additionally, the NCTD Sprinter rail line provides some contribution, as it runs along East Mission Road approximately 160 feet south of the project site.

The closest airport is the McClellan-Palomar Airport, located approximately 6 miles to the west of the project site, in the neighboring city of Carlsbad. The San Diego County Sheriff's Office (SDSO) operates a helipad on Santar Place, approximately 4,000 feet to the southwest of the project site. The City is located entirely outside the 60 dBA CNEL contours for the McClellan-Palomar Airport, and SDSO helipad operations are minimal and for emergency purposes only (City of San Marcos 2013).

Sensitive Receptors

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. The City of San Marcos General Plan Noise Element identifies noise sensitive land uses as schools, libraries, hospitals, convalescent and day care facilities, parks, churches, places of public assembly, guest lodging, and residential neighborhoods (City of San Marcos 2013). Nearby noise-sensitive land uses include single-family residences located 100 feet and more from the project site. The San Marcos Branch Library is approximately 350 feet south of the site.

Vibration sensitive receivers are generally similar to noise sensitive receivers, such as residences, and institutional uses, such as schools, churches, and hospitals. However, vibration sensitive receivers also include buildings where vibrations may interfere with vibration-sensitive equipment, affected by levels that may be well below those associated with human annoyance. Nearby vibration-sensitive land uses include single-family residences located 100 feet and more from the project site.

Figure 4.3-1 Noise Measurement Location



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Existing Project Area Noise Levels

Ldn Consulting Inc. prepared a Noise Assessment (Appendix F) to measure existing noise conditions, and model noise and vibration impacts to and from the proposed project. The study included a 44-hour noise measurement between August 2 and 4, 2018, using two Larson-Davis Spark Model 706 Type 2 precision sound level meters in accordance with standard protocols. The noise meters were positioned on relatively flat terrain without obstruction from trees or rock outcroppings in order to determine worst case scenarios at the nearest proposed sensitive receptors. Hourly noise levels were measured along East Mission Road during typical weekday conditions, over 24 hours, to determine the average daytime and nighttime hourly noise levels, or Leq, and the 24-hour CNEL. Table 4.3-2 details the measured sound levels.

Table 4.3-2 24-Hour Ambient Noise Level Measurements

Measure-ment Location	Distance: Measurement Location to Existing Primary Noise Source (feet)	Time	Noise Level (CNEL)	Noise Levels (dBA L_{eq})					
				L_{eq}	L_{max}	L_{min}	L10	L50	L90
M1 (Figure 4.3-1)	90	August 2, 2018, 4:00 p.m. – August 4, 12:00 p.m.	53	52.5	85.4	35.3	54.0	49.5	39.5

Source: Ldn Consulting Inc. on August 2-4, 2018 (Appendix F)

c. Regulatory Setting

Federal

No federal noise requirements or regulations apply directly to the implementation of the project, but federal agencies have established guidelines and thresholds pertaining to noise and groundborne vibration as they relate to land use compatibility, human response, and structural integrity. These thresholds, as applicable, are discussed below in Section 4.3.2, *Impact Analysis*.

State

The state of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires each county and city to adopt a General Plan that includes a Noise Element prepared per guidelines adopted by the Governor's Office of Planning and Research. The purpose of the Noise Element is to limit the exposure of the community to excessive noise levels. The California Environmental Quality Act requires all known environmental effects of a project be analyzed, including environmental noise impacts.

California Noise Control Act of 1973

California Health and Safety Code Sections 46000 through 46080, known as the California Noise Control Act, find that excessive noise is a serious hazard to public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. The act also finds that there is a continuous and increasing bombardment of noise in urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and

abatement of noise. It is the policy of the State to provide an environment for all Californians that is free from noise that jeopardizes their health or welfare.

California Building Code (CCR Title 24, Part 2)

In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for multi-family residential buildings (Title 24, Part 2, California Code of Regulations). Title 24 establishes standards for interior room noise (attributable to outside noise sources). The regulations also specify that acoustical studies must be prepared whenever a multi-family residential building or structure is proposed to be located near an existing or adopted freeway route, expressway, parkway, major street, thoroughfare, rail line, rapid transit line, or industrial noise source, and where such noise source or sources create an exterior CNEL (or Ldn) of 60 dBA or greater. Such acoustical analysis must demonstrate that the residence has been designed to limit intruding noise to an interior CNEL (or Ldn) of at least 45 dBA in any habitable room. Acoustical studies that accompany building plans for noise-sensitive land uses must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable levels. Table 4.3-3 specifies the levels for new residential buildings, schools, and hospitals to satisfy the acceptable interior noise limit for new construction of 45 dBA CNEL.

Table 4.3-3 California Building Code Interior Noise Standards

Land Use Category	Exterior Noise Level where Noise Study is Required (dBA CNEL)	Interior Noise Level Limit (dBA CNEL)
Residential, schools, and hospitals	60	45
Non-residential	65	50

Source: California Building Standards Commission 2017

If the development falls within an airport or freeway 65 dBA CNEL noise contour, the combined sound transmission class (STC) rating of the wall and roof-ceiling assemblies must be at least 50. For those developments in areas where noise contours are not readily available, and the noise level exceeds 65 dBA Leq for any hour of operation, a wall and roof-ceiling combined STC rating of 45, and exterior windows with a minimum STC rating of 40 are required (Section 5.507.4.1). Alternatively, if the interior noise levels of non-residential buildings satisfy the performance criteria of 50 dBA Leq (1 hour), then the performance method defined by the California's Green Building Standards can be used.

California General Plan Guidelines

The California General Plan Guidelines, published by the Governor's Office of Planning and Research, indicate acceptable, specific land use types in areas with specific noise exposure. The guidelines also offer adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution. These guidelines are advisory, and local jurisdictions, including the City of San Marcos, have the responsibility to set specific noise standards based on local conditions. Please refer to the discussion below, under City of San Marcos General Plan, for the compatibility guidelines adopted by the City.

Local

City of San Marcos General Plan

The City has adopted a General Plan Noise Element to control and abate environmental noise, and to protect the citizens of the City from excessive exposure to nose. The Noise Element specifies the maximum allowable unmitigated exterior noise levels for new developments impacted by transportation noise sources such as arterial roads, freeways, airports, and railroads. In addition, the Noise Element identifies several polices to minimize the impacts of excessive noise levels throughout the community (City of San Marcos 2013).

Goal N-1: Promote a pattern of land uses compatible with current and future noise levels.

Policy N-1.2: Ensure that acceptable noise levels are maintained near noise-sensitive uses.

Policy N-1.3: Incorporate design features into residential land use projects that can be used to shield residents from excessive noise. Design features may include, but are not limited to: berms, walls, and sound attenuating architectural design and construction methods.

Policy N-1.4: Require new development projects to provide barriers to reduce noise levels, or provide sufficient spatial buffers to separate excessive noise generating land uses and noise-sensitive land uses.

Policy N-1.5: Require an acoustical study for proposed developments in areas where the existing and projected noise level exceeds or would exceed the Normally Acceptable levels identified in Table 7-3 (adapted and shown in Table 4.3-4 below)

The Noise Element establishes compatibility standards for land uses in the City. As shown in Table 4.3-4, the Noise Element sets normally acceptable, conditionally acceptable, and generally unacceptable ambient noise levels for proposed developments based on land use.

Table 4.3-4 Noise and Land Use Compatibility Guidelines for Exterior Noise

Land Use Category	Exterior Noise Level (CNEL)		
	Normally Acceptable	Conditionally Acceptable	Conditionally Unacceptable
Residential – Single Family, mobile homes, senior/age-restricted housing	<60	60-75	>75
Residential – Multi-family, mixed use (residential/commercial)	<65	65-75	>75
Lodging – Hotels, motels	<65	65-75	>75
Schools, churches, hospitals, residential care facility, child care facilities	<65	65-75	>75
Passive recreational parks, nature preserves, contemplative spaces, cemeteries	<65	65-75	>75
Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation	<65	65-75	>75
Office/professional, government, medical/dental, commercial, retail, laboratories	<65	65-75	>75
Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair	<65	>65	N/A

Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction measures necessary to achieve acceptable levels for land use. If a project cannot mitigate noise to a level deemed Acceptable, the appropriate County decision-maker must determine that mitigation has been provided to the greatest extent practicable or that extraordinary circumstances exist.

Unacceptable: New construction or development should generally not be undertaken.

Source: City of San Marcos 2013, Table 7-3 *Noise and Land Use Compatibility Guidelines for Transportation-related Noise*.

Furthermore, the City's Noise Element states that maximum interior noise level standards for new residential development is 45 dBA CNEL/Ldn, and new development must have sufficient noise insulation to achieve this interior noise standard.

City of San Marcos Municipal Code

The City of San Marcos Municipal Code (SMMC) sets forth the City's standards, guidelines, and procedures concerning the regulation of operational noise. Specifically, noise levels in the City are regulated by SMMC Chapter 10.24.010, Noise Ordinance. These regulations are intended to implement the goals, objectives, and policies of the General Plan, protect the public health, safety, and welfare of the City, and to control unnecessary excessive, and/or annoying noise in the City.

SMMC Chapter 17.32.180 states that grading, extraction, and construction activities are allowed between 7:00 AM to 4:30 PM, Monday through Friday. Grading, extraction, or construction activities are not permitted in the City on weekends or holidays. The City's municipal code does not set noise limits on construction activities, though the City has commonly utilized the County of San Diego's Noise Ordinance construction noise threshold of 75 dBA.

Chapter 20.300.070 of the City of San Marcos Municipal Code (Performance Standards) establishes exterior noise standards, which require noise levels from sources maintain noise levels of 60 dBA or less at surrounding single-family residences and 65 dBA at multi-family and all commercial uses. Although the City does not have a specific noise threshold for rock crushing, these standards are applicable to rock crushers.

4.3.2 Impact Analysis

d. Methodology and Significance Thresholds

According to Appendix G of the State CEQA Guidelines, significant noise impacts would occur if the proposed project would result in any of the following conditions:

1. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
2. Generation of excessive ground-borne vibration or ground-borne noise levels
3. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels

Impacts Determined to be Less than Significant

The Initial Study concludes that less than significant impacts would occur from project construction activities not involving a rock crusher (e.g., from grading), from on-site noise sources (e.g., from heating, ventilation, and air conditioning [HVAC] units), and from off-site traffic noise from project traffic. Further, it was determined that impacts from vibration, including from blasting during construction, would be less than significant. Finally, the Initial Study concludes that no noise impacts would occur from public airports or private airstrips. Therefore, an in depth analysis of threshold 2 and threshold 3, and the aforementioned aspects of threshold 1 is not warranted, and a summary of these impacts are described below.

Threshold 1:	Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction

Construction activities are anticipated to commence in December 2019 and would occur over a period of approximately 20 months. According to the project's Noise Assessment (Appendix F), highest noise levels from the construction equipment (not including rock crushing, discussed in Section 4.3) would occur during the grading operations. Grading activities would consist of the preparation of internal roadways, parking and the finished pads. The grading equipment would be spread out over the project site from distances near the property line adjacent to the nearest sensitive receptor (approximately 100 feet north) to distances of 500 feet or more away. Equipment would include dozers, scrapers, loaders, excavators, compactors, backhoes, and water trucks. Based on the site plan included in Appendix B to this EIR, the majority of the grading operations would occur more than 300 feet from the property lines. This means that most of the time the average distance from the equipment to the nearest property line is 300 feet. For the noise analysis, the

cumulative noise level at an average distance of 150 feet was analyzed. Cumulative noise levels during grading activities at this distance would be 74.6 dBA Leq (8-hour). The City of San Marcos Municipal Code does not set limits on construction noise levels, but commonly the City utilizes the County of San Diego's construction noise threshold of 75 dBA Leq (8-hour). The noise level from project construction activities would comply with the 75 dBA Leq (8-hour) threshold.

Furthermore, sound levels are logarithmic and not linear[1]. Sound levels that are separated by more than ten decibels generally do not cumulatively add to each other. The rock crusher noise level with implementation of mitigation measure NOI-1 would be estimated at 58.9 dBA Leq at the nearest residence (Section 4.3, *Noise*). The sum of the noise levels generated during grading (74.6 dBA Leq) and the mitigated rock crusher would be 74.7 dBA Leq, which is below the County's and City's noise level threshold. Construction noise would not exceed the 75 dBA standard average over eight hours at the property lines based on the difference between the two noise levels (74.6 dBA Leq – 58.9 dBA Leq = difference of 15.7 dBA Leq, which is greater than ten decibels). Therefore, temporary construction noise generated by the proposed project would have less than significant impacts.

Operational Noise

Existing uses near the project site may periodically be subject to noises associated with operation of the project, including from project traffic noise and HVAC units. The closest noise sensitive receptors would be the residences located approximately 100 feet east of the project site boundary (Mission 316 East).

ON-SITE NOISE SOURCES

The proposed project would introduce new residential development on the project site. Noise that is typical of such development include conversations, music, noise associated with rooftop HVAC units, and noise from people using outdoor spaces such as patios, balconies, and the passive recreational area.

The proposed two-car garages would be enclosed at the ground floor level of each residential unit. Therefore, noise associated with vehicle parking and lot circulation would not be audible at nearby noise-sensitive receptors.

Noise from HVAC units can reach 100 dBA at a distance of three feet without shielding (EPA 1971). This equipment usually has noise shielding cabinets placed on the roof or is located within mechanical equipment rooms. HVAC equipment noise would not be perceptible to nearby noise sensitive receptors if HVAC equipment would be placed in the interior of the proposed units (in the garage on the first floor), which is typical of multi-family residential development. If the HVAC equipment is placed on the roof with noise shielding, noise would be reduced to no greater than 55 dBA Leq at 50 feet from the source (EPA 1971). Site plans indicate that the nearest rooftop of the proposed residential units would be approximately 200 feet southwest of the property line of the nearest sensitive receptor (Appendix B). At 200 feet, the distance from the proposed residential unit nearest to the property line of the nearest noise sensitive receptor, HVAC noise would be 43 dBA Leq based on a 6 dB reduction per doubling of distance. This would not exceed the City's exterior noise standard of 60 dBA Leq during the daytime or 50 dBA Leq during the evening for single-family residential uses adjacent to the project site.

[1] Example: the sum of two noise sources of 68 dBA plus 68 dBA is equal to 71 dBA, not 136 dBA.

Noise generated by residents would include conversations, music, and the use of outdoor spaces such as patios, balconies, and the passive recreational area. Conversational noise would be intermittent, occurring only when people are using the outdoor spaces. Such noise levels would be imperceptible and would not exceed the City's exterior noise standard of 60 dBA Leq during the daytime and 55 dBA Leq during the evening for single-family residential uses adjacent to the project site. Furthermore, SMMC Chapter 10.24.010 prohibits loud, unnecessary or unusual noise that unreasonably disturbs the peace and quiet of any residential neighborhood or that causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area. Noise sources associated with property maintenance activities and all portable blowers, lawnmowers, or similar devices would be limited to normal daytime hours and prohibited on holidays.

Because the project would be similar to the surrounding community, would not generate substantial noise increases above ambient noise conditions, and would comply with the SMMC, on-site noise sources would not expose adjacent noise-sensitive receptors to significant noise impacts. Therefore, the project's on-site operational noise would not substantially contribute to ambient noise and the impact would be less than significant.

OFF-SITE TRAFFIC NOISE

Primary noise sources in the vicinity of the project site are motor vehicle activities and traffic. Vehicle trips associated with the project would permanently increase ambient noise from traffic on nearby street segments. For traffic-related noise, impacts would be significant if project-generated traffic results in exposure of sensitive receptors to unacceptable noise levels.

The Transportation Impact Analysis (TIA) prepared by Linscott, Law & Greenspan Engineers (Appendix G) provides traffic volumes for the AM and PM peak hour for several roadways in the vicinity of the project site. The project is calculated to generate approximately 536 ADT with 43 AM peak hour trips (6 inbound/34 outbound) and 54 PM peak hour trips (38 inbound/16 outbound).

Table 4.3-5 summarizes the percent changes in daily traffic volumes on nearby roadway segments and the resulting estimated increase in noise levels. Per FTA standards (FTA 2018), a noise exposure increase of 1 dBA or greater would result in a potentially significant traffic noise impact since the combination of existing roadway and train activities generates noise levels between 66 dBA CNEL and 72 dBA CNEL.

Table 4.3-5 Projected Change in Traffic Noise

Street Segment	Existing ADT	Existing +Project ADT	Percent Increase in ADT	Noise Level Increase (dBA)
Woodward Street				
Mulberry Dr. to Borden Rd.	3,100	3,150	2%	<0.4
Vineyard Rd. to Mission St.	7,900	8,010	1%	<0.4
Vineyard Road				
Borden Rd. to Woodward St.	3,600	3,650	1%	<0.4
Mission Road				
Firebird Ln. to Woodward St.	15,100	15,130	<1%	<0.4
Woodward St. to Mulberry Dr.	23,500	23,660	<1%	<0.4
San Marcos Boulevard				
Twin Oaks Valley Rd. to Mission Rd.	16,800	16,800	No change	No Change
Twin Oaks Valley Road				
San Marcos Blvd. to SR-78 WB Ramps	36,100	36,340	1%	<0.4

Source: Ldn Consulting, Inc. 2019 (Appendix G)

As shown in Table 4.3-5, traffic noise due to the project would not increase by more than 0.4 dBA at a roadway segment or intersection. The estimated project traffic noise increase would not exceed the most conservative applicable noise exposure increase threshold of 1 dBA. Therefore, traffic noise impacts would be less than significant.

Threshold 2: Would the project result in the generation of excessive groundborne vibration or groundborne noise levels?

The noise report prepared by Ldn Consulting (Appendix F) included vibration analysis, which concluded that vibration generated during construction activities would not exceed 85 vibration decibels (VdB) at the nearest sensitive receptors located 100 feet from the project site. Such construction activities would be restricted to daytime hours in accordance with the City's Noise Ordinance, and vibration-generating construction activities would not occur during recognized sleep hours for nearby residents.

Some rock blasting was determined to be necessary during project construction, though location, duration, and extent of blasting activities are undetermined at this time. SMMC Title 17 states that all blasting operations within the City of San Marcos are prohibited unless a Certificate of Authorization is first obtained from the San Marcos Building Director and an Operations Permit issued by the Fire Chief.

Based on the construction vibration damage criteria published by the FTA (2018), the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second. Therefore, the effect of the blasting activity on nearby residential structures would not be significant. On the other hand, the human annoyance criterion of 85 VdB may be exceeded when blasting occurs within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided, but can be minimized by following the City's blasting procedures as stated in SMMC Section 17.60.060, which include notification procedures to the City's Building Division, SMFD, and all residences or

businesses within 600 feet of any potential blast location; as well as post-blasting inspections and written report by a registered structural engineer employed by the blaster or project contractor, to be submitted to the Building Division. Therefore, vibration impacts from construction and blasting activities would be less than significant.

The project would be located approximately 175 feet north from the centerline of the San Diego Northern Railroad which consists of a SPRINTER line service operated by North Coast Transit District (NCTD). The Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual estimates that freight train vibration levels can be as high as 72 VdB at 175 feet from the track centerline and up to 62 VdB for commuter rail trains (Ldn Consulting, 2019). Therefore, the freight trains will be below the 80 VdB threshold for infrequent events and the SPRINTER commuter train will be below the 72 VdB threshold for frequent annoyance events. Additionally, the SPRINTER transit center is located approximately 500 feet from the project site and, therefore, commuter trains would be travelling slower than usual and would have a lower vibration level.

Residential uses are not typically associated with the generation of substantial vibration. Consequently, operation of the proposed project would not perceptibly increase groundborne vibration or groundborne noise on the project site above existing conditions. Therefore, vibration impacts generated from project operation would be less than significant.

Threshold 3:	For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?

The project site is not located near an airport or private airstrip. The nearest airport to the project site is the McClellan-Palomar Airport, which is approximately seven miles west of the project site in the City of Carlsbad. According to the McClellan-Palomar Airport Compatibility Plan, the site is located outside of the 60 dBA noise contour from airport activities (SD County Airport Land Use Commission 2010). The San Diego County Sheriff's Department operates a helipad on Santar Place, approximately 4,000 feet to the southwest of the project site; helipad operations are sporadic and for emergency purposes only. Therefore, the project would not expose persons residing or working on the site to excessive noise levels associated with air traffic and the project would have no impact.

Impacts Determined to be Potentially Significant

The Initial Study determined that rock crushing during project construction could potentially impact nearby sensitive receptors. The impacts associated with Threshold 1 are described below.

Threshold 1:	Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Impact NOI-1 ROCK CRUSHING ACTIVITIES DURING SITE GRADING WOULD RESULT IN POTENTIALLY SIGNIFICANT IMPACTS FROM NOISE LEVELS TO ADJACENT MULTI-FAMILY RESIDENCES AND A NEARBY LIBRARY. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED.

The Initial Study identified the use of a rock crusher as a potentially significant impact, which is analyzed below. Noise impacts related to other construction activities are covered under Section 4.5, *Impacts Found to be Less than Significant.*

Construction activity is anticipated to occur over a period of approximately 20 months. A rock crusher would be needed for several weeks during project construction due to the properties of the bedrock on the project site. The rocks would be blasted and then transported to the rock crusher for further processing. A rock crusher can be selectively placed on-site to maximize the distance to the nearest noise-sensitive land use; therefore, the rock crusher would be located approximately 333 feet from the San Marcos Branch Library and 576 feet from the nearest multi-family residences, as seen in Figure 4.3-2 below. Use of the rock crusher would be limited to the hours of 7:00 AM to 4:30

PM, Monday through Friday, and would not be allowed on weekends or holidays, per SMMC Chapter 17.32.180.

The project would utilize a Thunderbird Hazemag Impact Crushing Plant Model CP300 rock crusher or equivalent. Based on empirical data collected at a material processing plant in the City of Upland, noise levels from an equivalent rock crusher ranged between 80-86 dBA at 45 feet (Ldn Consulting, Inc. 2018). Table 4.3-6 shows the estimated noise level for the rock crusher at the nearest noise-sensitive land uses. The estimate is conservative as it does not take into account any shielding from topography, stockpiled materials or any barriers that may exist at the nearest residences.

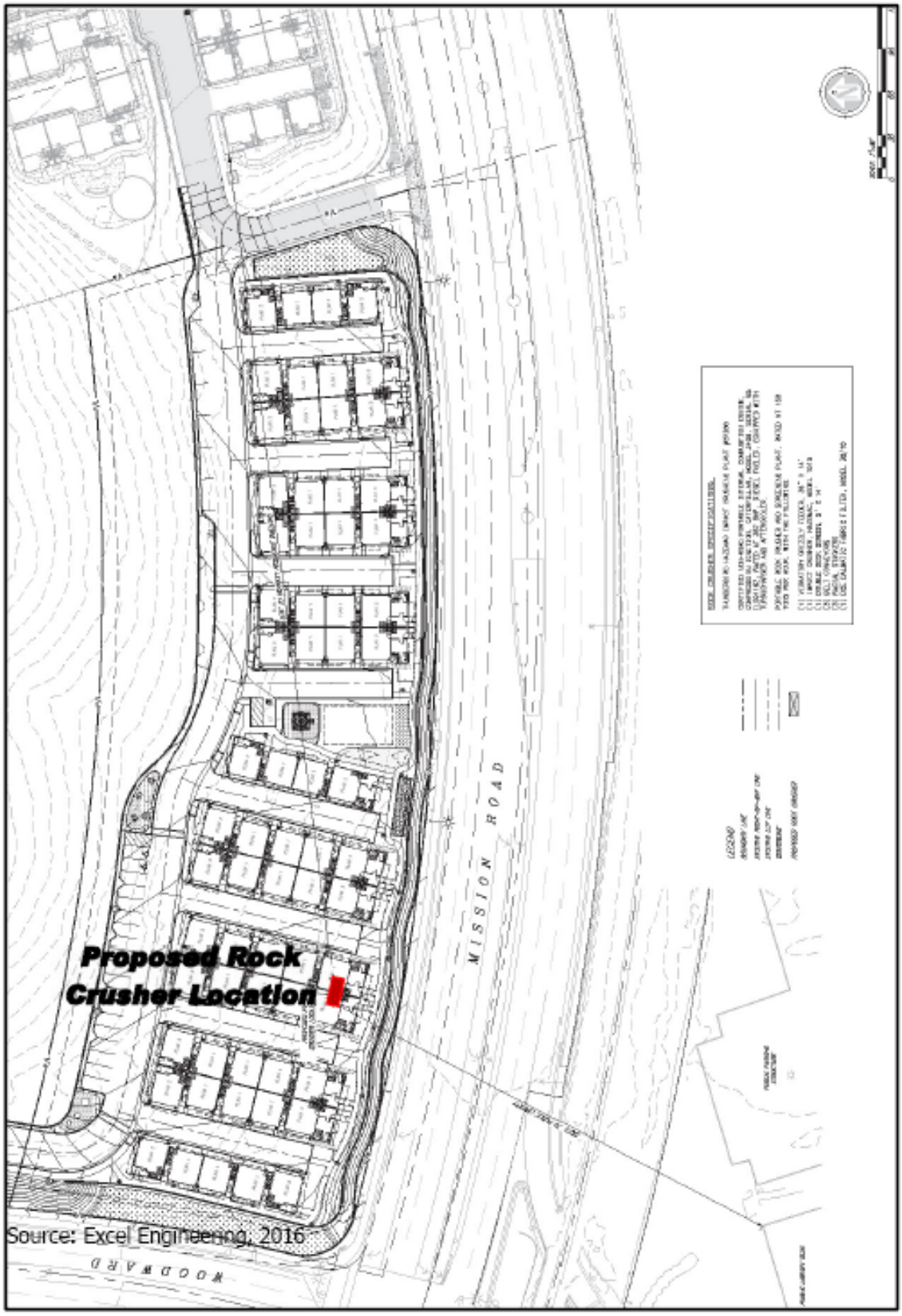
Table 4.3-6 Rock Crushing Noise Levels

Sensitive Use	Rock Crusher Noise Level at 45 feet (dBA Leq)	Distance to Sensitive Use (feet)	Noise Reduction due to Distance (dBA Leq)	Noise Level at Sensitive Use (dBA Leq)	Noise Threshold (dBA Leq)	Reduction Needed (dBA Leq
Multi-family Residential	86	576	-22.1	63.9	65	0
Library		333	-17.4	68.6	65	3.6

Source: Ldn Consulting, Inc. 2018

As shown in Table 4.3-6 the rock crusher would exceed established noise levels at the nearby San Marcos Branch Library by 3.6 dBA Leq. Therefore, noise impacts from the rock crusher are potentially significant and require mitigation to reduce noise levels at the library during its use.

Figure 4.3-2 Rock Crusher Location



Mitigation Measures

NOI-1 Rock Crusher Noise Shielding

A noise barrier shall be used during operation of the rock crusher to shield the line of sight from the rock crusher to the San Marcos Branch Library. The crusher is expected to be 10 feet in height. To shield the line of sight, the barrier shall be at least 1 to 2 feet taller than the rock crusher (e.g., with a 10-foot tall crusher, the barrier shall be at least 11 to 12 feet in height). The barrier can consist of an earthen berm, 5/8-inch plywood, 1-inch acoustical blankets or any combination of these materials. Figure 4-A of the Noise Assessment (Appendix F) shows the general location of the crusher and placement of the required barrier. Noise measurements of the rock crusher shall be conducted by a qualified acoustician once the final crusher type and location are determined to ensure compliance with the City's thresholds. If noise levels are found to be above the established thresholds of 60 dBA at any existing single family residential use or 65 dBA for any multifamily use, library, or commercial use, then additional mitigation in the form of higher barriers, sound absorbing material, and/or operational limits on the crushers usage shall be incorporated sufficient to reduce noise to levels not exceeding 60 dBA at any existing single family residential use and 65 dBA for any multifamily, library, or commercial use in the vicinity of the project. Noise measurements and any additional mitigation at the noise barrier shall be recorded by the qualified acoustician and provided to the City and the City's request.

Significance After Mitigation

Breaking the line of sight from a noise source to a receiver would typically achieve a 5 dBA or greater reduction (Appendix F); therefore, with implementation of Mitigation Measure NOI-1, the rock crusher would be estimated to generate a noise level of 58.9 dBA Leq at the nearest residence and 63.6 dBA Leq at the San Marcos Branch Library. With implementation of Mitigation Measure NOI-1, impacts from project construction noise would be below City thresholds for rock crushing and would be less than significant.

4.3.3 Cumulative Impacts

The proposed project, in conjunction with other development in the City and surrounding areas as listed in Table 3-1 in Section 3, *Environmental Setting*, would cumulatively increase noise levels on a temporary basis during construction periods and permanently during operation. However, temporary construction noise impacts are site-specific and would be reduced to a less-than-significant level due to implementation of mitigation measures on a project-by-project basis to prevent adverse noise impacts on existing uses and residents. As discussed in the *Impacts Found to be Less then Significant* Chapter, Section 4.5.12, *Noise*, sound levels are logarithmic and not linear, and sound levels that are separated by more than ten decibels generally do not cumulatively add to each other. Furthermore, as stated above under Section 4.3.1, *Setting*, noise levels from a point source typically attenuate, or drop off, at a rate of 6 dBA per doubling of distance (e.g., construction, industrial machinery, ventilation units). Therefore, the distance between cumulative projects and the proposed project alone would be sufficient in ensuring cumulative construction noise impacts for all projects considered are less than significant, should construction activities overlap in schedule.

Rock crushing activities during construction are dependent on existing site conditions, which vary by project, and may not occur at all of the projects listed in Table 3-1. Any other projects that would require rock crushing would be subject to the City regulations for allowable construction schedules

and the 60 dBA noise level threshold specific to rock crushers, and may be required to implement mitigation measures similar to NOI-1, above. Furthermore, the noise level threshold for rock crushers (60 dBA) is more stringent than construction noise (75 dBA). Therefore, cumulative noise impacts from temporary construction or rock crushing activities would be less than significant and would not be cumulatively considerable.

The Noise Report concluded that the project does not create a direct or cumulative increase in noise levels greater than 3 dBA CNEL on local roadways. Therefore, the project would not cause cumulatively significant traffic noise impacts (Appendix F). Cumulative noise levels from roadway traffic and train activity was modeled to determine impacts to the proposed multi-family residences and outdoor spaces along Woodward Street and E. Mission Road. Noise levels at the building façade and outdoor areas along Woodward Street and E. Mission Road were found to exceed the 65 dBA CNEL City standard. As a design feature, noise barriers in the form of five-foot walls along the ground floor patio and outdoor space and four-foot walls at the second-floor balconies/decks along Woodward Street and E. Mission Road will be installed and constructed with non-gapping material as part of the project. The Noise Report concluded that the cumulative noise levels at the outdoor spaces along Woodward Street and E. Mission Road would comply with the City's noise standard of 65 dBA CNEL with the proposed noise barriers (Appendix F). Pursuant to Building Code requirements, a noise report will be required prior to building permit issuance to show interior noise levels comply with City and Building Code requirements of 45 dBA CNEL. The Noise Report concluded that standard construction material would reduce interior noise levels to 45 dBA CNEL (Appendix F).

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4.4 Transportation

This section investigates the effects of the multi-family residential project on transportation. The analysis is based on a Traffic Impact Analysis (TIA) prepared by LLG Engineers, which includes a sight distance analysis for the proposed project driveways, and is provided as Appendix G.

4.4.1 Setting

a. Existing Transportation Setting

Transportation Facilities

Roadway System

The study area was based on the San Diego Traffic Engineering Council (SANTEC)/Institute of Traffic Engineers (ITE) Guidelines for Traffic Impact Studies in the San Diego Region, March 2, 2000. Based on the guidelines, the traffic study must include "all local roadway segments, intersections, and mainline freeway locations where the Project will add 50 or more peak hour trips in either direction or freeway ramp meter locations where the Project will add 20 or more peak hour trips in either direction to the existing traffic conditions."

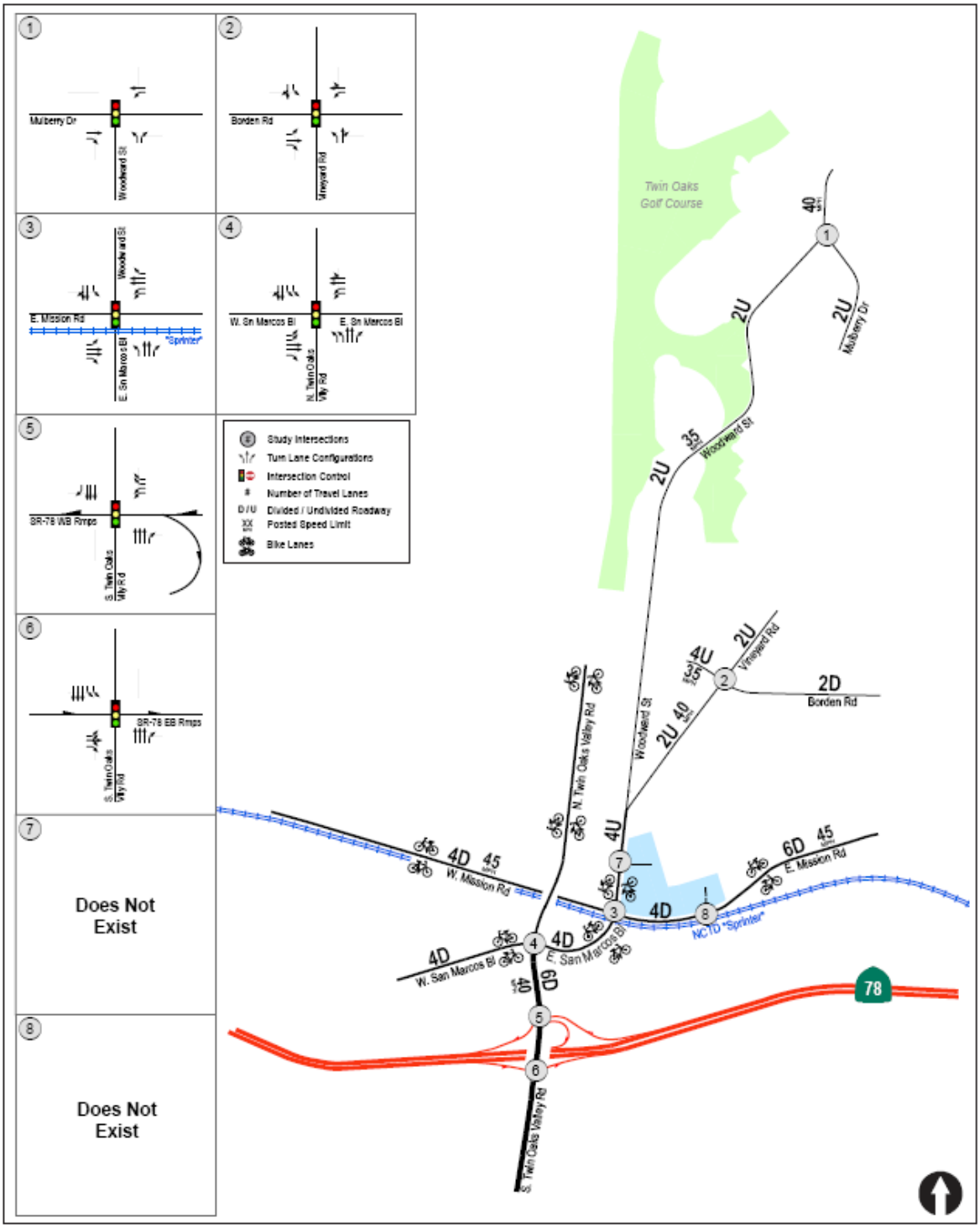
Therefore, the project study area includes the following intersections as seen in Figure 4.4-1:

1. Mulberry Drive and Woodward Street
2. Vineyard Road and Borden Road
3. East San Marcos Boulevard/Woodward Street and East Mission Road
4. Twin Oaks Valley Road and San Marcos Boulevard
5. Twin Oaks Valley Road and SR 78 WB Ramps
6. Twin Oaks Valley Road and SR 78 EB Ramps
7. Woodward Street and Proposed Project Driveway #1
8. East Mission Road and Proposed Project Driveway #2

The TIA describes the existing street system as composed of highway ramps (SR 78), arterial streets, collector streets, and local streets. The TIA evaluated the following roadway segments, selected by the City:

- **Woodward Street** from Mulberry Drive to Borden Road
- **Woodward Street** from Vineyard Road to Mission Street
- **Vineyard Road** from Borden Road to Woodward Street
- **Mission Road** from Firebird Lane to Woodward Street
- **Mission Road** from Woodward Street to Mulberry Drive
- **San Marcos Boulevard** from Twin Oaks Valley Road to Mission Road
- **Twin Oaks Valley Road** from San Marcos Boulevard to SR 78 WB Ramp

Figure 4.4-1 Roadway Network and Study Area Intersections Existing Conditions



LINSCOTT LAW & GREENSPAN engineers

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Date: 07/24/18

Figure 3-1

Existing Conditions Diagram

URBAN VINEYARD

Source: LLG Engineers, 2018

Public Transit

The North County Transit District (NCTD) is the public agency that serves the project area. Transit service is provided to the area via the BREEZE Bus System Route 305 and the SPRINTER Hybrid Rail Line. Route 305 provides bus service to the area via the Mission Road and Vineyard Road stop. Route 305, with service between the Vista Transit Center and the Escondido Transit Center, operates between 4:34 AM and 6:34 PM with a 30-minute frequency on weekdays and between 5:34 AM to 10:56 PM with a frequency of a 30-minute frequency on weekends and holidays. The Mission Road and Vineyard Road stop is located about 0.7 miles mile from the project site.

NCTD also runs the SPRINTER Hybrid Rail line. The nearest station to the project site is the San Marcos Civic Center Station, located at Mission Road and Vineyard Road approximately 500 feet southwest of the project site. The SPRINTER runs between 4:03 AM and 8:33 PM with stops every 30 minutes.

Bicycle and Pedestrian Facilities

Sidewalks are provided along all streets in the study area with the exception of the east side of Woodward Street along the stretch from Mulberry Drive to Atwood Place. Within the study area, Class 2 bike lanes are provided on Twin Oaks Valley Road, San Marcos Boulevard, and Mission Road in both directions, on portions of Woodward Street north of Mission Road, and on Vineyard Road between Mulberry Drive and Woodward Street.

Intersection and Roadway Volumes

There are various methodologies used to analyze signalized intersections, unsignalized intersections and street segments. The measure of effectiveness for intersection and segment operations is level of service (LOS) which denotes the operating conditions which occur at a given intersection or on a given roadway segment under various traffic volume loads. It is a qualitative measure used to describe a quantitative analysis taking into account factors such as roadway geometries, signal phasing, speed, travel delay, freedom to maneuver, and safety. LOS provides an index to the operational qualities of a roadway segment or an intersection. LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst. LOS designation is reported differently for signalized and unsignalized intersections, as well as for roadway segments.

In the 2000 Highway Capacity Manual (HCM), LOS for signalized intersections is defined in terms of delay. The LOS analysis results in seconds of delay expressed in terms of letters A through F. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Table 4.4-1 summarized the intersection LOS descriptions.

Table 4.4-1 Signalized and Unsignalized Intersection LOS Descriptions

Level of Service	Description	Signalized Delay (seconds)	Unsignalized Delay (seconds)
A	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.	0 to 10.00	0 to 10.0
B	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.	10.01 to 20.00	10.1 to 15.0
C	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.	20.01 to 35.00	15.1 to 25.0
D	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.	35.01 to 55.00	25.1 to 35.0
E	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.	55.01 to 80.00	35.1 to 50.0
F	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.	80.01 and up	50.1 and up

Source: Table 4-1 and 4-2 of the TIA, Appendix G

Existing Intersection Level of Service

Table 4.4-2 summarizes the peak hour intersection operations under existing conditions. As shown, all project study area intersections operate at a LOS D or better.

Table 4.4-2 Existing Intersection LOS

			Delay[1]		LOS	
No.	Intersection	Traffic Control	AM	PM	AM	PM
1	Mulberry Dr. and Woodward St.	Signal	8.2	7.3	A	A
2	Borden Rd. and Vineyard Dr.	Signal	21.5	18.2	C	B
3	San Marcos Blvd. and Woodward St.	Signal	38.6	40.2	D	D
4	San Marcos Blvd. and Twin Oaks Valley Rd.	Signal	45.8	46.1	D	D
5	SR 78 WB Ramps and Twin Oaks Valley Rd.	Signal	10.5	13.3	B	B
6	SR 78 EB Ramps and Twin Oaks Valley Rd.	Signal	27.1	19.1	C	B
7	Woodward St. and Proposed Project Driveway #1	MSSC[2]	n/a	n/a	n/a	n/a
8	E. Mission Rd. and Proposed Project Driveway #2	MSSC[2]	20.6	14.2	C	B

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] Minor Street Stop Controlled intersection

Source: Table 6-1 of the TIA, Appendix G

Existing Roadway Level of Service

Street segment analysis is based upon the comparison of daily traffic volumes (ADTs) to the City of San Marcos's *Roadway Classification, Level of Service, and ADT Table*. This table provides segment capacities for different street classifications, based on traffic volumes and roadway characteristics. Table 4.4-3 details the roadway segment operations under existing conditions.

Table 4.4-3 Existing Roadway Segment LOS

No.	Roadway	Segment Limits	LOS Capacity[1]	Existing ADT[2]	V/C[3]	LOS
1	Woodward St.	Mulberry Dr. to Borden Rd.	8,000	3,100	0.388	A
2	Woodward St.	Vineyard Rd. to Mission St.	8,000	7,900	0.988	D
3	Vineyard Rd.	Borden Rd. to Woodward St.	8,000	3,600	0.450	B
4	Mission Rd.	Firebird Ln. to Woodward St.	40,000	15,100	0.378	A
5	Mission Rd.	Woodward St. to Mulberry Dr.	60,000	23,500	0.392	A
6	San Marcos Blvd.	Twin Oaks Valley Rd to Mission Rd	40,000	16,800	0.420	A
7	Twin Oaks Valley Rd.	San Marcos Blvd. to SR 78 WB Ramps	60,000	36,100	0.602	B

1 Capacities based on City of San Marcos Roadway Classification Table and LOS Table.

2 Average Daily Traffic Volumes

3 Volume to Capacity

Source: Table 6-2 of the TIA, Appendix G

b. Regulatory Setting

State

State Senate Bill 375

Senate Bill (SB) 375, signed in August 2008, directs each of the state's 18 major Metropolitan Planning Organizations to prepare a "sustainable communities strategy" (SCS) that contains a growth strategy to meet emission targets for inclusion in the Regional Transportation Plan (RTP). On September 23, 2010, CARB adopted final regional targets for reducing GHG emissions to 2005 levels by 2020 and 2035.

The intent of Senate Bill (SB) 375 is to use the Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS) to integrate land use, regional housing needs assessments (RHNA), environmental, and transportation planning to ensure efficient regional planning in the future that leads to reduced greenhouse gas emissions from land and transportation uses. As a result of SB 375, preparation of local RHNA Plans are required to be coordinated regionally and be consistent with the RTP and SCS for the length of the housing element cycle. Local governments play a large role in helping to develop the transportation and land use scenarios used in the SCS development process.

State Senate Bill 743

Senate Bill (SB) 743 was signed into law by Governor Brown in 2013 and tasked the State Office of Planning and Research (OPR) with establishing new criteria for determining the significance of transportation impacts under the California Environmental Quality Act (CEQA). SB 743 requires the new criteria to "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." It also states that alternative measures of transportation impacts may include "vehicle miles traveled, vehicle miles traveled per capita, automobile trip generation rates, or automobile trips generated."

On September 27, 2013, California Governor Jerry Brown signed SB 743 into law and started a process that changes transportation impact analysis as part of CEQA compliance. SB 743 requires the Governor's OPR to identify new metrics for identifying and mitigation transportation impacts within CEQA. In January 2018, OPR transmitted its proposed CEQA Guidelines implementing SB 743 to the California Natural Resources Agency for adoption, and in January 2019 the Natural Resources Agency finalized updates to the CEQA Guidelines, which incorporated SB 743 modifications, and are now in effect SB 743 changed the way that public agencies evaluate the transportation impacts of projects under CEQA, recognizing that roadway congestion, while an inconvenience to drivers, is not itself an environmental impact (Public Resource Code, § 21099, subd. (b)(2)). In addition to new exemptions for projects consistent with specific plans, the CEQA Guidelines replaced congestion based metrics, such as auto delay and level of service, with Vehicle Miles Traveled as the basis for determining significant impacts, unless the Guidelines provide specific exceptions.

Local

San Diego Forward: The Regional Plan: SANDAG Regional Transportation Plan and Sustainable Community Strategy

San Diego Forward was adopted by the SANDAG Board of Directors on October 9, 2015. San Diego Forward combines and updates the region's two regional planning documents: the Regional Comprehensive Plan (2004) and the Regional Transportation Plan/Sustainable Communities Strategy (2011). San Diego Forward provides a vision for the region's growth through the year 2050. The Plan reflects a strategy for a more sustainable future which includes investing in a transportation network that will provide people more travel choices, protects the environment, creates healthy communities, and stimulates economic growth (SANDAG 2015). San Diego Forward includes a detailed blueprint for how we will invest in our transportation system in ways over the next 35 years. The Regional Plan outlines the investment of nearly $204 billion in year-of expenditure dollars in local, State, and Federal dollars to build a comprehensive, interconnected transportation system that provides choices.

City of San Marcos General Plan

The Mobility Element of the 2013 San Marcos General Plan contains several goals and policies pertaining to the improvement of transportation facilities and reducing project impacts. The following goals and policies apply to the project:

- **Goal M-1:** Provide a comprehensive multimodal circulation system that serves the City land uses and provides for the safe and effective movement of people and goods.
  - **Policy M-1.2**: Require new development to finance and construct internal adjacent roadway circulation and City-wide improvements as necessary to mitigate project impacts, including roadway, transit, pedestrian and bicycle facilities.

- **Policy M-1.3**: Require new development to finance and construct internal adjacent roadway circulation and City-wide improvements as necessary to mitigate project impacts, including roadway, transit, pedestrian and bicycle facilities.

- **Goal M-2**: Protect neighborhoods by improving safety for all modes of travel and calming traffic where appropriate.
  - **Policy M-2.1**: Work with new development to design roadways that minimize traffic volumes and/or speed, as appropriate within residential neighborhoods; while maintaining the City's desire to provide connectivity on the roadway network.

4.4.2 Impact Analysis

a. Methodology and Significance Thresholds

According to Appendix G (Transportation) of the State CEQA Guidelines, the project would have a significant impact on transportation if it would:

1. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities
2. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)
3. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)
4. Result in inadequate emergency access

Impacts Determined to be Less than Significant

The Initial Study (Appendix A) concluded that the project would have a less than significant impact on a local plan, policy, or ordinance which addresses the circulation system, on conflicting with CEQA Guidelines section 15064.3(b), and on emergency access. Therefore, in depth analysis of Threshold 1, 2, and 4 is not warranted and a summary of these impacts are described below.

Threshold 1:	Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

The TIA evaluated potential project-related traffic impacts at six key intersections in the vicinity of the project site, plus the two proposed driveways. Thresholds based on the San Diego Traffic Engineer's Council (SANTEC) guidelines are considered consistent with City of San Marcos Policy, and were used to analyze the project's impacts on local roadways. The analysis shows that none of the intersections would operate at unacceptable Levels of Service beyond SANTEC thresholds with traffic from existing and project increases. Therefore, project-generated traffic would not have a significant impact on local street segments. Furthermore, the project would not conflict with any adopted plan for bicycle or pedestrian infrastructure. The project would not hinder access to nor remove the existing bicycle path or pedestrian walkway along the front of the project site on East Mission Road. Therefore, project would have a less than significant impact.

Threshold 2:	Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Neither the City of San Marcos nor the County of San Diego have adopted thresholds for vehicle miles travelled pursuant to 15064.3(b)(1).However, the project site is located within one quarter

mile away from the major transit stops and corridors served by North County Transit District, including the Civic Center SPRINTER Station and BREEZE Route 305. Because the project site is located closer than one-half mile to major bus stops and commuter rail lines, the project would not conflict with CEQA Guidelines 15064.3(b)(1); therefore, the project would have a less than significant impact.

Threshold 4:	Would the project result in inadequate emergency access?

The project includes two access driveways: one on Woodward Street and the other on East Mission Road. The East Mission Road driveway would share access with the Mission 316 East development. The access driveway on East Mission Road would be a right-in-right-out only, and the Woodward Street driveway would be a full-access driveway, which is not proposed to include a signal. All internal roadways would comply with roadway width requirements and require the approval of the San Marcos Fire Department for consistency with applicable health and safety codes. Construction of the project would not result in the closure of local roadways, and off-site sewer improvements along Woodward Street and Mission Road would comply with applicable regulations and encroachment permit conditions for work within the City right-of-way. The project would not result in inadequate emergency access; therefore, the project would have less than significant impacts.

Impacts Determined to be Potentially Significant

The Initial Study analyzed the two proposed driveways for the project based on information provided by the project's civil engineer, and concluded that the driveways would provide adequate sight distances to and from on-coming traffic. Upon further review of the Traffic Impact Analysis, the City Traffic Engineer determined the need for additional site analyses at both project driveways, to be conducted by a traffic engineer rather than the civil engineer. The City Traffic Engineer sighted the vertical curve on Woodward and an existing wrought iron fence along the Mission Road driveway as the primary factors in making this determination. Therefore, the project's traffic engineer completed a subsequent, supplemental sight distance analysis with speed surveys at the request of the lead agency, which confirmed that the driveways would provide adequate sight distances to and from on-coming traffic. The findings of the subsequent sight distance analysis can be found in the TIA (Appendix G). The impacts associated with Threshold 3 are described below.

Threshold 3:	Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

Impact T-1 UPON FURTHER ANALYSIS OF THE SIGHT DISTANCE AT THE WOODWARD STREET AND E. MISSION ROAD DRIVEWAYS, IT WAS DETERMINED THAT THEY WOULD EACH MEET THE REQUIRED INTERSECTION SIGHT DISTANCE REQUIREMENTS AND IMPACTS WOULD BE LESS THAN SIGNIFICANT.

The project proposes two access driveways, one on Woodward Street (Driveway #1) and one on E. Mission Road (Driveway #2).

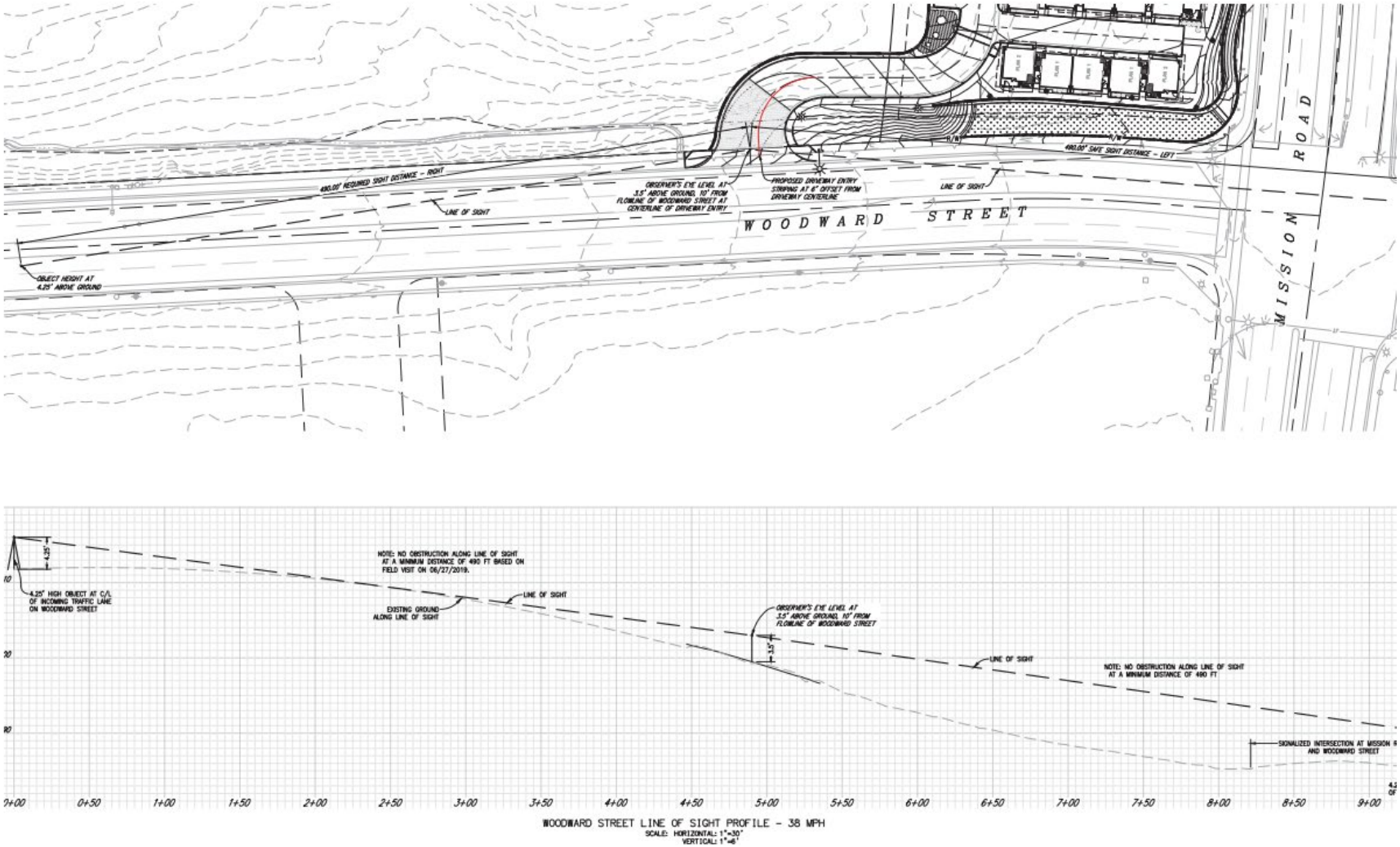
Driveway #1 is proposed as a full access driveway. A vertical curve exists along Woodward Avenue, an approximate three percent uphill grade going northbound and 2.5 percent downhill grade going southbound, which limits the available sight distance when turning left from Driveway #1 onto Woodward Street. A speed study and sight distance analysis was conducted based on the City of San Marcos *Minimum Sight Distance Standards.* Based on the 85th percentile speed of 38 mph, the required intersection sight distance would be 490 feet per City of San Marcos standards and the

required intersection stopping distance would be 300 feet per the *California Highway Design Manual*. A field survey was conducted to determine the available sight and stopping distance at Driveway #1 in accordance with the City of San Marcos guidelines. As shown in Figure 4.4-2, the available sight and stopping distance at Driveway #1 is 490 feet. Thus, the project driveway would meet the required intersection sight and stopping distance standard and not significantly increase hazards.

Driveway #2, located along E. Mission Road, would be right-in/right-out only due to a raised median along E. Mission Road. The Driveway would be a shared driveway with the adjacent development and is located on an inside of a horizontal curve which potentially limits the available sight distance when leaving the project site. A speed survey and sight distance analysis based on the City of San Marcos *Minimum Sight Distance Standards* concluded that the 85th percentile speed is 46 mph. Based on the 85th percentile speed of 46 mph, the required sight distance would be 570 feet per the City of San Marcos standards and the required stopping distance would be 370 feet per the *California Highway Design Manual* (Appendix G). A field survey from LLG Engineers concluded that the available sight distance is 145 feet due to the obstruction from an existing wrought iron fence, as seen in Figure 4.4-3.

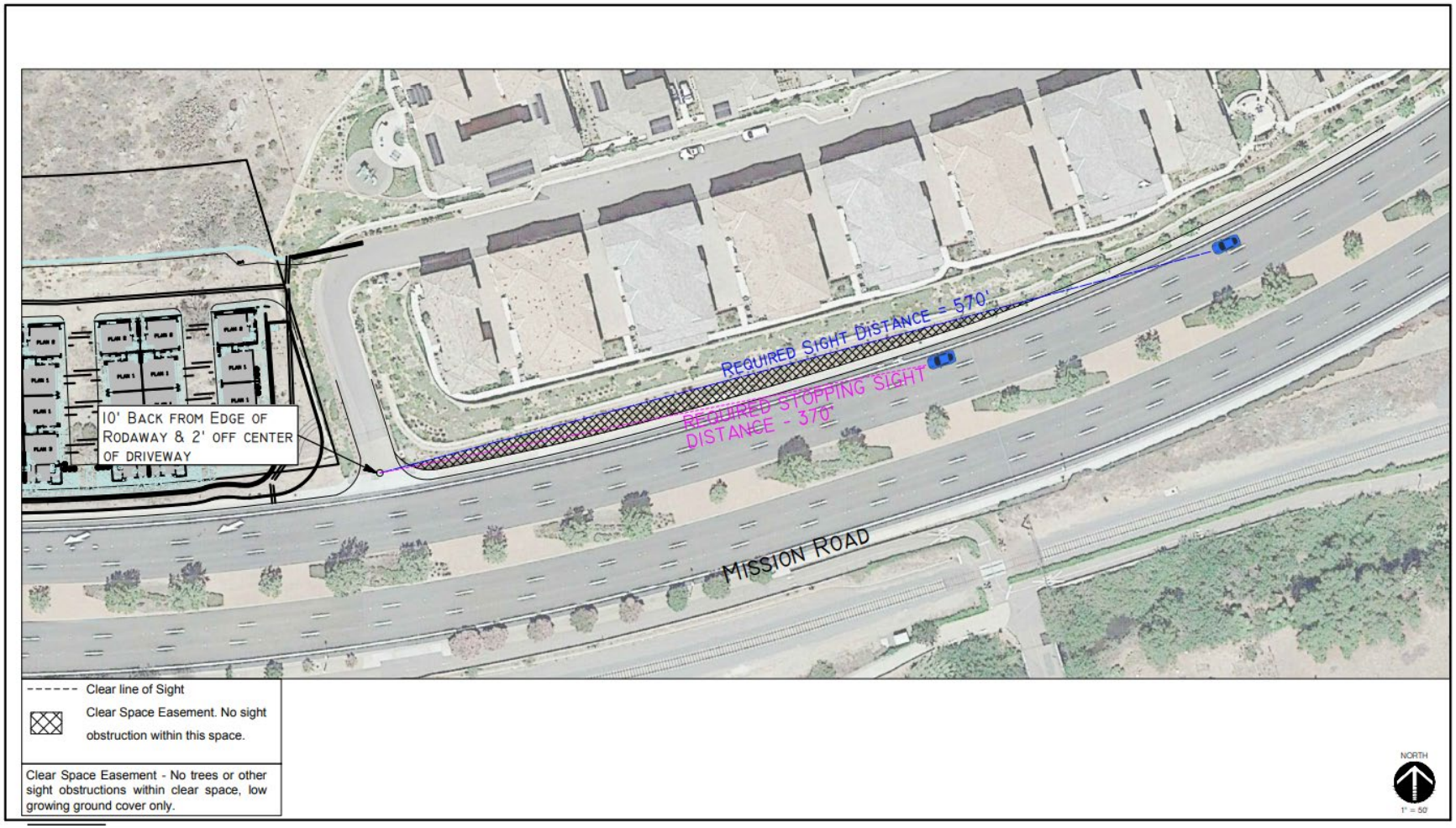
A Sight Corridor Easement (Map 16111) was recorded on the neighboring property (with the fence), which provides a clear sight easement to the east of Driveway #2 at the location of the wrought iron fence. The fence exceeded the allowable height limits of the easement and was removed on June 25, 2019, as seen in Figure 4.4-4. According to the sight distance analysis, with the removal of the fence, the available sight distance at Driveway #2 would meet the required sight distance of 596 feet. The adjacent property is required to comply with the Sight Corridor Easement enforced by the City. With the removal of the fence, the sight distance available at Driveway #2 would comply with the City of San Marcos *Minimum Sight Distance Standards.* Therefore, impacts would be less than significant at both project driveways.

Figure 4.4-2 Woodward Street Stopping Distance



Source: LLG, 2019 (Appendix G)

Figure 4.4-3 E. Mission Road Sight Distance



Source: LLG, 2019 (Appendix G)

Figure 4.4-4 Fence Removal at Driveway #2



Photo taken in early June 2019 showing a wrought iron fence at Driveway #2.



Photo taken June 25, 2019 showing the wrought iron fence was removed.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

4.4.3 Cumulative Impacts

The TIA analyzed traffic impacts from the project and cumulative development in the area on nearby intersections and roadway segments. The TIA reviewed the cumulative projects in the City of San Marcos and compared them to the assumed land uses in the SANDAG Series 12 Year 2020 Model, which was used to determine the traffic volume from cumulative projects. Table 4.4-4 summarizes the intersection operations under cumulative conditions and cumulative plus project conditions.

Table 4.4-4 Cumulative Intersection Operation

Intersection	Existing + Cumulative Projects		Existing + Cumulative Projects + Project		Significant Impact
	Delay	LOS	Delay	LOS	
Woodward St./Mulberry Drive					
AM	8.6	A	8.7	A	No
PM	7.5	A	7.6	A	No
Borden Rd./Vineyard Rd.					
AM	26.7	C	26.7	C	No
PM	19.8	B	19.9	B	No
San Marcos Blvd./Woodward St.					
AM	43.3	D	44.3	D	No
PM	45.3	D	46.2	D	No
San Marcos Blvd./N. Twin Oaks Valley Rd.					
AM	62.5	E	64.3	E	No
PM	66.2	E	67.1	E	No
SR 78 WB Ramps/Twin Oaks Valley Rd.					
AM	10.1	B	10.1	B	No
PM	11.3	B	11.3	B	No
SR 78 EB Ramps/Twin Oaks Valley Rd.					
AM	30.5	C	30.7	C	No
PM	19.0	B	19.2	B	No
Woodward St./Project Dwy. #1					
AM	n/a	n/a	11.7	B	No
PM	n/a	n/a	13.4	B	No
E. Mission Rd./Project Dwy. #2					
AM	23.8	C	25.0	C	No
PM	15.3	C	15.5	C	No

[1] Not a significant cumulative impact since the increase in delay due to the Project is less than the allowable threshold of 2.0 seconds.

Source: Transportation Impact Analysis, Appendix G

As detailed in Table 4.4-4, all study area intersections would continue to operate at a LOS D or better with the addition of cumulative project traffic and the proposed project traffic. Therefore, cumulative impacts to surrounding intersections would be less than significant.

In addition to surrounding intersections, roadway segments could also be impacted by cumulative development. Table 4.4-5 summarizes the roadway segment operations under cumulative conditions and cumulative plus project conditions.

Table 4.4-5 Cumulative Roadway Segment Operation

Intersection	Capacity	Classification	Existing + Cumulative Projects			Existing + Cumulative + Project			Significant Impact?
			ADT	LOS	V/C	ADT	LOS	V/C	
Woodward St.									
Mulberry Dr. to Borden Rd.	8,000	Local Street	3,500	A	0.233	3,550	A	0.237	No
Vineyard Rd. to Mission St.	8,000	Local Street	8,400	A	0.280	8,510	A	0.284	No
Vineyard Rd.									
Boden Rd. to Woodward St.	8,000	Local Street	5,000	A	0.333	5,050	B	0.337	No
Mission Rd.									
Firebird Ln. to Woodward St.	40,000	4-Lane Major Arterial	16,200	B	0.405	16,230	B	0.406	No
Woodward St. to Mulberry Dr.	60,000	6-Lane Prime Arterial	27,000	B	0.450	27,160	B	0.453	No
San Marcos Blvd.									
Twin Oaks Valley Rd. to Mission Rd.	40,000	4-Lane Major Arterial	21,500	C	0.538	21,500	C	0.538	No
Twin Oaks Valley Rd.									
San Marcos Blvd. to SR-78 WB Ramp	60,000	6-Lane Prime Arterial	40,100	C	0.668	40,340	C	0.672	No

Source: Transportation Impact Analysis, Appendix G

The project, in associated with cumulative development in the area, would not significantly increase the volume to capacity levels or cause the study area roadway segments have significant delays. Therefore cumulative impacts would be less than significant.

References

San Marcos, City of. 2013. 2013 *San Marcos General Plan*. February 14, 2012. http://www.san-marcos.net/work/economic-development/general-plan. Accessed June 2019.

Transportation Research Board. 2000. Highway Capacity Manual. https://sjnavarro.files.wordpress.com/2008/08/highway_capacital_manual.pdf. Accessed June 2019.

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4.5 Tribal Cultural Resources

This section analyzes the effects of the proposed multi-family residential project on tribal cultural resources. The following discussion and analysis includes findings about tribal cultural resources from the Initial Study, included in its entirety as Appendix A. This analysis is based on a 2017 pedestrian survey and due diligence report by Helix Environmental Planning, Inc. (Appendix E), and a 2018 Phase II cultural resources excavation and report by Rincon Consultants, Inc, which contains confidential information and is available for review at the City pursuant to Public Resources Code 21082.3(c)(1) and 21082.3(c)(2). Additionally, the discussion and analysis contained herein is informed by Tribal Consultations completed between the City and Native American tribes in the vicinity of the project site (Appendix H).

4.5.1 Setting

a. Existing Tribal Resource Setting

The project site is situated in an area that was occupied by the Luiseño (O'Neil 2002). Section 4.2, *Cultural Resources*, contains an ethnographic overview of the Luiseño tribe.

A review of previously recorded resources and results of a pedestrian field survey by an archaeologist did not reveal findings of significant tribal cultural resources present on the project site. Though there are no known tribal cultural resources present on the project site, the project requires discretionary review by the City of San Marcos and includes requests for General Plan and Specific Plan amendments. Therefore, notification of Native American tribes in the vicinity of the project site was required for this project under both SB 18 and AB 52. Thirty-four tribes or tribal representatives were notified pursuant to SB 18 (see the Native American Heritage Commission (NAHC) contact list included in Appendix H). Three tribes were notified pursuant to AB 52.

b. Regulatory Setting

Federal

Native American Involvement

Several federal and state laws address Native American involvement in the development review process. The most notable of these are the federal Native American Graves Protection and Repatriation Act (1990) and the California Native American Graves Protection and Repatriation Act (2001). These acts ensure that Native American human remains and cultural items be treated with respect and dignity.

State

Senate Bill 18

Enacted on March 1, 2005, Senate Bill (SB) 18 (California Government Code Sections 65352.3 and 65352.4) requires cities and counties to notify and consult with California Native American tribal groups and individuals regarding proposed local land use planning decisions for the purpose of protecting traditional tribal cultural places (sacred sites), prior to adopting or amending a General

Plan or designating land as open space. Tribal groups or individuals have 90 days to request consultation following the initial contact.

Assembly Bill 52

California Assembly Bill (AB) 52 of 2014 was enacted in 2015, expanding the California Environmental Quality Act (CEQA) by defining a new resource category: "tribal cultural resources." AB 52 establishes that "a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" (Public Resource Code [PRC] Section 21084.2). It further states the lead agency shall establish measures to avoid impacts that would alter the significant characteristics of a tribal cultural resource, when feasible (PRC Section 21084.3). PRC Section 21074 (a)(1)(A) and (B) defines tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe" and that are either:

a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of PRC Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

In recognition of California Native American tribal sovereignty and the unique relationship of California local governments and public agencies with California Native American tribal governments, and to respect the interests and roles of project proponents, it is the intent AB 52 to:

1. Recognize that California Native American prehistoric, historic, archaeological, cultural, and sacred places are essential elements in tribal cultural traditions, heritages, and identities.
2. Establish a new category of resources in CEQA called "tribal cultural resources" that considers the tribal cultural values in addition to the scientific and archaeological values when determining impacts and mitigation.
3. Establish examples of mitigation measures for tribal cultural resources that uphold the existing mitigation preference for historical and archaeological resources of preservation in place, if feasible.
4. Recognize that California Native American tribes may have expertise with regard to their tribal history and practices, which concern the tribal cultural resources with which they are traditionally and culturally affiliated. Because CEQA calls for a sufficient degree of analysis, tribal knowledge about the land and tribal cultural resources at issue should be included in environmental assessments for projects that may have a significant impact on those resources.
5. In recognition of their governmental status, establish a meaningful consultation process between California Native American tribal governments and lead agencies, respecting the interests and roles of all California Native American tribes and project proponents, and the level of required confidentiality concerning tribal cultural resources, at the earliest possible point in CEQA environmental review process, so that tribal cultural resources can be identified, and culturally appropriate mitigation and mitigation monitoring programs can be considered by the decision making body of the lead agency.

6. Recognize the unique history of California Native American tribes and uphold existing rights of all California Native American tribes to participate in, and contribute their knowledge to, the environmental review process pursuant to CEQA.
7. Ensure that local and tribal governments, public agencies, and project proponents have information available, early in CEQA environmental review process, for purposes of identifying and addressing potential adverse impacts to tribal cultural resources and to reduce the potential for delay and conflicts in the environmental review process.
8. Enable California Native American tribes to manage and accept conveyances of, and act as caretakers of, tribal cultural resources.
9. Establish that a substantial adverse change to a tribal cultural resource has a significant effect on the environment.

AB 52 also establishes a formal consultation process for California tribes regarding those resources. The consultation process must be completed before a CEQA document can be certified. AB 52 requires lead agencies to "begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project." Native American tribes to be included in the process are those that have requested notice of projects proposed within the jurisdiction of the lead agency.

Public Resources Code 5097.5

Section 5097.5 of the California Public Resources Code prohibits excavation or removal of any "vertebrate paleontological site or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands." Section 30244 requires reasonable mitigation of adverse impacts to paleontological resources from development on public land.

Health and Safety Code 7050.5

This code establishes that any person who knowingly mutilates, disinters, wantonly disturbs, or willfully removes any human remain in or from any location without authority of the law is guilty of a misdemeanor. It further defines procedures for the discovery and treatment of Native American remains.

Health and Safety Code 8010-8011

This code is intended to provide consistent state policy to ensure that all California Indian human remains and cultural material are treated with dignity and respect. The code extends policy coverage to non-federally recognized tribes and federally recognized groups.

Assembly Bill 2461

The section provides procedures for private land owners to follow upon discovering Native American human remains. Land owners are encouraged to consider culturally appropriate measures if they discover Native American human remains as set forth in California PRC 5097.98.

Local

City of San Marcos General Plan

The Conservation and Open Space Element of the 2013 San Marcos General Plan contains policies related to the historic and prehistoric cultural resources in the City. In addition to the objectives and policies relevant to cultural resources provided in Section 4.2, *Cultural Resources*, the following policy of the Conservation and Open Space Element would also apply to the proposed project:

> **Policy COS-2.5:** Continue to review future development proposals to ensure that cultural resources (including prehistoric, historic, paleontological, and Senate Bill 18 Tribal resources) are analyzed and conserved in compliance with CEQA requirements.

4.5.2 Impact Analysis

a. Methodology and Significance Thresholds

Potential impacts on tribal cultural resources are analyzed based on the potential for the project to impact any tribal cultural resources during construction or operation. The significance of a tribal cultural resource and subsequent significance of any impact is determined by, among other things, consideration of whether or not that resource has heritage value to California Native Americans. Further, this impact analysis is also based on consultations with the interested tribe leaders as disclosed above.

In June 2018, the City of San Marcos distributed SB 18 consultation letters for the proposed project, including project information and a map, to 34 of the tribes and tribal representatives listed by NAHC as having an interest in area projects. Three tribes requested government-to-government consultation as a result of the SB 18 notification: the San Luis Rey Band of Mission Indians (SLR) (received June 28, 2018), Pechanga Band of Luiseno Mission Indians (Pechanga) (received June 28, 2018), and Rincon Band of Mission Indians (Rincon) (received July 27, 2018).

Concurrently, the City of San Marcos distributed AB 52 consultation letters to three area tribes: SLR, Rincon, and Mesa Grande Band of Mission Indians (Mesa Grande). Two tribes requested government-to-government consultation as a result of the AB 52 notification: SLR and Rincon. The SLR and Rincon AB 52 consultation requests were received as part of the SB 18 consultation request letters indicated above. All tribes that submitted letters in response to SB 18 and AB 52 notification, despite whether or not they requested consultation, have been added to the list of groups to be notified when project documents are ready for public review. A copy of all the City's SB 18 and AB 52 consultation letters are included in Appendix H.

The City responded to each request and opened consultation with SLR, Rincon, and Pechanga to discuss the project. SLR and Rincon were provided the project technical studies and reports, and were given the opportunity to review and comment on the recommended mitigation measures. In addition, two site visits were conducted, one on March 20, 2019 and a second one on May 20, 2019, with tribal representatives, City planners, and a Rincon Consultants, Inc. archaeologist in attendance. Table 4.5-1 details the various meetings and site visits that occurred during the course of consultation with SLR and Rincon. The City also engaged in consultation efforts with Pechanga via phone and email. City staff has provided requested cultural resource information to Pechanga as a part of the ongoing consultation process.

Table 4.5-1 Tribal Consultation Meetings

Meeting Dates	Tribal Government and Representative	Location
08/28/18	Rincon Band of Luiseno Indians/Destiny Colocho	City of San Marcos
08/28/18	San Luis Rey Band of Mission Indians/Cami Mojado	City of San Marcos
03/07/19	San Luis Rey Band of Mission Indians/Cami Mojado	Conference Call
03/20/19	San Luis Rey Band of Mission Indians/Cami Mojado	Site Meeting
03/21/19	San Luis Rey Band of Mission Indians/Cami Mojado	City of San Marcos
03/28/19	San Luis Rey Band of Mission Indians/Cami Mojado	Conference Call
04/17/19	San Luis Rey Band of Mission Indians/Cami Mojado	Conference Call
05/02/19	San Luis Rey Band of Mission Indians/Cami Mojado	City of San Marcos
05/09/19	San Luis Rey Band of Mission Indians/Cami Mojado	Conference Call
05/21/19	Rincon Band of Luiseno Indians/Destiny Colocho	City of San Marcos
05/29/19	San Luis Rey Band of Mission Indians/P.J. Stoneburner & Rincon Band of Luiseno Indians/Destiny Colocho	Site Meeting
05/30/19	San Luis Rey Band of Mission Indians/Cami Mojado	City of San Marcos

Tribal consultation input from SLR and Rincon regarding potential project impacts and agreed upon mitigation language is considered herein. The mitigation measures presented in this EIR were prepared in coordination with tribal representatives from SLR and Rincon, and they will be notified before any ground-disturbing activities commence for the project. The AB 52 consultation process with both tribes is ongoing and anticipated to conclude concurrent with the EIR process. Given the nature of the SB 18 consultation process procedures, tribes may choose not conclude the SB 18 process until the project is closer to completion of the entitlement process.

The discussion of tribal cultural resources is based on consultations with interested Native American tribal leaders and lead by the City of San Marcos. In accordance with Appendix G of the *State CEQA Guidelines*, an impact to Tribal Cultural Resources from the proposed project would be significant if the project would:

1. Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:
    a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)
    b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe

The Initial Study (Appendix A) concluded there could be significant impacts to tribal cultural resources due to the potential existence of previously unknown resources at the project site. Grading and ground-disturbing activity could impact currently unknown subsurface cultural

resources of tribal or Native American importance. Therefore, impacts associated with the thresholds above are analyzed below.

Threshold 1: Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)?, or

b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

Impact TCR-1 THERE IS A MULTI-COMPONENT RESOURCE SITE WITHIN AND ADJACENT TO THE DEVELOPMENT ENVELOPE OF THE PROJECT. ADDITIONALLY, CONSTRUCTION OF THE PROJECT WOULD INVOLVE GROUND-DISTURBING ACTIVITIES SUCH AS GRADING AND SURFACE EXCAVATION, WITH THE POTENTIAL TO UNEARTH OR ADVERSELY IMPACT PREVIOUSLY UNIDENTIFIED TRIBAL CULTURAL RESOURCES. THEREFORE, PROJECT IMPACTS WOULD BE LESS THAN SIGNIFICANT IMPACTS WITH MITIGATION INCORPORATED.

As discussed in Section 4.2, *Cultural Resources,* there is a multi-component site (RIN-S-01) that includes four bedrock milling features (BMFs) within and adjacent to the development envelope of the project. Based on the Phase II testing and archival research completed by Rincon Consultants, Inc., RIN-S-01 is not eligible for listing in the NRHP, CRHR or any local designation. However, upon consultation with the San Luis Rey Band of Mission Indians and Rincon Band of Mission Indians, the tribes expressed concern over impacts to the BMFs that are within the development envelope. The City and consulting tribes agreed that compliance with Mitigation Measures TCR-1 and TCR-2 would conserve the impacted BMFs through relocation.

Besides the BMFs described above, which do not qualify as a significant resource under CEQA, there are no known significant tribal cultural resources located on the project site based on the findings of the project-specific pedestrian survey and due diligence (Appendix E), the Phase II cultural resources excavation and report, and on consultation with SLR and Rincon (Appendix H). However, grading and ground-disturbing activities during project construction could impact currently unknown subsurface cultural resources of tribal or Native American importance. The City and the consulting tribes agreed that compliance with Mitigation Measures CR-1 through CR-6 detailed in Section 4.2, *Cultural Resources* and with Mitigation Measures TCR-1, TCR-2, and TCR-3 would ensure that impacts to tribal cultural resources would be less than significant.

Mitigation Measures

If previously unknown tribal cultural resources are discovered during ground disturbing activities, Mitigation Measures CR-1 through CR-8 would be implemented, detailed in Section 4.2, *Cultural Resources* to reduce impacts to tribal cultural resources.

Mitigation Measure CR-1 requires cultural sensitivity training for contractors, CR-2 requires a tribal cultural resources monitoring agreement, and CR-3 through CR-5 require the obtainment of a Qualified Archaeologist and Traditionally and Culturally Affiliated Native American Tribe ("TCA") Native American monitor, collaboration between the Qualified Archaeologist and TCA Native American monitor, and the preparation of a monitoring report. Mitigation Measure CR-6 requires the Qualified Archaeologist and TCA Native American monitor to be present during construction meetings and ground disturbing activities, and CR-7 includes measures to follow if unknown archaeological resources are discovered.

In addition, mitigation measures TCR-1 and TCR-2 would be implemented to reduce potentially significant impacts and ensure proper treatment and disposition of tribal cultural resources and measures to follow if unanticipated human remains are discovered.

TCR-1 Treatment and Disposition of Tribal Cultural Resources

The landowner shall relinquish ownership of all non-burial related tribal cultural resources collected during the grading monitoring program and to the extent performed by landowner, from any previous archaeological studies or excavations on the project site to the TCA Tribe for proper treatment and disposition per the Cultural Resources Treatment and Monitoring Agreement. Reburial of any such repatriated items shall be completed within the project area in a location determined culturally appropriate by the landowner and the San Luis Rey Band, or TCA Tribe referenced in Mitigation Measure CR-2, and shall have all necessary protections placed upon the area for avoidance of any future disturbance.

Any burial related to tribal cultural resources (as determined by the Most Likely Descendant) shall be repatriated to the Most Likely Descendant as determined by the Native American Heritage Commission pursuant to California Public Resources Code Section 5097.98. If none of the TCA Tribes accept the return of the cultural resources, then the cultural resources will be subject to the curation requirements contained herein. In the event that curation of tribal cultural resources is required by a superseding regulatory agency, curation shall be conducted by an approved facility and the curation shall be guided by California State Historic Resource Commissions Guidelines for the Curation of Archaeological Collections. The City of San Marcos shall provide the developer with standard final curation procedures on the project grading plans prior to issuance of the grading permit, if applicable, during project construction. The applicant shall provide to the City written documentation from the TCA Tribe, the Most Likely Descendant, and/or the curation facility, whichever is most applicable, that the repatriation and/or curation have been completed. Any reburial activities and/or curation activities must be completed in the presence of the Qualified Archaeologist and TCA Native American monitor.

TCR-2 Treatment and Disposition of Onsite Bedrock Milling Features

Bedrock milling feature(s) that will be impacted by the project shall be relocated prior to the start of construction to a location determined culturally appropriate by the landowner, San Luis Rey Band or TCA Tribe referenced in Mitigation Measure CR-2, utilizing culturally appropriate methods as developed by the San Luis Rey Band or TCA Tribe referenced in Mitigation Measure CR-2, the TCA Native American monitor, the Qualified Archaeologist, and City. The features shall be protected from future disturbance and vandalism through a preservation mechanism acceptable to all parties.

TCR-3 Human Remains

As specified by State Health and Safety Code Section 7050.5, if human remains are found on the project site during construction or during archaeological work, the person responsible for the excavation, or his or her authorized representative, shall immediately notify the San Diego County Medical Examiner's Office. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the Medical Examiner has made the necessary findings as to origin and disposition pursuant to Public Resources Code 5097.98. If such a discovery occurs, a temporary construction exclusion zone shall be established surrounding the area of the discovery so that the area would be protected, and consultation and treatment could occur as prescribed by law. By law, the Medical Examiner will determine within two working days of being notified if the remains are subject to his or her authority. If the Medical Examiner recognizes the remains to be Native American, he or she shall contact the Native American Heritage Commission (NAHC), by telephone, within 24 hours. The NAHC will make a determination as to the Most Likely Descendent. If suspected Native American remains are discovered, the remains shall be handled pursuant to the process described in Mitigation Measure CR-7, which may include keeping remains in-situ, or in a secure location in close proximity to where they were found, and the examination of the remains shall only occur on-site in the presence of a TCA Native American monitor.

Significance After Mitigation

Implementation of Mitigation Measures CR-1 through CR-8 and TCR-1 and TCR-2 would reduce potentially significant impacts to tribal cultural resources to a less than significant level.

4.5.3 Cumulative Impacts

The proposed project, in conjunction with other development in the City and surrounding areas as listed in Table 3-1 in Section 3, *Environmental Setting*, would cumulatively increase the potential to encounter sensitive tribal cultural resources. However, as discussed above, potential impacts to tribal cultural resources are site-specific and would be reduced to a less-than-significant level due to implementation of mitigation measures on a project-by-project basis that would protect tribal cultural resources. In the event that tribal cultural resources are discovered, each individual project would be required to comply with the applicable regulatory requirements and the consultation requirements of SB 18 and AB 52, as applicable, to determine and mitigate any potential impacts to tribal cultural resources. Therefore, cumulative impacts to tribal cultural resources would be less than significant and would not be cumulatively considerable.

References

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O'Neil, Stephen. 2002. The Acjachemen in the Franciscan Mission System: Demographic Collapse and Social Change. Masters thesis, Department of Anthropology, California State University, Fullerton.

Rincon Consultants, Inc. 2018. Mission 316 West Confidential Phase II Testing Report. November 2018.

San Marcos, City of. 2013. *2013 San Marcos General Plan*. San Marcos, CA. February 14, 2012. http://www.san-marcos.net/home/showdocument?id=8482. Accessed June 2018

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4.6 Impacts Found to be Less than Significant

This section addresses issue areas for which no significant adverse impacts were identified in the Initial Study, which is included as Appendix A. The items listed below are contained in the City's environmental checklist form as well as Appendix G of the *CEQA Guidelines*. Issue areas not addressed in this section have been addressed with an expanded discussion in Sections 4.1 through 4.5, of this EIR. Issue areas found to have a less than significant project-specific impact, include a short discussion of the potential for cumulative impacts when assessing the project in addition to the projects listed in Table 3-1 in Section 3, *Environmental Setting*. Planned and pending projects in the City include residential units, commercial and industrial space, educational facilities, and a hotel.

4.6.1 Aesthetics

Would the project:

1. *Have a substantial adverse effect on a scenic vista?*
2. *Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?*

The project site is undeveloped and located in a mixed commercial, residential, and light industrial area at the northeast corner of Woodward Street and East Mission Road. The project site is not located in or near a designated scenic vista according to the City of San Marcos General Plan; therefore, the project would not degrade any views of designated scenic resources from any publicly accessible view locations. The City of San Marcos General Plan designates the San Marcos Mountains, Cerro de Las Posas, Owens Peak, creek corridors, eucalyptus stands, historic buildings, and ocean views as scenic resources. The project would not impact views of these designated scenic resources and impacts would be less than significant.

Furthermore, State Route 78 (SR 78), which runs through San Marcos, is designated in the San Marcos General Plan as a view corridor with publicly accessible views to the Merriam Mountains, Mount Whitney, and Double Peak. The project site is located approximately 2,000 feet north of SR 78 and is not visible from and would not directly damage or block views of scenic resources from SR 78. SR 78 is not a state-designated scenic highway (Caltrans 2018). Therefore, the project would have no impact on scenic resources viewed from a scenic highway.

3. *Substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?*

The project site is publicly visible and proposed grading and development of the site would impact the existing visual character of the site. However, the project site is located in an urbanized area and the buildings would be consistent with height and set back standards set forth in the Mission 316 Specific Plan and San Marcos Municipal Code Section 17.32.110. The architectural design of the buildings would be compatible in height and appearance with the adjacent Mission 316 East development. The landscape plans would comply with Section 3.3 of the Mission 316 Specific Plan, *Landscape Guidelines*. Project site grading would require the installation of retaining walls along the northern portion of the project site, which are designed with visually appealing materials. The

project would not conflict with applicable zoning or other regulations governing scenic quality. Therefore, the project would have no impact.

4. *Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?*

The project site vicinity currently experiences light and glare from the reflective windows on the San Marcos City Hall buildings, car headlights along city roadways and SR 78, and some light and glare from commercial buildings to the west. The proposed project would generate typical residential light and glare sources, such as street lights along the perimeter of the site, home and vehicle lights, and window glare. Proposed building materials would not consist of reflective materials that would create a significant amount of glare, as shown in the project plans (Appendix B). Additionally, exterior project street lights and accent lights in the open space area would be wall- or ground-mounted with deflectors to confine rays to the site, with minimal intrusion to proposed dwelling units and surrounding neighbors, consistent with Section 20.300.080 of the San Marcos Zoning Ordinance (City of San Marcos 2012). Compliance with this City regulation would ensure the proposed project has a less than significant impact.

4.6.2 Agriculture and Forest Resources

Would the project:

1. *Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?*
2. *Conflict with existing zoning for agricultural use or a Williamson Act contract?*
3. *Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?*
4. *Result in the loss of forest land or conversion of forest land to non-forest use?*
5. *Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?*

The project site is located in an urbanized area of San Marcos, and is not designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (California Department of Conservation 2018a). The project site is located in an area designated as Non-Farmland/Open Space according to Figure 4-4 *Agricultural Areas* in the City of San Marcos General Plan *Open Space and Conservation Element*. The site is not designated as forestland or farmland, and it is not currently used for agricultural purposes or subject to a Williamson Act contract. The proposed project would not involve any conversion of farmland or forestland to non-agricultural, non-forest use. Therefore, the proposed project would have no impact on forestland or impacts related to the conversion of farmland to non-agricultural uses.

4.6.3 Air Quality

Would the project:

1. Conflict with or obstruct implementation of the applicable air quality plan?

The project site is located in the San Diego Air Basin (SDAB) for which air quality management is under the jurisdiction of the San Diego Air Pollution Control District (SDAPCD). The SDAB has been classified as being in non-attainment, as the state air quality standards for 8-hour ozone, 1-hour ozone, PM_{10} and $PM_{2.5}$ are not met. The SDAPCD has prepared a Regional Air Quality Strategies (RAQS) plan to address San Diego County's non-attainment status for these criteria pollutants. The RAQS relies on information from the California Air Resources Board (CARB) and San Diego Association of Governments (SANDAG), including projected growth in San Diego County and air pollutant emission sources, to project future emissions and determine strategies for emission reduction through regulatory control. Projects that propose development consistent with the growth anticipated by the San Marcos General Plan are consistent with the RAQS.

The City of San Marcos is forecast to add 7,233 multi-family residential units between 2012 and 2050, increasing the multi-family residential housing stock from 9,738 units to 16,971 units (SANDAG 2015). The project includes 67 residential units, which would account for 0.9 percent of the forecasted additional multi-family units, which is within SANDAG's projections and the growth anticipated in the City's General Plan. The growth associated with the project would not obstruct or conflict with implementation of the RAQS. Therefore, the project would have a less than significant impact.

2. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Rincon Consultants, Inc. prepared a project-specific Air Quality and Greenhouse Gas Study, included as Appendix I, for this project and the results are summarized here. Construction activities associated with the proposed project would consist of grading, site preparation, construction of the proposed buildings, parking lot and roadway paving, and architectural coating. These construction activities would generate temporary emissions of fugitive dust (measured as particulate matter), exhaust emissions from heavy construction vehicles and soil hauling trucks, and ROGs from architectural coatings. Table 4.6-1 summarizes maximum daily and annual emissions of pollutants throughout the construction period of the project. Emissions of ROG, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$ would not exceed SDAPCD screening level thresholds during project construction. Therefore, the project would not result in a cumulatively considerable increase in criteria pollutants during construction.

Table 4.6-1 Maximum Daily Estimated Construction Emissions

Emissions Source	Maximum Emissions[1]					
	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Daily Construction Emissions (lbs/day)						
2019 Maximum	5.2	57.8	25.0	<0.1	10.4	6.4
2020 Maximum	52.0	67.7	36.5	0.1	10.2	2.4
2021 Maximum	51.6	41.1	37.9	<0.1	4.2	2.3
SDAPCD Screening Level Thresholds	75	250	550	250	100	55
Threshold Exceeded?	No	No	No	No	No	No
Annual Construction Emissions (tons/yr)						
2019 Maximum	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2020 Maximum	0.6	3.8	2.5	<0.1	0.4	0.2
2021 Maximum	1.0	2.0	1.8	<0.1	0.2	0.1
SDAPCD Screening Level Thresholds	13.7	40	100	40	15	10
Threshold Exceeded?	No	No	No	No	No	No

Notes: All calculations were made using CalEEMod v.2016.3.2. Site Preparation, Grading, Paving, Building Construction, and Architectural Coating totals include worker trips, soil export hauling trips, construction vehicle emissions and fugitive dust. Totals may not add up due to rounding. Emission data is pulled from "mitigated" results that include compliance with regulations and project design features as described in Section 1.2 (Rincon Consultants, Inc., 2019a).

[1] Grading phases incorporate anticipated emissions reductions from the conditions listed above, which are required by SDAPCD Rules 52, 54, and 55 to reduce fugitive dust. The architectural coating phases incorporate anticipated emissions reductions from the conditions listed above, which are required by SDAPCD Rule 67.

Operation of the project would result in area source emissions from landscaping equipment and cleaning supplies, energy source emissions from electricity use, and mobile emissions from vehicles. Table 4.6-2 summarizes estimated emissions associated with operation of the project. The majority of operational emissions generated would be due to mobile emissions from vehicle trips to and from the project site. As shown in Table 4.6-2, emissions generated during the operation of project would not exceed SDAPCD screening level thresholds for ROG, NO_X, CO, SO_X, PM_{10}, or $PM_{2.5}$. Therefore, the project would not result in a cumulative considerable increase in criteria air pollutants in the area.

Table 4.6-2 Project Operational Emissions

Emissions Source	Estimated Emissions (lbs/day)					
	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Area	2.8	0.1	5.5	<0.1	<0.1	<0.1
Energy	<0.1	0.2	0.1	<0.1	<0.1	<0.1
Mobile	0.8	2.9	7.4	<0.1	2.1	0.6
Project Total	3.5	3.2	13.0	<0.1	2.1	0.6
SDAPCD Screening Level Thresholds	75	250	550	250	100	55
Threshold Exceeded?	No	No	No	No	No	No

Source: Air Quality and Greenhouse Gas Study (Appendix I)

Note: Estimate emissions are from Annual operational emissions. Numbers may not add up due to rounding.

A carbon monoxide (CO) hotspot analysis is required by the City if a proposed development would cause road intersections to operate at or below level of service (LOS) E with intersection peak-hour trips exceeding 3,000 trips. According to the Transportation Impact Analysis (Appendix G) prepared for the project, the project would generate approximately 536 daily trips once fully operational, which would include 43 peak morning trips and 54 peak afternoon trips on the roadways surrounding the project site. The additional traffic generated during project operation would not cause intersections in the vicinity of the project site to operate at or below LOS E, and project-generated trips would not exceed 3,000 peak-hour trips. Therefore, a CO hotspot analysis is not required and project-generated trips would not result in, or substantially contribute to, CO concentrations that exceed the eight-hour ambient air quality standards along area roadways and intersections and the project would have a less than significant impact.

3. Expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors that may be affected by air quality impacts associated with project construction and operation include multi-family residences located approximately 500 feet east of the site along East Mission Road, single-family residences located approximately 700 feet north east of the site along Silk Mill Place, and the San Marcos Civic Center located approximately 1,000 feet southwest of the project site along East San Marcos Boulevard. The nearest school is Mission Hills High School (1 Mission Hills Court) located approximately 0.9 miles east of the project site along East Mission Road.

According to the County of San Diego Guidelines for Determining Significance for air quality, the primary emissions of concern regarding health effects for land development projects are diesel-fired particulates and carbon monoxide. As detailed in the impacts above, a CO hotspot would not be created with the implementation of the project, and the project would not exceed SDAPCD thresholds for CO during construction or operation. The primary source of diesel particulates in the project site vicinity is heavy-duty trucks on freeways and high-volume arterial roadways. The project site is approximately 0.32 miles north of CA-78 and is not located within 500 feet of other high-volume roadways. Additionally, project emissions would not exceed criteria pollutant thresholds during construction or operation of the project. Therefore, the proposed project would not expose

the surrounding sensitive receptors to substantial pollutant contaminants and the project would have a less than significant impact.

4. *Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?*

During construction, the project would involve the temporary use of diesel-powered equipment, which would generate exhaust that may be noticeable for short durations at adjacent properties. However, construction activities would be temporary and this impact would be less than significant and no mitigation would be necessary. Furthermore, land uses and facilities typically associated with odor complaints include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, refineries, landfills, dairies, and fiberglass molding. Operation of multi-family residential dwellings is not typically associated with objectionable odors. Therefore, the project would not generate objectionable odors and the project would have no impact.

4.6.4 Energy

Would the project:

1. *Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?*

Energy consumption associated with the proposed project consists of petroleum use in combustion engines during project construction activities, electricity use during project operation, and motor vehicle trips generated by future residents and people accessing the site. Electricity would be provided to the project site by San Diego Gas and Electric (SDG&E) which provided 18,660 gigawatt-hours (GWh) of electricity to the greater San Diego area in 2017, 6.4 percent of the total 292,039 GWh of electricity used in California. Petroleum use in California for transportation comprises approximately 40 percent of the state's energy consumption (EIA 2018). The project would not consume natural gas as the development proposes to only use electricity and would not pipe and connect into the existing natural gas pipelines.

During project construction energy would be consumed in the form of petroleum-based fuels used to power off-road construction vehicles and equipment on the project site, construction worker travel to and from the project site, and vehicles used to deliver materials to the site. Wasteful or inefficient fuel use would be minimized as construction equipment would be maintained to all applicable standards, and construction activity and associated fuel consumption and energy use would be temporary and typical for construction sites.

Furthermore, all construction equipment used for the project are subject to California Code of Regulations Title 13 Section 2449(d)(2), which states that construction equipment may not idle for more than five consecutive minutes with exception to specific work progress actions (i.e.: idling when queuing; to verify that the vehicle is in safe operating condition; etc.). Though such a regulation is targeted toward reducing air emissions, such rules assure construction is done in a manner that reduces fuel consumption. Therefore, the proposed project would not involve the inefficient, wasteful, or unnecessary use of energy during construction, and construction-phase energy consumption would have a less than significant impact.

Project operation would use electricity for lighting and multi-family home end-use, resulting in an increased energy use compared to that of the currently undeveloped site. However, the project would comply with all standards set in the California Building Code (CBC) Title 24 which would minimize the wasteful, inefficient, or unnecessary consumption of energy resources during

operation. Furthermore, the project would comply with California's Green Building Code (CALGreen; California Code of Regulations, Title 24, Part 11) and the 2019 Building Energy Efficiency Standards (CBC Title 24, Part 6) which require implementation of energy efficient light fixtures, building materials and performance standards in newly constructed buildings. These standards, updated every three years, are specifically crafted to reduce inefficient, wasteful, and unnecessary use of electricity. Therefore, electricity use associated with project operation would not result in wasteful, inefficient, or an unnecessary use of energy.

Energy use in the form of petroleum-based gasoline would be increased during project operation with vehicle miles traveled by future residents of the project. However, the project site is adjacent to the San Marcos Civic Center, a branch of the San Marcos Library, bus stops, and the Sprinter commuter rail stop. The ease of access to these resources would result in reduced vehicle miles traveled, reducing gasoline use, and inhibiting wasteful, inefficient, or unnecessary use of energy. Therefore, the project would have a less than significant impact.

2. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

The proposed project would be consistent with state and local plans for renewable energy and energy efficiency. The City of San Marcos adopted a CAP in 2013 in order to reduce greenhouse gas emissions from City government operations and community activities. The plan includes a number of measures and strategies to achieve greenhouse gas reduction targets, including energy efficiency measures. The City of San Marcos General Plan also has energy efficiency policies that encourage energy conservation, promote energy efficiency, and encourage use of renewable energy sources. The proposed project would not conflict with or obstruct the implementation of these policies through the installation of electric vehicle charging station capacity in all proposed residential garages and no use of natural gas for project operation. Furthermore, the project would be constructed in accordance with Title 24 of the California Building and Energy Code, and would wholly rely on electricity which is increasingly generated from renewable sources. Therefore, the project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency and would have a less than significant impact.

4.6.5 Geology and Soils

Would the project:

1.a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

The project site is not located in an Alquist-Priolo Earthquake Fault Zone (California Department of Conservation 2018b). No active or potentially active faults are located in the City (City of San Marcos 2013). Therefore, the potential for exposure of people or structures to risk of ground rupture of a known earthquake fault is low, and the project would have no impact.

1.b. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

San Marcos has lower potential for strong seismic ground shaking than other areas in Southern California. There are a number of regional faults that surround the City and are capable of producing

severe earthquakes of magnitude 6.0 or greater, as shown in Figure 6-2 of the San Marcos General Plan *Safety Element*; however, general seismic risk in San Marcos is considered low. The Geotechnical Report, conducted by GeoSoils, Inc., provided as Appendix J to this EIR, suggests conformance with the 2016 California Building Code (CBC) seismic design parameters would reduce impacts related to ground shaking to less than significant (Appendix J). The proposed project will conform to the 2016 CBC seismic design parameters, and therefore impacts involving strong seismic ground shaking, and the project would have a less than significant impact.

1.c. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

Liquefaction susceptibility is based on the areas risk to severe ground shaking, the height of groundwater, and the density and type of soil deposits. According to Figure 6-1 of the General Plan Safety Element and Alquist-Priolo Earthquake Fault Zoning Map, the project site is not located in a liquefaction zone (California Department of Conservation 2018b). Furthermore, the Geotechnical Report determined that liquefaction hazards would not affect the proposed development (Appendix J). The proposed project would not expose people or structures to potential substantial adverse effects involving seismic related ground failure; therefore, the project would have a less than significant impact.

1.d. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

The project site is not located in an area susceptible to landslides according to Figure 6-1 of the General Plan *Safety Element* or from maps produced by the California Department of Conservation. The Geotechnical Report concluded that landslides and other adverse geologic features are not anticipated to significantly affect the development of the site (Appendix J). The risk associated with landslide hazards is low; therefore, the project would have a less than significant impact.

2. Result in substantial soil erosion or the loss of topsoil?

The project is proposed on a lot with relatively steep to gentle, south-facing slopes, with slopes as steep as 1:1 (horizontal:vertical). Activities during the construction phase of the project, including excavation and grading, have the potential to cause a loss of topsoil and soil erosion. During construction, short-term erosion impacts would be reduced by compliance with the National Pollutant Discharge Elimination System (NPDES) permit, the implementation of a stormwater pollution prevention plan (SWPPP), an erosion control plan, and the implementation of required best management practices (BMPs). Erosion control BMPs which may be used during project construction include use of temporary groundcover, temporary silt fences to catch soil and debris to prevent them from clogging areas downstream, and placement of gravel bags to protect storm drain inlets and streets. Compliance with these requirements would reduce impacts related to soil erosion and a loss of top soil, and the project would have a less than significant impact.

3. *Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?*
4. *Be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?*

Unstable soils include expansive, compressible, erodible, corrosive, or collapsible soils. Expansive soils are associated with soils, alluvium, and bedrock formations that contain minerals susceptible to expansion under wet conditions and contracting under dry conditions. According to the Geotechnical Report, the earth materials on the project site consist of undocumented fill, topsoil, collivium, and granitic bedrock (Appendix J). These materials consist of silty sands and sand with variable amount of rock fragments, and are generally considered non-detrimentally expansive. With adherence to recommendations in the geotechnical report, the project would have a less than significant impact from unstable and expansive soils.

5. *Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?*

The project would connect to the existing sewer system and not use septic tanks or another alternative wastewater disposal system. Therefore, there is no impact to soils from proposed septic tanks or wastewater.

6. *Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?*

Paleontological resources are not known to be present on-site, as identified in the General Plan. According to the Geologic Map of the Oceanside 30' x 60' Quadrangle, the project is located in an area underlain by tonalite (California Geological Survey 2007). Tonalite is a plutonic igneous rock which has no paleontological resource potential due to its formation from molten rock deep below the earth's surface. Due to the geologic formation under the project site, the project would not directly or indirectly impact a unique paleontological resource or geologic feature and there would be no impacts.

4.6.6 Greenhouse Gas Emissions

Would the project:

1. *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

Project construction and operation would produce greenhouse gas (GHG) emissions both directly and indirectly. Construction of the project would generate temporary GHG emissions primarily as a result of operation of construction equipment on-site, as well as from vehicles transporting construction workers to and from the project site and heavy trucks to export earth materials on site. Operational GHG emissions would result from energy use, area emissions from landscaping equipment and consumer products, waste generation and water consumption, and from mobile sources from vehicle trips generated by the project.

An Air Quality and Greenhouse Gas Study was prepared by Rincon Consultants, Inc. (Appendix I) to predict future GHG emissions associated with both construction and operational phases of the project. We refer the reader to the GHG Study in Appendix I for a comprehensive discussion and

analysis of the regulatory background, project-specific GHG threshold, and impact analysis. Project emissions would have a less than significant impact if they do not exceed locally appropriate thresholds that are consistent with the California GHG reduction targets outlined in Senate Bill (SB) 32, which requires a 40 percent reduction in GHG emissions below 1990 levels. The study found the project would result in emissions equivalent to 3.0 metric tons (MT) of CO_2e per service population for the estimated 209 new San Marcos residents. This is consistent with the locally appropriate service population efficiency threshold consistent with the SB 32 target of 3.2 MT CO_2e per service population, which was determined to be the appropriate threshold for the project in the operational year of 2021 based on the same methodology used in the City's existing Climate Action Plan (CAP) and recommended by CARB's 2017 Scoping Plan, for projects until the City adopts an updated, consistent CAP (Appendix I). Table 4.6-3, below, provides a summary of net annual emissions at project buildout (Appendix I). Therefore, project generated GHG emissions would have a less than significant impact.

Table 4.6-3 Project Net Annual Emissions at Buildout

Emission Source	Annual Emissions (MT of CO_2e)
Construction	35.4
Operational	
Area	0.8
Energy	149.6
Solid Waste	15.5
Water	28.6
Mobile	
CO_2 and CH_4	392.3
N_2O	19.4
Total Project Emissions	**641.6**
Project Service Population (SP)	209
Project Emissions per Service Population (MT CO2e/SP/year)	3.1
Project Specific Efficiency Threshold (MT CO_2e/SP/year)	3.2
Exceed Project Specific SB 32 Threshold?	No

Source: Rincon Consultants, Inc. 2019 (Appendix I)

2. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases?

The Air Quality and Greenhouse Gas Study (Appendix I) found the project would be consistent with policies and growth projections of the SANDAG 2050 Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS), and GHG emission reduction targets of SB 32. The project site is located adjacent to City services and in proximity to existing transit options. Therefore, the project would not conflict with RTP/SCS policies, which require promotion of alternative transportation options in new developments, with the goal of reducing transportation-related GHG emissions. Table 4.6-4, below, provides a summary of project consistency with applicable RTP/SCS policies.

Table 4.6-4 RTP/SCS Consistency

RTP/SCS Policy	Project Consistency
Provide convenient travel choices including transit, intercity and high-speed trains, driving, ridesharing, walking, and biking	The project is located within a five minute walk to transit stops and train stations as well as across E. Mission Road from the San Marcos Library and Civic Center. This provides convenient transportation choices.
Increase the use of transit, ridesharing, walking and biking in major corridors and communities	The proximity of the project to the Civic Center, transit stops, and a train station will increase the use of alternative modes of transportation.
Ensure access to jobs, services, and recreation for populations with fewer transportation choices	The project is across E. Mission Road for the Civic Center and about 0.7 miles north of CSU San Marcos, providing easy access to job centers, education, and recreational areas.
Reduce greenhouse gas emission from vehicles and continue to improve air quality in the region	The project would promote the use of alternative modes of transportation due to its location, which would reduce greenhouse gas emissions.

Source: Rincon Consultants, Inc. 2019 (Appendix I)

Furthermore, as described in the Air Quality and Greenhouse Gas Study, the City has not adopted an updated CAP consistent with SB 32. GHG emissions per service population would not exceed the locally appropriate service population efficiency thresholds established by SB 32 and based on the same methodology used in the City's existing CAP and recommended by CARB's 2017 Scoping Plan (Appendix I). Since the project would not exceed growth projections or established GHG thresholds and is consistent with applicable policies in the 2050 RTP/SCS, the project would have no significant impact.

4.6.7 Hazards and Hazardous Materials

Would the project:

1. *Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?*
2. *Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?*

Construction and operation of the project would not involve the use and transport of hazardous materials outside of those used in operation of typical construction equipment or typical household and landscape materials. Materials used for construction would be transported to and within the project site for regular construction activities, and include: diesel fuel, lubricants, adhesives, cleaning solutions, and chemical toilets. The amount of hazardous materials used during project operation would not be substantial and would not pose a risk to the public or environment. Hazardous materials use and transport during both construction and operation of the project would comply with all pertinent federal, state, and City regulations regarding their storage, on-site use, and off-site disposal. Compliance with the applicable regulations would reduce project impacts to a less than significant level.

3. *Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?*

The nearest schools are San Marcos Elementary and California State University San Marcos, which are 0.44 miles and 0.54 miles away from the project site, respectively. The project would not emit hazardous materials during operations, and handling of hazardous materials consistent with typical construction activities would occur within the project site. Furthermore, there are no schools within one-quarter mile of the project site. As such, the project would have no impact.

4. *Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?*

The project site is not listed as a hazardous materials site according to the Department of Toxic Substances EnviroStor database and the State Water Board GeoTracker. Five sites in the project site vicinity are identified as containing hazardous materials; however, all have been closed or require no further action, and present no potential hazard to the project. Because there were no hazardous material sites on or near the project, the project would have no impact.

5. *For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?*
6. *For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?*

The nearest airport is McClellan-Palomar Airport, located 6.3 miles west of the project site. The project is not located within an airport land use plan or within two miles of a public or private airport; therefore, the project would have no impact.

7. *Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?*

The City of San Marcos adopted the Unified San Diego County Emergency Services Organization Emergency Operations Plan in 2010; however, official evacuation routes have not been established. The San Marcos Fire Department Community Wildfire Protection Plan contains recommended fire evacuation routes, with which the project site would not interfere (SMFD 2007). Increased traffic generated by the project would be minor in nature and would also not impact the evacuation routes. Furthermore, the project would comply with all applicable City standards for emergency access to the development, and the project would be reviewed by the San Marcos Fire Department and comply with all design recommendations. Therefore, project impacts to emergency evacuation routes and emergency response would be less than significant.

8. *Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?*

The project site is located in a Moderate Fire Hazard Severity Zone according to the California Department of Forestry and Fire Protection and according to Figure 6-4 of the General Plan, the project site is not located in an area at significant risk of wildfire (Cal Fire 2009, City of San Marcos 2013). Further, the project site is bounded by Mission Road to the south, Woodward Street to the west and a driveway for the neighboring residential development to the east. These streets and

related improvements provide a fire buffer for the project site. To the north of the project site, there is vegetated, undeveloped land which could pose a risk of fire to the project. However, the project would be designed and constructed according to California Building and Fire Code standards, including installing fire sprinklers, and the proposed fuel modification zone (FMZ), approved by the Fire Marshal, would provide an adequate buffer between the residences and nearby vegetation (Appendix K). In addition, the project would be reviewed and approved by the San Marcos Fire Department (SMFD) prior to building permit and/or occupancy permit issuance, as appropriate. With implementation of the Fire Prevention Plan, the incorporation of the FMZ, implementation of fire protection design features, and compliance with building standards, the project would not expose people or structures to a significant wildfire risk and the project would have a less than significant impact.

4.6.8 Hydrology and Water Quality

Would the project:

1. *Violate any water quality standard or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?*

The proposed project would be required to comply with all applicable stormwater discharge regulations. Potential water quality impacts associated with project construction include erosion, sedimentation, and potential hazardous material discharge from construction equipment and materials. The site size and proposed grading activities require compliance with National Pollution Discharge Elimination System (NPDES) regulations for construction stormwater discharge, and the development of a Storm Water Pollution Prevention Plan (SWPPP), required by the Construction General Permit, General Permit Order 2009-0009-DWQ. Furthermore, the City of San Marcos would require an Erosion and Sediment Control Plan as part of the grading plans for the project, and would require the project to meet minimum Best Management Practices (BMPs) detailed in the City Construction Best Management Practices Manual. Post construction and operation of the project would comply with Chapter 14.15 of the San Marcos Municipal Code and the City Jurisdictional Urban Runoff Management Program, which are designed to prevent pollutants from entering the stormwater conveyance system in the City. The project's status as a "priority project" also requires additional treatment control BMPs under the City's Jurisdictional Urban Runoff Management Program (JURMP) Provision E.3.b (City of San Marcos 2008). Compliance with all applicable regulations and measures setting water quality standards and waste discharge requirements ensure the project would have a less than significant impact.

2. *Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?*

The project site's relative geography and compliance with stormwater runoff regulations reduce the project's impact on groundwater resources. The San Marcos water supply is provided primarily by Vallecitos Water District (VWD), which receives all of its supply from the San Diego County Water Authority (SDCWA). The SDCWA obtains most of its water from the State Water Project, which imports water from the Colorado River via the Colorado River Aqueduct. The project site and the surrounding area are located within the San Marcos Valley Groundwater Basin (SMVGB), which the City of San Marcos does not utilize as a potable water source as extraction would be economically unviable (VWD 2015). Furthermore, impacts on replenishment for the SMVGB due to the project's use of impervious surfaces would be reduced by implementation of BMPs and compliance with

NPDES. The project would not decrease groundwater supplies or interfere substantially with groundwater recharge; therefore, it would have a less than significant impact.

3. *Substantially alter the existing drainage of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site; substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; create or contribute to runoff which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede or redirect flood flows?*

No streams or rivers are present on the project site; however, the project would increase impervious surfaces on-site, creating potential impacts to the nearby streams and drainage patterns due to increased stormwater runoff. The project would be considered a priority project and would be designed to minimize erosion and siltation through soil stabilization, sediment control, and erosion control BMPs outlined in the City of San Marcos Construction Urban Runoff Requirements Manual (City of San Marcos 2018). Furthermore, the project would be required to comply with a Construction General Permit, which would entail an Erosion Control Plan, SWPPP and compliance with JURMP. The project applicant would also implement site design BMPs to mimic the hydrology of the site before development of the proposed project, as well as control post-development peak stormwater runoff discharge rates to reduce the project impacts on surface water runoff. Stormwater runoff and associated pollutants would be controlled through compliance with previously mentioned BMPs, JURMP, the San Marcos Municipal Code, and NPDES regulations. Lastly, the project is not located in a flood hazard area according to the FEMA Flood Insurance Map; therefore, the project would have no impact on flood flows. Compliance with applicable regulations and BMPs would reduce impacts to a less than significant level.

4. *In flood hazard, tsunami or seiche zones, would the project risk release of pollutants due to project inundation?*

According to Figure 6-3 FEMA Flood Hazards and Reservoir/Dam Inundation Zones in the General Plan Safety Element (City of San Marcos 2013), the project site is not located in an inundation zone of the dams and reservoirs located in the City. Consequently, there would be no impact related to risk associated with failure of a levee or dam.

5. *Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?*

The project would comply with all applicable regulations and measures to reduce potential water quality impacts during construction and operations of the project. Therefore, the project would not conflict with the implementation of The SDRWQCB Basin Plan, which establishes water quality objectives and implementation measures. The project site is located within the SMVGB, which is not required to prepare a Groundwater Sustainability Plan under the Sustainable Groundwater Management Act. The proposed project would not conflict with or obstruct implementation of water quality control plan or sustainable groundwater management plan; therefore, the project would have no impact.

4.6.9 Land Use and Planning

Would the project:

1. *Physically divide an established community?*

The proposed project outlines a plan for a residential development on currently undeveloped property. The proposed update to the Mission 316 Specific Plan would specify a circulation plan that incorporates one circulation road originating from East Mission Road, that would share an access point with the existing multi-family development to the east (Mission 316 East), and connecting to a second access point on Woodard Street. The circulation road would not divide an existing community or negatively affect the physical structure of the surrounding neighborhoods; therefore, the project would have no impact.

2. *Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigation an environmental effect?*

The project site is located in the Richland Neighborhood of San Marcos. The City's General Plan designates the site as a Specific Plan Area (SPA), and the project site is currently located in the Heart of the City Specific Plan area and Richmar Specific Plan area, although no adopted Specific Plan text exists for the Richmar Specific Plan area. The project site currently has a commercial land use designation, and the project includes a Specific Plan Amendment to the Mission 316 Specific Plan in order to add the project site to the Specific Plan boundaries, thereby removing the project site from the Heart of the City and Richmar Specific Plans, and to provide for additional standards and regulations for the design and construction of the residential use. If the project is approved, the proposed development, density, and standards would be consistent with the City's General Plan, applicable land use policies, and applicable regulations in the City's municipal code. The proposed residential use of the site is consistent with the surrounding multi-family and single-family development to the north and east of the project site. In addition, the development of housing would help the City meet their regional housing needs and would be consistent with smart growth and in-fill policies in the City's General Plan as the project places housing within the Town Center area near transit, employment, and civic uses. Therefore, the project would have less than significant impacts.

4.6.10 Mineral Resources

Would the project:

1. *Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?*
2. *Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?*

The project site and surrounding properties are part of the overall urbanized area within the City of San Marcos. According to the Conservation Open Space Element of the General Plan, the project site is located in Mineral Resource Zone 3 and there are no known mineral resources on-site. In addition, there are no suitable sources of mineral resources for construction materials within the City of San Marcos (City of San Marcos 2013). Therefore, the project would not have an impact on any known mineral resource and no impact would occur.

4.6.11 Population and Housing

Would the project:

1. *Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?*

The RTP/SCS estimates the San Marcos population to increase by 7,040 residents between 2017 and 2050 from 96,198 to 105,546 residents (U.S. Census Bureau 2017; SANDAG 2011). The 209 new residents generated by the project would represent two percent of the City's projected growth, and would not exceed growth projections for the area. The project would not induce substantial population growth in the City as the project would not involve development that would substantially increase the population over what is expected. Therefore, the project would have a less than significant impact.

2. *Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?*

The project site is vacant and contains no existing housing or people. The project would not displace a substantial number of people or require the construction of replacement housing. Therefore, the project would have no impact.

4.6.12 Public Services

1a-b. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: Fire protection and police protection?

The proposed project is located in an area that is already served by the San Diego County Sheriff's Department and the San Marcos Fire Department (SMFD). The proposed development may minimally increase the demand for emergency services; however, the applicant would be required to submit and annex into the applicable Community Facilities District (CFD) or pay an in-lieu fee due to the proposed new development. Property owners within CFDs are taxed annually for their share to finance local public facilities and services. Payment of these taxes would reduce impacts for the additional demand of fire and police services from the project. The 67-unit development would not exceed the capacity of SMFD or Sheriff Department to serve the region and provide fire protection services or create the need for new or expanded facilities. Therefore, the project would have a less than significant impact.

1c-e. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: Schools, Parks, or other public facilities?

The proposed 67-unit development would result in an estimated 209 additional residents, with an anticipated student resident population of 24. The project would be served by Richland Elementary, Woodland Park Middle School, and Mission Hills High School, which are all within the San Marcos Unified School District. All three schools are currently considered impacted and over capacity. As

stated by the Facilities Planning and Development Department of the San Marcos Unified School District, the project applicant is required to pay the District's Residential Dwelling Unit Fee (currently $5.61 per square foot) (SMUSD 2019). This fee serves to offset any significant impacts on school facilities and would reduce project impacts on schools to a less than significant level (Government Code Section 65996). Impacts to parks and other public facilities, although minimal, would be offset through payment of Public Facility Fees, as detailed in Section 17.44.060 of the San Marcos Municipal Code. No need or physically altered park or additional public facilities would be required to serve the project's 209 additional residents. Payment of the District and Public Facility Fees by the project developer would offset increased use of services associated with the project's estimated population increase. Therefore, the project would result in a less than significant impact.

4.6.13 Recreation

1. *Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?*
2. *Does the project include recreational facilities or require the construction or expansion of recreational facilities which may have an adverse physical effect on the environment?*

San Marcos has over 357 acres of planned parkland to be constructed over the next several years. With this acreage, the City will exceed its standard of 5 acres per 1,000 residents by providing over 7 acres per 1,000 residents (City of San Marcos 2013). The estimated net addition of 209 residents would not cause a significant increase in use of parkland, would not contribute to the accelerated deterioration of parks or recreational facilities, nor would it require the construction or expansion of new park facilities. The project also proposes 33,889 square feet of common open space which includes gathering areas, barbeque counters, turf areas, and seating areas and shade structures for residential use. These proposed on-site amenities would reduce the need for residents to utilize public recreation areas. The project would also be subject to Public Facility Fees (PFF), as detailed in Section 17.44.060 of the San Marcos Municipal Code, to offset impacts from additional residents from the project. Due to the amount of existing and proposed parkland in the City and the proposed common open space areas, the project would not require construction of new or expanded facilities. The project would also be subject to the payment of PFFs. Therefore, the project would result in a less than significant impact.

4.6.14 Utilities and Service Systems

Would the project:

1. *Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?*

The proposed residential development would bring approximately 209 people which would generate additional water, wastewater, and electricity demand. As discussed in the Energy Conservation section, the project would not generate electrical demand requiring additional sources of electricity production by the utility provider. The project site is located next to existing utility facilities and would not require the construction or relocation of facilities in order to serve the project.

The project would include the installation of water and sanitary sewer lines. Water service, potable and wastewater, to the project site would be provided by Vallecitos Water District (VWD). The

water line would connect to an existing eight-inch water line under Mission Road. The excavation would occur in areas previously disturbed and would not result in impacts on biological resources, cultural resources, or other environmental resources.

VWD completed a Water Systems Analysis for this project, included as Appendix L of this EIR. VWD determined the proposed project would increase water demand by 12,705 gallons per day and generate 7,623 gallons of wastewater per day.

VWD's water distribution system modeling based on estimated project demand did not result in system deficiencies under average day demand or maximum day plus fire flow demand conditions. VWD also determined that water storage capacity is currently available to serve the project's increase water storage requirements (calculated to be 500 percent of daily demand; 12,705 gallons per day x 500 percent = 63,525 gallons; Appendix L).

VWD's wastewater modeling results showed that the proposed project does not result in any wastewater system deficiencies under peak wet weather flows during ultimate build-out conditions. VWD currently owns 10.47 million gallons per day (MGD) of solids treatment capacity at the Encina Water Pollution Control Facility (EWPCF). VWD currently owns 7.67 MGD of liquids treatment capacity at the EWPCF in addition to the 5.0 MGD capacity at the Meadowlark Reclamation Facility for a total of 12.67 MGD of liquids treatment capacity. VWD's 2014 average daily wastewater flow was 7.2 MGD. Therefore, VWD and EWPCF have adequate solids and liquids treatment capacities to serve the project (Appendix L).

Furthermore, the project would not require an upgrade or construction of a pump station since the project site is located in a pressure zone that is not served by pumping. Therefore, the project would have a less than significant impact.

2. *Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?*

VWD completed a Water Systems Analysis for this project, included as Appendix L of this EIR, to determine if the District has adequate supplies and capacity to serve the project. According to the Water Systems Analysis, VWD has sufficient water storage capacity to serve the proposed project. The proposed project would require 63,525 gallons of additional reservoir storage in the zone, which would be covered with the payment of Water and Wastewater Capital Facility Fees, which are determined according to VWD Ordinance 175 (*Modifying Water Capital Facility Fees in Fiscal Year 2012-2013*) and 188 (*Modifying Ordinance No. 175*). These fees would be used by VWD to expand water storage facilities within their service area, and VWD considers payment of the Water and Wastewater Capital Facility Fees as mitigation for the increase in water storage demand (Appendix L). Therefore, the VWD would have sufficient water supplies to serve the project and impacts would be less than significant.

3. *Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?*

The wastewater analysis completed by VWD (Appendix L) concluded that there is adequate solid and liquid treatment capacity, as well as adequate ocean disposal capacity. The VWD 2008 Master Plan estimates that buildout upon approved land uses would result in a peak wet weather flow exceeding current capacity. To account for needed expansion of wastewater capacity, the project would have to pay Wastewater Capital Facility Fees pursuant to VWD Ordinance No. 176 (*Modifying*

Wastewater Capital Facility Fees for Fiscal Year 2012-2013). By paying the proposed fees and constructing and accepting all on site water and sewer facilities prior to service being provided, the project would have a less than significant impact on wastewater treatment capacity at VWD (Appendix L).

4. *Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?*

Solid waste service would be provided by EDCO Waste and Recycling Services, which handles residential, commercial, and industrial collections in the City of San Marcos. EDCO transports collected waste to the Escondido Transfer Station, where it is then transferred to the Sycamore Sanitary Landfill located in Santee. The Sycamore Landfill has a permitted capacity of 5,000 tons/day and a remaining capacity of 113,972,637 cubic yards (CalRecycle 2018a). The average daily weight received during September 2018 was 3,356 tons, which resulted in excess daily capacity of 1,644 tons (Sycamore Landfill, Inc. 2018). The proposed project of 67 dwelling units would add approximately 209 residents, based on the City's average household size established by the Department of Finance. Using the California Department of Resources Recycling and Recovery (CalRecycle) per capital disposal rate of 4.9 pounds per resident per day, the project is anticipated to generate 1,024 pounds of solid waste per day, which the Sycamore Landfill can adequately accommodate. Furthermore, the City of San Marcos currently exceeds its solid waste diversion goal of 50 percent (CalRecycle 2018b), with which the proposed project would not interfere. The project's generation of solid waste would have a less than significant impact.

5. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Solid waste facilities require permits to operate, and the San Diego County Department of Environmental Health issues the facility permits. The Sycamore Landfill currently has active permit 37-AA-0023 and undergoes quarterly inspections. Because the project would utilize the Sycamore Landfill for solid waste disposal, it would comply with existing regulations related to solid waste. The City of San Marcos currently exceeds AB 939 requirements of solid waste diversion and is close to meeting AB 341 requirements of diverting 75 percent of solid waste by 2020. The project would comply with applicable solid waste diversion programs; therefore, the project would have no impact.

4.6.15 Wildfire

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

1. *Substantially impair an adopted emergency response plan or emergency evacuation plan?*
2. *Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?*
3. *Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?*

4. Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

A project-specific Fire Prevention Plan (FPP) was prepared by Dudek (Appendix K), which included fire risk analysis for the project site, project effects on fire hazards, and efficacy of fire protection design features which are included as part of the project (described in Section 2.0, *Project Description*). According to the Fire Hazard Severity Zones Maps, the project site is not located in a very high fire hazard severity zone (Cal Fire 2009). The nearest very high fire hazard severity zone is located in the Santa Fe Hills, approximately 0.5 miles southeast of the project site (City of San Marcos 2013). The area of the Santa Fe Hills nearest to the project site has been partially developed by single-family residences. Multiple major roads, as well as existing residential and commercial development, are located between Santa Fe Hills and the project location, which would limit the ability of wildfire to reach the project site.

The project site is located in an area subject to occasional weather extremes that may facilitate wildfire ignition and spread. Terrain within the vicinity of the project site may facilitate the spread of fire due to steep, vegetation-covered slopes. However, the project site is situated on the leeward side of the small hill, and is less exposed to the direct pathway of an approaching fire. The northern portion of the project site includes potential vegetation that could serve as fuel sources, which would be converted from readily ignited fuels to ignition-resistant structures and landscaped areas as a result of the project (Appendix K). The proposed project would be developed to meet all existing development codes and fire codes, including landscaping and vegetation requirements as indicated in Section 4907 of the 2016 California Fire Code, which is adopted by the City (Appendix K).

The project would include conversion of existing fuel sources to maintained urban development with designated landscaping and fuel modification zones (FMZ). Due to site constraints, the FPP recommended a 100-foot wide FMZ for the project, along with additional vegetation and structural protection measures. The FMZ would include a minimum 100-foot wide irrigated Zone A extending north from the proposed residential buildings. Based on the analysis completed in the FPP, Zone A was determined to be applicable to the project site, and includes key components such as an irrigated wet zone, tree spaced of a minimum of 10 feet between crowns, year round maintenance of the FMZ, and fire-resistive species composition. The FPP was reviewed by the Fire Marshal and the recommended 100-foot FMZ was found to be acceptable for the project site.

The two proposed driveways and on site roads are designed and would be constructed to ensure accessibility and staging for fire apparatus, consistent with City standards and 2016 California Fire Code. Furthermore, a minimum 10-foot wide Zone A would be provided along the east and north driveway entrance from Woodward Street beyond the proposed 33-foot high anchor wall. Therefore, the project would not impair implementation of existing emergency response or evacuation plans.

Implementation of the project would not exacerbate wildfire risks, and proposed driveways and on site roads have been designed to accommodate fire apparatus. Therefore, the project would have a less than significant impact related to wildfire.

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5 Other CEQA Required Discussions

This section discusses growth-inducing impacts and irreversible environmental impacts that may be caused by the proposed project.

5.1 Growth Inducement

Section 15126(d) of the CEQA Guidelines requires a discussion of a proposed project's potential to foster economic or population growth, including ways in which a project could remove an obstacle to growth. Growth does not necessarily create significant physical changes to the environment. However, depending upon the type, magnitude, and location of growth, it can result in significant adverse environmental effects. The proposed project's growth inducing potential is therefore considered significant if project-induced growth could result in significant physical effects in one or more environmental issue areas.

5.1.1 Population Growth

As discussed in Section 14, *Population and Housing*, of the Initial Study (Appendix A), the proposed project would create a population growth of approximately 209 persons, using the City's average household size of 3.13 (Department of Finance [DOF] 2018). This is a conservative estimate as 37 of the 67 units in the multi-family development would be two-bedroom units that would likely have a lower household size than the average due to limited number of bedrooms. The project does not propose other uses that would result in indirect population growth in the City.

The current population of the City is approximately 93,483 (U.S. Census 2017). According to regional growth forecasts from SANDAG, the population of the City is expected to increase to 113,015 in 2050, an increase of approximately 19,532 people (SANDAG 2015). In addition, from 2012 to 2050 the number of multi-family residential units in the City is expected to increase by 7,233. The project property was not included in the projected housing numbers as the site is currently commercially designated. However, the estimated 209 people added by the project would not cause the City to exceed the population forecasts and would not induce substantial population growth. Additionally, the 67 housing units would help the City meet its projected housing needs.

5.1.2 Economic Growth

The proposed project would generate temporary employment opportunities during construction. The Economic Impact Report prepared for the project estimated 119 temporary construction jobs would be created, and because construction workers would be expected to be drawn from the existing regional work force, construction of the project would not be growth-inducing from a temporary employment standpoint (Appendix M). Although operation of the project would provide limited opportunities for landscaping and maintenance work, the project would not result in direct long-term employment opportunities that would lead to growth in the area. However, as discussed in the Market Analysis prepared for the project, the region currently has an employment:permit (E/P) ratio above 2.0, which indicates that for each housing permit filed, two jobs were added to the region (Appendix M). The E/P ratio is expected to decline into the future, but any ratio over one

indicates there is an economic opportunity for new housing. Therefore, the proposed project could aid in the regions job growth by providing necessary housing.

Since the project does not include commercial or industrial uses that would provide employment opportunities, it would not be expected to induce substantial economic expansion to the extent that direct physical environmental effects would result. The proposed project could provide housing for workers in the area; however, as discussed under Section 5.1.1, *Population Growth*, the project would be well within the population growth projections for the City.

5.1.3 Removal of Obstacles to Growth

The proposed project is located in a mostly urbanized area that is served by existing infrastructure. As discussed in Section 4.5.16, *Transportation and Traffic*, and Section 4.5.17, *Utilities,* existing infrastructure in the City would be adequate to serve the project. Minor improvements to water, sewer, and drainage connection infrastructure would be needed to connect the existing infrastructure to the undeveloped project site, but would be sized to specifically serve the project. Additional minor improvements to the City right-of-way for site access would be needed, but would not alter overall uses or design once the project is implemented. No new roads would be required. The project does not and would not provide a link to the single-family residential neighborhoods to the north of the site. Because the project constitutes development within a mostly urbanized area and does not require major extensions of new infrastructure, project implementation would not remove an obstacle to growth.

5.2 Irreversible Environmental Effects

The CEQA Guidelines require that an EIR contain a discussion of significant irreversible environmental changes. This section addresses non-renewable resources, the commitment of future generations to the proposed uses, and irreversible impacts associated with the proposed project.

The proposed project involves development on a currently undeveloped lot in a mostly urbanized area of the City. Construction and operation of the project would involve an irreversible commitment of construction materials and non-renewable energy resources. The project would involve the use of building materials and energy, some of which are non-renewable resources, to construct the overall building floor area of approximately 85,000 gross square feet (not including parking areas and other project amenities). Consumption of these resources would occur with any development in the region, and are not unique to the proposed project.

The proposed project would also irreversibly increase local demand for non-renewable energy resources. The site is currently undeveloped and is utilizing no energy resources. However, increasingly efficient building design would offset the demand to some degree by reducing energy demands of the project. As discussed in Section 2.5.6, *Green Building Features*, the proposed project's overall design would meet CALGreen standards (California Code of Regulations, Title 24, Part 11), which requires implementation of energy efficient light fixtures and building materials. Furthermore, the project would comply with the 2019 Building Energy Efficiency Standards (CBC Title 24, Part 6), which requires newly constructed buildings to meet energy performance standards set by the California Energy Commission. Each residential unit would comply with California Building Code standards and be wired for a future electric vehicle charging station. In addition, the project would only operate with electricity and would not utilize natural gas. As the electricity generated by renewable resources increases due to State policies and regulations, the project would become more carbon neutral. Consequently, the project would not use unusual amounts of energy or

construction materials and impacts related to consumption of non-renewable and slowly renewable resources would be less than significant. Again, consumption of these resources would occur with any development in the region and is not unique to the proposed project.

Additional vehicle trips associated with the proposed project would incrementally increase local traffic and regional air pollutant and GHG emissions. However, as discussed in Section 4.5.3, *Air Quality*, and Section 4.5.7, *Greenhouse Gas Emissions*, development and operation of the project would not generate air quality or GHG emissions that would result in a significant impact. Additionally, Section 4.5.16, *Transportation and Traffic*, of this EIR concludes that long-term impacts associated with the proposed project would be less than significant based on City and regional thresholds.

The project would also require a commitment of law enforcement, fire protection, water supply, wastewater treatment, and solid waste disposal services. However, as discussed in Section 4.5.14, *Public Services*, and Section 4.5.17, *Utilities and Service Systems*, impacts to these service systems would not be significant.

Given the aforementioned, the proposed project would not result in significant irreversible environmental changes.

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6 Alternatives

As required by Section 15126.6 of the *CEQA Guidelines*, this EIR examines a range of reasonable alternatives to the proposed project that would attain most of the basic project objectives and would avoid or substantially lessen the significant adverse impacts. As discussed in Section 2, *Project Description*, the objectives for the proposed project, are as follows:

Fundamental Project Objectives

- Incorporate a medium density multi-family residential development into the neighborhood that serves as a transitional residential use to surrounding low-density residential neighborhood and to the Town Center area
- Increase the amount of attainable housing available in the City by introducing a range of unit sizes and different bedroom counts including two- and three-bedroom units to accommodate a large spectrum of family demographics and growing housing needs
- Strategically locate multi-family housing adjacent to public transportation such as the Rail Sprinter Line and the City's Town Center area, which consists of employment and civic centers, retail, and schools, to facilitate smart growth

Basic Project Objectives

- Use land resources more efficiently by providing well-planned, infill development on a currently vacant site
- Provide a visually pleasing street scene with medium-density development through architectural design, unified landscape theme, and recreation areas providing continuity along Mission Road
- Create a multi-family community that is cohesive in design with existing adjacent development and consistent with the Mission 316 Specific Plan
- Design a safe and efficient circulation system that adequately supports the anticipated level of traffic in and around the site that is pedestrian safe

Included in this analysis are three alternatives, including the CEQA-required "no project" alternative, that involve changes to the project that may reduce the project-related environmental impacts as identified in this EIR. Alternatives have been developed to provide a reasonable range of options to consider that would help decision makers and the public understand the general implications of revising or eliminating certain components of the proposed project.

The following alternatives are evaluated in this EIR:

- Alternative 1: No Project
- Alternative 2: Reduced Project Footprint
- Alternative 3: Live/Work Units

Detailed descriptions of the alternatives are included in the impact analysis for each alternative. The potential environmental impacts of each alternative are briefly analyzed in Section 6.1 through 6.3.

6.1 Alternative 1: No Project Alternative

6.1.1 Description

The No Project Alternative assumes that the project site continues to be designated for commercial pursuant to the Heart of the City Specific Plan and the proposed project with 67 residential units, 33,889 square feet of common open space, and 27 street guest parking spaces would not constructed. Despite many years of designation for commercial uses, the site has remained vacant and undeveloped for commercial purposes. According to the Market Analysis prepared for the proposed project, the retail vacancy rate in the City of San Marcos is fourth highest in any sub-market in the San Diego region (Appendix M). Therefore, under the No Project Alternative, it is assumed that the currently undeveloped site would remain commercially designated but undeveloped, and the site would remain ungraded and unmanaged. The No Project Alternative was determined to be the environmentally superior alternative. However, Alternative 1 would not fulfill any of the project's objectives because the existing site would not provide housing or meet the development and design goals of the Mission 316 Specific Plan. This Alternative has no characteristics in common with the proposed project or any of the alternatives, as no proposed development would occur.

6.1.2 Impact Analysis

a. Biological Resources

Development of the proposed project could result in direct or indirect impacts to wildlife species and plant communities on the site. Implementation of Mitigation Measures BIO-1 through BIO-7, as described in Section 4.1.2, *Impact Analysis*, would reduce potential impacts to less than significant levels. Under the No Project Alternative, the project would not involve construction or the development of the site. Therefore, no impacts would occur to any special-status species or vegetation communities that currently exist on-site. No mitigation measures would be necessary and the No Project Alternative would impact biological resources **less than** the proposed project.

b. Cultural Resources

Under the No Project Alternative, construction or ground-disturbing activities would not occur, which would eliminate potential impacts to previously unidentified archaeological resources and human remains. Therefore, implementation of mitigation measures would not be required and impacts would be **less than** under the proposed project.

c. Noise

Under the No Project Alternative, construction noise would not occur, which would eliminate potential impacts to sensitive receptors in the vicinity of the project site. Therefore, implementation of the mitigation measure would not be required and impacts would be **less than** under the proposed project.

d. Tribal Cultural Resources

Under the No Project Alternative, construction or ground-disturbing activities would not occur, which would eliminate potential impacts to previously unidentified tribal cultural resources.

Therefore, implementation of mitigation measures would not be required and impacts would be **less than** under the proposed project.

6.2 Alternative 2: Reduced Project Footprint

6.2.1 Description

The project as proposed with the 67 residential units would occupy a 40,172 square foot development footprint and the development is anticipated to impact 1.43 acres of Diegan Coastal Sage Scrub, a vegetation community which is considered a sensitive habitat group in the City. Alternative 2 would reduce the footprint of the project by approximately 50 percent by eliminating at least two units per single-loaded building, four units per double-loaded building, and potentially the westernmost building in order avoid impacts to Diegan Coastal Sage Scrub.

An approximately 20,300 square foot development footprint could be developed on the project site under Alternative 2. Residential units could consist of multiple floor plans distributed across multiple separate buildings, similar to the proposed project in layout.

The proposed project includes two driveways: ingress and egress from East Mission Road and Woodward Street. The two driveways are necessary for the project due to site accessibility to the 67 residential units and seven buildings, and to allow access to fire apparatus. Alternative 2 could be developed with the one existing driveway on East Mission Road for ingress and egress to the project site as long as no more than 49 units are provided and the single driveway does not exceed 600 feet, pursuant to the City's Cul-de-Sac/Single Access Policy Resolution No. 90-3568 The single driveway under Alternative 2 would be designed to accommodate fire apparatus with appropriate turn radius for emergency vehicles. The elimination of the proposed driveway from Woodward Street would further reduce the project footprint.

Alternative 2 could include common open space areas with recreational amenities similar to the proposed project. Alternative 2 could also include private garages in each residential unit and guest parking spaces, which would be located on the north side of the main drive aisle. The project site would have landscaping and hardscaping, and would still comply with the Mission 316 Specific Plan landscaping guidelines. Alternative 2 was determined to be environmentally superior among the development alternatives.

While Alternative 2 would generally meet all of the Project Objectives, it would not satisfy the fundamental project objectives to the same extent as the proposed project. In addition, the maximum number of residential units provided under Alternative 2 (49 units) would not contribute as many units to meet the City's existing shortage of housing, according to the City's General Plan 2013-2021 Housing Element. Furthermore, the reduced unit count would not maximize the density potential of the project site to provide medium density housing adjacent to public transportation such as the Rail Sprinter Line and the City's Town Center area, which consists of employment and civic centers, retail, and schools, to facilitate smart growth.

6.2.2 Impact Analysis

a. Biological Resources

Under Alternative 2, direct impacts to Diegan Coastal Sage Scrub could be avoided since the proposed driveway to Woodward Street would not be included. A fuel modification zone would still be required due to the existing vegetation in the northern portion of the project site. Development

of the site would still require site preparation and grading that could result in indirect impacts California Gnatcatchers, which have been found to inhabit the Diegan Coastal Sage Scrub near the project site, and nesting birds from construction activities during breeding season. There is the potential for greater preservation of open space and habitat on the project site under Alternative 2 due to the reduced development footprint. Nevertheless, the alternative would require the implementation of Mitigation Measures BIO-1 through BIO-6 to reduce impacts to a less than significant level. Mitigation Measure BIO-7, which requires the preservation of Diegan Coastal Sage Scrub through the purchase of credits from a mitigation bank, would not apply to this alternative. Biological Resources impacts under Alternative 2 would be **less, but not substantially less than** those of the proposed project.

b. Cultural Resources

Alternative 2 would have ground-disturbing activities similar to those of the proposed project and the alternative would have the potential to unearth and impact unidentified archaeological resources and human remains. Therefore, Alternative 2 would also require implementation of Mitigation Measures CR-1 through CR-8, as well as TCR-1 and TCR-2, to reduce potential impacts. Impacts under Alternative 2 would be **similar** to those of the proposed project.

c. Noise

Alternative 2 would result in construction noise similar to that of the proposed project. The alternative would require the use of a rock crusher during project construction, which would generate noise exceeding the City's noise threshold for residences that are adjacent to the project site. Therefore, Alternative 2 would require the implementation of Mitigation Measure NOI-1 to reduce potential project impacts. Vibration impacts from construction equipment would be **similar** to those of the proposed project.

Alternative 2 would be developed with up to 49 units. Therefore, trip generation under Alternative 2 (up to 392 daily trips) would be less than that of the proposed project (536 daily trips; Appendix K). Noise increases from the traffic under Alternative 2 would be less than under the proposed project, which is less than significant. Operation of this alternative would include new sources of noise that could be audible at surrounding sensitive receptors, but as with the project, impacts would remain less than significant. Operational noise impacts under Alternative 2 would be **less, but not substantially less than** those of the proposed project, though construction noise impacts would be **similar** to those of the proposed projec**t**.

d. Tribal Cultural Resources

Development under Alternative 2 would involve ground-disturbing activities such as grading and surface excavation that have the potential to unearth or adversely impact unidentified tribal cultural resources. Similar to the proposed project, Alternative 2 would be subject to SB 18 and AB 52 tribal consultation and Mitigation Measures CR-1 through CR-8, as well as TCR-1 and TCR-2 would apply. Impacts under Alternative 2 would be **similar** to those of the proposed project.

6.3 Alternative 3: Live/Work Units

6.3.1 Description

Alternative 3 would involve the development of live-work residential units on the existing, vacant project site. Live-work units would provide a commercial component to the site, consistent with the current commercial designation, and would also provide additional housing types in the City. According to the San Marcos Municipal Code, live-work units are integrated dwelling units and working space, in which the work component is the primary use and the residential component is secondary. Live-work units would require a Specific Plan amendment to allow for a mix of residential and commercial uses and change the land use designation from Commercial to Mixed-used in the Heart of the City Specific Plan area.

Development under Alternative 3 would have a site plan similar to that of the proposed project, with structures located along East Mission Road and parking and driveways in the rear of the site. The alternative would comply with the height regulations and development standards within the Heart of the City Specific Plan. Commercial areas and uses would be concentrated on the ground levels with residential uses on the second and third floors. The units would be less than 2,000 square feet and parking would be provided at one space per unit, consistent with Chapter 20.340-2 of the San Marcos Municipal Code. The actual number of live-work units under Alternative 3 is likely to be fewer than 67 units based on the City's development standards and parking requirements for live/work space units. Alternative 3 could contain one driveway based on the existing entrance on East Mission Road if there are fewer than 49 live-work units developed. The overall development footprint under Alternative 3 may be less than that of the proposed project. However, a second driveway would be needed if Alternative 3 contains more than 49 units, which would make the development footprint under Alternative 3 similar to that of the proposed project.

While Alternative 3 would generally meet the basic Project Objectives, it would further the fundamental Project Objectives to a much lesser extent. Moreover, market studies indicate that there is no market demand for commercial uses in this area, as is demonstrated by the fact that the property has remained vacant for many years despite being designated for commercial development. Governmental finance programs (e.g., FHA, Fannie Mae) are often not available for live work units, which also impacts the viability and marketability of a live work development. In addition, the likely number of residential units provided under Alternative 3 would not contribute as many units to the City's anticipated multi-family housing unit forecast.

6.3.2 Impact Analysis

a. Biological Resources

The development of live-work units under Alternative 3 would involve construction activities similar to those of the proposed project, which could result in direct and indirect impacts to California Gnatcatchers and nesting birds. In addition, the overall development footprint may be similar to the proposed project, which would impact a similar amount of Diegan Coastal Sage Scrub habitat and potential sensitive-species on-site. Therefore, this alternative would require implementation of Mitigation Measures BIO-1 through BIO-7. Overall Biological Resources impacts under Alternative 3 would be **similar** to those of the proposed project.

b. Cultural Resources

Development under Alternative 3 would have a development footprint similar to that of the proposed project. Site preparation and grading would occur under this Alternative, which would have the potential to unearth previously unidentified archaeological resources. Therefore Alternative 3 would require implementation of Mitigation Measures CR-1 through CR-8, as well as TCR-1 and TCR-2, to reduce potential impacts. Impacts would be **similar** to those of the proposed project.

c. Noise

Development under Alternative 3 would result in construction noise impacts similar to those of the proposed project. The alternative would require the use of a rock crusher during project construction, which would generate noise exceeding the City's noise threshold for residences that are adjacent to the project site. Therefore, Alternative 3 would require the implementation of Mitigation Measure NOI-1 to reduce potential impacts. Vibration impacts from the construction equipment would be **similar** to those of the proposed project.

Operation of Alternative 3 may generate a similar number of vehicle trips as the proposed project due to the commercial component of the project even if fewer than 49 units are developed. Therefore, vehicle noise under Alternative 3 may be similar to the proposed project. However, the hours of noise impact would be limited to typical day time commercial activity and would not be anticipated to exceed City noise thresholds. It is assumed live-work units would draw in single occupants rather than families, as compared to the multi-family residences of the proposed project. Therefore, the residential portion of Alternative 3 may generate slightly less noise due to a smaller population on site, and overall residential and commercial noise impacts would have a less than significant impact similar to the project.

The work uses of Alternative 3 could contain commercial retail, creative space, and workshops, which may contain tools or machinery. Work space uses would depend on the activities of the residents. Operational noise from the work spaces under Alternative 3 may be **slightly greater** than that of the proposed project. However, overall work space noise impacts would have a less than significant impact similar to the project.

d. Tribal Cultural Resources

Development under Alternative 3 would be subject to SB 18 and AB 52 and require tribal consultation. Construction of the alternative would involve ground disturbing activities such as grading and surface excavation, which have the potential to unearth and impact unidentified tribal resources. Alternative 3 would require implementation of Mitigation Measures CR-1 through CR-8 and TCR-1 and TCR-2 to reduce potential impacts. Alternative 3 would have impacts **similar** to those of the proposed project.

6.4 Alternatives Considered But Rejected

Section 15126.6 of the State CEQA Guidelines states that:

> An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project.

> Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation. An EIR is not required to consider alternatives which are infeasible.
>
> The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason.

The City acknowledges that the EIR includes a chapter on potential impacts related to traffic safety hazards as a result of the proposed project driveways. As described in Section 4.4, traffic safety hazard impacts were ultimately determined to be less than significant and no mitigation measures are required. Therefore, there is no impact to lessen through the analysis of an Alternative and this topic was excluded from the scenarios described above.

In addition to the three alternatives analyzed above, other alternatives considered include Development Under Existing Land Use (Commercial) and Senior Housing Development. Among the factors that may be used to eliminate alternatives from consideration in an EIR are (1) failure to meet most of the basic project objectives, (2) infeasibility, or (3) inability to avoid significant environmental impacts.

It was determined that the Development Under Existing Land Use (Commercial) alternative would not substantially reduce the environmental impacts of the proposed project. This alternative could actually increase traffic and operational noise concerns since commercial uses would generate greater traffic than residential uses, and would require a development footprint similar to that of the proposed project. Overall, this project would have the same environmental impacts as the proposed project with respect to biological resources, cultural resources, and tribal cultural resources, and may create additional environmental impacts related to greenhouse gas emissions noise, and transportation. Additionally, this alternative would not meet the proposed project's objectives of providing multi-family housing in an in-fill location close to public transit, schools, and employment and entertainment centers that meets the City's housing needs for families. Furthermore, an economic study completed for the project site to assess the feasibility of commercial development (Appendix M) determined that northern San Diego County, inclusive of the City of San Marcos and the project site, cannot absorb additional retail space at current market rates due to the high vacancies in existing retail space (Appendix M). Based on these facts, the commercial development alternative was eliminated from further consideration.

While a Senior Housing Development alternative would meet the proposed project's objectives of meeting the residential needs of the City, implementation of this alternative may be duplicative. As listed in the cumulative project list in Section 3, *Environmental* Setting, there is already a senior housing development proposed for a site directly west, across Woodward Street, from the project site and an existing senior housing development approximately 0.5 mile north of the project site (the Royal Oaks Senior Apartments located at 650 Woodward Street). An alternative that would entail development of a senior housing community on the project site would not meet the project objective of providing housing for a large spectrum of family demographics and growing housing needs. Therefore, this alternative was eliminated from further consideration.

6.5 Environmentally Superior Alternative

CEQA requires the identification of the environmentally superior alternative among the options studied. Identification of the environmentally superior alternative is an informational procedure and the alternative identified as environmentally superior may not be the one that best meets the goals or needs of the proposed project.

Table 6-1 indicates whether each alternative's environmental impact is greater than, less than, or similar to that of the proposed project for each of the issue areas studied. Based on the alternatives analysis provided above, Alternative 1: No Project Alternative, would be the environmentally superior alternative. The No Project Alternative would avoid all significant impacts of the proposed project. However, the No Project Alternative would not fulfill any of the project objectives and may leave the site undeveloped for an indefinite period of time as development consistent with the current designated commercial use was determined to be undesirable for the site and economically infeasible.

When the "No Project" alternative is determined to be environmentally superior, CEQA Guidelines also requires identification of the environmentally superior alternative among the development options. Of the other alternatives evaluated in this EIR, Alternative 2: Reduced Project Footprint, is the environmentally superior alternative due to the reduction in impacts to biological resources and noise.

Table 6-1 Impact Comparison of Alternatives

Issue	Proposed Project Impact Classification	Alternative 1: No Project	Alternative 2: Reduce Project Footprint	Alternative 3: Live/Work Units
Biological Resources	Less than Significant with Mitigation Incorporated	+	+	=
Cultural Resources	Less than Significant with Mitigation Incorporated	+	=	=
Noise	Less than Significant with Mitigation Incorporated	+	+	+/=
Tribal Cultural Resources	Less than Significant with Mitigation Incorporated	+	=	=

+ Superior to the proposed project (reduced level of impact)
- Inferior to the proposed project (increased level of impact)
= Similar level of impact to the proposed project

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Appendix A

Initial Study



Mission 316 West

Initial Study

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February 2019

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Mission 316 West

Initial Study

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Initial Study

1. Project Title

Mission 316 West Project

2. Lead Agency Name and Address

City of San Marcos Planning Division
1 Civic Center Drive
San Marcos, California 92069
Contact: Joseph Farace, Principal Planner
(760) 744-1050, ext. 3248

3. Contact Person and Phone Number

Kurt Bausback, Director of Planning and Entitlements
KB Home Coastal
9915 Mira Mesa Blvd., Suite 100
San Diego, California 92131
(858) 877-4262

4. Project Location

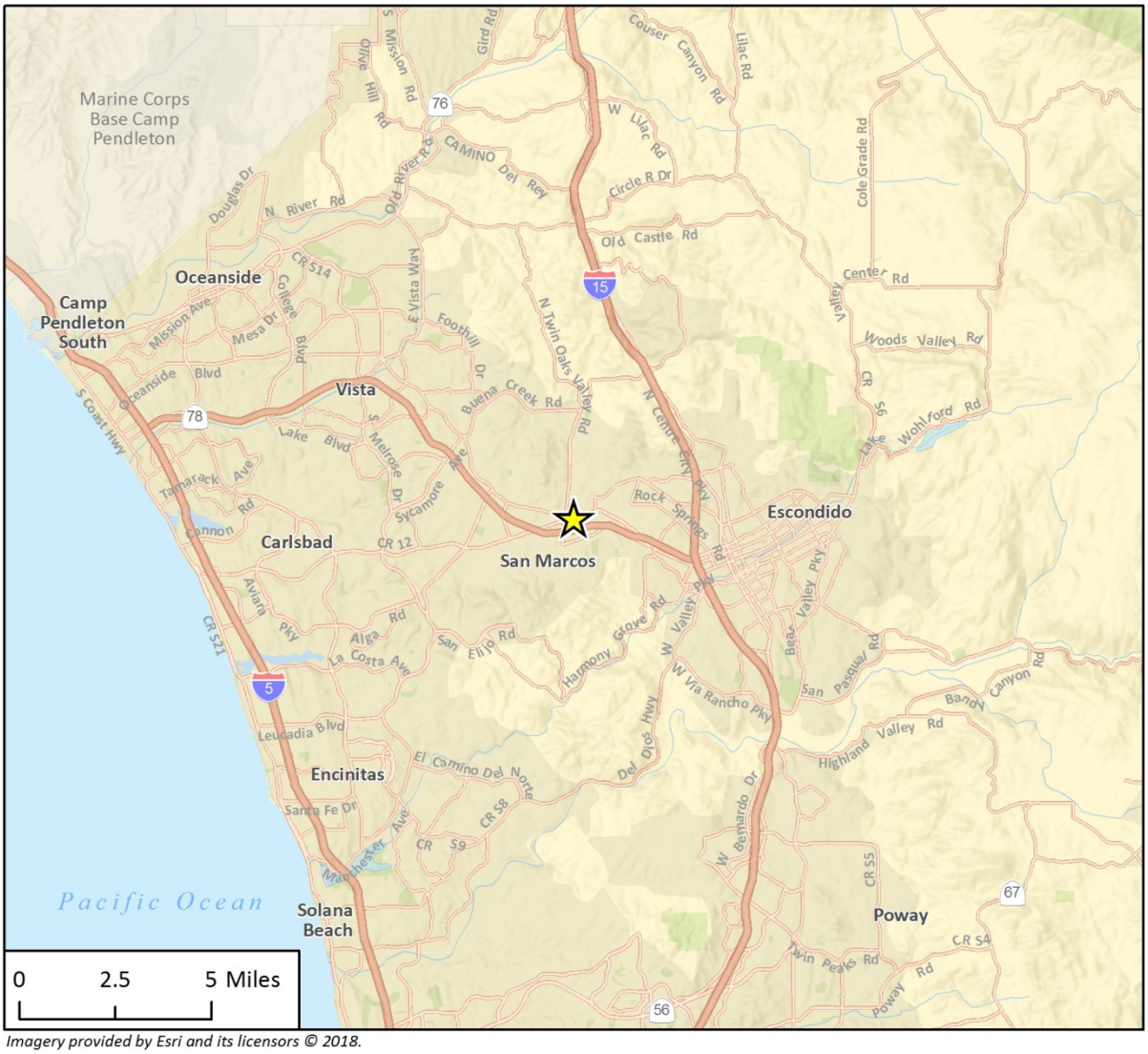
The project site is located in the City of San Marcos in northern San Diego County. The approximate 3.7-acre site is identified as APN 220-210-50 and is located at 260 East Mission Road in the northeast corner of Woodward Street and East Mission Road, as seen in Figure 2. The site has diverse topography, with a steep hillside sloping down towards East Mission Road. The regional location of the project is shown in Figure 1.

5. Related Permits and other Public Approvals

The following entitlements are required for the proposed project:

- Specific Plan Amendment
- General Plan Amendment
- Multi-family Site Development Plan
- Tentative Subdivision Map
- Grading Variance
- Conditional Use Permit for blasting and rock crushing

Figure 1 Regional Location



Imagery provided by Esri and its licensors © 2018.

Figure 2 Project Location



Imagery provided by Microsoft Bing and its licensors © 2019.

Fig 2 Project Location

6. Existing Zoning District

The project site is zoned Specific Plan Area (SPA) in the Heart of the City and Richmar Specific Plan areas.

7. Proposed Use of Site

The site is proposed for multi-family residential units, with a total of 67 units in nine separate buildings.

8. General Plan Land Use Designation

The General Plan Land Use Designation for the project site is Specific Plan Area according to Figure 2-3 in the City's General Plan. The Mission 316 Specific Plan is proposing residential and open space land uses within an area designated for commercial within the existing Heart of the City Specific Plan area. The development will expand the existing Mission 316 Specific Plan area to the west creating a similar residential community to the existing developed site.

9. Zoning

The project site is zoned Specific Plan Area – SPA.

10. Project Description

Background

The proposed project is intended to complement and be consistent with the residential development to the east, known as Mission 316 East. That property, APN 220-210-50, was developed under the Mission 316 Specific Plan, which established standards and regulations for the development of the multi-family housing. The proposed development, Mission 316 West, would be developed in accordance with the Mission 316 Specific Plan, which would be updated to incorporate design standards and development regulations specific to the proposed project.

Proposed Development

The project would develop 3.7 acres with 67 two-and three-bedroom multi-family housing units, detailed in Figure 3. The residential units would consist of three plan types, detailed in Table 1. The units would be distributed in nine separate buildings with five building typologies. Figure 4 shows the elevation of a residential building typology. The 67 residential units provide for a density of approximately 18 dwelling units per acre. The project includes 161 total parking spaces, 134 of which would be provided in two-garages for each residential unit. An additional 27 open parking spaces for residents and visitors are proposed. The San Marcos Municipal Code requires 2.33 spaces per unit, which would total 157 parking spaces.

Figure 3 Proposed Site Plan



Figure 4 Proposed Multi Family Building Elevations



RIGHT



REAR



LEFT



(MISSION RD) FRONT



PERSPECTIVE

MATERIAL SCHEDULE

1	ROOF - CONCRETE 'S' TILE
2	FASCIA - 2 X 6 RESAWN WOOD
3	WALL - STUCCO
4	WALL - BRICK VENEER
5	TRIM - 2 X STUCCO OVER
6	RAILING - DECORATIVE METAL
7	DECORATIVE - WOOD SHUTTERS
8	DECORATIVE - RAFTER TAILS
9	SECTIONAL GARAGE DOOR
10	EXTERIOR LIGHT FIXTURE
11	DECORATIVE POTSHELF
12	DECORATIVE METAL GRILLE



PERSPECTIVE

SAN MARCOS, CA
KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST
AUGUST 31, 2018
SCALE: 0 8 16 24

BUILDING E ELEVATION
SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198
A-13

Table 1 Residential Unit Summary

Plan Type	Number of Units	Square Feet per Unit
2 bedroom/2.5 bathroom	37	1,104
3 bedroom/2.5 bathroom	17	1,339
3 bedroom/3.5 bathroom	13	1,646

The proposed open space would conform to the Mission 316 Specific Plan development standards. The project includes 33,889 square feet of common open space. This includes a recreational area with amenities such as barbeques, counters, seating and share structures, and an open turf area.

The project also includes 3,263 square feet of private open space in the form of patios and decks. The project proposes retaining walls and tubular, steel patio fencing. Walls and fences would be visually appealing and add visual landscape treatments to the project site in conformance with the guidelines of the Missions 316 Specific Plan. Proposed landscaping and hardscaping would also confirm to the standards by incorporating drought tolerant plant species and would maintain continuity with the Mission 316 East development by incorporating a similar landscape theme. Hardscaping would utilize pavers to accentuate entry points and provide pedestrian pathways through the project site and landscaped areas.

The project site contains steep slopes that require substantial grading to accommodate the project. Earthwork quantities would include approximately 25,200 cubic yards of cut material, 13,400 cubic yards of fill material, and 11,800 cubic yards of export material. A grading variance is proposed for slopes exceeding 20 feet in height. Utilities to the site would be extended from existing facilities located off of East Mission Road.

Access to the site would be provided via one driveway located off Woodward Street and one driveway off East Mission Road. The project would share access from East Mission Road with the neighboring Mission 316 East development via a central 24-foot wide circulation road. Twenty-foot wide internal alleys would connect the multi-family dwellings to the main circulation road.

11. Surrounding Land Uses and Setting

The project site is surrounded by a mix of land uses. The Inland Rail Line runs parallel to the project frontage, south of East Mission Road. Multi-family residences are located east of the site. Single-family residences are located northeast of the site. The City of San Marcos Civic Center is located to the south, and includes the public library, the Veteran's Center, and City Hall. Areas of open space with sensitive habitats are located near the project site, including land containing coastal sage scrub to the north and a riparian corridor of Twin Oaks Valley Creek to the south. Neighborhood context is shown in Figure 2.

12. Other Public Agencies Whose Approval is Required

No other public agency approval is anticipated to be required.

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Environmental Factors Potentially Affected

This project would potentially affect the environmental factors checked below, involving at least one impact that is "Potentially Significant" or "Less than Significant with Mitigation Incorporated" as indicated by the checklist on the following pages.

☐	Aesthetics	☐	Agriculture and Forestry Resources	☐	Air Quality
■	Biological Resources	■	Cultural Resources	☐	Energy
☐	Geology/Soils	☐	Greenhouse Gas Emissions	☐	Hazards & Hazardous Materials
☐	Hydrology/Water Quality	☐	Land Use/Planning	☐	Mineral Resources
■	Noise	☐	Population/Housing	☐	Public Services
☐	Recreation	☐	Transportation	■	Tribal Cultural Resources
☐	Utilities/Service Systems	☐	Wildfire	☐	Mandatory Findings of Significance

Determination

Based on this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions to the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

■ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potential significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

2/4/19
Date

JOSEPH FARACE
Printed Name

PRINCIPAL PLANNER
Title

Environmental Checklist

1 Aesthetics

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☐	■
b. Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	■
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☐	■
d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	☐	☐	■	☐

a. Except as provided in Public Resources Code Section 21099, would the project have a substantial adverse effect on a scenic vista?

The site is undeveloped and located in a mixed commercial, residential, and light industrial area near Woodward Street and East Mission Road. The project site is not located in or near a designated scenic vista according to the City of San Marcos General Plan; therefore, the project would not degrade the view of designated scenic resources from any important view location. The City of San Marcos has designated the San Marcos Mountains, Merriam Mountains, Mount Whitney, Cerro de La Posas, Double Peak, Owens Peak, Franks Peak, creek corridors, eucalyptus stands, historic buildings, and ocean views as scenic resources. The project site would not affect views of these designated scenic resources and does not lie within the Ridgeline Protection and Management Overlay Zone (City of San Marcos 2012). Therefore, there would be no project impacts related to scenic vistas.

NO IMPACT

b. Except as provided in Public Resources Code Section 21099, would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

The portion of State Route 78 (SR 78) that travels through the City of San Marcos and by the project site is not a designated scenic highway (Caltrans 2011). However, the City of San Marcos General Plan designates SR 78 as a view corridor, providing views of the Merriam Mountains, Mount Whitney, and Double Peak (City of San Marcos 2013). The project site is located approximately 0.38 miles north of SR 78. Due to the elevation of the highway and relative location to these scenic resources, the project is not visible from and would not directly damage or block the view of these designated scenic resources from SR 78. Therefore, the proposed project would not affect scenic resources as viewed from a scenic highway and there would be no impact.

NO IMPACT

c. Except as provided in Public Resources Code Section 21099, would the project, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

The project site is located in an urbanized area in the City of San Marcos. The proposed architectural design would comply with the Mission 316 Specific Plan guidelines and would be compatible in height and appearance with the adjacent Mission 316 East development. The proposed three-story buildings would be consistent with the height standards and regulations set forth in both the Mission 316 Specific Plan and San Marcos Municipal Code. The landscape plans would comply with Section 3.3 of the Mission 316 Specific Plan, Landscape Guidelines, and the project has included a Lighting Plan (see section d for more information) and fuel modification zones.

Given the topography of the proposed Mission 316 West site, the project would require a grading exception to grade and remove over 11,000 cubic yards of material off-site. Due to the substantial amount of grading proposed, retaining walls would be installed along the northern portion of the project site. The retaining wall has been designed with materials which are visually appealing. Additionally, the grading and retaining walls would comply with City regulations. The project would not conflict with applicable zoning and other regulations governing scenic quality and therefore, there would be no impact.

NO IMPACT

d. Except as provided in Public Resources Code Section 21099, would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

The surrounding area has existing light from the reflective windows in San Marcos City Hall, car headlights on State Route 78, and minimal light from commercial buildings to the west. The proposed project would generate typical residential light sources such as street lights, home lighting, and vehicle lights and would not use reflective materials that would create a significant amount of glare. The project would utilize interior street lighting, as specified in the project Lighting Plan, located on the corner of each building and key areas along the proposed circulation road. Accent lighting would also be implemented within the open space area. These additional light sources would be compatible with the surrounding residential developments, commercial buildings,

and light industrial infrastructure. The project would also be required to comply with the light and glare guidelines set by Section 20.300.080 of the San Marcos Zoning Code. The proposed lighting would be wall- or ground-mounted with deflectors to confine the rays to the site with minimal intrusion to the dwelling units, as consistent with Section 20.300.080 of the San Marcos Zoning Ordinance (City of San Marcos 2012). Therefore, compliance with the preceding regulations would reduce the proposed project's impact to a less than significant level.

LESS THAN SIGNIFICANT IMPACT

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2 Agriculture and Forestry Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Convert Prime Farmland, Unique Farmland, Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	■
b. Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	■
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	■
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	■
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	■

a. Would the project convert Prime Farmland, Unique Farmland, Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

b. Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

c. Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

d. Would the project result in the loss of forest land or conversion of forest land to non-forest use?

e. Would the project involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?

The project site is located in an urbanized area of San Marcos, and is not labeled as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (California Department of Conservation 2018a). The project site is located in an area designated as Non-Farmland/Open Space according to Figure 4-4 *Agricultural Areas* in the City of San Marcos General Plan Open Space and Conservation Element. The site is not labeled as forestland or farmland, and it is not currently used for agricultural purposes or outlined within a Williamson Act contract. The proposed project would not involve any conversion of farmland or forestland to non-agricultural, non-forest use. Therefore, the proposed project would have no impact on forestland or related to the conversion of farmland to non-agricultural uses.

NO IMPACT

3 Air Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	■	☐
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	■	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	■	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	■	☐

The project area is located in the San Diego Air Basin (SDAB), which is bordered by the Pacific Ocean to the west, the South Coast Air Basin to the north, the Salton Sea Air Basin to the east, and the United States/Mexico border to the south. The project site is located approximately nine miles inland from the coast in an interior valley. Air pollutant emission sources in the SDAB are typically grouped into two categories: stationary and mobile sources. Mobile source emissions can be attributed to vehicles and transportation-related activities. Stationary sources can be divided into two major subcategories: point and area sources. Point source emissions originate from manufacturing and industrial processes, while area emissions are generated from residential heaters, small engines, and other consumer products. Both major emissions categories are widely distributed within SDAB and may have a cumulative effect.

An Air Quality and Greenhouse Gas Study was prepared by Rincon Consultants, Inc. to analyze the project's air quality emissions and impacts on surrounding sensitive land uses. The analysis considered temporary construction impacts and long-term operation impacts associated with the project. The results of the Air Quality and Greenhouse Gas Study are used in the analysis in the section.

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

The San Diego County Air Pollution Control District has prepared a Regional Air Quality Strategies (RAQS) to address San Diego County's nonattainment status for ozone. The RAQS relies on information from the California Air Resources Board (CARB) and San Diego Association of Governments (SANDAG), including projected growth in the County, mobile, area, and all other source emissions to project future emissions and determine from that the strategies necessary for the reduction of stationary source emissions through regulatory controls. Projects that propose

development that is consistent with the growth anticipated by the City's General Plan is consistent with the RAQS.

Based on the California Department of Finance estimate for the City's average persons per household rate of 3.13, the proposed 67 dwelling units would generate an estimated 209 additional residents in the City (DOF 2018). According to demographic and socioeconomic estimates provided by the SANDAG Data Surfer database, the City of San Marcos is forecast to add 7,233 multi-family residential units by between 2012 and 2050, a 74 percent increase that would bring the overall multi-family residential inventory from 9,738 units to 16,971 units (SANDAG 2015). The 67 proposed units would account for 0.9 percent[1] of the additional multi-family residential units forecast by SANDAG. The project is not anticipated to provide new employment opportunities. The project would result in growth in residential units that is consistent with the City's General Plan and would not exceed the regional growth or population forecasts in the City. Therefore, impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

The project site is located in the SDAB, which is under the jurisdiction of the San Diego Air Pollution Control District (SDAPCD). As the local air quality management agency, the SDAPCD is required to monitor air pollutant levels to ensure that state and federal air quality standards are met and, if they are not met, to develop strategies to meet the standards.

Depending on whether or not the standards are met or exceeded, the SDAB is classified as being in "attainment" or "nonattainment." Under state law, air districts are required to prepare a plan for air quality improvement for pollutants for which the district is in non-compliance. The SDAB is designated a nonattainment area for the federal and State eight-hour ozone standards, State one-hour ozone standards, and for State PM_{10} and $PM_{2.5}$. The SDAB is designated unclassifiable or in attainment for all other federal and State standards (SDAPCD 2017).

The characteristics associated with criteria pollutants for which the SDAB is in non-attainment are described in Table 2.

[1] Project residential units as percentage of SANDAG multi-family unit forecast for City of San Marcos (67 project units / [16,971 2050 units – 9,738 2012 units]) * 100 = 0.9 percent.

Table 2 Health Effects Associated with Non-Attainment Criteria Pollutants

Pollutant	Adverse Effects
Ozone	Ozone is produced by a photochemical reaction (triggered by sunlight) between nitrogen oxides (NO_X) and volatile organic compounds (VOC)[2]. NO_X is formed during the combustion of fuels, while VOCs are formed during combustion and evaporation of organic solvents. Because O_3 requires sunlight to form, it mostly occurs in substantial concentrations between the months of April and October. Ozone is a pungent, colorless, toxic gas with direct health effects on humans including respiratory and eye irritation and possible changes in lung functions. Groups most sensitive to O_3 include children, the elderly, people with respiratory disorders, and people who exercise strenuously outdoors.
Suspended particulate matter	Atmospheric particulate matter is comprised of finely divided solids and liquids such as dust, soot, aerosols, fumes, and mists. The particulates that are of particular concern are PM_{10} (which measures no more than 10 microns in diameter) and $PM_{2.5}$ (a fine particulate measuring no more than 2.5 microns in diameter). The characteristics, sources, and potential health effects associated with small particulates (PM_{10} and $PM_{2.5}$) can be different. Major man-made sources of PM_{10} are agricultural operations, industrial processes, combustion of fossil fuels, construction and demolition operations, and entrainment of road dust into the atmosphere. Natural sources include windblown dust, wildfire smoke, and sea spray salt. The finer $PM_{2.5}$ particulates are generally associated with combustion processes as well as being formed in the atmosphere as a secondary pollutant through chemical reactions. $PM_{2.5}$ is more likely to penetrate deeply into the lungs and poses a serious health threat to all groups, but particularly to the elderly, children, and those with respiratory problems. More than half of the small and fine particulate matter that is inhaled into the lungs remains there, which can cause permanent lung damage. These materials can damage health by interfering with the body's mechanisms for clearing the respiratory tract or by acting as carriers of an absorbed toxic substance.

More detailed discussions on the health effects associated with exposure to suspended particulate matter can be found in the following documents: EPA, Air Quality Criteria for Particulate Matter, October 2004.

The SDAPCD has adopted numerical thresholds to analyze the significance of a project's construction and operational emissions. These thresholds are designed such that a project consistent with the thresholds would not have an individually or cumulatively significant impact to the SDAB's air quality. These thresholds are also used by planning agencies and local jurisdictions for comparative purposes when evaluating projects under CEQA. Thus, a project that does not exceed these SDAPCD thresholds would have a less than significant impact. Table 3 presents the significance thresholds for construction and operational-related criteria air pollutant and precursor emissions being used for the purposes of this analysis. These represent the levels at which a project's individual emissions of criteria air pollutants or precursors would result in a cumulatively considerable contribution to the SDAB's existing air quality conditions. For the purposes of this analysis, the proposed project would result in a significant impact if construction or operational emissions would exceed any of the thresholds shown in Table 3.[3]

[2] Organic compound precursors of ozone are routinely described by a number of variations of three terms: hydrocarbons (HC), organic gases (OG), and organic compounds (OC). These terms are often modified by adjectives such as total, reactive, or volatile, and result in a rather confusing array of acronyms: HC, THC (total hydrocarbons), RHC (reactive hydrocarbons), TOG (total organic gases), ROG (reactive organic gases), TOC (total organic compounds), ROC (reactive organic compounds), and VOC (volatile organic compounds). While most of these differ in some significant way from a chemical perspective, from an air quality perspective two groups are important: non-photochemically reactive in the lower atmosphere, or photochemically reactive in the lower atmosphere (HC, RHC, VOC, ROC, and VOC). SDAPCD uses the term VOC to denote organic precursors.

[3] Note the thresholds for PM_{10} and $PM_{2.5}$ apply to construction exhaust emissions only.

Table 3 SDAPCD Screening Level Significance Thresholds

Pollutant	Total Emissions	
	Lbs per Day	Tons per Year
ROG/VOCs	75[1]	13.7[2]
NO_x	250	40
CO	550	100
SO_x	250	40
PM_{10}	100	15
$PM_{2.5}$	55[3]	10[3]

[1] Threshold for VOCs based on the threshold of significance for VOCs from the SCAQMD for the Coachella Valley.

[2] 13.7 tons per year threshold based on 75 lbs/day multiplied by 365 days/year and divided by 2,000 lbs/ton.

[3] EPA "Proposed Rule to Implement the Fine Particle National Ambient Air Quality Standards" published September 8, 2005. Also used by the SCAQMD.

Source: San Diego County. March 2007. *County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements: Air Quality*. Accessed June 2018 at: http://www.sandiegocounty.gov/content/dam/sdc/pds/ProjectPlanning/docs/AQ-Guidelines.pdf

Air quality modeling was performed in general accordance with the statutory requirements outlined in the SDAPCD 2016 RAQS to identify both construction and operational emissions associated with the proposed project. All emissions were calculated using the California Emissions Estimator Model (CalEEMod) software version 2016.3.2 (Rincon Consultants, Inc., 2019a)

Construction Emissions

Construction activities associated with the proposed project would consist of grading, site preparation, construction of the proposed buildings, parking lot and roadway paving, and architectural coating. These construction activities would generate temporary emissions of fugitive dust (measured as particulate matter), exhaust emissions from heavy construction vehicles and soil hauling trucks, and ROGs from architectural coatings. Table 4 summarizes maximum daily and annual emissions of pollutants throughout the construction period of the project. Emissions of ROG, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$ would not exceed SDAPCD screening level thresholds during project construction.

Table 4 Maximum Daily Estimated Construction Emissions

	Maximum Emissions[1]					
Emissions Source	**ROG**	**NO_x**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Daily Construction Emissions (lbs/day)						
2019 Maximum	1.8	21.6	12.2	<0.1	1.5	0.9
2020 Maximum	50.4	39.3	24.9	<0.1	4.4	2.5
2021 Maximum	50.2	18.9	21.6	<0.1	3.2	1.4
SDAPCD Screening Level Thresholds	75	250	550	250	100	55
Threshold Exceeded?	No	No	No	No	No	No
Annual Construction Emissions (tons/yr)						
2019 Maximum	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2020 Maximum	0.5	2.2	1.6	<0.1	0.3	0.2
2021 Maximum	0.9	0.9	1.0	<0.1	0.2	0.1
SDAPCD Screening Level Thresholds	13.7	40	100	40	15	10
Threshold Exceeded?	No	No	No	No	No	No

Notes: All calculations were made using CalEEMod v.2016.3.2. Site Preparation, Grading, Paving, Building Construction, and Architectural Coating totals include worker trips, soil export hauling trips, construction vehicle emissions and fugitive dust. Totals may not add up due to rounding. Emission data is pulled from "mitigated" results that include compliance with regulations and project design features as described in Section 1.2 (Rincon Consultants, Inc., 2019a).

[1] Grading phases incorporate anticipated emissions reductions from the conditions listed above, which are required by SDAPCD Rules 52, 54, and 55 to reduce fugitive dust. The architectural coating phases incorporate anticipated emissions reductions from the conditions listed above, which are required by SDAPCD Rule 67.

Operational Emissions

Table 5 summarizes estimated emissions associated with operation of the project. The majority of operational emissions generated would be due to mobile emissions from vehicle trips to and from the project site. As shown in Table 5, emissions generated during the operation of project would not exceed SDAPCD screening level thresholds for ROG, NO_X, CO, SO_X, PM_{10}, or $PM_{2.5}$.

Table 5 Project Operational Emissions

Emissions Source	Estimated Emissions (lbs/day)					
	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Area	2.8	0.1	5.5	<0.1	<0.1	<0.1
Energy	<0.1	0.2	0.1	<0.1	<0.1	<0.1
Mobile	0.8	2.9	7.4	<0.1	2.1	0.6
Project Total	3.5	3.2	13.0	<0.1	2.1	0.6
SDAPCD Screening Level Thresholds	75	250	550	250	100	55
Threshold Exceeded?	No	No	No	No	No	No

Source: Air Quality and Greenhouse Gas Study

Note: Estimate emissions are from Annual operational emissions. Numbers may not add up due to rounding.

CO Hotspots

The SDAB is in attainment of State and federal CO standards. The Escondido - E. Valley Parkway monitoring station (600 E Valley Parkway) is located closest to the project site that provides CO data. The maximum 8-hour average CO level recorded in 2015 was 3.10 ppm, which is well below the 9 ppm State and federal eight-hour standard. A CO hotspot analysis is required by the County if a proposed development would cause road intersections to operate at or below LOS E with intersection peak-hour trips exceeding 3,000 trips.

The traffic study prepared for the project evaluated three intersections in the vicinity of the project site, as well as the proposed driveway for the project (LLG, 2018). The project would generate approximately 536 daily trips once fully operational, which would include 43 peak morning trips and 54 peak afternoon trips on the roadways surrounding the project site. The additional traffic generated during project operation would not cause intersections in the vicinity of the project site to operate at or below LOS E, and project-generated trips would not exceed 3,000 peak-hour trips. Therefore, a CO hotspot analysis is not required and project-generated trips would not result in, or substantially contribute to, CO concentrations that exceed the eight-hour ambient air quality standards along area roadways and intersections and impacts would be less than significant.

Since emissions associated with the project would not exceed SDAPCD thresholds for construction or operation, the project would not violate an air quality standard or lead to result in a cumulatively considerable net increase in criteria pollutants and impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

c. Would the project expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors that may be affected by air quality impacts associated with project construction and operation include multi- family residences located approximately 500 feet east of the site along East Mission Road, single-family residences located approximately 700 feet north east of the site along Silk Mill Place, and the San Marcos Civic Center located approximately 1,000 feet southwest of the project site along East San Marcos Boulevard. The nearest school is Mission Hills High School (1 Mission Hills Court) located approximately 0.9 miles east of the project site along East Mission Road.

According to the County of San Diego Guidelines for Determining Significance for air quality, the primary emissions of concern regarding health effects for land development projects are diesel-fired particulates and carbon monoxide. As detailed in the impacts above, a CO hotspot would not be created with the implementation of the project, and the project would not exceed SDAPCD thresholds for CO during construction or operation. The primary source of diesel particulates is heavy-duty trucks on freeways and high-volume arterial roadways. The project site is approximately 0.32 miles north of CA-78 and is not located within 500 feet of other high-volume roadways. Additionally, the project would not exceed criteria pollutant thresholds during construction or operation of the project. Therefore, the proposed project would not expose the surrounding sensitive receptors to substantial pollutant contaminants and impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

d. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

During construction, the project would involve the temporary use of diesel-powered equipment, which would generate exhaust that may be noticeable for short durations at adjacent properties. However, construction activities would be temporary and this impact would be less than significant and no mitigation would be necessary.

Land uses and facilities typically associated with odor complaints include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, refineries, landfills, dairies, and fiberglass molding. The operation of the proposed multi-family residential dwellings is not typically associated with objectionable odors. Therefore, the project would not generate objectionable odors and there would be no impacts.

LESS THAN SIGNIFICANT IMPACT

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4 Biological Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	■	□	□	□
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	■	□	□	□
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	□	□	□	■
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	□	□	■	□
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	■	□	□	□
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	■	□	□	□

The project site is located in the Multiple Habitat Conservation Program (MHCP) Subregional Plan for the northwestern portion of San Diego County. Specifically, the project site is within the City of

San Marcos Draft Subarea Habitat Conservation Plan/Natural Communities Conservation Plan (hereafter, Draft Subarea Plan), which comprehensively addresses how the City will conserve natural biotic communities and sensitive plant and wildlife species. The Draft Subarea Plan has been prepared in response to direction from the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) to meet the applicable requirements of the Federal and state Endangered Species Acts and the Natural Communities Conservation Planning Act of 1992. The City's Draft Subarea Plan is not formally approved and adopted, so all projects are required to obtain applicable permits for impacts to sensitive species and communities. Although the Draft Subarea Plan has not yet been approved, the plan has been used by the City as a guide for open space design and preservation.

Rincon Consultants, Inc. prepared a Biological Resources Assessment of the project site in January 2019. According to the assessment, the project site contains three vegetation communities: Diegan coastal sage scrub (2.1 acres), Disturbed Habitat (1.05 acres), and Urban/Developed (1.28 acres). The assessments conclude that there is moderate potential of four special-status plant species occurring on-site and low potential for seven special-status species. No jurisdictional features that would be regulated by the US Army Corps of Engineers (USACE), the Regional Water Quality Control Board (RWQCB), and/or CDFW are present on the project site. Coastal California Gnatcatcher (CAGN) Protocol surveys were completed for the project and one pair and one individual CAGN were observed on and near the site (Rincon Consultants, Inc., 2019b)).

a. *Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as candidate, sensitive, or special status in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?*

b. *Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?*

The project site supports approximately 2.01 acres of Diegan Coastal Sage Scrub (Rincon Consultants, Inc., 2019b). Diegan Coastal Sage Scrub is considered a sensitive community by the City, according to the Draft Subarea Plan. Also, a CAGN pair and individual were observed during CAGN protocol surveys. As detailed in the Biological Resources Assessment, individuals were observed adjacent to the development envelope of the project. CAGN is federally-listed as threatened and is a MHCP Covered Species. A Cooper's Hawk, which is a CDFW watch list species and a MHCP Covered Species, was also observed flying over the project site.

The Biological Resources Assessment did not identify special-status plant species on-site and concluded there is moderate to low potential for some species to occur (Rincon Consultants, Inc., 2019b). However, the assessment concluded protocol surveys were not completed during optimal blooming season for some of the species which have the potential to occur. The site also contains potential nesting habitat for raptors and birds protected under the Migratory Bird Treaty Act, which would require preconstruction surveys if construction occurs during the breeding season. Due to the presence of sensitive communities and wildlife species and the potential for other special-status species to occur, impacts to special status species and sensitive natural communities are potentially significant and will be further addressed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

c. Would the project have a substantial adverse effect on state or federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

According to the Biological Resources Assessment prepared by Rincon Consultants, Inc., the project site does not contain wetland or riparian areas or habitat on-site. No jurisdictional features that would be regulated by USACE, RWQCB, and/or CDFW are on-site. Therefore, there would be no impact and further analysis of this issue is not warranted.

NO IMPACT

d. Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Wildlife movement corridors are defined as areas that connect suitable wildlife habitat areas in a region otherwise fragmented by rugged terrain, changes in vegetation, or human disturbance. Natural features such as canyon drainages, ridgelines, and areas with vegetation cover provide corridors for wildlife travel. The project site is located near the San Marcos Creek wildlife corridor located along Twin Oaks Valley Road. However, the project site is a habitat island with Twin Oaks Valley Road to the west, Mission Road to the south, and residential development to the north and east of the site, which would prevent the movement of wildlife. The site is not identified as within a wildlife corridor per Figure 4-2 of the City of San Marcos General Plan. The project site is also not within or adjacent to an essential connectivity area or natural landscape block (Spencer et al. 2010). Since there were no wildlife corridors identified on the project site, the project would not interfere substantially with the movement of wildlife species. Short-distance movements of low-mobility wildlife could be impacted on a local scale; however this would be less than significant since it would not impact regional movements. Therefore, impacts would be less than significant and further analysis is not warranted.

LESS THAN SIGNIFICANT IMPACT

e. Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Due to the Coastal Sage Scrub located on the project site, the presence of Cooper's Hawk and CAGN, and nesting bird habitat, the project may conflict with the guidelines of the MHCP and related policies in the San Marcos General Plan. Because the project has the potential to conflict with the MHCP and General Plan policies, the impact is potentially significant and this issue will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

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5 Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☐	■
b. Cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?	■	☐	☐	☐
c. Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	■	☐

CEQA requires a lead agency determine whether a project may have a significant effect on historical resources (Public Resources Code [PRC], Section 21084.1) and tribal cultural resources (PRC Section 21074 [a][1][A]-[B]). A historical resource is a resource listed in, or determined to be eligible for listing, in the California Register of Historical Resources (CRHR), a resource included in a local register of historical resources, or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant (State CEQA Guidelines, Section 15064.5[a][1-3]).

A resource shall be considered historically significant if it:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, if it can be demonstrated that a project would cause damage to a unique archaeological resource, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that resources cannot be left undisturbed, mitigation measures are required (PRC, Section 21083.2[a], [b]).

PRC, Section 21083.2(g) defines a unique archaeological resource as an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;

2. Has a special and particular quality such as being the oldest of its type or the best available example of its type; or
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Rincon Consultants, Inc. completed a cultural resources study in September 2018. The report identifies nine previously recorded cultural resources within a half-mile radius of the project site. One resource, CA-SDI-21254, is located adjacent to the development envelope of the project. It is a multi-component site that was originally recorded as the ruins of a residential structure with historic and modern debris, but during construction monitoring in July 2015, prehistoric cultural deposits were identified. The remaining eight cultural resources consist of five prehistoric sites, one prehistoric isolate, one historic building, and one prehistoric lithic scatter. The multi-component historic and prehistoric site located adjacent to the project site were recommended as ineligible for listing on the CRHR and NRHP due its inability to meet the criteria to be eligible.

a. Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

The project site is vacant and lacks historical resources as defined in Section 15064.5 of the CEQA Guidelines. Therefore, no impact would occur and further analysis of this issue is not warranted.

NO IMPACT

b. Would the project cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?

As detailed above, the archaeological resource identified on-site is not considered eligible for listing and is located outside of the building envelope of the project. Archaeological resources are not known to be present on-site. Nevertheless, excavation and ground disturbing activities during construction have the potential to directly or indirectly disturb additional subsurface archaeological resources. This impact is potentially significant and will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

c. Would the project disturb any human remains, including those interred outside of formal cemeteries?

Due to ground disturbing activities during construction, the potential exists for the discovery of human remains. If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the county coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the county coroner must be notified immediately. If the human remains are determined to be prehistoric, the coroner would notify the Native American Heritage Commission (NAHC), which would determine and notify a most likely descendant (MLD). The MLD shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials. With adherence to existing regulations regarding the treatment of human remains, the impact would be less than significant.

LESS THAN SIGNIFICANT IMPACT

6 Energy

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	■	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	■	☐

Electricity and Natural Gas

In 2017, California used 292,039 gigawatt-hours (GWh) of electricity, of which 29 percent were from renewable resources (CEC 2018a). California also consumed approximately 12,500 million U.S. therms (MMthm) of natural gas in 2017. (CEC 2017b). The project site would be provided electricity by San Diego Gas and Electric Company (SDGE). The project would not consume natural gas as the development proposes to only run off electricity and would not pipe and connect into the surrounding natural gas pipes. Table 6 shows the electricity consumption by sector and total for SDGE. In 2017, SDGE provided approximately 0.06 percent of the total electricity used in California.

Table 6 Electricity Consumption in the SDGE Service Area in 2017

Agriculture and Water Pump	Commercial Building	Commercial Other	Industry	Mining and Construction	Residential	Streetlight	Total Usage
286.6	8,534.7	1,679.0	1,245.3	344.9	6,481.2	87.9	18,659.6

Notes: All usage expressed in GWh

Source: CEC 2017a, http://ecdms.energy.ca.gov/elecbyutil.aspx

Petroleum

In 2016, approximately 40 percent of the state's energy consumption was used for transportation activities (EIA 2018a). Californians presently consume over 19 billion gallons of motor vehicle fuels per year (CEC 2018b). Though California's population and economy are expected to grow, gasoline demand is projected to decline from roughly 15.8 billion gallons in 2017 to between 12.3 billion and 12.7 billion gallons in 2030, a 20 percent to 22 percent reduction. This decline comes in response to both increasing vehicle electrification and higher fuel economy for new gasoline vehicles (CEC 2018b).

a. Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Construction Energy Demand

During project construction, energy would be consumed in the form of petroleum-based fuels used to power off-road construction vehicles and equipment on the project site, construction worker travel to and from the project site, and vehicles used to deliver materials to the site. The proposed project would require site preparation and grading, including hauling material off-site; pavement and asphalt installation; building construction; architectural coating; and landscaping and hardscaping.

The total consumption of gasoline and diesel fuel during project construction was estimated using the assumptions and factors from CalEEMod used to estimate construction air emissions in the Air Quality and Greenhouse Gas Study. Table 7 presents the estimated construction phase energy consumption, indicating construction equipment, vendor trips, and worker trips would consume approximately 37,496 gallons of diesel fuel over the project construction period. Construction equipment would consume an estimated 35,284 gallons of fuel; vendor trips would consume approximately 2,038 gallons of fuel; and worker trips would consume approximately 173 gallons of fuel over the combined phases of project construction.

Table 7 Estimated Fuel Consumption during Construction

Fuel Type	Gallons of Fuel	MMBtu[4]
Diesel Fuel (Construction Equipment)[1]	35,284.1	4,497.5
Diesel Fuel (Hauling & Vendor Trips)[2]	2,038.0	259.8
Other Petroleum Fuel (Worker Trips)[3]	173.4	19.0
Total	**37,495.5**	**4,776.3**

[1] Fuel demand rate for construction equipment is derived from the total hours of operation, the equipment's horse power, and the equipment's fuel usage per horse power per hour of operation, which are all taken from CalEEMod outputs (Rincon Consultants, Inc., 2019a)). Fuel consumed for all construction equipment is assumed to be diesel fuel.
[2] Fuel demand rate for hauling and vendor trips (cut material imports) is derived from hauling and vendor trip number, hauling and vendor trip length, and hauling and vendor vehicle class from "Trips and VMT" Table contained in Section 3.0, *Construction Detail*, of the CalEEMod results (Rincon Consultants, Inc., 2019a)). The fuel economy for hauling and vendor trip vehicles is derived from the United States Department of Transportation (DOT 2018). Fuel consumed for all hauling trucks is assumed to be diesel fuel.
[3] The fuel economy for worker trip vehicles is derived from the U.S. Department of Transportation (24 mpg) (DOT 2018). Fuel consumed for all worker trips is assumed to be gasoline fuel.
[4] CaRFG CA-GREET 2.0 fuel specification of 109,786 Btu/gallon used to identify conversion rate for fuel energy consumption for worker trips specified above (California Air Resources Board [CARB] 2015). Low-sulfur Diesel CA-GREET 2.0 fuel specification of 127,464 Btu/gallon used to identify conversion rate for fuel energy consumption for construction equipment specified above (CARB 2015). Totals may not add up due to rounding.

The construction energy estimates represent a conservative estimate as the construction equipment used in each phase of construction was assumed to be operating every day of construction. The fuel consumption during construction represents a nominal percentage of the total fuel consumption in the State, less than 0.0001[4] percent. Construction equipment would be maintained to all applicable standards, and construction activity and associated fuel consumption and energy use would be

[4] 110.060.1/19,000,000,000

temporary and typical for construction sites. It is also reasonable to assume contractors would avoid wasteful, inefficient, and unnecessary fuel consumption during construction to reduce construction costs. Therefore, the proposed project would not involve the inefficient, wasteful, and unnecessary use of energy during construction, and the construction-phase impact related to energy consumption would be less than significant.

Operational Energy Demand

The operation of the project would increase area energy demand from greater electricity and gasoline consumption at a currently undeveloped site. Gasoline consumption would be attributed to the trips generated from future residents and people accessing the site. The estimated number of average daily trips associated with the proposed project is used to determine the energy consumption associated with fuel use from the operation of the project. The majority of the fuel consumption would be from motor vehicles traveling to and from the project site. According to the Traffic Impact Analysis, the project would result in approximately 536 average daily trips, or 965,213 annual vehicle miles travelled (LLG, 2018). Table 8 shows the estimated total annual fuel consumption of the project and the assumed vehicle fleet mix.

Table 8 Estimated Project Annual Transportation Energy Consumption

Vehicle Type[1]	Percent of Vehicle Trips[2]	Annual Vehicle Miles Traveled[3]	Average Fuel Economy (miles/gallon)[4]	Total Annual Fuel Consumption (gallons)	Total Fuel Consumption (MBtu)[6]
Passenger Cars	59.9	577,820	24.0	24,076	2,643
Light/Medium Trucks	22.2	214,279	17.4	12,315	1,352
Heavy Trucks/Other	17.3	167,307	7.4	22.609	2,482
Motorcycles	0.6	5,807	43.9[5]	132	14
Total	**100.00**	**965,213**	**–**	**59,132**	**6,491**

[1] Vehicle classes provided in CalEEMod do not correspond exactly to vehicle classes in DOT fuel consumption data, except for motorcycles. Therefore, it was assumed that passenger cars correspond to the light-duty, short-base vehicle class, light/medium trucks correspond to the light-duty long-base vehicle class, and heavy trucks/other correspond to the single unit, 2-axle 6-tire or more class.

[2] Percent of vehicle trips from Table 4.4 "Fleet Mix" in Air Quality and Greenhouse Gas Study, CalEEMod output (Rincon Consultants, Inc., 2019a).

[3] Annual VMT found in Table 4.2 "Trip Summary Information" in Air Quality and Greenhouse Gas Study CalEEMod output (Rincon Consultants, Inc., 2019a).

[4] Average Fuel Economy: U.S. Department of Transportation 2018.

[5] U.S.Department of Transportation 2013

[6] CaRFG fuel specification of 109,786 Btu/gallon used to identify conversion rate for fuel energy consumption for vehicle classes specified above (CARB 2015).

Notes: Totals may not add up due to rounding.

As shown in Table 8, vehicles associated with operation of the project would consume approximately 59,132 gallons of fuel, or 6,491 MBtu, each year under the most conservative estimate. The fuel consumed by the project operation is assumed to be typical of other multi-family residential developments.

The operation of the project would also increase energy demand from greater electricity consumption at a currently undeveloped site. The project would not include natural gas connections and would run only off electricity. Electricity would be used for heating and cooling systems,

lighting, appliances, water use, and the overall operation of the residential units. Electricity consumption is based on electricity and natural gas CalEEMod outputs included in the Air Quality and Greenhouse Gas Study, which is based on baseline values determined through California Energy Commission (CEC) surveys and studies. Natural gas energy outputs were converted into the electrical units. Table 9 shows the estimated annual electricity use from operation of the project.

Table 9 Estimated Project Energy Use Compared to Utility Provider Sources

Form of Energy	Units	Annual Project-Related Energy Use	Utility Provider Energy Use
Electricity	GWh	0.335[1]	18,659.6[2]
Natural Gas	GWh	0.262[3]	–
Total		**0.597**	–

[1] Electricity Use provided in the CalEEMod output for the Air Quality and Greenhouse Gas Study (Rincon Consultants, Inc., 2019a)

[2] CEC 2017, http://ecdms.energy.ca.gov/elecbyutil.aspx.

[3] Natural Gas use provided in CalEEMod outputs for the Air Quality and Greenhouse Gas Study and was converted from kBTU to GWh.

After converting the estimated natural gas use from the CalEEMod outputs, the operation of the project would consume approximately 0.597 GWh of electricity per year (Rincon Consultants, Inc., 2019a). The project's energy demands would be served by SDGE, which provided 18,660 GWh of electricity in 2017; therefore, SDGE would have sufficient supplies to serve the project.

Furthermore, the project would comply with all standards set in California Building Code (CBC) Title 24, which would minimize the wasteful, inefficient, or unnecessary consumption of energy resources during operation**.** California's Green Building Standards Code (CALGreen; California Code of Regulations, Title 24, Part 11) requires implementation of energy efficient light fixtures and building materials into the design of new construction projects. Furthermore, the 2019 Building Energy Efficiency Standards (CBC Title 24, Part 6) requires newly constructed buildings to meet energy performance standards set by the Energy Commission. As the name implies, these standards are specifically crafted for new buildings to result in energy efficient performance so that the buildings do not result in wasteful, inefficient, or unnecessary consumption of energy. The standards are updated every three years and each iteration is more energy efficient than the previous standards. For example, according to the CEC, residences built with the 2019 standards will use about seven percent less energy due to energy efficiency measures versus those built under the 2016 standards, or 53 percent less energy with rooftop solar, and nonresidential buildings will use about 30 percent less energy due mainly to lighting upgrades (CEC 2018c). Furthermore, the project would further reduce its use of nonrenewable energy resources as the electricity generated by renewable resources provided by SCE continues to increase to comply with state requirements through Senate Bill 100, which requires electricity providers to increase procurement from eligible renewable energy resources to 33 percent of total retail sales by 2020, 60 percent by 2030, and 100 percent by 2045.The proposed project is located adjacent to the San Marcos Civic Center, a branch of the San Marcos Library, bus stops, and the Sprinter commuter rail stop. Due to the location, the project would reduce the number of vehicle trips and miles used compared to other similar projects. Therefore, the operational energy use attributed from transportation fuel consumption would not result in a wasteful, inefficient, or unnecessary consumption of energy resources. In conclusion, the construction of the project would be typical of similar projects and not result in the wasteful use of energy. The operation of the project would increase the consumption of fuel and electricity from

existing conditions of an undeveloped site. However, development would be in conformance with the applicable version of California Green Building Standards Code and the Building Energy Efficiency Standards. In addition, SDGE has sufficient supplies to serve the project. Therefore, the project would not result in wasteful, inefficient, or unnecessary use of energy resources and impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

The City of San Marcos adopted a Climate Action Plan (CAP) in 2013 in order to reduce greenhouse gas emissions from City government operations and community activities. The plan includes a number of measures and strategies to achieve greenhouse gas reduction targets, including energy efficiency measures. Energy efficiency measures which relate to the project in the CAP include:

- **E-1 Energy Efficiency of Existing Buildings:** Facilitate voluntary energy assessments, retrofits, and retrocommissioning of existing residential and nonresidential buildings within San Marcos.
- **E-2 Energy Efficient New Construction:** Increase the efficient use of energy and conservation of available resources in the design and construction of new buildings.
- **E-3 Energy Efficiency Outreach and Incentives:** Increase energy efficiency and conservation by promoting existing incentive programs and providing targeted education and outreach.
- **E-4 Smart Meters:** Increase the community's awareness, understanding, and use of realtime energy consumption data and pricing available through SDGE's Smart Meter program.
- **E-5 On-Site Small-Scale Solar Energy:** Facilitate the installation and use of on-site small-scale solar energy systems, such as solar PV systems and solar water heaters.

The project would not conflict with the City's outreach or promotion efforts for energy efficiency in new construction. The project would also comply with all City requirements for energy efficiency and with the latest Title 24 standards. The City of San Marcos also has energy efficiency policies in the General Plan. Energy related policies that are applicable to the project include:

- **Policy COS-4.5:** Encourage energy conservation and the use of alternative energy sources within the community.
- **Policy COS-4.6:** Promote efficient use of energy and conservation of available resources in the design, construction, maintenance and operation of public and private facilities, infrastructure and equipment.
- **Policy COS-4.8:** Encourage and support the generation, transmission and use of renewable energy.
- **Policy COS-4.9:** Encourage use and retrofitting of existing buildings under Title 24 of the California Building Energy Code.

The project would be constructed in accordance with Title 24 of the California Building and Energy Code and would run entirely off electricity, which is increasingly generated from renewable resources. The project would not conflict or inhibit implementation of energy conservation policies or measures in the General Plan. Therefore, the project would not conflict or obstruct a local plan for renewable energy or energy efficiency and there would be no impacts.

NO IMPACT

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7 Geology and Soils

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Directly or indirectly cause potential adverse effects, including the risk of loss, injury, or death involving:				
1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	☐	☐	☐	■
2. Strong seismic ground shaking?	☐	☐	■	☐
3. Seismic-related ground failure, including liquefaction?	☐	☐	■	☐
4. Landslides?	☐	☐	■	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	■	☐
c. Be located on a geologic unit or soil that is made unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	■	☐
d. Be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	■	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	■
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	■

a.1. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

The project site is not located in an Alquist-Priolo Earthquake Fault Zone (California Department of Conservation, 2015). No active or potentially active faults are located in the City (General Plan, 2012). Therefore, the risk associated exposing people or structures to risk of ground rupture of a known earthquake fault is low, and there would be no impact and further analysis of this issue is not warranted.

NO IMPACT

a.2. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

San Marcos has experienced minor to moderate ground shaking events historically. The City has a lower potential for strong ground shaking than other areas in Southern California. As shown in Figure 6-2 of the San Marcos General Plan Safety Element, there are a number of regional faults that surround the City and are capable of producing severe earthquakes of magnitude 6.0 or greater. These regional faults are:

- Elsinore Fault Zone
- San Jacinto Fault Zone
- Rose Canyon Fault Zone
- San Joaquin Hills Blind Thrust
- Carlsbad Blind Thrust
- Oceanside Blind Thrust

General seismic risk is considered low in San Marcos, with higher seismic activity and risk concentrated in the fault areas to the east, west, and north. The Rose Canyon Fault is considered the greatest potential threat to San Marcos. This fault and the other Southern California faults are potential generators of ground shaking in the project area. Conformance with the California Building Code (CBC) as recommended in the Geotechnical Report by GeoSoils, Inc., would reduce impacts related to ground shaking to a less than significant level. Therefore, further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.3. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

Liquefaction susceptibility is based on the areas risk to severe ground shaking, the height of groundwater, and the density and type of soil deposits. There is limited information on the overall groundwater depth throughout the City of San Marcos. Previous studies indicate that liquefaction areas in the City are a concern in the areas adjacent to San Marcos Creek and Twin Oaks Valley channel. According to Figure 6-1 of the Safety Element in the General Plan, the project site is not located in an area prone to liquefaction. The project site is also not located in a liquefaction zone according to the Alquist-Priolo Earthquake Fault Zoning Map (California Department of Conservation, 2018b). A preliminary geotechnical investigation by GeoSoils, Inc. encountered

groundwater as localized seepage within bedrock at about 5 to 17 feet below existing grades. It has been determined that liquefaction hazards would not affect the development and impacts would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.4. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

The project is not located within an area susceptible to landslides according to Figure 6-1 of the General Plan Safety Element or from maps produced by the California Department of Conservation. The Geotechnical Report concluded that landslides and other adverse geologic features were not noted during review and surveys of the site and are not anticipated to significantly affect the development of the site (GeoSoils, Inc., 2018). The risk associated with landslide hazards is low. Impacts would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

b. Would the project result in substantial soil erosion or the loss of topsoil?

The project is proposed on a lot with relatively steep to gentle, south-facing slopes, with slopes as steep as 1:1 (horizontal:vertical). Activities during the construction phase of the project, including excavation and grading, have the potential to cause a loss of topsoil and soil erosion. During construction, short-term erosion impacts would be reduced by compliance with the National Pollutant Discharge Elimination System (NPDES) permit, the implementation of a stormwater pollution prevention plan (SWPPP), an erosion control plan, and the implementation of required BMPs. Compliance with these requirements would reduce impacts to soil erosion and a loss of top soil to a less than significant level and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

c. Would the project be located on a geologic unit or soil that is made unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?

d. Would the project be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Unstable soils include expansive, compressible, erodible, corrosive, or collapsible soils. Expansive soils are associated with soils, alluvium, and bedrock formations that contain minerals susceptible to expansion under wet conditions and contracting under dry conditions. According to the General Plan Safety Element, the likely locations for collapsible soils are in the San Marcos Creek Valley and Twin Oaks Valley Drainage. The project is located nearby these drainages. According to the Geotechnical Report, the earth materials on the project site consist of undocumented fill, topsoil, collivium, and granitic bedrock (GeoSoils, Inc., 2018). These materials consist of silty sands and sand with variable amount of rock fragments, and are generally considered non-detrimentally expansive.

With adherence to recommendations in the geotechnical report, impacts from unstable soils and placing structures on expansive soils would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

e. Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

The project would connect to the existing sewer system and not use septic tanks or another alternative wastewater disposal system. Therefore, there is no impact to soils from proposed septic tanks or wastewater. Further analysis of this issue is not warranted.

NO IMPACT

f. Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Paleontological resources are not known to be present on-site, as identified in the General Plan. According to the Geologic Map of the Oceanside 30' x 60' Quadrangle, the project is located in an area underlain by tonalite (California Department of Conservation 2007). Tonalite is a plutonic igneous rock which has no paleontological resource potential due to its formation from molten rock deep below the earth's surface. Due to the geologic formation under the project site, the project would not directly or indirectly impact a unique paleontological resource or geologic feature and there would be no impacts.

NO IMPACT

8 Greenhouse Gas Emissions

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	■	☐
b. Conflict with any applicable plan, policy, or regulation adopted for the purposes of reducing the emissions of greenhouse gases?	☐	☐	☐	■

Climate Change Background

Climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other substantial changes in climate (such as wind patterns, precipitation, and storms) over an extended period of time. Climate change is the result of numerous, cumulative sources of greenhouse gases (GHGs). GHGs contribute to the "greenhouse effect," which is a natural occurrence that helps regulate the temperature of the planet. The majority of radiation from the Sun hits the Earth's surface and warms it. The surface in turn radiates heat back towards the atmosphere, known as infrared radiation. Gases and clouds in the atmosphere trap and prevent some of this heat from escaping back into space and re-radiate it in all directions. This process is essential to supporting life on Earth because it warms the planet by approximately 60° Fahrenheit. Emissions from human activities since the beginning of the industrial revolution (approximately 250 years ago) are adding to the natural greenhouse effect by increasing the gases in the atmosphere that trap heat, thereby contributing to an average increase in the Earth's temperature.

GHGs occur naturally and from human activities. Human activities that produce GHGs are the burning of fossil fuels (coal, oil and natural gas for heating and electricity, gasoline and diesel for transportation); methane from landfill wastes and raising livestock; deforestation activities; and some agricultural practices. GHGs produced by human activities include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). Emissions of GHGs affect the atmosphere directly by changing its chemical composition while changes to the land surface indirectly affect the atmosphere by changing the way in which the Earth absorbs gases from the atmosphere. Potential impacts of global climate change in California may include loss of snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CEC March 2009).

Regulations

In 2005, the Governor issued Executive Order (EO) S-3-05, which identifies Statewide GHG emission reduction targets of reducing GHG emissions to 1990 levels by 2020 and reducing GHG emissions to 80 percent below 1990 levels by 2050 in order to achieve long-term climate stabilization. Senate Bill

(SB) 97, signed in August 2007, acknowledges that climate change is an environmental issue that requires analysis in California Environmental Quality Act (CEQA) documents. In March 2010, the California Resources Agency (Resources Agency) adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts.

Assembly Bill 32 (AB 32), the "California Global Warming Solutions Act of 2006," was signed into law in 2006. AB 32 codifies the statewide goal of reducing GHG emissions to 1990 levels by 2020 and requires CARB to prepare a Scoping Plan that outlines the main State strategies for reducing GHGs to meet the 2020 deadline. In addition, AB 32 requires CARB to adopt regulations to require reporting and verification of statewide GHG emissions. Based on this guidance, CARB approved a 1990 statewide GHG level and 2020 limit of 427 MMT of CO_2e. The Scoping Plan was approved by the CARB on December 11, 2008 and included measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted since approval of the Scoping Plan. In May 2014, CARB approved the first update to the AB 32 Scoping Plan. The 2013 Scoping Plan update defines CARB's climate change priorities for the next five years and sets the groundwork to reach post-2020 statewide goals.

SB 375, signed in August 2008, enhances the state's ability to reach AB 32 goals by directing the CARB to develop regional GHG emission reduction targets to be achieved from passenger vehicles for 2020 and 2035. In addition, SB 375 directs each of the state's 18 major Metropolitan Planning Organizations (MPO) to prepare a "sustainable communities strategy" (SCS) that contains a growth strategy to meet these emission targets for inclusion in the Regional Transportation Plan (RTP). On September 23, 2010, the CARB adopted final regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035.

Senate Bill 32 became effective on January 1, 2017 and requires the ARB to develop technologically feasible and cost effective regulations to achieve the targeted 40 percent GHG emission reduction. The 2017 Scoping Plan was adopted by ARB on December 14, 2017. The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program. The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2013 Scoping Plan Update, the 2017 Scoping Plan does not provide project-level thresholds for land use development. Instead, it recommends that local governments adopt policies and locally-appropriate quantitative thresholds consistent with a statewide per capita goal of six metric tons (MT) of CO_2e by 2030 and two MT of CO_2e by 2050 (CARB 2017b). As stated in the 2017 Scoping Plan, these goals may be appropriate for plan-level analyses (city, county, subregional, or regional level), but not for specific individual projects because they include all emissions sectors in the State.

In 2018, the Governor expanded upon EO S-3-05 by issuing EO S-55-18 and creating a statewide goal of carbon neutrality by 2045. EO S-55-18 identifies the CARB as the lead agency to develop a framework for implementation and progress-tracking toward this goal.

Greenhouse Gas Analysis

The City of San Marcos has an adopted CAP with a 2020 target that is consistent with AB 32 (establishes a target of statewide GHG emissions to be reduced to 1990 levels by the year 2020). Thus, the adopted CAP qualifies as GHG reduction plan under CEQA for the period up to 2020.

However, the proposed project has an operational year or horizon year of 2021 and as such, the project level CEQA tiering or analysis should be completed using a GHG reduction plan that consistent with the adopted 2030 statewide target in SB 32. The adopted San Marcos CAP was completed prior to the adoption of SB 32 (establishes a statewide mid-term GHG reduction target of 40 percent below 1990 levels by 2030) and includes a 2030 target that is not consistent with the statewide 2030 target. Therefore, the CAP does not qualify as a GHG reduction plan for projects with horizon years beyond 2020 and the Consistency Checklist or 2030 project-level GHG efficiency threshold cannot be use for CEQA analysis.

Because the proposed project has an operational year (horizon year) after 2020, it is evaluated for consistency with the statewide SB 32 State targets. Based on current industry best practice, the project was evaluated by comparing the project's calculated construction and operational emissions against a project-specific efficiency threshold derived from the SB 32 target (Rincon Consultants, Inc., 2019a).

Greenhouse Gas Efficiency Thresholds

A project-specific efficiency threshold can be calculated by dividing statewide GHG emissions by the sum of statewide jobs and residents. However, not all statewide emission sources are present in the project area (e.g., mining). Accordingly, the Air Quality and Greenhouse Gas Study modified the 2030 statewide inventory target with substantial evidence provided to establish a locally-appropriate, evidence-based, project-specific threshold consistent with California's SB 32 targets.

To develop this threshold, the local planning area was first evaluated to determine emissions sectors that are present and will be directly affected by potential land-use changes. After removing Agricultural, Industrial, and Cap and Trade emissions, the remaining emissions sectors with sources within the San Marcos planning area are then summed to create a locally-appropriate emissions total. This locally-appropriate emissions total is divided by the statewide 2030 service person population to determine a locally-appropriate, project-level threshold of 3.2 MT of CO_2e per service person that is consistent with SB 32 targets (Rincon Consultants, Inc., 2019a).

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

Construction Emissions

Construction of the project would generate temporary GHG emissions primarily as a result of operation of construction equipment on-site, as well as from vehicles transporting construction workers to and from the project site and heavy trucks to export earth materials on-site. Site preparation and grading typically generate the greatest amount of emissions due to the use of grading equipment and soil hauling.

Emissions associated with the construction period were estimated using the CalEEMod v. 2016.3.2 based on the projected maximum amount of equipment that would be used on-site at any given time during construction activities. The construction GHG emissions associated with the project are shown in Table 10 below. Construction emissions would generate an estimated 629.4 MT of CO_2e per year, or 21.0 MT of CO_2e per year when amortized over a 30-year period.

Table 10 Estimated Construction GHG Emissions

Year	Project Emissions (MT/yr CO_2e)
Total	629.4
Total Amortized over 30 Years	21.0

Calculations were taken from the CalEEMod results in the Air Quality and Greenhouse Gas Study.

Operational Emissions

Project operation would generate GHG emissions as a result of energy use, area emissions from landscaping equipment and consumer products, waste generation and water consumption, and from mobile sources from vehicle trips generated by the project. Table 11 combines the amortized construction, operational, and mobile GHG emissions associated with the project.

Table 11 Combined Annual Emissions of Greenhouse Gases

Emission Source	Annual Emissions (MT of CO_2e)
Construction	21.0
Operational	
Area	0.8
Energy	149.6
Solid Waste	15.5
Water	28.6
Mobile	
CO_2 and CH_4	392.3
N_2O	19.4
Total Project Emissions	**627.2**

Source: Air Quality and Greenhouse Gas Study

The overall operational emissions of the project would be approximately 627.2 MT of CO_2e per year. The project's service population is based on the 2017 average household rate for the City of San Marcos of 3.11 persons per household (US Census Bureau 2017). Using this rate, the project would add approximately 209 residents (3.11 x 67 dwelling units = 209) to the project site. The project does not propose employment opportunities. Therefore, the project's service population is 209. Table 12 details the breakdown of the project's per service population emissions in relation to SB 32 thresholds.

Table 12 Project GHG Emissions Consistency Evaluation

	Metric
Project Service Population	209
Project Total Annual Emissions (MT CO_2e/year)	627.2
Project Annual Emissions per Service Person (MT CO_2e/SP/year)	**3.0**
SB 32 Efficiency Threshold (MT CO_2e/SP/year)	3.2
Exceed SB 32 Threshold?	No

Source: Air Quality and Greenhouse Gas Study

The project would generate 3.0 MT CO_2e per capita of its service population. As the SB 32 project specific threshold of 3.2 MT CO_2e would not be exceeded, impacts would be less than significant. Therefore, further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

b. Would the project conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

As mentioned above, the project would add 209 additional people to the City. As of July 2017, the U.S. Census estimates San Marcos's population at 96,198 (U.S. Census Bureau 2017). The San Diego Association of Governments 2050 Regional Transportation Plan and Sustainable Community Strategy estimates the population of San Marcos to reach 103,238 by 2035, which would be an increase of 7,040 people (SANDAG 2011b). The 209 people created by the proposed project would represent three percent of the projected growth, would not exceed plans for projected growth in the area.

As mentioned above, the San Marcos CAP qualifies as an AB 32 GHG reduction plan under CEQA and can be used to evaluate projects with horizon years prior to 2020. However, the CAP is not consistent with SB 32 and therefore cannot be used to evaluate GHG emissions associated for projects with a horizon year that extends past 2020. Therefore, compliance with thresholds specific with SB 32 targets would be applicable for this project. The project would not exceed established per service population thresholds and would be consistent with applicable policies and regulations related to reducing greenhouse gas emissions.

The project also consistent with and promotes policies in SANDAG's 2050 RTP/SCS. Table 13 lists the applicable policies and how the project is consistent.

Table 13 Consistency with SANDAG's 2050 RTP/SCS

RTP/SCS Policy	Project Consistency
Provide convenient travel choices including transit, intercity and high speed trains, driving, ridesharing, walking, and biking	The project is located conveniently adjacent to transit stops and train stations as well as across E. Mission Road from the San Marcos Library and Civic Center. This provides convenient transportation choices.
Increase the use of transit, ridesharing, walking and biking in major corridors and communities	The proximity of the project to the Civic Center, transit stops, and a train station will increase the use of alternative modes of transportation.
Ensure access to jobs, services, and recreation for populations with fewer transportation choices	The project is across E. Mission Road for the Civic Center and about 0.7 miles north of CSU San Marcos, providing easy access to job centers, education, and recreational areas.
Reduce greenhouse gas emission from vehicles and continue to improve air quality in the region	The project would promote the use of alternative modes of transportation due to its location, which would reduce greenhouse gas emissions.

With the adoption of EO S-55-18, the State now has a policy and goal of carbon neutrality for the State by 2045. Currently the EO is applicable to state agencies, and while quantitative long-term emissions analysis may be speculative at this point, the project is designed as an all-electric and EV-ready community to fully utilize the existing legislation for carbon intensity reduction in utility electricity mix portfolios. As SB 100 requires electricity providers to reduce the emissions of provided electricity to zero-GHG emissions by 2045, Mission 316 development emissions will be

reduced in tandem. Therefore, under existing legislation, long term emissions of the Mission 316 development are expected to continually decrease relative to the emissions at build-out.

Since the project would not exceed growth projections or established GHG thresholds and is consistent with applicable policies in the 2050 RTP/SCS, there would be no impact and further analysis of this issue is not warranted.

NO IMPACT

9 Hazards and Hazardous Materials

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	■	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	■	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?	☐	☐	☐	■
d. Be located on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	■
e. For a project located in an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	■	☐
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	■	☐
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	■	☐

a. Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b. Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Construction of the project would involve the temporary use and transport of hazardous materials used in the operation of required construction equipment. These materials include diesel fuel, lubricants, gasoline, adhesives, cleaning solutions, and chemical toilets. The materials would be transported to and within the project site for regular construction activities. The project, however, would comply with all pertinent federal, state, and City regulations, which regulate the control of these materials on-site and the disposal of them off-site. Compliance with applicable regulations would reduce potential impact to a less than significant level.

Operation of the residential development would not require the transport or disposal of hazardous materials, other than typical household and landscaping materials. These would be subject to federal and state regulations which would minimize the risk of hazardous materials release. The amount of these hazardous materials would not be substantial and would not pose a risk to the public or environment. Compliance with the applicable regulations of hazardous materials use, storage, and disposal during construction and operation of the project would reduce impacts to a less than significant level.

Based on the above, further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

c. Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?

The nearest schools are San Marcos Elementary, 0.44 miles away, and California State University San Marcos, 0.54 miles away. Potential hazardous materials, such as paint products, lubricants, solvents, gasoline, and cleaning products, would be used and stored on-site during the construction of the proposed project. However, due to the limited quantities of these materials to be used by the project, they are not considered hazardous to the public at large. Also, the transport, use, and storage of hazardous materials during the construction of the project would be conducted in accordance with all applicable state and federal laws, such as the Hazardous Materials Transportation Act, Resource Conservation and Recovery Act, the California Hazardous Material Management Act, and the California Code of Regulations, Title 22.

The operation of the project would not emit or handle hazardous materials. Given that there are no schools located within 0.25 miles of the project site and that construction or operation of the project would not emit hazardous materials, there would be no potential impact on local schools. Further analysis of this issue is not warranted.

NO IMPACT

d. Would the project be located on a site included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

A search of the Department of Toxic Substances EnviroStor database and the State Water Board GeoTracker database concluded that the project site is not located on any known hazardous materials site. Five sites are located nearby the project site. These are detailed in Table 14.

Table 14 Hazardous Materials Sites

Project Type	Name	Location	Status
LUST Cleanup Site	US Post Office	420 N. Twin Oaks Valley Road	Completed- Case Closed
LUST Cleanup Site	Tri-M-Co	528 E. Mission Road	Completed- Case Closed
School	North County Regional Learning Center	Mission Road & Pico Avenue	No further action as of 12/12/2005
School	Proposed Foothill High School Southeast Site	140 W. San Marcos Blvd.	No action required as of 7/14/2011
School	Future Foothill High School	West San Marcos Blvd	No further action as of 10/15/2009

Source: GeoTracker Database, 2015; EnviroStor, 2018

The nearby sites have been closed and/or require no further action and present no potential hazard to the project. Because there were no hazardous material sites on or near the property, there would be no impact. Further analysis of this issue is not warranted.

NO IMPACT

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

The airport nearest to the project site is the McClellan-Palomar Airport, which is about 6.3 miles west of the project site. The site is located within the McClellan-Palomar Airport Land Use Compatibility Plan, which contains policies and guidelines to create compatible development and land uses adjacent to the airport, and to protect the public health, safety, and welfare. Policies in the Compatibility Plan are based on the project airport activity levels associated with the airport and addresses noise, safety, airspace protection, and overflight compatibility factors with proposed projects.

According to the McClellan-Palomar Airport Compatibility Plan, the site is located within Review Area 2, which limits the height of structures in higher elevated areas (SD County Airport Land Use Commission 2010). The proposed project would not be on high terrain and the proposed heights of the buildings do not conflict with the Compatibility Plan regulations. While the project is not located within the overflight notification area, since the project is located in Review Area 2, it would still be required to record overflight notification documents per the Compatibility Plan and Chapter 20.265 of the City's Municipal Code (City of San Marcos, 2012). This would serve to notify potential residents of common annoyances associated with the proximity to the Airport, such as noise, vibration, and overflights. The project would not exceed height limits and would comply with

nuisance notification requirements. Impacts related to airport hazards would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

f. Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

The City of San Marcos adopted the Unified San Diego County Emergency Services Organization Emergency Operations Plan in 2010. Official evacuation routes have not been established. However, emergency communication systems will provide information on event-specific evacuation plans and routes. There are several main thoroughfares that would serve as primary evacuation corridors in most cases, which include Mission Road which borders the project site. The project site is not located in recommended fire evacuation routes in the San Marcos Fire Department Community Wildfire Protection Plan (SMFD 2007).

The project does not include structures that would impair or block any established evacuation routes. The project would generate increased traffic from the proposed residences, but the increase would be minor in nature and not impact the evacuation routes. The project would comply with all applicable City standards for emergency access in the development, and the project would be reviewed by the San Marcos Fire Department and comply with all design recommendations. Therefore, impacts to emergency evacuation routes and emergency response would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

g. Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

The project site is located in a Moderate Fire Hazard Severity Zone according to the California Department of Forestry and Fire Protection, and according to Figure 6-4 of the General Plan, the project site is not located in an area at risk of wildfire (Cal Fire 2009, San Marcos 2013). The project site is located adjacent to vegetated, undeveloped land, which could pose a risk of fire to the project. The project would be designed and constructed according to California Building and Fire Code standards, including installing fire sprinklers, and the project would be reviewed and approved by the San Marcos Fire Department. The project will prepare a Fire Prevention Plan as well as implement and maintain a fuel modification zone, approved by the Fire Marshal, to separate the residences from nearby vegetation. With the preparation of a Fire Prevention Plan, the incorporation of the fuel modification zone, and compliance with building standards, the project would not expose people or structures to a significant wildfire risk. Therefore impacts would be less than significant and no further analysis is warranted.

LESS THAN SIGNIFICANT IMPACT

10 Hydrology and Water Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	■	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	■	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
(i) Result in substantial erosion or siltation on- or off-site;	☐	☐	■	☐
(ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;	☐	☐	■	☐
(iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	■	☐
(iv) Impede or redirect flood flows?	☐	☐	☐	■
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	■
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	■

a. Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Potential water quality impacts associated with the project include short-term construction impacts from erosion and sedimentation as well as potential hazardous material discharge from construction equipment and materials. Because the project would involve development and ground disturbance of over one acre, it would be required to comply with regulations established under the National Pollution Discharge Elimination System (NPDES) for construction stormwater discharges. The Construction General Permit, General Permit Order 2009-0009-DWQ, would also require the development of a Storm Water Pollution Prevention Plan (SWPPP) by a certified Qualified SWPPP Developer (QSD). The project would be considered a high priority project with the City of San Marcos, which will require a SWPPP and Erosion and Sediment Control Plan as a part of the grading plans for the project. The SWPPP for the Construction General Permit can be used for the City, but the project will also meet the minimum BMP requirements for the City that are detailed Construction Best Management Practices Manual. These would reduce potential construction impacts to water quality and discharge to a less than significant level.

Post construction and operation of the project would comply with Chapter 14.15 of the San Marcos Municipal Code, which requires development of land to prevent, to the maximum extent possible, pollutants from entering the stormwater conveyance system in the City. The project would also comply with requirements of the San Diego Regional Water Quality Control Board (SDRWQCB) Municipal Separate Stormwater Permit, Order No. R9-2013-0001. The City of San Marcos developed a Jurisdictional Urban Runoff Management Program (JURMP) to comply with this Order and to reduce pollution in urban runoff within the City. Under Order R9-2013-0001, the project would be considered a priority project and will require additional treatment control BMPs under Provision E.3.b (City of San Marcos 2008). The project would comply with all necessary provisions and BMPs, along with preparing a SWPPP.

With compliance with all applicable regulations and measures, the project would not violate water quality standards or waste discharge requirements. Impacts would be less than significant and further analysis of these issues is not warranted.

LESS THAN SIGNIFICANT IMPACT

b. Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

San Marco's water supply is provided primarily by Vallecitos Water District (VWD), which receives all of its supply from the San Diego County Water Authority (SDCWA). SDCWA obtained most of its water from the State Water Project (SWP) and from the Colorado River via the Colorado River Aqueduct. The project and area are located within the San Marcos Valley Groundwater Basin. The basin occupies and area of 2,130 acres (3.3 square miles) (California Department of Water Resources 2004). VWD currently does not obtain water from the groundwater basin, as it receives its water from SDCWA, which is not reliant on imported water sources. VWD conducted a groundwater feasibility analysis in 1996 which concluded the storage capacity would not produce groundwater at an economically viable rate, even in the short term (VWD 2015). Therefore, there would be no impact to groundwater depletion as the project would not utilize the groundwater as a potable water source.

The project is located on a currently undeveloped lot with no impervious surfaces within the San Marcos Valley Groundwater Basin. Construction of the project would increase impervious surfaces with the construction of 67 housing units, parking lots and roads, and walkways to 2.41 acres which could impact groundwater recharge and supplies. The project would be required to implement BMPs and the required NPDES permit, which would reduce the impacts of the increased impervious surfaces. The project would comply with all applicable regulations and policies, and would not utilize groundwater for construction or operation; therefore, impacts to groundwater would be less than significant and further analysis is not warranted.

LESS THAN SIGNIFICANT IMPACT

c.i. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site?

c.ii. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?

There are no streams or rivers present on the project site, but the site is located nearby the Twin Oaks Valley and San Marcos Creeks. As mentioned above, the project would increase the imperious surfaces on-site, creating potential impacts to the nearby streams and drainage patterns due to increased stormwater runoff. The project, however, will be required to comply with a Construction General Permit, which will entail an Erosion Control Plan, SWPPP, and compliance with JURMP. During the construction phase, the project will implement BMPs to for erosion and siltation prevention. The project would be considered a priority project and will be designed to minimize erosion and siltation through soil stabilization, sediment control, and erosion control BMPs outlined in the City of San Marcos's Construction Urban Runoff Requirements Manual (City of San Marcos 2008). The project would, therefore, have a less than significant impact on drainage patterns through increased erosion and siltation.

All development projects in San Marcos are required to meet minimum requirements of incorporating site design and source control BMPs. Source control BMPs, as mentioned above, would reduce erosion and siltation impacts on local drainage patterns. The project will also implement site design BMPs, or low impact development, to mimic the hydrology of the site before the development of the proposed project. These measures capture, filter, evaporate, detain, and/or infiltrate runoff within the development area. Priority project shall also control post-development peak storm water runoff discharge rates and velocity to maintain or reduce pre-development downstream erosion (JURMP, 2008). These measures will reduce the project's impact on surface water runoff to a less than significant level.

Based on the above, further analysis of these issues is not warranted.

LESS THAN SIGNIFICANT IMPACT

c.iii. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

As discussed previously, the project would implement BMPs to accommodate project runoff volumes and rates with those prior to project development. This would reduce any potential impacts on stormwater system capacity. The project would also comply with requirements of MS4 Permit No. R9-2013-0001, the JURMP, and Chapter 14.15 of the San Marcos Municipal Code, which would prevent pollutants, to the maximum extent possible, from entering the stormwater conveyance system. Compliance with these regulations would reduce project impacts related to runoff exceeding system capacity to a less than significant level. Further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

c.iv. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would impede of redirect flood flows?

The project site is not located in a flood hazard area according to FEMA Flood Insurance Rate Map 06073C0793G (U.S. Department of Homeland Security 2012). The project is located in Zone X, area of minimal flood hazard. Therefore, the project would not place development within a flood hazard area which would impede or redirect flood flows. There would be no impact and further analysis of these issues is not warranted.

NO IMPACT

d. Would the project in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

The City is located downstream of various dams and reservoirs which create various inundation hazards in parts of the City. According to San Marcos 2013 General Plan Safety Element, there are four dams and ten reservoirs in the planning area:

- South Lake
- Discovery Lake
- San Marcos Lake
- Jack's Pond
- Palomar Reservoir
- Richland #1 Reservoir
- Meadowlark #1 Reservoir
- Meadowlark #2 Reservoir
- School House Reservoir
- Sage Canyon Reservoir
- Via Vera Cruz Reservoir
- Double Peak Reservoir

- Palomar Estates Reservoir
- Simmons Park Reservoir

According to Figure 6-3 FEMA Flood Hazards and Reservoir/Dam Inundation Zones in the General Plan, the project is not located within an inundation zone from the previously listed dams and reservoirs. Therefore, there would be no impact related to risk associated with failure of a levee or dam and further analysis is not warranted.

NO IMPACT

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

As discussed under Impact A, the project would comply with all applicable regulations and measures to reduce potential water quality impacts during construction and operations of the project. Therefore, the project would not conflict with the implementation of The SDRWQCB Basin Plan, which establishes water quality objectives and implementation measures.

The project site is located in the San Marcos Valley Groundwater Basin (9-032). The Basin is a "Very Low" basin priority under the California Department of Water Resources Final 2018 Basin Prioritization (California Department of Water Resources 2019). Therefore, it is not required to prepare a Groundwater Sustainability Plan under the Sustainable Groundwater Management Act. Therefore, the project would not impact a sustainable groundwater management plan. There would be no impacts.

NO IMPACT

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11 Land Use and Planning

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Physically divide an established community?	☐	☐	☐	■
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	■	☐

a. Would the project physically divide an established community?

The proposed project outlines a plan for a residential development on currently undeveloped property, surrounded by existing development including commercial, residential, light industrial, and civic/public facility uses. The proposed update to the Mission 316 Specific Plan would specify a circulation plan that incorporates one circulation road originating from East Mission Road, that would share an access point with Mission 316 East, and connecting to a second access point on Woodard Street. Internal alleyways would be constructed to connect the multi-family dwelling units to the proposed circulation road. The circulation road would not divide an existing community or negatively affect the physical structure of the surrounding neighborhoods. There would be no impact and further analysis of this issue is not warranted.

NO IMPACT

b. Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

The project site is located in the Richland Neighborhood of the City of San Marcos. The City's General Plan designates the site as a Specific Plan Area (SPA), and specifically it is located within the existing Heart of the City and Richmar Specific Plan areas. The project includes a Specific Plan Amendment to the Mission 316 Specific Plan in order to add the project site within the Specific Plan boundaries and to provide for additional standards and regulations for the design and construction of the proposed project. If the project is approved, the proposed development, density, and standards would be consistent with the City's General Plan and applicable land use policies. The project would also comply with all applicable regulations in the City's municipal code. Therefore, impacts would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

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12 Mineral Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	■
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	■

a. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b. Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan

The project site and surrounding properties are part of the overall urbanized area within the City of San Marcos. According to the Conservation Open Space Element of the General Plan, the project site is located in Mineral Resource Zone 3 and there are no known mineral resources on-site. In addition, there are no suitable sources of mineral resources for construction materials within the City of San Marcos (San Marcos 2013). Therefore, the project would not have an impact on any known mineral resource and no impact would occur.

NO IMPACT

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13 Noise

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project result in:				
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	■	□	□	□
b. Generation of excessive groundborne vibration or groundborne noise levels?	□	□	■	□
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	□	□	□	■

Noise is unwanted sound that disturbs human activity. Environmental noise levels typically fluctuate over time, and different types of noise descriptors are used to account for this variability. Noise level measurements include intensity, frequency, and duration, as well as time of occurrence. Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). Because of the way the human ear works, a sound must be about 10 dBA greater than the reference sound to be judged as twice as loud. In general, a 3 dBA change in community noise levels is noticeable, while 1-2 dBA changes generally are not perceived. Quiet suburban areas typically have noise levels in the range of 40-50 dBA, while arterial streets are in the 50-60+ dBA range. Normal conversational levels are in the 60-65 dBA range, and ambient noise levels greater than 65 dBA can interrupt conversations.

Noise levels typically attenuate at a rate of 6 dBA per doubling of distance from point sources (such as construction equipment). Noise from lightly traveled roads typically attenuates at a rate of about 4.5 dBA per doubling of distance. Noise from heavily traveled roads typically attenuates at about 3 dBA per doubling of distance, while noise from a point source typically attenuates at about 6 dBA per doubling of distance. Noise levels may also be reduced by the introduction of intervening structures. For example, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm that breaks the line-of-sight reduces noise levels by 5 to 10 dBA. The construction style for new buildings in California generally provides a reduction of exterior-to-interior noise levels of about 30 dBA with closed windows (Federal Highway Administration [FHWA] 2006).

The Community Noise Equivalent Level (CNEL) is the 24 hour A-weighted average for sound, with corrections or penalties for evening and nighttime hours. The corrections require an addition of 5 decibels to sound levels in the evening hours between 7:00 PM and 10:00 PM and an addition of 10 decibels to sound levels at nighttime hours between 10:00 PM and 7:00 AM. These additions are made to account for the increased sensitivity during the evening and nighttime hours when sounds appear louder.

The City of San Marcos General Plan Noise Element provides a description of existing noise levels and sources, and incorporates comprehensive goals and policies. The Noise Element includes several policies on noise and acceptable noise levels. The City has an established land use compatibility exterior noise exposure threshold of 65 dBA CNEL for multi-family housing and housing in mixed-use areas (City of San Marcos 2013).

To implement the City's noise policies, the City adopted a Noise Ordinance. San Marcos's Noise Ordinance (San Marcos Municipal Code (SMMC) Chapter 10.24.010) which states that it is the City's policy to regulate and control annoying noise levels from all sources, and prohibits loud, unnecessary or unusual noise that unreasonably disturbs the peace and quiet of any residential neighborhood or that causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.

SMMC Chapter 17.32.180 states that grading, extraction, and construction activities are allowed between 7:00 AM to 4:30 PM, Monday through Friday. Grading, extraction, or construction activities are not permitted in the City on weekends or holidays. The City's municipal code does not set noise limits on construction activities, though the City has commonly utilized the County of San Diego's Noise Ordinance construction noise threshold of 75 dBA.

Some land uses are more sensitive to ambient noise levels than other uses due to the amount of noise exposure and the types of activities involved. The General Plan Noise Element identified residences, hospitals, convalescent and day care facilities, schools, and libraries as sensitive land uses. The proposed residential units are considered a noise sensitive land use, and are surrounded by existing noise sensitive uses such as the single-family residences to the north.

Ldn Consulting prepared a noise study for the project in September 2018. Information from this technical report is used herein.

a. Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

On-site noise-generating activities associated with the project would include short-term construction and long-term operational noise. The project would generate off-site traffic noise along adjacent roadways (primarily along E. Mission Road and Woodward Street). These potential effects are analyzed below.

Construction Noise

Temporary construction noise would be generated from construction activities on-site and traffic noise from construction vehicles. Nearby noise-sensitive land uses include single-family residences located 100 feet and more from the project site. Noise impacts are a function of the type of activity being undertaken and the distance to the receptor location. Construction activity would commence in December 2019 and would occur over a period of approximately 20 months.

Calculations of the expected construction noise impacts were completed using a point-source noise prediction model. The essential model input data for these performance equations include the source levels of each type of equipment, relative source to receiver horizontal and vertical separations, the amount of time the equipment is operating in a given day, also referred to as the duty-cycle and any transmission loss from topography or barriers.

Based on the EPA noise emissions, empirical data and the amount of equipment needed, worst case noise levels from the construction equipment for site preparation would occur during the grading operations. No pile driving is anticipated as part of the project. However, some blasting is anticipated and a rock crusher is needed during project construction due to the properties of the bedrock on the project site. Rock crushing is anticipated to occur for several weeks once the material is required, and would be located approximately 500 feet from the nearest existing residence in the southwestern portion of the project site in order to maximize the distance from adjacent residential uses. Rock crushing and blasting activities would be completed separately from grading activities, and therefore, these activities were separately analyzed.

Grading Activities

Grading activities would consist of the preparation of internal roadways, parking and the finished pads. The grading equipment would be spread out over the project site from distances near the property line adjacent to the nearest sensitive receptor (approximately 100 feet north) to distances of 500 feet or more away. Based on the site plan, the majority of the grading operations will occur more than 300 feet from the property lines. This means that most of the time the average distance from all the equipment to the nearest property line is 300 feet.

Table 15 shows the noise levels generated from construction activities at 50 feet from the noise source and the cumulative noise level at an average distance of 150 feet over the amount of time the equipment would operate during a normal work day (duty-cycle).

Table 15 Construction Noise Levels

Construction Equipment	Quantity	Source Level at 50 ft (dBA)	Duty Cycle (hours/day)	Cumulative Noise Level at 50 ft (dBA)
Dozer – D8	1	74	8	74.0
Dozer – D6	1	74	6	72.8
Dozer – 450	1	74	6	72.8
Scraper – 621G	3	75	8	79.8
Wheel Loader – 972G	1	73	8	73.0
Excavator – 336E	1	72	8	72.0
Compactor – 815B	1	74	6	72.8
Grader – 160M	1	73	4	70.0
Grader – 14M	1	73	8	73.0
Backhoe	1	72	4	69.0
Water Truck	1	70	8	70.0
Cumulative Levels at 50 feet				84.2
Average Distance to Property Line (feet)				150.0
Noise Reduction Due to Distance				-9.6
Nearest Property Line Noise Level				74.6

Source: Ldn Consulting 2018.

As shown in Table 15, construction noise at the nearest property line is estimated at 74.6 dBA. This noise level would comply with the 75 dBA Leq standard average over 8 hours at the property lines.

Rock Crusher

The project may utilize a Thunderbird Hazemag Impact Crushing Plant Model CP300 rock crusher, or equivalent as proposed by the applicant. Use of the rock crusher is limited to the hours of 7:00AM to and 4:30PM, Monday through Friday. Rock crushing is not allowed on weekends or holidays. According to the project applicant, rock crushing is anticipated to occur for several weeks once the material is required. The rock crusher would have a worst case 60 dBA noise contour extending 900 feet. The noise contours do not take into account any shielding from topography, stockpiled materials or any barriers that may exist at the nearest residences.

The rock crushing equipment would be located in the southwestern corner of the proposed site, more than 500 feet from the nearest residence. Based on empirical data collected at a material processing plant in the City of Upland, noise levels from a rock crusher ranged between 80-86 dBA at 45 feet (Ldn 2018). In order to achieve the City's 60 dBA Leq standard, the rock crusher needs to be 900 feet from the nearest residence. The nearest residence to the proposed rock crusher

location is 576 feet. Table 16 shows the estimated noise level for the rock crusher from the nearest sensitive receptor.

Table 16 Rock Crushing Noise Levels

Construction Equipment	Quantity	Source Level at 50 ft (dBA)	Duty Cycle (hours/day)	Cumulative Noise Level at 50 ft (dBA)
Thunderbird Hazemag #CP300	1	86	8	86.0
Distance to Sensitive Use (feet)				576.0
Noise Reduction Due to Distance				-22.1
Property Line Noise Level				**63.9**

Source: Ldn Consulting 2018

As shown in Table 16, noise generated by the rock crusher would exceed the City's 60 dBA Leq rock crusher standard. Therefore, construction noise impacts may be potentially significant, and will be further analyzed in an EIR.

Operational Noise

The project would construct new multi-family residential buildings on the project site with driveways between the proposed buildings to access garages, an outdoor recreational area for residents, and landscaping throughout the site. Existing uses near the project site may periodically be subject to noises associated with operation of the project. The closest noise sensitive receptors are residences located approximately 100 feet north of the project site boundary. The proposed project would also be a sensitive use upon completion.

On-site Noise Sources

The proposed project would introduce new residential development on the project site. Noise that is typical of such development include conversations, music, noise associated with rooftop ventilation and heating systems, and noise from people using outdoor spaces such as patios, balconies, and the passive recreational area.

The proposed two-car garages would be enclosed at the ground floor level of each residential unit. Therefore, noise associated with vehicle parking and lot circulation would not be audible at nearby noise-sensitive receptors. Similarly, parking noise would not be audible by the proposed residential units based on the use of wall and floor-ceiling assemblies that have a sound transmission class (STC) of at least 40 to ensure interior noise environment does not exceed an hourly equivalent noise level of 45 dBA in occupied areas, per CALGreen standards (CALGreen Code 2016).

Rooftop ventilation and heating systems would be on-site noise generators. Noise from heating, ventilation and air conditioning (HVAC) equipment can reach 100 dBA at a distance of three feet without shielding (EPA 1971). This equipment usually has noise shielding cabinets placed on the roof or is located within mechanical equipment rooms. HVAC equipment noise would not be perceptible to nearby noise sensitive receptors if HVAC equipment would be placed in the interior of the proposed units (in the garage on the first floor), which is typical of multi-family residential development. If the HVAC equipment is placed on the roof with noise shielding, noise would be

reduced to no greater than 55 dBA Leq at 50 feet from the source (EPA 1971). Site plans indicate that the nearest rooftop of the proposed residential units would be approximately 200 feet southwest of the property line of the nearest sensitive receptor. At 200 feet, the distance from the proposed residential unit nearest to the property line of the nearest noise sensitive receptor, HVAC noise would be 43 dBA Leq. This would not exceed the City's exterior noise standard of 60 dBA Leq during the daytime or 50 dBA Leq during the evening for single-family residential uses adjacent to the project site.

Noise generated by residents would include conversations, music, and the use of outdoor spaces such as patios, balconies, and the passive recreational area. Conversational noise would be intermittent, occurring only when people are using the outdoor spaces. Such noise levels would be imperceptible and would not exceed the City's exterior noise standard of 65 dBA Leq during the daytime and 55 dBA Leq during the evening for multi-family residential uses. Furthermore, SMMC Chapter 10.24.010 prohibits loud, unnecessary or unusual noise that unreasonably disturbs the peace and quiet of any residential neighborhood or that causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area. Noise sources associated with property maintenance activities and all portable blowers, lawnmowers, or similar devices would be limited to normal daytime hours and prohibited on holidays.

Because the project would be similar to the surrounding community, would not generate substantial noise increases above ambient noise conditions, and would comply with the SMMC, on-site noise sources would not expose adjacent noise-sensitive receptors to significant noise impacts. Noise levels from the project would not exceed existing ambient traffic noise along East Mission Road, which has an ambient 24-hour CNEL noise level of roughly 53 dBA CNEL (Ldn Consulting 2018). Therefore, the project's on-site operational noise would not substantially contribute to ambient noise and would have a less than significant impact. Further analysis of this issue is not warranted.

Off-site Traffic Noise

Primary noise sources in the vicinity of the project site originate from motor vehicle activities and traffic. Motor vehicle noise is of concern because it is characterized by a high number of individual events, which often create a sustained noise level, and because of its proximity to areas sensitive to noise exposure. Vehicle trips associated with the project would permanently increase ambient noise from traffic on nearby street segments. For traffic-related noise, impacts would be significant if project-generated traffic results in exposure of sensitive receptors to unacceptable noise levels. Table 17 shows significance thresholds for increases in traffic related noise caused by the project.

Table 17 Significance of Changes in Operational Roadway Noise Exposure

Existing Noise Exposure (Ldn or Leq in dBA)	Noise Exposure Increase Threshold (Ldn or Leq in dBA)
45-50	7
50-55	5
55-60	3
60-65	2
65-75	1
75+	0

Source: FTA 2018

The Traffic Impact Analysis (TIA) prepared by Linscott, Law & Greenspan Engineers (LLG 2018) provides traffic volumes for the AM and PM peak hour for several roadways in the vicinity of the project site. The project is calculated to generate approximately 536 ADT with 43 AM peak hour trips (6 inbound/34 outbound) and 54 PM peak hour trips (38 inbound/16 outbound).

A noise exposure increase of 1 dBA or greater would result in a potentially significant traffic noise impact according to Table 17 since the combination of existing roadway and train activities generates noise levels between 66 dBA CNEL and 72 dBA CNEL. Table 18 summarizes the percent changes in daily traffic volumes on nearby roadway segments and the resulting estimated increase in noise levels.

Table 18 Projected Change in Daily Traffic

Street Segment	Existing ADT	Existing +Project ADT	Percent Increase in ADT	Noise Level Increase (dBA)
Woodward Street				
Mulberry Dr. to Borden Rd.	3,100	3,150	2%	<0.4
Vineyard Rd. to Mission St.	7,900	8,010	1%	<0.4
Vineyard Road				
Borden Rd. to Woodward St.	3,600	3,650	1%	<0.4
Mission Road				
Firebird Ln. to Woodward St.	15,100	15,130	<1%	<0.4
Woodward St. to Mulberry Dr.	23,500	23,660	<1%	<0.4
San Marcos Boulevard				
Twin Oaks Valley Rd. to Mission Rd.	16,800	16,800	No change	No Change
Twin Oaks Valley Road				
San Marcos Blvd. to SR-78 WB Ramps	36,100	36,340	1%	<0.4

Source: LLG 2018

As shown in Table 18, traffic noise due to the project would not increase by more than an estimated 0.4 dBA at any roadway segment or intersection. The estimated project traffic noise increase would not exceed the most conservative applicable noise exposure increase threshold of 1 dBA. Therefore, traffic noise impacts would be less than significant and further analysis of this issue is not warranted.

POTENTIALLY SIGNIFICANT IMPACT

b. Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Vibration is a unique form of noise because its energy is carried through buildings, structures, and the ground, whereas noise is simply carried through the air. Thus, vibration is generally felt rather than heard. The ground motion caused by vibration is measured as particle velocity in inches per second and is referenced as vibration decibels (VdB) in the U.S. The City has not yet adopted any thresholds or regulations addressing vibration. The US Department of Transportation Federal Transit Administration (FTA) provides criteria for acceptable levels of groundborne vibration for various types of special buildings that are sensitive to vibration, which were used to analyze construction vibration impacts for the proposed project.

The FTA has set guidelines for evaluating human response to vibration, shown in Table 19. The FTA guidelines are based on the frequency of events as well as the receiving uses. The FTA standard of 85 VdB for infrequent vibration events applies as the vibration threshold for existing residential uses adjacent to the project site.

Table 19 Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Human Response
65 VdB	Approximate threshold of perception for many humans.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying.
85 VdB	Vibration tolerable only if there are an infrequent number of events per day.

[1] "Frequent events" is defined as more than 70 vibration events of the same source per day.

[2] "Occasional events" is defined as between 30 and 70 vibration events of the same source per day.

[3] "Infrequent events" is defined as fewer than 30 vibration events of the same source per day.

Source: FTA 2018

The nearest vibration-sensitive uses are the residences located to the east of the project site, 100 feet or more from proposed construction. The vibration analysis assumed trucks would travel along with western portion of the project site at a minimum distance of 100 feet from vibration-sensitive land uses. Table 20 lists the average vibration levels that would be experienced at the nearest vibration-sensitive land uses to the east from temporary construction activities.

Table 20 Vibration Levels from Construction Activities (Residential Receptors)

	Approximate VdB	
Equipment	25 feet	100 feet
Small bulldozer	58	40
Jackhammer	79	61
Loaded trucks	86	68
Large bulldozer	87	69

Source: Ldn Consulting 2018

Vibration at the nearest receptors 100 feet from the project site would not exceed 85 VdB. Project construction would be temporary, occurring for approximately 20 months, and would be restricted to daytime hours in accordance with the City's Noise Ordinance. Vibration would not occur during recognized sleep hours for nearby residents and would not exceed 85 VdB. Residential uses are not typically associated with the generation of substantial vibration. Consequently, operation of the proposed project would not perceptibly increase groundborne vibration or groundborne noise on the project site above existing conditions. Therefore, vibration impacts generated from temporary project construction activities would be less than significant and further analysis of this issue is not warranted.

Blasting Vibration

Some rock blasting (blasting) would be necessary during project construction. The location, duration, and extent of blasting activities are undetermined at this time. The purpose of blasting is to sufficiently break the rock in order for it to be excavated and removed from the site, or to be crushed and reused as aggregate on site. To accomplish this, the blaster drills a pattern of boreholes distributed evenly throughout the rock to be shattered. These boreholes are then filled with a predetermined amount of explosives. These explosives release energy in the form of shock waves and high gas pressure. The energy confined in the rock shatters the surrounding rock, but a small amount of the gas pressure escapes into the atmosphere and produces noise. The force exerted on the rock causes the desired fracturing effect and at the same time, produces a shock wave. It is this shock wave, or ground vibration, that radiates out from the blast site and can be felt by people or cause buildings to vibrate.

San Marcos Municipal Code Title 17 states that all blasting operations within the City of San Marcos are prohibited unless a Certificate of Authorization is first obtained from the San Marcos Building Director and an Operations Permit issued by the Fire Chief. Additional relevant sections of the City's Code for Blasting are provided below:

- The general contractor or property owner/developer shall give reasonable notice in writing at the time of issuance of a building permit, grading permit or encroachment license to all residences or businesses within 600 feet of any potential blast location. The notice shall be in a form approved by the Building Director. Any resident or business receiving such notice may request of the Building Director that a notice of impending blasting be given by the blaster at the time of the 12 hour advance notice given to the Building Director. The general contractor or property owner/developer shall make all reasonable efforts to contact any and all parties requesting the second notice.
- The blaster shall file a written certification with the Building Director certifying that the general notice required by Section 17.60.060(b) has been given. The certificate shall include addresses and date(s) of notification. A copy shall be retained on file at the Building Division.
- Inspections of all structures within 300 feet of the blast site shall be made before blasting operations. The persons inspecting shall obtain the permission of the building owner to conduct an inspection. The inspections shall be done by a registered structural engineer employed by the blaster or project contractor. The inspection shall be only for the purpose of determining the existence of any visible or reasonably recognizable pre-existing defects or damages in any structure. Inspection refusal shall be at the discretion of the property owner.
- Blasting shall only be permitted between the hours of 9:00 a.m. and 4:00 p.m. during any weekday, Monday through Friday, exclusive of City recognized holidays unless special circumstances warrant another time or day and special approval is granted by the Building Director and Fire Chief.

Blasting for construction projects typically results in an average vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. The shortest distance between blasting activity and nearest sensitive receptor was assumed to be 100 feet. Given attenuation of vibration velocities with distance, the average intensity vibration velocity and peak particle velocity at the nearest existing residence would be about 91 VdB and 0.05 inch per second, respectively.

Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second. Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 85 VdB would be exceeded when blasting occurs within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided, but can be minimized by following the City's blasting procedures as stated above and annoyances can be avoided with proper notice. Therefore, vibration impacts from blasting activities during project construction would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The project site is not located near an airport or airstrip. The nearest airport to the project site is the McClellan-Palomar Airport, which is approximately seven miles west of the project site in the City of Carlsbad. According to the McClellan-Palomar Airport Compatibility Plan, the site is located outside of the 60 dBA noise contour from airport activities (SD County Airport Land Use Commission 2010). Therefore, the proposed project would not expose persons residing or working in the project site to excessive noise levels associated with air traffic. There would be no impact and further analysis of this issue is not warranted.

NO IMPACT

14 Population and Housing

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	☐	☐	■	☐
b. Displace substantial amounts of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	■

a. Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Based on the California Department of Finance estimate for the City's average persons per household rate of 3.13, the proposed 67 dwelling units would generate an estimated 209 additional residents in the City (DOF 2018). According to demographic and socioeconomic estimates provided by the SANDAG Data Surfer database, the City of San Marcos is forecast to add 7,233 multi-family residential units by between 2012 and 2050, a 74 percent increase that would bring the overall multi-family residential inventory from 9,738 units to 16,971 units (SANDAG 2015). The 67 proposed units would account for 0.9 percent[5] of the additional multi-family residential units forecast by SANDAG and would not induce substantial population growth in the City.

To meet the regional housing needs, San Marcos has a remaining 2,452 housing units to build in the extremely- and very-low, low, and above moderate income categories (General Plan, 2012). The 67 housing units with this project have the potential to constitute 2.7 percent of the regional housing needs for the City. The project would not induce substantial population growth in the City as the project would not involve development that would substantially increase the population over what is expected. Therefore, impacts related to population would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

[5] Project residential units as percentage of SANDAG multi-family unit forecast for City of San Marcos (67 project units / [16,971 2050 units – 9,738 2012 units]) * 100 = 0.9 percent.

b. Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

The project site is vacant and does not contain residential units or people. Consequently, there would be no displacement of housing or people. There would be no impact and further analysis of these issues is not warranted.

NO IMPACT

15 Public Services

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a.	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
	1 Fire protection?	☐	☐	■	☐
	2 Police protection?	☐	☐	■	☐
	3 Schools?	☐	☐	■	☐
	4 Parks?	☐	☐	■	☐
	5 Other public facilities?	☐	☐	■	☐

a.1. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered fire protection facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

The San Marcos Fire Department (SMFD) responds to a 33 square mile area inclusive of about 95,000 existing residents. SMFD has an ISO Rating 2 and currently operates 4 Fire Stations, 4 Paramedic assessment engine companies, 1 Paramedic assessment truck company, 5 24-hour Paramedic transport ambulances, 1 Battalion Chief, and 1 on-call duty Chief (City of San Marcos 2018). SMFD average response time is seven minutes for 90 percent of the emergency calls received, and within 10 minutes for 90 percent of the non-emergency calls received (J. Nailon, personal communication. July 3, 2018). The project site is located approximately 0.26 miles from San Marcos Fire Station No. 1, at 180 W Mission Road, which would likely be the station serving the project site in an emergency. The additional estimated 209 residents of the proposed project would not exceed the capacity of the Fire Department to provide protective services. Additionally, the proposed 67-unit residential development is required to comply with all applicable fire codes and regulations stated by the State Fire Marshall, SMFD, and building codes.

The proposed development may minimally increase the demand for emergency services; however, the applicant will be required to submit and annex into the applicable Community Facilities District (CFD) or pay an in-lieu fee due to the proposed new development. Property owners within CFDs are taxed annually for their share to finance local public facilities and services. This would reduce impacts for the additional demand of fire services from the project. The 67-unit development would not exceed the capacity of SMFD to serve the region and provide fire protection services or create the need for new or expanded fire protection facilities. The impact would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.2. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered police protection facilities, or the need for new or physically altered police protection facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

The nearest police station is located at 182 Santar Place, approximately 0.73 miles from the project site. The City of San Marcos partners with the San Diego County Sheriff's Department to provide law enforcement and police services (San Diego County Sheriff's Department 2018). The San Diego County Sheriff's San Marcos Station serves about 100 square miles.

The project would increase demand for emergency police services with the construction of 67 residential units and the addition of approximately 209 residents. The project would be required to annex the site into a CFD for police services or make an in-lieu fee, which would offset the cost of increased services. The project is also located in a developed area that is already served and patrolled by the Sheriff. The proposed 67 units would not exceed the capacity of the Sheriff Department to provide police services to the area. With the payment of applicable taxes and/or fees, impacts would be less than significant and further analysis is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered schools, or the need for new or physically altered schools, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

The project would be served by Richland Elementary (1.38 mi away), Woodland Park Middle School (1.65 mi away), and Mission Hills High (0.92 mi away) within the San Marcos Unified School District. Richland Elementary School has a design capacity of 454 students with an enrollment total of 767 students in 2018. Woodland Park Middle School has a design capacity of 1,260 with an enrollment total of 1,377 in 2018. Mission Hills High School has a design capacity of 2,551 with an enrollment total of 2,547 in 2018 (San Marcos Unified School District 2018). The proposed project would add 67 new units to the City. Using the student generation rate for multi-family residential units provided in the San Marcos Unified School District (SMUSD) of 0.3679 students per units, the project would add approximately 24 students.

As detailed above, the nearby schools, especially the elementary and middle school, are currently over capacity. As stated by the Facilities Planning and Development Department of the San Marcos Unified School District, the project applicant is required to pay the District's Residential Dwelling Unit Fee (currently $5.61 per square foot) (SMUSD 2019). This fee serves to offset any significant

impacts on school facilities and would reduce project's impacts on schools to a less than significant level. Further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.4. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered parks, or the need for new or physically altered parks, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives?

The 2013 San Marcos General Plan sets a parkland standard of 5 acres per 1,000 residents. The City currently provides approximately 270 acres of developed parkland for 95,261 residents. The closest parks to the project site are Hollandia Park (0.89 mi away, 30 acres), Buelow Park (0.8 mi away, 1.9 acres), Connors Park (0.58 mi away, 3.63 acres), and a small neighborhood park (0.08 mi away) across the street. The 2013 City of San Marcos General Plan: Parks, Recreation, and Community Health Element describes 75 acres of future Community Park space, 2 acres of future Neighborhood Park space, 21 acres of future Mini-Park space, and 17 acres of future trails around the City. Approximately 357.79 acres of general future parkland has been allotted through the Planning Department, to create a total of 697.84 acres of parkland within the City of San Marcos (City of San Marcos 2013).

Although the existing parkland alone does not satisfy the City standard, the total planned and existing parkland will exceed the standard to satisfy over 139,568 residents. It is anticipated that the estimated increase of 209 residents may increase demand on local recreational facilities and other public facilities, but the net addition of residents represents a small impact on the overall population. The total planned and existing parkland will exceed the City standard of 5 acres of parkland per 1,000 residents. Furthermore, the minimal impact of increased demand would be offset through the payment of Public Facility Fees (PFF), as detailed in Section 17.44.060 of the San Marcos Municipal Code. A portion of the PFF fees for the proposed multi-family project would go to parks. Therefore, the proposed project would not necessitate the construction of new or expanded parks. Impacts would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.5. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for other public facilities?

The proposed project would be served by the San Marcos Branch of the San Diego County Library system, which is located at 2 Civic Center Drive (approximately 0.08 mi away). The San Marcos Branch Library is 15,394 feet and has a Community Meeting Room and 3D Printer, as well as being ADA accessible. San Marcos residents can also use the California State University San Marcos Library and the Palomar Community College Library for additional resources. The estimated net addition of 209 residents would incrementally increase the demand for library use, but would not require the construction or expansion of new library facilities. Additionally, the City of San Marcos Public Works Department facilitates maintenance of public parks, streets, traffic signals, and stormwater management initiatives (City of San Marcos 2018). Because the project site does not require the

construction of public roads, parks, or libraries, the impacts of the project would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

16 Recreation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	■	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	■	☐

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Reference Item 14.a.4 to see relevant park locations and current parkland guidelines for the City of San Marcos. Because San Marcos has over 357 acres of planned parkland to be constructed over the next several years, the City will exceed its standard of 5 acres per 1,000 residents by providing over 7 acres per 1,000 residents (City of San Marcos 2013). The estimated net addition of 209 residents would not cause a significant increase in use of parkland, so it would not contribute to the accelerated deterioration of parks or recreational facilities, nor would it require the construction or expansion of new park facilities. The project also proposes 33,889 square feet of common open space which includes gathering areas, barbeque counters, turf areas, and seating areas and shade structures. This will reduce the need for residents to utilize public recreation areas. *The project would also be subject to Public Facility Fees (PFF), as detailed in Section 17.44.060 of the San Marcos Municipal Code, to offset impacts from additional residents from the project.* Due to the amount of existing and proposed parkland in the City, the proposed common open space areas, and the payment of PFFs, the project would result in a less than significant impact and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

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17 Transportation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	■	☐
b. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	■	☐
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?	☐	☐	■	☐
d. Result in inadequate emergency access?	☐	☐	■	☐

a. Would the project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Linscott, Law, & Greenspan (LLG) prepared a Traffic Impact Analysis (TIA) for the project, dated July 31, 2018, to assess traffic impacts. The TIA evaluated potential project-related traffic impacts at six key intersections in the vicinity of the project site, plus the two proposed driveways:

- Mulberry Drive and Woodward Street
- Vineyard Road and Borden Road
- East San Marcos Boulevard-Woodward Street and East Mission Road
- Twin Oaks Valley Road and San Marcos Boulevard
- Twin Oaks Valley Road and SR-78 Westbound (WB) ramps
- Twin Oaks Valley Road and SR-78 Eastbound (EB) ramps
- Woodward Street and Project Driveway #1
- East Mission Road and Project Driveway #2

The project's trip generation was estimated using trip generation rates for condominiums outlined in SANDAG's *(Not so) Brief Guide of Vehicular Rates for the San Diego Region*. The project would generate an estimated 536 average daily trips with 43 AM peak hour trips and 54 PM peak hour trips (LLG, 2018). The project was analyzed based on its impacts to intersections, roadway segments, and freeways. Table 21 details the thresholds based on the San Diego Traffic Engineer's Coucil (SANTEC) guidelines, which were used to analyze the project's impacts on local roadways, consistent with the City of San Marcos policy.

Table 21 Significant Impact Threshold for Intersections

Level of Service with Project	Allowable Increase Due to Project Impacts					
	Freeways		Roadway Segments		Intersections Delay (sec)	Ramp Metering Delay (min)
	V/C	Speed (mph)	V/C	Speed (mph)		
D/E/F	0.01	1	0.02	1	2	2

V/C = Volume to Capacity Ratio

Speed = Arterial speed measured in miles per hour

Delay = Average stopped delay per vehicle measured in seconds for intersections, or minutes for ramp meters

Source: LLG 2018

Table 22 details the existing, existing plus project, and horizon year (2035) plus project operational levels for the intersections in the study. As shown, none of the intersections would operate at unacceptable LOS levels with traffic from existing and project increases. Under horizon year plus project traffic impacts, only San Marcos Boulevard and N. Twin Oaks Valley Road would operate at an unacceptable level. However, this is not a significant impact because the delay from the project would not exceed the allowable thresholds. Therefore, impacts would be less than significant and further analysis of these issues is not warranted.

Table 22 Existing, Project, and Horizon Year Intersection Operations

Intersection	Existing LOS	Existing + Project		Horizon Year 2035 + Project		Significant Impact
		Delay Change	LOS	Delay Change	LOS	
Woodward St./Mulberry Dr.						
AM	A	4.0	B	4.0	B	No
PM	A	4.2	B	4.2	B	No
Borden Rd./Vineyard Rd.						
AM	B	0.0	B	0.0	C	No
PM	B	0.0	B	0.1	C	No
San Marcos Blvd./Woodward St.						
AM	D	0.8	D	1.6	D	No
PM	C	0.3	C	0.4	C	No
San Marcos Blvd./N. Twin Oaks Valley Rd.						
AM	D	0.0	D	0.5	E	No[1]
PM	D	0.0	D	0.0	E	No[1]
SR-78 WB Ramps/Twin Oaks Valley Rd.						
AM	B	0.0	B	0.0	B	No
PM	C	0.1	C	0.1	C	No
SR-78 EB Ramps/Twin Oaks Valley Rd.						
AM	C	0.2	C	0.2	D	No
PM	B	0.2	B	0.2	C	No
Woodward St./Project Dwy. #1						
AM	N/A	N/A	B	N/A	B	No
PM	N/A	N/A	B	N/A	B	No
E. Mission Rd./Project Dwy. #2						
AM	N/A	N/A	C	N/A	C	No
PM	N/A	N/A	B	N/A	C	No

[1] Not a significant cumulative impact since the increase in delay due to the Project is less than the allowable threshold of 2.0 seconds.

Source:Transportation Impact Analysis

Table 23 Existing, Project, and Horizon Year Street Segment Operations

Intersection	Capacity	Existing		Existing + Project			Horizon Year 2035 + Project			Significant Impact?
		ADT	LOS	ADT	LOS	ΔV/C	ADT	LOS	ΔV/C	
Woodward St.										
Mullberry Dr. to Borden Rd.	8,000	3,100	A	3,150	A	0.003	2,650	A	0.004	No
Vineyard Rd. to Mission St.	8,000	7,900	D	8,010	A	0.004	4,710	A	0.004	No
Vineyard Rd.										
Boden Rd. to Woodward St.	8,000	3,600	B	3,650	A	0.003	6,150	B	0.003	No
Mission Rd.										
Firebird Ln. to Woodward St.	40,000	15,100	A	15,130	B	0.000	9,630	A	0.001	No
Woodward St. to Mulberry Dr.	60,000	23,500	A	23,660	A	0.002	24,660	A	0.003	No
San Marcos Blvd.										
Twin Oaks Valley Rd. to Mission Rd.	40,000	16,800	A	16,800	B	0.000	27,950	C	0.009	No
Twin Oaks Valley Rd.										
San Marcos Blvd. to SR-78 WB Ramps	60,000	36,100	B	36,340	C	0.004	55,940	E	0.004	No[1]

[1] Not a significant impact since the increase in the V/C ratio due to the Project is less than the allowable threshold of 0.02.

Source: Transportation Impact Analysis

As show in Table 23 above, the project would not have a significant impact on local street segments under project-generated traffic or horizon year plus project traffic. The project would also not conflict with any adopted plan for bicycle or pedestrian infrastructure. The project would not remove the bike path in front of the project site and would not result to impacts to the City's plan for bike lanes. The project could result in temporary impacts to areas of sidewalk surrounding the project site. Impacts would be temporary and the sidewalks would be constructed back to standards after construction. Therefore, impacts would be less than significant and further analysis is not warranted.

LESS THAN SIGNIFICANT IMPACT

b. Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Neither the City of San Marcos nor County of San Diego have adopted thresholds for vehicle miles travelled pursuant to 15064.3(b)(1). As discussed above, the project would not have a significant impact on traffic delays on surrounding intersections and roadways. Moreover, the project site is also located in near major transit stops and corridors. There is one bus stop in each direction of travel along Mission Road, less than ¼ mile from the project site, which served North Coast Transit District (NCTD) Route 305. Similarly, the Civic Center SPRINTER Station is located less than ¼ mile

from the proposed project site. Pursuant to CEQA Guidelines 15064.3 (b)(1), projects within one-half miles of a major transit stop or corridor should be presumed to have a less than significant impact. As the project is located closer than one-half mile to major bus stops and commuter rail lines, the project would not conflict with CEQA Guidelines 15064.3 (b). Impacts would be less than significant and further analysis is not warranted.

LESS THAN SIGNIFICANT IMPACT

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

The project proposes to provide two access driveways; one on Woodward Street and the other on East Mission Road. The East Mission Road driveway would share access with the Mission 316 East development. The access driveway on East Mission Road will be a right-in-right-out only. The Woodward Street driveway would be a full-access driveway and is not proposed to include a signal. The posted speed limit along East Mission Road is 45 miles per hour and 35 miles per hour along Woodward Street. The driveways would provide adequate site distances to and from on-coming traffic. Moreover, all internal roadways would comply with roadway width requirements and require the approval of the San Marcos Fire Department. Therefore, impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

d. Would the project result in inadequate emergency access?

The project provides adequate emergency access. There are two entry points to the project site, a 24-foot wide main circulation road, and eight 20-foot wide alley roads to access the residential units. These street widths and the project building designs would be reviewed by the San Marcos Fire Department for consistency with applicable health and safety codes. Construction of the project would not result in the closure of local roadways which would impede emergency access. Off-site sewer improvements along Woodward Street and Mission Road would comply with applicable regulations and encroachment permit conditions for work within the City right-of-way. Therefore, impacts would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

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18 Tribal Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in a Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	■	□	□	□
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Cod Section 2024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significant of the resource to a California Native American tribe.	■	□	□	□

As of July 1, 2015, California Assembly Bill 52 of 2014 (AB 52) was enacted and expands CEQA by defining a new resource category, "tribal cultural resources." AB 52 establishes that "A project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" (PRC Section 21084.2). It further states that the lead agency shall establish measures to avoid impacts that would alter the significant characteristics of a tribal cultural resource, when feasible (PRC Section 21084.3).

PRC Section 21074 (a)(1)(A) and (B) defines tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe" and is:

1. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or
2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying these criteria, the lead agency shall consider the significance of the resource to a California Native American tribe.

AB 52 also establishes a formal consultation process for California tribes regarding those resources. The consultation process must be completed before a CEQA document can be certified. Under AB 52, lead agencies are required to "begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project." Native American tribes to be included in the process are those that have requested notice of projects proposed within the jurisdiction of the lead agency.

a. *Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074 that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?*

b. *Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074 that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 2024.1?*

The project site is undeveloped and, as discussed in Section 5, *Cultural Resources*, there is potential for the project to impact unidentified cultural resources. As of the publication of the Initial Study, AB 52 consultation has been initiated between the City of San Marcos and Native American tribes. In addition, the project would involve land use changes through a Specific Plan Amendment and would require compliance with SB 18. Although resources of tribal or Native American importance are not known to be present on-site, as yet undiscovered resources could potentially be uncovered during excavation and grading. Impacts would be potentially significant and this issue will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

19 Utilities and Service Systems

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	■	☐
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	■	☐
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	■	☐
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	■	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	■

a. Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

The proposed residential development would bring approximately 209 people which would generate additional water, wastewater, and electricity demand. As discussed in the Energy Conservation section, the project would not generate electrical demand requiring additional sources of electricity production by the utility provider. The project site is located next to existing utility facilities and would not require the construction or relocation of facilities in order to serve the project. The project would include the installation of water and sanitary sewer lines. Water service,

potable and wastewater, to the project site would be provided by Vallecitos Water District (VWD). The water line would connect to an existing eight-inch water line under Mission Road. The excavation would occur in areas previously disturbed and would not result in impacts on biological resources, cultural resources, or other environmental resources. Therefore, the project would have a less than significant impact and further analysis of these issues is not warranted.

LESS THAN SIGNIFICANT IMPACT

b. Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

The project site is within the service area of VWD which provides water to approximately 94,000 customers in a 45-square mile service area (VWD 2015). VWD currently obtains 100 percent of its water supply from the San Diego County Water Authority (SDCWA), which obtains a majority of its water via the State Water Project and the Colorado River Aqueduct. Recently, VWD has increased its portfolio to include at least 1,140 million gallons of desalinization water from SDCWA and 120 million gallons to be supplied to existing reservoirs. These additional water supply sources are indirectly from SDCWA.

In 2015, the average daily water use for residential, commercial, light industrial, landscaping, and agriculture was 11.1 million gallons per day and VWD's total water demand for the year was 4.349 million gallons. This was a reduction from the water demand in 2010, which was 5,315 million gallons, due to mandatory water use restrictions. The projected annual water use was estimated in five year increments up to 2035, which is expected to be 10,644 million gallons in 2020 up to 12,330 million gallons in 2035. VWM estimated the available supply and demands in normal years, single dry years, and multiple dry years as required. If water demands develop as projected in the Master Plan, there is a projected shortfall of supplies in each of the categories as shown in Table 24, Table 25, and Table 26 (VWD 2015).

Table 24 Normal Year Supply and Demand

	2020	2025	2030	2035
Supply Totals	6,914	8,011	6,794	9,198
Demand Totals	10,644	11,187	11,569	12,330
Difference	(3,730)	(3,176)	(2,775)	(3,132)

Units in million gallons

Source: Vallecitos Water District Urban Water Management Plan, 2015

Table 25 Single Dry Year Supply and Demand

	2020	2025	2030	2035
Supply Totals	7,362	8,539	9,359	9,799
Demand Totals	11,399	11,985	12,398	13,225
Difference	(4,037)	(3,446)	(3,039)	(3,462)

Units in million gallons

Source: Vallecitos Water District Urban Water Management Plan, 2015

Table 26 Multiple Dry Years Supply and Demand

		2020	2025	2030	2035
First Year	Supply Totals	7,359	8,533	9,349	9,781
	Demand Totals	11,389	11,970	12,379	13,193
	Difference	(4,030)	(3,437)	(3,030)	(3,412)
Second Year	Supply Totals	7,494	8,691	9,518	9,958
	Demand Totals	11,623	12,216	12,633	13,464
	Difference	(4,129)	(3,525)	(3,115)	(3,506)
Third Year	Supply Totals	7,691	8,922	9,763	10,216
	Demand Totals	11,953	12.563	12,992	13,847
	Difference	(4,262)	(3,641)	(3,229)	(3,631)

Units in million gallons

Source: Vallecitos Water District Urban Water Management Plan, 2015

Since VWD has a deficit of supplies during normal, single-dry, and multiple dry years, according to the 2015 UWMP, VWD completed a Water Systems Analysis for the project to determine if the District has adequate supplies and capacity to serve the project. According to the report, the project would increase the average water demand by 12,705 gallons per day. The project site is located in VWD 920 pressure zone, which has limited capacity to store potable water for development in the zone. According to the Water Systems Analysis, there is sufficient water storage capacity to serve the proposed project. The proposed project would require 63,525 gallons of additional reservoir storage in the zone, which would be covered with the payment of Water Capital Facilities Fees. These fees would be used by VWD to expand water storage facilities within their service area, and VWD considers payment of the Water Capital Facility Fees as mitigation for the increase in water storage demand. Therefore, the VWD would have sufficient water supplies to serve the project and impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

c. Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

The project would be served by VWD and the associated wastewater treatment facilities Encina Water Pollution Control Facility (EWPCF) and Meadowlark Water Reclamation Facility (MRF). The VWD prepared a Wastewater Systems Analysis to determine if there is sufficient capacity to serve the project. VWD has a solid treatment capacity of 10.47 million gallons per day (MGD) at EWPCF, a liquid capacity of 12.67 MGD at EWPCF and MRF, and an ocean disposal capacity of 10.47 MGD at EWPCF (VWD 2018). The average wastewater flow rate in 2014 was 7.2 MGD. The project is expected to generate approximately 7,623 gallons per day (GPD). Therefore, the wastewater analysis concluded that there is adequate solid and liquid treatment capacity, as well as adequate ocean disposal capacity to serve the project.

The Wastewater Systems Analysis also looked at lift station and land outfall capacity with the project. The project is not located in a sewer shed served by a lift station (VWD, 2018). Therefore, there is no lift station upgrades required by the project. VWD's existing land outfall collection

capacity is 20.10 MGD. As the 2014 average wastewater flow was 7.2 MGD and the project would generate approximately 7,623 GPD, the District determined there is sufficient current capacity to serve the project. VWD 2008 Master Plan estimated that buildout under the approved land uses at the time would result in a peak wet weather flow of 29.5 MGD, which exceeds current capacity. To accommodate the additional wastewater flows, the 2008 Master Plan recommended conveyance of peak flows through a parallel land outfall. The 7,623 GPD from the project was not accounted for in the 2008 Master Plan capacity estimates. While the VWD determined that there is current capacity for the project, the project would have to pay Wastewater Capital Facility Fees to be used towards design and construction of a parallel land outfall.

The project would pay applicable Wastewater Capital Facility Fees and follow the conditions in the VWD Wastewater Systems Study. Therefore, the project would have a less than significant impact on wastewater treatment capacity at VWD.

LESS THAN SIGNIFICANT IMPACT

d. Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Solid waste service would be provided by EDCO Waste and Recycling Services, which handles residential, commercial, and industrial collections in the City of San Marcos. EDCO transports collected waste to the Escondido Transfer Station, where it is then transferred to the Sycamore Sanitary Landfill located in Santee. The Sycamore Landfill has a permitted capacity of 5,000 tons/day and a remaining capacity of 113,972,637 cubic yards (CalRecycle 2018). The average daily weight received during September 2018 was 3,356 tons (Sycamore Landfill, Inc. 2018).

The California Department of Resources Recycling and Recovery (CalRecycle) estimates the per capita disposal rate under SB 1016's system to be 4.9 pounds per resident per day (CalRecycle, 2018b). The proposed project of 67 dwelling units would add approximately 209 residents, based on the City's average household size established by the Department of Finance. The project, therefore, is anticipated to generate 1,024 pounds of solid waste per day, or 12,289 pounds per year. This would not exceed the permitted daily capacity when combined with the current average daily disposal rates at the landfill. Furthermore, the amount does not consider any recycling or waste diversion. AB 939 requires that local governments divert 50 percent of the community's solid waste. The City has a disposal rate target of 8.9 pounds per person per day to meet this target and is currently exceeding the goal with a disposal rate of 5.1 per person per day in 2015 (CalRecycle, 2018c). Assuming a conservative 50 percent diversion rate (as the City is currently exceeding 50 percent), the project would generate 512 pounds per day of solid waste, which is within the available daily capacity. Considering the permitted daily capacity of the Sycamore Sanitary Landfill and the remaining overall capacity, the project's solid waste generation can be accommodated. Impacts would be less than significant and further analysis of this issue is not warranted.

LESS THAN SIGNIFICANT IMPACT

e. Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Solid waste facilities require solid waste facility permits to operate, and the San Diego County Department of Environmental Health issues the facility permits. The Sycamore Landfill currently has active permit 37-AA-0023 and undergoes quarterly inspections. As the project would utilize the

Sycamore Landfill for solid waste disposal, it would comply with existing regulations related to solid waste. The City of San Marcos currently exceeds AB 939 requirements of solid waste diversion and is close to meeting AB 341 requirements of diverting 75 percent of solid waste by 2020. The project would comply with applicable solid waste diversion programs; therefore, it would have no impact related to solid waste regulations.

NO IMPACT

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20 Wildfire

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	■	☐
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	■	☐
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	■	☐
d. Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	■	☐

a. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

b. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

c. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

d. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project expose people or structures to significant risks, including downslopes

or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The project site is not located within a State Responsibility Area (SRA) (Cal Fire 2012). According to the Fire Hazard Severity Zones Maps, the project is also not located in a very high fire hazards zone (Cal Fire 2009). The project site is located approximately 0.5 miles southeast from a very high fire hazard zone, which is located in the Santa Fe Hills (San Marcos 2013). While the project is located 0.5 miles of an area designated as very high fire hazard, the area of the Santa Fe Hills most near to the project site have been partially developed by single-family residences. Multiple major roads, as well as existing residential and commercial development, are located between Santa Fe Hills and the project location, which would limit the ability of wildfire to reach the project site. The project would include a fuel modification zone providing the development with a defensible space for combatting potential fire hazards adjacent to the property. The fuel modification zone would be approved by the City Fire Department. Additionally, the project is preparing a Fire Prevention Plan to further reduce risks of fire on the project. The project site is also located less that one half mile from San Marcos Fire Station No. 1. Due to the distance from the nearest very high fire hazard zone, the proximity to fire prevention services, and the implementation of the necessary fuel modification zone, impacts related to wildfire would be less than significant and no further analysis is warranted.

LESS THAN SIGNIFICANT IMPACT

21 Mandatory Findings of Significance

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Does the project:				
a. Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	■	□	□	□
b. Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	■	□	□	□
c. Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	■	□	□	□

a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

The project site contains Coastal Sage Scrub and Cooper's Hawk and California gnatcatchers have been observed to occur on-site. Therefore, implementation of this project would have potentially significant impacts on sensitive biological species. In addition, there is potential for the project to encounter and adversely affect cultural and tribal cultural resources during ground disturbing activities. Since there is the potential to impact wildlife and important examples of major periods of California history or prehistory, these impacts are potentially significant and will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

As described in the discussion of Environmental Checklist Sections 1 through 20, the proposed project has potentially significant impacts requiring further analysis in an EIR for the following environmental issues: biological resources, cultural resources, noise, and tribal cultural resources. Therefore, the potential cumulative impacts of these environmental issues may also be potentially significant and will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

In general, impacts to human beings are related to air quality, geology and soils, hazards and hazardous materials, noise, and traffic. As detailed in the environmental checklist portion of this Initial Study, the project would not have a significant impact on air quality, geology and soils, hazards and hazardous materials, or traffic. The project would have potential impacts to noise and, therefore, would have the potential to cause substantial adverse effects, directly or indirectly, on human beings. Therefore, this issue is potentially significant and will be further addressed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

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List of Preparers

Rincon Consultants, Inc. prepared this Initial Study under contract to the City of San Marcos. Persons involved in data gathering analysis, project management, and quality control are listed below.

RINCON CONSULTANTS, INC.

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Sally Schifman, Project Manager
Ryan Russell, MCRP, Associate Planner
Lynette Leighton, MEM, Associate Planner
Matthew Anderson, Associate Planner

Appendix B

Project Plans

OPEN SPACE

PRIVATE		
PLAN 1	37 X 55 S.F.	2,035 S.F.
PLAN 2	17 X 50 S.F.	850 S.F.
PLAN 3	13 X 310 S.F.	4,030 S.F.
SUBTOTAL		6,915 S.F.

COMMON	
GRADES LESS THAN 10%	33,889 S.F.
GRADES MORE THAN 10%	37,545 S.F.
SUBTOTAL	71,434 S.F.
TOTAL	78,349 S.F.

PROJECT SUMMARY

3 STORY TOWNHOMES & MIXED USE

RESIDENCES PROPOSED	67 HOMES
SITE AREA	3.71 ACRES
DENSITY	18.0 DU/AC
APN	220-210-50

UNIT MIX

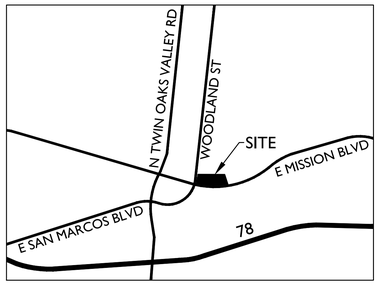
37	PLAN 1	2BD/2.5BA	1,104 SF
17	PLAN 2	3BD/2.5BA	1,339 SF
13	PLAN 3	3BD/3.5BA	1,646 SF
67	TOTAL HOMES		

PARKING REQUIRED

67 DU X 2.33 SP/DU =157 SPACES

PARKING PROVIDED

GARAGES	=134 SPACES
OPEN	=26 SPACES
TOTAL PROPOSED	=160 SPACES (2.38 SP/DU)



VICINITY MAP - NOT TO SCALE

SAN MARCOS, CA

MISSION 316 WEST

SITE PLAN

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

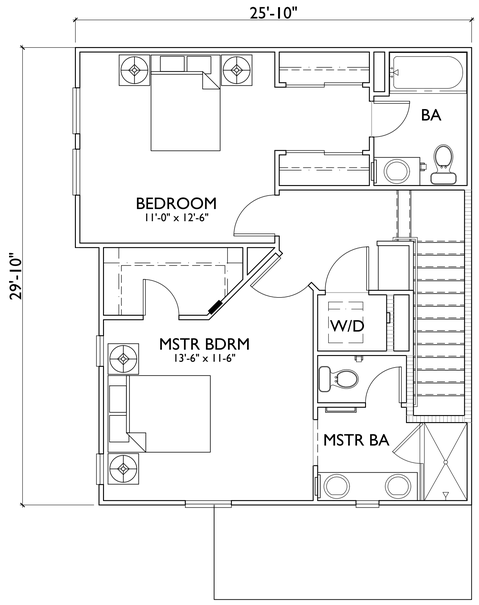
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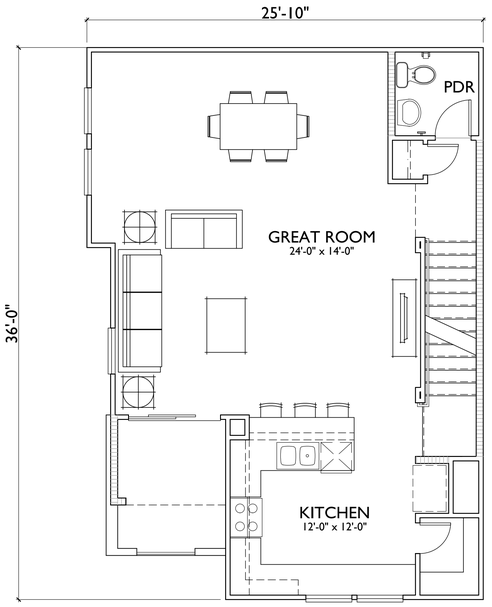
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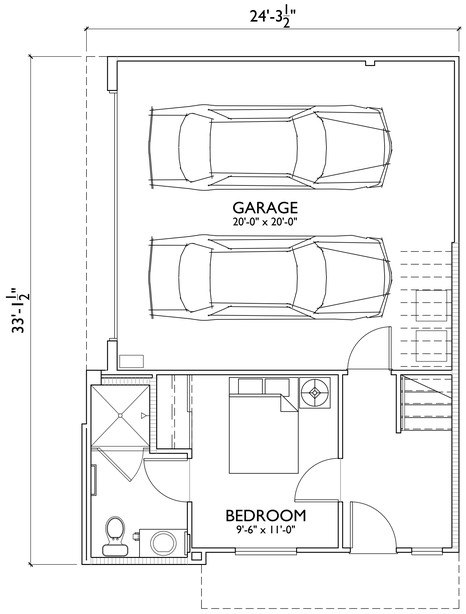
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SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

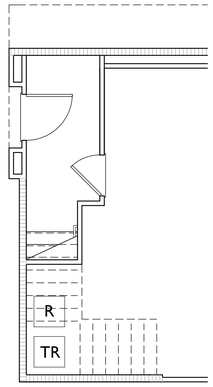
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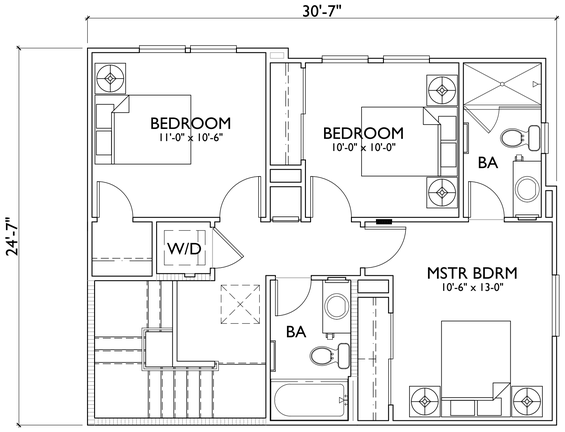


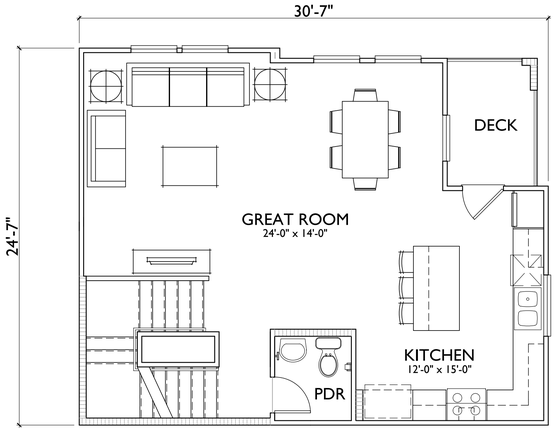


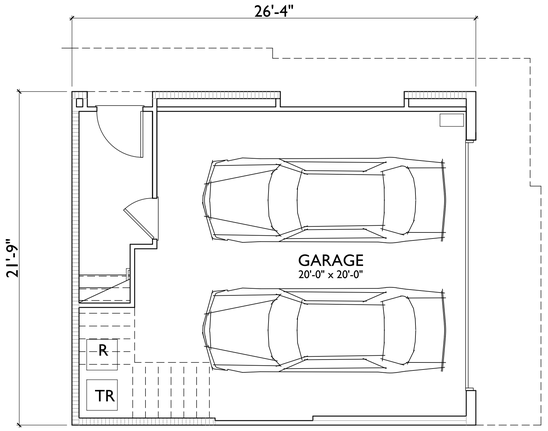
PLAN 3:	3BD/3.5BA
1ST FLR -	267 S.F.
2ND FLR-	740 S.F.
3RD FLR-	639 S.F.
TOTAL	1,646 S.F.
DECK	60 S.F.



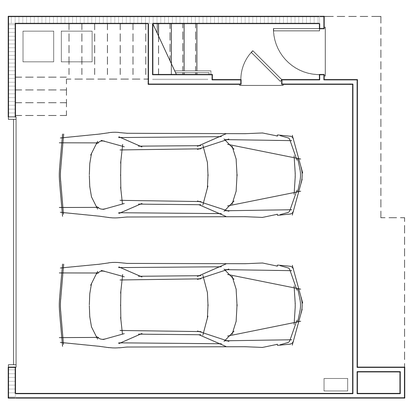
PLAN 2 ALTERNATE ENTRY



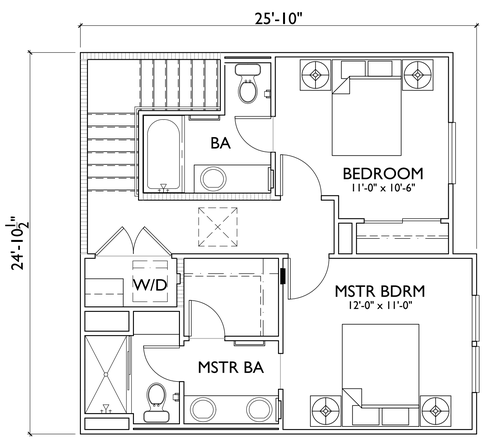




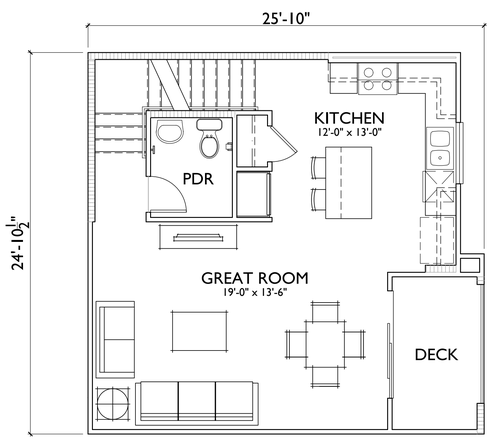
PLAN 2:	3BD/2.5BA
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2ND FLR-	654 S.F.
3RD FLR-	631 S.F.
TOTAL	1,339 S.F.
DECK	50 S.F.



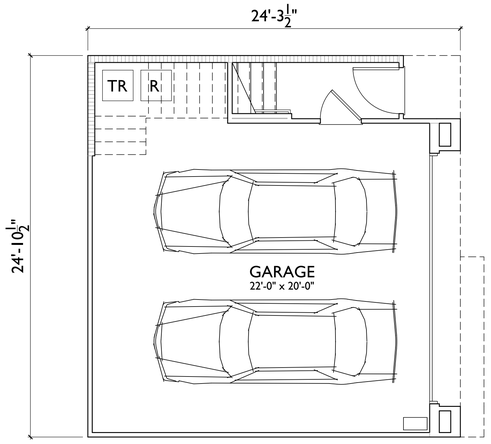
PLAN 1 ALTERNATE ENTRY



THIRD FLOOR



SECOND FLOOR



FIRST FLOOR

PLAN 1:	2BD/2.5BA
1ST FLR -	39 S.F.
2ND FLR-	523 S.F.
3RD FLR-	542 S.F.
TOTAL	1,104 S.F.
DECK	55 S.F.

SAN MARCOS, CA

MISSION 316 WEST

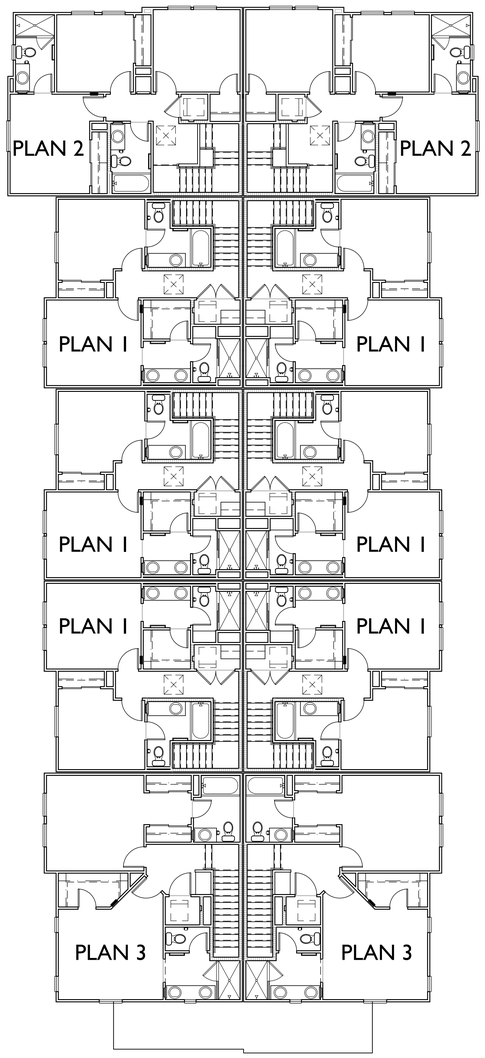
UNIT PLANS

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

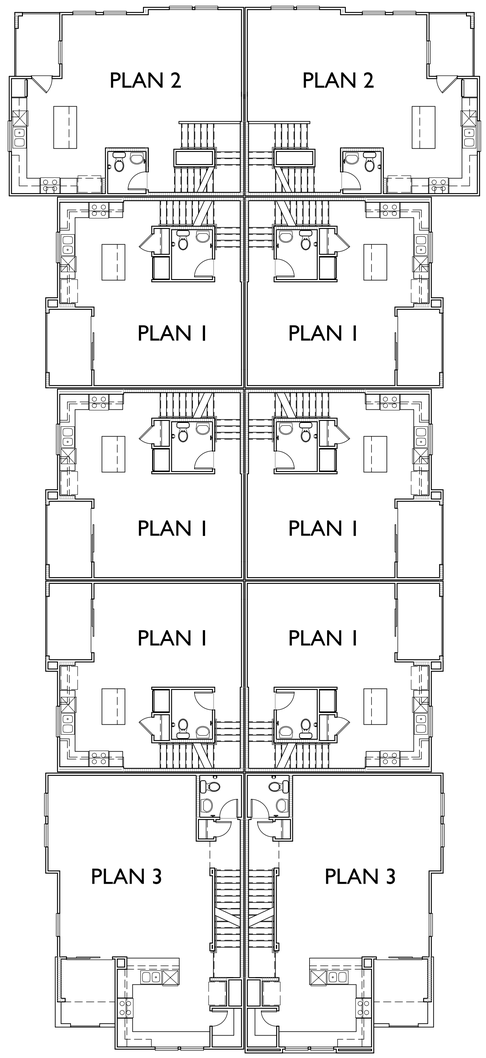
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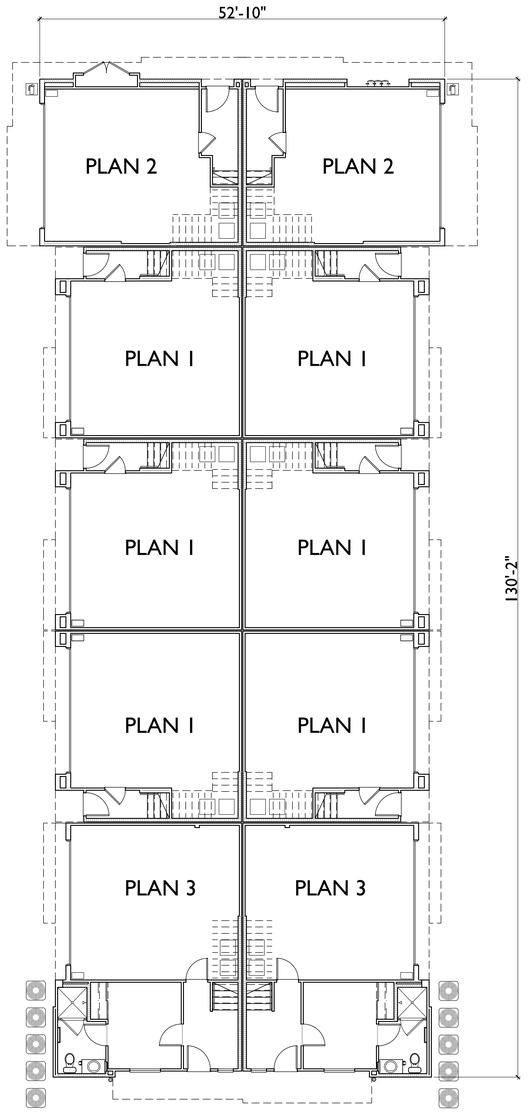
SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198



THIRD FLOOR



SECOND FLOOR



FIRST FLOOR

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

MAY 23, 2019

SCALE: 0 8 16 24

BUILDING A COMPOSITE

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

A-2



RIGHT



REAR



LEFT



(MISSION RD) FRONT



PERSPECTIVE

MATERIAL SCHEDULE

1	ROOF - CONCRETE FLAT TILE
2	FASCIA - 2 X 6 RESAWN WOOD
3	WALL - STUCCO
4	WALL - LAP SIDING
5	WALL - STONE VENEER
6	TRIM - 2 X STUCCO OVER
7	RAILING - DECORATIVE WOOD
8	DECORATIVE - WOOD SHUTTERS
9	DECORATIVE - OUTLOOKERS
10	DECORATIVE - CORBEL
11	SECTIONAL GARAGE DOOR
12	EXTERIOR LIGHT FIXTURE



PERSPECTIVE

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

MAY 23, 2019

SCALE: 0 8 16 24

BUILDING A ELEVATION 'A'

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

A-3



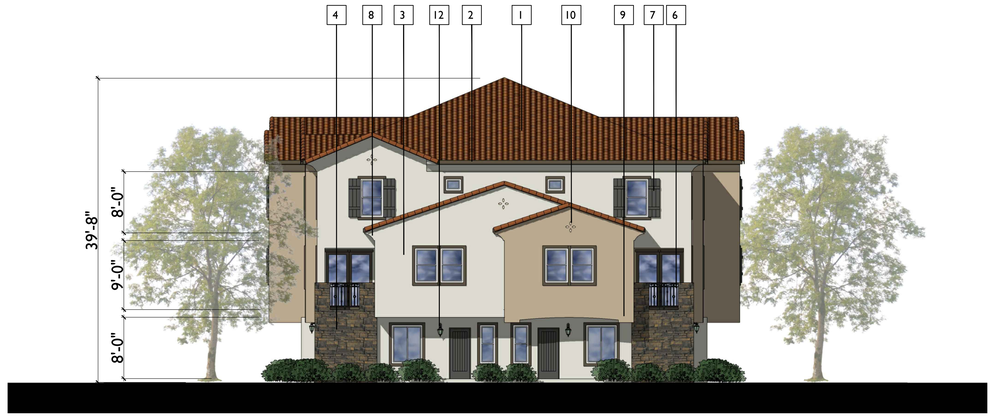
RIGHT



REAR



LEFT



(MISSION RD) FRONT



PERSPECTIVE

MATERIAL SCHEDULE

1	ROOF - CONCRETE 'S' TILE
2	FASCIA - 2 X 6 RESAWN WOOD
3	WALL - STUCCO
4	WALL - STONE VENEER
5	TRIM - 2 X STUCCO OVER
6	RAILING - DECORATIVE METAL
7	DECORATIVE - WOOD SHUTTERS
8	DECORATIVE - FOAM EAVE
9	DECORATIVE - CORBEL
10	DECORATIVE - GABLE END
11	SECTIONAL GARAGE DOOR
12	EXTERIOR LIGHT FIXTURE



PERSPECTIVE

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

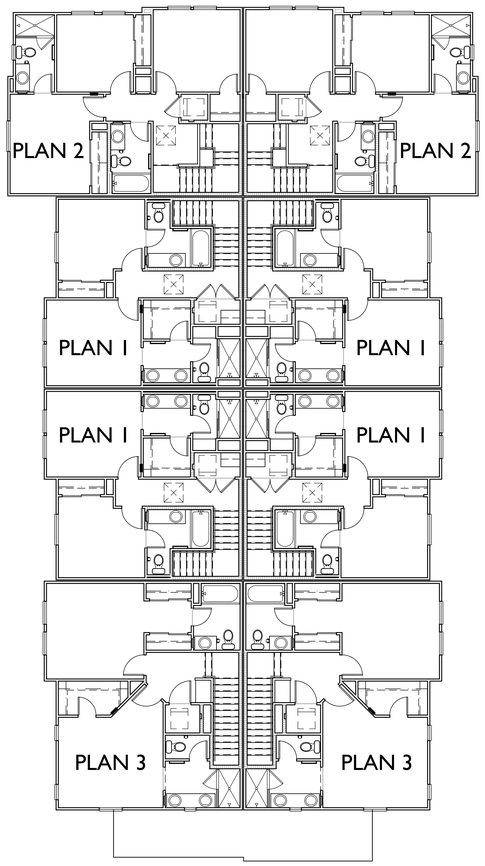
MAY 23, 2019

SCALE: 0 8 16 24

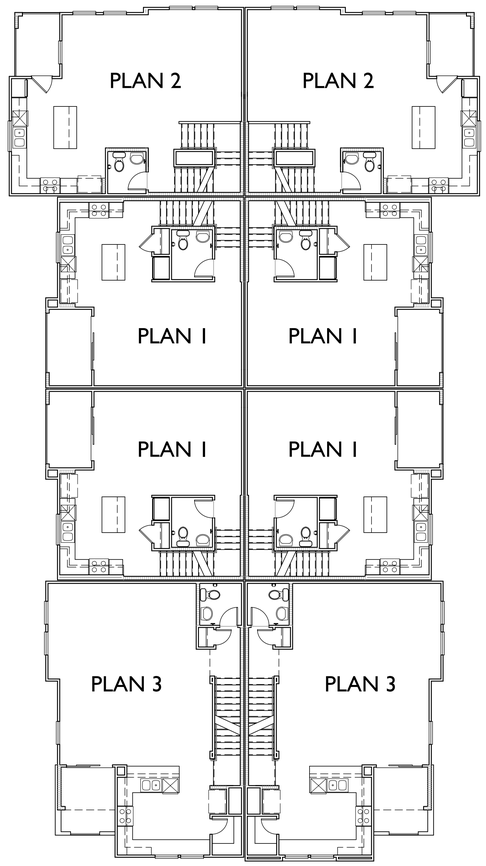
BUILDING A ELEVATION 'B'

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

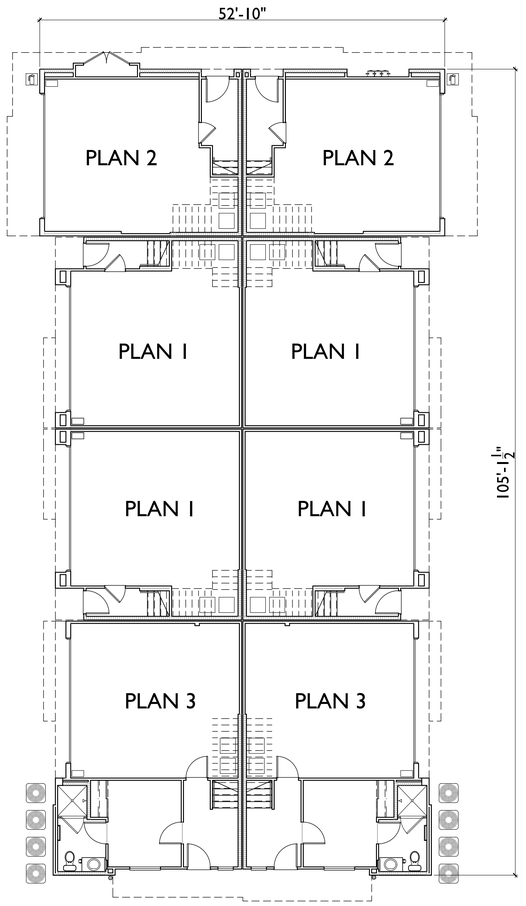
A-4



THIRD FLOOR



SECOND FLOOR



FIRST FLOOR

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

MAY 23, 2019

SCALE: 0 8 16 24

BUILDING B COMPOSITE

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

A-5



RIGHT



REAR



LEFT



(MISSION RD) FRONT



PERSPECTIVE

MATERIAL SCHEDULE

1	ROOF - CONCRETE FLAT TILE
2	FASCIA - 2 X 6 RESAWN WOOD
3	WALL - STUCCO
4	WALL - LAP SIDING
5	WALL - STONE VENEER
6	TRIM - 2 X STUCCO OVER
7	RAILING - DECORATIVE WOOD
8	DECORATIVE - WOOD SHUTTERS
9	DECORATIVE - OUTLOOKERS
10	DECORATIVE - CORBEL
11	SECTIONAL GARAGE DOOR
12	EXTERIOR LIGHT FIXTURE



PERSPECTIVE

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

MAY 23, 2019

SCALE: 0 8 16 24

BUILDING B ELEVATION 'A'

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

A-6



RIGHT



REAR



LEFT



(MISSION RD) FRONT



PERSPECTIVE

MATERIAL SCHEDULE

1	ROOF - CONCRETE 'S' TILE
2	FASCIA - 2 X 6 RESAWN WOOD
3	WALL - STUCCO
4	WALL - STONE VENEER
5	TRIM - 2 X STUCCO OVER
6	RAILING - DECORATIVE METAL
7	DECORATIVE - WOOD SHUTTERS
8	DECORATIVE - FOAM EAVE
9	DECORATIVE - CORBEL
10	DECORATIVE - GABLE END
11	SECTIONAL GARAGE DOOR
12	EXTERIOR LIGHT FIXTURE



PERSPECTIVE

SAN MARCOS, CA

MISSION 316 WEST

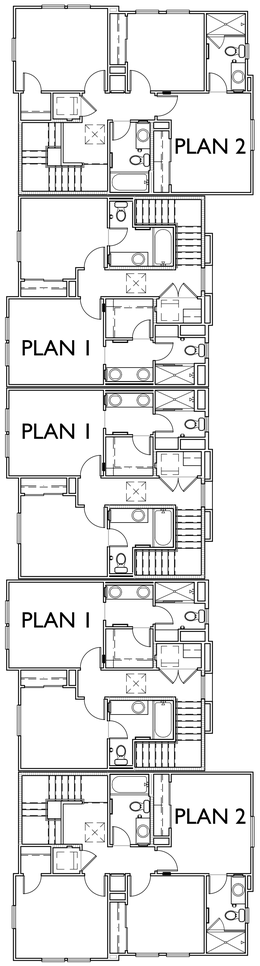
BUILDING B ELEVATION 'B'

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

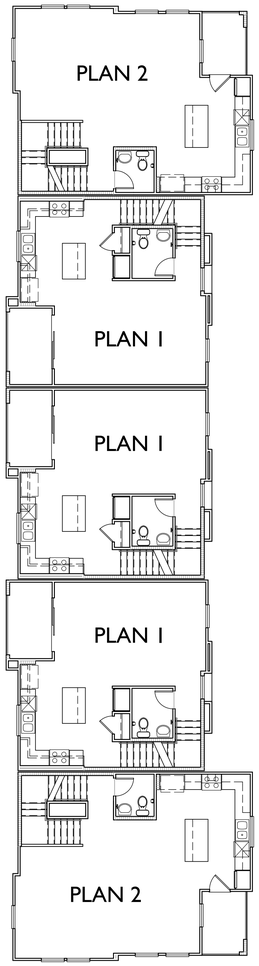
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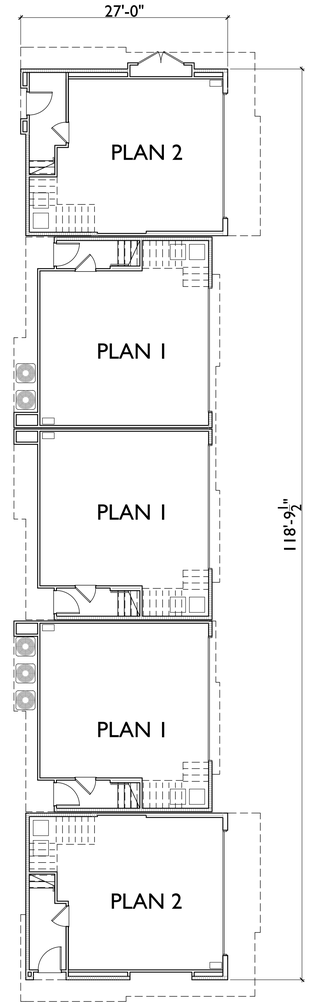
SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198



THIRD FLOOR



SECOND FLOOR



FIRST FLOOR

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

MAY 23, 2019

SCALE: 0 8 16 24

BUILDING C COMPOSITE

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

A-8



RIGHT



REAR



(WOODWARD ST) LEFT



(MISSION RD) FRONT



PERSPECTIVE

MATERIAL SCHEDULE

1	ROOF - CONCRETE 'S' TILE
2	FASCIA - 2 X 6 RESAWN WOOD
3	WALL - STUCCO
4	WALL - BRICK VENEER
5	TRIM - 2 X STUCCO OVER
6	RAILING - DECORATIVE METAL
7	DECORATIVE - WOOD SHUTTERS
8	DECORATIVE - RAFTER TAILS
9	SECTIONAL GARAGE DOOR
10	EXTERIOR LIGHT FIXTURE
11	DECORATIVE POTSHELF
12	DECORATIVE METAL GRILLE



PERSPECTIVE

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

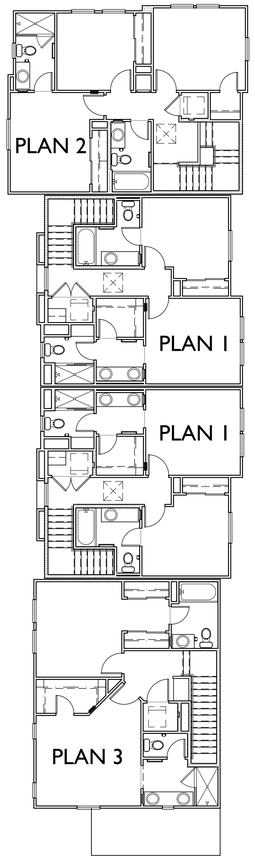
MISSION 316 WEST

MAY 23, 2019

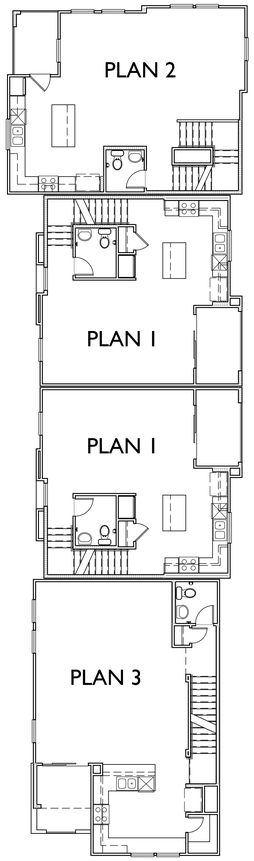
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BUILDING C ELEVATION

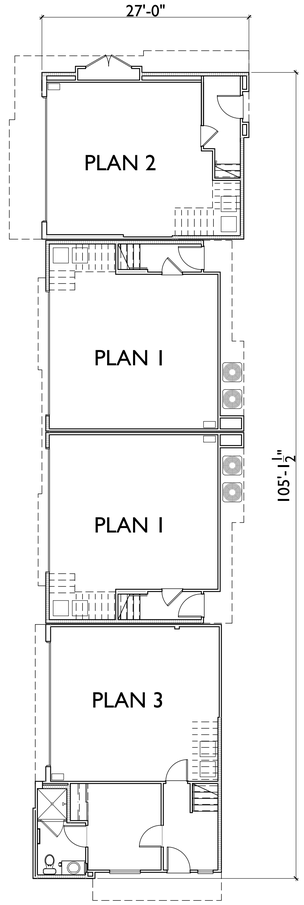
SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198



THIRD FLOOR



SECOND FLOOR



FIRST FLOOR

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

MAY 23, 2019

SCALE: 0 8 16 24

BUILDING D COMPOSITE

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

A-10



RIGHT



REAR



LEFT



(MISSION RD) FRONT



PERSPECTIVE

MATERIAL SCHEDULE

1	ROOF - CONCRETE 'S' TILE
2	FASCIA - 2 X 6 RESAWN WOOD
3	WALL - STUCCO
4	WALL - BRICK VENEER
5	TRIM - 2 X STUCCO OVER
6	RAILING - DECORATIVE METAL
7	DECORATIVE - WOOD SHUTTERS
8	DECORATIVE - RAFTER TAILS
9	SECTIONAL GARAGE DOOR
10	EXTERIOR LIGHT FIXTURE
11	DECORATIVE POTSHELF
12	DECORATIVE METAL GRILLE



PERSPECTIVE

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

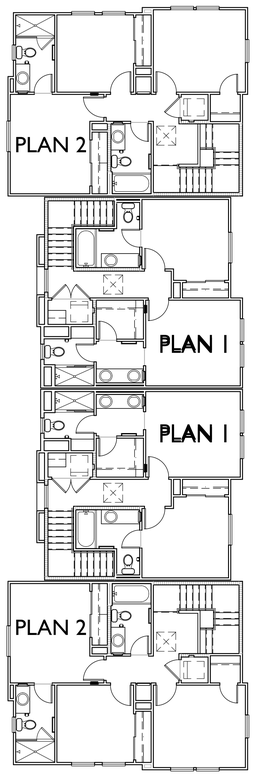
MAY 23, 2019

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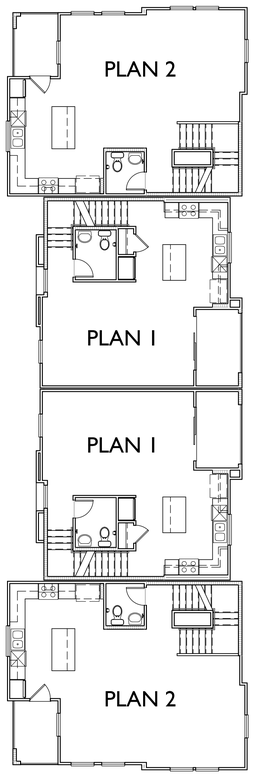
BUILDING D ELEVATION

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

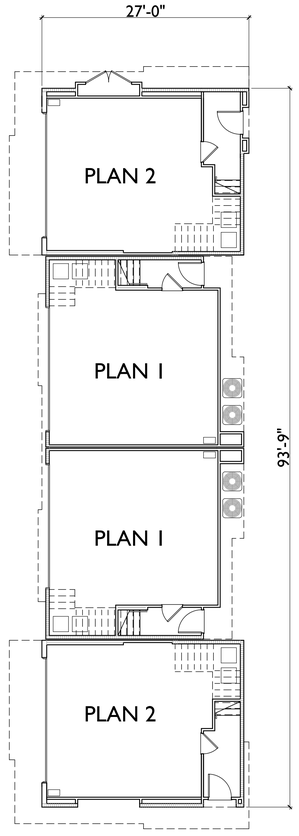
A-11



THIRD FLOOR



SECOND FLOOR



FIRST FLOOR

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

MAY 23, 2019

SCALE: 0 8 16 24

BUILDING E COMPOSITE

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198



RIGHT



REAR



LEFT



(MISSION RD) FRONT



PERSPECTIVE

MATERIAL SCHEDULE

1	ROOF - CONCRETE 'S' TILE
2	FASCIA - 2 X 6 RESAWN WOOD
3	WALL - STUCCO
4	WALL - BRICK VENEER
5	TRIM - 2 X STUCCO OVER
6	RAILING - DECORATIVE METAL
7	DECORATIVE - WOOD SHUTTERS
8	DECORATIVE - RAFTER TAILS
9	SECTIONAL GARAGE DOOR
10	EXTERIOR LIGHT FIXTURE
11	DECORATIVE POTSHELF
12	DECORATIVE METAL GRILLE



PERSPECTIVE

SAN MARCOS, CA

KB HOME
9915 MIRA MESA BLVD. STE 100
SAN DIEGO, CA 92131

MISSION 316 WEST

MAY 23, 2019

SCALE: 0 8 16 24

BUILDING E ELEVATION

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

Appendix C

Biological Resources Assessment



Mission 316 West

Biological Resources Assessment

prepared by

City of San Marcos
Planning Division
1 Civic Center Drive
San Marcos, California 92069
Contact: Joseph Farace, Principal Planner

prepared with the assistance of

Rincon Consultants, Inc.
2215 Faraday Avenue, Suite A
Carlsbad, California 92008

August 2019

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

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1 Introduction

This report provides information pertaining to the existing biological resources observed by Rincon Consultants Inc. (Rincon) for the Mission 316 West Project (project) located within the City of San Marcos (City). The purpose of this report is to document the existing conditions of the project area and to evaluate the potential for impacts to biological resources, facilitating the City's environmental review of the project.

1.1 Project Location

The project area is located in the City of San Marcos in northern San Diego County. The approximately 4.02-acre project area is identified as Assessor Parcel Number (APN) 220-210-50 and is located at 260 East Mission Road on the northeast corner of Woodward Street and East Mission Avenue, as seen in Figure 1. The project area can be found on the U.S. Geologic Survey (USGS) 7.5-minute topographic quadrangle *San Marcos, California*, as seen in Figure 2.

1.2 Project Description

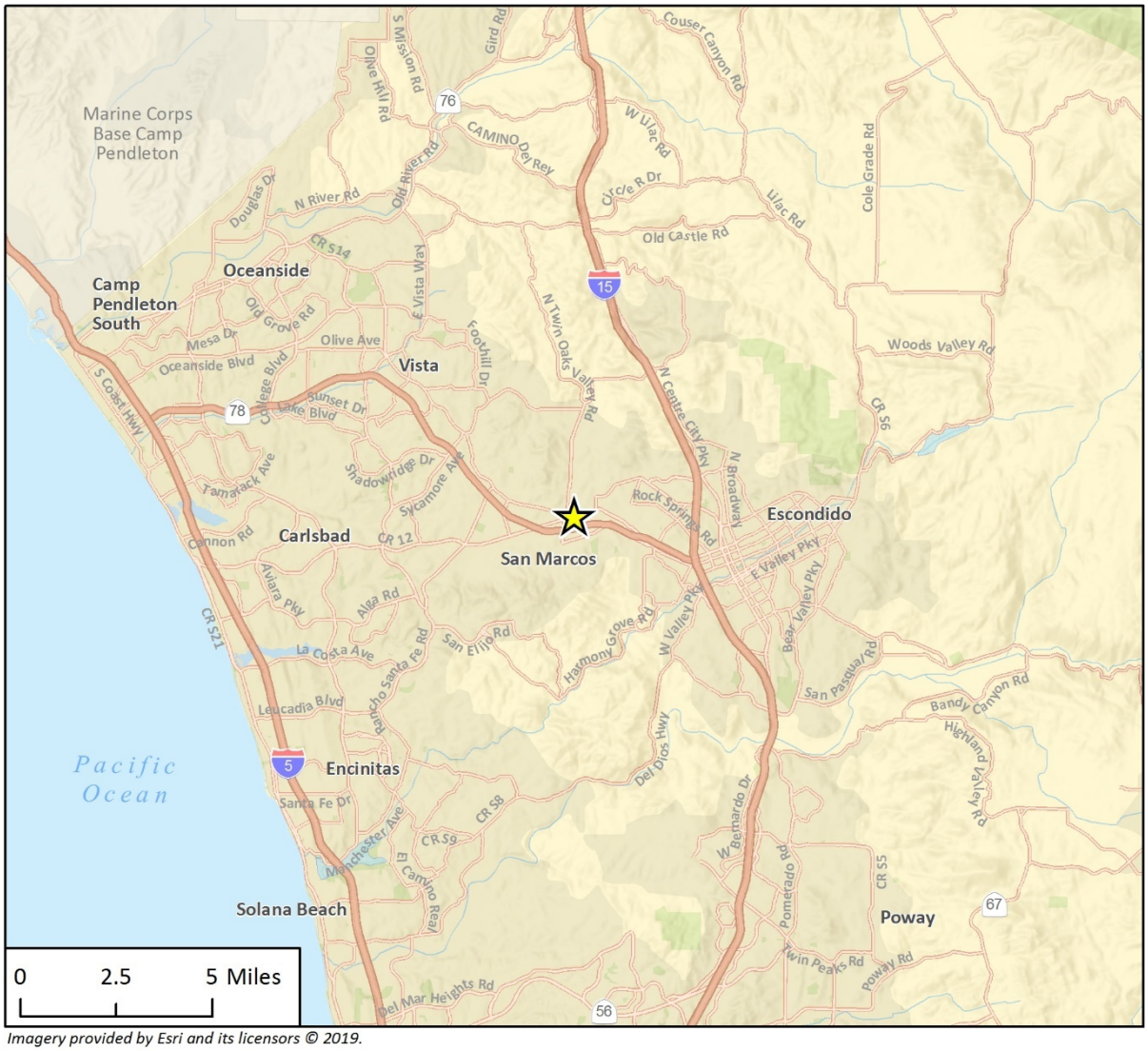
The project entails development of 3.7 acres that includes 67 two-and three-bedroom units of multi-family housing plus fuel modification performed to reduce wildfire hazards, for a total project area of 4.02 acres. In this report, the project site is the 3.7-acre development area and the project area is the 3.7-acre development area and the fuel modification zone.

Rincon is currently preparing a focused environmental impact report (EIR) for the project that is expected to be completed in summer 2019, with construction anticipated to begin in the fall of 2020. The project area contains steep slopes which will require extensive grading. Earthwork quantities would include approximately 25,200 cubic yards of cut material, 13,400 cubic yards of fill material, and 11,800 cubic yards of export material.

1.3 Surrounding Land Uses and Setting

The project area is surrounded by a mix of land uses and sits across East Mission Avenue from the Inland Rail Line, as seen in Figure 3. To the east of the project are multi-family residential units, and single-family residences are located northeast of the project area. The City of San Marcos Civic Center is located to the south of the project area, and includes the public library, the Veteran's Center, and City Hall. Open spaces supporting natural vegetation communities are found to the north and across Woodward Street to the west and northwest.

Figure 1 Regional Project Location



Imagery provided by Esri and its licensors © 2019.

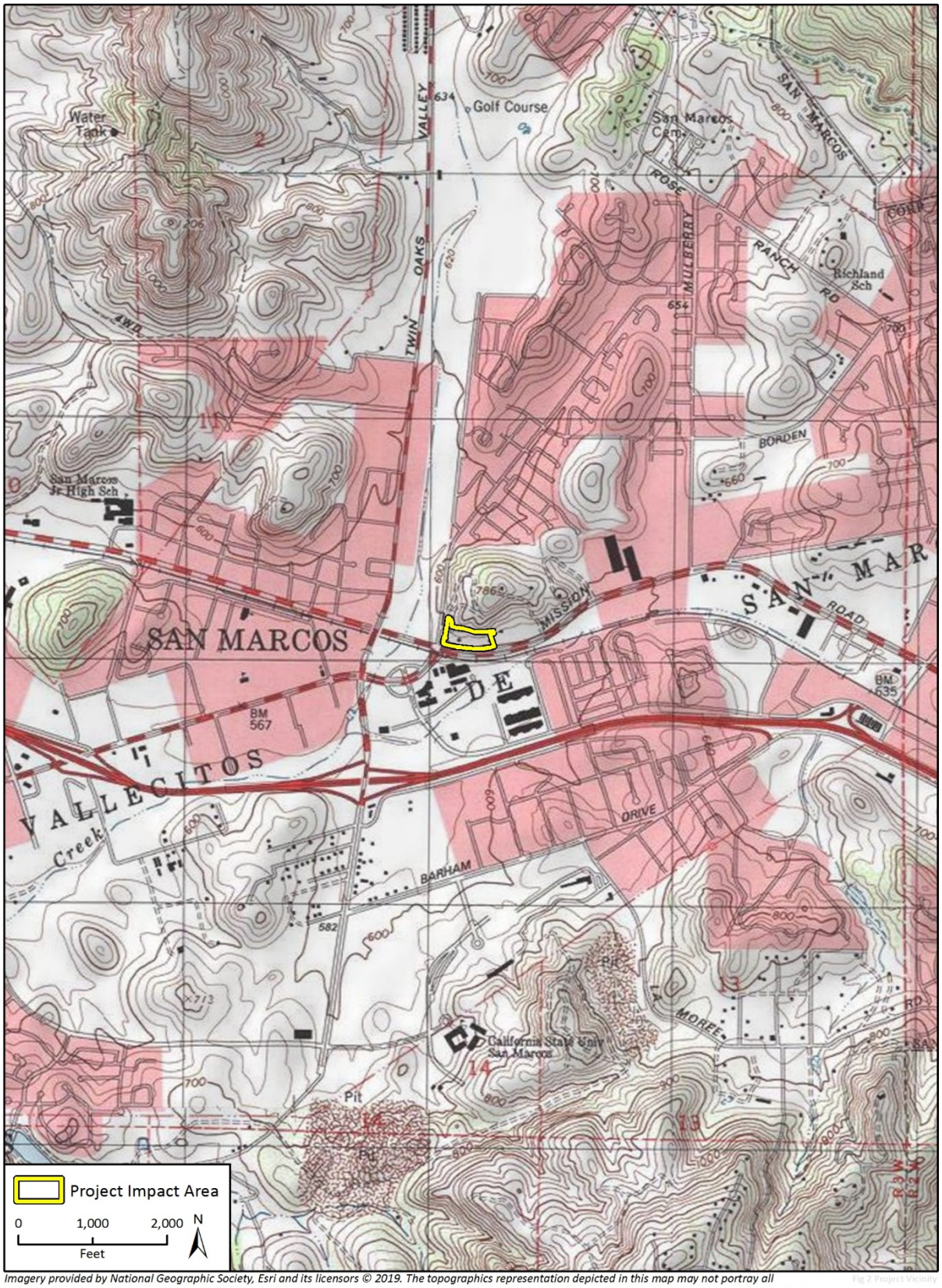
Project Impact Area

N



BRAFig 1 Regional Location

Figure 2 Project Location Map



Imagery provided by National Geographic Society, Esri and its licensors © 2019. The topographics representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographics map was assembled.

Fig 2 Project Vicinity

Figure 3 Project Area Overview



Imagery provided by Google and its licensors © 2019.

BRAFig 2 Project Location

2 Regulatory Overview

Regulated or sensitive resources studied and analyzed herein include special status plant and animal species, nesting birds and raptors, sensitive plant communities, jurisdictional waters and wetlands, wildlife movement, and locally protected resources, such as protected trees.

2.1 Federal and State Environmental Statutes

For the purpose of this report, the following statutes are applicable (expanded upon in Appendix A):

- **California Environmental Quality Act (CEQA).** Requires environmental review prior to approval of discretionary projects, and requires significant impacts to be mitigated if feasible.
- **Federal Endangered Species Act (FESA).** Prohibits the unauthorized take of federally-listed threatened and endangered species.
- **California Endangered Species Act (CESA).** Prohibits the unauthorized take of State-listed threatened and endangered species.
- **California Fish and Game Code (CFGC) Sections 1600 *et seq*.** These sections of the CFGC set forth the Lake/ Streambed Alteration Agreement program, through which the California Department of Fish and Wildlife (CDFW) regulates activities that would divert, obstruct, or alter streambeds.
- **CFGC Section 3503.** The California Fish and Game Code (CFGC) provides similar protection to that afforded by the federal Migratory Bird Treaty Act (Sections 3503 and 3513) and extends additional protection to any birds in the orders Falconiformes and Strigiformes (raptors or birds-of-prey) (CFGC Section 3503.5). It is anticipated that the project will comply with these CFGC sections.
- **Migratory Bird Treaty Act (MBTA).** Under the provisions of the Migratory Bird Treaty Act of 1918 (MBTA), it is unlawful "by any means or manner to pursue, hunt, take, capture (or) kill" any migratory birds except as permitted by regulations issued by the U.S. Fish and Wildlife Service (USFWS). The term "take" is defined by the USFWS regulation to mean to "pursue, hunt, shoot, wound, kill, trap, capture or collect" any migratory bird or any part, nest, or egg of any migratory bird covered by the conventions, or to attempt those activities. It is anticipated that the project will comply with the provisions of the MBTA.
- **Clean Water Act (CWA) and Porter-Cologne Water Quality Control Act.** These laws prohibit unauthorized discharges of pollutants, including fill material for construction, into jurisdictional waters of the United States and waters of the State.

2.2 Guidelines for Determining CEQA Significance

The following threshold criteria, as defined by the CEQA Guidelines Appendix G Initial Study Checklist, were used to evaluate potential environmental effects. Based on these criteria, the proposed project would have a significant effect on biological resources if it would:

a) Have substantial adverse effects, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service.

c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

2.3 Local Regulations

2.3.1 Multiple Habitat Conservation Program

The Multiple Habitat Conservation Program (MHCP) is a comprehensive conservation planning process that addresses the needs of multiple plant and animal species in North Western San Diego County. The MHCP encompasses the cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista. Its goal is to conserve approximately 19,000 acres of habitat, of which roughly 8,800 acres (46 percent) are already in public ownership and contribute toward the habitat preserve system for the protection of rare, threatened, or endangered species (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b).

The MHCP Subregional Plan and Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR) were adopted and certified by the SANDAG Board of Directors on March 28, 2003. A Subarea Plan for the City of San Marcos has been prepared, but it must be adopted by the City and implementing agreements with CDFW and USFWS must be signed before incidental take permits can be issued.

Focus Planning Areas

The MHCP identifies a series of Focus Planning Areas (FPA) within which some lands will be dedicated for preservation of native habitats. These areas contain both “hard line” areas, which will be preserved as open space, and “soft line” areas, which will include both development and open space to be determined through the planning process (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b). Several objectives were incorporated into the process of designing the MHCP FPAs:

- Conserve as much of the biologically most important habitat lands remaining in the subregion as possible, in a system that minimizes preserve fragmentation. ·
- Maximize the inclusion of public lands within the preserve. ·
- Maximize the inclusion of lands already conserved as open space, where appropriate. ·

- Maintain individual property rights and economic viability for the subregion (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b).

Biological Core and Linkage Areas

The MHCP identifies Biological Core and Linkage Areas (BCLAs) as those areas determined biologically valuable for inclusion in the regional preserve system (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b). BCLAs were designed to conserve sensitive species and corridors between areas of high-quality habitat and to provide avenues for wildlife movement between these areas.

Covered Species

A Covered Species is a species for which take authorization would be provided under the MHCP because long-term viability was determined to be adequately maintained under a particular preserve system design. The federal action addressed in the MHCP is the issuance of incidental take permits for all species on the Covered Species list whether they currently are listed or are to be listed in the future. The MHCP Covered Species include 20 plant species and 30 wildlife species.

City of San Marcos Subarea Habitat Conservation Plan/Natural Communities Conservation Plan

The City of San Marcos Draft Subarea Habitat Conservation Plan/Natural Communities Conservation Plan (hereafter, Draft Subarea Plan) comprehensively addresses how the City will conserve natural biotic communities and sensitive plant and wildlife species. The Draft Subarea Plan has been prepared in response to direction from the USFWS and the CDFW to meet the applicable requirements of the Federal and state Endangered Species Acts and the Natural Communities Conservation Planning Act of 1992. The City's Draft Subarea Plan is not formally approved and adopted, so all projects are required to obtain applicable permits for impacts to listed species as per Section 4D (for coastal sage impacts, through the I122 process), 10(a) or Section 7 of the federal Endangered Species Act. Also, because the City does not have an approved Subarea Plan, the mitigation requirements for impacts to the biological resources are based on ratios provided by the approved MHCP (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b). Although the Draft Subarea Plan has not yet been approved, the plan has been used by the City as a guide for open space design and preservation.

2.3.2 City of San Marcos General Plan

The Conservation and Open Space Element of the 2013 San Marcos General Plan contains several policies pertaining to the protection of biological resources (City of San Marcos 2013). The following goals and policies apply to the project:

- **Goal COS-1:** Identify, protect, and enhance significant ecological and biological resources within San Marcos and its adaptive Sphere of Influence.
  - **Policy COS-1.1:** Support the protection of biological resources through the establishment, restoration, and conservation of high-quality habitat areas.
  - **Policy COS-1.2:** Ensure that new development, including Capital Improvement Projects, maintain the biotic habitat value of riparian areas, oak woodlands, habitat linkages, and other sensitive biological habitats.

- **Goal COS-2:** The City is committed to conserving, protecting, and maintaining open space, agricultural, and limited resources for future generations. By working with property owners, local organizations, and state and federal agencies, the City can limit the conversion of resource lands to urban uses.
  - **Policy COS-2.1:** Provide and protect open space areas throughout the City for its recreational, agricultural, safety, and environmental value.
  - **Policy COS-2.2:** Limit, to the extent feasible, the conversion of open space to urban uses and place a high priority on acquiring and preserving open space lands for recreation, habitat protection and enhancement, flood hazard management, water and agricultural resources protection, and overall community benefit.
  - **Policy COS-2.6:** Preserve healthy mature trees where feasible; where removal is necessary, trees shall be replaced at a ratio of 1:1.

3 Methodology

Biological conditions within the project area were evaluated by confirming applicable biological regulations, policies, and standards; reviewing biological literature and querying available databases pertinent to the project area and vicinity; and conducting a reconnaissance-level biological survey of the project area. The methods employed are described in detail below. The findings and opinions conveyed in this report are based on this methodology; therefore, all quantitative impact assumptions are estimates.

3.1 Background Research

Prior to the field survey, Rincon conducted background research to better characterize the nature and extent of biological resources on and adjacent to the project area. The research included the following:

- Current and historical aerial photographs of the project area (Google 2018, Nationwide Environmental Title Research 2018);
- Current and historic topographic maps of *San Marcos, California* USGS 7.5-minute topographic quadrangle (USGS 2017, Nationwide Environmental Title Research 2018);
- Natural Resources Conservation Service's (NRCS) *Web Soil Survey* for soils mapped in the region (NRCS 2018).
- National Wetlands Inventory (NWI) wetlands mapper (USFWS 2018a);
- National Hydrography Dataset (USGS 2018b);
- USFWS Critical Habitat Portal (USFWS 2018b);
- USFWS's *Information for Planning and Consultation* online project planning tool (USFWS 2018b);
- CDFW's *California Natural Diversity Data Base* (CNDDB) was queried for special status plant and wildlife species in the project region, defined as the *San Marcos, California* USGS 7.5-minute topographic quadrangle and surrounding eight quadrangles (CDFW 2018a);
- California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Plants of California* (online edition) was queried for special status plant species in the project region, defined as the *San Marcos, California* USGS 7.5-minute topographic quadrangle and surrounding eight quadrangles (CNPS 2018);
- Calflora's *What Grows Here* online application was queried for plant species that have been collected or overserved in the project vicinity (Calflora 2018);
- CDFW's Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2018b) and Special Animal List (CDFW 2018c) were reviewed.
- Multiple Species Conservation Program for the Cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista Volume I and II (County of San Diego, 2009);
- San Diego Association of Governments (SANDAG) *Parcel Lookup Tool* was reviewed to determine areas designated in the MHCP Subarea Plan (SANDAG 2018);
- SanGIS geographic information system data regarding biological resources was reviewed (SanGIS 2018);

- Natural Community Conservation Plan for the City of San Marcos (City of San Marcos 2001);
- The City of San Marcos General Plan (City of San Marcos 2013); and
- Previous biological reports prepared in support of the project (Helix 2015, 2017).

3.2 Reconnaissance Survey

Rincon Senior Biologist Michael Cady conducted a field survey on October 24, 2018 to document the existing conditions of the project area and surrounding area (bounded by East Mission Avenue, Woodward Street, the residential development to the east, and 100 feet into the open space area to the north). All accessible portions of the project area were covered on foot. Inaccessible areas were mapped using binoculars and aerial photography interpretation. Vegetation communities were mapped, and the wildlife and plants observed were noted.

3.2.1 Vegetation Communities

Vegetation classification was based on the classification systems provided in the *Draft Vegetation Communities of San Diego County* (Oberbauer et al. 2008) to provide consistency with the MHCP; and modified as appropriate to reflect the existing site conditions. Where applicable, vegetation communities were further classified using *A Manual of California Vegetation, Second Edition* (Sawyer et al. 2009) to better identify the species composition and provide consistency with CDFW's preference.

3.2.2 Flora

All plant species observed on the property were noted, and plants that could not be identified in the field were identified later using taxonomic keys (Baldwin et al. 2012). The reconnaissance survey included a directed search for special-status plants that would have been apparent at the time of the survey.

3.2.3 Fauna

Animal species observed directly or detected from calls, tracks, scat, nests, or other sign were documented. Zoological nomenclature for birds is in accordance with the California Birds Records Committee (CBRC) *Official California Checklist* (CBRC 2018); for mammals using *Mammals of California* (Wilson and Reeder 2005); and for amphibians and reptiles using Society for the Study of Amphibians and Reptiles' (SSAR) *Checklist of the Standard English & Scientific Names of Amphibians & Reptiles* (SSAR 2017).

3.2.4 Survey Limitations

The survey was conducted outside of the typical blooming period for most of the common and special-status plant species. Additionally, the biological survey was conducted during the fall; therefore, potentially occurring spring migrants and certain breeding birds may not have been observed. As the survey was performed during the day, identification of nocturnal animals was limited to sign if present on site. The potential presence of special-status species is based on a literature review, existing site conditions and a general biological field survey to assess habitat suitability.

3.3 California Gnatcatcher Protocol Survey

The project area supports suitable habitat for coastal California gnatcatcher (CAGN; *Polioptila californica*) and additional habitat is adjacent to the project on the north; therefore, a protocol survey for the species was conducted. The Survey Area included a 500-foot buffer around the 3.7-acre project site that equated to 28 acres. A total of nine surveys were completed by KMEA biologists Monica Alfaro (TE-051242) and Alicia Cooper Hill (06145B) per the recommendation of USFWS staff via electronic correspondence, beginning on August 1, 2018 and finishing on November 1, 2018. All surveys were conducted in accordance with USFWS protocol requirements (USFWS 1997). Pre-recorded coastal California gnatcatcher vocalizations were played throughout the entire project area during the first survey. After the first survey, vocalizations were only played in areas where gnatcatcher had not been detected. All surveys were conducted in the morning between 0600 and 1200, when gnatcatchers are most active. Surveys were not conducted during inclement weather such as extreme hot or cold temperatures, fog, high winds, or rain.

3.4 Special Status Biological Resources Assessments

Local, state, and federal agencies regulate special status species and other sensitive biological resources and may require an assessment of their presence or potential presence to be conducted prior to the approval of proposed development on a property. This section discusses sensitive biological resources observed on the project area and evaluates the potential for the project area to support additional sensitive biological resources. Assessments for the potential occurrence of special status species are based upon known ranges, habitat preferences for the species, species occurrence records from the CNDDB, species occurrence records from other sites in the vicinity of the Survey Area, previous reports for the project area, and the results of surveys of the project area. The potential for each special status species to occur in the project area was evaluated according to the following criteria:

- **No Potential.** Habitat on and adjacent to the project area is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, project area history, disturbance regime); for plants, the species has no recorded occurrences within 10 miles of the project area indicating that the project area may be outside of the range of the species (e.g. the species is known from Coastal Sage Scrub, but only along the coastal margin); or, the species is conspicuous and would have certainly been identified on site if present (e.g., oak trees). Protocol surveys (if conducted) did not detect species.
- **Low Potential.** The species is not likely to be found on the project area. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the project area is unsuitable or of very poor quality, and/or there are no recent records of the species within five miles of the project.
- **Moderate Potential**. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the project area is unsuitable. The species has a moderate probability of being found on the project area.
- **High Potential.** All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the project area is highly suitable. The species has a high probability of being found on the project area.
- **Present.** Species is observed on the project area or has been recorded (e.g., CNDDB, other reports) on the project area recently (within the last 5 years).

For the purpose of this report, special-status species are those plants and animals listed, proposed for listing, or candidates for listing as Threatened or Endangered by the USFWS under the ESA; those listed as Threatened, Endangered, or Rare by the CDFW under CESA or the Native Plant Protection Act; those designated as Fully Protected species by the State; those recognized as Species of Special Concern (SSC) by the CDFW; Covered Species identified in the MHCP; and regulations and plants occurring on lists 1 and 2 of the CNPS California Rare Plant Rank (CRPR) system per the following definitions:

- **CRPR 1A** = Plants presumed extirpated in California and either rare or extinct elsewhere;
- **CRPR 1B** = Plants rare, threatened, or endangered in California and elsewhere;
- **CRPR 2A** = Plants presumed extirpated in California but common elsewhere;
- **CRPR 2B** = Plants rare, threatened, or endangered in California but more common elsewhere;

Additionally, CNPS assigns the following threat codes:

- 0.1 - Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat);
- 0.2 – Moderately threatened in California (20-80% occurrences threatened/moderate degree and immediacy of threat); and
- 0.3 - Not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known).

In addition, special-status species and vegetation communities are ranked globally (G) and subnationally (S) 1 through 5 based on NatureServe's (2010) methodologies:

- **G1 or S1:** Critically Imperiled Globally or Subnationally (state)
- **G2 or S2:** Imperiled Globally or Subnationally (state)
- **G3 or S3:** Vulnerable to extirpation or extinction Globally or Subnationally (state)
- **G5 or S5:** Secure Globally or Subnationally (state)
- **?:** Inexact Numeric Rank
- **T:** Infraspecific Taxon (subspecies, varieties, and other designations below the level of species)
- **Q:** Questionable taxonomy that may reduce conservation priority

4 Existing Conditions

The following describes the conditions of the project area based upon the background research and observations recorded during the field survey. Representative photos of the project area can be found in Appendix B.

4.1 Topography and Soils

The northern portion of the project area is very rugged, with a steep hillside, sloping down towards a relatively flat area adjacent to East Mission Avenue. Elevation ranges from 585 feet above mean sea level (AMSL) at the southern boundary of the project area to 685 feet in central portion of the northern boundary. No drainages occur on the project area. Three soil types have been identified on the project area, as shown mapped in Figure 4: Cieneba rocky coarse sandy loam, 9 to 30 percent slopes, eroded; Placentia sandy loam, 2 to 9 percent slopes; and Huerhuero loam, 2 to 9 percent slopes. The following are the official soils series descriptions for each soil series (NRCS 2018b).

4.1.1 Cieneba Series

Cieneba rocky coarse sandy loam, 90 to 30 percent slopes, is the most common soil type that has been mapped on the project area and it is found on the majority of the slopes on the project area and in the middle of the relatively flat southern portion. The Cieneba series consists of very shallow and shallow, somewhat excessively drained soils that formed in material weathered from granitic rock. The soils have low to high runoff, with moderately rapid permeability in the soil and much slower in the weathered bedrock. Associated vegetation is typically chaparral, with widely spread foothill pine (*Pinus sabiniana*) or oak (*Quercus* spp.) tree; however, that type of vegetation is not found on the project area or adjacent open space areas. Rock outcrops cover approximately 10% of the surface within the project area.

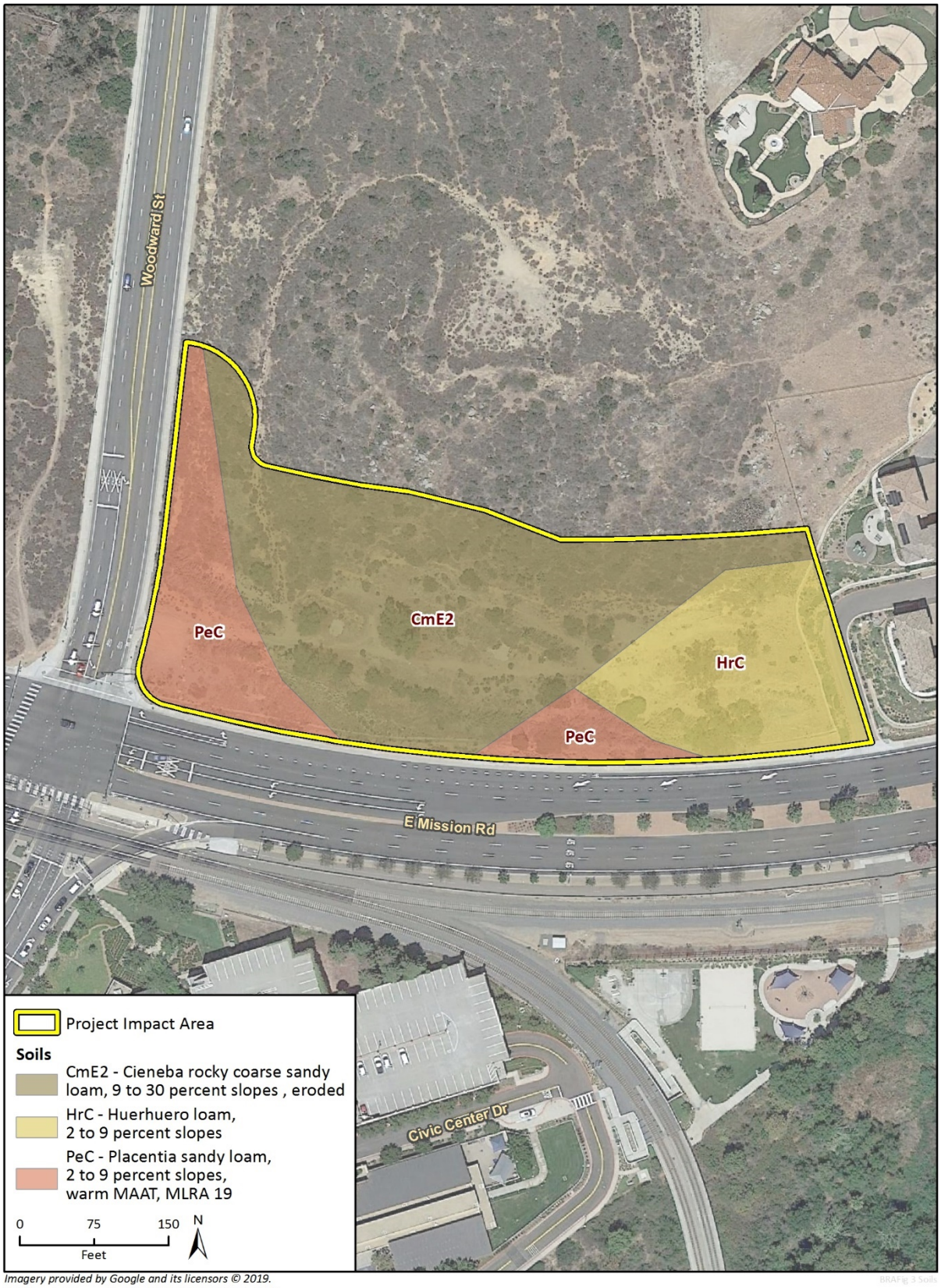
4.1.2 Placentia Series

Placentia sandy loam, 2 to 9 percent slopes, is found in the relatively flat southwest corner of the project area. The Placentia series are found on nearly level to moderately sloping areas and are on fans and terraces. The soils formed in alluvium from granite and other rocks of similar composition and texture. Placentia series soils are well or moderately well drained, with slow to rapid runoff and very slow permeability. Most uncultivated areas where the soils are found have annual grasses and forbs. Placentia sandy loam, 2 to 9 percent slopes, has been classified as a hydric soil (NRCS 2018c).

4.1.3 Huerhuero Series

Huerhuero loam, 2 to 9 percent slopes, are found in the relatively flat southeastern corner of the project area The Huerhuero series (now included in the Antioch Series) are found on nearly level to strongly sloping alluvial fans and terraces. The soils are moderately well to somewhat poorly drained, with slow to medium runoff and very slow permeability. Naturally associated vegetation is typically annual grasses, forbs, and weeds, with scattered oaks; however, that type of vegetation is not found on the project area or adjacent open space areas. Huerhuero loam, 2 to 9 percent slopes, is classified as a hydric soil (NRCS 2018c).

Figure 4 Soils



Imagery provided by Google and its licensors © 2019.
Additional data provided by USDA NRCS SSURGO, 2018.

BRAFig 3 Soils

4.2 Vegetation Communities and Land Cover

Two vegetation communities and one land cover type (Table 1 and Figure 5) were identified on the project area. The southern portion of the project area consists of a relatively flat area adjacent to East Mission Road that was previously developed and is now highly disturbed and vegetated with nonnative, ornamental species and ruderal native and nonnative species. Historical aerial imagery show that this area has been disturbed since at least 1938, with structures present through 2008. The northern portion of the project area consists of a steep, south-facing slope that supports vegetation communities that are typically grouped together as Diegan Coastal Sage Scrub. The slope continues to the north and is composed of the same Diegan Coastal Sage Scrub communities as found on site.

Table 1 Vegetation Community/Land Cover Type On Site[1]

Habitat Group	Vegetation Community/Land Cover Type (Holland Code)	Acres	Sensitive
C	Diegan Coastal Sage Scrub (32500)	1.43	Yes
F	Disturbed Habitat (11300)	1.07	No
F	Urban/Developed (12000)	1.52	No
Total		4.02	

[1] Based on Oberbauer et al. 2008

4.2.1 Diegan Coastal Sage Scrub (32500)

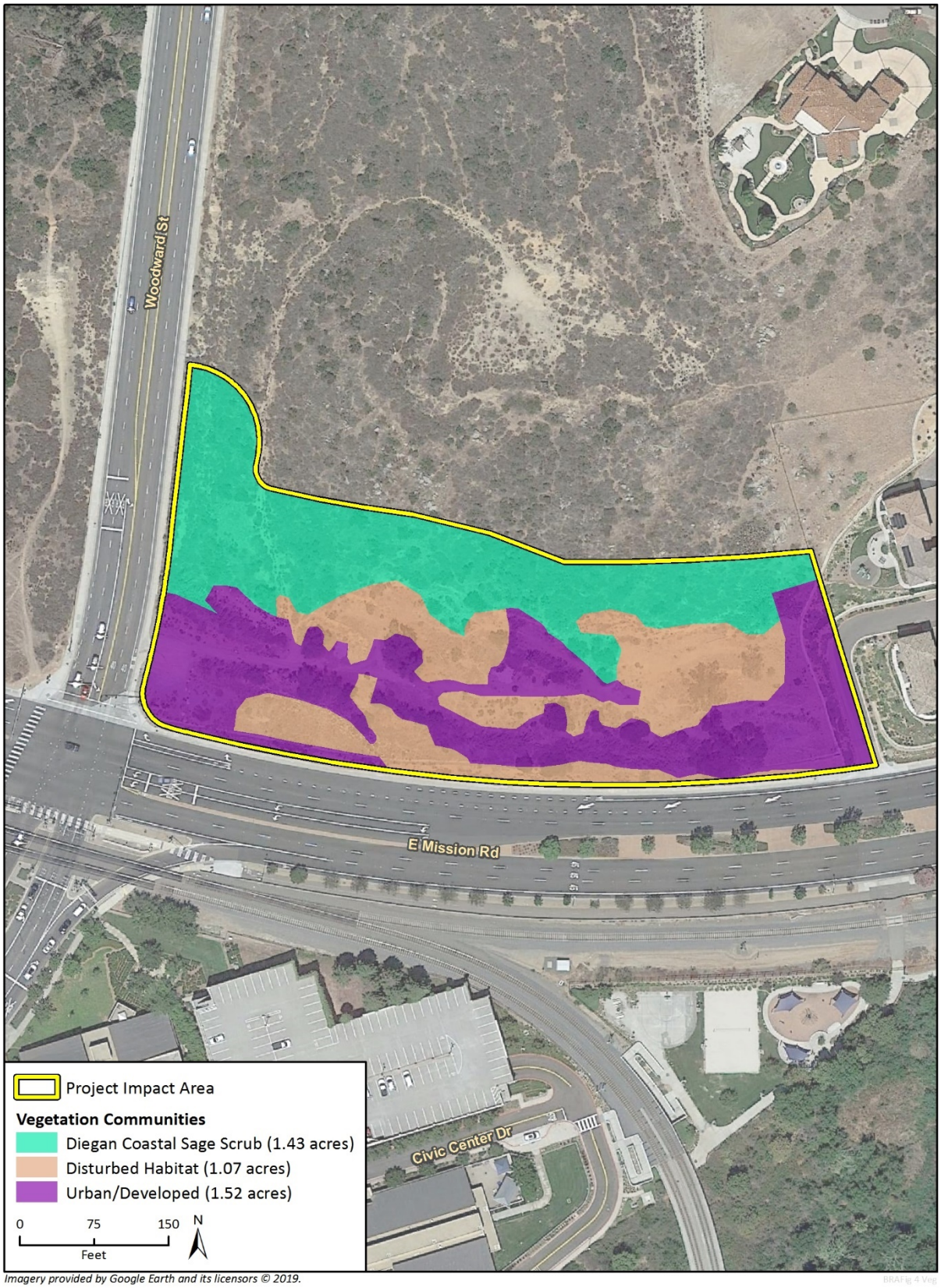
Diegan Coastal Sage Scrub is found on 1.43 acres on the slope in the northern portion of the project area. The community is dominated by low, soft-woody subshrubs that are most active in winter and early spring. Many taxa are facultatively drought-deciduous. Diegan Coastal Sage Scrub is typically on low moisture-availability sites: steep, xeric slopes or clay-rich soils that are slow to release stored water. The community intergrades at higher elevations with several chaparrals. Dominant plant species in Diegan Coastal Sage Scrub include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), deerweed (*Acmispon glaber*), chaparral mallow (*Malacothamnus fasciculatus*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), white sage (*Salvia apiana*), and black sage (*S. mellifera*) (Oberbauer et al. 2008).

Diegan Coastal Sage Scrub is considered a sensitive community by the City, falling under the Habitat Group C. The Diegan Coastal Sage Scrub was further classified using *A Manual of California Vegetation, Second Edition* (Sawyer et al. 2009), which resulted in the designation of the following four alliances.

California Sagebrush-California Buckwheat Scrub

California sagebrush-California buckwheat scrub (*Artemisia californica-Eriogonum fasciculatum* Shrubland Alliance) is found on the slopes in the northwest portion of the project area. California sagebrush and California buckwheat are codominant, with each having 30%-60% relative cover in the shrub canopy, and black sage and laurel sumac also contribute to the structure. Dieback of the shrubs in the community has allowed for the establishment of shortpod mustard (*Hirschfeldia incana*). This community is the main one found on the open space to the north of the project area and is also located on the open space to the west of Woodward Street.

Figure 5 Vegetation Communities and Land Cover



Imagery provided by Google Earth and its licensors © 2019.

BRAFig 4 Veg

California Sagebrush-Black Sage Scrub

California sagebrush-black sage scrub (*Artemisia californica-Salvia mellifera* Shrubland Alliance) is found on the slopes in the northwest-central portion of the project site. California sagebrush and black sage are codominant, with each having 30%-60% relative cover in the shrub canopy, and California buckwheat, laurel sumac, and coast prickly pear (*Opuntia littoralis*) also contribute to the structure. Some California sagebrush has died back in this area, allowing shortpod mustard to increase. This is the second most common community on the open space to the north of the project area.

Black Sage Scrub

Black sage scrub (*Salvia mellifera* Shrubland Alliance) is found in the northeast corner of the project area and continues upslope to the north of the site. Black sage is the dominate species, with over 60% of the relative cover in the shrub canopy, and California sage brush, laurel sumac, and coast prickly pear also contribute to the structure. Dieback of some of the shrubs has allowed for the spread of shortpod mustard into the interspatial areas between the shrubs.

Laurel Sumac Scrub

Laurel sumac scrub (*Malosma laurina* Shrubland Alliance) is found in the northern-central portion of the project area and continues upslope to the north of the site. Laurel sumac composes 30% to 50% of the relative shrub cover, along with California sagebrush and black sage. Past disturbances within the southern fringe of this community on site, along with the dieback of shrubs, has allowed for the spread of shortpod mustard into the interspatial areas between the shrubs.

4.2.2 Disturbed Habitat (*11300*)

Disturbed Habitat are areas that have been physically disturbed (by previous legal human activity) and are no longer recognizable as a native or naturalized vegetation association but continue to retain a soil substrate. Typically, vegetation, if present, is nearly exclusively composed of non-native plant species such as ornamentals or ruderal exotic species that take advantage of disturbance, or shows signs of past or present animal usage that removes any capability of providing viable natural habitat for uses other than dispersal. Examples of disturbed land include areas that have been graded, repeatedly cleared for fuel management purposes and/or experienced repeated use that prevents natural revegetation (i.e., dirt parking lots, trails that have been present for several decades), recently graded firebreaks, graded construction pads, construction staging areas, off-road vehicle trails, and old homesites. Characteristic species found in Disturbed Habitats are invasive, non-native forb species and a limited number of grass species, including Pampas grass (*Cortaderia* spp.) and fountain grass (*Pennisetum* spp.) (Holland et al. 2008).

On the project area, Disturbed Habitat is found on 1.07 acres in the relatively flat southern portion of the project area. Based on available historical aerial imagery, this area has been anthropogenically affected since at least 1938, with buildings being found on site from approximately 1953 to 2003 (Nationwide Environmental Title Research 2018). This has removed the natural occurring vegetation community, and primarily non-native plant species that are adapted to disturbances have become established, including shortpod mustard, tocalote (*Centaurea melitensis*), fountain grass (*Pennisetum setaceum*) and tree tobacco (*Nicotiana glauca*). Some native species are scattered in the Disturbed Habitat, including coyote brush (*Baccharis pilularis*) and Menzies' golden bush (*Isocoma menziesii* ssp. *menziesii*).

4.2.3 Urban/Developed

Urban/Developed are areas that have been constructed upon or otherwise physically altered to an extent that native vegetation is no longer supported. Developed land is characterized by permanent or semi-permanent structures, pavement or hardscape, and landscaped areas that often require irrigation. Areas where no natural land is evident due to a large amount of debris or other materials being placed upon it may also be considered Urban/Developed (e.g., car recycling plant, quarry) (Holland et al. 2008).

On the project area, Urban/Developed areas are found on 1.52 acres in the relatively flat southern portion of the project area. Unmaintained dirt road and concrete pads are remnants of developed portions of the site that have little to no vegetation. Ornamental vegetation was planted associated with the structures that includes giant reed (*Arundo donax*), pepper tree (*Schinus* spp.), blue gum (*Eucalyptus globulus*), mission cactus (*Opuntia ficus-indica*), and Mexican fan palm (*Washingtonia robusta*). There are nine mature, nonnative ornamental trees within the project area. Giant reed has been classified as a facultative wetland species (Lichvar et al. 2009), but the stands on site do not appear to be associated with any drainages or areas of ponding, so it's assumed that the stands were planted as a visual barrier and received supplemental water from manmade irrigation.

4.3 Common Wildlife

A list of the wildlife species observed during the 2018 survey, as well as the surveys conducted in 2015 and 2017 (Helix 2015, 2017), is provided in Appendix C. The majority of the species detected during the biological surveys were birds. Common species observed include California scrub-jay (*Aphelocoma californica*), California towhee (*Melozone crissalis*), house finch (*Haemorhous mexicanus*), Anna's hummingbird (*Calypte anna*), and mourning dove (*Zenaida macroura*). Two common reptiles, western side-blotched lizard (*Uta stansburiana elegans*) and Great Basin fence lizard (*Sceloporus occidentalis longipes*), was observed within the project area.

5 Special Status Biological Resources

The project area contains special-status biological resources, including sensitive vegetation communities and suitable habitat for nesting birds. This section discusses special-status biological resources observed within the project area and evaluates the potential for the project area to support other sensitive resources. Appendix D provides the complete list of all special-status resources with records in the CNDDB and CNPS within the nine USGS topographic quadrangle query for the project area. Appendix D; Figure D-1 provides the location of all special-status resources with records in the CNDDB within three miles of the project area.

5.1 Sensitive Plant Communities

The Diegan Coastal Sage Scrub mapped on 1.43 acres the project area, falls within the City's "Coastal Sage Scrub" habitat group and type (City of San Marcos 2001), which is considered a sensitive habitat group. This community within the project area is part of a contiguous island of Diegan Coastal Sage Scrub that is bounded by East Mission Road to the south, Woodward Street to the west, and residential development to the north and east. This block of Diegan Coastal Sage Scrub measures over 23 acres.

5.2 Special-status Plant Species

No special-status plant species were observed on the project area during the surveys, but the surveys were not conducted during the optimal blooming season for some of the species that have some level of potential to occur. A focused special-status plant species survey is anticipated to occur in spring 2019. Many of the species with recorded occurrences in the project vicinity are associated with habitats that are not found on the project area, including species associated with vernal pools, which are not present on site. A majority of the project area has been systemically disturbed for over 50 years, which has altered the vegetation communities and soils, limiting the potential for the species that have associated habitats on site; however, two species that are associated with disturbed habitats have potential to occur on site: San Diego ambrosia (*Ambrosia pumila*) and San Diego sand aster (*Corethrogyne filaginifolia* var. *incana*).

5.2.1 San Diego Ambrosia

The federally-listed as endangered San Diego ambrosia has a low potential to occur on the project area. The disturbances in the project area have been substantial over a long period of time, which has resulted in non-native herbaceous annuals to dominate the understory in the Disturbed Habitat and within the openings of the Diegan Coastal Sage Scrub on the project area. Marginal habitat for the species is present and there are several recent records from within 10 miles of the project area; however, these occurrences are associated with lower level of disturbances (e.g. grazing). The species occurs primarily on upper terraces of rivers and drainages, and has also been found in association with vernal pools. Within these areas, the San Diego ambrosia is found in open grassland of native and nonnative plant species, and openings in Coastal Sage Scrub, and primarily on sandy loam or clay soils. The species may also be found in ruderal habitat types (disturbed communities containing a mixture of native and nonnative grasses and forbs) such as fire fuel breaks and edges of

dirt roadways. Nonnative grassland and ruderal habitat types provide adequate habitat San Diego ambrosia; however, nonnative plants can out-compete the species for resources in some situations (USFWS 2010).

The species has a low potential to occur in the Disturbed Habitat and Diegan Coastal Sage Scrub portions of the project area.

5.2.2 San Diego Sand Aster

San Diego sand aster has been determined to have a moderate potential to occur on the project area due to suitable habitat (Disturbed Habitat and Diegan Coastal Sage Scrub) as well as being present throughout San Diego County. It has a CNPS CRPR that indicates it is rare, threatened, or endangered in California (CRPR 1B.1).

5.3 Special-status Wildlife Species

Two special-status wildlife species were observed on the project area, CAGN and Cooper's hawk (*Accipiter cooperii*). Three additional species have a high potential to occur on site: orange-throated whiptail (*Aspidoscelis hyperythra*), coastal whiptail (*Aspidoscelis tigris stejnegeri*), and San Diego desert woodrat (*Neotoma lepida intermedia*). An additional 11 wildlife species have a low potential to occur due to the presence of marginal habitat or that the species may use the project area temporarily during foraging or overnight roosting. Due to the low probability of occurrence they are not discussed further.

5.3.1 Coastal California Gnatcatcher

One pair of CAGN and one individual CAGN were observed during the nine protocol-level surveys for the species (Appendix E). CAGN is federally-listed as threatened and is a MHCP Covered Species. None of the observations of the species were within the project area, as shown in Figure 6. The project area is not within critical habitat for the species and there are relatively few local records of the species in the CNDDB (Appendix D: Figure D-1).

A pair of CAGN was detected during the first five surveys and on the ninth survey. During Survey 1, a fledgling was observed with the CAGN pair. The family group was foraging in Coastal Sage Scrub in the central portion of the Survey Area. During the following three surveys, the CAGN pair was observed in the central portion of the Survey Area for a brief period at the start of the survey. Shortly thereafter, the CAGN pair moved east along the south facing slope to a small patch of Coastal Sage Scrub outside of the Survey Area. This patch of Coastal Sage Scrub receives irrigation from a neighboring residential area and likely provides better foraging opportunities.

On Survey 5, the CAGN pair was only detected outside of the Survey Area in the irrigated Coastal Sage Scrub. No CAGN were detected during Surveys 6, 7, and 8 which had a later start time than previous surveys. On Survey 9, the CAGN pair was detected in the central portion of the Survey Area. The pair was in the area briefly prior to making its way east along the south facing slope to the irrigated Coastal Sage Scrub. The fledgling was only detected during the first survey. A CAGN individual was observed in the western portion of the Survey Area during survey 1. CAGN was not detected in the western portion of the Survey Area during the remaining surveys.

Figure 6 CAGN Observations During Protocol Surveys



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Fig 3 2018 Coastal California Gnatcatcher Survey Results

5.3.2 Cooper's Hawk

Cooper's hawk is a CDFW Watch List species and MHCP Covered Species. One individual was observed flying over the project area. The species frequents landscapes where wooded areas occur in patches and groves, but it is also found foraging in urban environments. Dense stands of trees with moderate crown-depths are typically used for nesting. The species is not expected to nest on the project area, but it may occur occasionally as a transient during foraging activities.

5.3.3 Orange-Throated Whiptail

Orange-throated whiptail is a CDFW Watch List species and MHCP Covered Species. The species inhabits low-elevation coastal scrub, chaparral, and valley-foothill hardwood habitats. It prefers washes and other sandy areas with patches of brush and rocks and feeds mostly on small invertebrates, especially spiders, scorpions, centipedes, and termites, and small lizards. Suitable habitat for this species is present on site and the species was observed on the parcel adjacent to the east of the project prior to its development.

5.3.4 Coastal Whiptail

Coastal whiptail is a CDFW Species of Special Concern. The species is typically found in deserts and semi-arid areas with sparse vegetation and open areas. It is also found less often in woodland and riparian areas. Suitable habitat for this species is present on site and the species was observed on the parcel adjacent to the east of the project prior to its development.

5.3.5 San Diego Desert Woodrat

San Diego desert woodrat is a CDFW Species of Special Concern. It is a resident of moderate to dense canopy coastal scrub habitats from San Diego County to San Luis Obispo County. The species is particularly abundant in rock outcrops, rocky cliffs, and slopes. Woodrat middens were identified during the surveys of the project area and associated habitat is present; however, there is a range and habitat overlap with the big-eared woodrat in the region.

5.3.6 Other Protected Species

Habitat is present within and adjacent to the project area that has the potential to support protected nesting birds.

5.4 Jurisdictional Waters and Wetlands

No drainages or wetlands were identified in the project area during the surveys or background research. Waters are expected to infiltrate the soils or sheetflow through the project area without causing substantial erosion.

5.5 Wildlife Corridors

Wildlife movement corridors are defined as areas that connect suitable wildlife habitat areas in a region otherwise fragmented by rugged terrain, changes in vegetation, or human disturbance. Natural features such as canyon drainages, ridgelines, and areas with vegetation cover provide corridors for wildlife travel. The project area is a habitat island, with Twin Oaks Valley Road farther west of the project area, Mission Road south of the project area, and residential development north

and east of the project area blocking any wildlife movement. The project area and vicinity are not identified as being within or adjacent to a wildlife corridor per Figure 4-2 of the City of San Marcos General Plan (City of San Marcos 2013). The project area is also not within or adjacent to a BCLA as illustrated in Figure 2-3 of the Final MHCP Plan (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b). Finally, the project is not within or adjacent to an essential connectivity area or natural landscape block as identified by the California Essential Habitat Connectivity Project (Spencer et al. 2010).

6 Project Impact Analysis

Guidelines for Determining CEQA Significance require that impacts of a proposed project be analyzed for significance. Impacts of the project on biological resources are described below. Where warranted, recommended mitigation measures are provided in Section 7.

The proposed project would directly impact special-status vegetation communities and could potentially directly impact special-status plant and wildlife species, including CAGN.

6.1 Special-Status Species

The proposed project would have a significant effect on biological resources if it would:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

Impact-1: Special-status Plant Species

One special-status species, San Diego sand aster, has a moderate potential to occur and one special-status species, San Diego ambrosia, has a low potential to occur. Rare plant surveys were conducted on April 12, 2019, during the flowering period for the potential sensitive plant species. San Diego sand aster, San Diego ambrosia, or any other rare plant species were not detected on-site during the survey. For this reason, implementation of the project would not have substantial impacts to special-status plant species. Impacts would be less than significant. Impact-2: Coastal California Gnatcatcher

CAGN has been identified in the Diegan Coastal Sage Scrub to the north of the project area. The project could directly impact CAGN through direct impacts to occupied nests within that community during vegetation removal on the project area. Indirect impacts to CAGN due to construction noise[1] and dust are also possible, which could cause nest failures due to parental abandonment. Impacts to CAGN are considered significant without mitigation.

"Take" of the species, as defined in the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct" (16 U.S. C. 1542(b)), is not expected from the implementation of the proposed project. Recent USFWS (2018d) guidance on when to seek an incidental take permit (ITP) was issued that provided a summary of the legal guidance on the definitions of "harm" and "harass." It also provides the following questions that should be asked before a determination is made that an action involving habitat modification is likely to result in take:

1. Is the modification of habitat significant?

[1] The USFWS typically considers noise in excess of 60 dBA Leq. to constitute a risk of impacting nesting birds.

2. If so, does that modification also significantly impair an essential behavior pattern of a listed species?
3. And, is the significant modification of the habitat, with a significant impairment of an essential behavior pattern, likely to result in the actual killing or injury of wildlife?

The proposed project will impact 1.43 acres of Diegan Coastal Sage Scrub, a habitat type that is used by CAGN for most of its life history. The Diegan Coastal Sage Scrub within the project area is part of a contiguous island of Diegan Coastal Sage Scrub that is bound by East Mission Road to the south, Woodward Street to the west, and residential development to the north and east; as shown on Figure 4-1 of the City's General Plan (City of San Marcos 2013). The proposed development area is composed mainly of disturbed/ruderal vegetation and a small amount of CAGN preferred habitat (*Artemisia californica-Eriogonum fasciculatum* shrubland alliance). In addition, as detailed under Impact BIO-6, the project would be required to preserve Diegan Coastal Sage Scrub at a ratio of 2:1 through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof, compliant with the City's Draft Subarea Plan which would contribute to the regional availability of CAGN habitat.

The implementation of project design features and MM-1 through MM-6, would reduce potential impacts to CAGN to less than significant by requiring the implementation of CAGN avoidance measures prior to and during construction, implementation of a WEAP to educate construction workers, the delineation of work areas to avoid additional impacts, and a Biological Monitor for activities in and around sensitive habitat areas . Implementation of BIO-2 would reduce impacts to nesting birds by surveying to identify nests in the open space areas surrounding the project site. . As a project design feature, all vegetation clearing and earthwork will be conducted between September 16 through February 14, outside of the breeding season for CAGN, which would avoid direct impacts to occupied nests. MM-1 required CAGN avoidance measures be implemented to avoid impacts from construction and noise on CAGN. MM-2 requires a nesting bird survey be conducted during the breeding season of the species to determine if there are active CAGN nests in the open space adjacent to the project area and actions to limit any indirect impacts to the species. MM-3 requires a WEAP be implemented that would educate project construction workers on the sensitive species that could occur, as well as measures to reduce indirect impacts to the environment (e.g., picking up trash to not subsidize potential predators of CAGN). MM-4 requires that the work limits be delineated, which would ensure that project impacts to potential habitat for the species (Diegan Coastal Sage Scrub) beyond the 1.43 acres discussed herein are less than significant, leaving as much habitat as possible in the adjacent open space. MM-5 would require a Biological Monitor be present during initial clearing, grading, and construction in sensitive habitat areas, and construction would be temporarily halted to allow wildlife to move out of the area. MM-6 requires a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager.

Based on the analysis above, and the project design and mitigation proposed, impacts to CAGN would be reduced to less than significant.

Impact-3: Other Special-status Wildlife Species

Orange-throated whiptail, coastal whiptail, and San Diego desert woodrat all have a high potential to occur on the project area, primarily within the Diegan Coastal Sage Scrub. The species are all highly mobile and would likely escape direct impacts from vegetation removal and grading activities

associated with the project by moving into the undisturbed open space to the north. Some mortality to the three species could occur; however, project implementation would not impact a large enough number of individuals to put the population of these species in jeopardy of extinction, especially given the isolated nature of the site and the very small number of individuals likely to be impacted, so the impact would be less than significant.

Impact-4: Nesting Birds and Raptors

The project could adversely affect raptors and other nesting birds if construction occurs while they are present on or adjacent to the project area through direct mortality. Cooper's hawk was observed over the project area as a transient, but is not expected to nest on site. The loss of a nest due to construction activities would be a violation of CFGC Sections 3503, 3503.5, 3511, 3513 and 3800 and the MBTA, and is prohibited by law, and would be a significant impact without mitigation.

MM-2 and MM-3 would be implemented by the project to reduce impacts to special-status wildlife species. MM-2 requires a nesting bird survey be conducted to determine the presence of nesting birds and the establishment of the appropriate buffer for any nests that are found to keep construction activities from causing nest failure. MM-3 requires a WEAP be implemented for the project, and a part of that WEAP would be the discussion of nesting birds and "no work" buffers that would be establish for any active nests that are near the project. With the implementation of these mitigation measures, impacts to nesting birds and raptors would be reduced to less than significant.

6.2 Riparian Habitat or Sensitive Natural Communities

The proposed project would have a significant effect on biological resources if it would:

b) Have a substantial adverse impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service.

Riparian Habitat

There are no riparian habitats located on the project area; therefore, the project will not have a substantial adverse effect on any riparian habitat. No impact is identified.

Impact-5: Sensitive Natural Communities

The project has been designed to be primarily located on the Disturbed Habitat and Urban/Developed areas, while limiting impacts to Diegan Coastal Sage Scrub, which is a sensitive vegetation community. The project would result in the direct removal of 1.43 acres of Diegan Coastal Sage Scrub that falls under the City's Habitat group C definition of Coastal Sage Scrub, which is considered a sensitive habitat. Impacts to vegetation communities are summarized in Table 2. Impacts to Diegan Coastal Sage Scrub would be considered significant without mitigation.

Table 2 Impacts to Vegetation Communities and Land Cover

Tier	Vegetation Community/Land Cover Type (Holland Code)	Acres Impacted	Sensitive
II	Diegan Coastal Sage Scrub (32500)	1.43	Yes
	Disturbed Habitats	1.07	No
	Urban/Developed	1.52	No
Total		4.02	

MM-3, MM-4, MM-5 and MM-6 would be implemented by the project to reduce impacts to special-status wildlife species. MM-3 requires a WEAP be implemented that would educate project construction workers on the sensitive species that could occur, as well as measures to reduce indirect impacts to the environment (e.g., picking up trash). MM-4 requires that the work limits be delineated, which would ensure that project impacts to Diegan Coastal Sage Scrub are limited to the smallest extent possible, leaving as much vegetation as possible in the adjacent open space. MM-5 would require a Biological Monitor be present during initial clearing, grading, and construction in sensitive habitat areas. MM-6 requires a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager. With the implementation of these mitigation measures, impacts to sensitive vegetation communities would be reduced to less than significant.

6.3 Wetlands

The proposed project would have a significant effect on biological resources if it would:

c) *) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means*

No definable wetlands were identified within the project area; therefore, implementation of the proposed project would not have a substantial adverse effect on State or federally protected wetlands. No impact is identified.

6.4 Wildlife Corridors

The proposed project would have a significant effect on biological resources if it would:

d) *Interfere substantially with the movement of any resident or migratory fish or wildlife species or with established resident or migratory wildlife corridors, or impede the use of wildlife nursery sites.*

No wildlife corridors were identified in the project area and adjacent areas; therefore, the project will not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery site. The project could disrupt short-distance movements of low-mobility species on a local scale; however, this would be less than significant impact since it would not affect movement on a regional scale.

6.5 Local Policies and Ordinances

The proposed project would have a significant effect on biological resources if it would:

f) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The Conservation and Open Space Element of the City's General Plan includes policies related to the protection of biological resources. The applicable policies, as well as the project's consistency with these policies, are presented below:

Policy COS-1.1: Support the protection of biological resources through the establishment, restoration, and conservation of high-quality habitat areas.

With the exception of on-site Diegan Coastal Sage Scrub, the majority of the project area would not be characterized as a high-quality habitat area. Mitigation for impacts to Diegan Coastal Sage Scrub is identified in MM-6, which would require a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager. Therefore, implementation of the project does not conflict with this policy.

Policy COS-1.2: Ensure that new development, including Capital Improvement Projects, maintain the biotic habitat value of riparian areas, oak woodlands, habitat linkages, and other sensitive habitats.

The project area does not support any riparian areas, oak woodlands, or habitat linkages. On site Diegan Coastal Sage Scrub is considered sensitive; however, mitigation for impacts to habitat is identified in MM-6, which would require a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager. Therefore, the project does not conflict with this policy.

Policy COS-2.1: Provide and protect open space areas throughout the City for its recreational, agricultural, safety, and environmental value.

With the exception of the on-site open space that supports Diegan Coastal Sage Scrub, the majority of the project area was previously developed. Mitigation for impacts to Diegan Coastal Sage Scrub is identified in MM-6, which requires a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager. Therefore, implementation of the project does not conflict with this policy.

Policy COS-2.2: Limit, to the extent feasible, the conversion of open space to urban uses and place a high priority on acquiring and preserving open space lands for recreation, habitat protection and enhancement, flood hazard management, water and agricultural resources protection, and overall community benefit.

With the exception of the on-site open space that supports Diegan Coastal Sage Scrub, the majority of the project area was previously developed. Mitigation for impacts to Diegan Coastal Sage Scrub is

identified in MM-6, which would require a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager. Therefore, implementation of the project does not conflict with this policy.

Policy COS-2.6: Preserve healthy mature trees where feasible; where removal is necessary, trees shall be replaced at a ratio of 1:1.

While there are nine mature trees on the project area, they are nonnative species that were planted as landscaping for the historic development on the project area and are not natural elements of the existing communities in the open space of the region. The proposed project design includes the installation of a number of trees as part of the landscaping plan, which would offset the loss of the nine trees at a ratio greater than 1:1.

6.6 Habitat Conservation Plans

The proposed project would have a significant effect on biological resources if it would:

e) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan.

The project area is located within the MHCP, a comprehensive, multi-jurisdictional habitat conservation plan approved in 2003 for northwestern San Diego County. The project area is not located within an FPA, as illustrated in Figure 2-1 of the Final MHCP Plan (AMEC Earth & Environmental, Inc., et al. 2003b). The project area is also not within a BCLA, as illustrated in Figure 2-3 of the Final MHCP Plan (AMEC Earth & Environmental, Inc., et al. 2003b). Two Covered Species have a high potential to occur on the project area, CAGN and orange-throated whiptail. Impacts to CAGN would conflict with the MHCP and would be a significant impact without mitigation. Some mortality to orange-throated whiptail could occur; however, project implementation would not impact a large enough number of individuals to put the population of the species in jeopardy of extinction, especially given the isolated nature of the project area and the very small number of individuals likely to be impacted, so the impact would be less than significant.

The implementation of project design features and MM-1 through MM-6 would be implemented by the project to reduce impacts to CAGN. MM-1 requires avoidance and minimization measures for CAGN during construction activities. MM-2 requires a nesting bird survey be conducted during the breeding season of the species to determine if there are active CAGN nests in the open space adjacent to the project area and actions to limit any indirect impacts to the species. MM-3 requires a WEAP be implemented that would educate project construction workers on the sensitive species that could occur, as well as measures to reduce indirect impacts to the environment (e.g., picking up trash). MM-4 requires that the work limits be delineated, which would ensure that project impacts to Diegan Coastal Sage Scrub are limited to the smallest extent possible, leaving as much habitat as possible in the adjacent open space. MM-5 would require a Biological Monitor be present during initial clearing, grading, and construction in sensitive habitat areas. MM-6 requires a total of 1.43 acres of Diegan Coastal Sage Scrub be preserved at a 2:1 ratio. This can be accomplished through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager. With the implementation of these mitigation measures, confliction with the MHCP provisions for Covered Species would be reduced to less than significant.

7 Mitigation, Monitoring, and Reporting

The following mitigation measures are proposed to reduce potential project impacts to below a level of significance.

7.1 Mitigation for Special-status Species

MM-1: Coastal California Gnatcatcher Surveys

Pre-Construction Surveys

Presence/absence surveys of the project site and a 500-foot buffer around the project site shall be conducted by a qualified biologist with a valid USFWS 10A 1A permit to determine the presence of CAGN that could be affected by construction activities, including vegetation clearance. A minimum of 3 surveys will be conducted no less than 7 days apart and within 90 days prior to commencement of construction activities. The results of the survey shall be submitted to the USFWS prior to initiation of construction activities.

Pre-Vegetation Clearance Survey

Vegetation clearing shall only be conducted between September 1 and February 28, outside of the breeding season for CAGN. No more than three (3) days prior to the clearing of vegetation, a qualified biologist shall conduct 1 survey for CAGN to ensure that the vegetation on-site is not occupied by the species. If the vegetation clearance survey identifies the presence of CAGN, the project biologist shall either use appropriate techniques to flush the bird(s) from the project site or delay the removal of vegetation until CAGN has left the project site on their own volition.

MM-2: Nesting Birds and Raptors

If site clearing activities are conducted between February 1 and February 28 or September 1 and September 15, a qualified biologist shall conduct a nesting bird survey no more than three (3) days prior to the start of such activities to identify nesting birds within the project site and a 250-foot buffer around the project site. If any nests are found, their locations shall be flagged and an appropriate avoidance buffer, ranging in size from 25 to 50 feet for song birds, and up to 250 feet for raptors depending upon the species and the proposed work activity, shall be determined and demarcated by a qualified biologist with bright orange construction fencing or other suitable flagging. Active nests shall be monitored at a minimum of once per week until it has been determined that the nest is no longer being used by either the young or adults. No disturbance shall occur within this buffer until the qualified biologist confirms that breeding/nesting is completed, and all the young have fledged. If project activities must occur within the buffer, they shall be conducted at the discretion of the qualified biologist and with monitoring and management to ensure that nesting success is not jeopardized. If no nesting birds are observed during the survey, then no further actions shall be necessary.

MM-3: Worker Environmental Awareness Program (WEAP)

The applicant is required to have a WEAP for the construction crew that will be developed and implemented by a qualified biologist. Each employee (including temporary, contractors, and subcontractors) will receive the WEAP within two weeks of working on the proposed project. They will be advised of the potential impact to the listed species and the potential penalties for taking such species. At a minimum, the WEAP will include the following topics: occurrence of the listed and sensitive species in the area, their general ecology, sensitivity of the species to human activities, legal protection afforded these species, penalties for violations of Federal and State laws, reporting requirements, and project features designed to reduce the impacts to these species and promote continued successful occupation of the project area environs.

MM-4: Work Limit Delineation

Construction work areas shall be delineated and marked clearly, by flagging or temporary orange construction fencing, in the field prior to habitat removal, and the marked boundaries maintained and clearly visible to personnel on foot and by heavy equipment operators. Fencing shall be placed on the impact side to reduce the potential for additional vegetation loss within open space. Fencing placement shall be done by a qualified biologist. All temporary fencing shall be removed only after the conclusion of all grading, clearing, and construction. Employees shall strictly limit their activities and vehicles to the proposed project areas, staging areas, and routes of travel. The project site will be kept clean and food related trash items shall be enclosed in sealed containers and regularly removed from the site. The biological monitor shall verify that the limits of construction have been properly staked and are readily identifiable. Intrusion by unauthorized vehicles outside of construction limits shall be prohibited, with control exercised by an on-site foreman. Access routes to the construction area outside of work hours shall be blocked with physical barriers, such as concrete blocks or large equipment.

MM-5: Biological Monitor

A CDFW and USFWS approved Biologist (hereafter, qualified biologist) familiar with CAGN and its habitat shall be present during all vegetation clearing and other activities with the potential to affect CAGN and will monitor the project to ensure that there are no unanticipated impacts to the CAGN and its habitat. The biologist shall have the authority to halt all associated project activities that may be in violation of the protective measures.

If CAGN are found to be within the survey area during pre-construction surveys, the following avoidance and minimization measures shall be implemented.

a. To reduce potential noise impacts to nesting CAGN, a qualified biologist shall monitor noise levels at the project site to determine if construction activity noise is above 60 dBA, the standard level requested by the USFWS, or if noise levels above 60 dBA have the potential to affect any CAGN nests.
b. If/when an active CAGN nest is identified, a qualified biologist shall monitor noise at the edge of construction as directed by the qualified biologist. A noise barrier will be erected to reduce noise levels to 60dBA or less. This noise barrier shall consist of a 10-foot-high, continuous plywood fence, or comparable barrier, supported by posts or an earthen berm located at the site boundary that abuts potential off-site habitat. If noise levels continue to exceed 60 dBA, the acoustician shall consult with the qualified biologist and provide requirements for the construction contractor to make operational and barrier changes to reduce noise levels to 60

dBA during the breeding season (March 1 through August 31). Noise monitoring will occur during operational changes and installation of barriers, as needed, to ensure their effectiveness. If the noise meets or exceeds the 60 dB(A) Leq threshold, or if the biologist determines that the activities in general are disturbing the nesting activities, the biologist shall have the authority to halt construction and shall consult with the Wildlife Agencies to devise methods to reduce the noise and/or disturbance in the vicinity. This may include methods such as, but not limited to, turning off vehicle engines and other equipment whenever possible to reduce noise, installing a protective noise barrier between the nesting coastal CAGN and the activities, and working in other areas until the young have fledged.

c. All active nests will be reported within 24 hours to the USFWS upon detection.

7.1.1 Sensitive Vegetation Communities

MM-6: Mitigation for Diegan Coastal Sage Scrub

The MHCP has classified vegetation communities and landcover into six classes, as shown in Table 3, based on rarity and ecological importance (AMEC Earth & Environmental, Inc., et al. 2003a, 2003b). The MHCP has also established mitigation ratios based upon whether or not the impacted habitat is within or outside an FPA.

Table 3 MHCP Habitat Group and Type and Associated Mitigation Ratios

		Mitigation Ratio by Location of Impacted Habitat	
Habitat Group	**Type**	**Inside Focus Planning Area**	**Outside Focus Planning Area**
A	Coastal salt marsh, alkali marsh, freshwater marsh, estuarine, salt pan/mudflats, riparian forest, riparian woodland, riparian scrub, vernal pool, disturbed wetland flood channel fresh water	No net loss goal (mitigation varies by type of replacement habitat)	No net loss goal (mitigation varies by type of replacement habitat)
B	Southern coastal bluff scrub, maritime succulent scrub, southern maritime chaparral, Engelmann oak woodland, coast live oak woodland, native grassland	Maximum avoidance and onsite conservation 3:1	2:1
C	Coastal Sage Scrub coastal sage/chaparral mix	2:1	1:1
D	Chaparral (excluding southern maritime chaparral)	1:1	0.5:1
E	Annual (non-native) grassland	0.5:1	None
F	Disturbed, agriculture land, eucalyptus	None	None

Source: AMEC Earth & Environmental, Inc., et al. 2003a, 2003b

The project area is not located within an MHCP FPA; however, based on discussions with USFWS on December 19, 2019, permanent loss of Diegan Coastal Sage Scrub will be mitigated at a 2:1 ratio. Section 5.2.1 of City of San Marcos Draft Subarea Habitat Conservation Plan references the preferred order of mitigation to be on-site mitigation, off-site acquisition, in-lieu fees, and mitigation credits. Thus, a total of 1.43 acres of Diegan Coastal Sage Scrub will be preserved by the project applicant through on-site preservation, off-site acquisition, in lieu fees, a purchase of credits from an approved mitigation bank, or a combination thereof as approved by the Planning Manager

8 Limitations, Assumptions, and Use Reliance

This Biological Resources Assessment has been performed in accordance with professionally accepted biological investigation practices conducted at this time and in this geographic area. The biological investigation is limited by the scope of work performed. The biological surveys are limited also by the environmental conditions present at the time of the surveys. In addition, general biological (or protocol) surveys do not guarantee that the organisms are not present and will not be discovered in the future within the site. In particular, mobile wildlife species could occupy the site on a transient basis, or re-establish populations in the future. Our field studies were based on current industry practices, which change over time and may not be applicable in the future. No other guarantees or warranties, expressed or implied, are provided. The findings and opinions conveyed in this report are based on findings derived from site reconnaissance, jurisdictional areas, review of CNDDB RareFind5, and specified historical and literature sources. Standard data sources relied upon during the completion of this report, such as the CNDDB, may vary with regard to accuracy and completeness. In particular, the CNDDB is compiled from research and observations reported to CDFW that may or may not have been the result of comprehensive or site-specific field surveys. Although Rincon believes the data sources are reasonably reliable, Rincon cannot and does not guarantee the authenticity or reliability of the data sources it has used. Additionally, pursuant to our contract, the data sources reviewed included only those that are practically reviewable without the need for extraordinary research and analysis.

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Appendix A

Federal and State Regulatory Setting

Federal and State Regulatory Setting

Special-status habitats are vegetation types, associations, or sub-associations that support concentrations of special-status plant or animal species, are of relatively limited distribution, or are of particular value to wildlife.

Listed species are those taxa that are formally listed as endangered or threatened by the federal government (e.g., U.S. Fish and Wildlife Service [USFWS]), pursuant to the Federal Endangered Species Act (FESA) or as endangered, threatened, or rare (for plants only) by the State of California (i.e., California Fish and Game Commission), pursuant to the California Endangered Species Act or the California Native Plant Protection Act. Some species are considered rare (but not formally listed) by resource agencies, organizations with biological interests/expertise (e.g., Audubon Society, CNPS, The Wildlife Society), and the scientific community.

The following is a brief summary of the regulatory context under which biological resources are managed at the federal, state, and local levels. A number of federal and state statutes provide a regulatory structure that guides the protection of biological resources. Agencies with the responsibility for protection of biological resources within the project site include:

- U.S. Army Corps of Engineers (wetlands and other waters of the United States)
- San Diego Regional Water Quality Control Board (waters of the State)
- U.S. Fish and Wildlife Service (federally listed species and migratory birds)
- California Department Fish and Wildlife (riparian areas, streambeds, and lakes; state-listed species; Species of Special Concern; nesting birds)
- City of San Marcos (city wetlands)

U.S. Army Corps of Engineers

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) has authority to regulate activities that could discharge fill of material into wetlands or other “waters of the United States.” Perennial and intermittent creeks are considered waters of the United States if they are hydrologically connected to other jurisdictional waters (typically a navigable water). The USACE also implements the federal policy embodied in Executive Order 11990, which is intended to result in no net loss of wetland value or acres. In achieving the goals of the Clean Water Act, the USACE seeks to avoid adverse impacts and offset unavoidable adverse impacts on existing aquatic resources. Any fill of wetlands that are hydrologically connected to jurisdictional waters would require a permit from the USACE prior to the start of work. Typically, when a project involves impacts to waters of the United States, the goal of no net loss of wetland acres or values is met through avoidance and minimization to the extent practicable, followed by compensatory mitigation involving creation or enhancement of similar habitats.

Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB) and the local Regional Water Quality Control Board (RWQCB) have jurisdiction over "waters of the State," pursuant to the Porter-Cologne Water Quality Control Act, which are defined as any surface water or groundwater, including saline waters, within the boundaries of the State. The SWRCB has issued general Waste Discharge Requirements (WDRs) regarding discharges to "isolated" waters of the State (Water Quality Order No. 2004-0004-DWQ, Statewide General Waste Discharge Requirements for Dredged or Fill Discharges to Waters Deemed by the U.S. Army Corps of Engineers to be Outside of Federal Jurisdiction). The RWQCB administers actions under this general order for isolated waters not subject to federal jurisdiction, and is also responsible for the issuance of water quality certifications pursuant to Section 401 of the Clean Water Act for waters subject to federal jurisdiction.

United States Fish and Wildlife Service

The USFWS implements the Migratory Bird Treaty Act (16 United States Code [USC] Section 703-711) and the Bald and Golden Eagle Protection Act (16 USC Section 668). The USFWS and National Marine Fisheries Service (NMFS) share responsibility for implementing the Federal Endangered Species Act (FESA) (16 USC § 153 et seq.). Generally, the USFWS implements the FESA for terrestrial and freshwater species, while the NMFS implements the FESA for marine and anadramous species. Projects that would result in "take" of any federally threatened or endangered species are required to obtain permits from the USFWS or NMFS through either Section 7 (interagency consultation with a federal nexus) or Section 10 (Habitat Conservation Plan) of the FESA, depending on the involvement by the federal government in permitting and/or funding of the project. The permitting process is used to determine if a project would jeopardize the continued existence of a listed species and what measures would be required to avoid jeopardizing the species. "Take" under federal definition means to harass, harm (which includes habitat modification), pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Proposed or candidate species do not have the full protection of the FESA; however, the USFWS and NMFS advise project applicants that they could be elevated to listed status at any time.

California Department of Fish and Wildlife

The California Department of Fish and Wildlife (CDFW) derives its authority from the Fish and Game Code of California. The California Endangered Species Act (CESA) (Fish and Game Code Section 2050 et. seq.) prohibits take of state listed threatened or endangered. Take under CESA is restricted to direct mortality of a listed species and the law does not prohibit indirect harm by way of habitat modification. Where incidental take would occur during construction or other lawful activities, CESA allows the CDFW to issue an Incidental Take Permit upon finding, among other requirements, that impacts to the species have been minimized and fully mitigated.

The CDFW also enforces Sections 3511, 4700, 5050, and 5515 of the Fish and Game Code, which prohibits take of species designated as Fully Protected. The CDFW is not allowed to issue an Incidental Take Permit for Fully Protected species; therefore, impacts to these species must be avoided.

California Fish and Game Code sections 3503, 3503.5, and 3513 describe unlawful take, possession, or destruction of native birds, nests, and eggs. Section 3503.5 of the Code protects all birds-of-prey and their eggs and nests against take, possession, or destruction of nests or eggs. Section 3513

makes it a state-level office to take any bird in violation of the federal Migratory Bird Treaty Act. CDFW administers these requirements.

Species of Special Concern (SSC) is a category used by the CDFW for those species which are considered to be indicators of regional habitat changes or are considered to be potential future protected species. Species of Special Concern do not have any special legal status except that which may be afforded by the Fish and Game Code as noted above. The SSC category is intended by the CDFW for use as a management tool to include these species in special consideration when decisions are made concerning the development of natural lands. The CDFW also has authority to administer the Native Plant Protection Act (NPPA) (Fish and Game Code Section 1900 et seq.). The NPPA requires the CDFW to establish criteria for determining if a species, subspecies, or variety of native plant is endangered or rare. Effective in 2015, CDFW promulgated regulations (14 CCR 786.9) under the authority of the NPPA, establishing that the CESA's permitting procedures would be applied to plants listed under the NPPA as "Rare." With this change, there is little practical difference for the regulated public between plants listed under CESA and those listed under the NPPA.

Perennial, intermittent, and ephemeral streams and associated riparian vegetation, when present, also fall under the jurisdiction of the CDFW. Section 1600 *et seq*. of the Fish and Game Code (Lake and Streambed Alteration Agreements) gives the CDFW regulatory authority over activities that divert, obstruct, or alter the channel, bed, or bank of any river, stream or lake.

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Appendix B

Site Photographs



Photograph 1. Representative photo of Diegan Coastal Sage Scrub (black sage scrub) on the project area.



Photograph 2. Representative photo of Diegan Coastal Sage Scrub (laurel sumac scrub) on the project area.



Photograph 3. Representative photo of Diegan Coastal Sage Scrub (California sagebrush-California buckwheat scrub) on the project area.



Photograph 4. Representative photo of Disturbed Habitat on the project area.



Photograph 5. Representative photo of Urban/Developed on the project area.



Photograph 6. Overview of the central portion of the project area with East Mission Road, rail road tracks, and the San Marcos Library in the background.



Photograph 7. Overview of the eastern portion of the project area with the residential development to the east in the background.



Photograph 8. Overview of the open space west of Woodward Street and the project area.

Appendix C

Floral and Faunal Compendium

Table C-1 Plant Species Observed within the Project Site During the Surveys for the Project[1]

Scientific Name	Common Name	Status	Native or Introduced
Plants			
Agavaceae: Century Plant Family			
Yucca gigantea	Mojave yucca	None	Introduced
Anacardiaceae: Sumac Family			
Malosma laurina	laurel sumac	None	Native
Rhus integrifolia	lemonadeberry	None	Native
Schinus molle	Peruvian pepper tree	None	Introduced
Schinus terebinthifolius	Brazilian pepper tree	None	Introduced
Arecaceae: Palm Family			
Washingtonia robusta	Mexican fan palm	None	Introduced
Asteraceae: Sunflower Family			
Artemisia californica	California sagebrush	None	Native
Baccharis pilularis	coyote brush	None	Native
Brickellia californica	Brickell bush	None	Native
Centaurea melitensis	star thistle	None	Introduced
Deinandra fasciculata	fascicled tarplant	None	Native
Dittrichia graveolens	stinkwort	None	Introduced
Encelia californica	California encelia	None	Native
Erigeron canadensis	horseweed	None	Native
Eriophyllum confertiflorum	golden-yarrow	None	Native
Isocoma menziesii var. *menziesii*	Menzies' goldenbush	None	Native
Hazardia squarrosa	saw-toothed goldenbush	None	Native
Pseudognaphalium californicum	ladies tobacco	None	Native
Brassicaceae: Mustard Family			
Brassica nigra	black mustard	None	Introduced
Hirschfeldia incana	shortpod mustard	None	Introduced
Sisymbrium sp.	mustard	None	Introduced
Cactaceae: Cactus Family			
Opuntia ficus-indica	mission cactus	None	Introduced
Opuntia littoralis	coast prickly pear	None	Native
Chenopodiaceae: Goosefoot Family			
Salsola tragus	Russian thistle	None	Introduced
Cucurbitaceae: Gourd Family			
Marah macrocarpa	wild cucumber	None	Native
Fabaceae: Legume Family			
Acacia baileyana	wattle	None	Introduced
Acmispon glaber	deerweed	None	Native
Parkinsonia aculeata	Mexican palo verde	None	Introduced
Gentianaceae: Gentian Family			
Zeltnera venusta	charming centaury	None	Native
Lamiaceae: Mint Family			
Salvia mellifera	black sage	None	Native

Scientific Name	Common Name	Status	Native or Introduced
Malvaceae: Mallow Family			
Malacothamnus fasciculatus	chaparral mallow	None	Native
Myrtaceae: Myrtle Family			
Eucalyptus globulus	blue gum	None	Introduced
Nyctaginaceae: Four-o'clock Family			
Mirabilis laevis	wishbone bush	None	Native
Phrymaceae: Lopseed Family			
Diplacus aurantiacus	sticky monkeyflower	None	Native
Pinaceae: Pine Family			
Pinus sp.	unknown ornamental pine	None	Introduced
Plantaginaceae: Plantain Family			
Antirrhinum nuttallianum	Nuttall's snapdragon	None	Native
Poaceae: Grass Family			
Arundo donax	giant reed	None	Introduced
Bromus diandrus	ripgut brome	None	Introduced
Bromus madritensis spp. *rubens*	red brome	None	Introduced
Pennisetum setaceum	fountain grass	None	Introduced
Polygonaceae: Buckwheat Family			
Eriogonum fasciculatum	California buckwheat	None	Native
Rosaceae: Rose Family			
Heteromeles arbutifolia	toyon	None	Native
Solanaceae: Nightshade Family			
Nicotiana glauca	tree tobacco	None	Introduced

[1] This includes Rincon Consultant's survey on October 24, 2018 and Helix Environmental Planning surveys on April 27, 2015 and December 4, 2017

Table C-2 Wildlife Species Observed within the Project Site During the Surveys for the Project[1]

Scientific Name	Common Name	Status	Native or Introduced
Birds			
Cathartes aura	turkey vulture	None	Native
Accipiter cooperii	Cooper's hawk	SSC	Native
Buteo jamaicensis	red-tailed hawk	None	Native
Zenaida macroura	mourning dove	None	Native
Aeronautes saxatalis	white-throated swift	None	Native
Chaetura vauxi	Vaux's swift	None	Native
Calypte anna	Anna's hummingbird	None	Native
Selasphorus sp.	Selasphorus	None	Native
Picoides nuttallii	Nuttall's woodpecker	None	Native
Sayornis nigricans	black phoebe	None	Native
Sayornis saya	Say's phoebe	None	Native
Tyrannus vociferans	Cassin's kingbird	None	Native

Scientific Name	Common Name	Status	Native or Introduced
Aphelocoma californica	California scrub-jay	None	Native
Corvus corax	common raven	None	Native
Corvus brachyrhynchos	American crow	None	Native
Stelgidopteryx serripennis	northern rough-winged swallow	None	Native
Hirundo rustica	barn swallow	None	Native
Psaltriparus minimus	bushtit	None	Native
Thryomanes bewickii	Bewick's wren	None	Native
Polioptila californica californica	coastal California gnatcatcher	FT and SSC	Native
Polioptila caerulea	blue-gray gnatcatcher	None	Native
Chamaea fasciata	wrentit	None	Native
Toxostoma redivivum	California thrasher	None	Native
Sturnus vulgaris	European starling	None	Introduced
Mimus polyglottos	northern mockingbird	None	Native
Setophaga coronata	yellow-rumped warbler	None	Native
Pipilo maculatus	spotted towhee	None	Native
Melozone crissalis	California towhee	None	Native
Melospiza melodia	song sparrow	None	Native
Zonotrichia leucophrys	white-crowned sparrow	None	Native
Haemorhous mexicanus	house finch	None	Native
Spinus psaltria	lesser goldfinch	None	Native
Reptiles			
Sceloporus occidentalis	western fence lizard	None	Native
Uta stansburiana elegans	western side-blotched lizard	None	Native
Mammals			
Sylvilagus audubonii	desert cottontail	None	Native
Spermophilus beecheyi	California ground squirrel	None	Native
Neotoma sp.	woodrat	SSC	Native

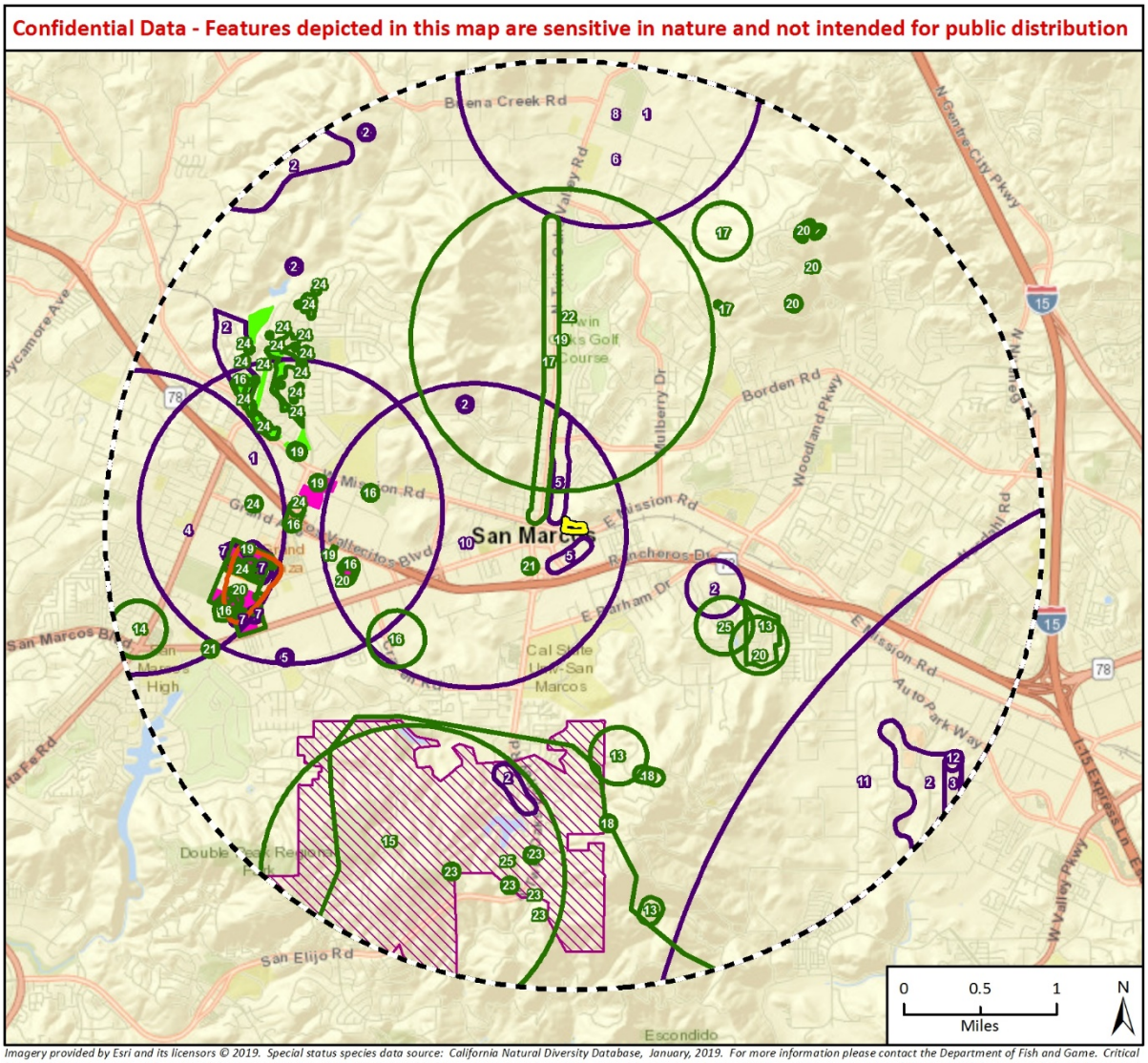
[1] This includes Rincon Consultant's survey on October 24, 2018 and Helix Environmental Planning surveys on April 27, 2015 and December 4, 2017

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Appendix D

Special Status Species Evaluation Tables

Figure D-1 CNDDB Records Within Three Miles of the Project Area



Imagery provided by Esri and its licensors © 2019. Special status species data source: California Natural Diversity Database, January, 2019. For more information please contact the Department of Fish and Game. Critical habitat data source: U.S. Fish and Wildlife Service, October, 2018. Final critical habitat acquired via the USFWS Critical Habitat Portal. It is only a general representation of the data and does not include all designated critical habitat. Contact USFWS for more specific data.

Project Impact Area
3-Mile Buffer

CNDDB*
Animals
Plants
Natural Communities

Critical Habitat
Coastal California gnatcatcher
San Diego fairy shrimp
Spreading navarretia
Thread-leaved brodiaea

**CNDDB version 1/2019. Please Note: The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDB about a species or an area can never be used as proof that no special status species occur in an area.*

1 - American badger
2 - coastal California gnatcatcher
3 - coastal whiptail
4 - hoary bat
5 - least Bell's vireo
6 - orange-throated whiptail
7 - San Diego fairy shrimp
8 - southern California legless lizard
9 - southern California rufous-crowned sparrow
10 - Townsend's big-eared bat
11 - tricolored blackbird
12 - western spadefoot
13 - Del Mar manzanita
14 - Encinitas baccharis
15 - felt-leaved monardella
16 - Orcutt's brodiaea
17 - Parry's tetracoccus
18 - Ramona horkelia
19 - San Diego button-celery
20 - San Diego thorn-mint
21 - southern tarplant
22 - spreading navarretia
23 - summer holly
24 - thread-leaved brodiaea
25 - wart-stemmed ceanothus
26 - San Diego Mesa Claypan Vernal Pool

BRAFigX CNDDB Disclaimer

Special Status Plant Species in the Regional Vicinity of the Project Area

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Plants and Lichens				
Abronia villosa var. *aurita* chaparral sand-verbena	None/None G5T2T3/S2 1B.1	Chaparral, coastal scrub, desert dunes. Sandy areas. -60-1570 m. annual herb. Blooms (Jan)Mar-Sep	No Potential	Suitable habitat is present in the project area, but the project is outside the known distribution of the species.
Acanthomintha ilicifolia San Diego thorn-mint	Threatened/ Endangered G1/S1 1B.1 MHCP Covered Species	Chaparral, coastal scrub, valley and foothill grassland, vernal pools. Endemic to active vertisol clay soils of mesas and valleys. Usually on clay lenses within grassland or chaparral communities. 25-945 m. annual herb. Blooms Apr-Jun	No Potential	The species' associated soils are not present in the project area.
Acmispon prostratus Nuttall's acmispon	None/None G1G2/S1 1B.1	Coastal dunes, coastal scrub. On sand dunes. 0-18 m. annual herb. Blooms Mar-Jun(Jul)	No Potential	Sand dunes are not present in the project area.
Adolphia californica California adolphia	None/None G3/S2 2B.1	Chaparral, Coastal Sage Scrub, valley and foothill grassland. From sandy/gravelly to clay soils within grassland, Coastal Sage Scrub, or chaparral; various exposures. 5-335 m. perennial deciduous shrub. Blooms Dec-May	No Potential	This conspicuous shrub species was not observed during any of the surveys.
Ambrosia pumila San Diego ambrosia	Endangered/None G1/S1 1B.1	Chaparral, coastal scrub, valley and foothill grassland. Sandy loam or clay soil; sometimes alkaline. In valleys; persists where disturbance has been superficial. Sometimes on margins or near vernal pools. 3-580 m. perennial rhizomatous herb. Blooms Apr-Oct	Low Potential	The disturbances in the project area have been substantial over a long period of time, which has resulted in non-native herbaceous annuals to dominate the understory in the Disturbed Habitat and within the openings of the Diegan Coastal Sage Scrub on the project area. Marginal habitat for the species is present and there are several recent records from within 10 miles of the project area; however, these occurrences are associated with lower level of disturbances (e.g. grazing).
Arctostaphylos glandulosa ssp. *crassifolia* Del Mar manzanita	Endangered/None G5T2/S2 1B.1 MHCP Covered Species	Chaparral. Sandy coastal mesas and ocean bluffs; in chaparral or Torrey pine forest. 30-365 m. perennial evergreen shrub. Blooms Dec-Jun	No Potential	This conspicuous shrub species was not observed during any of the surveys.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Arctostaphylos rainbowensis rainbow manzanita	None/None G2/S2 1B.1	Chaparral. Usually found in gabbro chaparral. 100-870 m. perennial evergreen shrub. Blooms Dec-Mar	No Potential	This conspicuous shrub species was not observed during any of the surveys.
Atriplex coulteri Coulter's saltbush	None/None G3/S1S2 1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, valley and foothill grassland. Ocean bluffs, ridgetops, as well as alkaline low places. Alkaline or clay soils. 2-460 m. perennial herb. Blooms Mar-Oct	No Potential	The species' associated topography is not present in the project area.
Atriplex pacifica south coast saltscale	None/None G4/S2 1B.2	Coastal scrub, coastal bluff scrub, playas, coastal dunes. Alkali soils. 1-400 m. annual herb. Blooms Mar-Oct	No Potential	The species' associated soils are not present in the project area.
Atriplex parishii Parish's brittlescale	None/None G1G2/S1 1B.1	Vernal pools, chenopod scrub, playas. Usually on drying alkali flats with fine soils. 5-1420 m. annual herb. Blooms Jun-Oct	No Potential	The species' associated habitat is not present in the project area.
Baccharis vanessae Encinitas baccharis	Threatened/ Endangered G1/S1 1B.1 MHCP Covered Species	Chaparral, cismontane woodland. On sandstone soils in steep, open, rocky areas with chaparral associates. 60-900 m. perennial deciduous shrub. Blooms Aug, Oct, Nov	No Potential	This conspicuous shrub species was not observed during any of the surveys.
Bloomeria clevelandii San Diego goldenstar	None/None G2/S2 1B.1	Chaparral, coastal scrub, valley and foothill grassland, vernal pools. Mesa grasslands, scrub edges; clay soils. Often on mounds between vernal pools in fine, sandy loam. 60-465 m. perennial bulbiferous herb. Blooms Apr-May	No Potential	The species' associated soils are not present in the project area.
Brodiaea filifolia thread-leaved brodiaea	Threatened/ Endangered G2/S2 1B.1	Chaparral (openings), cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools. Usually associated with annual grassland and vernal pools; often surrounded by shrubland habitats. Occurs in openings on clay soils. 15-1030 m. perennial bulbiferous herb. Blooms Mar-Jun	No Potential	The species' associated soils are not present in the project area.
Brodiaea orcuttii Orcutt's brodiaea	None/None G2/S2 1B.1	Vernal pools, valley and foothill grassland, closed-cone coniferous forest, cismontane woodland, chaparral, meadows and seeps. Mesic, clay habitats; usually in vernal pools and small drainages. 30-1615 m. perennial bulbiferous herb. Blooms May-Jul	No Potential	The species' associated soils are not present in the project area.
Calochortus dunnii Dunn's mariposa-lily	None/Rare G2G3/S2S3 1B.2	Closed-cone coniferous forest, chaparral, valley and foothill grassland. On gabbro or metavolcanic soils; also known from sandstone; often associated with chaparral. 255-1615 m. perennial bulbiferous herb. Blooms (Feb)Apr-Jun	No Potential	The species' associated habitat is not present in the project area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Ceanothus verrucosus wart-stemmed ceanothus	None/None G2/S2? 2B.2 MHCP Covered Species	Chaparral. 25-470 m. perennial evergreen shrub. Blooms Dec-May	No Potential	This conspicuous shrub species was not observed during any of the surveys.
Centromadia parryi ssp. *australis* southern tarplant	None/None G3T2/S2 1B.1	Marshes and swamps (margins), valley and foothill grassland, vernal pools. Often in disturbed sites near the coast at marsh edges; also in alkaline soils sometimes with saltgrass. Sometimes on vernal pool margins. 0-975 m. annual herb. Blooms May-Nov	No Potential	The species' associated habitat is not present in the project area.
Centromadia pungens ssp. *laevis* smooth tarplant	None/None G3G4T2/S2 1B.1	Valley and foothill grassland, chenopod scrub, meadows and seeps, playas, riparian woodland. Alkali meadow, alkali scrub; also in disturbed places. 5-1170 m. annual herb. Blooms Apr-Sep	No Potential	The species' associated habitat is not present in the project area.
Chaenactis glabriuscula var. *orcuttiana* Orcutt's pincushion	None/None G5T1T2/S1 1B.1	Coastal bluff scrub, coastal dunes. Sandy sites. 3-80 m. annual herb. Blooms Jan-Aug	No Potential	The species' associated habitat is not present in the project area.
Chorizanthe orcuttiana Orcutt's spineflower	Endangered/ Endangered G1/S1 1B.1 MHCP Covered Species	Coastal scrub, chaparral, closed-cone coniferous forest. Sandy sites and openings; sometimes in transition zones. 3-125 m. annual herb. Blooms Mar-May	No Potential	The project is outside the known range of the species, with most records being coastal.
Chorizanthe polygonoides var. *longispina* long-spined spineflower	None/None G5T3/S3 1B.2	Chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, vernal pools. Gabbroic clay. 30-1540 m. annual herb. Blooms Apr-Jul	No Potential	The species' associated soils are not present in the project area.
Clarkia delicata delicate clarkia	None/None G3/S3 1B.2	Cismontane woodland, chaparral. Often on gabbro soils. 50-1360 m. annual herb. Blooms Apr-Jun	No Potential	The species' associated habitat is not present in the project area.
Comarostaphylis diversifolia ssp. *diversifolia* summer holly	None/None G3T2/S2 1B.2 MHCP Covered Species	Chaparral, cismontane woodland. Often in mixed chaparral in California, sometimes post-burn. 30-945 m. perennial evergreen shrub. Blooms Apr-Jun	No Potential	This conspicuous shrub species was not observed during any of the surveys.
Corethrogyne filaginifolia var. *incana* San Diego sand aster	None/None G4T1Q/S1 1B.1	Coastal scrub, coastal bluff scrub, chaparral. Most sites are disturbed, so hard to tell. Possibly in disturbed sites and ecotones. 35-115 m. perennial herb. Blooms Jun-Sep	Medium Potential	Suitable habitat is present in the project area and the species is widespread throughout San Diego County.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Corethrogyne filaginifolia var. *linifolia* Del Mar Mesa sand aster	None/None G4T1T2Q/S1S2 1B.1 MHCP Covered Species	Chaparral, coastal scrub, coastal bluff scrub. In coastal, shrubby communities on maritime sediments and conglomerates; in openings. 15-150 m. perennial herb. Blooms May, Jul, Aug, and Sep	No Potential	The species' associated soils are not present in the project area.
Cryptantha wigginsii Wiggins' cryptantha	None/None G2/S1 1B.2	Coastal scrub. Often on clay soils. 45-110 m. annual herb. Blooms Feb-Jun	No Potential	The species' associated soils are not present in the project area.
Dudleya blochmaniae ssp. *blochmaniae* Blochman's dudleya	None/None G3T2/S2 1B.1	Coastal scrub, coastal bluff scrub, chaparral, valley and foothill grassland. Open, rocky slopes; often in shallow clays over serpentine or in rocky areas with little soil. 5-450 m. perennial herb. Blooms Apr-Jun	No Potential	The species' associated soils are not present in the project area.
Dudleya multicaulis many-stemmed dudleya	None/None G2/S2 1B.2	Chaparral, coastal scrub, valley and foothill grassland. In heavy, often clayey soils or grassy slopes. 15-790 m. perennial herb. Blooms Apr-Jul	No Potential	The species' associated soils are not present in the project area.
Dudleya variegata variegated dudleya	None/None G2/S2 1B.2	Chaparral, coastal scrub, cismontane woodland, valley and foothill grassland. In rocky or clay soils; sometimes associated with vernal pool margins. 3-550 m. perennial herb. Blooms Apr-Jun	No Potential	The species' associated soils are not present in the project area.
Dudleya viscida sticky dudleya	None/None G2/S2 1B.2	Coastal scrub, coastal bluff scrub, chaparral, cismontane woodland. On north and south-facing cliffs and banks. 20-870 m. perennial herb. Blooms May-Jun	No Potential	The species' associated topography is not present in the project area.
Ericameria palmeri var. *palmeri* Palmer's goldenbush	None/None G4T2?/S2 1B.1	Coastal scrub, chaparral. On granitic soils, on steep hillsides. Mesic sites. 5-625 m. perennial evergreen shrub. Blooms (Jul)Sep-Nov	No Potential	This conspicuous shrub species was not observed during any of the surveys.
Eryngium aristulatum var. *parishii* San Diego button-celery	Endangered/ Endangered G5T1/S1 1B.1	Vernal pools, coastal scrub, valley and foothill grassland. San Diego mesa hardpan and claypan vernal pools and southern interior basalt flow vernal pools; usually surrounded by scrub. 15-880 m. annual/perennial herb. Blooms Apr-Jun	No Potential	Vernal pools are not present in the project area.
Eryngium pendletonense Pendleton button-celery	None/None G1/S1 1B.1	Coastal bluff scrub, valley and foothill grassland, vernal pools. Clay. Vernally mesic sites. 20-30 m. perennial herb. Blooms Apr-Jun(Jul)	No Potential	The species' associated soils are not present in the project area.
Erysimum ammophilum sand-loving wallflower	None/None G2/S2 1B.2	Chaparral (maritime), coastal dunes, coastal scrub. Sandy openings. 5-130 m. perennial herb. Blooms Feb-Jun	No Potential	Suitable habitat is present in the project area, but the species does not have recorded occurrences within 10 miles of the project.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Euphorbia misera cliff spurge	None/None G5/S2 2B.2 MHCP Covered Species	Coastal bluff scrub, coastal scrub, Mojavean desert scrub. Rocky sites. 3-430 m. perennial shrub. Blooms Dec-Aug(Oct)	No Potential	Suitable habitat is present in the project area, but the species does not have recorded occurrences within 10 miles of the project. Most records are coastal.
Ferocactus viridescens San Diego barrel cactus	None/None G3?/S2S3 2B.1 MHCP Covered Species	Chaparral, coastal scrub, valley and foothill grassland. Often on exposed, level or south-sloping areas; often in coastal scrub near crest of slopes. 3-490 m. perennial stem succulent. Blooms May-Jun	No Potential	This conspicuous species was not observed during any of the surveys.
Hazardia orcuttii Orcutt's hazardia	None/Threatened G1/S1 1B.1 MHCP Covered Species	Chaparral, coastal scrub. Often on clay; in grassy edges of chaparral and coastal scrub. 5-85 m. perennial evergreen shrub. Blooms Aug-Oct	No Potential	The species' associated soils are not present in the project area.
Heterotheca sessiliflora ssp. *sessiliflora* beach golden aster	None/None G4T2T3/S1 1B.1	Coastal dunes, coastal scrub, chaparral (coastal). Sandy sites. 0-5 m. perennial herb. Blooms Mar-Dec	No Potential	Suitable habitat is present in the project area, but the species does not have recorded occurrences within 10 miles of the project.
Horkelia cuneata var. *puberula* mesa horkelia	None/None G4T1/S1 1B.1	Chaparral, cismontane woodland, coastal scrub. Sandy or gravelly sites. 15-1645 m. perennial herb. Blooms Feb-Jul(Sep)	No Potential	Suitable habitat is present in the project area, but the species does not have recorded occurrences within 10 miles of the project.
Horkelia truncata Ramona horkelia	None/None G3/S3 1B.3	Chaparral, cismontane woodland. Habitats in California include: mixed chaparral, vernal streams, and disturbed areas near roads. Clay soil; at least sometimes on gabbro. 380-1190 m. perennial herb. Blooms May-Jun	No Potential	The species' associated soils are not present in the project area.
Isocoma menziesii var. *decumbens* decumbent goldenbush	None/None G3G5T2T3/S2 1B.2	Coastal scrub, chaparral. Sandy soils; often in disturbed sites. 1-915 m. perennial shrub. Blooms Apr-Nov	No Potential	*I. m.* var. *menziesii* was identified as occurring on the project based upon the plants being glabrous or slightly hairy, sometimes resinous, as opposed to I. m. var. decumbens being prominently long-soft-hairy or tomentosa.
Iva hayesiana San Diego marsh-elder	None/None G3/S2 2B.2 MHCP Covered Species	Marshes and swamps, playas. Riverwashes. 1-430 m. perennial herb. Blooms Apr-Oct	No Potential	The species' associated habitat is not present in the project area.

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Lasthenia glabrata ssp. *coulteri* Coulter's goldfields	None/None G4T2/S2 1B.1	Coastal salt marshes, playas, vernal pools. Usually found on alkaline soils in playas, sinks, and grasslands. 1-1375 m. annual herb. Blooms Feb-Jun	No Potential	The species' associated habitat is not present in the project area.
Lepechinia cardiophylla heart-leaved pitcher sage	None/None G3/S2S3 1B.2	Closed-cone coniferous forest, chaparral, cismontane woodland. 520-1370 m. perennial shrub. Blooms Apr-Jul	No Potential	The species' associated habitat is not present in the project area.
Leptosyne maritima sea dahlia	None/None G2/S1 2B.2	Coastal scrub, coastal bluff scrub. Occurs on a variety of soil types, including sandstone. 5-185 m. perennial herb. Blooms Mar-May	No Potential	Suitable habitat is present in the project area, but the project is outside the known distribution of the species. Occurrences are closer to the coast.
Monardella hypoleuca ssp. *intermedia* intermediate monardella	None/None G4T2?/S2? 1B.3	Chaparral, cismontane woodland, lower montane coniferous forest (sometimes). Often in steep, brushy areas. 195-16750 m. perennial rhizomatous herb. Blooms Apr-Sep	No Potential	The species' associated habitat is not present in the project area.
Monardella hypoleuca ssp. *lanata* felt-leaved monardella	None/None G4T3/S3 1B.2	Chaparral, cismontane woodland. Occurs in understory in mixed chaparral, chamise chaparral, and southern oak woodland; sandy soil. 425-1585 m. perennial rhizomatous herb. Blooms Jun-Aug	No Potential	The species' associated habitat is not present in the project area.
Nama stenocarpa mud nama	None/None G4G5/S1S2 2B.2	Marshes and swamps. Lake shores, river banks, intermittently wet areas. 5-500 m. annual/perennial herb. Blooms Jan-Jul	No Potential	The species' associated habitat is not present in the project area.
Navarretia fossalis spreading navarretia	Threatened/None G2/S2 1B.1 MHCP Covered Species	Vernal pools, chenopod scrub, marshes and swamps, playas. San Diego hardpan and San Diego claypan vernal pools; in swales and vernal pools, often surrounded by other habitat types. 15-850 m. annual herb. Blooms Apr-Jun	No Potential	The species' associated habitat is not present in the project area.
Nemacaulis denudata var. *denudata* coast woolly-heads	None/None G3G4T2/S2 1B.2	Coastal dunes. 0-100 m. annual herb. Blooms Apr-Sep	No Potential	The species' associated habitat is not present in the project area.
Nemacaulis denudata var. *gracilis* slender cottonheads	None/None G3G4T3?/S2 2B.2	Coastal dunes, desert dunes, Sonoran desert scrub. In dunes or sand. -50-400 m. annual herb. Blooms (Mar)Apr-May	No Potential	The species' associated habitat is not present in the project area.
Nolina cismontana chaparral nolina	None/None G3/S3 1B.2	Chaparral, coastal scrub. Primarily on sandstone and shale substrates; also known from gabbro. 140-1275 m. perennial evergreen shrub. Blooms (Mar)May-Jul	No Potential	This conspicuous species was not observed during any of the surveys.

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Orcuttia californica California Orcutt grass	Endangered/ Endangered G1/S1 1B.1 MHCP Covered Species	Vernal pools. 10-660 m. annual herb. Blooms Apr-Aug	No Potential	The species' associated habitat is not present in the project area.
Pinus torreyana ssp. *torreyana* Torrey pine	None/None G1T1/S1 1B.2 MHCP Covered Species	Closed-cone coniferous forest, chaparral. On dry, sandstone slopes. 70-160 m. perennial evergreen tree.	No Potential	This conspicuous tree species was not observed during any of the surveys.
Pogogyne abramsii San Diego mesa mint	Endangered/ Endangered G1/S1 1B.1	Vernal pools. Vernal pools within grasslands, chamise chaparral, or Coastal Sage Scrub communities. 70-195 m. annual herb. Blooms Mar-Jul	No Potential	The species' associated habitat is not present in the project area.
Pseudognaphalium leucocephalum white rabbit-tobacco	None/None G4/S2 2B.2	Riparian woodland, cismontane woodland, coastal scrub, chaparral. Sandy, gravelly sites. 35-515 m. perennial herb. Blooms (Jul)Aug-Nov(Dec)	No Potential	Suitable habitat is present in the project area, but the species does not have recorded occurrences within 10 miles of the project.
Quercus dumosa Nuttall's scrub oak	None/None G3/S3 1B.1 MHCP Covered Species	Closed-cone coniferous forest, chaparral, coastal scrub. Generally on sandy soils near the coast; sometimes on clay loam. 15-640 m. perennial evergreen shrub. Blooms Feb-Apr(May-Aug)	No Potential	This conspicuous tree species was not observed during any of the surveys.
Salvia munzii Munz's sage	None/None G2/S2 2B.2	Coastal scrub, chaparral. Rolling hills and slopes, in rocky soil. 35-575 m. perennial evergreen shrub. Blooms Feb-Apr	No Potential	This conspicuous shrub species was not observed during any of the surveys.
Sidalcea neomexicana salt spring checkerbloom	None/None G4/S2 2B.2	Playas, chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub. Alkali springs and marshes. 3-2380 m. perennial herb. Blooms Mar-Jun	No Potential	The species' associated habitat is not present in the project area.
Stemodia durantifolia purple stemodia	None/None G5/S2 2B.1	Sonoran desert scrub. Sandy soils; mesic sites. 35-385 m. perennial herb. Blooms (Jan) Apr, Jun, Aug, Sep, Oct, Dec	No Potential	The species' associated habitat is not present in the project area.
Suaeda esteroa estuary seablite	None/None G3/S2 1B.2	Marshes and swamps. Coastal salt marshes in clay, silt, and sand substrates. 0-80 m. perennial herb. Blooms (May)Jul-Oct(Jan)	No Potential	The species' associated habitat is not present in the project area.

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Tetracoccus dioicus Parry's tetracoccus	None/None G3?/S2 1B.2 MHCP Covered Species	Chaparral, coastal scrub. Stony, decomposed gabbro soil. 135-705 m. perennial deciduous shrub. Blooms Apr-May	No Potential	This conspicuous shrub species was not observed during any of the surveys.
Invertebrates				
Bombus crotchii Crotch bumble bee	None/None G3G4/S1S2 None	Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia, and Eriogonum.	Low Potential	Eriogonum fasciculatum is present in the project area, but little is known about the natural history of the species.
Branchinecta lynchi vernal pool fairy shrimp	Threatened/None G3/S3 None	Endemic to the grasslands of the Central Valley, Central Coast mountains, and South Coast mountains, in astatic rain-filled pools. Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	No Potential	The species' associated habitat is not present in the project area.
Branchinecta sandiegonensis San Diego fairy shrimp	Endangered/ None G2/S2 None	Endemic to San Diego and Orange County mesas. Vernal pools.	No Potential	The species' associated habitat is not present in the project area.
Cicindela senilis frosti senile tiger beetle	None/None G2G3T1T3/S1 None	Inhabits marine shoreline, from Central California coast south to salt marshes of San Diego. Also found at Lake Elsinore Inhabits dark-colored mud in the lower zone and dried salt pans in the upper zone.	No Potential	The species' associated habitat is not present in the project area.
Danaus plexippus pop. 1 monarch - California overwintering population	None/None G4T2T3/S2S3 None	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	No Potential	Only a few *Eucalyptus globulus* are found in the project area.
Streptocephalus woottoni Riverside fairy shrimp	Endangered/ None G1G2/S1S2 None MHCP Covered Species	Endemic to Western Riverside, Orange, and San Diego counties in areas of tectonic swales/earth slump basins in grassland and Coastal Sage Scrub. Inhabit seasonally astatic pools filled by winter/spring rains. Hatch in warm water later in the season.	No Potential	The species' associated habitat is not present in the project area.
Tryonia imitator mimic tryonia (=California brackish water snail)	None/None G2/S2 None	Inhabits coastal lagoons, estuaries and salt marshes, from Sonoma County south to San Diego County. Found only in permanently submerged areas in a variety of sediment types; able to withstand a wide range of salinities.	No Potential	The species' associated habitat is not present in the project area.

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Fish				
Eucyclogobius newberryi tidewater goby	Endangered/ None G3/S3 SSC	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water and high oxygen levels.	No Potential	The species' associated habitat is not present in the project area.
Gila orcuttii arroyo chub	None/None G2/S2 SSC	Native to streams from Malibu Creek to San Luis Rey River basin. Introduced into streams in Santa Clara, Ventura, Santa Ynez, Mojave and San Diego river basins. Slow water stream sections with mud or sand bottoms. Feeds heavily on aquatic vegetation and associated invertebrates.	No Potential	The species' associated habitat is not present in the project area.
Amphibians				
Anaxyrus californicus arroyo toad	Endangered/ None G2G3/S2S3 SSC	Semi-arid regions near washes or intermittent streams, including valley-foothill and desert riparian, desert wash, etc. Rivers with sandy banks, willows, cottonwoods, and sycamores; loose, gravelly areas of streams in drier parts of range.	No Potential	The species' associated habitat is not present in the project area.
Spea hammondii western spadefoot	None/None G3/S3 SSC MHCP Covered Species	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	No Potential	The species' associated habitat is not present in the project area.
Reptiles				
Anniella stebbinsi southern California legless lizard	None/None G3/S3 SSC	Generally south of the Transverse Range, extending to northwestern Baja California. Occurs in sandy or loose loamy soils under sparse vegetation. Disjunct populations in the Tehachapi and Piute Mountains in Kern County. Variety of habitats; generally in moist, loose soil. They prefer soils with a high moisture content.	No Potential	The species' associated habitat is not present in the project area.
Arizona elegans occidentalis California glossy snake	None/None G5T2/S2 SSC	Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja California. Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	Low Potential	Suitable habitat is present in the project area, but the species does not have recorded occurrences within five miles of the project.
Aspidoscelis hyperythra orange-throated whiptail	None/None G5/S2S3 WL MHCP Covered Species	Inhabits low-elevation coastal scrub, chaparral, and valley-foothill hardwood habitats. Prefers washes and other sandy areas with patches of brush and rocks. Perennial plants necessary for its major food: termites.	High Potential	This species has previously been observed on the parcel to the east of the project, which has since been developed.

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Aspidoscelis tigris stejnegeri coastal whiptail	None/None G5T5/S3 SSC	Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland and riparian areas. Ground may be firm soil, sandy, or rocky.	High Potential	The species was overserved on the property to the east of the project area.
Crotalus ruber red-diamond rattlesnake	None/None G4/S3 SSC	Chaparral, woodland, grassland, and desert areas from coastal San Diego County to the eastern slopes of the mountains. Occurs in rocky areas and dense vegetation. Needs rodent burrows, cracks in rocks or surface cover objects.	Low Potential	Suitable habitat is present in the project area, but the species does not have recorded occurrences within five miles of the project.
Emys marmorata western pond turtle	None/None G3G4/S3 SSC MHCP Covered Species	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	No Potential	The species' associated habitat is not present in the project area.
Phrynosoma blainvillii coast horned lizard	None/None G3G4/S3S4 SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	Low Potential	Suitable habitat is present in the project area, but the species does not have recorded occurrences within five miles of the project.
Plestiodon skiltonianus interparietalis Coronado skink	None/None G5T5/S2S3 WL	Grassland, chaparral, pinon-juniper and juniper sage woodland, pine-oak and pine forests in Coast Ranges of Southern California. Prefers early successional stages or open areas. Found in rocky areas close to streams and on dry hillsides.	No Potential	The species' associated habitat is not present in the project area.
Salvadora hexalepis virgultea coast patch-nosed snake	None/None G5T4/S2S3 SSC	Brushy or shrubby vegetation in coastal Southern California. Require small mammal burrows for refuge and overwintering sites.	Low Potential	Suitable habitat is present in the project area, but the species does not have recorded occurrences within five miles of the project.
Thamnophis hammondii two-striped gartersnake	None/None G4/S3S4 SSC	Coastal California from vicinity of Salinas to northwest Baja California. From sea to about 7,000 ft elevation. Highly aquatic, found in or near permanent fresh water. Often along streams with rocky beds and riparian growth.	No Potential	The species' associated habitat is not present in the project area.
Thamnophis sirtalis pop. 1 south coast gartersnake	None/None G5T1T2/S1S2 SSC	Southern California coastal plain from Ventura County to San Diego County, and from sea level to about 850 m. Marsh and upland habitats near permanent water with good strips of riparian vegetation.	No Potential	The species' associated habitat is not present in the project area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Birds				
Accipiter cooperii Cooper's hawk	None/None G5/S4 WL MHCP Covered Species	Woodland, chiefly of open, interrupted or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.	Present	The species was observed as a transient on the project area; however, the species' associated nesting habitat is not present on site.
Agelaius tricolor tricolored blackbird	None/Threatened G2G3/S1S2 SSC	Highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Aimophila ruficeps canescens southern California rufous-crowned sparrow	None/None G5T3/S3 WL MHCP Covered Species	Resident in Southern California Coastal Sage Scrub and sparse mixed chaparral. Frequents relatively steep, often rocky hillsides with grass and forb patches.	Low Potential	The species is typically associated with much steeper hillsides than what is found in the project area.
Aquila chrysaetos golden eagle	None/None G5/S3 FP, WL	Rolling foothills, mountain areas, sage-juniper flats, and desert. Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Artemisiospiza belli belli Bell's sage sparrow	None/None G5T2T4/S3 WL MHCP Covered Species	Nests in chaparral dominated by fairly dense stands of chamise. Found in Coastal Sage Scrub in south of range. Nest located on the ground beneath a shrub or in a shrub 6-18 inches above ground. Territories about 50 yds apart.	Low Potential	Marginal habitat for the species is found in the project area.
Athene cunicularia burrowing owl	None/None G4/S3 SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	No Potential	The species' associated nesting and foraging habitat is not present in the project area. No suitable burrows were identified during the survey. There are no records less than 90 years old within 10 miles of the project area.
Buteo swainsoni Swainson's hawk	None/Threatened G5/S3 None	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Campylorhynchus brunneicapillus sandiegensis coastal cactus wren	None/None G5T3Q/S3 SSC MHCP Covered Species	Southern California Coastal Sage Scrub. Wrens require tall *Opuntia* sp. cactus for nesting and roosting.	No Potential	There are a few scattered *Opuntia* sp. within the Diegan Coastal Sage Scrub in the project area; but no large stands suitable for occupation by the species
Charadrius alexandrinus nivosus western snowy plover	Threatened/None G3T3/S2S3 SSC MHCP Covered Species	Sandy beaches, salt pond levees and shores of large alkali lakes. Needs sandy, gravelly or friable soils for nesting.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Circus hudsonius northern harrier	None/None G5/S3 SSC	Coastal salt and freshwater marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Coccyzus americanus occidentalis western yellow-billed cuckoo	Threatened/ Endangered G5T2T3/S1 None	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems. Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Elanus leucurus white-tailed kite	None/None G5/S3S4 FP	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Empidonax traillii extimus southwestern willow flycatcher	Endangered/ Endangered G5T2/S1 None MHCP Covered Species	Riparian woodlands in Southern California.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Eremophila alpestris actia California horned lark	None/None G5T4Q/S4 WL	Coastal regions, chiefly from Sonoma County to San Diego County. Also main part of San Joaquin Valley and east to foothills. Short-grass prairie, "bald" hills, mountain meadows, open coastal plains, fallow grain fields, alkali flats.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Icteria virens yellow-breasted chat	None/None G5/S3 SSC MHCP Covered Species	Summer resident; inhabits riparian thickets of willow and other brushy tangles near watercourses. Nests in low, dense riparian, consisting of willow, blackberry, wild grape; forages and nests within 10 ft of ground.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Ixobrychus exilis least bittern	None/None G5/S2 SSC	Colonial nester in marshlands and borders of ponds and reservoirs which provide ample cover. Nests usually placed low in tules, over water.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Laterallus jamaicensis coturniculus California black rail	None/Threatened G3G4T1/S1 FP	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Passerculus sandwichensis beldingi Belding's savannah sparrow	None/ Endangered G5T3/S3 None	Inhabits coastal salt marshes, from Santa Barbara south through San Diego County. Nests in Salicornia on and about margins of tidal flats.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Plegadis chihi white-faced ibis	None/None G5/S3S4 WL MHCP Covered Species	Shallow freshwater marsh. Dense tule thickets for nesting, interspersed with areas of shallow water for foraging.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Polioptila californica californica coastal California gnatcatcher	Threatened/None G4G5T2Q/S2 SSC MHCP Covered Species	Obligate, permanent resident of Coastal Sage Scrub below 2500 ft in Southern California. Low, Coastal Sage Scrub in arid washes, on mesas and slopes. Not all areas classified as Coastal Sage Scrub are occupied.	High Potential	The species was observed to the north of the project area during protocol surveys conducted in 2018.
Rallus obsoletus levipes light-footed Ridgway's rail	Endangered/ Endangered G5T1T2/S1 FP	Found in salt marshes traversed by tidal sloughs, where cordgrass and pickleweed are the dominant vegetation. Requires dense growth of either pickleweed or cordgrass for nesting or escape cover; feeds on molluscs and crustaceans.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Riparia riparia bank swallow	None/Threatened G5/S2 None	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Setophaga petechia yellow warbler	None/None G5/S3S4 SSC	Riparian plant associations in close proximity to water. Also nests in montane shrubbery in open conifer forests in Cascades and Sierra Nevada. Frequently found nesting and foraging in willow shrubs and thickets, and in other riparian plants including cottonwoods, sycamores, ash, and alders.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Sternula antillarum browni California least tern	Endangered/ Endangered G4T2T3Q/S2 FP MHCP Covered Species	Nests along the coast from San Francisco Bay south to northern Baja California. Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, landfills, or paved areas.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Vireo bellii pusillus least Bell's vireo	Endangered/ Endangered G5T2/S2 None MHCP Covered Species	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	No Potential	The species' associated nesting and foraging habitat is not present in the project area.
Mammals				
Antrozous pallidus pallid bat	None/None G5/S3 SSC	Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	No Potential	The species associated roosting habitat is not present in the project area.
Chaetodipus californicus femoralis Dulzura pocket mouse	None/None G5T3/S3 SSC	Variety of habitats including coastal scrub, chaparral and grassland in San Diego County. Attracted to grass-chaparral edges.	Low Potential	The local recorded occurrences of the species are from chaparral habitats.
Chaetodipus fallax fallax northwestern San Diego pocket mouse	None/None G5T3T4/S3S4 SSC MHCP Covered Species	Coastal scrub, chaparral, grasslands, sagebrush, etc. in western San Diego County. Sandy, herbaceous areas, usually in association with rocks or coarse gravel.	Low Potential	The local recorded occurrences of the species are from chaparral habitats.
Choeronycteris mexicana Mexican long-tongued bat	None/None G4/S1 SSC	Occasionally found in San Diego County, which is on the periphery of their range. Feeds on nectar and pollen of night-blooming succulents. Roosts in relatively well-lit caves, and in and around buildings.	No Potential	The species associated roosting habitat is not present in the project area.
Corynorhinus townsendii Townsend's big-eared bat	None/None G3G4/S2 SSC	Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings of caves and abandoned buildings. Roosting sites limiting. Extremely sensitive to human disturbance.	No Potential	The species associated roosting habitat is not present in the project area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Dipodomys stephensi Stephens' kangaroo rat	Endangered/ Threatened G2/S2 None MHCP Covered Species	Primarily annual and perennial grasslands, but also occurs in coastal scrub and sagebrush with sparse canopy cover. Prefers buckwheat, chamise, brome grass and filaree. Will burrow into firm soil.	No Potential	The project area is outside the known range of the species.
Eumops perotis californicus western mastiff bat	None/None G5T4/S3S4 SSC	Many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, chaparral, etc. Roosts in crevices in cliff faces, high buildings, broad-leaved trees and tunnels.	No Potential	The species associated roosting habitat is not present in the project area.
Lasiurus cinereus hoary bat	None/None G5/S4 None	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.	Low Potential	Individuals of the species could potentially use the trees in the project for night roosts, but winter and maternal roosting by the species is not expected.
Lasiurus xanthinus western yellow bat	None/None G5/S3 SSC	Found in valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. Roosts in broad-leaved trees, particularly palms. Forages over water and among trees.	No Potential	The species associated roosting habitat is not present in the project area.
Leptonycteris yerbabuenae lesser long-nosed bat	Endangered/ None G4/S1 None	Arid regions such as desert grasslands and shrub land. Suitable day roosts (caves and mines) and suitable concentrations of food plants (columnar cacti and agaves) are critical resources. No maternity roosts known from California; may only be vagrant. Caves and mines are used as day roosts. Caves, mines, rock crevices, trees and shrubs, and abandoned buildings are used as night roosts for digesting meals. Nectar, pollen, and fruit eating bat; primarily feeding on agaves, saguaro, and organ pipe cactus.	Low Potential	Individuals of the species could potentially use the trees in the project area for night roosts, but winter and maternal roosting by the species is not expected.
Lepus californicus bennettii San Diego black-tailed jackrabbit	None/None G5T3T4/S3S4 SSC MHCP Covered Species	Intermediate canopy stages of shrub habitats and open shrub/herbaceous and tree/herbaceous edges. Coastal Sage Scrub habitats in Southern California.	No Potential	The Diegan sage scrub in the project area is mature and dense, and the project area is surrounded by urban development and busy roadways.
Neotoma lepida intermedia San Diego desert woodrat	None/None G5T3T4/S3S4 SSC	Coastal scrub of Southern California from San Diego County to San Luis Obispo County. Moderate to dense canopies preferred. They are particularly abundant in rock outcrops, rocky cliffs, and slopes.	High Potential	Woodrat middens were identified during the surveys of the project area and associated habitat is present.
Nyctinomops femorosaccus pocketed free-tailed bat	None/None G4/S3 SSC	Variety of arid areas in Southern California; pine-juniper woodlands, desert scrub, palm oasis, desert wash, desert riparian, etc. Rocky areas with high cliffs.	No Potential	The species associated roosting habitat is not present in the project area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Nyctinomops macrotis big free-tailed bat	None/None G5/S3 SSC	Low-lying arid areas in Southern California. Need high cliffs or rocky outcrops for roosting sites. Feeds principally on large moths.	No Potential	The species associated roosting habitat is not present in the project area.
Perognathus longimembris pacificus Pacific pocket mouse	Endangered/ None G5T1/S1 SSC	Inhabits the narrow coastal plains from the Mexican border north to El Segundo, Los Angeles County. Seems to prefer soils of fine alluvial sands near the ocean, but much remains to be learned.	No Potential	This species is only known from three viable populations: Dana Point, San Mateo Creek, and Camp Pendleton. Suitable soils not found on the project area.
Taxidea taxus American badger	None/None G5/S3 SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	No Potential	No diagnostic sign of the species (e.g., burrows or digs) were identified in the project area.
Sensitive Natural Communities				
Maritime Succulent Scrub Maritime Succulent Scrub	None/None G2/S1.1		No Potential	The community's plant species were not identified in the project area.
San Diego Mesa Claypan Vernal Pool San Diego Mesa Claypan Vernal Pool	None/None GNR/SNR		No Potential	The community's plant species were not identified in the project area.
San Diego Mesa Hardpan Vernal Pool San Diego Mesa Hardpan Vernal Pool	None/None G2/S2.1		No Potential	The community's plant species were not identified in the project area.
Southern Coast Live Oak Riparian Forest Southern Coast Live Oak Riparian Forest	None/None G4/S4		No Potential	The community's plant species were not identified in the project area.
Southern Coastal Salt Marsh Southern Coastal Salt Marsh	None/None G2/S2.1		No Potential	The community's plant species were not identified in the project area.
Southern Cottonwood Willow Riparian Forest Southern Cottonwood Willow Riparian Forest	None/None G3/S3.2		No Potential	The community's plant species were not identified in the project area.

Scientific Name Common Name	Status	Habitat Requirements	Potential to Occur in Project Area	Habitat Suitability/ Observations
Southern Maritime Chaparral Southern Maritime Chaparral	None/None G1/S1.1		No Potential	The community's plant species were not identified in the project area.
Southern Riparian Forest Southern Riparian Forest	None/None G4/S4		No Potential	The community's plant species were not identified in the project area.
Southern Riparian Scrub Southern Riparian Scrub	None/None G3/S3.2		No Potential	The community's plant species were not identified in the project area.
Southern Sycamore Alder Riparian Woodland Southern Sycamore Alder Riparian Woodland	None/None G4/S4		No Potential	The community's plant species were not identified in the project area.
Southern Willow Scrub Southern Willow Scrub	None/None G3/S2.1		No Potential	The community's plant species were not identified in the project area.

Appendix E

2018 Coastal California Gnatcatcher (*Polioptila californica californica*) Protocol Survey Results for the Mission 316 Project

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November 29, 2018

Ms. Stacey Love
Recovery Permit Coordinator
Department of Interior
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

Subject: **2018 Coastal California Gnatcatcher (*Polioptila californica californica*) Protocol Survey Results for the Mission 316 Project, San Marcos, California**

Dear Ms. Love,

This report documents the results of protocol coastal California gnatcatcher surveys conducted in 2018 by Monica Alfaro (TE-051242) and Alicia Cooper Hill (06145B) in San Marcos, California (Figure 1). The surveys were conducted in support of the Mission 316 Project (Project). Under the proposed Project, 67 two-and three-bedroom units of multiple family housing, access roads and parking areas would be constructed. A 150-foot fire clearing area is also included as part of the project. The project area consists of 4.34-acres of undeveloped lands supporting coastal sage scrub and other vegetation communities. Diegan coastal sage scrub occurring within the project area in addition to habitat located within 500 feet of the project boundary were surveyed for gnatcatcher.

Project Area Location

The Project area is located in the City of San Marcos, immediately adjacent to the northeastern corner of the Woodward Street and E. Mission Road intersection. Specifically, the survey area is in Township 12 South and Range 3 West of the San Marcos U.S. Geological Survey 7.5 Quadrangle Map (Figure 2). The Survey Area was accessed from Woodward Street and unofficial paths.

Environmental Setting

The 28-acre survey area which includes habitat up to 500-feet of the project area is bound to the south by E. Mission Road and is bisected by Woodward Street. Residential and commercial development surround the Survey Area which is undeveloped. It appears that the southeastern portion of the project area supported structures in the past as evidenced by concrete slabs and other indicators. Vegetation communities observed within the Survey Area included coastal sage scrub, ruderal habitat and southern willow scrub. Coastal sage scrub was dominated by California sagebrush (*Artemisia californica*), buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*) and black sage (*Salvia mellifera*). Coastal sage scrub occurring in the southern portion of the survey area which occurred on a south facing slope was not as tall as coastal sage scrub occurring at the northern portion. Southern willow scrub habitat occurs at the western portion of the survey area and is associated with San Marcos Creek. Ruderal areas supported short-pod mustard (*Hirschfeldia incana*), arundo (*Arundo donax*) and other invasive plant species. Elevation on-site ranges from 575 to 750 feet (ft) above mean sea level (AMSL).

Coastal California Gnatcatcher Biology

The coastal California gnatcatcher is a small, grey, non-migratory songbird that generally occurs in sage scrub habitats throughout southern California and northern Baja California, Mexico. This insectivorous bird preys on small insects on the ground and in shrubs. In addition to coastal sage scrub, the coastal California gnatcatcher can be found in other habitats that are similar in structure to coastal sage scrub such as coastal sage-chaparral scrub, chamise chaparral, and southern maritime chaparral (Campbell et al. 1998, Bontrager 1991). The coastal California gnatcatcher was afforded federal protection in 1993 when the U.S. Fish and Wildlife Service (USFWS) listed this species as threatened. It is considered a California Department of Fish and Wildlife Species of Special Concern. Critical habitat was designated for this species in 2000 and revised in 2007 (USFWS 2000, USFWS 2007).

The historical range of coastal California gnatcatchers extends from southern Ventura County southward through Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties, and into Baja California, Mexico, to approximately 30 degrees north latitude near El Rosario (Atwood 1990). Habitat loss, fragmentation and urban encroachment have led to this species' decline (USFWS 1993). Parasitism by brown-headed cowbird (*Malothrus ater*) also poses a threat to this species (Unitt 2004). In 2003, the Cedar Fire destroyed almost 28% of the remaining habitat that the USFWS believed to be suitable for the coastal California gnatcatcher (Bond and Bradley 2003). In October 2007, several fires burned approximately 369,000 acres in San Diego County.

Methods

A total of nine surveys were completed per the recommendation of USFWS staff via electronic correspondence. All surveys were conducted in accordance with USFWS protocol requirements (USFWS 1997). Pre-recorded coastal California gnatcatcher vocalizations were played throughout the entire project area during the first survey. After the first survey, vocalizations were only played in areas where gnatcatcher had not been detected. All surveys were conducted in the morning between 0600 and 1200, when gnatcatchers are most active. Surveys were not conducted during inclement weather such as extreme hot or cold temperatures, fog, high winds, or rain (Table 1). Approximately 28 acres were surveyed. A summary of survey dates, time, and weather conditions is presented in Table 1. Other wildlife species detected during the surveys were also documented.

Table 1. Survey Dates, Times, and Weather Conditions

Survey	Date	Time	Weather Conditions	Biologists
1	08/01/18	0615-0840	68°-83° F, 0-1 mph, 0% Cover	M. Alfaro, T. Easley
2	08/15/18	0600-0815	70°-73° F, 0-1 mph, 100-85% Cover	M. Alfaro, J. Kendrick
3	08/29/18	0615-0900	62°-71° F, 0-1 mph, 15-5% Cover	M. Alfaro, J. Kendrick, E. Eidson
4	09/12/18	0615-0845	76°-77° F, 0-1 mph, 100-60% Cover	M. Alfaro
5	09/26/18	0735-0945	72°-73° F, 1-3 mph, 100-50% Cover	A. Cooper Hill
6	10/10/18	0810-1025	77°-80° F, 1-3mph, 80-15% Cover	A. Cooper Hill, J. Kendrick
7	10/24/18	0820-1025	78°-80° F, 0-1 mph, 100-30% Cover	A. Cooper Hill
8	11/07/18	0730-0950	76°-77° F, 1-4 mph, 100-60% Cover	A. Cooper Hill
9	11/21/18	0615-0835	47°-53° F, 1-3 mph, 10% Cloud Cover	Monica Alfaro

Results

One pair of coastal California gnatcatchers (CAGN) and one individual CAGN were observed during the surveys (Figure 3). A pair of CAGN was detected during the first five surveys and on the last one. During Survey 1, a fledgling was observed with the CAGN pair. The family group was foraging in coastal sage scrub in the central portion of the Survey Area. During the following three surveys, the CAGN pair was observed in the central portion of the Survey Area for a brief period at the start of the survey. Shortly thereafter, the CAGN pair moved east along the south facing slope to a small patch of coastal sage scrub outside of the survey area. This patch of coastal sage scrub receives irrigation from a neighboring residential area and likely provides better foraging opportunities. On Survey 5, the CAGN pair was only detected outside of the survey area in the irrigated coastal sage scrub. No CAGN were detected during Surveys 6, 7, and 8 which had a later start time than previous surveys. On Survey 9, the CAGN pair was detected in the central portion of the Survey Area. The pair was in the area briefly prior to making its way east along the south facing slope to the irrigated coastal sage scrub. The fledgling was only detected during the first survey. A CAGN individual was observed in the western portion of the survey area near San Marcos Creek during survey 1. CAGN was not detected in the western portion of the Survey Area during the remaining surveys. Survey results are summarized in Table 2.

Table 2. Summary of Survey Results

Survey #	Date	CAGN Pair	CAGN Individual
1	08/01/18	Detected with fledgling	Detected
2	08/15/18	Detected	Not detected
3	08/29/18	Detected	Not detected
4	09/12/18	Detected	Not detected
5	09/26/18	Detected*	Not detected
6	10/10/18	Not detected	Not detected
7	10/24/18	Not detected	Not detected
8	11/07/18	Not detected	Not detected
9	11/21/18	Detected	Not detected

*Detected Outside of Survey Area Boundary

Discussion

A pair of CAGN inhabits the Survey Area. During the first two surveys the pair spent more time in the central portion of the Survey Area than on the following surveys. This may be due to the continued presence of the fledgling observed with the pair on the first survey. As the surveys progressed into the non-breeding season, the pair was observed foraging within the central portion of the survey area only at the very start of the survey and then outside of the survey area. The fledgling was not detected after Survey 1. During the non-breeding season, CAGN expand their use area, and given the dry conditions on-site, it is likely that more optimal foraging conditions occurred in areas that received irrigation from neighboring homes. Since the CAGN pair was observed in the central portion of the survey area when surveys started near dawn (Surveys 1, 2, 3, 4 and 9), it can be assumed that the pair roosts overnight in the central portion of the Survey Area.

Although the western portion of the Survey Area supports suitable coastal sage scrub habitat, CAGN was only detected once on the first survey. San Marcos Creek may serve as a movement corridor for

CAGN juveniles and the CAGN observed here may have been a dispersing individual. Several active homeless encampments and inhabitants were observed in this area. Habitat immediately surrounding the encampments was disturbed and covered with litter. A list of all species observed during the survey is presented in Table 3.

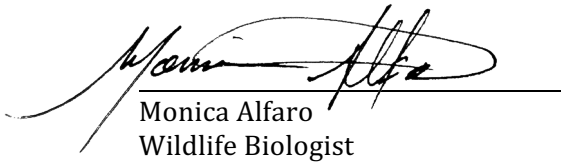
Table 3. List of Wildlife Species Detected

Common Name	Scientific Name	Status
Birds		
Cooper's hawk	*Accipiter cooperii*	CSC
Red-tailed hawk	*Buteo jamaicensis*	
Mourning dove	*Zenaida macroura*	
Vaux's swift	*Chaetura vauxi*	
Anna's hummingbird	*Calypte anna*	
Selasphorus	*Selasphorus sp.*	
Nuttall's woodpecker	*Picoides nuttallii*	
Black phoebe	*Sayornis nigricans*	
Say's phoebe	*Sayornis saya*	
Cassin's kingbird	*Tyrannus vociferans*	
Western-scrub jay	*Aphelocoma californica*	
Common raven	*Corvus corax*	
American crow	*Corvus brachyrhynchos*	
Northern rough-winged swallow	*Stelgidopteryx serripennis*	
Barn swallow	*Hirundo rustica*	
Bushtit	*Psaltriparus minimus*	
Bewick's wren	*Thryomanes bewickii*	
Coastal California gnatcatcher	*Polioptila californica californica*	FT and CSC
Blue-gray gnatcatcher	*Polioptila caerulea*	
Wrentit	*Chamaea fasciata*	
California thrasher	*Toxostoma redivivum*	
European starling	*Sturnus vulgaris*	
Northern mocking bird	*Mimus polyglottos*	
Yellow-rumped warbler	*Setophaga coronata*	
Spotted towhee	*Pipilo maculatus*	
California towhee	*Melozone crissalis*	
Song sparrow	*Melospiza melodia*	
White-crowned sparrow	*Zonotrichia leucophrys*	
House finch	*Haemorhous mexicanus*	
Lesser goldfinch	*Spinus psaltria*	
Mammals		
Audubon's cottontail	*Sylvilagus audubonii*	

FT - Federally Threatened, CE - California Endangered, CSC - California Species of Special Concern

Certification

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.



November 29, 2018
Date

Monica Alfaro
Wildlife Biologist
TE-051242



November 29, 2018
Date

Alicia Cooper Hill
Wildlife Biologist
TE-06145B

Attachments
Figure1. Regional Location, Mission 316 Project
Figure 2. Project Vicinity Map, Mission 316 Project
Figure 3. 2018 Coastal California Gnatcatcher Results, Mission 316 Project

References

Atwood, J.L. 1990. Status review of the California Gnatcatcher (*Polioptila californica*). Unpublished technical report, Manomet Bird Observatory, Manomet, MA. 79 pp.

Bond, M. and C. Bradley. 2003. Impacts of the 2003 Southern California Wildfires on Four Species Listed as Threatened or Endangered Under the Federal Endangered Species Act*:* Quino checkerspot butterfly, Mountain yellow-legged frog, Coastal California gnatcatcher, Least Bell's vireo. Unpublished report prepared by the Center for Biological Diversity.

Bontrager, D.R. 1991. Habitat requirements, home range requirements, and breeding biology of the California Gnatcatcher (*Polioptila californica*) in south Orange County, California. Prepared for Santa Margarita Company, Ranch Santa Margarita, CA. April.

Campbell, K.F., R.A. Erickson, W.E. Haas, and M.A. Patten. 1998. California Gnatcatcher use of habitats other than coastal sage scrub: conservation and management implications. Western Birds *29*: 421–433.

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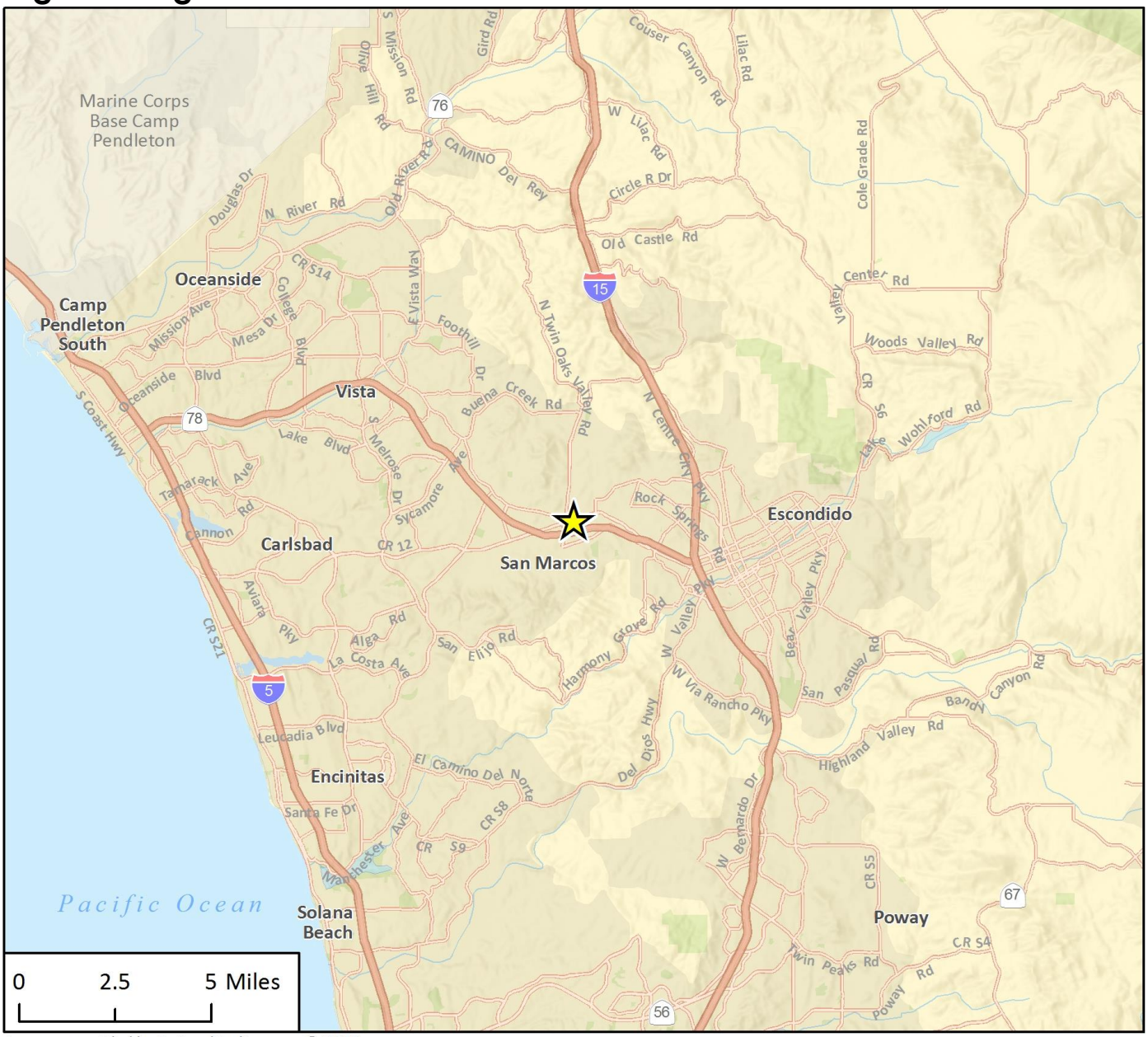
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Unitt, P. 2004. San Diego County Birds Atlas. San Diego Natural History Museum. San Diego, California

Figure1. Regional Location



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Project Location

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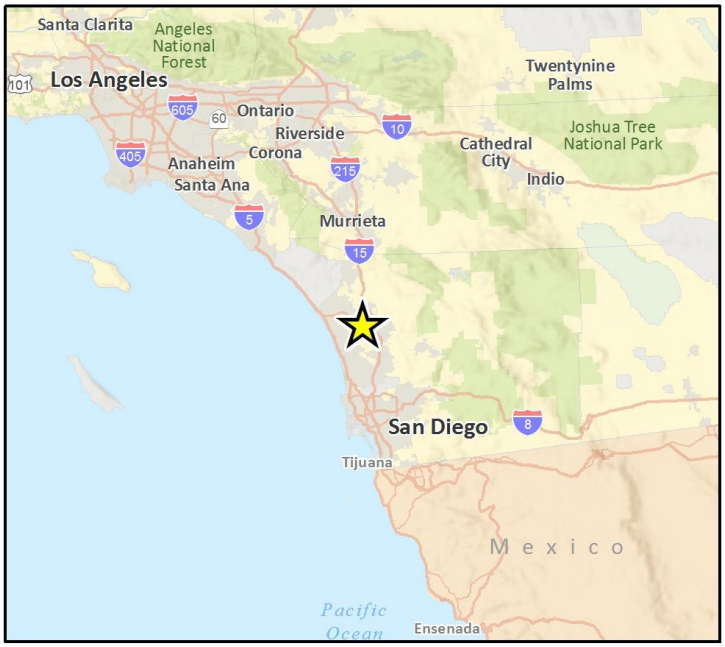
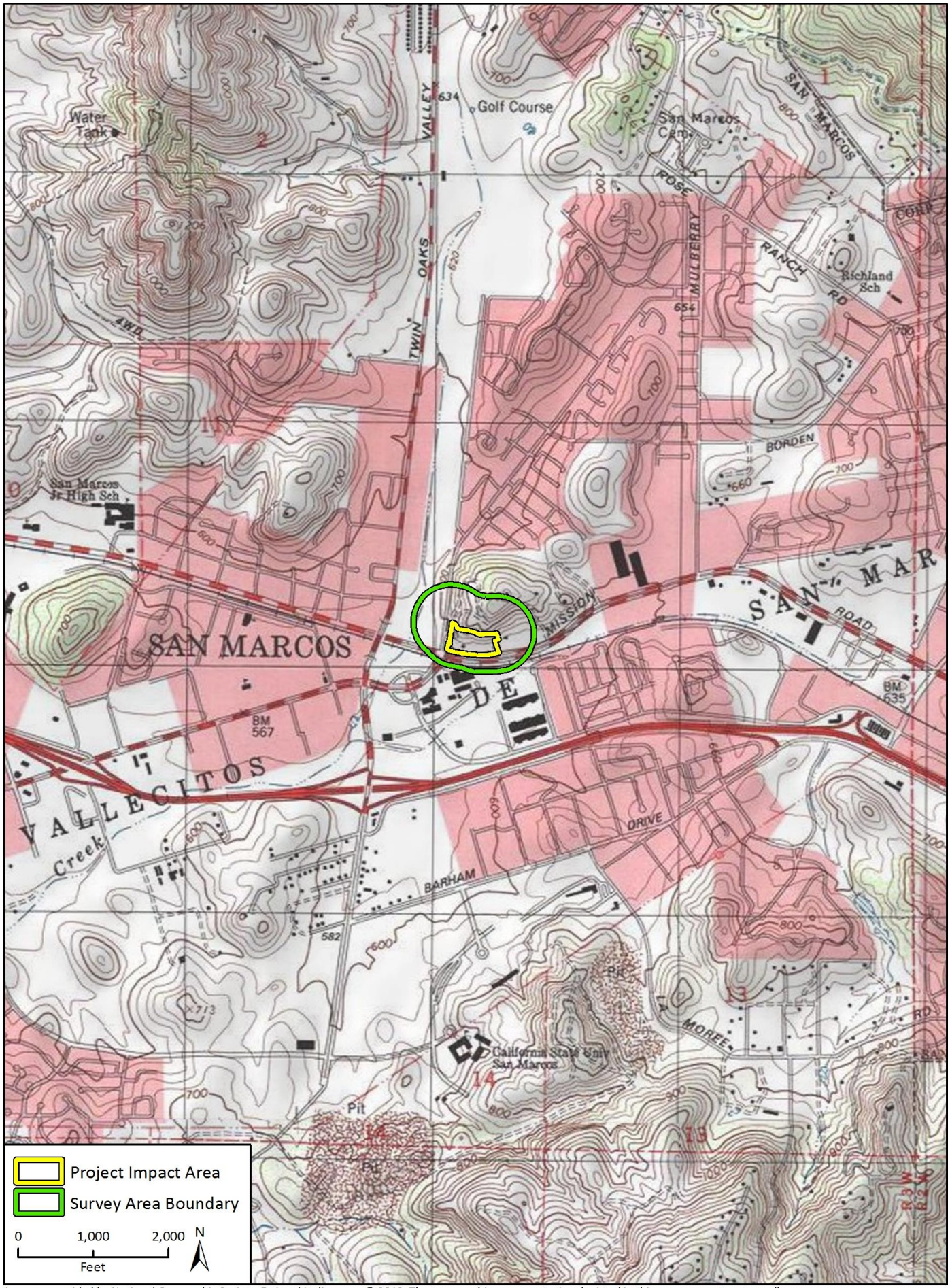


Fig 1 Regional Location

Figure 2. Project Vicinity



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Fig 2 Project Vicinity

Figure 3. 2018 Coastal California Gnatcatcher Survey Results



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KMEA®

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November 29, 2018

Ms. Stacey Love
Recovery Permit Coordinator
Department of Interior
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

Subject: **2018 Coastal California Gnatcatcher (*Polioptila californica californica*) Protocol Survey Results for the Mission 316 Project, San Marcos, California**

Dear Ms. Love,

This report documents the results of protocol coastal California gnatcatcher surveys conducted in 2018 by Monica Alfaro (TE-051242) and Alicia Cooper Hill (06145B) in San Marcos, California (Figure 1). The surveys were conducted in support of the Mission 316 Project (Project). Under the proposed Project, 67 two-and three-bedroom units of multiple family housing, access roads and parking areas would be constructed. A 150-foot fire clearing area is also included as part of the project. The project area consists of 4.34-acres of undeveloped lands supporting coastal sage scrub and other vegetation communities. Diegan coastal sage scrub occurring within the project area in addition to habitat located within 500 feet of the project boundary were surveyed for gnatcatcher.

Project Area Location

The Project area is located in the City of San Marcos, immediately adjacent to the northeastern corner of the Woodward Street and E. Mission Road intersection. Specifically, the survey area is in Township 12 South and Range 3 West of the San Marcos U.S. Geological Survey 7.5 Quadrangle Map (Figure 2). The Survey Area was accessed from Woodward Street and unofficial paths.

Environmental Setting

The 28-acre survey area which includes habitat up to 500-feet of the project area is bound to the south by E. Mission Road and is bisected by Woodward Street. Residential and commercial development surround the Survey Area which is undeveloped. It appears that the southeastern portion of the project area supported structures in the past as evidenced by concrete slabs and other indicators. Vegetation communities observed within the Survey Area included coastal sage scrub, ruderal habitat and southern willow scrub. Coastal sage scrub was dominated by California sagebrush (*Artemisia californica*), buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*) and black sage (*Salvia mellifera*). Coastal sage scrub occurring in the southern portion of the survey area which occurred on a south facing slope was not as tall as coastal sage scrub occurring at the northern portion. Southern willow scrub habitat occurs at the western portion of the survey area and is associated with San Marcos Creek. Ruderal areas supported short-pod mustard (*Hirschfeldia incana*), arundo (*Arundo donax*) and other invasive plant species. Elevation on-site ranges from 575 to 750 feet (ft) above mean sea level (AMSL).

Coastal California Gnatcatcher Biology

The coastal California gnatcatcher is a small, grey, non-migratory songbird that generally occurs in sage scrub habitats throughout southern California and northern Baja California, Mexico. This insectivorous bird preys on small insects on the ground and in shrubs. In addition to coastal sage scrub, the coastal California gnatcatcher can be found in other habitats that are similar in structure to coastal sage scrub such as coastal sage-chaparral scrub, chamise chaparral, and southern maritime chaparral (Campbell et al. 1998, Bontrager 1991). The coastal California gnatcatcher was afforded federal protection in 1993 when the U.S. Fish and Wildlife Service (USFWS) listed this species as threatened. It is considered a California Department of Fish and Wildlife Species of Special Concern. Critical habitat was designated for this species in 2000 and revised in 2007 (USFWS 2000, USFWS 2007).

The historical range of coastal California gnatcatchers extends from southern Ventura County southward through Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties, and into Baja California, Mexico, to approximately 30 degrees north latitude near El Rosario (Atwood 1990). Habitat loss, fragmentation and urban encroachment have led to this species' decline (USFWS 1993). Parasitism by brown-headed cowbird (*Malothrus ater*) also poses a threat to this species (Unitt 2004). In 2003, the Cedar Fire destroyed almost 28% of the remaining habitat that the USFWS believed to be suitable for the coastal California gnatcatcher (Bond and Bradley 2003). In October 2007, several fires burned approximately 369,000 acres in San Diego County.

Methods

A total of nine surveys were completed per the recommendation of USFWS staff via electronic correspondence. All surveys were conducted in accordance with USFWS protocol requirements (USFWS 1997). Pre-recorded coastal California gnatcatcher vocalizations were played throughout the entire project area during the first survey. After the first survey, vocalizations were only played in areas where gnatcatcher had not been detected. All surveys were conducted in the morning between 0600 and 1200, when gnatcatchers are most active. Surveys were not conducted during inclement weather such as extreme hot or cold temperatures, fog, high winds, or rain (Table 1). Approximately 28 acres were surveyed. A summary of survey dates, time, and weather conditions is presented in Table 1. Other wildlife species detected during the surveys were also documented.

Table 1. Survey Dates, Times, and Weather Conditions

Survey	Date	Time	Weather Conditions	Biologists
1	08/01/18	0615-0840	68°-83° F, 0-1 mph, 0% Cover	M. Alfaro, T. Easley
2	08/15/18	0600-0815	70°-73° F, 0-1 mph, 100-85% Cover	M. Alfaro, J. Kendrick
3	08/29/18	0615-0900	62°-71° F, 0-1 mph, 15-5% Cover	M. Alfaro, J. Kendrick, E. Eidson
4	09/12/18	0615-0845	76°-77° F, 0-1 mph, 100-60% Cover	M. Alfaro
5	09/26/18	0735-0945	72°-73° F, 1-3 mph, 100-50% Cover	A. Cooper Hill
6	10/10/18	0810-1025	77°-80° F, 1-3mph, 80-15% Cover	A. Cooper Hill, J. Kendrick
7	10/24/18	0820-1025	78°-80° F, 0-1 mph, 100-30% Cover	A. Cooper Hill
8	11/07/18	0730-0950	76°-77° F, 1-4 mph, 100-60% Cover	A. Cooper Hill
9	11/21/18	0615-0835	47°-53° F, 1-3 mph, 10% Cloud Cover	Monica Alfaro

Results

One pair of coastal California gnatcatchers (CAGN) and one individual CAGN were observed during the surveys (Figure 3). A pair of CAGN was detected during the first five surveys and on the last one. During Survey 1, a fledgling was observed with the CAGN pair. The family group was foraging in coastal sage scrub in the central portion of the Survey Area. During the following three surveys, the CAGN pair was observed in the central portion of the Survey Area for a brief period at the start of the survey. Shortly thereafter, the CAGN pair moved east along the south facing slope to a small patch of coastal sage scrub outside of the survey area. This patch of coastal sage scrub receives irrigation from a neighboring residential area and likely provides better foraging opportunities. On Survey 5, the CAGN pair was only detected outside of the survey area in the irrigated coastal sage scrub. No CAGN were detected during Surveys 6, 7, and 8 which had a later start time than previous surveys. On Survey 9, the CAGN pair was detected in the central portion of the Survey Area. The pair was in the area briefly prior to making its way east along the south facing slope to the irrigated coastal sage scrub. The fledgling was only detected during the first survey. A CAGN individual was observed in the western portion of the survey area near San Marcos Creek during survey 1. CAGN was not detected in the western portion of the Survey Area during the remaining surveys. Survey results are summarized in Table 2.

Table 2. Summary of Survey Results

Survey #	Date	CAGN Pair	CAGN Individual
1	08/01/18	Detected with fledgling	Detected
2	08/15/18	Detected	Not detected
3	08/29/18	Detected	Not detected
4	09/12/18	Detected	Not detected
5	09/26/18	Detected*	Not detected
6	10/10/18	Not detected	Not detected
7	10/24/18	Not detected	Not detected
8	11/07/18	Not detected	Not detected
9	11/21/18	Detected	Not detected

*Detected Outside of Survey Area Boundary

Discussion

A pair of CAGN inhabits the Survey Area. During the first two surveys the pair spent more time in the central portion of the Survey Area than on the following surveys. This may be due to the continued presence of the fledgling observed with the pair on the first survey. As the surveys progressed into the non-breeding season, the pair was observed foraging within the central portion of the survey area only at the very start of the survey and then outside of the survey area. The fledgling was not detected after Survey 1. During the non-breeding season, CAGN expand their use area, and given the dry conditions on-site, it is likely that more optimal foraging conditions occurred in areas that received irrigation from neighboring homes. Since the CAGN pair was observed in the central portion of the survey area when surveys started near dawn (Surveys 1, 2, 3, 4 and 9), it can be assumed that the pair roosts overnight in the central portion of the Survey Area.

Although the western portion of the Survey Area supports suitable coastal sage scrub habitat, CAGN was only detected once on the first survey. San Marcos Creek may serve as a movement corridor for

CAGN juveniles and the CAGN observed here may have been a dispersing individual. Several active homeless encampments and inhabitants were observed in this area. Habitat immediately surrounding the encampments was disturbed and covered with litter. A list of all species observed during the survey is presented in Table 3.

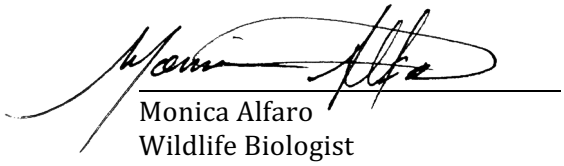
Table 3. List of Wildlife Species Detected

Common Name	Scientific Name	Status
Birds		
Cooper's hawk	*Accipiter cooperii*	CSC
Red-tailed hawk	*Buteo jamaicensis*	
Mourning dove	*Zenaida macroura*	
Vaux's swift	*Chaetura vauxi*	
Anna's hummingbird	*Calypte anna*	
Selasphorus	*Selasphorus sp.*	
Nuttall's woodpecker	*Picoides nuttallii*	
Black phoebe	*Sayornis nigricans*	
Say's phoebe	*Sayornis saya*	
Cassin's kingbird	*Tyrannus vociferans*	
Western-scrub jay	*Aphelocoma californica*	
Common raven	*Corvus corax*	
American crow	*Corvus brachyrhynchos*	
Northern rough-winged swallow	*Stelgidopteryx serripennis*	
Barn swallow	*Hirundo rustica*	
Bushtit	*Psaltriparus minimus*	
Bewick's wren	*Thryomanes bewickii*	
Coastal California gnatcatcher	*Polioptila californica californica*	FT and CSC
Blue-gray gnatcatcher	*Polioptila caerulea*	
Wrentit	*Chamaea fasciata*	
California thrasher	*Toxostoma redivivum*	
European starling	*Sturnus vulgaris*	
Northern mocking bird	*Mimus polyglottos*	
Yellow-rumped warbler	*Setophaga coronata*	
Spotted towhee	*Pipilo maculatus*	
California towhee	*Melozone crissalis*	
Song sparrow	*Melospiza melodia*	
White-crowned sparrow	*Zonotrichia leucophrys*	
House finch	*Haemorhous mexicanus*	
Lesser goldfinch	*Spinus psaltria*	
Mammals		
Audubon's cottontail	*Sylvilagus audubonii*	

FT - Federally Threatened, CE - California Endangered, CSC - California Species of Special Concern

Certification

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.



November 29, 2018
Date

Monica Alfaro
Wildlife Biologist
TE-051242



November 29, 2018
Date

Alicia Cooper Hill
Wildlife Biologist
TE-06145B

Attachments
Figure1. Regional Location, Mission 316 Project
Figure 2. Project Vicinity Map, Mission 316 Project
Figure 3. 2018 Coastal California Gnatcatcher Results, Mission 316 Project

References

Atwood, J.L. 1990. Status review of the California Gnatcatcher (*Polioptila californica*). Unpublished technical report, Manomet Bird Observatory, Manomet, MA. 79 pp.

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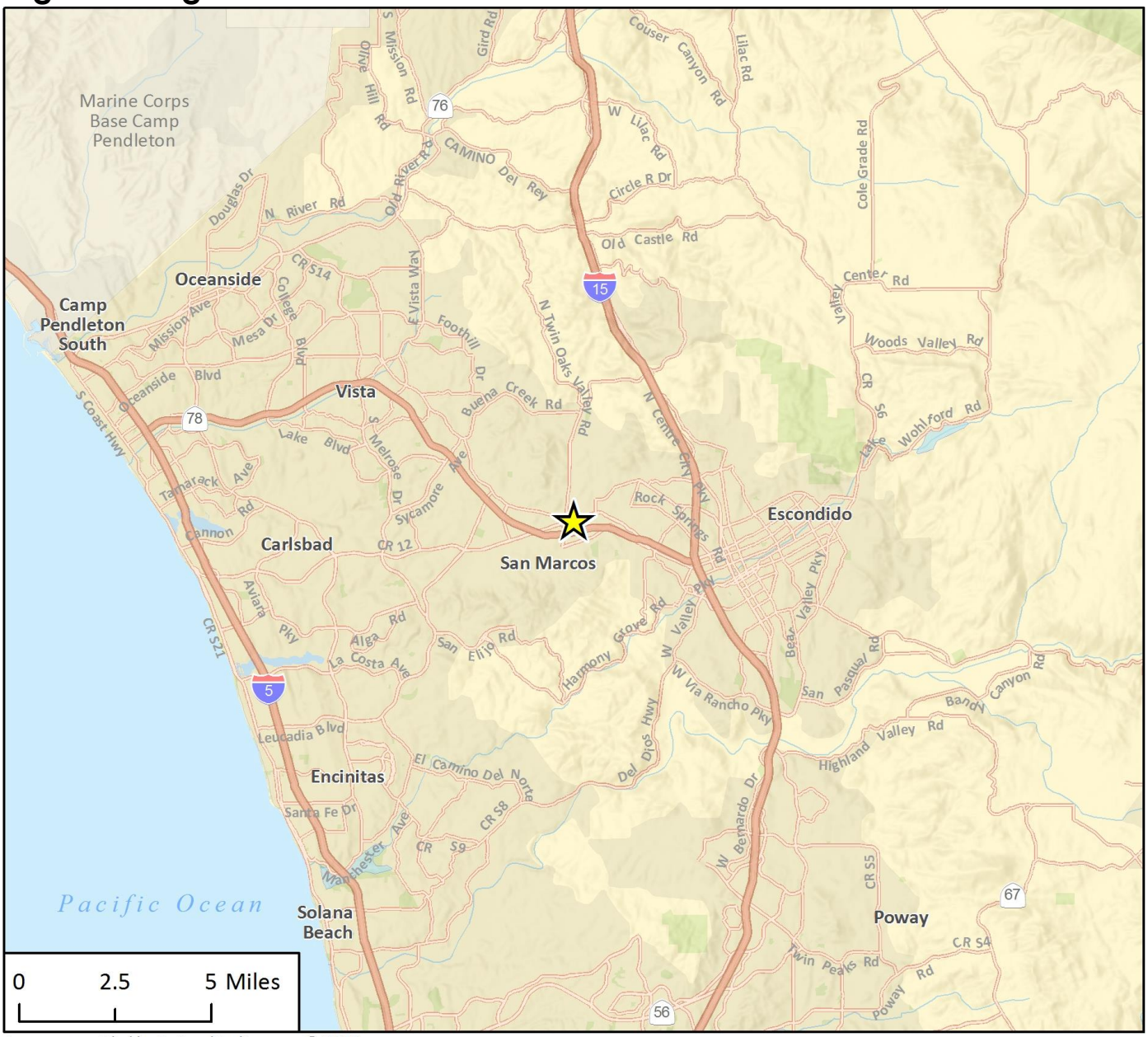
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Figure 1. Regional Location



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Project Location

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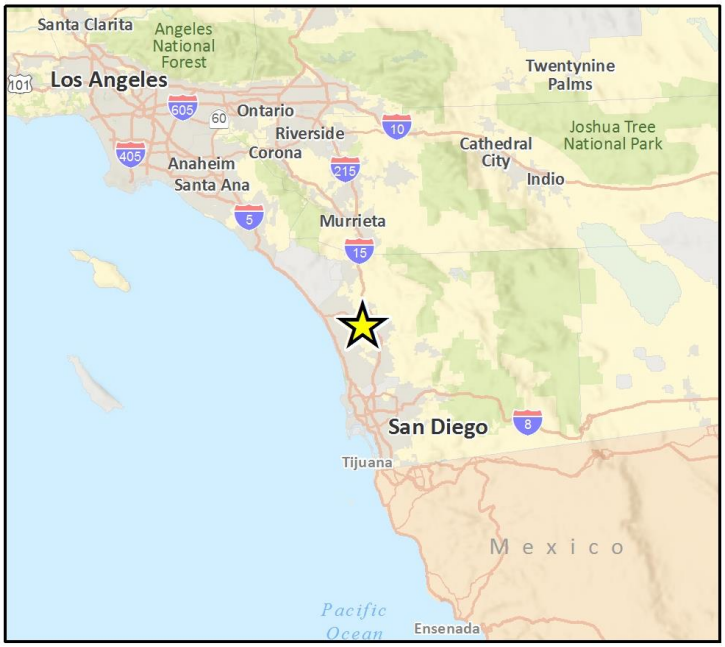
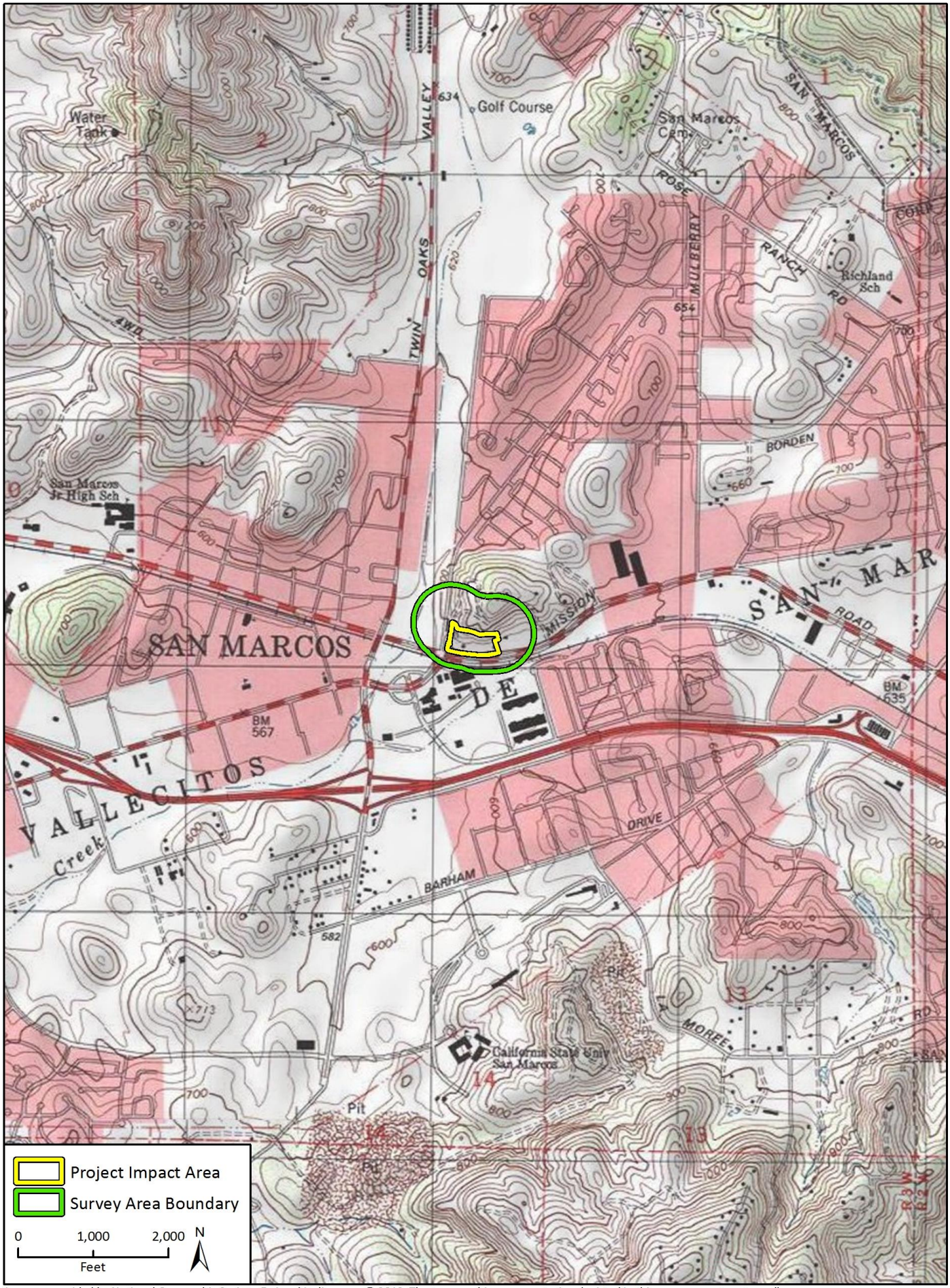


Figure 2. Project Vicinity



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Fig 2 Project Vicinity

Figure 3. 2018 Coastal California Gnatcatcher Survey Results



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Appendix D

Rare Plant Survey

Rincon Consultants, Inc.
2215 Faraday Avenue, Suite A
Carlsbad, California 92008

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info@rinconconsultants.com
www.rinconconsultants.com

April 23, 2019
Project No: 18-06100

Kurt Bausback
Director, Planning and Entitlements
KB Home Coastal
Director, Planning and Entitlements
Via email: *kbausback@kbhome.com*

Subject: **2019 Rare Plant Survey Report for the Mission 316 West Project, City of San Marcos, San Diego County, California**

Dear Mr. Bausback:

This letter report documents the findings of a 2019 focused rare plant survey conducted by Rincon Consultants, Inc. (Rincon) to determine the presence or absence of rare plant species which may potentially occur at the Mission 316 West Project, located in the City of San Marcos (City) in San Diego County, California (project site). The purpose of this report is to satisfy a request from the U.S. Fish and Wildlife Service (USFWS) that a rare plant survey be conducted on the project site. Rincon prepared a Biological Resources Assessment (BRA), dated April 2019, for the project. The BRA indicated that San Diego sand aster (*Corethrogyne filaginifolia* ssp. *incana*) had a moderate potential to occur at the site, and San Diego ambrosia (*Ambrosia pumila*) has a low potential to occur on the project site.

Rare Plant Survey

Rincon Senior Biologist Jared Reed conducted a rare plant survey on April 12, 2019, on the approximate 3.7-acre project site. The majority of the property was surveyed via pedestrian transects, but due to inaccessibility, the extremely steep slope in the northern portion of the site was surveyed with the aid of 8x32 binoculars.

Mr. Reed was equipped with a GPS unit capable of recording positions at sub-meter accuracy, a standardized field notebook, and an aerial photograph of the project site. He walked meandering transects throughout accessible areas and carefully surveyed steep slopes with binoculars.

Taxonomic nomenclature in this report is based on the following resources: the second edition of *The Jepson Manual* (Baldwin et al. 2012), and the Jepson Online Interchange for California Floristics (Jepson Flora Project, 2019).

San Diego Sand Aster

The Jepson Online Interchange indicates that since preparation of the April 2019 BRA, *Corethrogyne filaginifolia* var. *incana* is no longer recognized as a distinct variety, and taxonomically has been reverted to the primary species, California sand aster (*Corethrogyne filaginifolia)*. *Corethrogyne* is now a monospecific genus, and C. *filaginifolia* is common and widespread throughout California. Since the rare

variety is no longer recognized, it is not treated as a rare plant in this report. No *Corethrogyne* individuals were observed during the field survey.

San Diego Ambrosia

San Diego ambrosia is federally-listed as endangered and has a California Rare Plant Rank (CRPR) of 1B.1 in the California Native Plant Society (CNPS) online Inventory of Rare and Endangered Plants (CNPS 2019). This species typically occurs on upper terraces of rivers and drainages, and is found in association with vernal pools. It is found in open grassland of native and nonnative species, and openings in coastal sage scrub, primarily on sandy loam or clay soils. This species may also be found in ruderal habitat types (disturbed communities containing a mixture of native and nonnative grasses and forbs) such as fire fuel breaks and edges of dirt roadways. Nonnative grassland and ruderal habitat types provide adequate habitat for San Diego ambrosia; however, nonnative plants can out-compete the species for resources in some situations (USFWS 2010).

San Diego Ambrosia has a low potential to occur on the project site based on the presence of marginal habitat and recent records within 10 miles (CNDDB 2019). It has a low potential to occur in the Disturbed Habitat and Diegan Coastal Sage Scrub at the project site (Figure 1). This species would be evident and identifiable at the time of the field survey.

Results

No rare plant species were observed at the project site during the field survey, including San Diego ambrosia or any other rare species. No *Ambrosia* species were observed. Common plant species observed on-site during the survey include, but are not limited to, shortpod mustard (*Hirschfeldia incana*), black mustard (*Brassica nigra*), California buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), prickly sow thistle (*Sonchus asper* ssp. *asper*), Mediterranean schismus (*Schismus barbatus*), giant reed (*Arundo donax*), tocalote (*Centaurea melitensis*), and red-stem filaree (*Erodium cicutarium*). Table 1, Plant Species Observed Within the Project Site During Project Survey (attached), contains a comprehensive list of plant species observed on-site during the rare plant survey.

Conclusion

The rare plant survey described above fulfills the USFWS request and documents that rare plant species do not occur on the project site.

Thank you for the opportunity to assist you with this project. If you have any questions regarding our analysis or would like to discuss the findings, please contact Jared Reed at (760) 330-5202.

Sincerely,
Rincon Consultants, Inc.





Jared Reed
Senior Biologist/Project Manager

Jonathan True
Senior Botanist

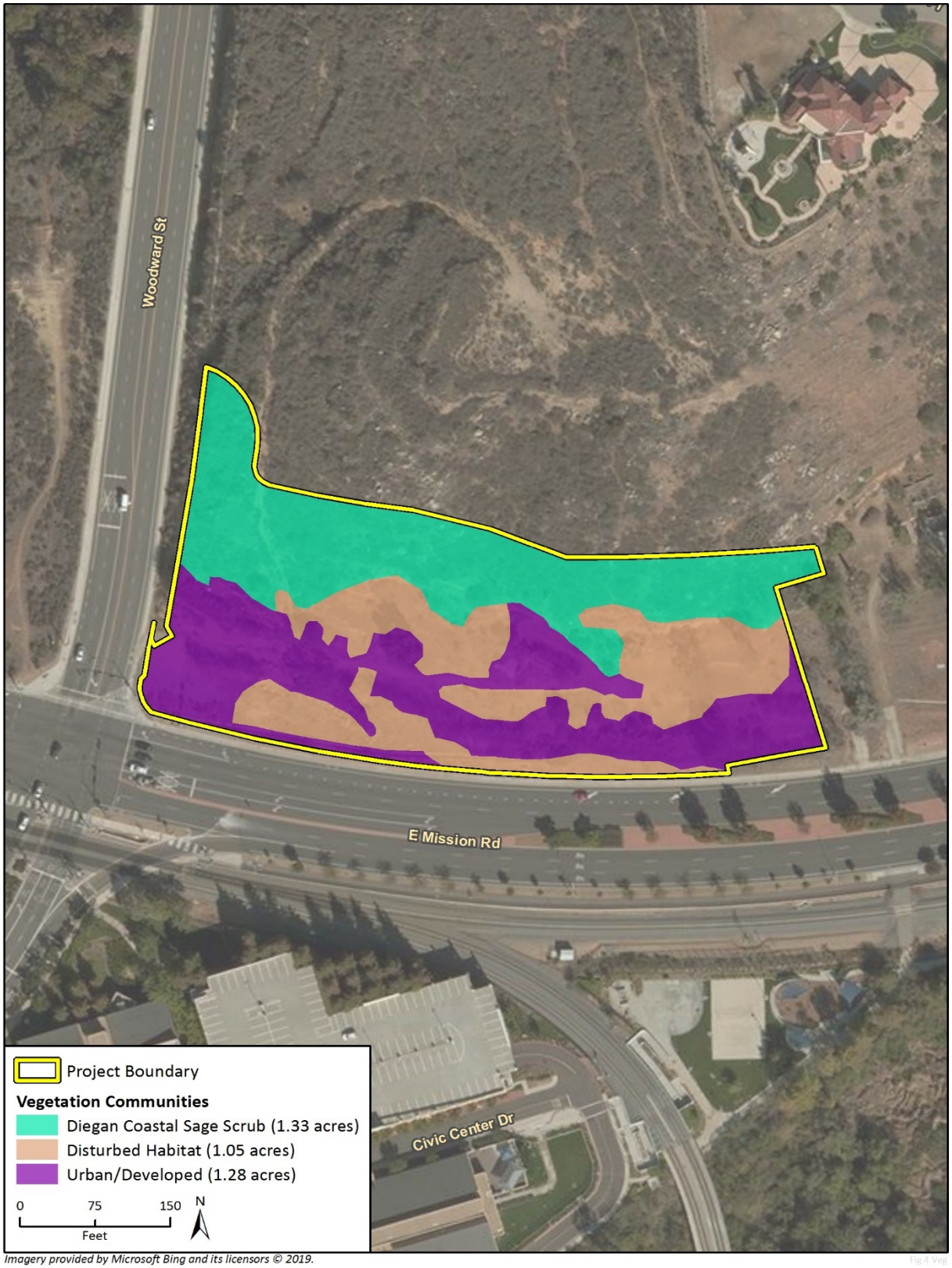
Attachments

Figure 1 Vegetation Communities

Table 1 Plant Species Observed Within the Project Site During Project Survey

References

Figure 1 Vegetation Communities



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Table 1 Plant Species Observed Within the Project Site During Project Survey

Scientific Name	Common Name	Status	Native or Introduced
Agavaceae: Century Plant Family			
Agave americana	century plant	None	Introduced
Yucca gigantea	Mojave yucca	None	Introduced
Anacardiaceae: Sumac Family			
Malosma laurina	laurel sumac	None	Native
Rhus integrifolia	lemonade berry	None	Native
Schinus molle	Peruvian pepper tree	None	Introduced
Schinus terebinthifolius	Brazilian pepper tree	None	Introduced
Apiaceae: Carrot Family			
Foeniculum vulgare	fennel	None	Introduced
Arecaceae: Palm Family			
Washingtonia robusta	Mexican fan palm	None	Introduced
Asteraceae: Sunflower Family			
Artemisia californica	California sagebrush	None	Native
Baccharis pilularis	coyote brush	None	Native
Brickellia californica	California brickellbush	None	Native
Centaurea melitensis	star thistle	None	Introduced
Deinandra fasciculata	fascicled tarplant	None	Native
Dittrichia graveolens	stinkwort	None	Introduced
Encelia californica	California encelia	None	Native
Erigeron canadensis	horseweed	None	Native
Eriophyllum confertiflorum	golden-yarrow	None	Native
Isocoma menziesii var. *menziesii*	Menzies' goldenbush	None	Native
Hazardia squarrosa	saw-toothed goldenbush	None	Native
Pseudognaphalium californicum	California everlasting	None	Native
Sonchus asper ssp. *asper*	prickly sow thistle	None	Introduced
Boraginaceae: Borage Family			
Cryptantha intermedia	common cryptantha	None	Native
Eucrypta chrysanthemifolia	common eucrypta	None	Native
Phacelia distans	distant phacelia	None	Native
Phacelia ramosissima	branching phacelia	None	Native
Plagiobothrys sp.	popcornflower	None	Native
Brassicaceae: Mustard Family			
Brassica nigra	black mustard	None	Introduced
Hirschfeldia incana	shortpod mustard	None	Introduced
Sisymbrium sp.	mustard	None	Introduced
Cactaceae: Cactus Family			
Opuntia ficus-indica	mission cactus	None	Introduced
Opuntia littoralis	coast prickly pear	None	Native
Chenopodiaceae: Goosefoot Family			
Salsola tragus	Russian thistle	None	Introduced
Cucurbitaceae: Gourd Family			
Marah macrocarpa	wild cucumber	None	Native

Scientific Name	Common Name	Status	Native or Introduced
Fabaceae: Legume Family			
Acacia baileyana	wattle	None	Introduced
Acmispon glaber	deerweed	None	Native
Melilotus indicus	sourclover	None	Introduced
Parkinsonia aculeata	Mexican palo verde	None	Introduced
Gentianaceae: Gentian Family			
Zeltnera venusta	charming centaury	None	Native
Geraniaceae: Geranium Family			
Erodium cicutarium	redstem filaree	None	Introduced
Iridaceae: Iris Family			
Sisyrinchium bellum	western blue-eyed-grass	None	Native
Lamiaceae: Mint Family			
Marrubium vulgare	horehound	None	Introduced
Salvia mellifera	black sage	None	Native
Malvaceae: Mallow Family			
Malacothamnus fasciculatus	chaparral mallow	None	Native
Myrsinaceae: Myrsinaceae			
Lysimachia arvensis	scarlet pimpernel	None	Introduced
Myrtaceae: Myrtle Family			
Eucalyptus globulus	blue gum	None	Introduced
Nyctaginaceae: Four-o'clock Family			
Mirabilis laevis	wishbone bush	None	Native
Onagraceae: Evening-Primrose Family			
Camissoniopsis bistorta	California sun cup	None	Native
Papaveraceae: Poppy Family			
Eschscholzia californica	California poppy	None	Native
Phrymaceae: Lopseed Family			
Diplacus aurantiacus	sticky monkeyflower	None	Native
Pinaceae: Pine Family			
Pinus sp.	unknown ornamental pine	None	Introduced
Plantaginaceae: Plantain Family			
Antirrhinum nuttallianum	Nuttall's snapdragon	None	Native
Poaceae: Grass Family			
Arundo donax	giant reed	None	Introduced
Bromus diandrus	ripgut brome	None	Introduced
Bromus madritensis spp. *rubens*	red brome	None	Introduced
Pennisetum setaceum	fountain grass	None	Introduced
Polypogon monspeliensis	rabbitfoot grass	None	Introduced
Schismus barbatus	Mediterranean schismus	None	Introduced
Polygonaceae: Buckwheat Family			
Eriogonum fasciculatum	California buckwheat	None	Native
Rosaceae: Rose Family			
Heteromeles arbutifolia	toyon	None	Native

Scientific Name	Common Name	Status	Native or Introduced
Rubiaceae: Madder Family			
Galium sp.	bedstraw	None	Native
Solanaceae: Nightshade Family			
Nicotiana glauca	tree tobacco	None	Introduced
Solanum xanti	purple nightshade	None	Native
Urticaceae: Nettle Family			
Urtica urens	dwarf nettle	None	Introduced

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Appendix E

Phase I Cultural Resources Due Diligence

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
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619.462.1515 tel
619.462.0552 fax
www.**helixepi**.com

December 4, 2017

Mr. Kurt Bausback KAB-256
KB Home
36310 Inland Valley Drive
Wildomar, CA 92595

Subject: Urban Vineyards Project Cultural Resources Due Diligence

Dear Mr. Bausback:

HELIX Environmental Planning, Inc. (HELIX) was contracted to conduct a due diligence/constraints analysis related to cultural resources for the Urban Vineyards Project (project) in the City of San Marcos. HELIX conducted a record search and a Sacred Lands File search, a review of historic maps and aerial photographs, and a field survey. This letter report details the methods and results of the due diligence study. Although we do not anticipate barriers to development of the property, additional cultural resources research and testing is recommended, as described below.

PROJECT LOCATION

The approximately 12.2-acre project site is located in the northern portion of the County of San Diego within the City of San Marcos (Figure 1, *Regional Location*). Specifically, the site is located to the north of East Mission Road, east of Woodward Street, north of State Route (SR-) 78, and west of Interstate 15, within the Los Vallecitos de San Marcos Land grant on the U.S. Geological Survey 7.5-minute San Marcos quadrangle map (Figures 2 and 3, *USGS Topography and Aerial Photograph]*, respectively). The site consists of a hilltop and surrounding slopes. Elevations range from approximately 585 feet (ft.) above mean sea level (amsl) in the southwestern portion of the site to 750 ft. amsl in the northeastern portion of the site. Residential, commercial, and civic development surrounds the site.

METHODS

HELIX conducted a record search of the project area and a half-mile radius at the South Coastal Information Center (SCIC) on November 13, 2017. Historic maps and aerial photographs of the property were reviewed to assess the potential for historic structures and historic archaeological material, and the Phase I Environmental Site Assessment (Akau and Lind 2005) was reviewed. Senior archaeologist Stacie Wilson and Luiseño Native American monitor, Banning Taylor, from Saving Sacred Sites, surveyed the project site on December 1, 2017.

The Native American Heritage Commission (NAHC) was contacted for a Sacred Lands File search on November 29, 2017; no additional outreach to the Native American community was conducted.

RESULTS

The record search from the SCIC indicated that 31 previous cultural resource studies have been conducted within the record search limits. The studies consisted of one archaeological monitoring report, 28 cultural resources assessments, one interchange improvements report, and one negative survey report addendum. Nine cultural resources have been previously recorded within a half-mile radius of the project areas (Table 1, *Previously Recorded Resources Within a Half-Mile of the Project)*. One resource, CA-SDI-21254 (P-37-033844), is located adjacent to the project area. This resource is a multi-component site and is described in further detail below. The remaining eight cultural resources consist of five prehistoric sites, one prehistoric isolate, one historic building, and one prehistoric lithic scatter that may not be cultural in nature.

Table 1
PREVIOUSLY RECORDED RESOURCES WITHIN A HALF-MILE OF THE PROJECT

Resource Number (P-37-#)	Resource Number (CA-SDI-#)	Description	Recorder, Date
000560	560	Prehistoric site. A village or campsite on a knoll. Lithic and ground stone artifacts present.	True, n.d.
000749	749	Prehistoric site. "Pottery camp or village area." No midden, thin scatter of shell and "La Jolla type artifacts."	True, 1959
012095	12095	Prehistoric site. Early Period lithic scatter or temporary camp which includes flaked lithic debitage, cores, core tools, and a single mano fragment; flaked lithic material all of Santiago Peak Volcanic material.	Pigniolo and Rader, 1991
012098	12098	The site was originally recorded as a prehistoric lithic scatter, but update recordation indicates there is nothing in the area except modern crushed gravel fragments.	Pigniolo and Briggs, 1991; Bissell, 1991
012210	12210	Prehistoric site. Flake scatter.	Joyner, 1990
014081	--	Historic building. The site consists of a fire suppression facility with combination barracks and a two-bay truck garage constructed in 1939 by the U.S. Forest Service-CCC construction program.	Thornton, 1994
015578	--	Prehistoric isolate. Whole granitic mano.	James, et al., 1996
015595	14340	Prehistoric site. Temporary camp or possible habitation site. Several milling features. Low density lithics and bone were found subsurface.	James, et al., 1996
033844	21254	Prehistoric site. Lithic, shell, historic material, and faunal remains, with one piece of bone identified as possibly human. A Chione shell produced dates between 955 and 685 calibrated years before present, placing the occupation of Area 2 to the Late Prehistoric period. A Cottonwood projectile point and prehistoric ceramics further date Area 2 to the Late Prehistoric Period.	Quach and Bowsher, 2014; Castells and Piek, 2015

CA-SDI-21254 (P-37-303844)

This site was originally recorded as the ruins of a residential structure with historic and modern debris, located on a parcel adjacent to the Urban Vineyards project site. In 2014, the site was evaluated for eligibility to the California Register of Historical Resources (CRHR) and was recommended not eligible for listing on the CRHR, thus, not a significant resource under the California Environmental Quality Act (CEQA). During construction monitoring in July 2015, prehistoric cultural deposits were identified and labeled as Area 1 and Area 2. Area 1 consisted of a scatter of lithic artifacts, marine shell, and historic artifacts. One piece of bone found in the area was identified as possibly human; the NAHC identified the San Luis Rey Band of Mission Indians as the Most Likely Descendant (MLD). Additional bone fragments were identified but determined by a forensic anthropologist to be not human. Area 2 contained a small scatter of lithic artifacts located within a historically used quarry which contained disturbed soils; the prehistoric cultural material was mixed with modern refuse. CA-SDI-21254 was re-evaluated for eligibility for listing on the CRHR and recommended as not eligible for listing on the CRHR under Criterion 4, due to a lack of data potential. However, because a piece of bone fragment was identified as possibly human, the site is significant under CEQA.

A field survey was conducted on December 1, 2017 by HELIX archaeologist Stacie Wilson, and Luiseño Native American monitor, Banning Taylor, from Saving Sacred Sites. Foundations and other historic-era features were observed throughout the southern portion of the project site. The middle portion of the project exhibited a graded clearing and contained farm equipment. According to the Phase I Assessment (Akau and Lind 2005), the property had been owned by the Bryant family since the 1940s, and an equipment rental business had been located on the site. While the Phase I Assessment says that residences and several outbuildings were constructed on the site between the 1940s and 1950s, no structures are seen on the 1947 historic aerial (NETR Online 2017); however, the southern portion of the project had been cleared and had been so since the 1938 aerial image. On the 1953 aerial, structures begin to appear in the southern portion of the project site, and by 1964, several structures, road cuts, and the graded pad in the middle of portion of the project site can be observed on the aerial imagery. No structures are indicated on the 1949 (1:24,000) San Marcos quadrangle, but two structures are indicated in the southern area of the project site on the 1968 (1:24,000) San Marcos quadrangle. At the time of the Phase I Assessment in 2005, two residences and several small outbuildings were still present, along with a significant amount of household debris, heavy equipment, old tires, and a small above ground fuel tank (Akau and Lind 2005). At the time of the present survey, only foundations and rock features remained within the project sites, along with a light density scatter of historic (post-World War II) and modern building material.

In addition to the historic features and debris, at least four prehistoric bedrock milling features were observed during the survey. Three of the features were located on outcrops situated along the western boundary of the project site, and one was located in the south-central area, directly above the area previously cut out of the hillside and occupied by the historic structures. Multiple milling elements are located on the features. No associated artifacts were observed; however, over much of the ground surface visibility was severely limited by dry brush, vegetation, and ornamental landscaping, such as cacti plants. It is likely that these bedrock milling features are associated with the artifact deposit that was previously identified in the adjoining parcel (CA-SDI-21254).

The NAHC was contacted on November 29, 2017 for a Sacred Lands File search. The response, received on December 4, 2017 indicated, “Sites have been located within the APE you provided that may be

impacted by the project. Please immediately contact the Pechanga Band of Luiseno Indians for more information about these sites."

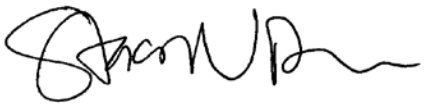
RECOMMENDATIONS

We do not anticipate any barriers to development of the property related to cultural resources, but as described above, the archaeological survey of the project site identified several bedrock milling features and the remains of historic residences and structures. The majority of the historic remains and at least one of the bedrock milling features are within the area of the project site currently proposed for development. Based on these factors, we recommend that recordation of the prehistoric and historic features identified within the project site be conducted, as well as historic background research in order to record the historical residences. If the resources cannot be avoided by project redesign, they will need to be evaluated for eligibility for inclusion in the California Register of Historical Resources (CRHR).

The site identified by the NAHC from the Sacred Lands Files is probably related to the identification of possible human bone at the archaeological site adjacent to the project area. While this heightens the cultural sensitivity of the project site, it should not prove a barrier to development of the Urban Vineyards project. We recommend discussion with both the San Luis Rey Band and the Pechanga Band regarding the project.

Based on the features that were identified during the current survey and the cultural material identified in the adjoining parcel during the construction phase, there is a potential for subsurface cultural deposits and features to be present within the project area. As such, we also recommend that a series of shovel test pits be excavated near the bedrock milling features to assess the potential for a subsurface deposit and that a cultural resource monitoring program be implemented for initial ground-disturbing activities, including brushing and grubbing.

If you have any questions, please call me at (619) 462-1515.



Stacie Wilson, RPA
Senior Archaeologist

Attachments:
Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Photograph

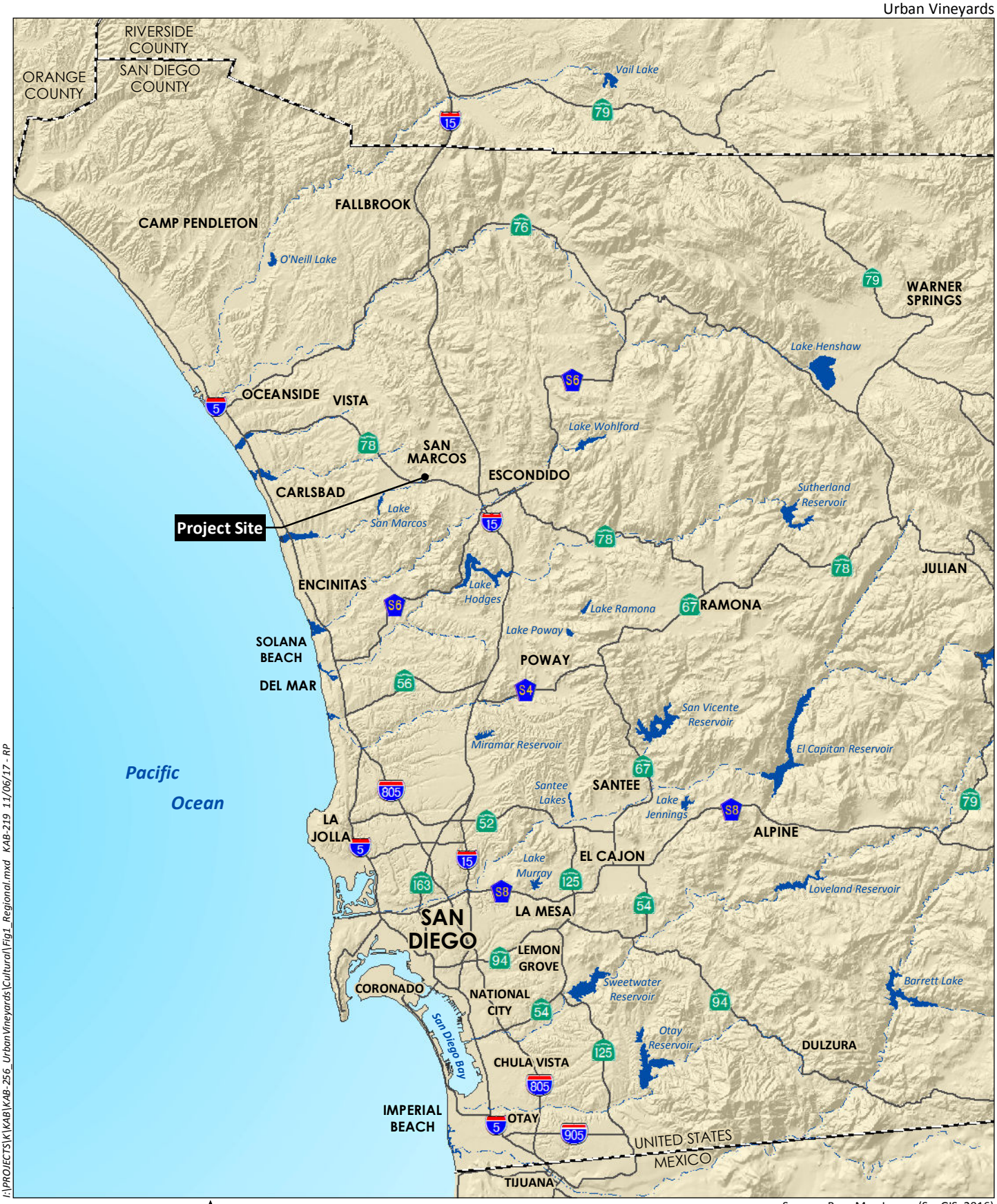
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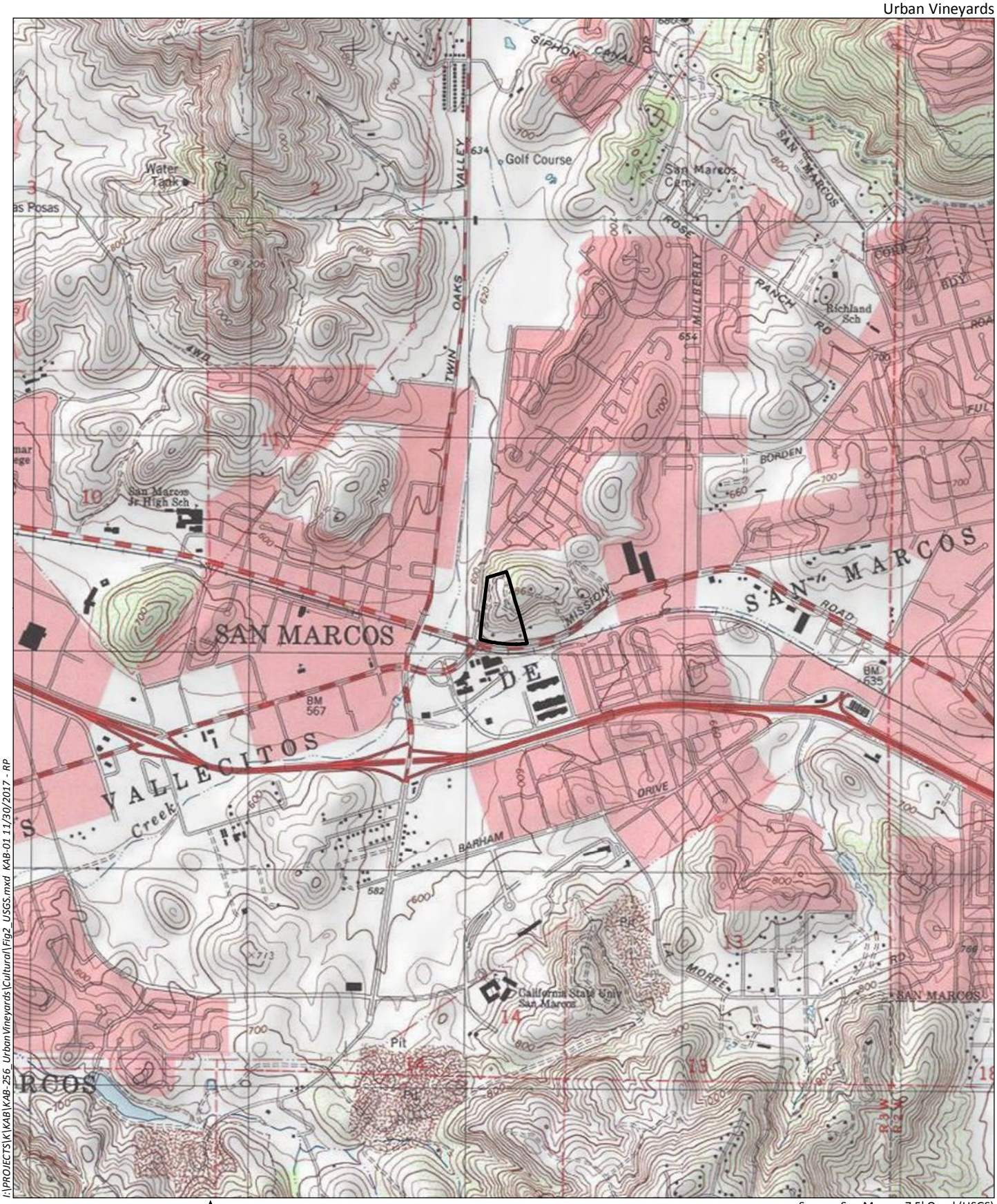
0 8 Miles

Source: Base Map Layers (SanGIS, 2016)

HELIX Environmental Planning

Regional Location

Figure 1



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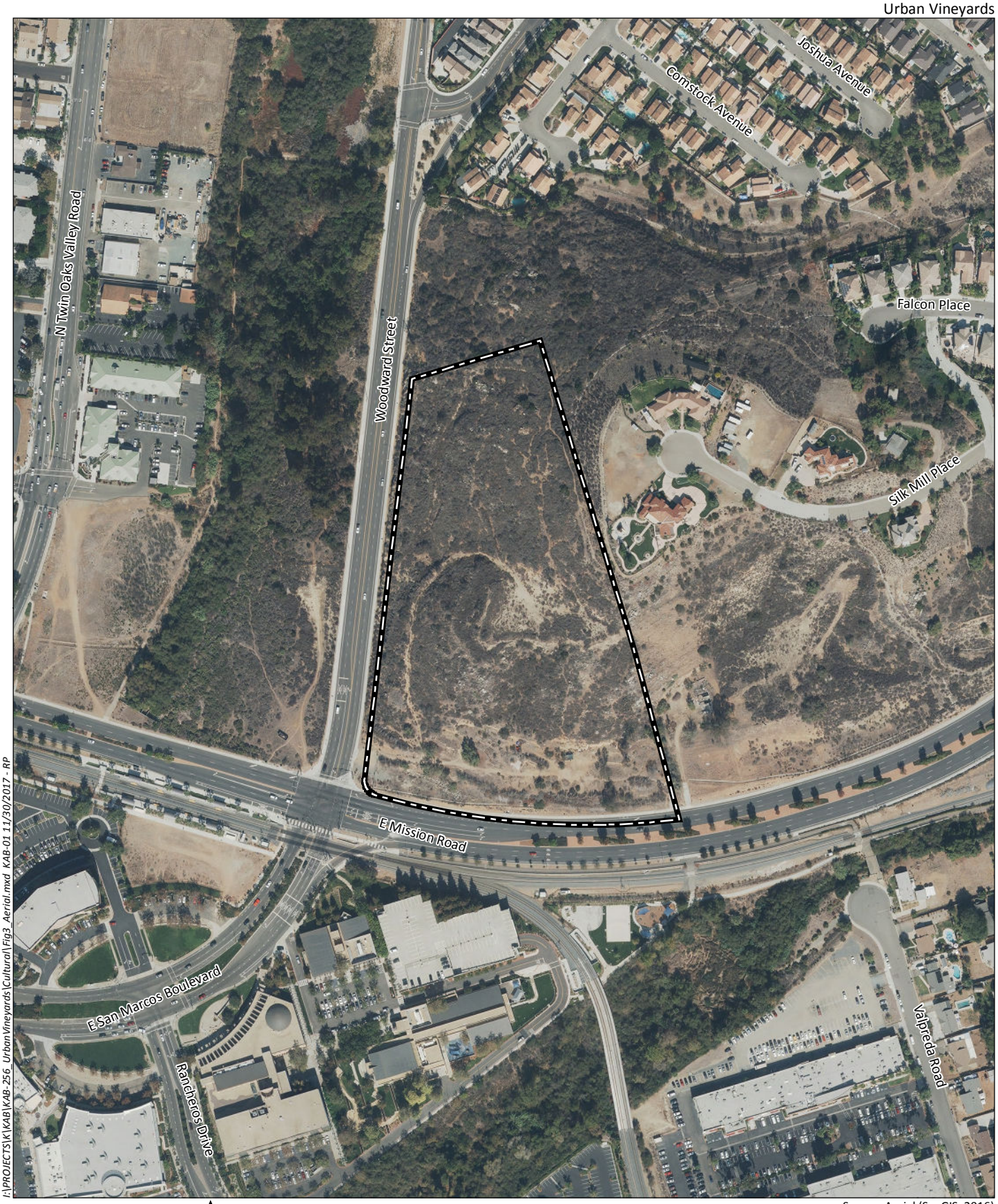
0 2,000 Feet

Source: San Marcos 7.5' Quad (USGS)

HELIX Environmental Planning

USGS Topography

Figure 2



I:\PROJECTS\K\KAB\KAB-256_UrbanVineyards\Cultural\Fig3_Aerial.mxd KAB-01 11/30/2017 - RP

0 300 Feet

Source: Aerial (SanGIS, 2016)

HELIX Environmental Planning

Aerial Photograph

Figure 3

Appendix F

Noise Report

NOISE ASSESSMENT

Mission 316 West
City of San Marcos

Prepared for:

City of San Marcos
1 Civic Center Drive
San Marcos, CA 92069

Prepared By:

Ldn Consulting, Inc.
42428 Chisolm Trail
Murrieta, CA 92562

June 12, 2019

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GLOSSARY OF TERMS

Sound Pressure Level (SPL): a ratio of one sound pressure to a reference pressure (L_{ref}) of 20 µPa. Because of the dynamic range of the human ear, the ratio is calculated logarithmically by 20 log (L/L_{ref}).

A-weighted Sound Pressure Level (dBA): Some frequencies of noise are more noticeable than others. To compensate for this fact, different sound frequencies are weighted more.

Minimum Sound Level (L_{min}): Minimum SPL or the lowest SPL measured over the time interval using the A-weighted network and slow time weighting.

Maximum Sound Level (L_{max}): Maximum SPL or the highest SPL measured over the time interval the A-weighted network and slow time weighting.

Equivalent sound level (L_{eq}): the true equivalent sound level measured over the run time. Leq is the A-weighted steady sound level that contains the same total acoustical energy as the actual fluctuating sound level.

Day Night Sound Level (Ldn): Representing the Day/Night sound level, this measurement is a 24 –hour average sound level where 10 dB is added to all the readings that occur between 10 pm and 7 am. This is primarily used in community noise regulations where there is a 10 dB "Penalty" for night time noise. Typically, Ldn's are measured using A weighting.

Community Noise Exposure Level (CNEL): The accumulated exposure to sound measured in a 24-hour sampling interval and artificially boosted during certain hours. For CNEL, samples taken between 7 pm and 10 pm are boosted by 5 dB; samples taken between 10 pm and 7 am are boosted by 10 dB.

Octave Band: An octave band is defined as a frequency band whose upper band-edge frequency is twice the lower band frequency.

Third-Octave Band: A third-octave band is defined as a frequency band whose upper band-edge frequency is 1.26 times the lower band frequency.

Response Time (F,S,I): The response time is a standardized exponential time weighting of the input signal according to fast (F), slow (S) or impulse (I) time response relationships. Time response can be described with a time constant. The time constants for fast, slow and impulse responses are 1.0 seconds, 0.125 seconds and 0.35 milliseconds, respectively.

EXECUTIVE SUMMARY

This noise study has been completed to determine the noise and vibration impacts to and from the proposed residential project. The project area is located in the southwest portion of the Heart of the City Specific Plan in the City of San Marcos CA. The project is located north of and adjacent to East Mission Road and east of Woodward Street in the Richland neighborhood.

Construction Noise

Grading equipment activities have noise levels ranging between 70-90 dBA and are dependent on the type of equipment, time the equipment is operating and distance the equipment is operating. The grading equipment will be spread out over the project site from distances near the occupied property lines to distances of 300 feet or more away. Based upon the site plan the majority of the grading operations, on average, will occur more than 300 feet from the property lines. At an average distance of 150 feet from the construction activities to the nearest property line, noise levels will comply with the 75 dBA Leq standard over 8 hours at the property lines. Therefore, no impacts are anticipated and no mitigation is required during construction of the proposed Project. Additionally, all equipment should be properly fitted with mufflers and all staging and maintenance should be conducted as far away for the existing residence as possible.

Rock Crusher Noise

The project may utilize a Thunderbird Hazemag Impact Crushing Plant Model CP300 rock crusher, or equivalent as proposed by the applicant. The rock crusher is limited between the hours of 7:00 am and 4:30 pm, Monday through Friday. Rock crushing is not allowed on weekends or holidays. According to the project applicant, rock crushing is only anticipated to occur for several weeks once the material is required.

Although the City does not have a specific noise threshold for rock crushing in the SMMC or in the General Plan, historically required that noise levels from the proposed temporary rock crusher maintain noise levels of 60 dBA or less at surrounding single-family residences, 65 dBA at multi-family uses, and 70 dBA at all commercial uses. The City updated the SMMC with the approval to amend Chapter 20 in 2017. Specifically, the amendment established under Chapter 20.300.070 (Performance Standards) regulating exterior noise standards requiring that noise levels from the sources maintain noise levels of 60 dBA or less at surrounding single-family residences, 65 dBA at multi-family and all commercial uses. Although rock crushing activities are part of the construction phase of project development the City has applied these standards to rock crushers.

The rock crushing equipment will be located in the southwestern corner of the proposed site, located 576 feet away from the multi-family uses and located 333 feet from the Library. Based on empirical data collected at a material processing plant in the City of Upland noise levels from a

rock crusher ranged between 80-86 dBA at 45 feet (Ldn, 2011). In order to achieve the City's 65 dBA Leq standard at the multi-family residential and at the Library, the rock crusher needs to be 505 feet from the nearest residence. Therefore, distance alone is not adequate enough to achieve the City's 65 dBA Leq standard at the Library.

An approximate 4 decibel reduction is needed to reduce to the noise level to 60 dBA Leq. Breaking the line of sight from a noise source to a receptor will typically achieve a 5 decibel reduction or better based on elevation offsets. Therefore, if the crusher is 10 feet in height, the barrier must be at least 11-12 feet in height. This will help shield the crusher both visually and acoustically. The mitigation can consist of an earthen berm, 5/8" plywood, 1 inch acoustical blankets or any combination of these materials.

Noise measurements of the rock crusher should be conducted once the final crusher type and location are determined to ensure compliance with the City's thresholds. If noise levels are found to be above the established thresholds of 60 dBA at any existing single family residential use, 65 dBA for any multifamily use or 65 dBA at a commercial use then additional mitigation in the form of higher barriers, sound absorbing materials or operational limits on the crushers usage will need to be incorporated.

Construction Vibration

The Federal Transit Administration (FTA) has determined vibration levels that would cause annoyance to a substantial number of people and potential damage to building structures. The FTA criterion for vibration induced structural damage is 0.20 in/sec for the peak particle velocity (PPV). The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses.

The nearest vibration-sensitive uses are the residences located to the northeast, 200 feet or more from the proposed construction. The average vibration levels that would be experienced at the nearest vibration sensitive land uses to the east from temporary construction activities were found to be below 0.2 in/sec. Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, Project construction activities would not result in vibration induced structural damage to residential buildings near the demolition and construction areas. Construction activities were found to generate levels of vibration below 80 VdB and would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

Blasting Vibration

Blasting for construction projects typically results in a Root Mean Square (RMS) or average intensity vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This

is equivalent to a peak particle velocity of about 0.4 inch per second. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 82 VdB and 0.05 inch per second, respectively. Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second. Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 80 VdB would be slightly exceeded when blasting occurred within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided it can be minimized by following the City's blasting procedures.

Onsite Transportation Noise

The ground floor patios and second floor balconies along Mission Road were determined to be above the City's 65 dBA CNEL threshold without mitigation. As a design feature, the project will install noise barriers in the form of 5-foot barriers at the ground floor patios and 4-foot barriers would be installed at the balconies/decks having direct line of sight to Mission Road. The noise levels at the outdoor use areas will be below the City's 65 dBA CNEL standards with the incorporation of the designed/proposed barriers.

Additionally, a final noise assessment is required prior to the issuance of the first building permit since the building facades are above 60 dBA CNEL. This final report would identify the interior noise requirements based upon architectural and building plans. It should be noted; interior noise levels of 45 dBA CNEL can easily be obtained with conventional building construction methods and providing a closed window condition requiring a means of mechanical ventilation (e.g. air conditioning) for each building and upgraded windows for all sensitive rooms (e.g. bedrooms and living spaces).

Offsite Transportation Noise

The Project does not create a direct and cumulative noise increase of more than 3 dBA CNEL on the segment of Mission Road. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

Onsite Train Vibration

Train vibration depends on the weight of the train, travel speed, the condition of the track and soil characteristics. The proposed project buildings would be more than 175 feet from the centerline of the tracks. Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual (FTA 2018) predicts that freight train vibration levels are as high as 73 VdB at 175 feet from the track centerline for a locomotive-powered freight train traveling at speeds

of 50 MPH and up to 62 VdB for commuter rail train events at that speed.

Therefore, the infrequent freight train activities will be below the 80 VdB, infrequent event for the freight train and the frequent commuter train activities will be below the 72 VdB frequent event annoyance thresholds as identified by the FTA. Additionally, due to the close proximity of the Transit Center, the commuter trains will be traveling at a slower speed of approximately 15 MPH, which would reduce the vibration levels 8 VdB and the freight train travel at speeds of 30 MPH or less which would reduce the vibration levels at least 4 VdB. Therefore, the train activities would have a less than significant impact on the proposed project.

1.0 PROJECT INTRODUCTION

1.1 Purpose of this Study

The purpose of this Noise study is to determine any potential noise impacts due to the proposed construction and operations of the proposed project and also to determine potential noise impacts (if any) to the proposed project generated from offsite sources. Should impacts be determined, the intent of this study would be to recommend suitable mitigation measures to bring those impacts to a level that would be considered less then significant.

1.2 Project Location

The Project site is located in the City of San Marcos, in the northern portion of San Diego County. A general project vicinity map is shown in Figure 1-A. The project area is generally located north of Mission Road between Woodward Street and Falcon Drive in the City of San Marcos. The project site is bounded on the south by Mission Road, on the west by Woodward street, on the north by existing residential and open space, and on the east by undeveloped land. Further west is Twin Oaks Valley Road, and residential development lies further north and east of the project site. Light commercial uses are located east of the project site and the City of San Marcos Civic Center is located farther south beyond Mission Road.

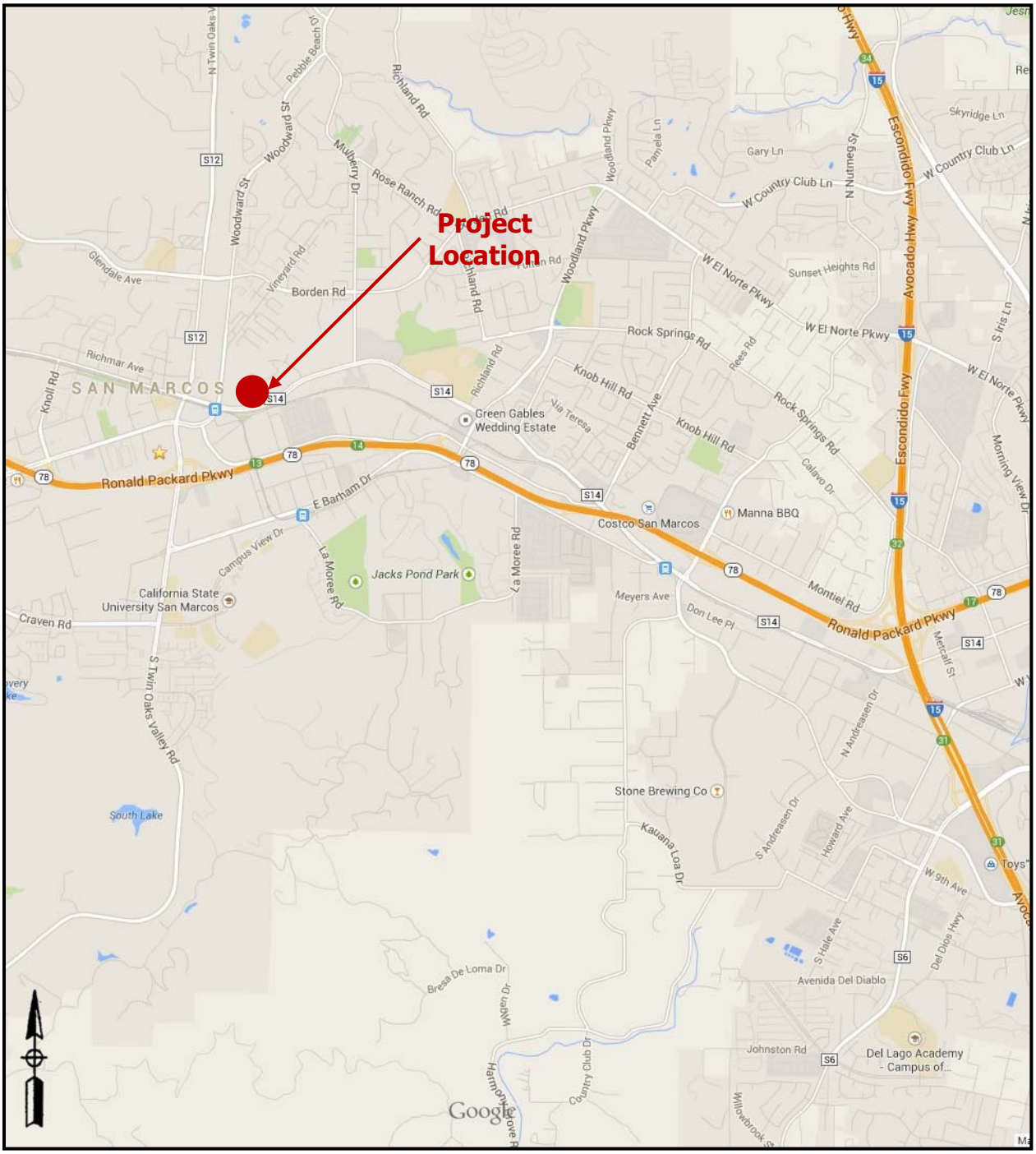
1.3 Project Description and Purpose

The proposed project will consist of 67 attached multi-family condominium homes across 9 condominium buildings as shown in the Project site configuration provided in Figure 1-B. The homes will range from approximately 1,400 square feet (s.f.) to 1,990 s.f. and feature two or three bedrooms, depending on the home plan and layout. The attached homes will be three stories with a maximum building height of 45 feet. Due to the properties of the bedrock, some blasting is anticipated and rock crusher is needed as part of the Project's construction. The rock crusher is limited between the hours of 7:00 am and 4:30 pm, Monday through Friday. Rock crushing is not allowed on weekends or holidays. According to the project applicant, rock crushing is only anticipated to occur for several weeks once the material is required.

1.4 Rock Crushing Operations

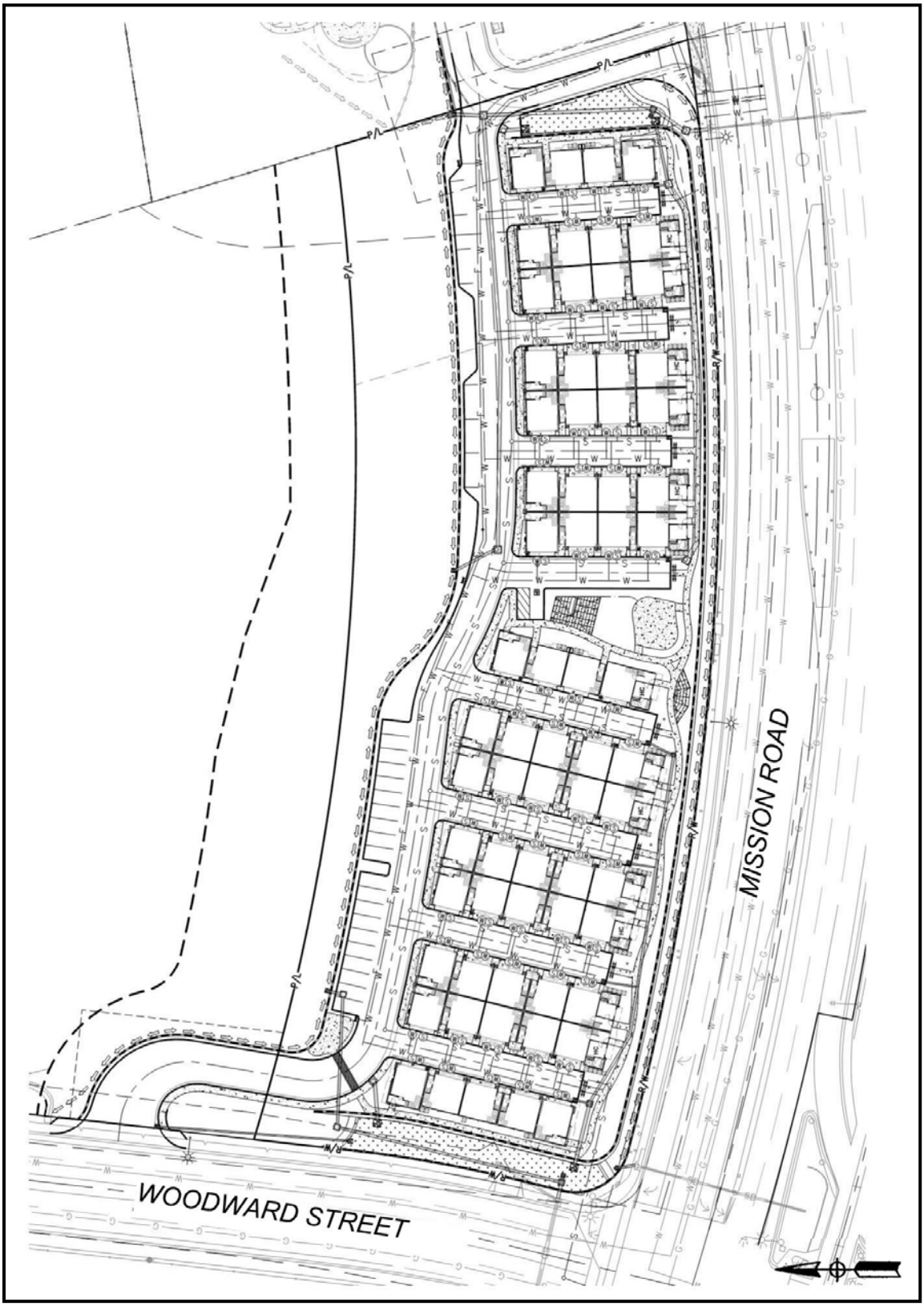
As proposed by the applicant, the project may utilize a Thunderbird Hazemag Impact Crushing Plant Model CP300 rock crusher, or equivalent. Rock crushing will occur between the hours of 9:00 AM and 4:00 PM. The crusher would be located approximately 500 feet from the nearest residence. The rock crushing equipment will be located in the southwestern portion of the proposed residential layout to maximize the distance separation from adjacent residential uses. The rock crusher location is shown in Figure 1-C.

Figure 1-A: Project Vicinity Map



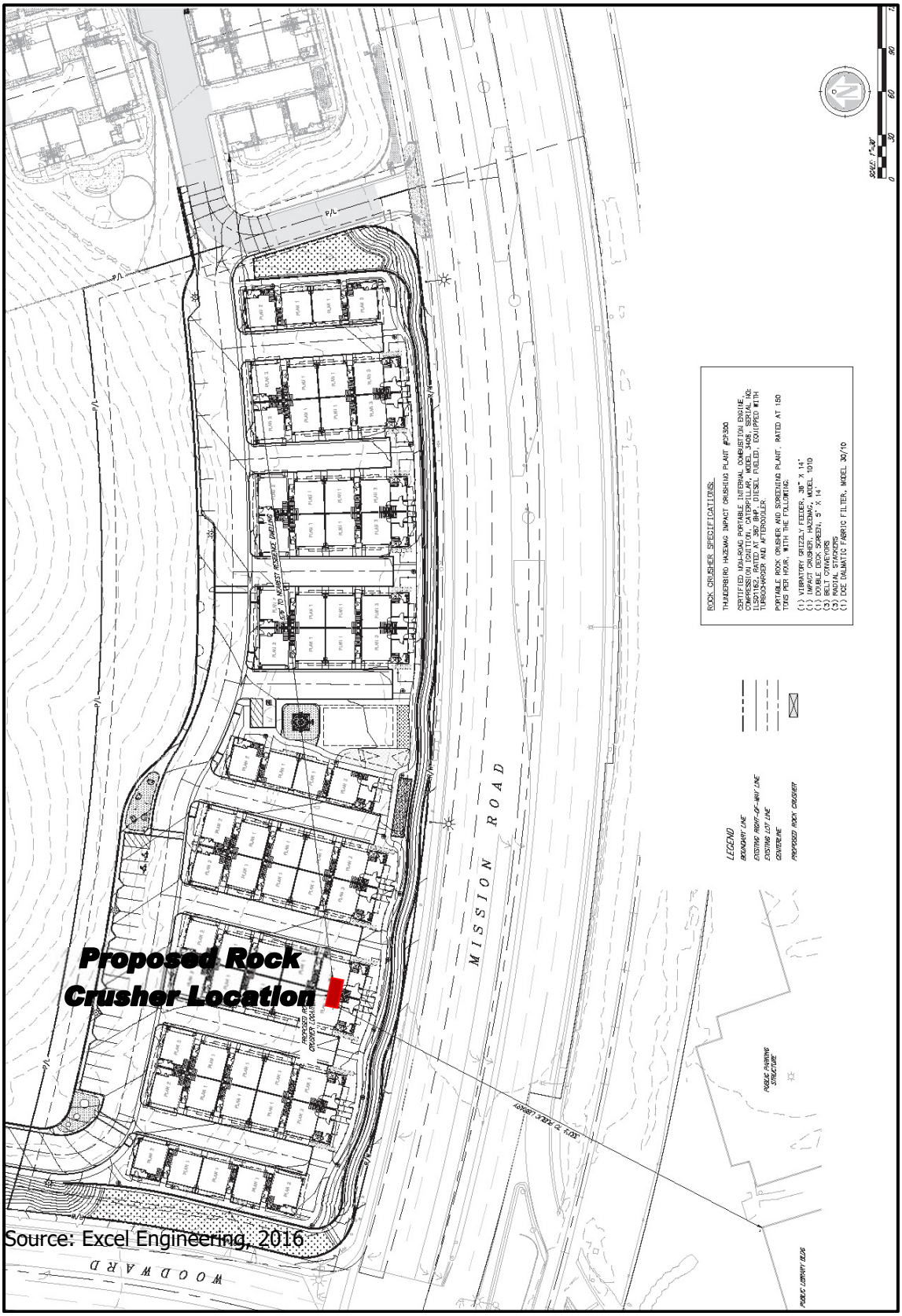
Source: Google Maps, 8/18

Figure 1-B: Project Configuration



Source: Excel Engineering, 2018

Figure 1-C: Rock Crusher Location



Source: Excel Engineering, 2016

2.0 FUNDAMENTALS

2.1 Acoustical Fundamentals

Noise is defined as unwanted or annoying sound which interferes with or disrupts normal activities. Exposure to high noise levels has been demonstrated to cause hearing loss. The individual human response to environmental noise is based on the sensitivity of that individual, the type of noise that occurs and when the noise occurs. Sound is measured on a logarithmic scale consisting of sound pressure levels known as a decibel (dB). The sounds heard by humans typically do not consist of a single frequency but of a broadband of frequencies having different sound pressure levels. The method for evaluating all the frequencies of the sound is to apply an A-weighting to reflect how the human ear responds to the different sound levels at different frequencies. The A-weighted sound level adequately describes the instantaneous noise whereas the equivalent sound level depicted as Leq represents a steady sound level containing the same total acoustical energy as the actual fluctuating sound level over a given time interval.

The Community Noise Equivalent Level (CNEL) is the 24 hour A-weighted average for sound, with corrections or penalties for evening and nighttime hours. The corrections require an addition of 5 decibels to sound levels in the evening hours between 7 p.m. and 10 p.m. and an addition of 10 decibels to sound levels at nighttime hours between 10 p.m. and 7 a.m. These additions are made to account for the increased sensitivity during the evening and nighttime hours when sounds appear louder.

A vehicles noise level is generated from a combination of noise produced by the engine, exhaust and tires. The cumulative traffic noise levels along a roadway segment are based on three primary factors: the amount of traffic, the travel speed of the traffic, and the vehicle mix ratio or number of medium and heavy trucks. The intensity of traffic noise is increased by higher traffic volumes, greater speeds and increased number of trucks.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiant in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas and vegetation. On the other hand, fixed/point sources radiate outward uniformly as it travels away from the source. Their sound levels attenuate or drop off at a rate of 6 dBA for each doubling of distance.

The most effective noise reduction methods consist of controlling the noise at the source, blocking the noise transmission with barriers or relocating the receiver. Any or all of these methods may be required to reduce noise levels to an acceptable level.

2.2 Vibration Fundamentals

Vibration is a trembling or oscillating motion of the ground. Like noise, vibration is transmitted in waves, but in this case through the ground or solid objects. Unlike noise, vibration is typically felt rather than heard. Vibration can be either natural as in the form of earthquakes, volcanic eruptions; or manmade as from explosions, heavy machinery, or trains. Both natural and manmade vibration may be continuous, such as from operating machinery; or infrequent, as from an explosion.

As with noise, vibration can be described by both its amplitude and frequency. Amplitude may be characterized in three ways: displacement, velocity, and acceleration. Particle displacement is a measure of the distance that a vibrated particle travels from its original position and for the purposes of soil displacement is typically measured in inches or millimeters. Particle velocity is the rate of speed at which soil particles move in inches per second or millimeters per second. Particle acceleration is the rate of change in velocity with respect to time and is measured in inches per second or millimeters per second. Typically, particle velocity (measured in inches or millimeters per second) and/or acceleration (measured in gravities) are used to describe vibration. Table 2-1 shows the human reaction to various levels of peak particle velocity.

Vibrations also vary in frequency and this affects perception. Typical construction vibrations fall in the 10 to 30 Hz range and usually occur around 15 Hz. Traffic vibrations exhibit a similar range of frequencies; however, due to their suspension systems, it is less common, to measure traffic frequencies above 30 Hz.

Propagation of ground-borne vibrations is complicated and difficult to predict because of the endless variations in the soil through which the waves travel. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by dropping an object into water. P-waves, or compression waves, are waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced

with distance as a result of material damping in the form of internal friction, soil layering, and special voids. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

Table 2-1: Human Reaction to Typical Vibration Levels

Vibration Level Peak Particle Velocity (in/sec)	Human Reaction	Effect on Buildings
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage
Source: Caltrans, Division of Environmental Analysis, *Transportation Related Earthborne Vibration, Caltrans Experiences*, Technical Advisory, Vibration, TAV-02-01-R9601, 2002.		

3.0 SIGNIFICANCE THRESHOLDS AND STANDARDS

3.1 Construction Noise

The Noise Element of the General Plan, limits construction activities to Monday through Friday 7:00 a.m. to 6:00 p.m. or on Saturdays 8:00 a.m. to 5:00 p.m. The City of San Marcos Municipal Code Title 17.32.180 addresses the time limits that apply to grading, extraction and construction activities between 7:00 a.m. and 4:30 p.m. Monday through Friday. Grading, extraction or construction is not allowed in the City on the weekends or holidays. The Municipal code does not set noise limits on construction activities. Commonly, the City has utilized the County of San Diego's Noise Ordinance noise limit for construction activities of 75 dBA over an 8-hour period (Leq-8).

3.2 Rock Crushing Noise Limits

The City of San Marcos has historically required that noise levels from the proposed temporary rock crusher and off-site material truck haulage maintain hourly noise levels of 60 dBA Leq or less at surrounding single family residences, 65 dBA Leq at multifamily uses and 70 dBA Leq at all commercial uses. The rock crusher and off-site haulage is also limited between the hours of 7:00 am and 4:30 pm, Monday through Friday. Rock crushing and off-site haulage is not allowed on weekends or holidays.

3.3 Transportation Noise Standards

To control transportation related noise sources such as arterial roads, freeways, airports and railroads, the City of San Marcos has established guidelines for acceptable community noise levels in the Noise Element of the General Plan. For noise sensitive rural and single family residential uses, schools, libraries, parks and recreational areas the City Noise Element requires an exterior noise level of less than 60 dBA CNEL for outdoor usable areas. For multi-family developments the standard is 65 dBA CNEL and a standard of 70 dBA CNEL is typically applied to commercial uses. The City has also established an interior noise limit of 45 dBA CNEL for all residential uses.

3.4 Blasting and Vibration Standards

The City of San Marcos Title 17 of the City's Municipal Code states that all blasting operations within the City of San Marcos are prohibited unless a Certificate of Authorization is first obtained from the San Marcos Building Director and an Operations Permit issued by the Fire Chief. Additional relevant sections of the City's Code for Blasting are provided below:

- The general contractor or property owner/developer shall give reasonable notice in writing at the time of issuance of a building permit, grading permit or encroachment license to all residences or

businesses within 600 feet of any potential blast location. The notice shall be in a form approved by the Building Director. Any resident or business receiving such notice may request of the Building Director that a notice of impending blasting be given by the blaster at the time of the 12 hour advance notice given to the Building Director. The general contractor or property owner/developer shall make all reasonable efforts to contact any and all parties requesting the second notice.

- The blaster shall file a written certification with the Building Director certifying that the general notice required by Section 17.60.060(b) has been given. The certificate shall include addresses and date(s) of notification. A copy shall be retained on file at the Building Division.

- Inspections of all structures within 300 feet of the blast site shall be made before blasting operations. The persons inspecting shall obtain the permission of the building owner to conduct an inspection. The inspections shall be done by a registered structural engineer employed by the blaster or project contractor. The inspection shall be only for the purpose of determining the existence of any visible or reasonably recognizable pre-existing defects or damages in any structure. Inspection refusal shall be at the discretion of the property owner.

- Blasting shall only be permitted between the hours of 9:00 a.m. and 4:00 p.m. during any weekday, Monday through Friday, exclusive of City recognized holidays unless special circumstances warrant another time or day and special approval is granted by the Building Director and Fire Chief.

The City of San Marcos has not yet adopted vibration criteria. The United States Department of Transportation Federal Transit Administration (FTA) provides criteria for acceptable levels of groundborne vibration for various types of special buildings that are sensitive to vibration. For purposes of identifying potential project-related vibration impacts, the FTA criteria will be used. The human reaction to various levels of vibration is highly subjective. The upper end of the range shown for the threshold of perception, or roughly 65 VdB, may be considered annoying by some people. Vibration below 65 VdB may also cause secondary audible effects, such as a slight rattling of doors, suspended ceilings/fixtures, windows, and dishes, any of which may result in additional annoyance. Table 3-1 on the following page, shows the FTA groundborne vibration and noise impact criteria for human annoyance.

In addition to the vibration annoyance standards presented above, the FTA also applies the following standards for construction vibration damage. As shown in Table 3-2 on the following page, structural damage is possible for typical residential construction when the peak particle velocity (PPV) exceeds 0.2 inch per second (in/sec). This criterion is the threshold at which there is a risk of damage to normal dwellings.

In the context of this analysis, the noise and vibration impacts associated with the construction, rock crushing operations and blasting operations will be conditioned to comply with the thresholds stated above. The potential noise and vibration impacts are analyzed separately below.

Table 3-1: Groundborne Vibration and Noise Impact Criteria (Human Annoyance)

Category	Groundborne Vibration Impact Levels (VdB re 1 microinch/second)			Groundborne Noise Impact Levels (dB re 20 micropascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* June 2006.

[1] "Frequent Events" are defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

[2] "Occasional Events" are defined as between 30 and 70 vibration events of the same source per day. Most commuter truck lines have this many operations.

[3] "Infrequent Events" are defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines

[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

[5] Vibration-sensitive equipment is not sensitive to groundborne noise.

Table 3-2: Groundborne Vibration Impact Criteria (Structural Damage)

Building Category	PPV (in/sec)	VdB
I. Reinforced-concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* June 2006.

Notes: RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.

4.0 CONSTRUCTION NOISE AND VIBRATION

4.1 Construction Noise Methodology

Construction noise represents a short-term impact on the ambient noise levels. Noise generated by construction equipment includes haul trucks, water trucks, graders, dozers, loaders and scrapers can reach relatively high levels. Grading activities typically represent one of the highest potential sources for noise impacts. The most effective method of controlling construction noise is through local control of construction hours and by limiting the hours of construction to normal weekday working hours.

The U.S. Environmental Protection Agency (U.S. EPA) has compiled data regarding the noise generating characteristics of specific types of construction equipment. Noise levels generated by heavy construction equipment can range from 60 dBA to in excess of 100 dBA when measured at 50 feet. However, these noise levels diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 75 dBA measured at 50 feet from the noise source to the receptor would be reduced to 69 dBA at 100 feet from the source to the receptor and reduced to 63 dBA at 200 feet from the source. Additionally, sound levels are logarithmic not linear, so adding two sources of 68 dBA plus 68 dBA is equal to 71 dBA not 136 dBA.

Using a point-source noise prediction model, calculations of the expected construction noise impacts were completed. The essential model input data for these performance equations include the source levels of each type of equipment, relative source to receiver horizontal and vertical separations, the amount of time the equipment is operating in a given day, also referred to as the duty-cycle and any transmission loss from topography or barriers.

The equipment needed for the development will consist of up to two large bulldozers, a medium bulldozer, three medium sized scrapers, a medium sized front loader, a medium sized crawler type excavator, a medium sized compactor, two small to medium sized road grader, a medium sized rubber tire backhoe and a water truck. Based on the EPA noise emissions, empirical data and the amount of equipment needed, worst case noise levels from the construction equipment for site preparation would occur during the grading operations. Additionally, the project will utilize a Thunderbird Hazemag Crusher or equivalent.

4.2 Findings and Mitigation for Grading Activities

The grading activities will consist of the preparation of internal roadways, parking and the finished pads. The grading equipment will be spread out over the project site from distances near the occupied property lines to distances of 500 feet or more away. Based upon the site plan the majority of the grading operations, on average, will occur more than 300 feet from the property lines. This means that most of the time the average distance from all the equipment to the nearest property

line is 300 feet. As can be seen in Table 4-1, at an average distance of 300 feet from the construction activities to the nearest property line would result in a noise attenuation of -15.6 dBA without shielding. Additionally, the amount of time equipment is operating during a normal work day, referred to as duty-cycle, is utilized in this analysis.

Table 4-1: Construction Noise Levels

Construction Equipment	Quantity	Source Level @ 50-Feet (dBA Leq)[1]	Duty Cycle (Hours/Day)	Cumulative Noise Level @ 50-Feet (dBA Leq-8)
Dozer – D8	1	74	8	74.0
Dozer – D6	1	74	6	72.8
Dozer – 450	1	74	6	72.8
Scraper – 621G	3	75	8	79.8
Wheel Loader – 972G	1	73	8	73.0
Excavator – 336E	1	72	8	72.0
Compactor – 815B	1	74	6	72.8
Grader – 160M	1	73	4	70.0
Grader – 14M	1	73	8	73.0
Backhoe	1	72	4	69.0
Water Truck	1	70	8	70.0
			Cumulative Levels @ 50 Feet	84.2
			Average Distance to Property Line (Feet)	300
			Noise Reduction Due to Distance	-15.6
			NEAREST PROPERTY LINE NOISE LEVEL	**68.6**

[1] Source: Empirical Data

Given this, the noise levels will comply with the 75 dBA Leq standard average over 8 hours at the property lines. Therefore, no impacts are anticipated and no mitigation is required during construction of the proposed Project. Additionally, all equipment should be properly fitted with mufflers and all staging and maintenance should be conducted as far away for the existing residence as possible.

4.3 Findings and Mitigation for Rock Crushing

This section examines the potential noise source impacts associated with the operation of the proposed temporary rock crushing equipment. The project may utilize a Thunderbird Hazemag Impact Crushing Plant Model CP300 rock crusher, or equivalent as proposed by the applicant. The rock crusher is limited between the hours of 7:00 am and 4:30 pm, Monday through Friday. Rock crushing is not allowed on weekends or holidays. According to the project applicant, rock crushing is only anticipated to occur for several weeks once the material is required. The crusher

would be located at the southwest grading limits of the project, approximately 576 feet from the nearest multifamily residence and 333 feet from the Library across Mission Road. Based on empirical data collected at a material processing plant in the City of Upland and a crushing operation in the City of Escondido, the average or hourly noise levels from different rock crushers ranged between 80-86 dBA Leq at 45 feet (Ldn, 2011-2012). A worst-case noise level of 86 dBA Leq at 45 feet will be utilized for the analysis.

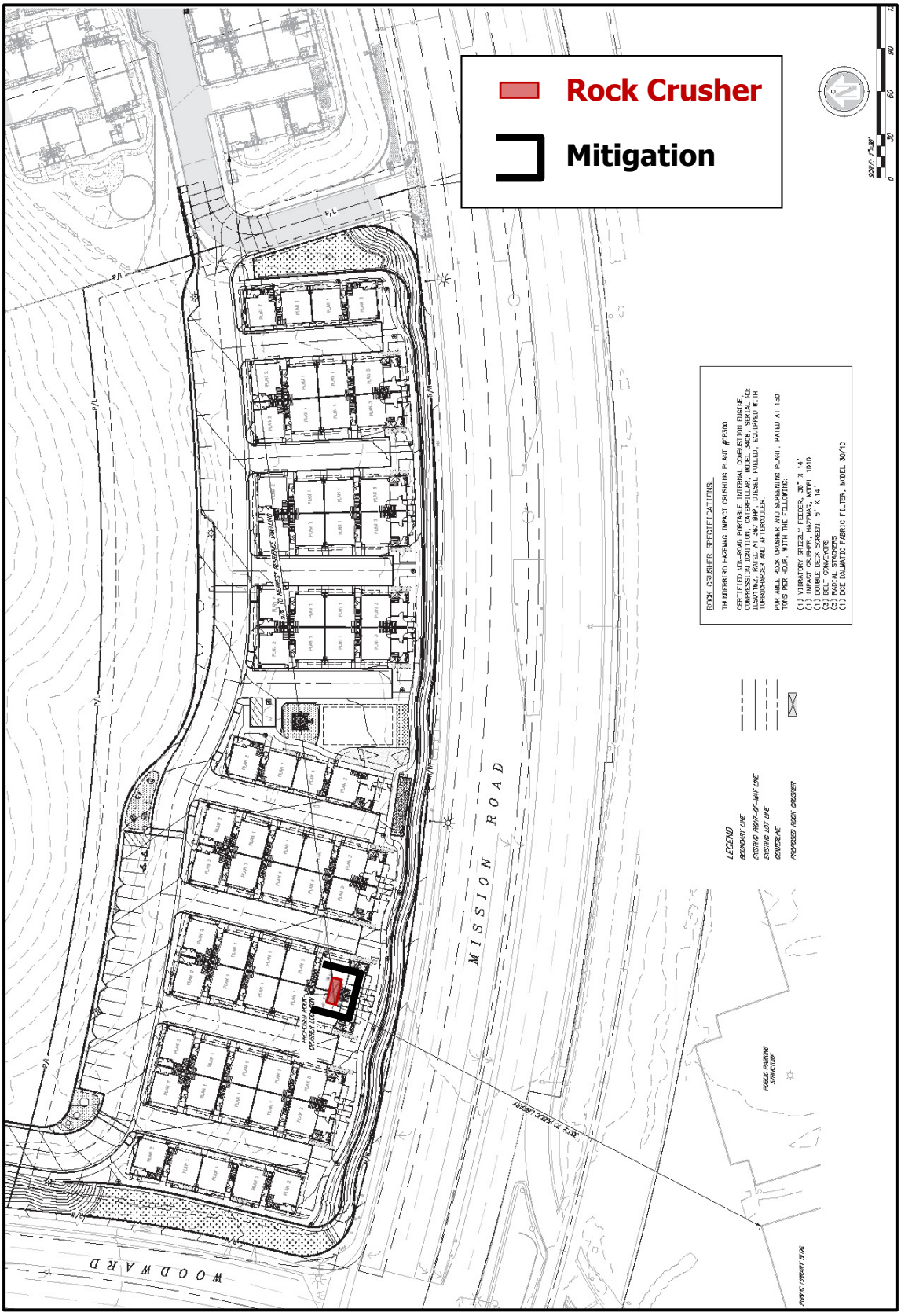
Although the City does not have a specific noise threshold for rock crushing in the SMMC or in the General Plan, historically required that noise levels from the proposed temporary rock crusher maintain noise levels of 60 dBA or less at surrounding single-family residences, 65 dBA at multi-family uses, and 70 dBA at all commercial uses. The City updated the SMMC with the approval to amend Chapter 20 in 2017. Specifically, the amendment established under Chapter 20.300.070 (Performance Standards) regulating exterior noise standards requiring that noise levels from the sources maintain noise levels of 60 dBA or less at surrounding single-family residences, 65 dBA at multi-family and all commercial uses. Although rock crushing activities are part of the construction phase of project development the City has applied these standards to rock crushers.

As can be seen in Table 4-2, distance alone is not adequate enough to achieve the City's 65 dBA Leq standard at the Library, but the crusher would comply with the 65 dBA Leq standard at the multi-family uses located 576 feet away. Given this, the noise levels are anticipated to be above the City's 65 dBA Leq standard, for the rock crusher, at the Library. Therefore, mitigation is required during rock crushing operations of the proposed Project. As can be seen in Table 4-2, a 3.6 decibel reduction is needed to reduce to the noise level to 65 dBA Leq. Breaking the line of sight from a noise source to a receptor will typically achieve a 5-decibel reduction or better based on elevation offsets resulting in a noise level of 63.8 dBA at the Library. Therefore, if the crusher is 10 feet in height, the barrier must be at least 11-12 feet in height. This will help shield the crusher both visually and acoustically. The mitigation can consist of an earthen berm, 5/8" plywood, 1 inch acoustical blankets or any combination of these materials. Figure 4-A shows the location of the crusher and placement of the required mitigation.

Table 4-2: Rock Crushing Noise Levels

Sensitive Use	Rock Crusher Noise Level @ 45 Feet (dBA Leq)	Distance to Sensitive Use (Feet)	Noise Reduction due to Distance (dBA Leq)	Noise Level @ Sensitive Uses (dBA Leq)	Noise Threshold (dBA Leq)	Reduction Needed (dBA Leq)
Multi-Family Residential	86	576	-22.1	63.9	65	0
Library		333	-17.4	68.6	65	3.6

Figure 4-A: Preliminary Rock Crusher Location and Mitigation



Noise measurements of the rock crusher should be conducted once the final crusher type and location are determined to ensure compliance with the City's thresholds. If noise levels are found to be above the established thresholds of 60 dBA Leq at any existing single family residential use, 65 dBA Leq for any multifamily use or 65 dBA Leq at a commercial use then additional mitigation in the form of higher barriers, sound absorbing materials or operational limits on the crushers usage will need to be incorporated.

Cumulative Construction Noise

Sound levels are logarithmic not linear, so adding two sources of 68 dBA plus 68 dBA is equal to 71 dBA not 136 dBA. You must first antilog each number, add and then log the summation. Sound levels that are separated by more than ten decibels generally do not cumulatively add to each other. The rock crusher noise level (63.8 dBA) and the grading noise level (68.6 dBA) are not anticipated to add to each based on the difference between the two noise levels and the separation of the equipment. Therefore, cumulatively would not exceed the 75 dBA Leq standard average over 8 hours at the property lines.

4.4 Findings and Mitigation for Construction Vibration

The nearest vibration-sensitive uses are the residences located to the east of the project site, 100 feet or more from the proposed construction. Table 4-3 lists the average vibration levels that would be experienced at the nearest vibration sensitive land uses to the east from temporary construction activities. Loaded trucks will be traveling along the western portion of the site and were assessed at a minimum distance of 100 feet from to be conservative.

The FTA has determined vibration levels that would cause annoyance to a substantial number of people and potential damage to building structures. The FTA criterion for vibration induced structural damage is 0.20 in/sec for the peak particle velocity (PPV). Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, Project construction activities would not result in vibration induced structural damage to residential buildings near the construction areas. The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

Table 4-3: Vibration Levels from Construction Activities (Residential Receptors)

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS Velocity at 25 Feet (in/sec)	Approximate Velocity Level at 100 Feet (VdB)[1]	Approximate RMS Velocity at 100 Feet (in/sec)[2]
Small bulldozer	58	0.003	39.9	0.0004
Jackhammer	79	0.035	60.9	0.0044
Loaded trucks	86	0.076	67.9	0.0095
Large bulldozer	87	0.089	68.9	0.0111
		FTA Criteria	80	0.2
		Significant Impact?	**No**	**No**

[1] VdB = VdB(25 feet) – 30log(d/25) provided by the FTA
[2] PPV at Distance D = PPVref x $(25/D)^{1.5}$ provided by the FTA

4.5 Findings and Mitigation for Blasting Vibration

Blasting for construction projects typically results in an average vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. As discussed above the smallest distance between an existing residence and the blasting activity was assumed to be 100 feet. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 91 VdB and 0.05 inch per second, respectively.

Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second. Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 80 VdB would be slightly exceeded when blasting occurs within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided but can be minimized by following the City's blasting procedures as stated above in Section 3.5 and with proper notice, annoyances can be avoided.

5.0 TRANSPORTATION NOISE

5.1 Existing Noise Environment Onsite

To determine the existing noise environment and to assess potential noise impacts, a 24-hour measurement was taken at the project having a relatively flat terrain and no obstruction from trees or rock outcroppings. This was done to determine the worst case conditions at the nearest proposed Noise Sensitive Land Use (NSLU). The noise measurements were recorded on August 2-4, 2018 by Ldn Consulting between approximately 4:00 p.m. and 12:00 p.m., two days later.

Noise measurements were taken using two Larson-Davis Spark Model 706 Type 2 precision sound level meters, programmed, in "slow" mode, to record noise levels in "A" weighted form. The sound level meter and microphone were mounted on a tripod, five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before and after the monitoring using a Larson-Davis calibrator, Model CAL 200.

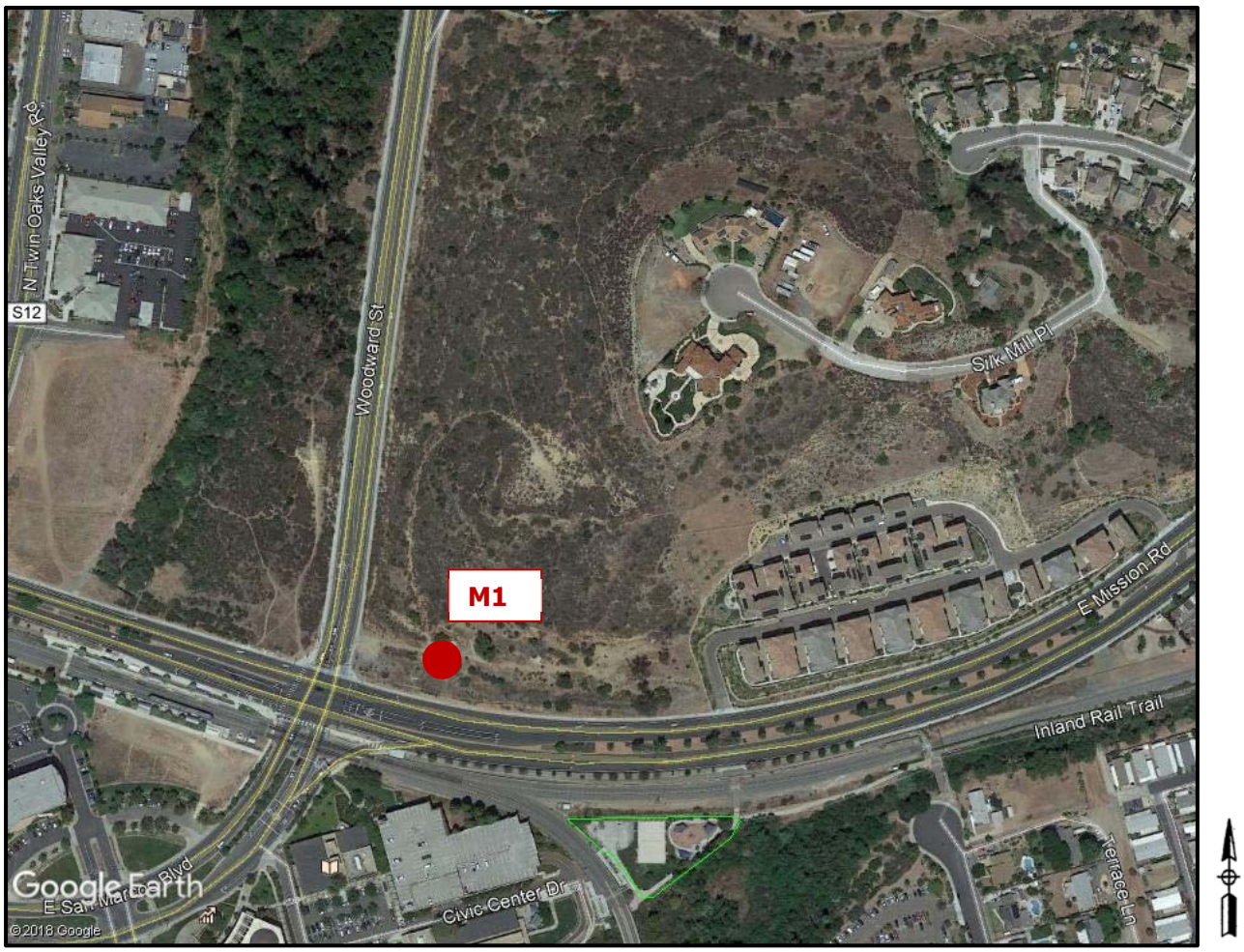
The noise measurement location was determined based on site access and noise impact potential to the proposed sensitive uses. Monitoring location 1 (M1) was located near the southern end of the project. The noise monitoring location is provided graphically in Figure 5-A on the following page.

The results of the noise level measurement is presented in Table 5-1. The ambient 24-hour CNEL noise levels measured in the area of the project was found to be roughly 53 dBA CNEL. The existing noise levels in the project area consisted primarily of traffic along E. Mission Road, and background noise from agricultural and equestrian operations in the distance.

Table 5-1: Measured Ambient Noise Levels

Measurement Identification	Description	Time	Noise Levels (dBA)					
			CNEL	Lmax	Lmin	L10	L50	L90
M1	Along E. Mission Road	August 2, 2018 4:00 p.m. – August 4, 2018 12:00 p.m.	52.5	85.4	35.3	54.0	49.5	39.5
Source: Ldn Consulting August 2-4, 2018								

Figure 5-A: Ambient Monitoring Locations



5.2 Future Onsite Noise Prediction

To determine the future noise environment and impact potentials the Sound32 model was utilized. The critical model input parameters, which determine the projected vehicular traffic noise levels, include vehicle travel speeds, the percentages of automobiles, medium trucks and heavy trucks in the roadway volume, the site conditions and the peak hour traffic volume. The peak hour traffic volumes range between 6-12% of the average daily traffic (ADT) and 10% is generally acceptable for noise modeling.

Table 5-2 presents the roadway parameters used in the analysis including the peak traffic volumes, vehicle speeds and the hourly traffic flow distribution (vehicle mix). The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the Sound32 Model. The Buildout conditions include the future traffic volume forecasts provided in the project's traffic study (Urban Vineyard Transportation Impact Analysis, Linscott Law & Greenspan, 2018).

Table 5-2: Future Traffic Parameters

Roadway	Average Daily Traffic (ADT)[1]	Peak Hour Volumes[1]	Modeled Speeds (MPH)	Vehicle Mix %[2]		
				Auto	Medium Trucks	Heavy Trucks
E Mission Road	24,660	2,466	45	96	2	2
Woodward Street	4,710	471	35	96	2	2

[1] Source: LLG, 2018
[2] Typical vehicle mix

The required coordinate information necessary for the Sound32 model input was taken from the conceptual site plans provided by Excel Engineering, 2019. The conceptual plans were used to identify the pad elevations, roadway elevations, and the relationship between the noise source(s) and the outdoor receptor areas. To evaluate the potential noise impacts on the proposed development, outdoor observers were located throughout the site and placed four feet above the finished pad elevation. The modeled observer locations for the potential outdoor use areas for are presented in Figure 5-B for ground floor areas and Figure 5-C for second floor balconies. Private outdoor use areas would be provided by ground floor patios and second floor balconies which were modeled to determine if shielding/mitigation is required to reduce the noise levels below the City's 65 dBA CNEL threshold.

Figure 5-B: Modeled Ground Floor Receptor Locations

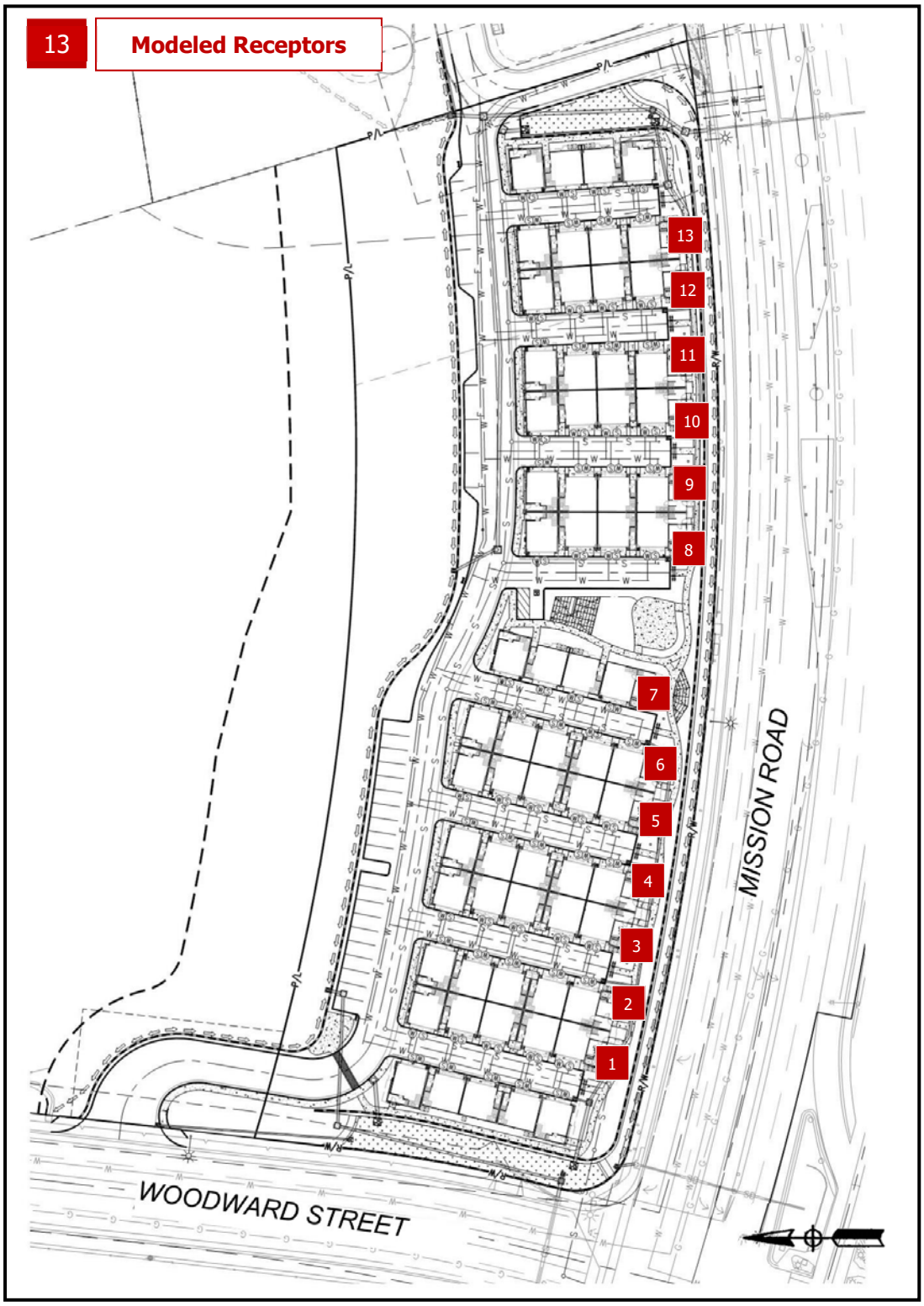
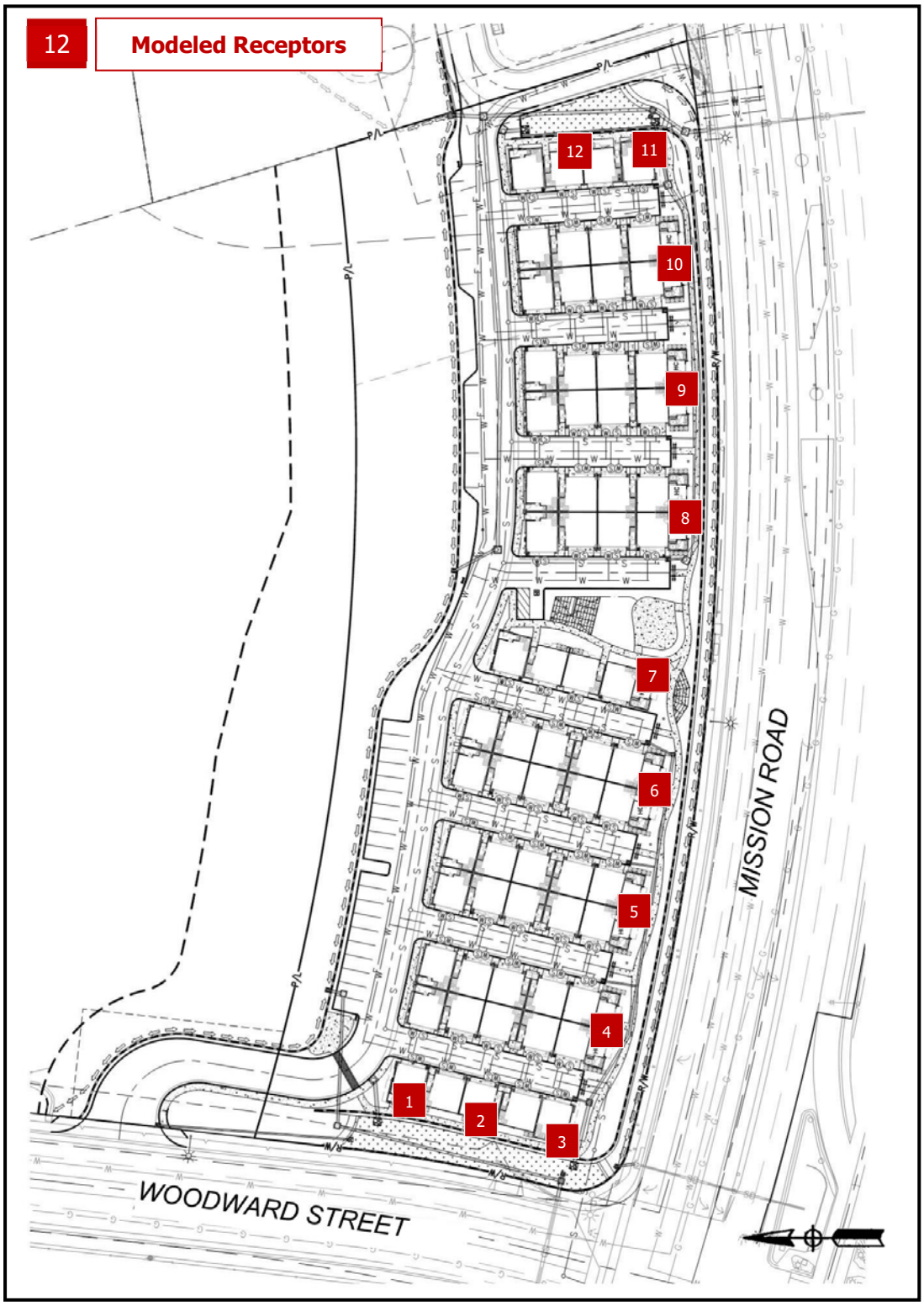


Figure 5-C: Modeled Second Floor Receptor Locations



5.3 Onsite Rail Line Noise

The proposed Project is located a minimum of 160 feet from the San Diego Northern Railroad (SDNR) consisting of Sprinter service operated by the NCTD. According to the City of San Marcos General Plan Noise Element, the 65 dBA CNEL noise contour from the rail activity, with no shielding, is located 130 feet from the centerline of the railroad. No reduction factor was taken for the building facades.

5.4 Cumulative Onsite Noise Levels and Findings

Ground floor patios and second floor balconies were modeled to determine if shielding/mitigation is required to reduce the noise levels below the City's 65 dBA CNEL threshold. The noise levels determined for the roadway and train activities were combined to determine the overall cumulative noise levels at the proposed balconies. The resultant cumulative noise levels from the traffic and train activities are provided below in Table 5-3 for each of the ground floor patios and the building facades and Table 5-4 for each of the proposed second floor balconies and the building facades. As a design feature, noise barriers in the form of 5-foot barriers at the ground floor patios and 4-foot barriers would be necessary at the balconies/decks of the units along Mission Road and Woodward Street were found to comply with the City of San Marcos Noise standards of 65 dBA CNEL at the multi-family residences and outdoor useable areas.

Table 5-3: Combined Future Exterior Noise Levels (Ground Floor)

Receptor Number	Unmitigated Noise Levels from all Sources (dBA CNEL)	Proposed Design Feature Barrier Height (Feet)	Outdoor Ground Floor Noise Levels with Design Features (dBA CNEL)[1]	Unshielded Building Façade Noise Levels (dBA CNEL)[1]
1	71	5	64	71
2	71	5	64	71
3	71	5	63	71
4	71	5	64	71
5	70	5	63	70
6	71	5	64	71
7	70	5	63	70
8	71	5	65	71
9	71	5	63	71
10	71	5	64	71
11	71	5	63	71
12	71	5	64	71
13	71	5	63	71

[1] Interior Noise Study required per City Guidelines if building façade is above 60 dBA CNEL.

Table 5-4: Combined Future Exterior Noise Levels (Upper Floors)

Receptor Number	Unmitigated Noise Levels from all Sources (dBA CNEL)	Proposed Design Feature Barrier Height (Feet)	Outdoor Ground Floor Noise Levels with Design Features (dBA CNEL)[1]	Unshielded Building Façade Noise Levels (dBA CNEL)[1]
1	65	4	62	65
2	66	4	63	66
3	67	4	64	67
4	70	4	65	70
5	70	4	65	70
6	70	4	65	70
7	70	4	65	70
8	71	4	65	71
9	71	4	65	71
10	71	4	65	71
11	66	4	62	66
12	66	4	62	66

[1] Interior Noise Study required per City Guidelines if building façade is above 60 dBA CNEL.

The barriers must be constructed of a non-gapping material (i.e., masonry, stucco, ¼ inch thick glass or Plexiglas). The general locations of proposed noise barriers of the ground floor patios are provided in Figure 5-D. The locations of the units with the proposed balconies/deck barriers are provided in Figure 5-E. The modeling input and outputs are provided in ***Attachment A***.

Additionally, a final noise assessment is required prior to the issuance of the first building permit for first, second and third floors of the units since the building facades are above 60 dBA CNEL. This final report would identify the interior noise requirements based upon architectural and building plans to meet the City's established interior noise limit of 45 dBA CNEL. It should be noted; interior noise levels of 45 dBA CNEL can easily be obtained with conventional building construction methods and providing a closed window condition requiring a means of mechanical ventilation (e.g. air conditioning) for each building and upgraded windows for all sensitive rooms (e.g. bedrooms and living spaces).

Figure 5-D: Proposed Noise Barriers (Ground Floor)

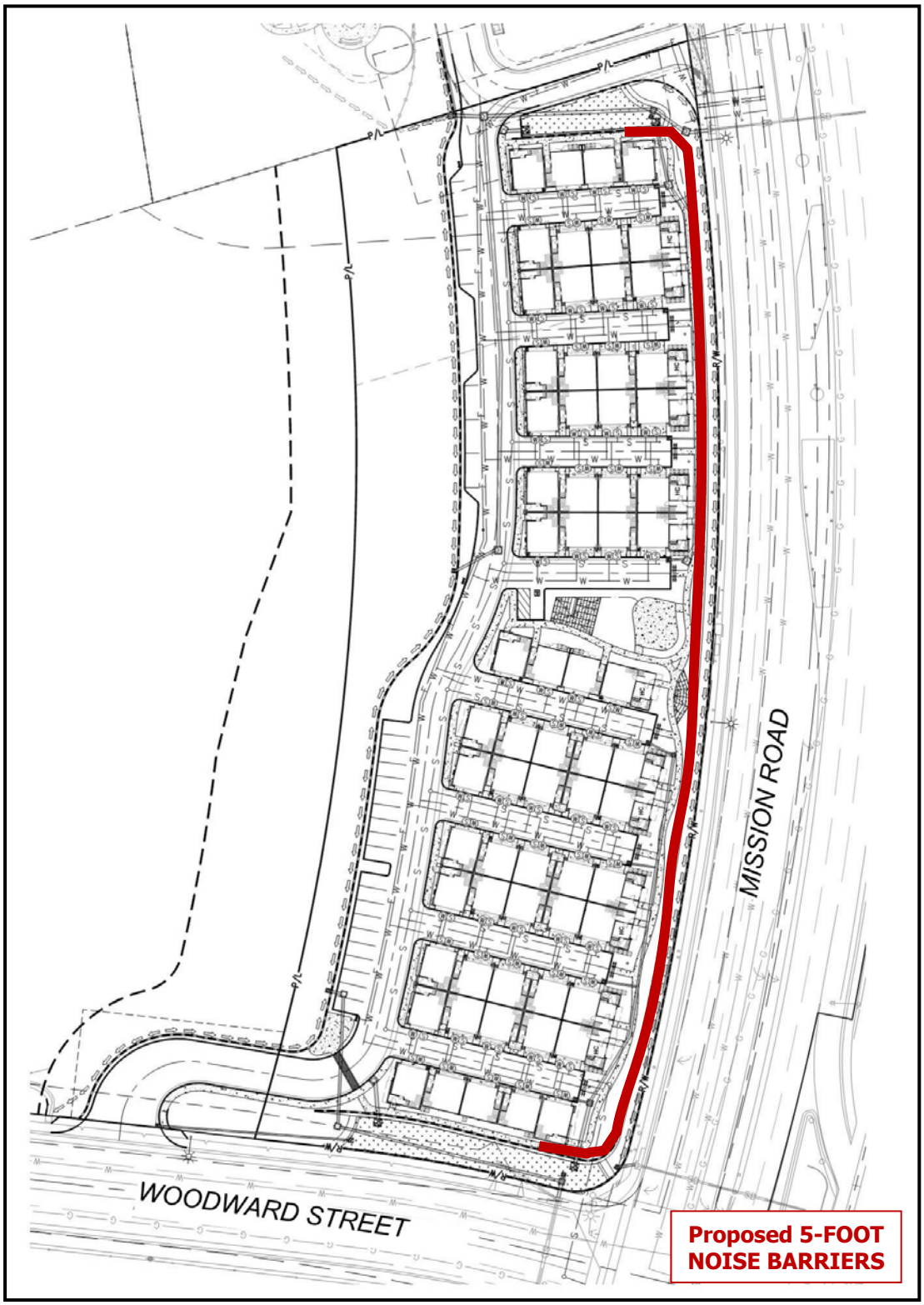
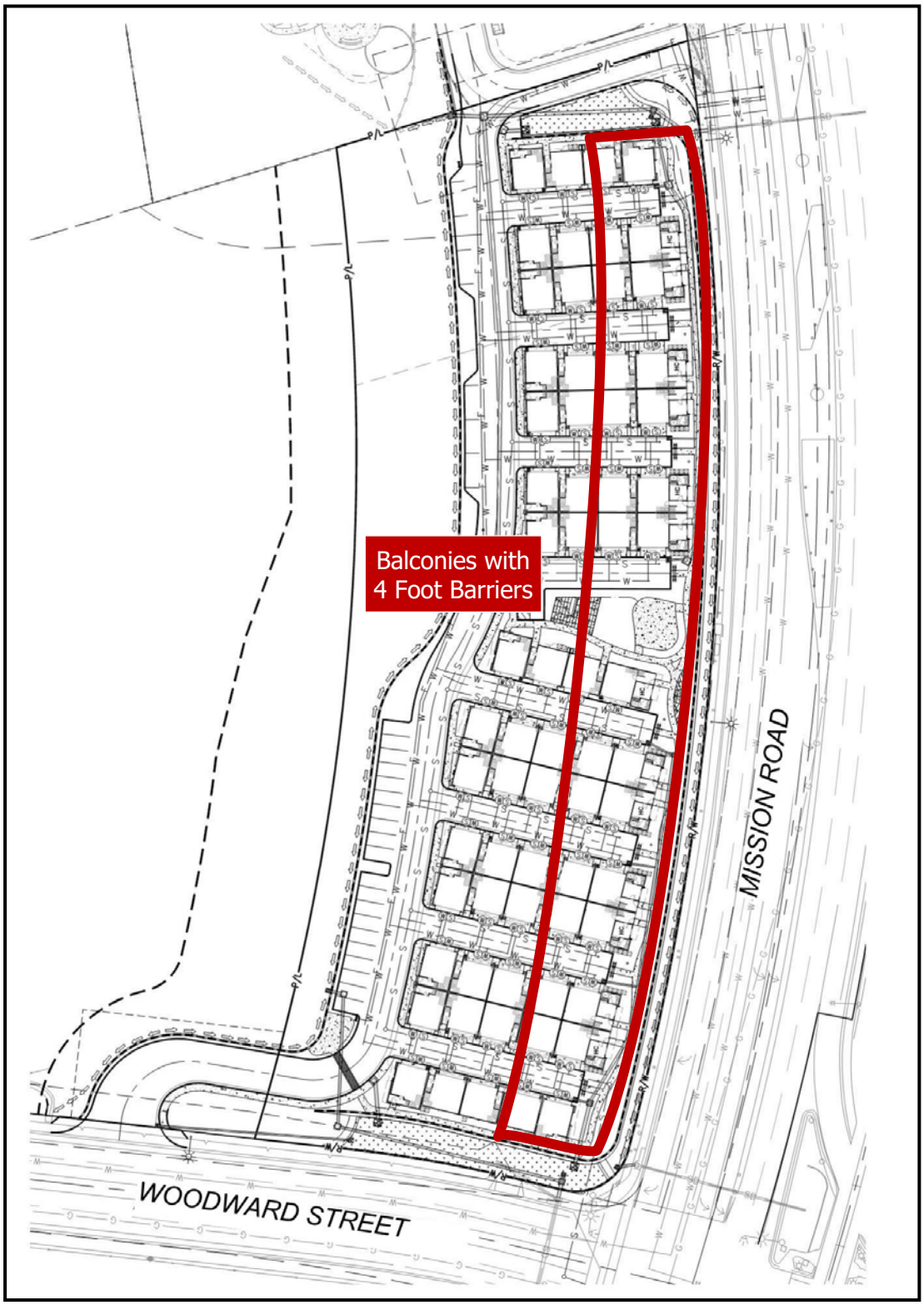


Figure 5-E: Proposed Noise Barriers (Balconies)



5.5 Project Related Offsite Transportation Noise

The off-site Project related roadway segment noise levels projected in this report were calculated using the methods in the Highway Noise Model published by the Federal Highway Administration (FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, December, 1978). The FHWA Model uses the traffic volume, vehicle mix, speed, and roadway geometry to compute the equivalent noise level. A spreadsheet calculation was used which computes equivalent noise levels for each of the time periods used in the calculation of CNEL. Weighting these equivalent noise levels and summing them gives the CNEL for the traffic projections. The noise contours are then established by iterating the equivalent noise level over many distances until the distance to the desired noise contour(s) are found.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore, the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiant in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas and vegetation. Hard site conditions, to be conservative, were used to develop the noise contours and analyze noise impacts along all roadway segments. The future traffic noise model utilizes a typical, conservative vehicle mix of 96% Autos, 2% Medium Trucks and 2% Heavy Trucks for all analyzed roadway segments. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the FHWA Model.

Community noise level changes greater than 3 dBA are often identified as audible and considered potential significant, while changes less than 1 dBA will not be discernible to local residents. In the range of 1 to 3 dBA, residents who are very sensitive to noise may perceive a slight change. There is no scientific evidence available to support the use of 3 dBA as the significance threshold. Community noise exposures are typically over a long time period rather than the immediate comparison made in a laboratory situation. Therefore, the level at which changes in community noise levels become discernible is likely greater than 1 dBA and 3 dBA appears to be appropriate for most people. For the purposes for this analysis a direct and cumulative roadway noise impacts would be considered significant if the project increases noise levels for a noise sensitive land use by 3 dBA CNEL and if the project increases noise levels above an unacceptable noise level per the City's General Plan in the area adjacent to the roadway segment.

Direct Noise Impacts

To determine if direct off-site noise level increases associated with the development of the Project will create noise impacts. The noise levels for the existing conditions were compared with the noise

level increase from the Project. Utilizing the Project's traffic assessment (Source: LLG 2018) noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.

Existing Plus Project: Current day noise conditions plus the completion of the project.

Existing vs. Existing Plus Project: Comparison of the direct project related noise level increases in the vicinity of the project site.

The noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 5-5 for the Existing Scenario and in Table 5-6 for the Existing Plus Project Scenario. Note that the values given do not take into account the effect of any noise barriers or topography that may affect ambient noise levels. Table 5-7 presents the comparison of the Existing Year with and without Project related noise levels. The overall roadway segment noise levels will increase from 0.0 to 0.1 dBA CNEL with the development of the Project. The Project does not create a direct noise increase of more than 3 dBA CNEL on any roadway segment. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

Table 5-5: Existing Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Woodward Street	Mulberry Dr to Borden Rd	3,100	35	61.8	66
	Vineyard Rd to Mission St	7,900	35	65.9	123
Vineyard Road	Borden Rd to Woodward St	3,600	40	63.7	88
Mission Road	Firebird Ln to Woodward St	15,100	45	71.0	272
	Woodward St to Mulberry Dr	23,500	45	72.9	365
San Marcos Boulevard	Twin Oaks Valley Rd to Mission Rd	16,800	45	71.5	292
Twin Oaks Valley Road	San Marcos Blvd to SR-78 WB Ramps	36,100	45	74.8	486

[1] Source: Project Traffic study prepared by LLG 2018

Table 5-6: Existing + Project Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Woodward Street	Mulberry Dr to Borden Rd	3,150	35	61.9	67
	Vineyard Rd to Mission St	8,010	35	65.9	124
Vineyard Road	Borden Rd to Woodward St	3,650	40	63.7	89
Mission Road	Firebird Ln to Woodward St	15,130	45	71.0	272
	Woodward St to Mulberry Dr	23,660	45	73.0	367
San Marcos Boulevard	Twin Oaks Valley Rd to Mission Rd	16,800	45	71.5	292
Twin Oaks Valley Road	San Marcos Blvd to SR-78 WB Ramps	36,340	45	74.8	488
[1] Source: Project Traffic study prepared by LLG 2018					

Table 5-7: Existing vs. Existing + Project Noise Levels

Roadway	Roadway Segment	Existing Noise Level @ 50-Feet (dBA CNEL)	Existing Plus Project Noise Level @ 50-Feet (dBA CNEL)	Project Related Noise Level Increase (dBA CNEL)
Woodward Street	Mulberry Dr to Borden Rd	61.8	61.9	0.1
	Vineyard Rd to Mission St	65.9	65.9	0.1
Vineyard Road	Borden Rd to Woodward St	63.7	63.7	0.1
Mission Road	Firebird Ln to Woodward St	71.0	71.0	0.0
	Woodward St to Mulberry Dr	72.9	73.0	0.0
San Marcos Boulevard	Twin Oaks Valley Rd to Mission Rd	71.5	71.5	0.0
Twin Oaks Valley Road	San Marcos Blvd to SR-78 WB Ramps	74.8	74.8	0.0

Cumulative Noise Impacts

To determine if cumulative off-site noise level increases associated with the development of the Project and other planned or permitted projects in the vicinity will create noise impacts. The noise levels for the near-term Project Buildout and other planned and permitted projects were compared with the existing conditions. Utilizing the Project's traffic assessment (Source: LLG 2018) noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.

Existing Plus Cumulative Projects Plus Project: Current day noise conditions plus the completion of the project and the completion of other permitted, planned projects or approved ambient growth factors.

Existing vs. Existing Plus Cumulative Plus Project: Comparison of the existing noise levels and the related noise level increases from the combination of the project and all other planned or permitted projects in the vicinity of the site.

The existing noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 5-5 above for the Existing Scenario. The near-term cumulative noise conditions are provided in Table 5-8. No noise barriers or topography that may affect noise levels were incorporated in the calculations.

Table 5-9 presents the comparison of the Existing Year and the Near-Term Cumulative noise levels. The overall roadway segment noise levels will increase 0.3 to 1.5 dBA CNEL with the development of the Project and proposed cumulative projects. The cumulative noise increase is less than 3 dBA CNEL on any roadway segment.

Table 5-8: Existing + Project + Cumulative Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Woodward Street	Mulberry Dr to Borden Rd	3,550	35	62.4	72
	Vineyard Rd to Mission St	8,510	35	66.2	129
Vineyard Road	Borden Rd to Woodward St	5,050	40	65.1	110
Mission Road	Firebird Ln to Woodward St	16,230	45	71.3	285
	Woodward St to Mulberry Dr	27,160	45	73.6	402
San Marcos Boulevard	Twin Oaks Valley Rd to Mission Rd	21,500	45	72.6	344
Twin Oaks Valley Road	San Marcos Blvd to SR-78 WB Ramps	40,340	45	75.3	523

[1] Source: Project Traffic study prepared by LLG 2018

Table 5-9: Existing vs. Existing + Project + Cumulative Noise Levels

Roadway	Roadway Segment	Existing Noise Level @ 50-Feet (dBA CNEL)	Existing Plus Project Plus Cumulative Noise Level @ 50-Feet (dBA CNEL)	Project Related Noise Level Increase (dBA CNEL)
Woodward Street	Mulberry Dr to Borden Rd	61.8	62.4	0.6
	Vineyard Rd to Mission St	65.9	66.2	0.3
Vineyard Road	Borden Rd to Woodward St	63.7	65.1	1.5
Mission Road	Firebird Ln to Woodward St	71.0	71.3	0.3
	Woodward St to Mulberry Dr	72.9	73.6	0.6
San Marcos Boulevard	Twin Oaks Valley Rd to Mission Rd	71.5	72.6	1.1
Twin Oaks Valley Road	San Marcos Blvd to SR-78 WB Ramps	74.8	75.3	0.5

5.6 Offsite Noise Findings and Mitigation

The Project does not create a direct or cumulative noise increase of more than 3 dBA CNEL on Mission Road. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

5.7 Train Vibration

Train vibration depends on the weight of the train, travel speed, the condition of the track and soil characteristics. The proposed project buildings would be more than 175 feet from the centerline of the tracks. Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual (FTA 2018) predicts that freight train vibration levels are as high as 73 VdB at 175 feet from the track centerline for a locomotive-powered freight train traveling at speeds of 50 MPH and up to 62 VdB for commuter rail train events at that speed.

Therefore, the infrequent freight train activities will be below the 80 VdB, infrequent event for the freight train and the frequent commuter train activities will be below the 72 VdB frequent event annoyance thresholds as identified in Category 2 of Table 3-1. Additionally, due to the close proximity of the Transit Center, the commuter trains will be traveling at a slower speed of approximately 15 MPH, which would reduce the vibration levels 8 VdB and the freight train travel at speeds of 30 MPH or less which would reduce the vibration levels at least 4 VdB. Therefore, the train activities would have a less than significant impact on the proposed project.

ATTACHMENT A

FUTURE EXTERIOR NOISE MODEL
INPUT AND OUTPUT FILES

Mission 316 West - Ground Level Unshielded
T-PEAK HOUR TRAFFIC CONDITIONS, 1
2367 , 45 , 49 , 45 , 49 , 45
T-PEAK HOUR TRAFFIC CONDITIONS, 2
452 , 35 , 9 , 35 , 9 , 35
L-Mission Road, 1
N,110,733,579,
N,491,625,586,
N,674,578,590,
N,818,556,593,
N,914,548,593,
N,1143,548,593,
N,1251,557,593,
N,1490,602,594,
N,1679,658,595,
N,1731,678,595,
L-Woodward Street, 2
N,414,453,584,
N,491,625,586,
N,515,709,586,
N,539,830,590,
N,552,927,595,
N,560,1008,600,
N,570,1107,605,
B-BARRIER PLACEMENT, 1 , 2 , 0 ,0
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629,676,607,607,
640,671,607,607,
656,666,607.5,607.5,
673,663,608,608,
683,662,608,608,
685,668,608,608,
B-BARRIER PLACEMENT, 2 , 2 , 0 ,0
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704,661,609,609,
714,656,609,609,
732,650,609.5,609.5,
750,647,610,610,
762,646,610,610,
764,652,610,610,
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837,634,612,612,
838,640,612,612,
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877,639,613,613,
886,637,613,613,
889,646,613,613,
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966,622,612.5,612.5,
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1027,632,612,612,
B-BARRIER PLACEMENT, 6 , 2 , 0 ,0
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1109,623,611,611,
1108,633,611,611,
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1121,623,611,611,
1190,629,610,610,
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R, 2 , 65 ,10
667,668,612,R2

R, 3 , 65 ,10
724,656,613,R3
R, 4 , 65 ,10
743,652,614,R4
R, 5 , 65 ,10
801,644,615,R5
R, 6 , 65 ,10
820,639,616,R6
R, 7 , 65 ,10
875,645,617,R7
R, 8 , 65 ,10
968,625,617.,R8
R, 9 , 65 ,10
1012,623,616,R9
R, 10 , 65 ,10
1052,624,616,R10
R, 11 , 65 ,10
1093,624,615,R11
R, 12 , 65 ,10
1135,626,615,R12
R, 13 , 65 ,10
1177,630,614,R13
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
Mission 316 West - Ground Level Unshielded

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	R1	65.	10.	70.3
2	R2	65.	10.	70.5
3	R3	65.	10.	70.3
4	R4	65.	10.	70.5
5	R5	65.	10.	70.0
6	R6	65.	10.	70.6
7	R7	65.	10.	69.5
8	R8	65.	10.	70.7
9	R9	65.	10.	70.8
10	R10	65.	10.	70.7
11	R11	65.	10.	70.8
12	R12	65.	10.	70.8
13	R13	65.	10.	70.6

Mission 316 West - Ground Level with Proposed Barriers
T-PEAK HOUR TRAFFIC CONDITIONS, 1
2367 , 45 , 49 , 45 , 49 , 45
T-PEAK HOUR TRAFFIC CONDITIONS, 2
452 , 35 , 9 , 35 , 9 , 35
L-Mission Road, 1
N,110,733,579,
N,491,625,586,
N,674,578,590,
N,818,556,593,
N,914,548,593,
N,1143,548,593,
N,1251,557,593,
N,1490,602,594,
N,1679,658,595,
N,1731,678,595,
L-Woodward Street, 2
N,414,453,584,
N,491,625,586,
N,515,709,586,
N,539,830,590,
N,552,927,595,
N,560,1008,600,
N,570,1107,605,
B-BARRIER PLACEMENT, 1 , 2 , 0 ,0
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629,676,607,612,
640,671,607,612,
656,666,607.5,612.5,
673,663,608,613,
683,662,608,613,
685,668,608,613,
B-BARRIER PLACEMENT, 2 , 2 , 0 ,0
705,666,609,614,
704,661,609,614,
714,656,609,614,
732,650,609.5,614.5,
750,647,610,615,
762,646,610,615,
764,652,610,615,
B-BARRIER PLACEMENT, 3 , 2 , 0 ,0
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782,645,611,616,
790,644,611,616,
809,637,611.5,616.5,
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838,640,612,617,
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889,646,613,618,
B-BARRIER PLACEMENT, 5 , 2 , 0 ,0
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955,625,613,618,
966,622,612.5,617.5,
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B-BARRIER PLACEMENT, 6 , 2 , 0 ,0
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1038,621,612,617,
1109,623,611,616,
1108,633,611,616,
B-BARRIER PLACEMENT, 7 , 2 , 0 ,0
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647,673,611,R1
R, 2 , 65 ,10
667,668,612,R2

R, 3 , 65 ,10
724,656,613,R3
R, 4 , 65 ,10
743,652,614,R4
R, 5 , 65 ,10
801,644,615,R5
R, 6 , 65 ,10
820,639,616,R6
R, 7 , 65 ,10
875,645,617,R7
R, 8 , 65 ,10
968,625,617.,R8
R, 9 , 65 ,10
1012,623,616,R9
R, 10 , 65 ,10
1052,624,616,R10
R, 11 , 65 ,10
1093,624,615,R11
R, 12 , 65 ,10
1135,626,615,R12
R, 13 , 65 ,10
1177,630,614,R13
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
Mission 316 West - Ground Level with Proposed Barriers

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	R1	65.	10.	62.1
2	R2	65.	10.	62.9
3	R3	65.	10.	61.6
4	R4	65.	10.	62.7
5	R5	65.	10.	61.2
6	R6	65.	10.	62.5
7	R7	65.	10.	61.3
8	R8	65.	10.	63.3
9	R9	65.	10.	61.5
10	R10	65.	10.	62.5
11	R11	65.	10.	61.0
12	R12	65.	10.	62.4
13	R13	65.	10.	61.4

Mission 316 West - Second Level Unshielded
T-PEAK HOUR TRAFFIC CONDITIONS, 1
2367 , 45 , 49 , 45 , 49 , 45
T-PEAK HOUR TRAFFIC CONDITIONS, 2
452 , 35 , 9 , 35 , 9 , 35
L-Mission Road, 1
N,110,733,579,
N,491,625,586,
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N,818,556,593,
N,914,548,593,
N,1143,548,593,
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N,1731,678,595,
L-Woodward Street, 2
N,414,453,584,
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N,515,709,586,
N,539,830,590,
N,552,927,595,
N,560,1008,600,
N,570,1107,605,
B-BARRIER PLACEMENT, 1 , 2 , 0 ,0
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609,800,616,616,
615,799,616,616,
615.,799,616,626,
619.,820,616,626,
B-BARRIER PLACEMENT, 2 , 2 , 0 ,0
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598,753,617,617,
603,751,617,617,
603.,751,617,627,
608.,772,617,627,
B-BARRIER PLACEMENT, 3 , 2 , 0 ,0
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591.,703,617,627,
595.,724,617,627,
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R, 4 , 65 ,10
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R, 5 , 65 ,10
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R, 7 , 65 ,10
879,647,627,R7
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983,625,627,R8
R, 9 , 65 ,10
1064,625,626,R9
R, 10 , 65 ,10
1147,629,625,R10
R, 11 , 65 ,10
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R, 12 , 65 ,10
1227,701,624,R12
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
Mission 316 West - Second Level Unshielded

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	R1	65.	10.	64.8
2	R2	65.	10.	65.7
3	R3	65.	10.	66.7
4	R4	65.	10.	70.1
5	R5	65.	10.	70.1
6	R6	65.	10.	70.1
7	R7	65.	10.	69.6
8	R8	65.	10.	70.6
9	R9	65.	10.	70.6
10	R10	65.	10.	70.5
11	R11	65.	10.	65.5
12	R12	65.	10.	65.5

Mission 316 West - Second Level with Proposed Barriers
T-PEAK HOUR TRAFFIC CONDITIONS, 1
2367 , 45 , 49 , 45 , 49 , 45
T-PEAK HOUR TRAFFIC CONDITIONS, 2
452 , 35 , 9 , 35 , 9 , 35
L-Mission Road, 1
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N,491,625,586,
N,674,578,590,
N,818,556,593,
N,914,548,593,
N,1143,548,593,
N,1251,557,593,
N,1490,602,594,
N,1679,658,595,
N,1731,678,595,
L-Woodward Street, 2
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N,515,709,586,
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B-BARRIER PLACEMENT, 9 , 2 , 0 ,0
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1056,622,622,626,
1073,623,622,626,
1073,627,622,626,
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R, 1 , 65 ,10
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879,647,627,R7
R, 8 , 65 ,10
983,625,627,R8
R, 9 , 65 ,10
1064,625,626,R9
R, 10 , 65 ,10
1147,629,625,R10
R, 11 , 65 ,10
1229,659,624,R11
R, 12 , 65 ,10
1227,701,624,R12
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
Mission 316 West - Second Level with Proposed Barriers

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	R1	65.	10.	60.3
2	R2	65.	10.	61.3
3	R3	65.	10.	62.3
4	R4	65.	10.	64.2
5	R5	65.	10.	64.1
6	R6	65.	10.	63.6
7	R7	65.	10.	63.4
8	R8	65.	10.	64.0
9	R9	65.	10.	64.1
10	R10	65.	10.	64.2
11	R11	65.	10.	60.1
12	R12	65.	10.	60.9

Appendix G

Transportation Impact Assessment

LINSCOTT LAW & GREENSPAN
engineers

TRANSPORTATION IMPACT ANALYSIS

MISSION 316 WEST

San Marcos, California
June 28, 2019

LLG Ref. 3-18-2928

Prepared by:
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EXECUTIVE SUMMARY

Linscott, Law & Greenspan, Engineers (LLG) has prepared the following transportation impact study to determine and evaluate the potential impacts to the local roadway system due to the proposed Mission 316 West project. The project site is located in the City of San Marcos, in the northeast quadrant of the E. Mission Road / Woodward Street intersection.

The project proposes the development of 67 multi-family units. The project is calculated to generate approximately 536 ADT with 43 AM peak hour trips (6 inbound / 34 outbound) and 54 PM peak hour trips (38 inbound / 16 outbound).

Based on the City of San Marcos significance criteria and the level of service analyses, the project is calculated to result in no significant impacts. Operational improvements including providing STOP signs at the Project driveways are recommended. Adequate sight distance should be ensured at the Project access driveways as described in Section 11, Project Access Discussion.

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F. Peak Hour Intersection Analysis Worksheets - Year 2035

G. Peak Hour Intersection Analysis Worksheets - Year 2035 + Project

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TRANSPORTATION IMPACT ANALYSIS

MISSION 316 WEST

San Marcos, California
June 28, 2019

1.0 INTRODUCTION

Linscott, Law & Greenspan, Engineers (LLG) has prepared the following transportation impact Analysis for the proposed Mission 316 West project. The project site is located in the City of San Marcos, on the northeast corner of the Mission Road / Woodward Street intersection.

The following items are included in this Transportation Impact Analysis:

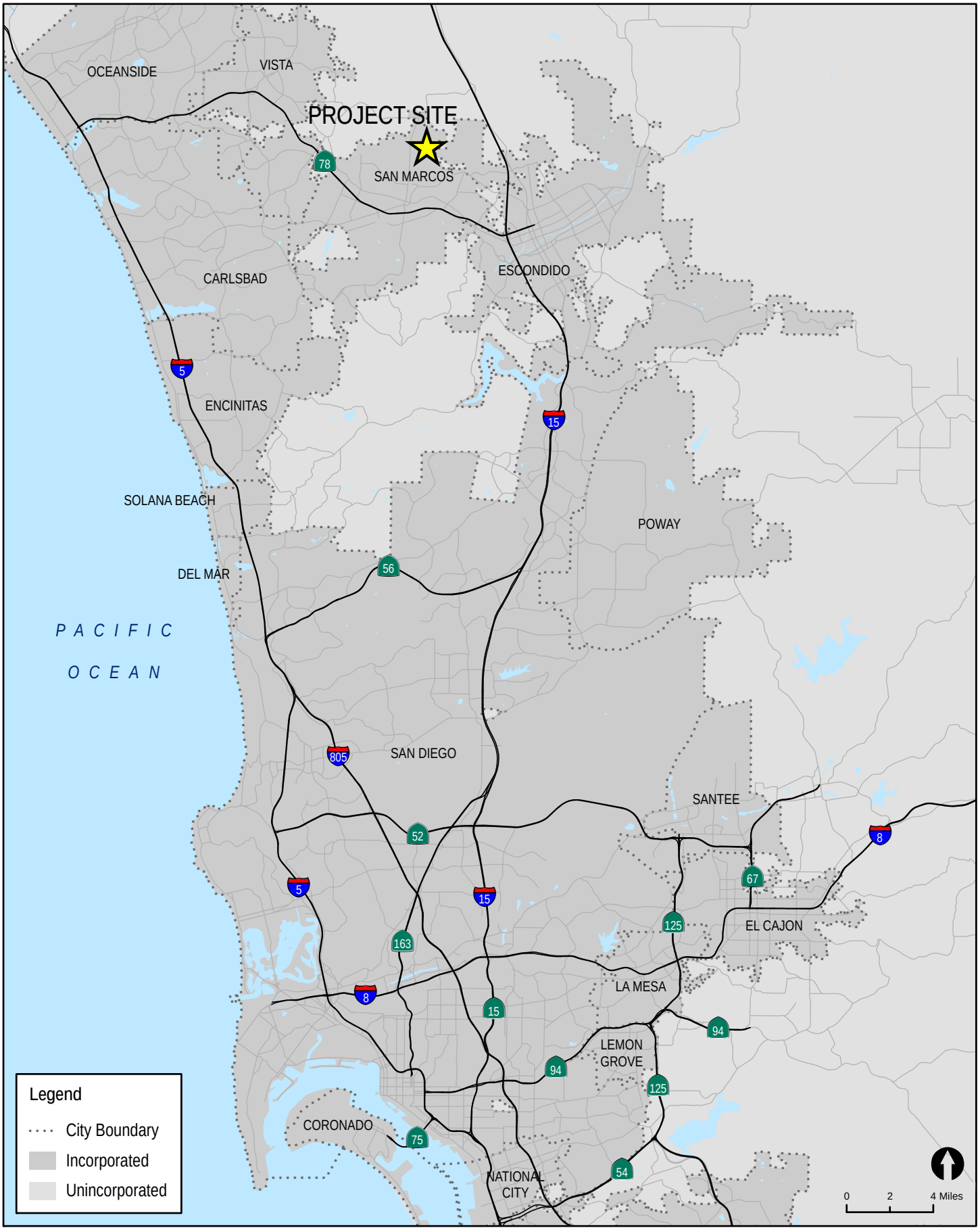
- Project Description
- Existing Conditions Discussion
- Analysis Approach and Methodology
- Significance Criteria
- Existing Conditions Analysis
- Cumulative Projects Discussion
- Trip Generation / Distribution /Assignment
- Near-Term Analysis
- Horizon Year Analysis
- Project Access Discussion
- Significance of Impacts and Mitigation Measures

2.0 PROJECT DESCRIPTION

The proposed Project consists of the development of 67 multi-family units on a vacant site in the northeast quadrant of the Mission Road / Woodward Street intersection in the City of San Marcos.

Access to the site is proposed via two (2) driveways – one full access driveway (Driveway #1) along Woodward Street and one right-in / right -out only access driveway (Driveway #1) along Mission Road.

Figure 2–1 depicts the Project vicinity and ***Figure 2–2*** depicts the Project area. ***Figure 2–3*** is the Conceptual site plan.



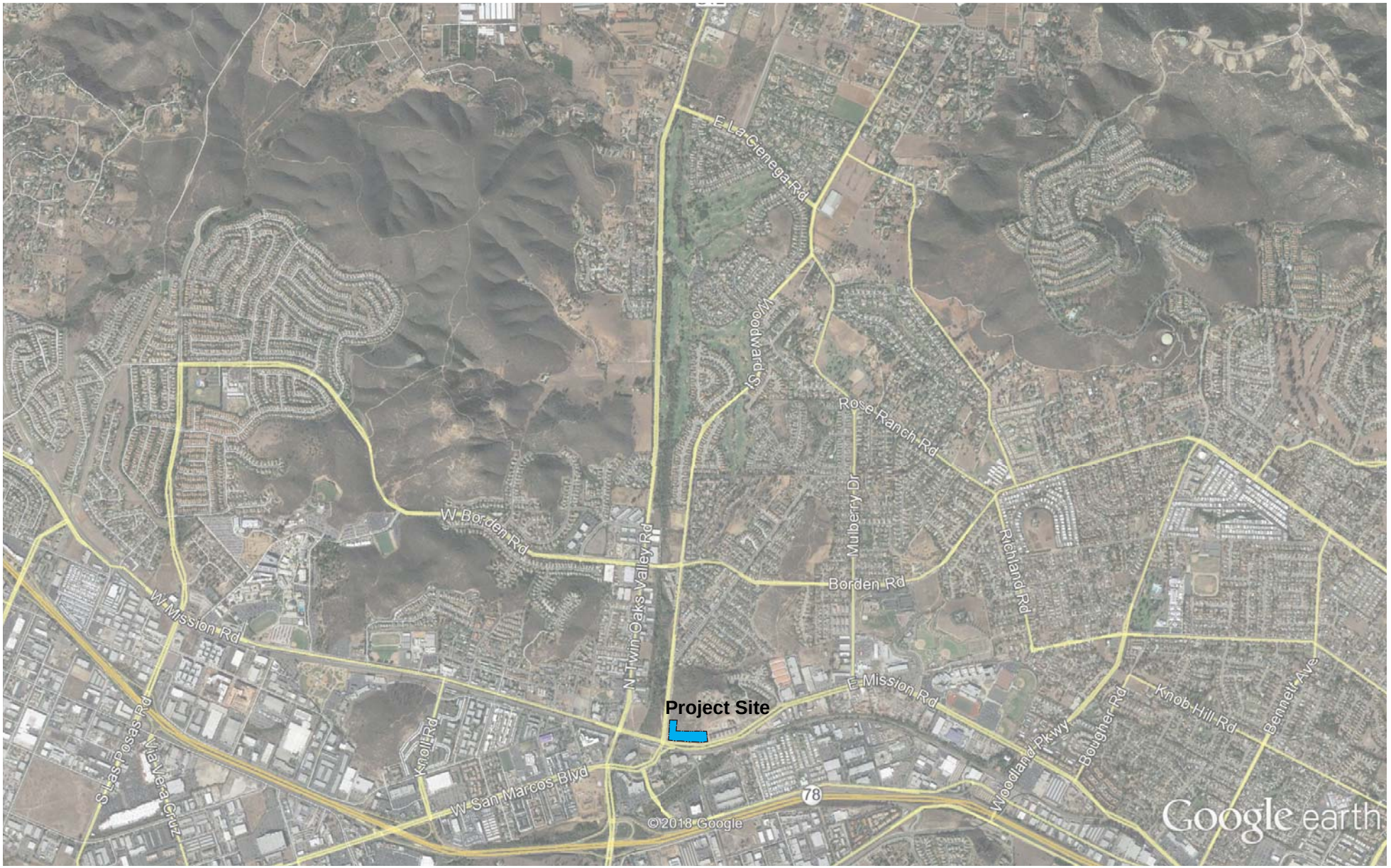
LINSCOTT LAW & GREENSPAN engineers

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Figure 2-1

Vicinity Map

MISSION 316 WEST



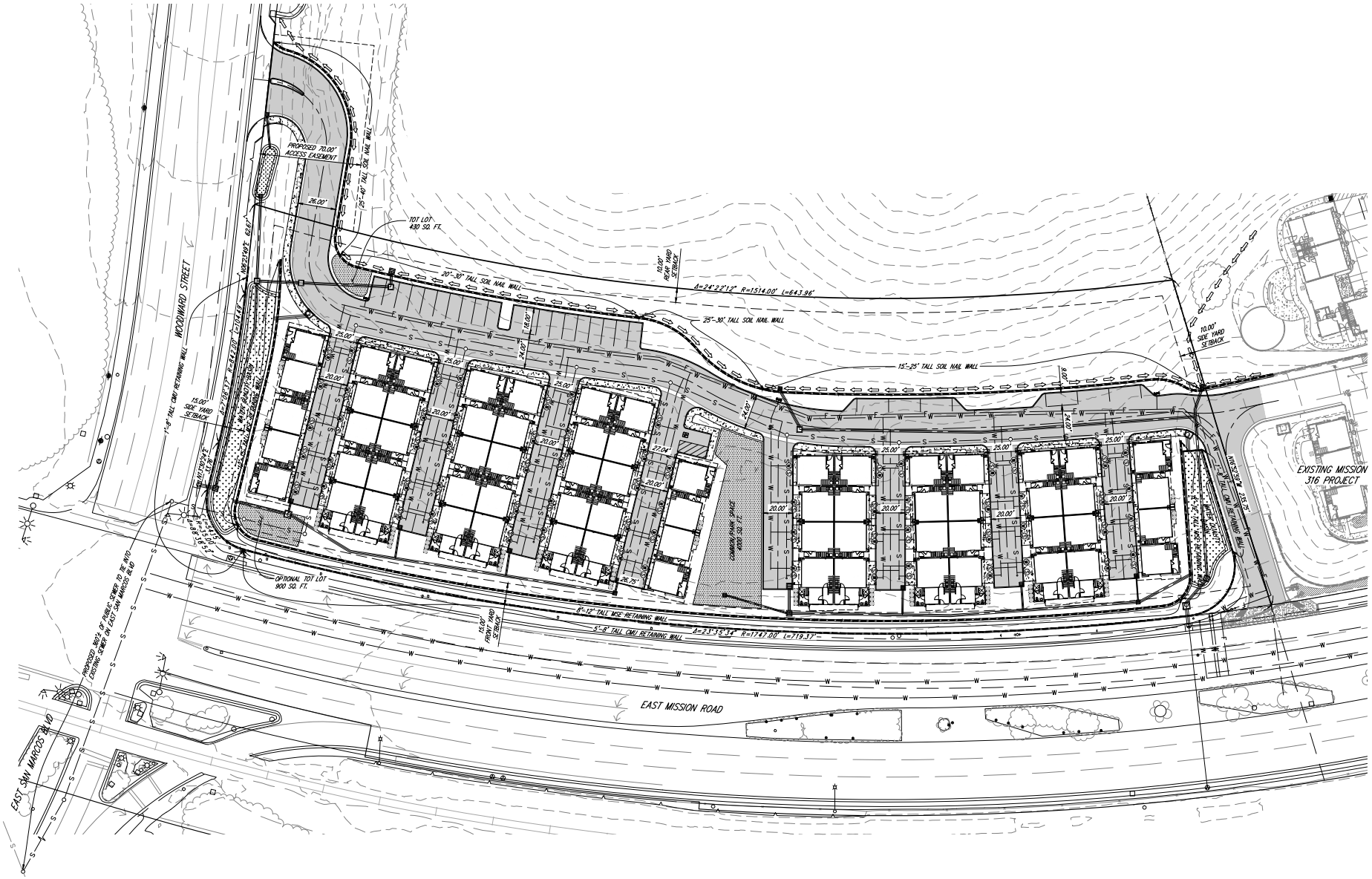
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Figure 2-2

Project Area Map

MISSION 316 WEST


WOODWARD STREET
EAST MISSION ROAD
EAST SAN MARCOS BLVD
EXISTING MISSION 316 PROJECT
PROPOSED 70.00' ACCESS EASEMENT
TOT LOT 430 SQ. FT.
OPTIONAL TOT LOT 900 SQ. FT.
20'-30' TALL SOIL NAIL WALL
25'-30' TALL SOIL NAIL WALL
15'-25' TALL SOIL NAIL WALL
25'-40' TALL SOIL NAIL WALL
8'-12' TALL MSE RETAINING WALL
5'-8' TALL CMU RETAINING WALL
1'-8' TALL CMU RETAINING WALL
A=24°22'12" R=1514.00' L=643.96'
A=23°3'3.34" R=1747.00' L=719.37'
10.00' REAR YARD SETBACK
15.00' FRONT YARD SETBACK
15.00' SIDE YARD SETBACK
10.00' SIDE YARD SETBACK
PROPOSED 'RIGHT-IN' ONLY ENTRANCE
PROPOSED 'RIGHT-IN' ONLY EXIT
PROPOSED 'RIGHT-IN' ONLY EXIT
PROPOSED 'RIGHT-IN' ONLY ENTRANCE

3.0 EXISTING CONDITIONS

Effective evaluation of the traffic impacts associated with the proposed project requires an understanding of the existing transportation system within the project area. ***Figure 3–1*** shows an existing conditions diagram, including signalized intersections and lane configurations. The study area includes the following intersections and street segments based on the anticipated distribution of the project traffic:

3.1 Existing Street Network

The principal roadways in the project study area are described briefly below. Roadway classification was determined from a review of the *City of San Marcos Mobility Element* and information gathered from field observations.

Woodward Street is a north-south facility in the project study area. Following is a description of this facility:

- Between Mulberry Drive and Vineyard Road, Woodward Street is currently constructed as a 2-lane undivided roadway with a two-way left-turn (TWLT) lane. The posted speed limit is 35 mph. On-street parking is only permitted between Kenfield Drive and Vineyard Road. Class II bike lanes are provided between Mulberry Drive and Golf Glen. South of Golf Glen, curbside parking is permitted.
- South of Vineyard Road to Mission Road, Woodward Street widens to a 4-lane undivided roadway with a TWLT lane, up to Mission Road. The posted speed limit is 35 mph. On-street parking is not permitted. Class II bike lanes are provided.

The photos below depict the sections of Woodward Street described above. The photo to the left depicts the northern section of Woodward Street between Mulberry Drive and Vineyard Road with the center TWLTL and bike lanes. The photo below right depicts the section of Woodward Street south of Vineyard Road with two lanes in each direction, a center TWLTL and bike lanes.







Vineyard Road is a north-south facility in the project study area and is currently constructed as a 2-lane undivided roadway with a TWLT lane between Mulberry Drive and Woodward Street. The posted speed limit is 40 mph. On-street parking is permitted on the west side of the roadway between Vineyard Court and Ivywood Court where on-street parking is then provided on the east side of the roadway until Mulberry Drive. Class II bike lanes are provided between Mulberry Drive and Woodward Street. Vineyard Road is classified as a local street.

Mission Road is an east-west facility in the project study area and is currently constructed as a 4-lane divided roadway between Firebird Lane and Woodward Street and a 6-lane divided roadway between Woodward Street and Woodland Parkway. The sprinter line runs parallel to Mission Road. The posted speed limit is 45 mph. On-street parking is prohibited on the roadway and Class II bike lanes are provided. Mission Road is classified as a Major Arterial between Firebird Lane and Woodward Street and is classified as a Prime Arterial between Woodward Street and Mulberry Road.







San Marcos Boulevard is an east-west facility in the project study area and is currently constructed as a 4-lane divided roadway between Twin Oaks Valley Road and Mission Road. The posted speed limit is 45 mph. On-street parking is prohibited and Class II bike lanes are provided. San Marcos Boulevard is classified as a Major Arterial between Twin Oaks Valley Road and Mission Road.

The photo to the left depicts a view of San Marcos Boulevard just west of Twin Oaks Valley Road.

Twin Oaks Valley Road is a north-south facility in the project study area and is currently constructed as a 4-lane undivided roadway with a TWLT lane between Borden Road and Richmar Avenue, a 4-lane divided roadway between Richmar Avenue and San Marcos Boulevard and a 6-lane divided roadway between San Marcos Boulevard and the SR-78 Eastbound ramps. The posted speed limit is 45 mph. On-street parking is prohibited. Class II bike lanes are provided between Borden Road and Richmar Avenue and Class I bike lanes are provided between Mission Road and the SR-78 Eastbound ramps. Twin Oaks Valley Road is classified as a Major Road between Borden Road and San Marcos Boulevard and a Prime Arterial between San Marcos Boulevard and the SR-78 Eastbound ramps.



The photo to the right depicts the six-lane section of Twin Oaks Valley Road between San Marcos Boulevard and SR 78.

3.2 Existing Bicycle Network

Within the Project study area, Class 2 bike lanes are provided as follows:

- On Twin Oaks Valley Road in both directions, all throughout the project study area.
- On San Marcos Boulevard in both directions.
- On Mission Road in both direction.

- On Woodward Street in both directions, north of Mission Road up to Vineyard Road. Class II bike lanes are also provided between Mulberry Drive and Golf Glen
- Class II bike lanes on Vineyard Road between Mulberry Drive and Woodward Street.

3.3 Existing Pedestrian Conditions

Sidewalks are provided along all streets in the study area with the exception of the east side of Woodward Street along the stretch from Mulberry Drive to Atwood Place.

3.4 Existing Transit Conditions

3.4.1 *Bus Routes*

Transit service is provided to the area via the Route 305 Bus Route and the Sprinter Line. Route 305 provides bus service to the area via the Mission Road and Vineyard Road stop.

Route 305, with service between the Vista Transit Center and the Escondido Transit Center, operates between 4:34 AM and 6:34 PM with a 30-minute frequency on weekdays and between 5:34 AM to 10:56 PM with a frequency of a 30-minute frequency on weekends and holidays. The Mission Road and Vineyard Road stop is located about 3/4ths of a mile from the project site.

3.4.2 *Sprinter Line*

San Marcos Civic Center Station, located at Mission Road and Vineyard Road, is the nearest Sprinter station to the Project site and is located about 3/4ths of a mile from the project site. The Sprinter runs between 4:03AM and 8:33PM with stops every 30 minutes. Plenty of onsite parking is available.

3.5 Existing Traffic Volumes

Table 3–1 summarizes the available average daily traffic volumes (ADTs) from counts conducted by Count Your Data on June 13, 2018. Counts at the study intersections, including bicycle and pedestrian counts, were also conducted on June 13, 2018 between 7:00-9:00 AM and 4:00-6:00 PM. Area schools were in session on June 13th.

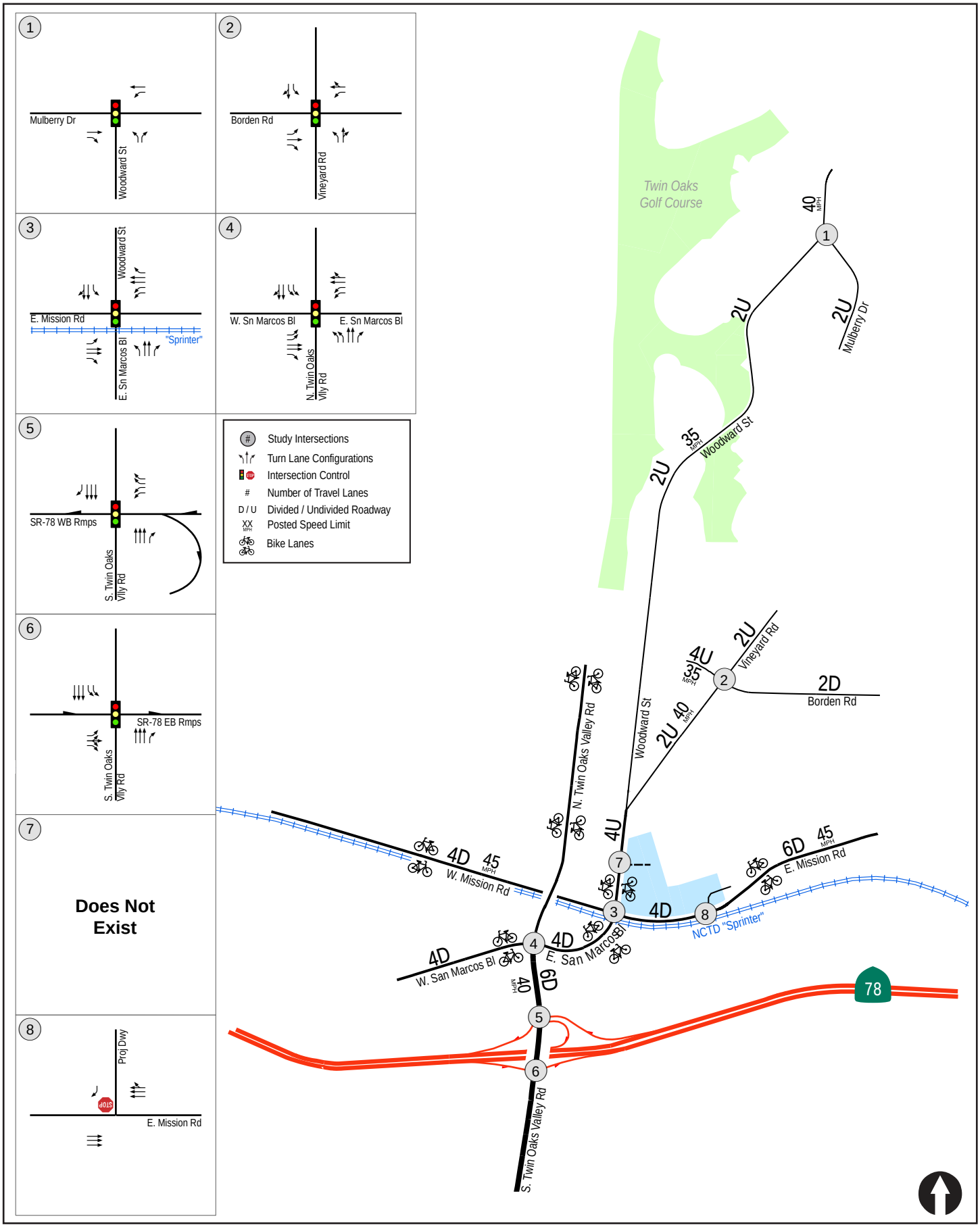
Figure 3–2 shows the Existing Traffic Volumes. ***Appendix A*** contains the count sheets.

TABLE 3–1
EXISTING TRAFFIC VOLUMES

Street Segment	ADT[a]
Woodward Street	
Mulberry Drive to Borden Road	3,100
Vineyard Road to Mission Road	7,900
Vineyard Road	
Borden Road to Woodward Street	3,600
Mission Road	
Twin Oaks Valley Road to Woodward Street	15,100
Woodward Street to Mulberry Drive	23,500
San Marcos Boulevard	
Firebird Lane to Mission Road	16,800
Twin Oaks Valley Road	
San Marcos Boulevard to SR-78 westbound ramps	36,100

Footnotes:

a. Average Daily Traffic Volumes.



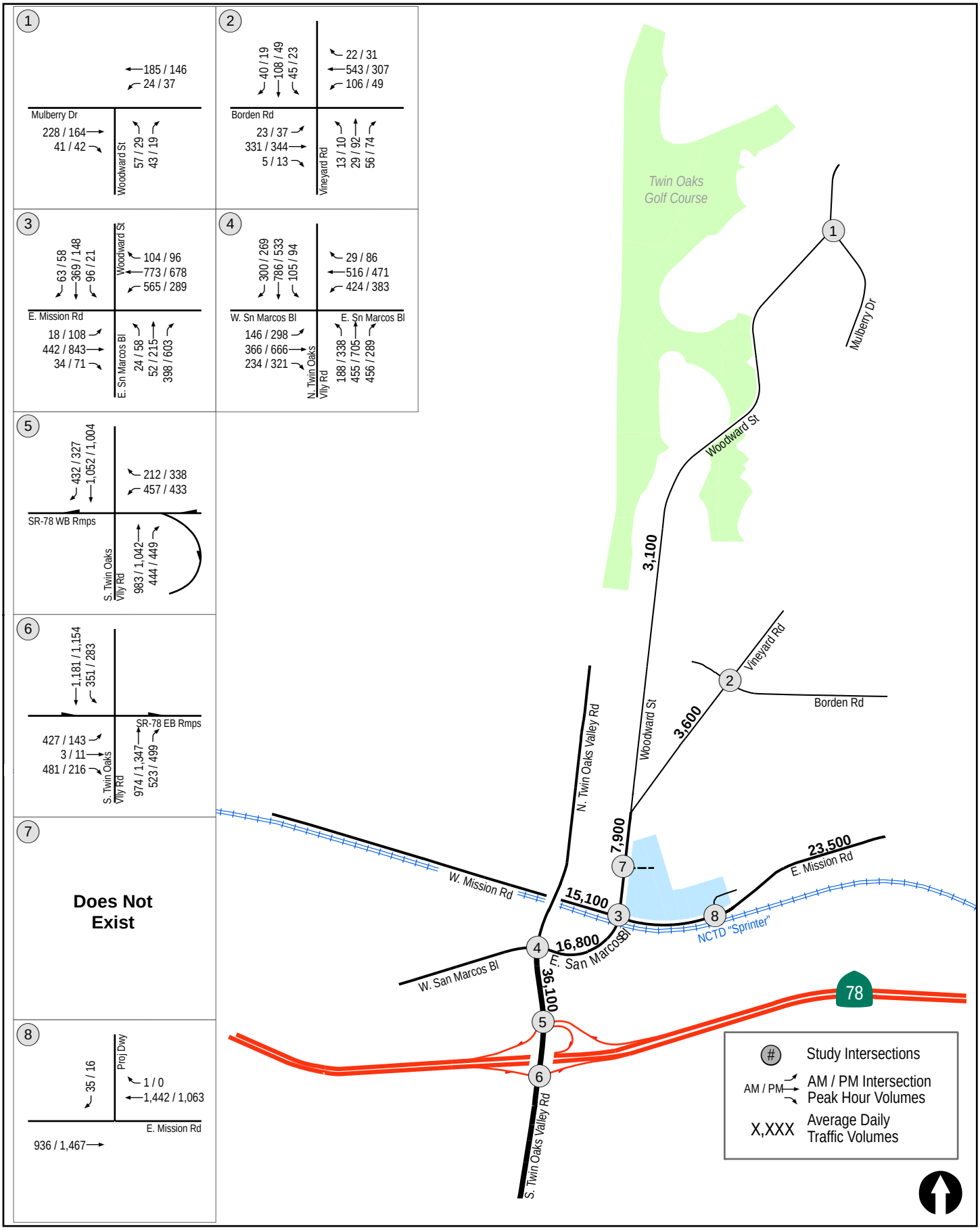
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Figure 3-1

Existing Conditions Diagram

MISSION 316 WEST



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Figure 3-2

Existing Traffic Volumes

MISSION 316 WEST

4.0 STUDY AREA, ANALYSIS APPROACH AND METHODOLOGY

4.1 Study Area

The study area was based on the criteria identified in the San Diego Traffic Engineering Council (SANTEC)/Institute of Traffic Engineers (ITE) *Guidelines for Traffic Impact Studies in the San Diego Region*, March 2, 2000. Based on these criteria, the traffic study must include "all local roadway segments, intersections, and mainline freeway locations where the Project will add 50 or more peak hour trips in either direction or freeway ramp meter locations where the Project will add 20 or more peak hour trips in either direction to the existing traffic conditions.

Based on the above criteria, the Project study area includes the following signalized locations:

INTERSECTIONS:

1. Mulberry Drive / Woodward Street
2. Vineyard Road / Borden Road
3. East San Marcos Boulevard – Woodward Street / East Mission Road
4. Twin Oaks Valley Road / San Marcos Boulevard
5. Twin Oaks Valley Road / SR-78 WB Ramps
6. Twin Oaks Valley Road / SR-78 EB Ramps
7. Woodward Street / Project Driveway #1 (does not exist)
8. East Mission Road / Project Driveway #2

SEGMENTS:

Woodward Street

- Mulberry Drive and Borden Road
- Vineyard Road and Mission Road

Vineyard Road

- Borden Road and Woodward Street

Mission Road

- Twin Oaks Valley Road and Woodward Street
- Woodward Street and Mulberry Drive

San Marcos Boulevard

- Firebird Lane and Mission Road

Twin Oaks Valley Road

- San Marcos Boulevard and SR-78 westbound ramps

4.2 Analysis Approach

The following near-term analysis scenarios are included in this report and the commuter AM and PM peak hour timeframes were analyzed.

- Existing
- Existing + Project
- Existing + Near-Term Cumulative Projects
- Existing + Near-Term Cumulative Projects + Project
- Horizon Year (2035)
- Horizon Year (2035) + Project

4.3 Methodology

There are various methodologies used to analyze signalized intersections, unsignalized intersections and street segments. The measure of effectiveness for intersection and segment operations is level of service (LOS) which denotes the operating conditions which occur at a given intersection or on a given roadway segment under various traffic volume loads. It is a qualitative measure used to describe a quantitative analysis taking into account factors such as roadway geometries, signal phasing, speed, travel delay, freedom to maneuver, and safety. LOS provides an index to the operational qualities of a roadway segment or an intersection. LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst. LOS designation is reported differently for signalized and unsignalized intersections, as well as for roadway segments.

In the 2000 Highway Capacity Manual (HCM), LOS for signalized intersections is defined in terms of delay. The LOS analysis results in seconds of delay expressed in terms of letters A through F. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. ***Table 4–1*** summarizes the signalized intersections levels of service descriptions.

4.3.1 *Signalized Intersections*

Table 4–2 depicts the criteria, which are based on the average control delay for any particular minor movement (unsignalized intersections) and overall intersection (signalized intersections).

For signalized intersections, LOS criteria is stated in terms of the average control delay per vehicle for a 15-minute analysis period. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

LOS A describes operations with very low delay, (i.e. less than 10.0 seconds per vehicle). This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

LOS B describes operations with delay in the range 10.1 seconds and 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of Average delay.

TABLE 4–1
INTERSECTION LEVEL OF SERVICE DESCRIPTIONS

LOS	Description
A	Occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
C	Generally results when there is fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	Generally results in noticeable congestion. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.
F	Considered to be unacceptable to most drivers. This condition often occurs with over saturation i.e. when arrival flow rates exceed the capacity of the intersection. It may also occur at high volume-to-capacity ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels

TABLE 4–2
INTERSECTION LEVEL OF SERVICE (LOS) & DELAY RANGES

LOS	Delay (seconds/vehicle)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10.0	≤ 10.0
B	10.1 to 20.0	10.1 to 15.0
C	20.1 to 35.0	15.1 to 25.0
D	35.1 to 55.0	25.1 to 35.0
E	55.1 to 80.0	35.1 to 50.0
F	≥ 80.1	≥ 50.1

Source: 2000 Highway Capacity Manual

LOS C describes operations with delay in the range 20.1 seconds and 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

LOS D describes operations with delay in the range 35.1 seconds and 55.0 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or higher v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are frequent.

LOS E describes operations with delay in the range of 55.1 seconds to 80.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with delay in excess of over 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over-saturation (i.e., when arrival flow rates exceed the capacity of the intersection). It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

4.3.2 *Unsignalized Intersections*

For unsignalized intersections, LOS is determined by the computed or measured control delay and is defined for each minor movement. LOS is not defined for the intersection as a whole.

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to safely cross through a major street traffic stream. This LOS is generally evident from extremely long control delays experienced by side-street traffic and by queuing on the minor-street approaches. The method, however, is based on a constant critical gap size; that is, the critical gap remains constant no matter how long the side-street motorist waits.

LOS F may also appear in the form of side-street vehicles selecting smaller-than-usual gaps. In such cases, safety may be a problem, and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior, which are more difficult to observe in the field than queuing.

4.3.3 *Impact of the Trolley on the Intersection Level of Service*

The SPRINTER light rail system, operated by North County Transit District (NCTD) connects Oceanside, Vista, San Marcos, and Escondido, serving 15 stations along the Highway 78 corridor. In the Project study area, the SPRINTER track crosses the south leg of the Mission Road / San Marcos Boulevard intersection. The following describes how LLG accounted for the additional delay at this intersection, due to the train crossings at this location.

Per NCTD, the SPRINTER runs every 30 minutes in each direction Monday through Friday, from approximately 4:00 AM to 9:00 PM. Therefore, during each peak hour, four trains pass through the intersection (two in either direction).

The total delay during a single hour was calculated as follows:

- Number of trolley passes at the intersection (Nt) = 4
- Average time of gate closure (Gc) = 54 seconds
- Total gate closure time per hour (Lgc) = Nt * Gc = 216 seconds

The average delay per cycle (D_c) is calculated by dividing the number of cycles per hour (N_c) by the total gate closure time per hour (L_{gc}). Based on the cycle lengths employed in the AM and PM peak hours D_c ranges between 5.4 to 6.0 seconds of added delay per cycle. This added delay was apportioned among the affected movements at the intersection using an adjustment factor within the Synchro software at this intersection for all analysis scenarios.

4.4 Street Segments

Street segment analysis is based upon the comparison of daily traffic volumes (ADTs) to the City of San Marcos's *Roadway Classification, Level of Service, and ADT Table*. This table provides segment capacities for different street classifications, based on traffic volumes and roadway characteristics. ***Table 4–3*** is the City of San Marcos's *Roadway Segment Capacity*.

TABLE 4–3
CITY OF SAN MARCOS
DAILY ROADWAY SEGMENT CAPACITY

Street Typology	Typical Lane Configuration	Vehicular Level of Service				
		LOS A	LOS B	LOS C	LOS D	LOS E
Existing Roadway Classifications / Standards						
Prime Arterial	7 to 8 lanes	29,200	40,800	58,300	64,200	70,000
Prime Arterial	6 lanes	25,000	35,000	50,000	55,000	60,000
Major Arterial	5 lanes	18,000	25,000	35,000	40,000	45,000
Major Arterial	4 lanes	15,000	21,000	30,000	35,000	40,000
Secondary Arterial	5 lanes	12,500	17,500	25,000	31,300	37,500
Secondary Arterial	4 lanes	10,000	14,000	20,000	25,000	30,000
Secondary Arterial	3 lanes	7,500	10,500	15,000	18,000	22,500
Collector	2 lanes plus TWLTL	5,000	7,000	10,000	13,000	15,000
Collector	2 lanes	2,500	3,500	5,000	6,500	8,000
General Plan Complete Street Typology Standards						
Arterial	8 lanes	29,200	40,800	58,300	64,200	70,000
Arterial	6 lanes	25,000	35,000	50,000	55,000	60,000
Arterial with Class II or Class III Bicycle Lanes	4 lanes	15,000	21,000	30,000	35,000	40,000
Arterial with enhanced Bicycle facilities	4 lanes	15,000	21,000	30,000	35,000	40,000
Multi-Way Boulevard	4 lanes for through trips, two lanes for local serving trips [1]	16,800	25,200	31,500	37,800	42,000
Industrial Collector	4 lanes	10,000	14,000	20,000	25,000	30,000
Collector & Main Street	2 lanes plus TWLTL	5,000	7,000	10,000	13,000	15,000
Collector & Main Street	2 lanes [2]	2,500	3,000	5,000	6,500	8,000
Freeway	Mixed-Flow Lane [3]	-	-	1,760	1,980	2,200
Freeway	HOV Lanes [3]	-	-	1,440	1,620	1,800

Note:
These are general capacities for planning purposes. Specific operational characteristics, such as signal coordination, can enhance operations significantly.

1. LOS thresholds were calculated based on V/C ratios of the daily threshold volumes for the corresponding roadway classification. Multi-way Boulevard
2. Capacity assumes a similar capacity as a 4-lane arterial plus an additional 1,000 ADT capacity per lane for the local service roadway.
3. With fronting commercial or residential property
4. Per lane capacities presented.

Source: SANTEC/ITE Guidelines for Traffic Impact Studies in the San Diego Region, 2000.

5.0 SIGNIFICANCE CRITERIA

A project is considered to have a significant impact if the new project traffic has decreased the operations of surrounding roadways by a defined threshold. The defined thresholds shown in ***Table 5–1*** below for freeway segments, roadway segments, intersections, and ramp meter facilities are based on published San Diego Traffic Engineers' Council (SANTEC) guidelines. If the project exceeds the thresholds in *Table 5–1*, then the project may be considered to have a significant project impact. A feasible mitigation measure will need to be identified to return the impact within the thresholds (pre-project + allowable increase) or the impact will be considered significant and unmitigated.

TABLE 5–1
TRAFFIC IMPACT SIGNIFICANT THRESHOLDS

Level of Service with Project[a]	Allowable Increase Due to Project Impacts[b]					
	Freeways		Roadway Segments		Intersections	Ramp Metering
	V/C	Speed (mph)	V/C	Speed (mph)	Delay (sec.)	Delay (min.)
D. E & F (*or ramp meter delays above 15 minutes*)	0.01	1	0.02	1	2	2[c]

Footnotes:

a. All level of service measurements are based upon HCM procedures for peak-hour conditions. However, V/C ratios for Roadway Segments may be estimated on an ADT/24-hour traffic volume basis (using Table 2 or a similar LOS chart for each jurisdiction). The acceptable LOS for freeways, roadways, and intersections is generally "D" ("C" for undeveloped or not densely developed locations per jurisdiction definitions). For metered freeway ramps, LOS does not apply. However, ramp meter delays above 15 minutes are considered excessive.

b. If a proposed project's traffic causes the values shown in the table to be exceeded, the impacts are deemed to be significant. These impact changes may be measured from appropriate computer programs or expanded manual spreadsheets. The project applicant shall then identify feasible mitigations (within the Traffic Impact Study [TIS] report) that will maintain the traffic facility at an acceptable LOS. If the LOS with the proposed project becomes unacceptable (see note a above), or if the project adds a significant amount of peak hour trips to cause any traffic queues to exceed on- or off-ramp storage capacities, the project applicant shall be responsible for mitigating significant impact changes.

c. The impact is only considered significant if the total delay exceeds 15 minutes.

General Notes:

1. V/C = Volume to Capacity Ratio
2. Speed = Arterial speed measured in miles per hour
3. Delay = Average stopped delay per vehicle measured in seconds for intersections, or minutes for ramp meters.
4. LOS = Level of Service

6.0 ANALYSIS OF EXISTING CONDITIONS

6.1 Peak Hour Intersection Levels of Service

Table 6–1 summarizes the peak hour intersection operations under the Existing conditions. As seen in *Table 6–1*, the study intersections are calculated to currently operate at LOS D or better.

Appendix B contains the existing intersection analysis worksheets.

TABLE 6–1
EXISTING INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Delay[a]	LOS[b]
1. Woodward St / Mulberry Dr	Signal	AM	8.2	A
		PM	7.3	A
2. Borden Rd / Vineyard Rd	Signal	AM	21.5	C
		PM	18.0	B
3. San Marcos Blvd / Woodward St	Signal	AM	38.6	D
		PM	40.2	D
4. San Marcos Blvd / N. Twin Oaks Valley Rd	Signal	AM	45.8	D
		PM	46.1	D
5. SR-78 WB Ramps / Twin Oaks Valley Rd	Signal	AM	10.5	B
		PM	13.3	B
6. SR-78 EB Ramps / Twin Oaks Valley Rd	Signal	AM	27.1	C
		PM	19.1	B
7. Woodward St / Project Dwy #1 [c]	MSSC [d]	AM	0.0	-
		PM	0.0	-
8. E. Mission Rd / Project Dwy #2	MSSC	AM	20.6	C
		PM	14.2	B

Footnotes:
a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. Project driveway intersection does not exist currently.
d. MSSC Minor Street Stop Controlled intersection. Minor street left turn delay is reported.

SIGNALIZED		UNSIGNALIZED	
Delay	LOS	Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

6.2 Daily Street Segment Levels of Service

Table 6–2 summarizes the segment operations under the Existing conditions. As seen in *Table 6–2*, the study segments are calculated to currently operate at LOS D or better.

TABLE 6–2
EXISTING STREET SEGMENT OPERATIONS

Street Segment	Classification	Capacity (LOS E) [a]	ADT [b]	LOS [c]	V/C [d]
Woodward Street					
Mulberry Dr to Borden Rd	Local Street	8,000	3,100	A	0.388
Vineyard Rd to Mission St	Local Street	8,000	7,900	D	0.988
Vineyard Road					
Borden Rd to Woodward St	Local Street	8,000	3,600	B	0.450
Mission Road					
Firebird Ln to Woodward St	4-Lane Major Arterial	40,000	15,100	A	0.378
Woodward St to Mulberry Dr	6-Lane Prime Arterial	60,000	23,500	A	0.392
San Marcos Boulevard					
Twin Oaks Valley Rd to Mission Rd	4-Lane Major Arterial	40,000	16,800	A	0.420
Twin Oaks Valley Road					
San Marcos Blvd to SR-78 WB Ramps	6-Lane Prime Arterial	60,000	36,100	B	0.602

Footnotes:

a. Capacities based on the City of San Marcos' Roadway Classification Table and LOS table (see *Table 4-3*).
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. Two-Way Left-Turn Lane

7.0 TRIP GENERATION/DISTRIBUTION/ASSIGNMENT

7.1 Trip Generation

The trip generation rates for the proposed project are based on the rates outlined in SANDAG's *(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, April 2002. The SANDAG trip rate for condominiums was applied to estimate the Project trip generation.

Table 7–1 tabulates the total project traffic generation. As seen in ***Table 7–1*** the project is calculated to generate approximately 536 ADT with 43 AM peak hour trips (9 inbound / 34 outbound) and 54 PM peak hour trips (38 inbound / 16 outbound).

7.2 Trip Distribution/Assignment

The traffic generated by the proposed Project was distributed and assigned based on anticipated traffic patterns to and from the site and the project's proximity to state highways and arterials.

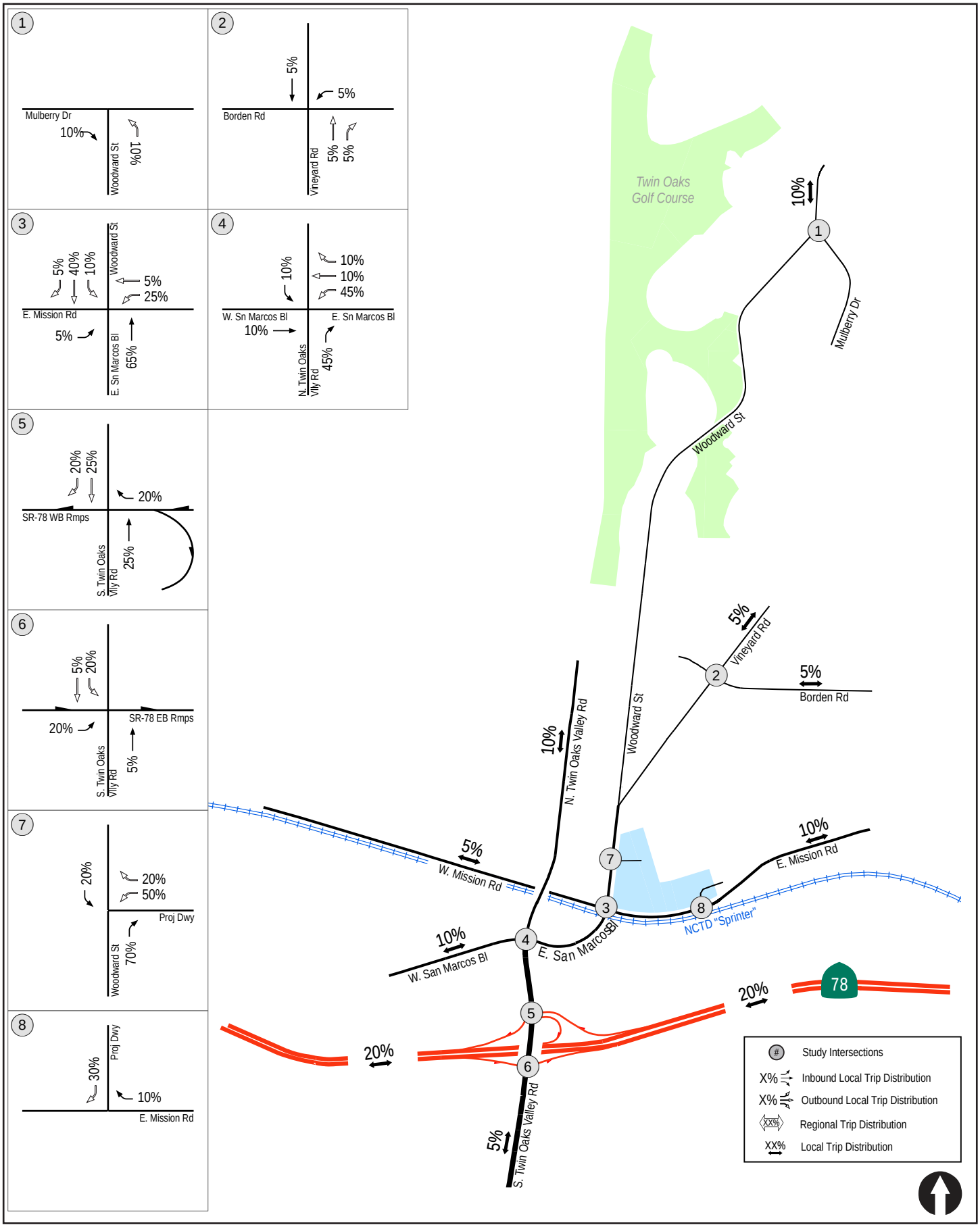
Figure 7–1 depicts the Project traffic distribution. ***Figure 7–2*** depicts the Project traffic volumes. ***Figure 7–3*** shows the Existing + Project traffic volumes.

TABLE 7–1
PROJECT TRIP GENERATION

Proposed Land Use	Size	Daily Trip Ends (ADT)		AM Peak Hour					PM Peak Hour				
		Rate [a]	Volume	% of ADT	In : Out Split	Volume			% of ADT	In : Out Split	Volume		
						In	Out	Total			In	Out	Total
Condominium	67 DU	8 /DU	536	8%	20:80	9	34	43	10%	70:30	38	16	54

Footnotes:

a. Generation rates obtained from SANDAG.



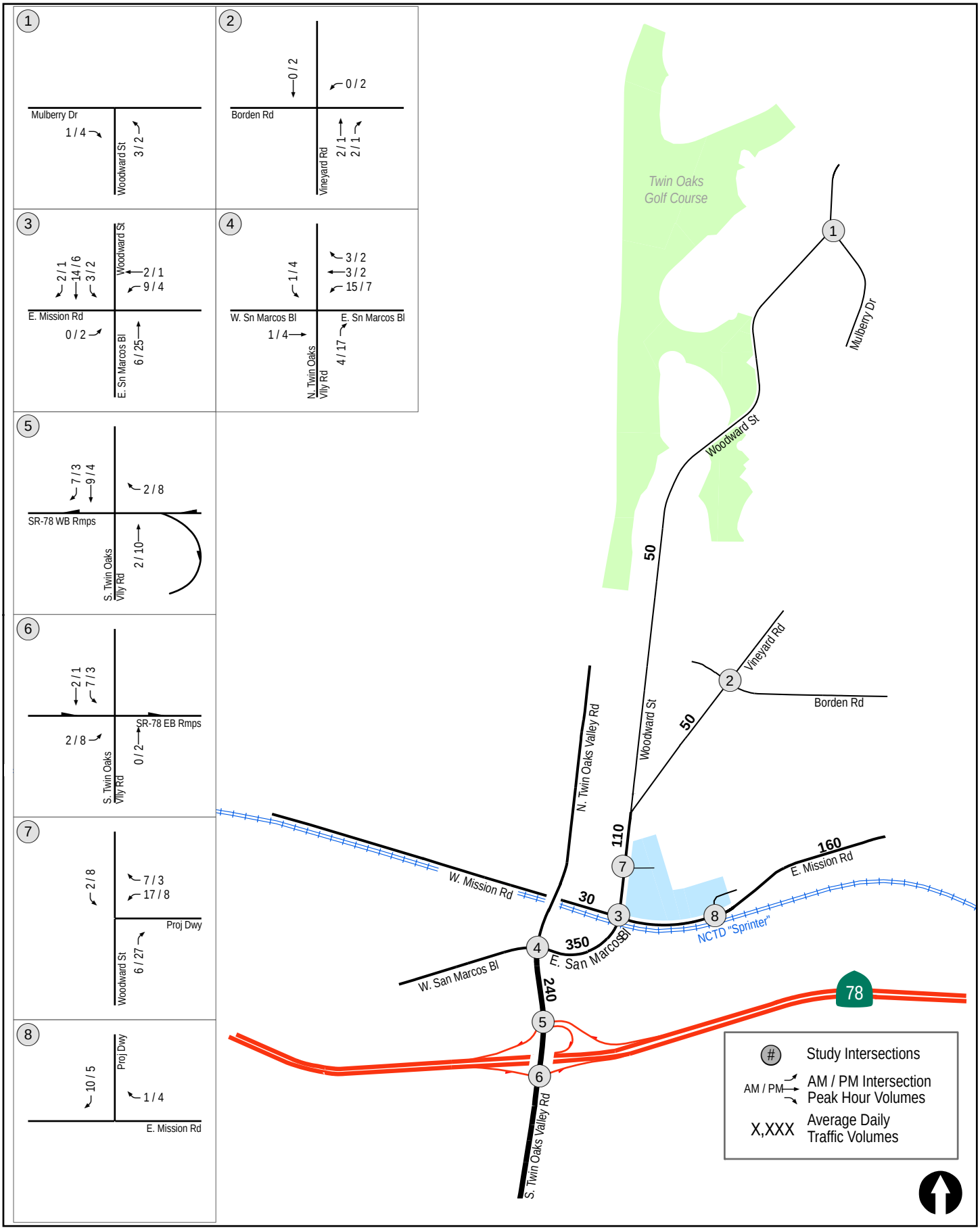
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Figure 7-1

Project Traffic Distribution

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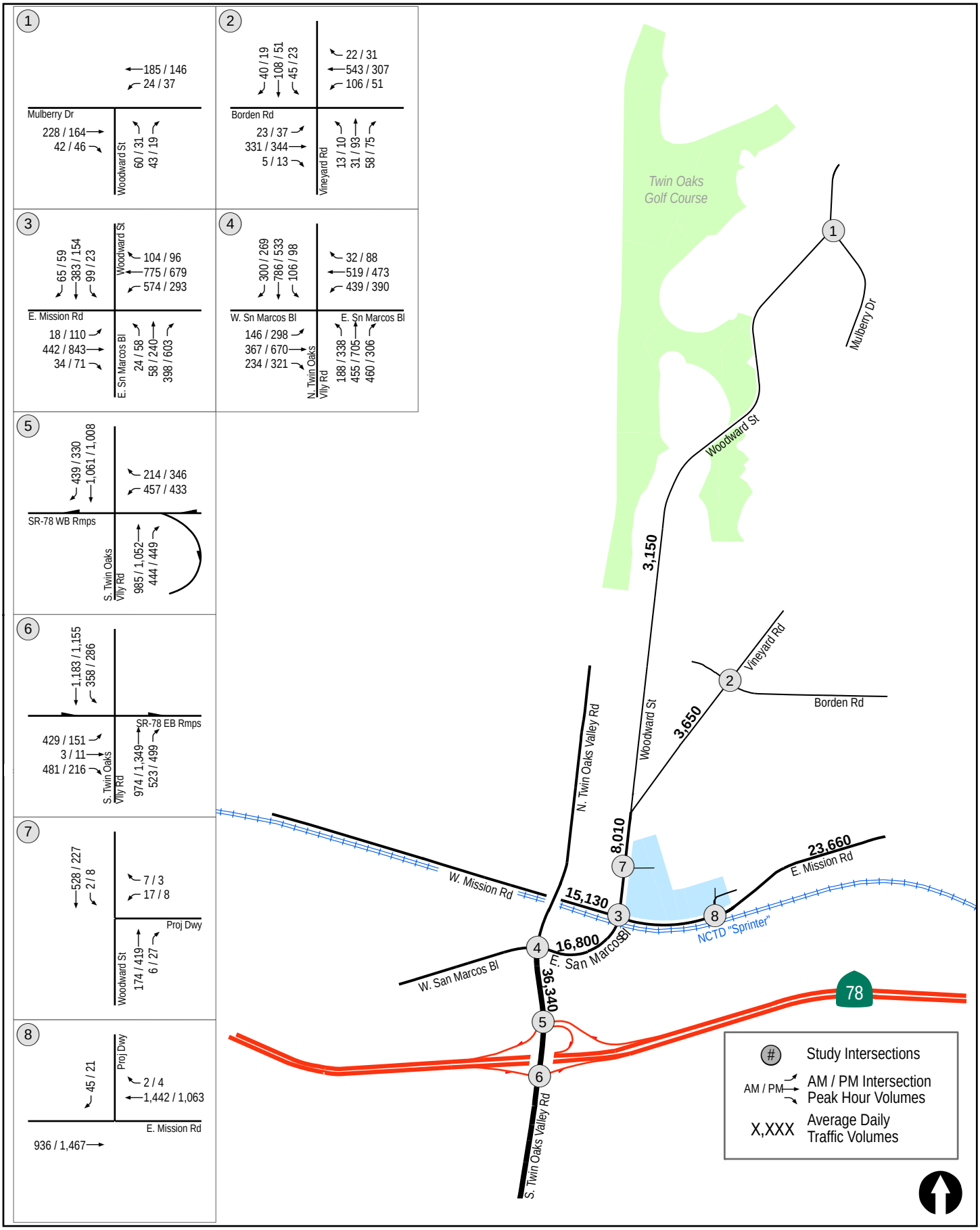
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Figure 7-2

Project Traffic Volumes

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Figure 7-3

Existing + Project Traffic Volumes

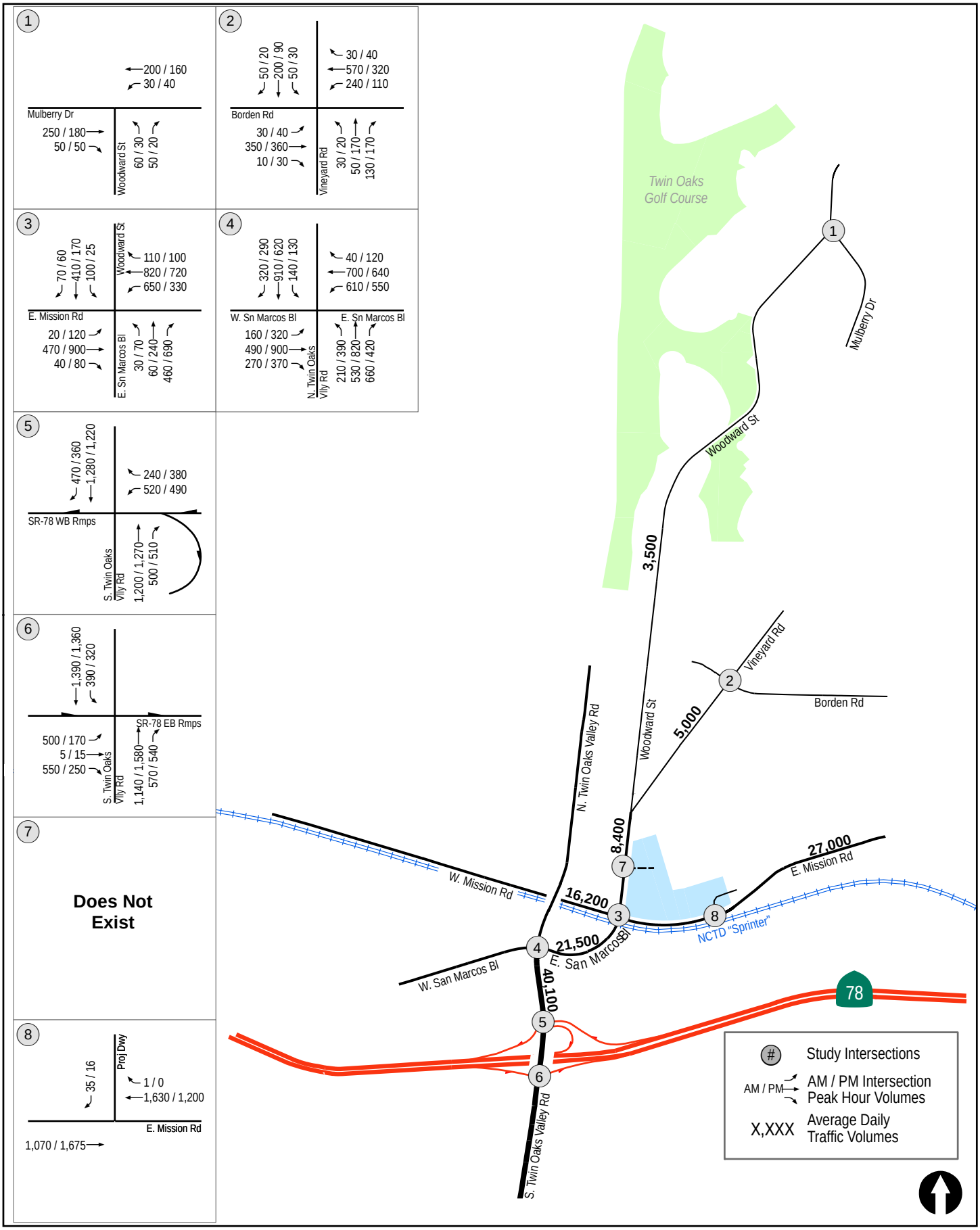
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8.0 CUMULATIVE PROJECTS

There are other planned projects within the vicinity which could potentially add traffic to the roadways and intersections in the study area. LLG reviewed the list of cumulative projects in the City of San Marcos, compared them to the assumed land uses in the SANDAG Series 12 Year 2020 Model. The Year 2020 model volumes were used to determine the Cumulative projects traffic volumes. The increase in volumes between the Existing ADT volumes and the Year 2020 SANDAG Series 12 model volumes is the Cumulative projects traffic volumes.

The Existing + Cumulative projects volumes were first estimated using a template in Excel developed by LLG to determine peak hour traffic at an intersection from future (Year 2020) ADT volumes using the relationship between existing peak hour turn movements and the existing ADT volumes. This same relationship can be assumed to generally continue in the future. For example, if the segment ADT on the roadway is forecast to double by the Year 2020, it is reasonable to assume that the peak hour intersection turning movement volumes will generally double. Thus, the Year 2020 peak hour volumes correspond to the Existing + Cumulative projects volumes. The difference between the Year 2020 peak hour volumes and the Existing peak hour volumes is the Cumulative projects traffic volumes.

Figure 8–1 depicts the peak hour and ADT segment volumes under the Existing + Cumulative projects scenario, while ***Figure 8–2*** depicts the same for the Existing + Cumulative projects + Project scenario



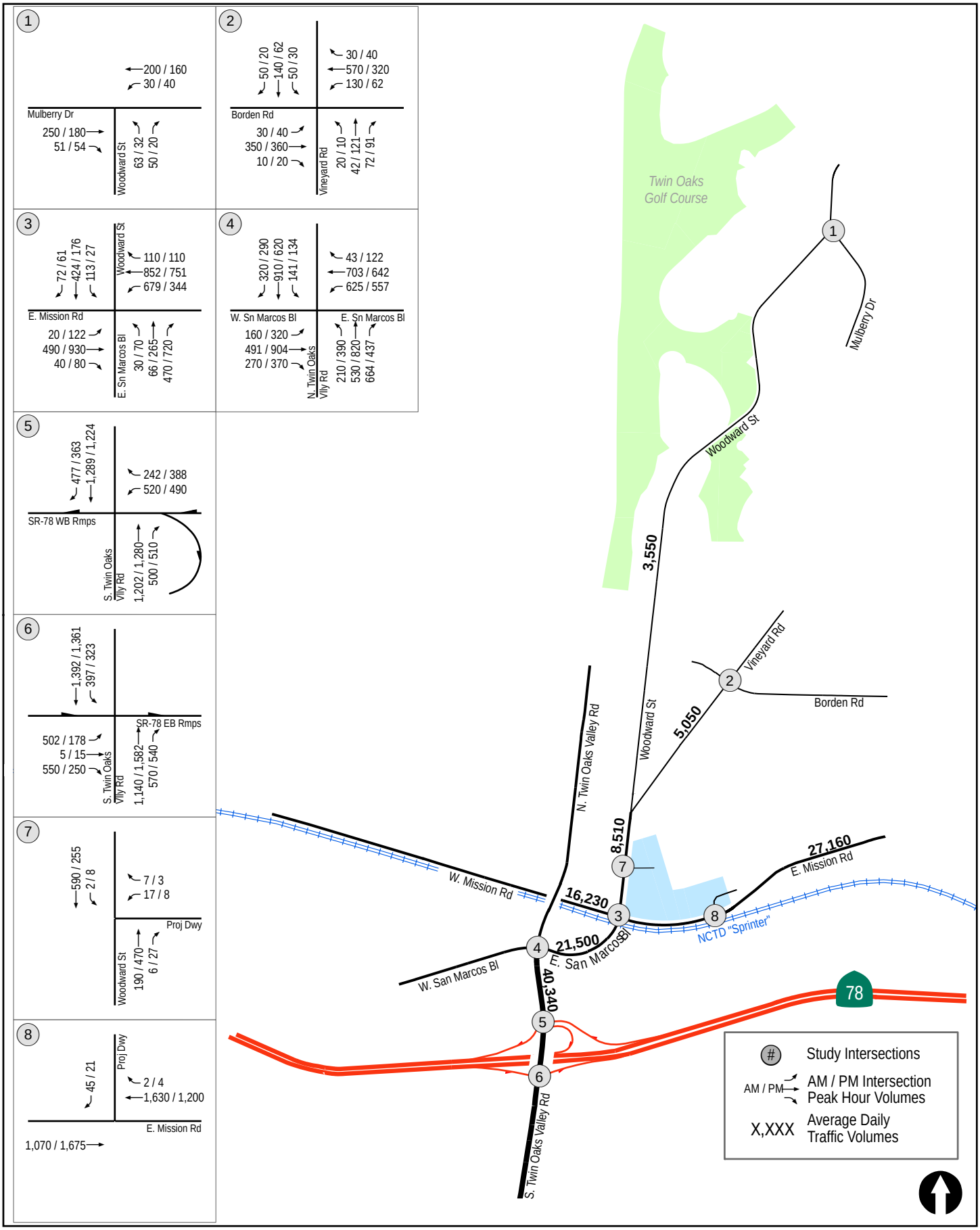
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Figure 8-1

Existing + Cumulative Projects Traffic Volumes

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Figure 8-2

Existing + Cumulative Projects + Project Traffic Volumes

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9.0 ANALYSIS OF NEAR-TERM SCENARIOS

9.1 Existing + Project

9.1.1 *Intersection Operations*

Table 9–1 summarizes the intersection operations under the Existing + Project scenario. As seen in *Table 9–1*, with the addition of Project traffic, the study intersections are calculated to continue to operate at LOS D or better.

Appendix C contains the Existing + Project intersection analysis worksheets.

9.1.2 *Segment Operations*

Table 9–2 summarizes the segment operations under the Existing + Project scenario. As seen in *Table 9–2*, with the addition of project traffic, the study segments are calculated to continue to continue to operate at LOS D or better.

9.2 Existing + Cumulative Projects

9.2.1 *Intersection Operations*

Table 9–3 summarizes the intersection operations under the Existing + Cumulative Projects scenario. As seen in *Table 9–3*, with the addition of Cumulative projects traffic, the following study intersection is calculated to operate at LOS E .

- San Marcos Boulevard / N. Twin Oaks Valley Road intersection (LOS F during the AM and PM Peak hours)

Appendix D contains the Existing + Cumulative Projects intersection analyses calculation worksheets.

9.2.2 *Segment Operations*

Table 9–4 summarizes the segment operations under the Existing + Cumulative Projects scenario. As seen in *Table 9–4*, with the addition of Cumulative projects traffic, all study segments are calculated to continue to operate at LOS D or better.

9.3 Existing + Cumulative Projects + Project

9.3.1 *Intersection Operations*

Table 9–3 summarizes the intersection operations under the Existing + Cumulative Projects + Project scenario. As seen in *Table 9–3*, with the addition of Cumulative projects and Project traffic, the following study intersection is calculated to operate at LOS E.

- San Marcos Boulevard / N. Twin Oaks Valley Road intersection (LOS F during the AM and PM Peak hours)

Even though the San Marcos Boulevard / N. Twin Oaks Valley Road intersection is calculated to operate at LOS E, the increase in delay due to the Project traffic is less than the allowable threshold of 2.0 seconds. Therefore, the Project does not have a significant cumulative impact at this location.

Appendix E contains the Existing + Cumulative Projects + Project intersection analyses calculation worksheets.

9.3.2 *Segment Operations*

Table 9–4 summarizes the segment operations under the Existing + Cumulative Projects + Project scenario. As seen in *Table 9–4*, with the addition of Cumulative projects and Project traffic, all study segments are calculated to continue to operate at LOS D or better.

TABLE 9–1
EXISTING AND EXISTING + PROJECT INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing		Existing + Project		Δ [c] Delay	Significant Impact?
			Delay [a]	LOS [b]	Delay	LOS		
1. Woodward St / Mulberry Dr	Signal	AM	8.2	A	8.3	A	0.1	No
		PM	7.3	A	7.4	A	0.1	No
2. Borden Rd / Vineyard Rd	Signal	AM	21.5	C	21.5	C	0.0	No
		PM	18.0	B	18.1	B	0.1	No
3. San Marcos Blvd / Woodward St	Signal	AM	38.6	D	39.4	D	0.8	No
		PM	40.2	D	41.5	D	1.3	No
4. San Marcos Blvd / N. Twin Oaks Valley Rd	Signal	AM	45.8	D	46.1	D	0.3	No
		PM	46.1	D	46.2	D	0.1	No
5. SR-78 WB Ramps / Twin Oaks Valley Rd	Signal	AM	10.5	B	10.5	B	0.0	No
		PM	13.3	B	13.4	B	0.1	No
6. SR-78 EB Ramps / Twin Oaks Valley Rd	Signal	AM	27.1	C	27.2	C	0.1	No
		PM	19.1	B	19.3	B	0.2	No
7. Woodward St / Project Dwy #1 [d]	MSSC [e]	AM	DNE	NA	11.3	B	NA	No
		PM	DNE	NA	12.6	B	NA	No
8. E. Mission Rd / Project Dwy #2	MSSC	AM	20.6	C	21.3	C	0.7	No
		PM	14.2	B	14.4	B	0.2	No

Footnotes:

a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. Increase in Delay due to Project traffic.
d. Project driveway intersection does not exist currently.
e. MSSC Minor Street Stop Controlled intersection. Minor street left turn delay is reported.

General Notes:

DNE – Does Not Exist
NA – Not Applicable.

SIGNALIZED		UNSIGNALIZED	
Delay	LOS	Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

TABLE 9–2
EXISTING AND EXISTING + PROJECT STREET SEGMENT OPERATIONS

Street Segment	Classification	Capacity (LOS E) [a]	Existing			Existing + Project			Δ V/C	Significant Impact?
			ADT [b]	LOS [c]	V/C	ADT	LOS	V/C		
Woodward Street										
Mulberry Dr to Borden Rd	Local Street	8,000	3,100	A	0.388	3,150	A	0.210	0.003	No
Vineyard Rd to Mission St	Local Street	8,000	7,900	D	0.988	8,010	A	0.267	0.004	No
Vineyard Road										
Borden Rd to Woodward St	Local Street	8,000	3,600	B	0.450	3,650	A	0.243	0.003	No
Mission Road										
Firebird Ln to Woodward St	4-Lane Major Arterial	40,000	15,100	A	0.378	15,130	B	0.378	0.000	No
Woodward St to Mulberry Dr	6-Lane Prime Arterial	60,000	23,500	A	0.392	23,660	A	0.394	0.002	No
San Marcos Boulevard										
Twin Oaks Valley Rd to Mission Rd	4-Lane Major Arterial	40,000	16,800	A	0.420	16,800	B	0.420	0.000	No
Twin Oaks Valley Road										
San Marcos Blvd to SR-78 WB Ramps	6-Lane Prime Arterial	60,000	36,100	B	0.602	36,340	C	0.606	0.004	No

Footnotes:

a. Capacities based on the City of San Marcos' Roadway Classification Table and LOS table (see *Table 4-3*).
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. Increase in V/C ratio due to Project traffic.

TABLE 9–3
NEAR-TERM INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing + Cumulative Projects		Existing + Cumulative Projects + Project		Δ [c] Delay	Significant Impact?
			Delay [a]	LOS [b]	Delay	LOS		
1. Woodward St / Mulberry Dr	Signal	AM	8.6	A	8.7	A	0.1	No
		PM	7.5	A	7.6	A	0.1	No
2. Borden Rd / Vineyard Rd	Signal	AM	26.7	C	26.7	C	0.0	No
		PM	19.8	B	19.9	B	0.1	No
3. San Marcos Blvd / Woodward St	Signal	AM	43.3	D	44.3	D	1.0	No
		PM	45.3	D	46.2	D	0.9	No
4. San Marcos Blvd / N. Twin Oaks Valley Rd	Signal	AM	62.5	E	64.3	E	1.8	No
		PM	66.2	E	67.1	E	0.9	No
5. SR-78 WB Ramps / Twin Oaks Valley Rd	Signal	AM	10.1	B	10.1	B	0.0	No
		PM	11.3	B	11.3	B	0.0	No
6. SR-78 EB Ramps / Twin Oaks Valley Rd	Signal	AM	30.5	C	30.7	C	0.2	No
		PM	19.0	B	19.2	B	0.2	No
7. Woodward St / Project Dwy #1 [d]	MSSC [e]	AM	0.0	-	11.7	B	-	No
		PM	0.0	-	13.4	B	-	No
8. E. Mission Rd / Project Dwy #2	MSSC	AM	23.8	C	25.0	C	1.2	No
		PM	15.3	C	15.5	C	0.2	No

Footnotes:
a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. Increase in Delay due to Project traffic.
d. Project driveway intersection does not exist currently.
e. MSSC Minor Street Stop Controlled intersection. Minor street left turn delay is reported.

General Notes:

DNE – Does Not Exist
NA – Not Applicable.

SIGNALIZED		UNSIGNALIZED	
Delay	LOS	Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

TABLE 9–4
NEAR-TERM + PROJECT STREET SEGMENT OPERATIONS

Street Segment	Classification	Capacity (LOS E) [a]	Existing + Cumulative Projects			Existing + Cumulative Projects + Project			Δ V/C	Significant Impact?
			ADT [b]	LOS [c]	V/C	ADT	LOS	V/C		
Woodward Street										
Mulberry Dr to Borden Rd	Local Street	8,000	3,500	A	0.233	3,550	A	0.237	0.004	No
Vineyard Rd to Mission St	Local Street	8,000	8,400	A	0.280	8,510	A	0.284	0.004	No
Vineyard Road										
Borden Rd to Woodward St	Local Street	8,000	5,000	A	0.333	5,050	B	0.337	0.004	No
Mission Road										
Firebird Ln to Woodward St	4-Lane Major Arterial	40,000	16,200	B	0.405	16,230	B	0.406	0.001	No
Woodward St to Mulberry Dr	6-Lane Prime Arterial	60,000	27,000	B	0.450	27,160	B	0.453	0.003	No
San Marcos Boulevard										
Twin Oaks Valley Rd to Mission Rd	4-Lane Major Arterial	40,000	21,500	C	0.538	21,500	C	0.538	0.001	No
Twin Oaks Valley Road										
San Marcos Blvd to SR-78 WB Ramps	6-Lane Prime Arterial	60,000	40,100	C	0.668	40,340	C	0.672	0.004	No

Footnotes:

a. Capacities based on the City of San Marcos' Roadway Classification Table and LOS table (see *Table 4-3*).
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. Increase in V/C ratio due to Project traffic.

10.0 ANALYSIS OF HORIZON YEAR SCENARIOS

10.1 Horizon Year 2035 Baseline Conditions & Traffic Volumes

In order to forecast future traffic volumes for Year 2035, the SANDAG Series 12 Model was utilized. The forecasted ADT volumes were then used to calculate peak hour volumes based partially on the existing relationship between ADT and peak hour volumes.

Several other traffic engineering principles and factors such as the K-factor (the proportion of daily volume that occurs during the peak period) and D-factor (the directional split of the traffic volumes) were also considered in the forecast analysis. The forecast volumes were also checked for consistency between intersections, where no driveways or roadways exist between intersections, and were compared to existing volumes for accuracy.

Figure 10–1 shows the Year 2035 baseline traffic volumes. ***Figure 10–2*** shows the Year 2035 + Project traffic volumes.

10.2 Year 2035

10.2.1 *Intersection Operations*

Table 10–1 summarizes the intersection operations under the Horizon Year (2035) Baseline scenario. As seen in *Table 10–1*, the following study intersection is calculated to operate at worse than LOS D:

- San Marcos Boulevard / N. Twin Oaks Valley Road intersection (LOS F during the AM and PM Peak hours)

Appendix F contains the Year 2035 intersection analyses calculation worksheets.

10.2.2 *Segment Operations*

Table 10–2 summarizes the segment operations under the Year 2035 scenario. As seen in *Table 10–2*, the study segments are calculated to operate at LOS D or better, except at the following locations:

- Twin Oaks Valley Road: San Marcos Boulevard to SR 78 WB Ramps (LOS E)

10.3 Year 2035 + Project

10.3.1 *Intersection Operations*

Table 10–1 summarizes the intersection operations under the Year 2035 + Project scenario. As seen in *Table 10–1*, with the addition of project traffic, the following study intersection is calculated to operate at worse than LOS D:

- San Marcos Boulevard / N. Twin Oaks Valley Road intersection (LOS F during the AM and PM Peak hours)

Even though the San Marcos Boulevard / N. Twin Oaks Valley Road intersection is calculated to operate at LOS F, the increase in delay due to the Project traffic is less than the allowable threshold of 2.0 seconds. Therefore, the Project does not have any significant cumulative impact at this location.

Appendix G contains the Year 2035 + Project intersection analyses calculation worksheets.

10.3.2 *Segment Operations*

Table 10–2 summarizes the segment operations under the Year 2035 + Project scenario. As seen in *Table 10–2*, with the addition of project traffic, the study segments are calculated to operate at LOS D or better, except at the following locations:

- Twin Oaks Valley Road: San Marcos Boulevard to SR 78 WB Ramps (LOS E)

Even though the segment of Twin Oaks Valley Road between San Marcos Boulevard and SR 78 WB Ramps is calculated to operate at LOS E, the increase in the V/C ratio due to the Project traffic is less than the allowable threshold of 0.02. Therefore, the Project does not have any significant cumulative impact at this location.

TABLE 10–1
HORIZON YEAR INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Horizon Year Baseline		Horizon Year + Project		Δ [c] Delay	Significant Impact?
			Delay [a]	LOS [b]	Delay	LOS		
1. Woodward St / Mulberry Dr	Signal	AM	8.7	A	8.8	A	0.1	No
		PM	7.5	A	7.6	A	0.1	No
2. Borden Rd / Vineyard Rd	Signal	AM	51.1	D	51.1	D	0.0	No
		PM	25.8	C	25.9	C	0.1	No
3. San Marcos Blvd / Woodward St	Signal	AM	50.8	D	52.6	D	1.8	No
		PM	45.2	D	46.1	D	0.9	No
4. San Marcos Blvd / N. Twin Oaks Valley Rd	Signal	AM	82.4	F	84.3	F	1.9	No [f]
		PM	88.0	F	88.9	F	0.9	No [f]
5. SR-78 WB Ramps / Twin Oaks Valley Rd	Signal	AM	9.4	A	9.4	A	0.0	No
		PM	10.2	B	10.2	B	0.0	No
6. SR-78 EB Ramps / Twin Oaks Valley Rd	Signal	AM	40.4	D	40.6	D	0.2	No
		PM	22.7	C	23.0	C	0.3	No
7. Woodward St / Project Dwy #1 [d]	MSSC [e]	AM	DNE	NA	11.9	B	NA	No
		PM	DNE	NA	13.6	B	NA	No
8. E. Mission Rd / Project Dwy #2	MSSC	AM	26.7	D	28.3	D	1.6	No
		PM	16.1	C	16.3	C	0.2	No

Footnotes:

a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. Increase in Delay due to Project traffic.
d. Project driveway intersection does not exist currently.
e. MSSC Minor Street Stop Controlled intersection. Minor street left turn delay is reported.
f. Not a significant cumulative impact since the increase in delay due to the Project is less than the allowable threshold of 2.0 seconds.

General Notes:

DNE – Does Not Exist
NA – Not Applicable.

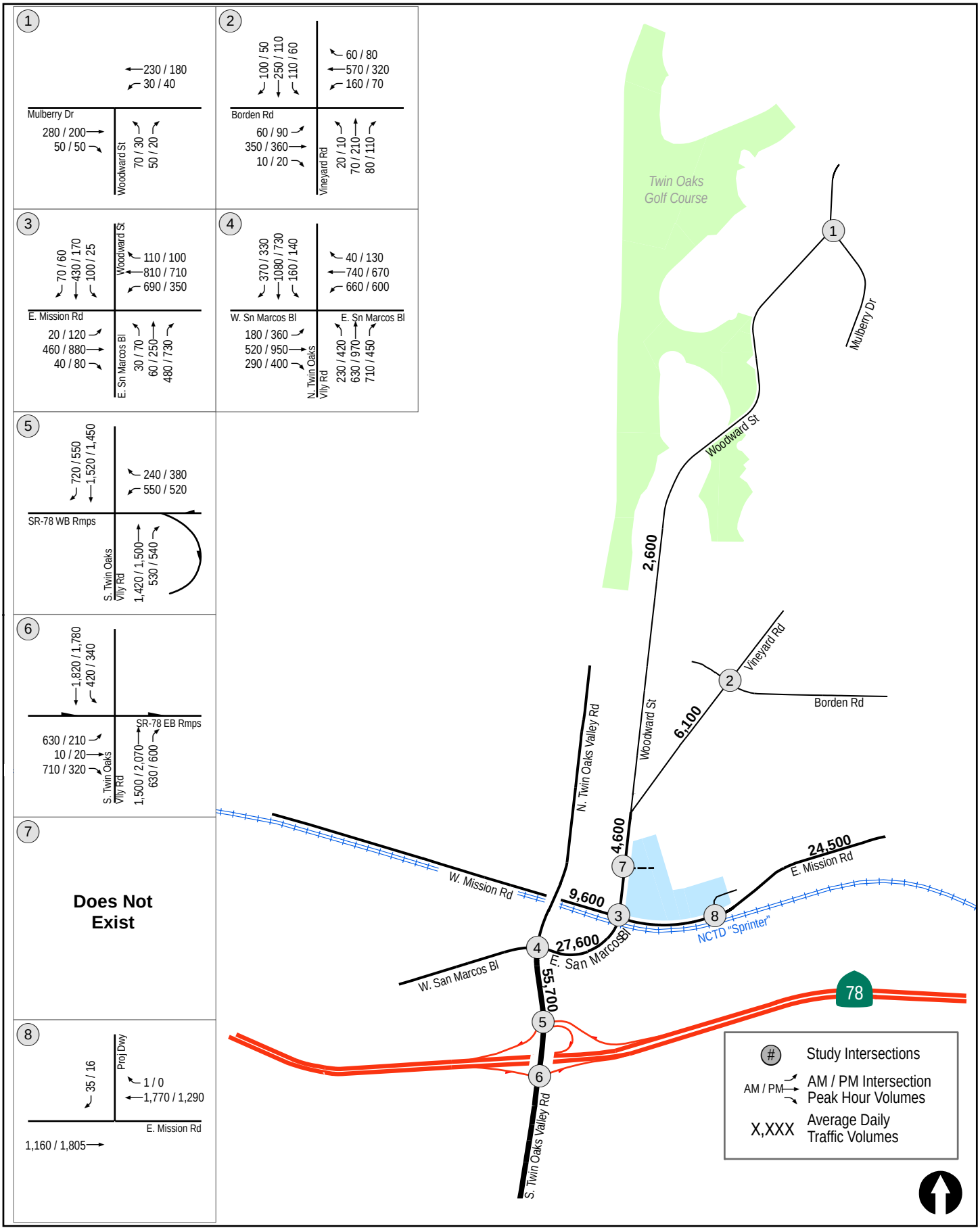
SIGNALIZED		UNSIGNALIZED	
Delay	LOS	Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

TABLE 10–2
HORIZON YEAR STREET SEGMENT OPERATIONS

Street Segment	Classification	Capacity (LOS E) [a]	Horizon Year Baseline			Horizon Year + Project			Δ V/C	Significant Impact?
			ADT [b]	LOS [c]	V/C	ADT	LOS	V/C		
Woodward Street										
Mulberry Dr to Borden Rd	Local Street	8,000	2,600	A	0.173	2,650	A	0.177	0.004	No
Vineyard Rd to Mission St	Local Street	8,000	4,600	A	0.153	4,710	A	0.157	0.004	No
Vineyard Road										
Borden Rd to Woodward St	Local Street	8,000	6,100	B	0.407	6,150	B	0.410	0.003	No
Mission Road										
Firebird Ln to Woodward St	4-Lane Major Arterial	40,000	9,600	A	0.240	9,630	A	0.241	0.001	No
Woodward St to Mulberry Dr	6-Lane Prime Arterial	60,000	24,500	A	0.408	24,660	A	0.411	0.003	No
San Marcos Boulevard										
Twin Oaks Valley Rd to Mission Rd	4-Lane Major Arterial	40,000	27,600	C	0.690	27,950	C	0.699	0.009	No
Twin Oaks Valley Road										
San Marcos Blvd to SR-78 WB Ramps	6-Lane Prime Arterial	60,000	55,700	E	0.928	55,940	E	0.932	0.004	No [f]

Footnotes:

a. Capacities based on the City of San Marcos' Roadway Classification Table and LOS table (see *Table 4-3*).
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. Increase in V/C ratio due to Project traffic.
f. Not a significant cumulative impact since the increase in the V/C ratio due to the Project is less than the allowable threshold of 0.02.



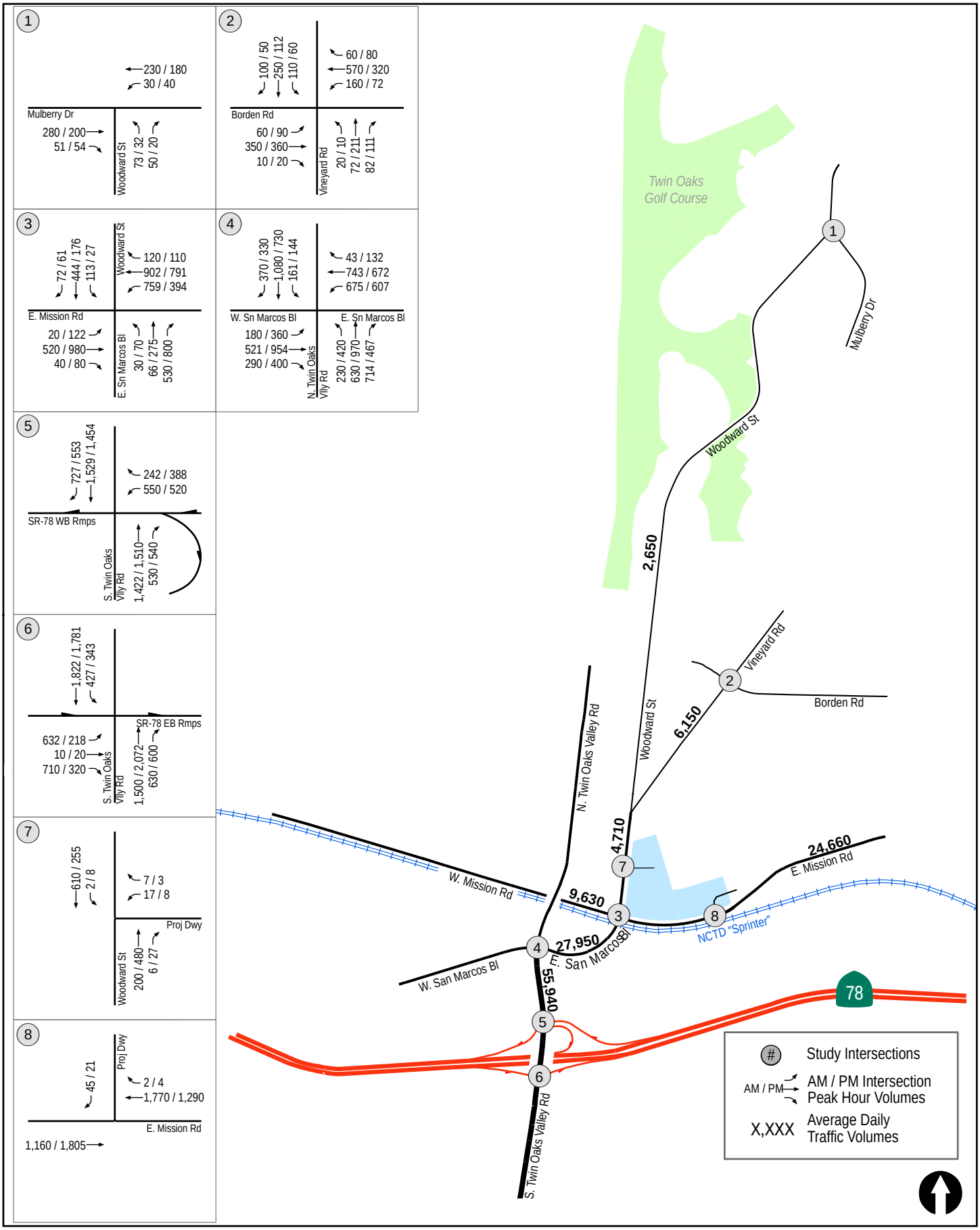
LINSCOTT LAW & GREENSPAN engineers

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Date: 06/04/19

Figure 10-1

Horizon Year (2035) Traffic Volumes

MISSION 316 WEST



LINSCOTT LAW & GREENSPAN engineers

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Date: 06/04/19

Figure 10-2

Horizon Year (2035) with Project Traffic Volumes

MISSION 316 WEST

11.0 PROJECT ACCESS DISCUSSION

The project proposes to provide two access driveways – one on Woodward Avenue and the other on Mission Avenue. This section describes the two access driveways and the intersection sight distance calculations.

11.1 Project Driveway #1 / Woodward Street

The Project driveway on Woodward Street is proposed as a full access driveway. A vertical curve exists in the vicinity of this driveway and hence, a sight distance analysis was conducted to confirm the adequacy of the available sight distance for Project traffic to enter Woodward Street.

11.1.1 *Sight Distance Analysis*

Woodward Street is a north-south facility in the project study area. Between Vineyard Road and Mission Road, Woodward Street is a 4-lane undivided roadway with a Two-Way-Left-Turn Lane (TWLTL). The posted speed limit is 40 mph in the northbound direction and 35 mph in the southbound direction. On-street parking is not permitted. Class II bike lanes are provided. A speed survey was provided by the City of San Marcos on Woodward Street in the vicinity of the planned Driveway #1 (see ***Appendix H***). Based on the speed survey, the 85th percentile speed is 38 mph. The proposed driveway is located on an existing vertical alignment along Woodward Street. Woodward Street has an approximately 3% uphill grade going northbound and 2.5% downhill grade going southbound.

11.1.2 *City of San Marcos Sight Distance Standards*

Per the City of San Marcos*'s Minimum Sight Distance Standards (Appendix H)*, 85th percentile speed is used as the operating speed to calculate required sight distance. If adequate sight distance is not available at a curve, the minimum required Stopping Sight Distance should be provided. Per the California *Highway Design Manual* (HDM), November 2017, "The minimum stopping sight distance is the distance required by the user, traveling at a given speed, to bring the vehicle or bicycle to a stop after an object ½-foot high on the road becomes visible."

The minimum required **intersection** sight distance based on the 85th percentile speed for drivers turning left from driveway onto Woodward Street looking right is determined to be 490 feet, using the City of San Marcos standards. This distance requirement is based on a 3.5 feet driver eye height and 4.25 feet object height for passenger cars. The minimum required **stopping** sight distance for an 85th percentile speed of 38 miles per hour is 300 feet.

11.1.3 *Existing Sight Distance Study Review*

A field survey and a sight distance analysis were conducted by Excel Engineering. The exhibit shows an available sight distance of 490 feet along Woodward Street north of proposed driveway. ***Figure 11-1*** depicts the minimum required sight distance of 490 feet.

In summary, the minimum required intersection sight distance is 490 feet and the minimum stopping sight distance is 300 feet and the available sight distance is 490 feet. Hence, adequate sight distance is available at the Project driveway on Woodward Street.

The adequacy of the available sight distance was confirmed by the City Traffic Engineer in his email dated June 26, 2019 (*Appendix H*):

> "We have determined that both intersectional and stopping sight distances for the proposed Mission 316 West project driveway have been satisfied based on our field review."

11.1.4 *Recommendation*

Based on the above discussion, a full access driveway can be permitted on Woodward Street.

11.2 Project Driveway #2 / Mission Road

The Project driveway on Mission Avenue will be a right-in / right out only since there is a raised median on Mission Avenue and left-turns in and out will not be possible. The Project driveway is located on the inside of a horizontal curve on Mission Road and hence, a sight distance analysis was conducted to confirm the adequacy of the available sight distance for Project traffic to enter Mission Road.

11.2.1 *Sight Distance Analysis*

As described in Section 4.0, Mission Road is an east-west facility in the project study area and is currently constructed as a 6-lane divided roadway between Woodward Street and Woodland Parkway. On-street parking is prohibited on the Mission Road and Class II bike lanes are provided. Mission Road is classified as a Prime Arterial between Woodward Street and Mulberry Road. The posted speed limit is 45 mph. LLG conducted a speed survey on April 10, 2019 and determined that the 85th percentile speed is 46 mph in the westbound direction (*Appendix H*).

11.2.2 *City of San Marcos Sight Distance Standards*

As explained previously, Per the City of San Marcos*'s Minimum Sight Distance Standards (Appendix H)*, 85th percentile speed is used as the operating speed to calculate required sight distance. If adequate sight distance is not available at a curve, the minimum required Stopping Sight Distance should be provided. Per the California *Highway Design Manual* (HDM), November 2017, "The minimum stopping sight distance is the distance required by the user, traveling at a given speed, to bring the vehicle or bicycle to a stop after an object ½-foot high on the road becomes visible."

The required **intersection** sight distance for vehicles turning right from driveway onto westbound Mission Road based on the 85th percentile speed of 46 mph is determined to be 570 feet, using the City of San Marcos standards. This distance requirement is based on a 3.5 feet driver eye height and 4.25 feet object height for passenger cars. The minimum required **stopping** sight distance for an 85th percentile speed of 46 miles per hour is 370 feet.

A sight corridor easement (Map 16111) was executed on May 10, 2016 with the City for this driveway. This agreement provided clear sight easement to the east of the Project Driveway #2 on Mission Road. A copy of this agreement is included in *Appendix H*. Adequate sight distance will be available **provided the clear sight easement is maintained**.

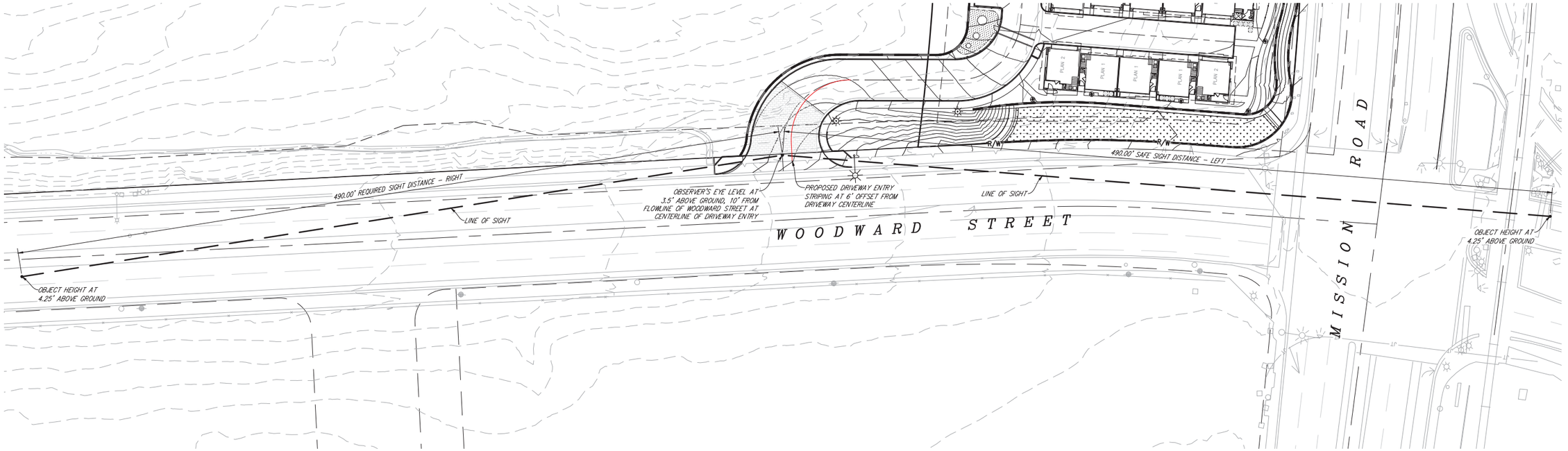
In summary, the minimum required intersection sight distance is 570 feet and the minimum stopping sight distance is 370 feet and the minimum required sight distance is available provided the sight corridor easement is maintained clear of any obstruction. Hence, adequate sight distance is available at the Project driveway on Mission Road.

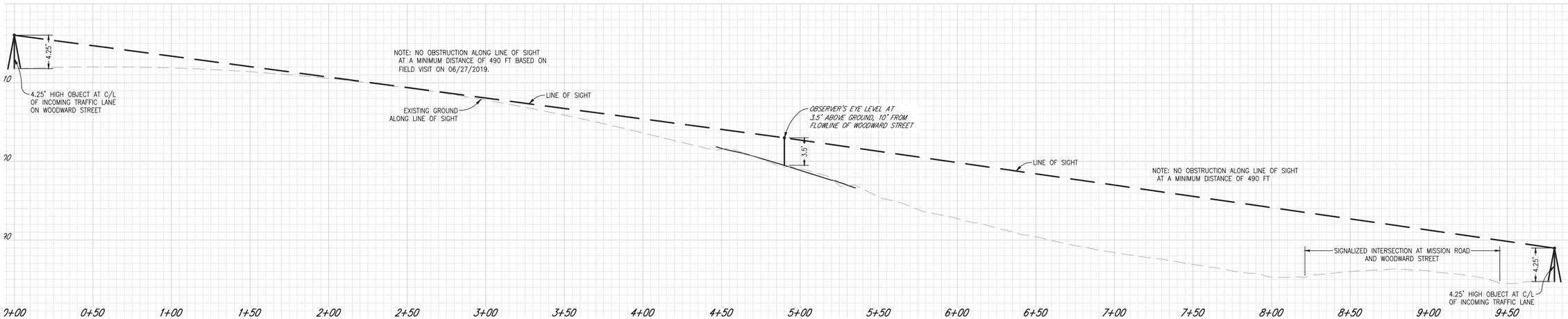
11.2.3 *Recommendations*

Based on the above discussion, it is recommended that the sight corridor easement shall be maintained clear of any obstruction and if so, adequate sight distance is provided for vehicles entering Mission Road from the Project driveway, as shown on ***Figure 11-2***.

11.3 Queuing at the Project Driveways

The Synchro intersection analysis provides the queue lengths in various movements at the Project driveways. As seen on the Synchro worksheets, in the long-term, with the Project traffic, the queue lengths at the Project driveway #1 on Woodward Street in the southbound and northbound directions are less than 1 passenger car (PC) length. Also, queue lengths at the Project driveway #1 on Woodward Street in the westbound direction is less than 1 PC length.





WOODWARD STREET LINE OF SIGHT PROFILE – 38 MPH

SCALE: HORIZONTAL: 1"=30'
VERTICAL: 1"=6'

SCALE: 1"=30'

0 30 60 90 120

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Date: 06/28/19

Figure 11-1

Sight Distance - Woodward Street

MISSION 316 WEST



------ Clear line of Sight

Clear Space Easement. No sight obstruction within this space.

Clear Space Easement - No trees or other sight obstructions within clear space, low growing ground cover only.

NORTH

1" = 50'

Linscott Law & Greenspan engineers

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Figure 11-2

Sight Distance - Mission Road

Mission 316 West

12.0 SIGNIFICANCE OF IMPACTS AND MITIGATION MEASURES

Based on the analysis and the established significance criteria, no significant direct or cumulative impacts were determined and no mitigation measures are therefore required. The following are recommended to ensure acceptable operations at the Project driveways:

- Provide a 45-foot outbound lane to allow right-turning traffic to pass traffic waiting to turn left at the Woodward Avenue / Project Driveway #1.
- Provide no median break on Mission Avenue thus permitting right-in / right-out on only movements at the Woodward Avenue / Project Driveway #2.
- Provide STOP signs at the two project driveways for outbound traffic.
- Ensure adequate sight-distance at both Project access driveways as described in Section 11 Project Access Discussion.

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LAW &
GREENSPAN
engineers

TECHNICAL APPENDICES

URBAN VINEYARD

San Diego, California
Jun 28, 2019

LLG Ref. 3-18-2928

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APPENDIX A

INTERSECTION AND SEGMENT MANUAL COUNT SHEETS

Prepared by National Data & Surveying Services

Woodward St & Mulberry Dr

Peak Hour Turning Movement Count

ID: 18-04219-001
City: San Marcos

Day: Wednesday
Date: 06/13/2018

PEAK HOURS

AM: 07:30 AM - 08:30 AM
NOON: NONE
PM: 04:30 PM - 05:30 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

SOUTHBOUND — Woodward St

AM	0	0	0	0	0	AM
NOON	0	0	0	0	0	NOON
PM	0	0	0	0	0	PM

EASTBOUND — Mulberry Dr

AM	NOON	PM		
242	0	175	⇦	
0	0	0	↶	0
0	0	0	↱	1
228	0	164	→	1
41	0	42	↴	0
AM	NOON	PM		

WESTBOUND — Mulberry Dr

PM	NOON	AM		
0	0	0	↰	0
146	0	185	←	1
37	0	24	↰	1
0	0	0	↶	0
			⇨	
183	0	271		
PM	NOON	AM		

NORTHBOUND — Woodward St

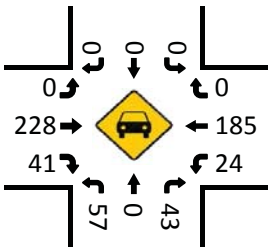
PM	79	0	29	0	19	PM
NOON	0	0	0	0	0	NOON
AM	65	0	57	0	43	AM

⇩	↶	↰	↑	↱
	0	1	1	0

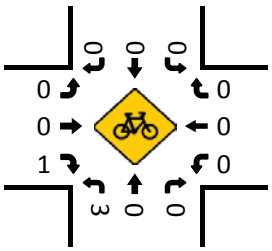
CONTROL: Signalized

TEV	578 AM	0 NOON	437 PM
PHF	0.88		0.87

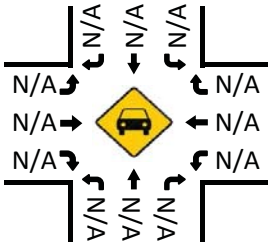
Total Vehicles (AM)



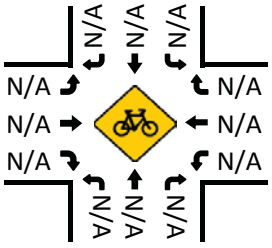
Bikes (AM)



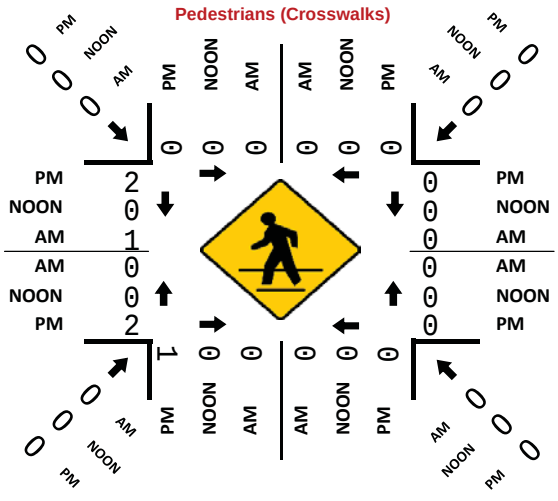
Total Vehicles (Noon)



Bikes (NOON)



Pedestrians (Crosswalks)


PM NOON AM
2 0 1
0 0
2 0 0
1 0 0 0 0 0
0 0 0 0 0 0
0 0 0
0 0 0
0 0 0 0 0 0
0 0 0
0 0 0
0 0 0 0 0 0
0 0 0

Prepared by National Data & Surveying Services

Vineyard Rd & Borden Rd

Peak Hour Turning Movement Count

ID: 18-04219-002
City: San Marcos

Day: Wednesday
Date: 06/13/2018

PEAK HOURS	COUNT PERIODS
07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NONE	NONE
04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

SOUTHBOUND — Vineyard Rd

AM	40	108	45	0	74	AM
NOON	0	0	0	0	0	NOON
PM	19	49	23	0	160	PM

EASTBOUND — Borden Rd

AM	NOON	PM	
596	0	336	
0	0	0	0
23	0	37	1
331	0	344	0.5
5	0	13	0.5

WESTBOUND — Borden Rd

PM	NOON	AM	
31	0	22	0
307	0	543	1
49	0	106	1
0	0	0	0
441	0	432	

NORTHBOUND — Vineyard Rd

PM	111	0	10	92	74	PM
NOON	0	0	0	0	0	NOON
AM	219	0	13	29	56	AM

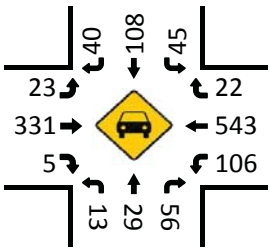
	0	1	1	0

CONTROL

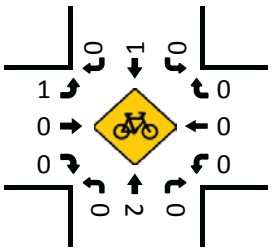
Signalized

TEV	1321 AM	0 NOON	1048 PM
PHF	0.86		0.92

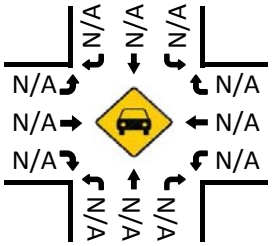
Total Vehicles (AM)



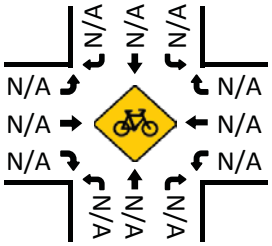
Bikes (AM)



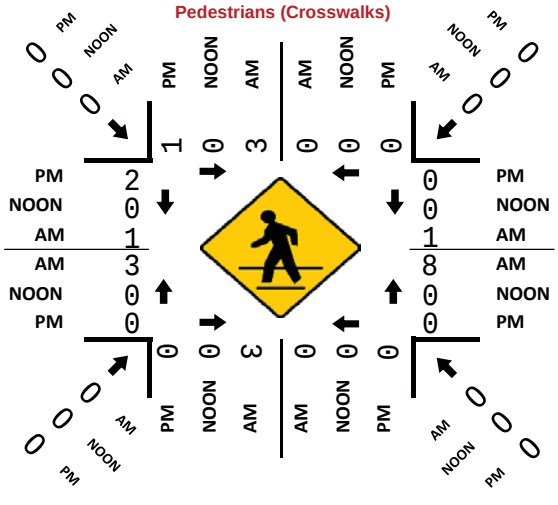
Total Vehicles (Noon)



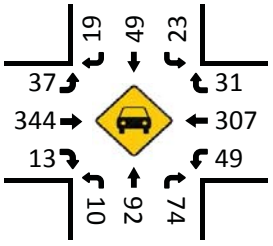
Bikes (NOON)



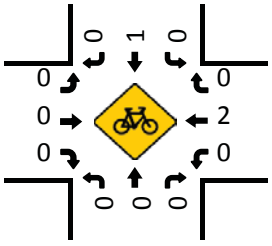
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Woodward St & Mission Rd

Peak Hour Turning Movement Count

ID: 18-04219-003
City: San Marcos

Day: Wednesday
Date: 06/13/2018

PEAK HOURS	COUNT PERIODS
07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NONE	NONE
05:00 PM - 06:00 PM	04:00 PM - 06:00 PM

Woodward St — SOUTHBOUND

AM	63	369	96	0	174	AM
NOON	0	0	0	0	0	NOON
PM	58	148	21	0	419	PM

EASTBOUND — Mission Rd

AM	NOON	PM		
860	0	795	⇦	
0	0	1	↶	0
18	0	108	↱	1
442	0	843	→	2
34	0	71	↳	1
AM	NOON	PM		

WESTBOUND — Mission Rd

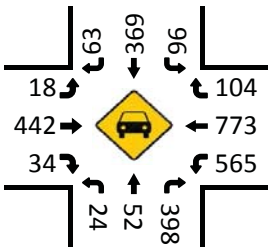
PM	NOON	AM		
96	0	104	↰	1
678	0	773	←	2
289	0	565	↰	2
9	0	13	↶	0
1476	0	949	⇨	
PM	NOON	AM		

Woodward St — NORTHBOUND

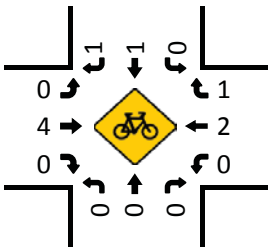
PM	515	7	58	215	603	PM
NOON	0	0	0	0	0	NOON
AM	970	2	24	52	398	AM

CONTROL			
Signalized			
TEV	2953 AM	0 NOON	3205 PM
PHF	0.82		0.96

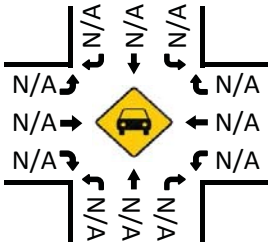
Total Vehicles (AM)



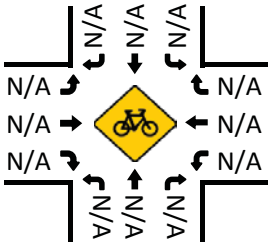
Bikes (AM)



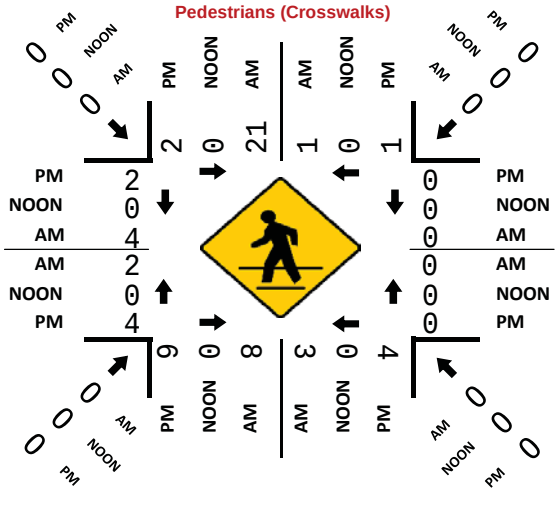
Total Vehicles (Noon)



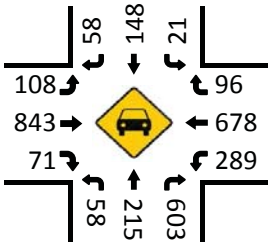
Bikes (NOON)



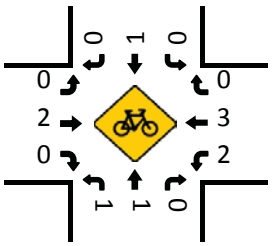
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Twin Oaks Valley Rd & San Marcos Blvd

Peak Hour Turning Movement Count

ID: 18-04219-004
City: San Marcos

Day: Wednesday
Date: 06/13/2018

PEAK HOURS

AM	07:30 AM - 08:30 AM
NOON	NONE
PM	04:30 PM - 05:30 PM

COUNT PERIODS

AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

Twin Oaks Valley Rd — SOUTHBOUND

AM	300	786	105	0	630	AM
NOON	0	0	0	0	0	NOON
PM	269	533	94	0	1089	PM

San Marcos Blvd — EASTBOUND

AM	NOON	PM		
1004	0	1081		
0	0	3	0	
146	0	298	2	
366	0	666	2	
234	0	321	1	
AM	NOON	PM		

San Marcos Blvd — WESTBOUND

PM	NOON	AM	
86	0	29	0
471	0	516	2
383	0	424	2
0	0	0	0
1049	0	927	
PM	NOON	AM	

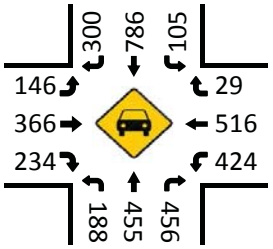
Twin Oaks Valley Rd — NORTHBOUND

PM	1237	0	338	705	289	PM
NOON	0	0	0	0	0	NOON
AM	1444	0	188	455	456	AM

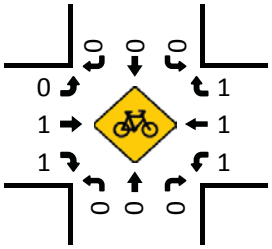
	0	2	2	0
	0	2	2	1

CONTROL			
Signalized			
TEV	4005 AM	0 NOON	4456 PM
PHF	0.98		0.98

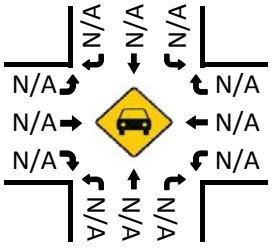
Total Vehicles (AM)



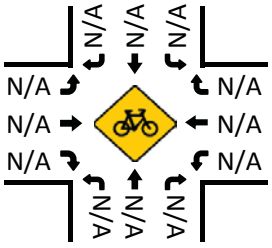
Bikes (AM)



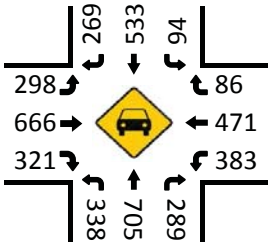
Total Vehicles (Noon)



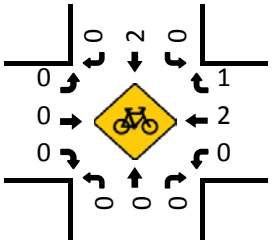
Bikes (NOON)



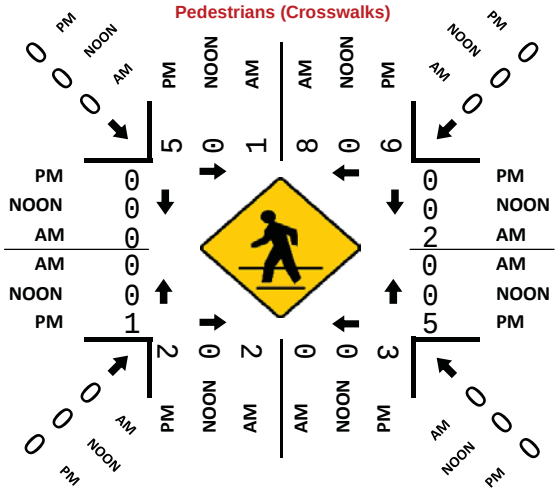
Total Vehicles (PM)



Bikes (PM)



Pedestrians (Crosswalks)



Prepared by National Data & Surveying Services

Twin Oaks Valley Rd & SR-78 westbound ramps

Peak Hour Turning Movement Count

ID: 18-04219-005
City: San Marcos

Day: Wednesday
Date: 06/13/2018

PEAK HOURS	COUNT PERIODS
07:30 AM - 08:30 AM	07:00 AM - 09:00 AM
NONE	NONE
04:30 PM - 05:30 PM	04:00 PM - 06:00 PM

Twin Oaks Valley Rd — SOUTHBOUND

AM	432	1052	0	0	1195	AM
NOON	0	0	0	0	0	NOON
PM	327	1004	0	0	1380	PM

SR-78 westbound ramps — EASTBOUND

AM	NOON	PM	
432	0	327	⇦
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
AM	NOON	PM	

WESTBOUND — SR-78 westbound ramps

PM	NOON	AM	
338	0	212	2
0	0	0	0
433	0	457	2
0	0	0	0
449	0	444	⇨
PM	NOON	AM	

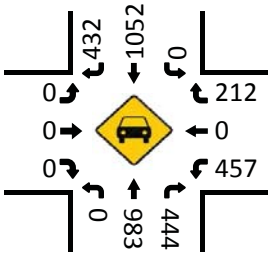
Twin Oaks Valley Rd — NORTHBOUND

PM	1437	0	0	1042	449	PM
NOON	0	0	0	0	0	NOON
AM	1509	0	0	983	444	AM

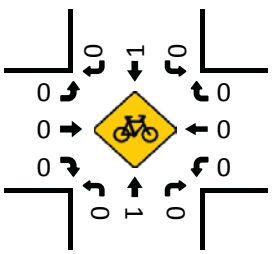
1	3	0	0	⇩
0	0	3	1	⇧

CONTROL			
Signalized			
TEV	3580 AM	0 NOON	3593 PM
PHF	0.92		0.98

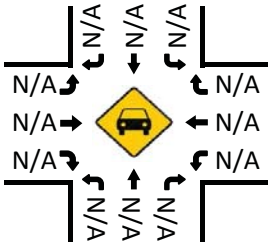
Total Vehicles (AM)



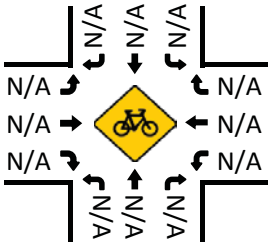
Bikes (AM)



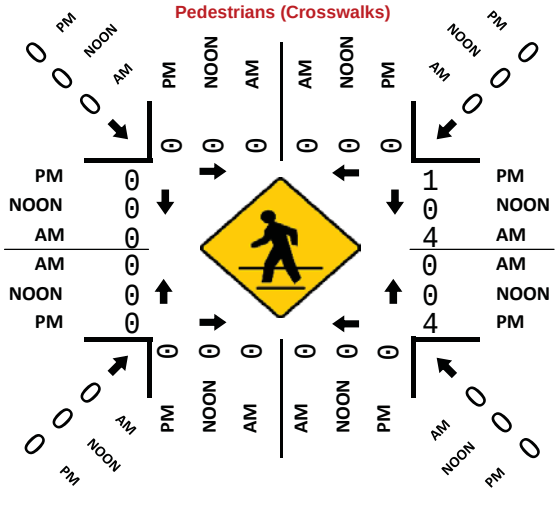
Total Vehicles (Noon)



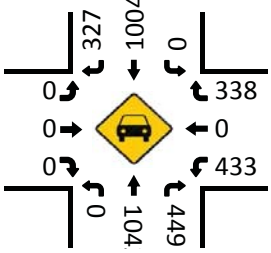
Bikes (NOON)



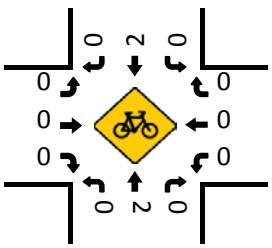
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Twin Oaks Valley Rd & SR-78 eastbound ramps

Peak Hour Turning Movement Count

ID: 18-04219-006
City: San Marcos

Day: Wednesday
Date: 06/13/2018

PEAK HOURS	COUNT PERIODS
07:45 AM - 08:45 AM	07:00 AM - 09:00 AM
NONE	NONE
04:30 PM - 05:30 PM	04:00 PM - 06:00 PM

Twin Oaks Valley Rd — SOUTHBOUND

AM	0	1181	351	4	1405	AM
NOON	0	0	0	0	0	NOON
PM	0	1154	283	12	1502	PM

SR-78 eastbound ramps — EASTBOUND

AM	NOON	PM		
0	0	0		
0	0	0	0	
427	0	143	1.3	
3	0	11	0.3	
481	0	216	1.3	
AM	NOON	PM		

SR-78 eastbound ramps — WESTBOUND

PM	NOON	AM	
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
793	0	877	
PM	NOON	AM	

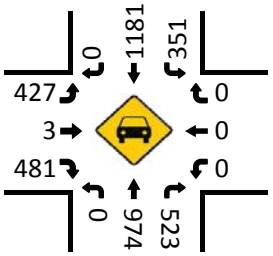
Twin Oaks Valley Rd — NORTHBOUND

PM	1370	0	0	1347	499	PM
NOON	0	0	0	0	0	NOON
AM	1662	0	0	974	523	AM

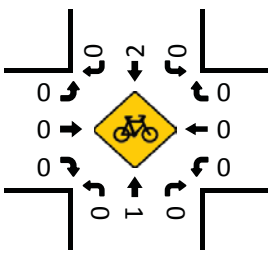
	0	3	2	0
	0	0	3	1

CONTROL			
Signalized			
TEV	3944 AM	0 NOON	3665 PM
PHF	0.96		0.95

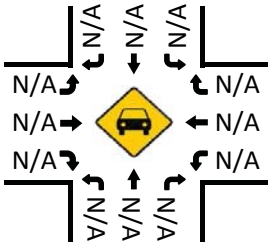
Total Vehicles (AM)



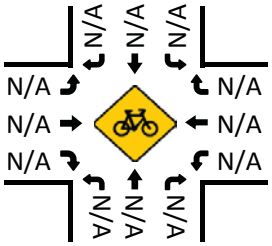
Bikes (AM)



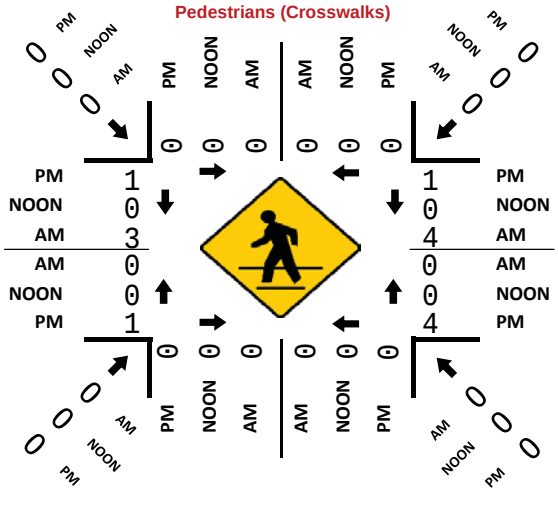
Total Vehicles (Noon)



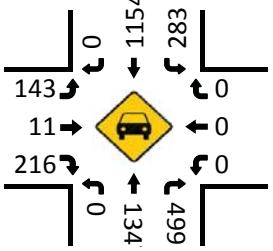
Bikes (NOON)



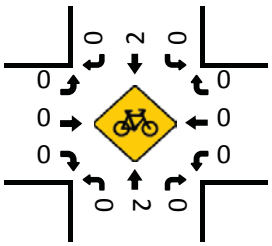
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers

Location:	#01	File Name:	ITM-19-037-01
Intersection:	East Mission Villas Road & East Mission Road	Project:	LLG Ref. 3-18-2928
Date of Count:	Wednesday, Aoril 3, 2019		San Marcos

AM	E Mission Villas Southbound			Avenue or Street Westbound			E Mission Villas Northbound			Avenue or Street Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	0	0	6	0	178	0	0	0	0	0	86	0	270
7:15	0	0	9	0	266	1	0	0	0	0	97	0	373
7:30	0	0	9	0	309	0	0	0	0	0	109	0	427
7:45	0	0	11	0	287	0	0	0	0	0	150	0	448
8:00	0	0	6	0	227	0	0	0	0	0	95	0	328
8:15	0	0	4	0	245	0	0	0	0	0	109	0	358
8:30	0	0	6	0	191	0	0	0	0	0	102	0	299
8:45	0	0	2	0	189	0	0	0	0	0	96	0	287
Total	0	0	53	0	1892	1	0	0	0	0	844	0	2790
Approach%	-	-	100.0	-	99.9	0.1	-	-	-	-	100.0	-	
Total%	-	-	1.9	-	67.8	0.0	-	-	-	-	30.3	-	

AM Intersection Peak Hour: **07:15 to 08:15**

Volume	-	-	35	-	1,089	1	-	-	-	-	451	-	1,576
Approach%	-	-	100.0	-	99.9	0.1	-	-	-	-	100.0	-	
Total%	-	-	2.2	-	69.1	0.1	-	-	-	-	28.6	-	
PHF			0.80			0.88			#DIV/0!			0.75	0.88

PM	E Mission Villas Southbound			Avenue or Street Westbound			E Mission Villas Northbound			Avenue or Street Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	0	0	0	0	170	0	0	0	0	0	455	0	625
16:15	0	0	2	0	243	0	0	0	0	0	404	0	649
16:30	0	0	4	0	230	0	0	0	0	0	390	0	624
16:45	0	0	6	0	262	0	0	0	0	0	387	0	655
17:00	0	0	5	0	229	0	0	0	0	0	421	0	655
17:15	0	0	1	0	281	0	0	0	0	0	392	0	674
17:30	0	0	9	0	259	0	0	0	0	0	345	0	613
17:45	0	0	4	0	240	1	0	0	0	0	326	0	571
Total	0	0	31	0	1914	1	0	0	0	0	3120	0	5066
Approach%	-	-	100.0	-	99.9	0.1	-	-	-	-	100.0	-	
Total%	-	-	0.6	-	37.8	0.0	-	-	-	-	61.6	-	

PM Intersection Peak Hour: **16:30 to 17:30**

Volume	-	-	16	-	1,002	-	-	-	-	-	1,590	-	2,608
Approach%	-	-	100.0	-	100.0	-	-	-	-	-	100.0	-	
Total%	-	-	0.6	-	38.4	-	-	-	-	-	61.0	-	
PHF			0.67			0.89			#DIV/0!			0.94	0.97

Intersection Turning Movement - Bicycle & Pedestrian Count

LINSCOTT LAW & GREENSPAN engineers

Location:	#01	File Name:	ITM-19-037-01
Intersection:	East Mission Villas Road & East Mission Road	Project:	LLG Ref. 3-18-2928
Date of Count:	Wednesday, Aoril 3, 2019		San Marcos

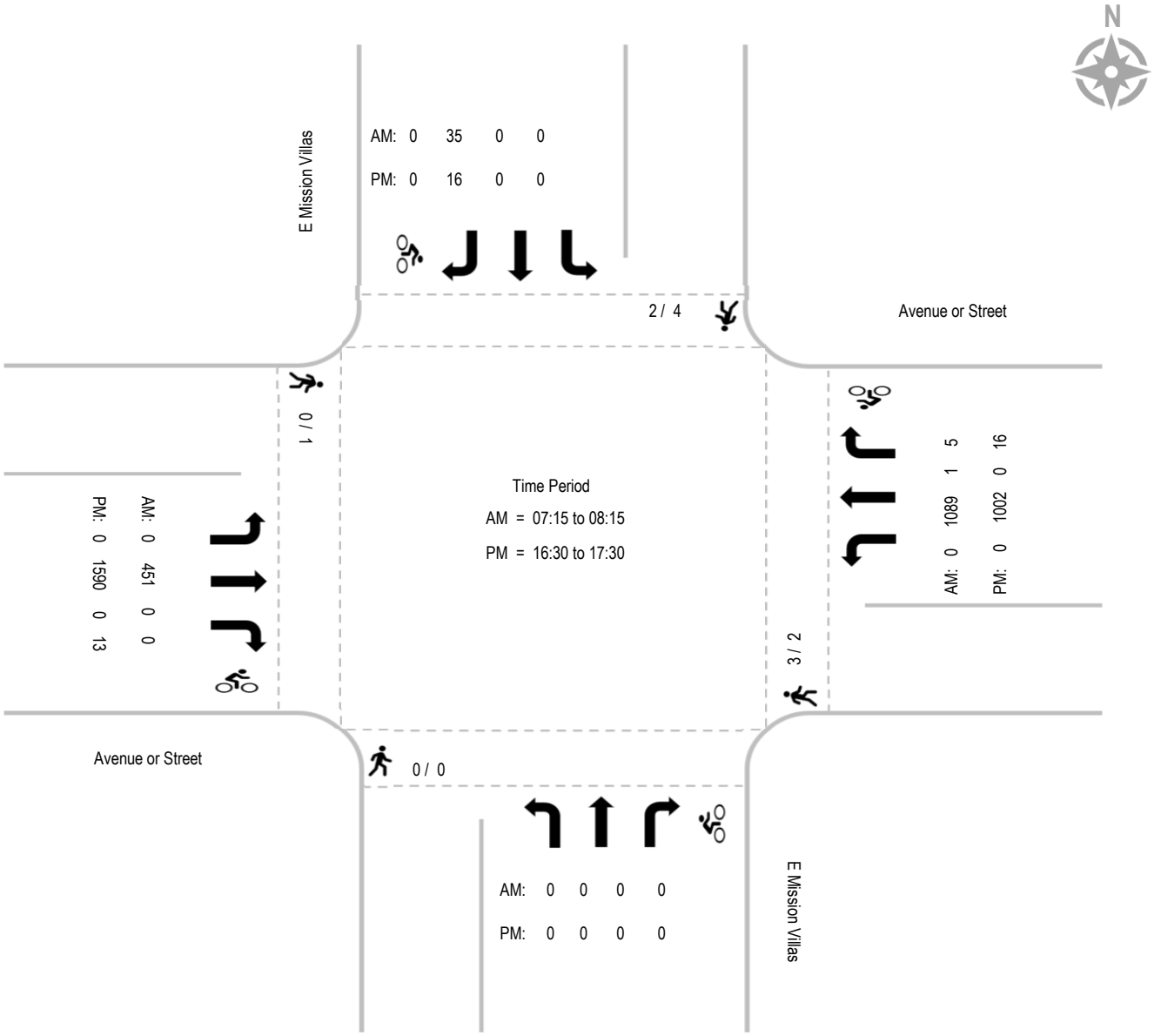
AM	E Mission Villas Southbound				Avenue or Street Westbound				E Mission Villas Northbound				Avenue or Street Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
7:30	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
7:45	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
8:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:15	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0
8:30	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:45	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Ped Total	2				3				0				0				5	
Bike Total		0	0	0		0	5	0		0	0	0		0	0	0		5

PM	E Mission Villas Southbound				Avenue or Street Westbound				E Mission Villas Northbound				Avenue or Street Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	4
16:15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
16:30	0	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	4
16:45	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	2	2
17:00	1	0	0	0	1	0	3	0	0	0	0	0	1	0	1	0	3	4
17:15	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	3
17:30	1	0	0	0	0	0	7	0	0	0	0	0	0	0	2	0	1	9
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
Ped Total	4				2				0				1				7	
Bike Total		0	0	0		0	16	0		0	0	0		0	13	0		29

Report Generated by Bearcat Enterprises LLC, DBA "Count Data" | 619-987-5136 | info@yourcountdata.com

Intersection Turning Movement - Peak Hour Summary

LINSCOTT LAW & GREENSPAN engineers	Location:	#01	File Name: ITM-19-037-01
	Intersection:	East Mission Villas Road & East Mission Road	Project: LLG Ref. 3-18-2928
	Date of Count:	Wednesday, Aoril 3, 2019	San Marcos



Prepared by NDS/ATD

VOLUME

Woodward St Bet. Mulberry Dr & Borden Rd

Day: Wednesday
Date: 6/13/2018

City: San Marcos
Project #: CA18_4220_001

DAILY TOTALS	NB	SB	EB	WB	Total
	1,499	1,556	0	0	3,055

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	0		4				4		12:00	19		20				39	
00:15	3		0				3		12:15	20		16				36	
00:30	2		1				3		12:30	23		21				44	
00:45	2	7	1	6			3	13	12:45	32	94	23	80			55	174
01:00	5		2				7		13:00	27		24				51	
01:15	1		0				1		13:15	20		24				44	
01:30	2		0				2		13:30	17		24				41	
01:45	0	8	2	4			2	12	13:45	31	95	19	91			50	186
02:00	1		2				3		14:00	26		23				49	
02:15	1		0				1		14:15	26		47				73	
02:30	0		0				0		14:30	28		26				54	
02:45	0	2	0	2			0	4	14:45	23	103	24	120			47	223
03:00	2		0				2		15:00	21		16				37	
03:15	1		0				1		15:15	23		18				41	
03:30	1		1				2		15:30	29		25				54	
03:45	1	5	2	3			3	8	15:45	30	103	23	82			53	185
04:00	0		1				1		16:00	28		19				47	
04:15	0		1				1		16:15	34		22				56	
04:30	1		6				7		16:30	30		30				60	
04:45	0	1	7	15			7	16	16:45	31	123	18	89			49	212
05:00	1		8				9		17:00	39		19				58	
05:15	4		9				13		17:15	30		29				59	
05:30	1		14				15		17:30	52		15				67	
05:45	5	11	16	47			21	58	17:45	33	154	23	86			56	240
06:00	5		19				24		18:00	41		16				57	
06:15	4		20				24		18:15	31		18				49	
06:30	6		16				22		18:30	33		19				52	
06:45	7	22	28	83			35	105	18:45	28	133	26	79			54	212
07:00	13		33				46		19:00	25		18				43	
07:15	14		40				54		19:15	32		23				55	
07:30	12		42				54		19:30	29		15				44	
07:45	17	56	51	166			68	222	19:45	31	117	16	72			47	189
08:00	19		42				61		20:00	23		15				38	
08:15	25		39				64		20:15	23		11				34	
08:30	20		33				53		20:30	16		12				28	
08:45	18	82	39	153			57	235	20:45	12	74	9	47			21	121
09:00	20		29				49		21:00	11		9				20	
09:15	10		20				30		21:15	16		12				28	
09:30	16		24				40		21:30	17		6				23	
09:45	19	65	22	95			41	160	21:45	17	61	4	31			21	92
10:00	14		25				39		22:00	10		5				15	
10:15	15		30				45		22:15	11		3				14	
10:30	18		25				43		22:30	7		2				9	
10:45	14	61	23	103			37	164	22:45	5	33	2	12			7	45
11:00	21		17				38		23:00	8		2				10	
11:15	18		17				35		23:15	4		1				5	
11:30	15		24				39		23:30	3		3				6	
11:45	16	70	25	83			41	153	23:45	4	19	1	7			5	26
TOTALS		390		760				1150	TOTALS		1109		796				1905
SPLIT %		33.9%		66.1%				37.6%	SPLIT %		58.2%		41.8%				62.4%

DAILY TOTALS	NB	SB	EB	WB	Total
	1,499	1,556	0	0	3,055

AM Peak Hour	08:15	07:15				07:30	PM Peak Hour	17:30	14:00				17:00
AM Pk Volume	83	175				247	PM Pk Volume	157	120				240
Pk Hr Factor	0.830	0.858				0.908	Pk Hr Factor	0.755	0.638				0.896
7 - 9 Volume	138	319	0	0		457	4 - 6 Volume	277	175	0	0		452
7 - 9 Peak Hour	08:00	07:15				07:30	4 - 6 Peak Hour	17:00	16:30				17:00
7 - 9 Pk Volume	82	175	0	0		247	4 - 6 Pk Volume	154	96	0	0		240
Pk Hr Factor	0.820	0.858	0.000	0.000		0.908	Pk Hr Factor	0.740	0.800	0.000	0.000		0.896

Prepared by NDS/ATD

VOLUME

Vineyard Rd Bet. Borden Rd & Woodward St

Day: Wednesday
Date: 6/13/2018

City: San Marcos
Project #: CA18_4220_002

DAILY TOTALS	NB	SB	EB	WB	Total
	1,970	1,616	0	0	3,586

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	5		1				6		12:00	29		21				50	
00:15	5		2				7		12:15	29		15				44	
00:30	1		1				2		12:30	26		21				47	
00:45	2	13	0	4			2	17	12:45	29	113	23	80			52	193
01:00	2		2				4		13:00	37		16				53	
01:15	4		0				4		13:15	28		13				41	
01:30	2		0				2		13:30	32		26				58	
01:45	1	9	1	3			2	12	13:45	36	133	21	76			57	209
02:00	1		3				4		14:00	37		18				55	
02:15	0		0				0		14:15	36		33				69	
02:30	2		2				4		14:30	38		29				67	
02:45	0	3	0	5			0	8	14:45	41	152	22	102			63	254
03:00	1		1				2		15:00	41		21				62	
03:15	1		1				2		15:15	35		27				62	
03:30	1		2				3		15:30	41		18				59	
03:45	0	3	1	5			1	8	15:45	41	158	32	98			73	256
04:00	1		4				5		16:00	32		26				58	
04:15	1		10				11		16:15	50		23				73	
04:30	2		2				4		16:30	42		29				71	
04:45	3	7	0	16			3	23	16:45	40	164	30	108			70	272
05:00	3		4				7		17:00	52		34				86	
05:15	4		10				14		17:15	54		35				89	
05:30	6		6				12		17:30	50		25				75	
05:45	2	15	13	33			15	48	17:45	48	204	27	121			75	325
06:00	6		15				21		18:00	43		19				62	
06:15	7		8				15		18:15	38		29				67	
06:30	10		27				37		18:30	48		21				69	
06:45	11	34	35	85			46	119	18:45	34	163	27	96			61	259
07:00	24		28				52		19:00	24		27				51	
07:15	19		46				65		19:15	34		18				52	
07:30	26		59				85		19:30	26		21				47	
07:45	22	91	62	195			84	286	19:45	38	122	21	87			59	209
08:00	19		47				66		20:00	31		11				42	
08:15	8		44				52		20:15	28		16				44	
08:30	27		32				59		20:30	36		14				50	
08:45	19	73	29	152			48	225	20:45	37	132	9	50			46	182
09:00	13		35				48		21:00	16		10				26	
09:15	15		24				39		21:15	27		6				33	
09:30	17		24				41		21:30	16		7				23	
09:45	12	57	26	109			38	166	21:45	19	78	4	27			23	105
10:00	10		19				29		22:00	22		5				27	
10:15	15		12				27		22:15	21		5				26	
10:30	13		15				28		22:30	9		2				11	
10:45	24	62	18	64			42	126	22:45	15	67	3	15			18	82
11:00	23		27				50		23:00	8		3				11	
11:15	22		18				40		23:15	9		2				11	
11:30	25		19				44		23:30	6		2				8	
11:45	20	90	13	77			33	167	23:45	4	27	1	8			5	35
TOTALS		457		748				1205	TOTALS		1513		868				2381
SPLIT %		37.9%		62.1%				33.6%	SPLIT %		63.5%		36.5%				66.4%

DAILY TOTALS	NB	SB	EB	WB	Total
	1,970	1,616	0	0	3,586

AM Peak Hour	11:45	07:15					07:15		PM Peak Hour	17:00	16:30					17:00		
AM Pk Volume	104	214					300		PM Pk Volume	204	128					325		
Pk Hr Factor	0.897	0.863					0.882		Pk Hr Factor	0.944	0.914					0.913		
7 - 9 Volume	164	347	0	0			511		4 - 6 Volume	368	229	0	0			597		
7 - 9 Peak Hour	07:00	07:15					07:15		4 - 6 Peak Hour	17:00	16:30					17:00		
7 - 9 Pk Volume	91	214	0	0			300		4 - 6 Pk Volume	204	128	0	0			325		
Pk Hr Factor	0.875	0.863	0.000	0.000			0.882		Pk Hr Factor	0.944	0.914	0.000	0.000			0.913		

Prepared by NDS/ATD

VOLUME

Woodward St Bet. Vineyard Rd & Mission Rd

Day: Wednesday
Date: 6/13/2018

City: San Marcos
Project #: CA18_4220_003

DAILY TOTALS	NB	SB	EB	WB	Total
	4,111	3,807	0	0	7,918

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	11		3				14		12:00	51		47				98	
00:15	9		0				9		12:15	57		45				102	
00:30	5		2				7		12:30	86		58				144	
00:45	8	33	1	6			9	39	12:45	108	302	53	203			161	505
01:00	3		2				5		13:00	77		59				136	
01:15	8		1				9		13:15	57		48				105	
01:30	5		3				8		13:30	65		52				117	
01:45	1	17	2	8			3	25	13:45	60	259	41	200			101	459
02:00	1		2				3		14:00	65		44				109	
02:15	0		4				4		14:15	65		61				126	
02:30	2		1				3		14:30	58		41				99	
02:45	0	3	2	9			2	12	14:45	76	264	67	213			143	477
03:00	2		0				2		15:00	83		48				131	
03:15	3		3				6		15:15	68		39				107	
03:30	2		4				6		15:30	71		55				126	
03:45	0	7	4	11			4	18	15:45	92	314	51	193			143	507
04:00	3		9				12		16:00	108		37				145	
04:15	0		8				8		16:15	90		50				140	
04:30	2		15				17		16:30	93		59				152	
04:45	2	7	21	53			23	60	16:45	97	388	45	191			142	579
05:00	5		24				29		17:00	96		65				161	
05:15	5		20				25		17:15	105		61				166	
05:30	5		41				46		17:30	87		53				140	
05:45	4	19	45	130			49	149	17:45	107	395	56	235			163	630
06:00	14		32				46		18:00	110		59				169	
06:15	16		49				65		18:15	84		47				131	
06:30	20		72				92		18:30	70		53				123	
06:45	19	69	63	216			82	285	18:45	83	347	48	207			131	554
07:00	32		72				104		19:00	79		48				127	
07:15	21		129				150		19:15	82		42				124	
07:30	37		144				181		19:30	70		37				107	
07:45	58	148	132	477			190	625	19:45	60	291	26	153			86	444
08:00	51		114				165		20:00	52		30				82	
08:15	36		107				143		20:15	68		29				97	
08:30	50		75				125		20:30	70		36				106	
08:45	29	166	87	383			116	549	20:45	48	238	37	132			85	370
09:00	33		55				88		21:00	51		28				79	
09:15	32		56				88		21:15	63		17				80	
09:30	35		57				92		21:30	47		24				71	
09:45	31	131	57	225			88	356	21:45	44	205	16	85			60	290
10:00	26		54				80		22:00	32		15				47	
10:15	41		48				89		22:15	34		16				50	
10:30	22		54				76		22:30	22		10				32	
10:45	45	134	45	201			90	335	22:45	26	114	9	50			35	164
11:00	46		41				87		23:00	18		5				23	
11:15	50		52				102		23:15	21		7				28	
11:30	51		53				104		23:30	18		3				21	
11:45	45	192	63	209			108	401	23:45	11	68	2	17			13	85
TOTALS		926		1928				**2854**	**TOTALS**		3185		1879				**5064**
SPLIT %		32.4%		67.6%				**36.0%**	**SPLIT %**		62.9%		37.1%				**64.0%**

DAILY TOTALS	NB	SB	EB	WB	Total
	4,111	3,807	0	0	7,918

AM Peak Hour	11:45	07:15				**07:15**	**PM Peak Hour**	17:15	17:00				**17:15**
AM Pk Volume	239	519				**686**	**PM Pk Volume**	409	235				**638**
Pk Hr Factor	0.695	0.901				**0.903**	**Pk Hr Factor**	0.930	0.904				**0.944**
7 - 9 Volume	314	860	0	0		**1174**	**4 - 6 Volume**	783	426	0	0		**1209**
7 - 9 Peak Hour	07:45	07:15				**07:15**	**4 - 6 Peak Hour**	17:00	17:00				**17:00**
7 - 9 Pk Volume	195	519	0	0		**686**	**4 - 6 Pk Volume**	395	235	0	0		**630**
Pk Hr Factor	0.841	0.901	0.000	0.000		**0.903**	**Pk Hr Factor**	0.923	0.904	0.000	0.000		**0.949**

Prepared by NDS/ATD

VOLUME

Mission Rd Bet. Firebird Lane & Woodward St

Day: Wednesday
Date: 6/13/2018

City: San Marcos
Project #: CA18_4220_004

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	7,605	7,460	15,065

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			5		5		10		12:00			85		91		176	
00:15			6		4		10		12:15			123		70		193	
00:30			6		2		8		12:30			136		149		285	
00:45			3	20	4	15	7	35	12:45			114	458	204	514	318	972
01:00			7		1		8		13:00			95		108		203	
01:15			1		3		4		13:15			75		87		162	
01:30			1		2		3		13:30			93		82		175	
01:45			1	10	4	10	5	20	13:45			112	375	79	356	191	731
02:00			4		4		8		14:00			102		66		168	
02:15			2		2		4		14:15			125		110		235	
02:30			1		1		2		14:30			198		110		308	
02:45			4	11	2	9	6	20	14:45			216	641	137	423	353	1064
03:00			2		2		4		15:00			220		195		415	
03:15			2		3		5		15:15			259		176		435	
03:30			2		3		5		15:30			244		152		396	
03:45			6	12	5	13	11	25	15:45			261	984	140	663	401	1647
04:00			1		7		8		16:00			225		119		344	
04:15			3		9		12		16:15			255		130		385	
04:30			2		12		14		16:30			240		151		391	
04:45			8	14	18	46	26	60	16:45			269	989	166	566	435	1555
05:00			12		12		24		17:00			263		200		463	
05:15			14		19		33		17:15			257		196		453	
05:30			27		31		58		17:30			270		191		461	
05:45			26	79	39	101	65	180	17:45			206	996	212	799	418	1795
06:00			18		40		58		18:00			191		169		360	
06:15			29		55		84		18:15			150		128		278	
06:30			54		88		142		18:30			111		106		217	
06:45			59	160	105	288	164	448	18:45			94	546	85	488	179	1034
07:00			92		116		208		19:00			70		77		147	
07:15			122		166		288		19:15			75		59		134	
07:30			162		187		349		19:30			71		62		133	
07:45			146	522	266	735	412	1257	19:45			49	265	50	248	99	513
08:00			75		210		285		20:00			52		52		104	
08:15			63		155		218		20:15			66		48		114	
08:30			64		129		193		20:30			59		40		99	
08:45			56	258	115	609	171	867	20:45			46	223	33	173	79	396
09:00			57		127		184		21:00			55		35		90	
09:15			66		99		165		21:15			44		44		88	
09:30			46		116		162		21:30			39		38		77	
09:45			60	229	101	443	161	672	21:45			28	166	31	148	59	314
10:00			56		83		139		22:00			22		25		47	
10:15			76		76		152		22:15			26		19		45	
10:30			59		87		146		22:30			16		16		32	
10:45			55	246	82	328	137	574	22:45			13	77	15	75	28	152
11:00			67		91		158		23:00			15		11		26	
11:15			58		94		152		23:15			8		10		18	
11:30			66		86		152		23:30			11		8		19	
11:45			93	284	101	372	194	656	23:45			6	40	9	38	15	78
TOTALS				1845		2969		4814	TOTALS				5760		4491		10251
SPLIT %				38.3%		61.7%		32.0%	SPLIT %				56.2%		43.8%		68.0%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	7,605	7,460	15,065

AM Peak Hour			07:00	07:15	07:15	PM Peak Hour			16:45	17:00	16:45
AM Pk Volume			522	829	1334	PM Pk Volume			1059	799	1812
Pk Hr Factor			0.806	0.779	0.809	Pk Hr Factor			0.981	0.942	0.978
7 - 9 Volume	0	0	780	1344	2124	4 - 6 Volume	0	0	1985	1365	3350
7 - 9 Peak Hour			07:00	07:15	07:15	4 - 6 Peak Hour			16:45	17:00	16:45
7 - 9 Pk Volume	0	0	522	829	1334	4 - 6 Pk Volume	0	0	1059	799	1812
Pk Hr Factor	0.000	0.000	0.806	0.779	0.809	Pk Hr Factor	0.000	0.000	0.981	0.942	0.978

Prepared by NDS/ATD

VOLUME

Mission Rd Bet. Woodward St & Mulberry Dr

Day: Wednesday
Date: 6/13/2018

City: San Marcos
Project #: CA18_4220_005

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	12,501	11,032	23,533

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			8		6		14		12:00			159		129		288	
00:15			13		5		18		12:15			133		143		276	
00:30			11		1		12		12:30			142		171		313	
00:45			8	40	9	21	17	61	12:45			166	600	179	622	345	1222
01:00			8		3		11		13:00			153		143		296	
01:15			8		9		17		13:15			139		131		270	
01:30			6		7		13		13:30			152		123		275	
01:45			4	26	6	25	10	51	13:45			176	620	128	525	304	1145
02:00			7		0		7		14:00			174		137		311	
02:15			3		4		7		14:15			234		161		395	
02:30			4		4		8		14:30			301		170		471	
02:45			10	24	4	12	14	36	14:45			342	1051	182	650	524	1701
03:00			1		6		7		15:00			351		272		623	
03:15			4		3		7		15:15			325		289		614	
03:30			3		9		12		15:30			342		224		566	
03:45			10	18	7	25	17	43	15:45			343	1361	193	978	536	2339
04:00			5		16		21		16:00			340		176		516	
04:15			2		11		13		16:15			370		168		538	
04:30			6		18		24		16:30			355		229		584	
04:45			14	27	27	72	41	99	16:45			397	1462	222	795	619	2257
05:00			15		27		42		17:00			381		254		635	
05:15			21		46		67		17:15			382		251		633	
05:30			33		63		96		17:30			366		235		601	
05:45			64	133	72	208	136	341	17:45			331	1460	280	1020	611	2480
06:00			78		84		162		18:00			304		242		546	
06:15			67		99		166		18:15			281		223		504	
06:30			88		159		247		18:30			202		191		393	
06:45			132	365	175	517	307	882	18:45			169	956	152	808	321	1764
07:00			153		191		344		19:00			145		123		268	
07:15			219		260		479		19:15			138		92		230	
07:30			341		330		671		19:30			118		77		195	
07:45			261	974	478	1259	739	2233	19:45			119	520	68	360	187	880
08:00			111		340		451		20:00			107		87		194	
08:15			139		243		382		20:15			98		64		162	
08:30			125		199		324		20:30			101		60		161	
08:45			122	497	164	946	286	1443	20:45			96	402	53	264	149	666
09:00			90		162		252		21:00			82		62		144	
09:15			114		147		261		21:15			73		55		128	
09:30			89		129		218		21:30			59		56		115	
09:45			105	398	144	582	249	980	21:45			70	284	36	209	106	493
10:00			92		130		222		22:00			46		39		85	
10:15			147		118		265		22:15			41		30		71	
10:30			110		122		232		22:30			36		23		59	
10:45			116	465	117	487	233	952	22:45			23	146	31	123	54	269
11:00			122		111		233		23:00			32		12		44	
11:15			171		101		272		23:15			19		13		32	
11:30			153		135		288		23:30			19		14		33	
11:45			140	586	128	475	268	1061	23:45			16	86	10	49	26	135
TOTALS				3553		4629		8182	TOTALS				8948		6403		15351
SPLIT %				43.4%		56.6%		34.8%	SPLIT %				58.3%		41.7%		65.2%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	12,501	11,032	23,533

AM Peak Hour			07:00	07:15	07:15	PM Peak Hour			16:45	17:00	16:45
AM Pk Volume			974	1408	2340	PM Pk Volume			1526	1020	2488
Pk Hr Factor			0.714	0.736	0.792	Pk Hr Factor			0.961	0.911	0.980
7 - 9 Volume	0	0	1471	2205	3676	4 - 6 Volume	0	0	2922	1815	4737
7 - 9 Peak Hour			07:00	07:15	07:15	4 - 6 Peak Hour			16:45	17:00	16:45
7 - 9 Pk Volume	0	0	974	1408	2340	4 - 6 Pk Volume	0	0	1526	1020	2488
Pk Hr Factor	0.000	0.000	0.714	0.736	0.792	Pk Hr Factor	0.000	0.000	0.961	0.911	0.980

Prepared by NDS/ATD

VOLUME

San Marcos Blvd Bet. Twin Oaks Valley Rd & Mission Rd

Day: Wednesday
Date: 6/13/2018

City: San Marcos
Project #: CA18_4220_006

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	9,558	7,226	16,784

AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00			14	5	19	12:00			155	94	249
00:15			17	3	20	12:15			149	79	228
00:30			7	4	11	12:30			142	117	259
00:45			8	5	13	12:45			152	187	339
			46	17	63				598	477	1075
01:00			4	2	6	13:00			149	117	266
01:15			7	1	8	13:15			128	130	258
01:30			4	2	6	13:30			131	91	222
01:45			5	2	7	13:45			151	110	261
			20	7	27				559	448	1007
02:00			6	2	8	14:00			170	93	263
02:15			2	4	6	14:15			182	91	273
02:30			5	3	8	14:30			175	113	288
02:45			8	3	11	14:45			176	101	277
			21	12	33				703	398	1101
03:00			2	1	3	15:00			184	87	271
03:15			1	1	2	15:15			198	113	311
03:30			3	12	15	15:30			225	123	348
03:45			4	6	10	15:45			216	128	344
			10	20	30				823	451	1274
04:00			5	12	17	16:00			225	120	345
04:15			4	10	14	16:15			212	126	338
04:30			5	7	12	16:30			227	129	356
04:45			13	26	39	16:45			213	109	322
			27	55	82				877	484	1361
05:00			10	18	28	17:00			269	133	402
05:15			13	33	46	17:15			251	125	376
05:30			25	54	79	17:30			239	114	353
05:45			47	54	101	17:45			213	135	348
			95	159	254				972	507	1479
06:00			52	55	107	18:00			242	111	353
06:15			44	67	111	18:15			212	106	318
06:30			57	73	130	18:30			175	75	250
06:45			68	118	186	18:45			147	90	237
			221	313	534				776	382	1158
07:00			76	140	216	19:00			140	77	217
07:15			139	188	327	19:15			140	87	227
07:30			133	221	354	19:30			151	73	224
07:45			122	291	413	19:45			109	79	188
			470	840	1310				540	316	856
08:00			96	224	320	20:00			123	50	173
08:15			97	188	285	20:15			121	53	174
08:30			104	146	250	20:30			106	51	157
08:45			117	146	263	20:45			84	44	128
			414	704	1118				434	198	632
09:00			111	101	212	21:00			108	46	154
09:15			75	105	180	21:15			90	54	144
09:30			82	81	163	21:30			71	33	104
09:45			104	129	233	21:45			65	26	91
			372	416	788				334	159	493
10:00			89	77	166	22:00			48	27	75
10:15			106	105	211	22:15			71	16	87
10:30			100	88	188	22:30			44	16	60
10:45			97	104	201	22:45			52	10	62
			392	374	766				215	69	284
11:00			143	91	234	23:00			36	10	46
11:15			118	95	213	23:15			38	12	50
11:30			108	94	202	23:30			31	10	41
11:45			141	101	242	23:45			24	7	31
			510	381	891				129	39	168
TOTALS			2598	3298	5896	TOTALS			6960	3928	10888
SPLIT %			44.1%	55.9%	35.1%	SPLIT %			63.9%	36.1%	64.9%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	9,558	7,226	16,784

AM Peak Hour			11:45	07:15	07:15	PM Peak Hour			16:45	12:30	17:00
AM Pk Volume			587	924	1414	PM Pk Volume			972	551	1479
Pk Hr Factor			0.947	0.794	0.856	Pk Hr Factor			0.903	0.737	0.920
7 - 9 Volume	0	0	884	1544	2428	4 - 6 Volume	0	0	1849	991	2840
7 - 9 Peak Hour			07:15	07:15	07:15	4 - 6 Peak Hour			16:45	17:00	17:00
7 - 9 Pk Volume	0	0	490	924	1414	4 - 6 Pk Volume	0	0	972	507	1479
Pk Hr Factor	0.000	0.000	0.881	0.794	0.856	Pk Hr Factor	0.000	0.000	0.903	0.939	0.920

Prepared by NDS/ATD

VOLUME

Twin Oaks Valley Rd Bet. San Marcos Blvd & SR-78 WB Ramps

Day: Wednesday
Date: 6/13/2018

City: San Marcos
Project #: CA18_4220_007

DAILY TOTALS	NB	SB	EB	WB	Total
	18,360	17,692	0	0	36,052

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	37		17				54		12:00	268		246				514	
00:15	25		4				29		12:15	322		231				553	
00:30	12		10				22		12:30	353		264				617	
00:45	22	96	8	39			30	135	12:45	375	1318	273	1014			648	2332
01:00	18		4				22		13:00	407		314				721	
01:15	13		12				25		13:15	413		305				718	
01:30	6		6				12		13:30	385		326				711	
01:45	10	47	9	31			19	78	13:45	420	1625	249	1194			669	2819
02:00	9		10				19		14:00	383		217				600	
02:15	9		7				16		14:15	306		324				630	
02:30	3		6				9		14:30	402		300				702	
02:45	7	28	10	33			17	61	14:45	382	1473	268	1109			650	2582
03:00	10		13				23		15:00	354		257				611	
03:15	8		13				21		15:15	380		266				646	
03:30	11		21				32		15:30	312		382				694	
03:45	10	39	14	61			24	100	15:45	332	1378	282	1187			614	2565
04:00	7		8				15		16:00	277		314				591	
04:15	20		15				35		16:15	316		323				639	
04:30	24		41				65		16:30	356		334				690	
04:45	36	87	59	123			95	210	16:45	350	1299	291	1262			641	2561
05:00	33		39				72		17:00	328		335				663	
05:15	52		78				130		17:15	346		317				663	
05:30	72		111				183		17:30	311		286				597	
05:45	97	254	149	377			246	631	17:45	313	1298	274	1212			587	2510
06:00	95		215				310		18:00	313		275				588	
06:15	132		306				438		18:15	316		192				508	
06:30	155		329				484		18:30	300		249				549	
06:45	175	557	308	1158			483	1715	18:45	278	1207	183	899			461	2106
07:00	175		281				456		19:00	242		225				467	
07:15	242		310				552		19:15	227		188				415	
07:30	299		344				643		19:30	188		190				378	
07:45	293	1009	361	1296			654	2305	19:45	166	823	194	797			360	1620
08:00	271		355				626		20:00	130		199				329	
08:15	305		340				645		20:15	154		142				296	
08:30	250		315				565		20:30	149		132				281	
08:45	293	1119	302	1312			595	2431	20:45	118	551	138	611			256	1162
09:00	232		255				487		21:00	136		149				285	
09:15	229		215				444		21:15	118		93				211	
09:30	209		242				451		21:30	121		105				226	
09:45	228	898	233	945			461	1843	21:45	100	475	105	452			205	927
10:00	201		263				464		22:00	83		121				204	
10:15	265		234				499		22:15	110		88				198	
10:30	202		291				493		22:30	76		59				135	
10:45	252	920	273	1061			525	1981	22:45	70	339	41	309			111	648
11:00	331		295				626		23:00	65		34				99	
11:15	346		262				608		23:15	47		29				76	
11:30	375		258				633		23:30	42		22				64	
11:45	276	1328	297	1112			573	2440	23:45	38	192	13	98			51	290
TOTALS		6382		7548				13930	TOTALS		11978		10144				22122
SPLIT %		45.8%		54.2%				38.6%	SPLIT %		54.1%		45.9%				61.4%

DAILY TOTALS	NB	SB	EB	WB	Total
	18,360	17,692	0	0	36,052

AM Peak Hour	11:00	07:30						07:30	PM Peak Hour	13:00	15:30							13:00
AM Pk Volume	1328	1400						2568	PM Pk Volume	1625	1301							2819
Pk Hr Factor	0.885	0.970						0.982	Pk Hr Factor	0.967	0.851							0.977
7 - 9 Volume	2128	2608	0	0				4736	4 - 6 Volume	2597	2474	0	0					5071
7 - 9 Peak Hour	07:30	07:30						07:30	4 - 6 Peak Hour	16:30	16:15							16:30
7 - 9 Pk Volume	1168	1400	0	0				2568	4 - 6 Pk Volume	1380	1283	0	0					2657
Pk Hr Factor	0.957	0.970	0.000	0.000				0.982	Pk Hr Factor	0.969	0.957	0.000	0.000					0.963

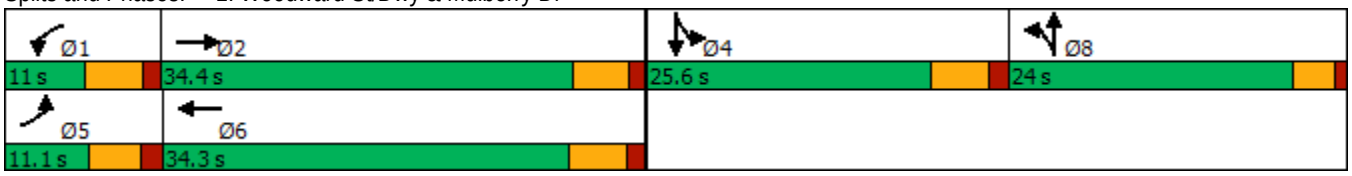
APPENDIX B

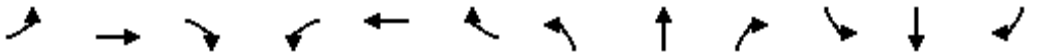
PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS – EXISTING

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	228	24	185	57	0		
Future Volume (vph)	228	24	185	57	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	25.1	6.4	25.9	9.8	9.8		
Actuated g/C Ratio	0.57	0.14	0.58	0.22	0.22		
v/c Ratio	0.30	0.11	0.19	0.17	0.05		
Control Delay	13.0	26.1	10.0	19.3	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.0	26.1	10.0	19.3	0.1		
LOS	B	C	B	B	A		
Approach Delay	13.0		11.9		11.1		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 44.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.30	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 33.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	228	41	24	185	0	57	0	43	0	0	0
Future Volume (veh/h)	0	228	41	24	185	0	57	0	43	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	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	0	259	47	27	210	0	65	0	49	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	6	435	79	60	950	0	262	0	234	0	7	0
Arrive On Green	0.00	0.28	0.28	0.03	0.51	0.00	0.15	0.00	0.15	0.00	0.00	0.00
Sat Flow, veh/h	1781	1535	278	1781	1870	0	1778	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	306	27	210	0	65	0	49	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1813	1781	1870	0	1778	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	4.0	0.4	1.7	0.0	0.9	0.0	0.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	4.0	0.4	1.7	0.0	0.9	0.0	0.8	0.0	0.0	0.0
Prop In Lane	1.00		0.15	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	6	0	514	60	950	0	262	0	234	0	7	0
V/C Ratio(X)	0.00	0.00	0.60	0.45	0.22	0.00	0.25	0.00	0.21	0.00	0.00	0.00
Avail Cap(c_a), veh/h	384	0	1895	365	1928	0	1277	0	1139	0	1344	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.6	13.2	3.8	0.0	10.5	0.0	10.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.1	1.9	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	1.1	0.2	0.3	0.0	0.3	0.0	0.2	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	9.7	15.1	3.9	0.0	10.7	0.0	10.6	0.0	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		306			237			114			0	
Approach Delay, s/veh		9.7			5.2			10.7			0.0	
Approach LOS		A			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.2	13.5		0.0	0.0	19.7		8.1				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.4	6.0		0.0	0.0	3.7		2.9				
Green Ext Time (p_c), s	0.0	1.8		0.0	0.0	1.2		0.2				

Intersection Summary		
HCM 6th Ctrl Delay		8.2
HCM 6th LOS		A

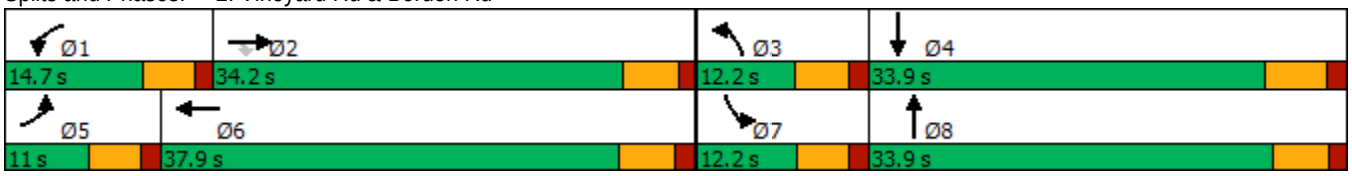
Notes

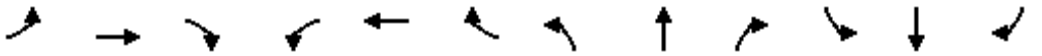
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	23	331	5	106	543	13	29	45	108
Future Volume (vph)	23	331	5	106	543	13	29	45	108
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	6.3	28.2	28.2	8.7	35.3	7.3	11.2	6.6	15.5
Actuated g/C Ratio	0.09	0.41	0.41	0.13	0.52	0.11	0.16	0.10	0.23
v/c Ratio	0.17	0.50	0.01	0.54	0.68	0.08	0.31	0.30	0.41
Control Delay	38.1	22.2	0.0	42.2	22.6	36.3	14.9	39.1	23.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	22.2	0.0	42.2	22.6	36.3	14.9	39.1	23.0
LOS	D	C	A	D	C	D	B	D	C
Approach Delay		22.9			25.7		17.7		26.7
Approach LOS		C			C		B		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 68.1	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 24.5	Intersection LOS: C
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	331	5	106	543	22	13	29	56	45	108	40
Future Volume (veh/h)	23	331	5	106	543	22	13	29	56	45	108	40
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		0.94	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	27	385	6	123	631	26	15	34	65	52	126	47
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, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	65	654	552	185	741	31	46	66	126	104	195	73
Arrive On Green	0.04	0.35	0.35	0.10	0.42	0.42	0.03	0.12	0.12	0.06	0.15	0.15
Sat Flow, veh/h	1781	1870	1578	1781	1783	73	1781	549	1050	1781	1290	481
Grp Volume(v), veh/h	27	385	6	123	0	657	15	0	99	52	0	173
Grp Sat Flow(s),veh/h/ln	1781	1870	1578	1781	0	1857	1781	0	1599	1781	0	1771
Q Serve(g_s), s	0.9	9.8	0.1	3.9	0.0	18.6	0.5	0.0	3.4	1.6	0.0	5.3
Cycle Q Clear(g_c), s	0.9	9.8	0.1	3.9	0.0	18.6	0.5	0.0	3.4	1.6	0.0	5.3
Prop In Lane	1.00		1.00	1.00		0.04	1.00		0.66	1.00		0.27
Lane Grp Cap(c), veh/h	65	654	552	185	0	771	46	0	192	104	0	267
V/C Ratio(X)	0.42	0.59	0.01	0.66	0.00	0.85	0.33	0.00	0.52	0.50	0.00	0.65
Avail Cap(c_a), veh/h	184	932	787	300	0	1034	214	0	783	217	0	853
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.4	15.5	12.3	25.1	0.0	15.4	27.8	0.0	24.0	26.6	0.0	23.2
Incr Delay (d2), s/veh	1.6	0.8	0.0	1.5	0.0	5.3	1.5	0.0	2.1	1.4	0.0	2.6
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	0.4	3.9	0.0	1.6	0.0	7.8	0.2	0.0	1.3	0.7	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.0	16.3	12.4	26.6	0.0	20.7	29.3	0.0	26.2	27.9	0.0	25.9
LnGrp LOS	C	B	B	C	A	C	C	A	C	C	A	C
Approach Vol, veh/h		418			780			114			225	
Approach Delay, s/veh		17.1			21.6			26.6			26.3	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	25.8	6.7	14.7	7.1	29.7	8.5	12.9
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	5.9	11.8	2.5	7.3	2.9	20.6	3.6	5.4
Green Ext Time (p_c), s	0.0	2.2	0.0	0.9	0.0	3.5	0.0	0.5

Intersection Summary	
HCM 6th Ctrl Delay	21.5
HCM 6th LOS	C

Notes

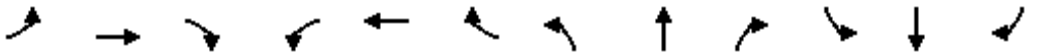
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	18	442	34	565	773	104	24	52	398	96	369
Future Volume (vph)	18	442	34	565	773	104	24	52	398	96	369
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	41.7	63.0	63.0	9.0	33.0	33.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	34.8%	52.5%	52.5%	7.5%	27.5%	27.5%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	4.9	23.2	23.2	49.1	70.9	70.9	4.9	18.9	18.9	10.3	27.7
Actuated g/C Ratio	0.04	0.19	0.19	0.41	0.59	0.59	0.04	0.16	0.16	0.09	0.23
v/c Ratio	0.31	0.79	0.12	0.61	0.45	0.14	0.50	0.14	0.80	0.77	0.81
Control Delay	67.1	55.0	0.7	33.5	16.9	3.0	78.0	58.2	31.1	85.2	52.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.1	55.0	0.7	33.5	16.9	3.0	78.0	58.2	31.1	85.2	52.3
LOS	E	E	A	C	B	A	E	E	C	F	D
Approach Delay		51.8			22.4			36.4			58.3
Approach LOS		D			C			D			E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 36.1	Intersection LOS: D
Intersection Capacity Utilization 70.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	442	34	565	773	104	24	52	398	96	369	63
Future Volume (veh/h)	18	442	34	565	773	104	24	52	398	96	369	63
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	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	1870	1870	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	22	539	41	689	943	127	29	63	0	117	450	77
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	27	1163	405	740	2099	914	33	453		142	524	89
Arrive On Green	0.02	0.33	0.33	0.27	0.59	0.59	0.02	0.16	0.00	0.08	0.22	0.22
Sat Flow, veh/h	1781	3554	1237	2765	3554	1547	1425	2843	1268	1781	2421	411
Grp Volume(v), veh/h	22	539	41	689	943	127	29	63	0	117	263	264
Grp Sat Flow(s),veh/h/ln	1781	1777	1237	1382	1777	1547	1425	1421	1268	1781	1421	1411
Q Serve(g_s), s	1.5	14.4	2.4	29.2	17.7	4.4	2.4	2.3	0.0	7.8	21.3	21.7
Cycle Q Clear(g_c), s	1.5	14.4	2.4	29.2	17.7	4.4	2.4	2.3	0.0	7.8	21.3	21.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.29
Lane Grp Cap(c), veh/h	27	1163	405	740	2099	914	33	453		142	307	305
V/C Ratio(X)	0.82	0.46	0.10	0.93	0.45	0.14	0.89	0.14		0.82	0.86	0.87
Avail Cap(c_a), veh/h	74	1163	405	869	2099	914	59	656		163	399	396
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	58.9	32.0	20.3	42.9	13.7	10.9	58.5	43.4	0.0	54.4	45.2	45.3
Incr Delay (d2), s/veh	19.7	0.4	0.2	14.0	0.7	0.3	23.9	0.1	0.0	22.0	13.3	14.6
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	0.8	6.3	0.8	11.3	7.1	1.6	1.1	0.8	0.0	4.4	8.6	8.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	78.6	32.4	20.5	56.8	14.4	11.3	82.3	43.4	0.0	76.4	58.6	59.9
LnGrp LOS	E	C	C	E	B	B	F	D		E	E	E
Approach Vol, veh/h		602			1759			92	A		644	
Approach Delay, s/veh		33.3			30.8			55.7			62.4	
Approach LOS		C			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	37.4	44.6	6.7	31.2	5.8	76.2	13.6	24.4
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	37.7	* 25	5.0	33.7	5.0	57.7	11.0	27.7
Max Q Clear Time (g_c+I1), s	31.2	16.4	4.4	23.7	3.5	19.7	9.8	4.3
Green Ext Time (p_c), s	1.0	3.1	0.0	2.3	0.0	13.0	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	38.6
HCM 6th LOS	D

Notes

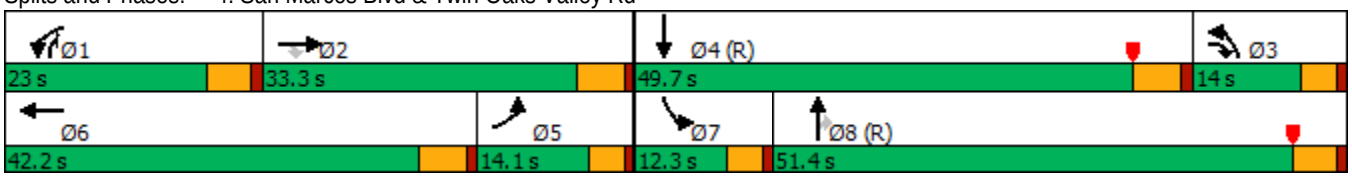
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

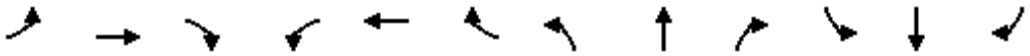
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	146	366	234	424	516	188	455	456	105	786
Future Volume (vph)	146	366	234	424	516	188	455	456	105	786
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	12.0	20.6	31.1	17.3	26.7	9.4	55.2	72.5	7.4	52.9
Actuated g/C Ratio	0.10	0.17	0.26	0.14	0.22	0.08	0.46	0.60	0.06	0.44
v/c Ratio	0.43	0.62	0.49	0.87	0.71	0.71	0.29	0.47	0.51	0.73
Control Delay	54.7	50.0	15.1	63.1	42.0	73.4	24.6	11.2	62.9	30.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.7	50.0	15.1	63.1	42.0	73.4	24.6	11.2	62.9	30.8
LOS	D	D	B	E	D	E	C	B	E	C
Approach Delay		40.0			51.3		27.4			33.6
Approach LOS		D			D		C			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 37.4	Intersection LOS: D
Intersection Capacity Utilization 76.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	146	366	234	424	516	29	188	455	456	105	786	300
Future Volume (veh/h)	146	366	234	424	516	29	188	455	456	105	786	300
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	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	149	373	239	433	527	30	192	464	465	107	802	306
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	345	600	518	487	708	40	556	1712	986	159	900	343
Arrive On Green	0.10	0.17	0.17	0.14	0.21	0.21	0.05	0.16	0.16	0.05	0.36	0.36
Sat Flow, veh/h	3456	3554	1556	3456	3412	194	3456	3554	1583	3456	2516	959
Grp Volume(v), veh/h	149	373	239	433	274	283	192	464	465	107	566	542
Grp Sat Flow(s),veh/h/ln	1728	1777	1556	1728	1777	1829	1728	1777	1583	1728	1777	1698
Q Serve(g_s), s	4.9	11.7	4.0	14.8	17.3	17.4	6.4	13.8	23.9	3.7	36.0	36.1
Cycle Q Clear(g_c), s	4.9	11.7	4.0	14.8	17.3	17.4	6.4	13.8	23.9	3.7	36.0	36.1
Prop In Lane	1.00		1.00	1.00		0.11	1.00		1.00	1.00		0.56
Lane Grp Cap(c), veh/h	345	600	518	487	369	379	556	1712	986	159	636	607
V/C Ratio(X)	0.43	0.62	0.46	0.89	0.74	0.75	0.35	0.27	0.47	0.67	0.89	0.89
Avail Cap(c_a), veh/h	345	829	618	518	546	562	556	1712	986	233	657	628
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.8	46.3	13.8	50.6	44.6	44.6	50.7	31.9	21.2	56.3	36.3	36.3
Incr Delay (d2), s/veh	0.3	2.2	1.3	15.7	5.9	5.9	0.1	0.4	1.6	1.8	17.1	17.9
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	2.1	5.3	3.1	7.4	8.2	8.5	2.9	6.7	10.4	1.6	18.4	17.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.1	48.5	15.1	66.3	50.5	50.5	50.9	32.3	22.7	58.2	53.4	54.2
LnGrp LOS	D	D	B	E	D	D	D	C	C	E	D	D
Approach Vol, veh/h		761			990			1121			1215	
Approach Delay, s/veh		38.5			57.4			31.5			54.2	
Approach LOS		D			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.9	25.5	24.3	48.2	17.3	30.2	9.7	62.8
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	16.8	13.7	8.4	38.1	6.9	19.4	5.7	25.9
Green Ext Time (p_c), s	0.1	5.0	0.0	4.8	0.1	5.5	0.0	9.1

Intersection Summary	
HCM 6th Ctrl Delay	45.8
HCM 6th LOS	D

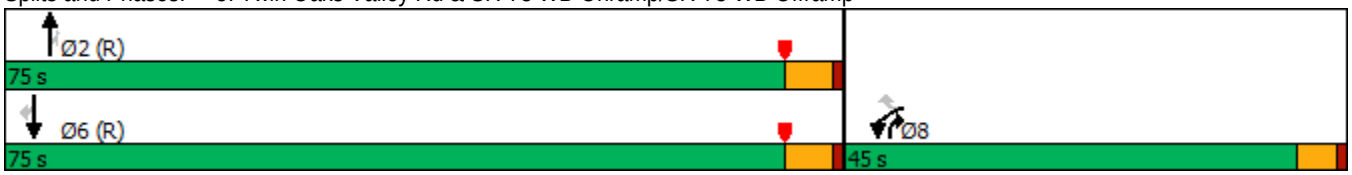
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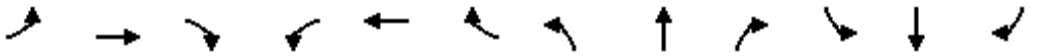
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	457	212	983	444	1052	432
Future Volume (vph)	457	212	983	444	1052	432
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	22.9	22.9	87.2	110.8	87.2	87.2
Actuated g/C Ratio	0.19	0.19	0.73	0.92	0.73	0.73
v/c Ratio	0.76	0.35	0.29	0.34	0.31	0.37
Control Delay	53.6	13.8	4.5	1.2	8.1	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.6	13.8	4.5	1.2	8.1	3.5
LOS	D	B	A	A	A	A
Approach Delay			3.5		6.8	
Approach LOS			A		A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 51.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	457	0	212	0	983	444	0	1052	432
Future Volume (veh/h)	0	0	0	457	0	212	0	983	444	0	1052	432
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				497	0	230	0	1068	483	0	1143	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				583	0	471	0	3824	1427	0	3824	
Arrive On Green				0.17	0.00	0.17	0.00	1.00	1.00	0.00	1.00	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1548	0	5274	1585
Grp Volume(v), veh/h				497	0	230	0	1068	483	0	1143	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1548	0	1702	1585
Q Serve(g_s), s				16.8	0.0	9.0	0.0	0.1	0.1	0.0	0.2	0.0
Cycle Q Clear(g_c), s				16.8	0.0	9.0	0.0	0.1	0.1	0.0	0.2	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				583	0	471	0	3824	1427	0	3824	
V/C Ratio(X)				0.85	0.00	0.49	0.00	0.28	0.34	0.00	0.30	
Avail Cap(c_a), veh/h				1163	0	939	0	3824	1427	0	3824	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.33	1.33	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.86	0.86	0.00	0.61	0.00
Uniform Delay (d), s/veh				48.4	0.0	45.2	0.0	0.1	0.0	0.0	0.1	0.0
Incr Delay (d2), s/veh				1.4	0.0	0.3	0.0	0.2	0.6	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				7.3	0.0	3.1	0.0	0.1	0.3	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				49.8	0.0	45.5	0.0	0.2	0.6	0.0	0.2	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					727			1551			1143	A
Approach Delay, s/veh					48.5			0.3			0.2	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	95.2		95.2		24.8			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	2.1		2.2		18.8			
Green Ext Time (p_c), s	7.7		6.9		1.5			

Intersection Summary		
HCM 6th Ctrl Delay	10.5	
HCM 6th LOS	B	

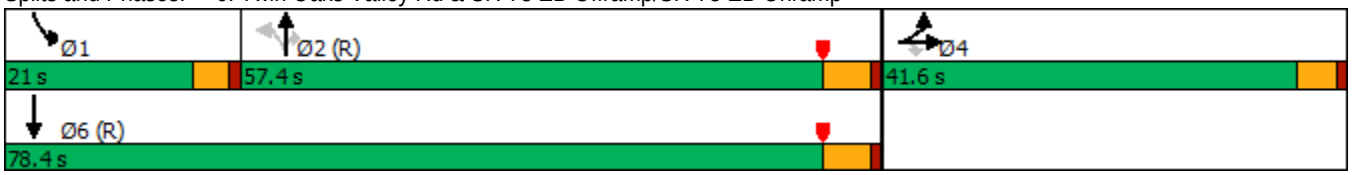
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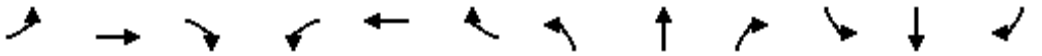
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	427	3	481	974	523	351	1181
Future Volume (vph)	427	3	481	974	523	351	1181
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	29.1	29.1	29.1	60.8	60.8	16.0	81.0
Actuated g/C Ratio	0.24	0.24	0.24	0.51	0.51	0.13	0.68
v/c Ratio	0.81	0.75	0.73	0.39	0.69	0.80	0.36
Control Delay	57.8	43.0	41.2	19.9	30.4	58.4	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.8	43.0	41.2	19.9	30.4	58.4	9.8
LOS	E	D	D	B	C	E	A
Approach Delay		47.5		23.6			21.0
Approach LOS		D		C			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 92 (77%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 28.1	Intersection LOS: C
Intersection Capacity Utilization 71.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	427	3	481	0	0	0	0	974	523	351	1181	0
Future Volume (veh/h)	427	3	481	0	0	0	0	974	523	351	1181	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	611	0	326				0	1015	545	366	1230	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	818	0	364				60	2713	830	420	3512	0
Arrive On Green	0.23	0.00	0.23				0.00	0.53	0.53	0.24	1.00	0.00
Sat Flow, veh/h	3563	0	1585				453	5106	1562	3456	5274	0
Grp Volume(v), veh/h	611	0	326				0	1015	545	366	1230	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				453	1702	1562	1728	1702	0
Q Serve(g_s), s	19.1	0.0	23.9				0.0	14.0	30.1	12.2	0.0	0.0
Cycle Q Clear(g_c), s	19.1	0.0	23.9				0.0	14.0	30.1	12.2	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	818	0	364				60	2713	830	420	3512	0
V/C Ratio(X)	0.75	0.00	0.90				0.00	0.37	0.66	0.87	0.35	0.00
Avail Cap(c_a), veh/h	1098	0	489				60	2713	830	484	3512	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.90	0.90	0.00
Uniform Delay (d), s/veh	43.0	0.0	44.8				0.0	16.4	20.2	44.5	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	12.9				0.0	0.4	4.0	13.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.5	0.0	10.7				0.0	5.5	11.6	5.4	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.2	0.0	57.7				0.0	16.8	24.3	57.8	0.2	0.0
LnGrp LOS	D	A	E				A	B	C	E	A	A
Approach Vol, veh/h		937						1560			1596	
Approach Delay, s/veh		48.9						19.4			13.4	
Approach LOS		D						B			B	

Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	18.8	69.1		32.2		87.8						
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3						
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1						
Max Q Clear Time (g_c+I1), s	14.2	32.1		25.9		2.0						
Green Ext Time (p_c), s	0.4	6.4		1.6		7.7						

Intersection Summary												
HCM 6th Ctrl Delay			23.8									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	174	0	0	528
Future Vol, veh/h	0	0	174	0	0	528
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	189	0	0	574

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	476	95	0	0	189	0
Stage 1	189	-	-	-	-	-
Stage 2	287	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	518	943	-	-	1382	-
Stage 1	824	-	-	-	-	-
Stage 2	736	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	518	943	-	-	1382	-
Mov Cap-2 Maneuver	518	-	-	-	-	-
Stage 1	824	-	-	-	-	-
Stage 2	736	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1382	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	936	1442	1	0	35
Future Vol, veh/h	0	936	1442	1	0	35
Conflicting Peds, #/hr	0	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1064	1639	1	0	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	822
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	272
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	271
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

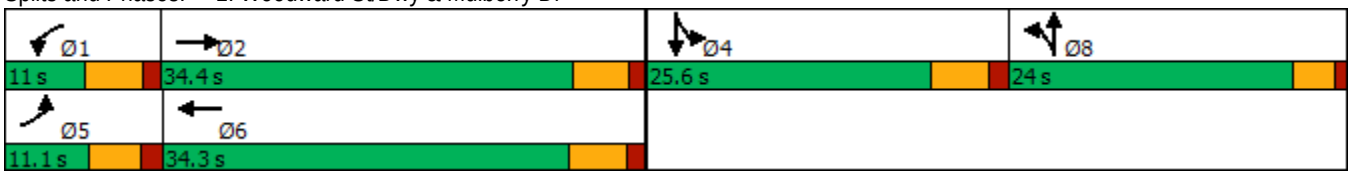
Approach	EB	WB	SB
HCM Control Delay, s	0	0	20.6
HCM LOS			C

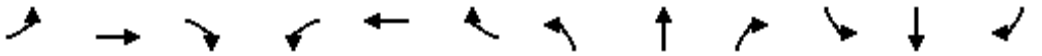
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	271
HCM Lane V/C Ratio	-	-	-	0.147
HCM Control Delay (s)	-	-	-	20.6
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.5

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	164	37	146	29	0		
Future Volume (vph)	164	37	146	29	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	27.8	6.3	31.3	9.7	9.7		
Actuated g/C Ratio	0.63	0.14	0.70	0.22	0.22		
v/c Ratio	0.21	0.17	0.13	0.09	0.02		
Control Delay	13.8	27.1	9.3	20.0	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.8	27.1	9.3	20.0	0.1		
LOS	B	C	A	C	A		
Approach Delay	13.8		12.9		12.0		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 44.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.21	
Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 34.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	164	42	37	146	0	29	0	19	0	0	0
Future Volume (veh/h)	0	164	42	37	146	0	29	0	19	0	0	0
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	0	189	48	43	168	0	33	0	22	0	0	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	397	101	92	1001	0	157	0	140	0	7	0
Arrive On Green	0.00	0.28	0.28	0.05	0.54	0.00	0.09	0.00	0.09	0.00	0.00	0.00
Sat Flow, veh/h	1781	1438	365	1781	1870	0	1775	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	237	43	168	0	33	0	22	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1804	1781	1870	0	1775	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	2.8	0.6	1.2	0.0	0.4	0.0	0.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	2.8	0.6	1.2	0.0	0.4	0.0	0.3	0.0	0.0	0.0
Prop In Lane	1.00		0.20	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	7	0	498	92	1001	0	157	0	140	0	7	0
V/C Ratio(X)	0.00	0.00	0.48	0.47	0.17	0.00	0.21	0.00	0.16	0.00	0.00	0.00
Avail Cap(c_a), veh/h	419	0	2057	398	2103	0	1391	0	1242	0	1466	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	7.7	11.8	3.0	0.0	10.8	0.0	10.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.7	1.4	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	0.7	0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	8.4	13.1	3.1	0.0	11.0	0.0	10.9	0.0	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		237			211			55			0	
Approach Delay, s/veh		8.4			5.2			11.0			0.0	
Approach LOS		A			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	12.6		0.0	0.0	19.3		6.3				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.6	4.8		0.0	0.0	3.2		2.4				
Green Ext Time (p_c), s	0.0	1.4		0.0	0.0	0.9		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		7.3
HCM 6th LOS		A

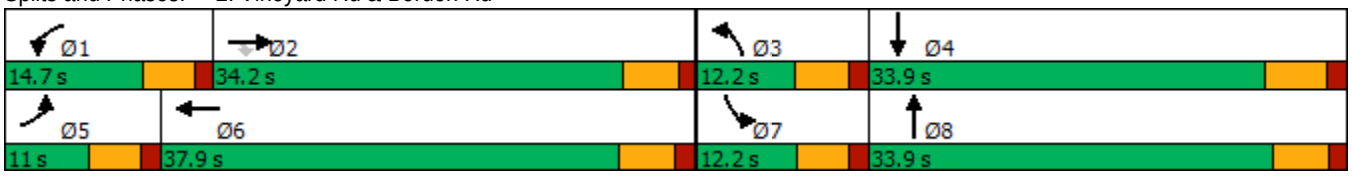
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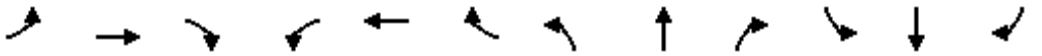
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	37	344	13	49	307	10	92	23	49
Future Volume (vph)	37	344	13	49	307	10	92	23	49
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	7.0	21.4	21.4	8.5	24.5	8.1	12.7	7.1	13.9
Actuated g/C Ratio	0.12	0.38	0.38	0.15	0.44	0.14	0.23	0.13	0.25
v/c Ratio	0.18	0.53	0.02	0.20	0.46	0.04	0.42	0.11	0.16
Control Delay	34.5	22.0	0.1	31.8	18.0	33.5	20.1	34.2	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.5	22.0	0.1	31.8	18.0	33.5	20.1	34.2	15.7
LOS	C	C	A	C	B	C	C	C	B
Approach Delay		22.4			19.7		20.9		20.4
Approach LOS		C			B		C		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 56.3	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 21.0	Intersection LOS: C
Intersection Capacity Utilization 55.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	344	13	49	307	31	10	92	74	23	49	19
Future Volume (veh/h)	37	344	13	49	307	31	10	92	74	23	49	19
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		0.98	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	374	14	53	334	34	11	100	80	25	53	21
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	93	511	433	134	490	50	36	142	114	64	204	81
Arrive On Green	0.05	0.27	0.27	0.08	0.29	0.29	0.02	0.15	0.15	0.04	0.16	0.16
Sat Flow, veh/h	1781	1870	1585	1781	1665	170	1781	962	770	1781	1267	502
Grp Volume(v), veh/h	40	374	14	53	0	368	11	0	180	25	0	74
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1835	1781	0	1732	1781	0	1770
Q Serve(g_s), s	1.0	8.3	0.3	1.3	0.0	8.1	0.3	0.0	4.5	0.6	0.0	1.7
Cycle Q Clear(g_c), s	1.0	8.3	0.3	1.3	0.0	8.1	0.3	0.0	4.5	0.6	0.0	1.7
Prop In Lane	1.00		1.00	1.00		0.09	1.00		0.44	1.00		0.28
Lane Grp Cap(c), veh/h	93	511	433	134	0	539	36	0	256	64	0	285
V/C Ratio(X)	0.43	0.73	0.03	0.40	0.00	0.68	0.31	0.00	0.70	0.39	0.00	0.26
Avail Cap(c_a), veh/h	234	1187	1006	382	0	1301	273	0	1080	277	0	1084
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.0	15.1	12.2	20.1	0.0	14.2	22.1	0.0	18.5	21.5	0.0	16.8
Incr Delay (d2), s/veh	1.2	2.0	0.0	0.7	0.0	1.5	1.8	0.0	3.5	1.5	0.0	0.5
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	0.4	3.3	0.1	0.5	0.0	3.0	0.1	0.0	1.8	0.3	0.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.2	17.1	12.2	20.9	0.0	15.8	23.9	0.0	22.1	23.0	0.0	17.3
LnGrp LOS	C	B	B	C	A	B	C	A	C	C	A	B
Approach Vol, veh/h		428			421			191			99	
Approach Delay, s/veh		17.4			16.4			22.2			18.7	
Approach LOS		B			B			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	18.0	6.1	13.3	7.4	18.9	6.7	12.6
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	3.3	10.3	2.3	3.7	3.0	10.1	2.6	6.5
Green Ext Time (p_c), s	0.0	2.2	0.0	0.3	0.0	2.3	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	18.0
HCM 6th LOS	B

Notes

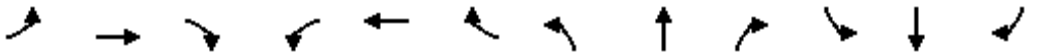
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	108	843	71	289	678	96	58	215	603	21	148
Future Volume (vph)	108	843	71	289	678	96	58	215	603	21	148
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	39.7	61.0	61.0	11.0	35.0	35.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	33.1%	50.8%	50.8%	9.2%	29.2%	29.2%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	5.0	25.0	25.0	54.4	74.4	74.4	6.8	19.5	19.5	6.1	17.2
Actuated g/C Ratio	0.04	0.21	0.21	0.45	0.62	0.62	0.06	0.16	0.16	0.05	0.14
v/c Ratio	1.55	1.19	0.22	0.24	0.32	0.10	0.76	0.49	0.86	0.25	0.50
Control Delay	341.0	140.8	4.5	23.4	13.1	3.2	90.6	61.7	39.8	60.8	39.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	341.0	140.8	4.5	23.4	13.1	3.2	90.6	61.7	39.8	60.8	39.1
LOS	F	F	A	C	B	A	F	E	D	E	D
Approach Delay		152.6			15.0			48.5			41.1
Approach LOS		F			B			D			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.55	
Intersection Signal Delay: 70.2	Intersection LOS: E
Intersection Capacity Utilization 85.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	108	843	71	289	678	96	58	215	603	21	148	58
Future Volume (veh/h)	108	843	71	289	678	96	58	215	603	21	148	58
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		0.97
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	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	112	878	74	301	706	100	60	224	0	22	154	60
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	1926	675	353	2270	998	72	425		27	229	85
Arrive On Green	0.04	0.54	0.54	0.13	0.64	0.64	0.05	0.15	0.00	0.02	0.11	0.11
Sat Flow, veh/h	1781	3554	1245	2765	3554	1562	1425	2843	1268	1781	2010	747
Grp Volume(v), veh/h	112	878	74	301	706	100	60	224	0	22	107	107
Grp Sat Flow(s),veh/h/ln	1781	1777	1245	1382	1777	1562	1425	1421	1268	1781	1421	1335
Q Serve(g_s), s	5.0	18.0	2.5	12.8	10.7	3.0	5.0	8.7	0.0	1.5	8.6	9.3
Cycle Q Clear(g_c), s	5.0	18.0	2.5	12.8	10.7	3.0	5.0	8.7	0.0	1.5	8.6	9.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.56
Lane Grp Cap(c), veh/h	74	1926	675	353	2270	998	72	425		27	162	152
V/C Ratio(X)	1.51	0.46	0.11	0.85	0.31	0.10	0.83	0.53		0.82	0.66	0.70
Avail Cap(c_a), veh/h	74	1926	675	822	2270	998	83	704		163	399	375
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	57.5	16.7	6.9	51.2	9.8	8.4	56.5	47.1	0.0	58.9	50.9	51.2
Incr Delay (d2), s/veh	286.5	0.2	0.1	2.3	0.4	0.2	39.9	0.4	0.0	19.6	4.5	5.8
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	8.2	7.3	1.0	4.5	4.1	1.0	2.6	3.1	0.0	0.8	3.3	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	344.0	17.0	7.1	53.5	10.1	8.6	96.4	47.5	0.0	78.5	55.4	57.1
LnGrp LOS	F	B	A	D	B	A	F	D		E	E	E
Approach Vol, veh/h		1064			1107			284	A		236	
Approach Delay, s/veh		50.7			21.8			57.8			58.3	
Approach LOS		D			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.6	70.3	10.1	19.0	9.0	82.0	5.8	23.2
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	35.7	* 25	7.0	33.7	5.0	55.7	11.0	29.7
Max Q Clear Time (g_c+I1), s	14.8	20.0	7.0	11.3	7.0	12.7	3.5	10.7
Green Ext Time (p_c), s	0.5	3.1	0.0	1.2	0.0	9.1	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	40.2
HCM 6th LOS	D

Notes

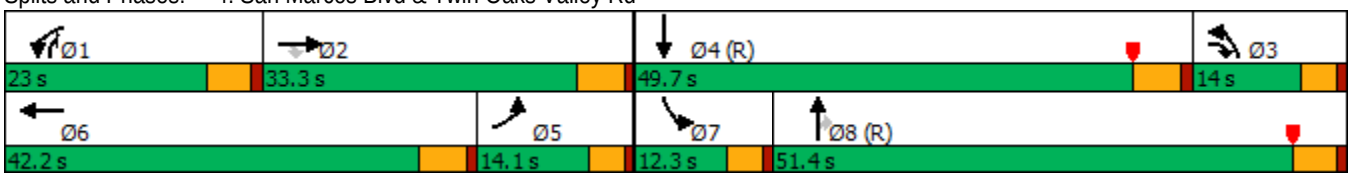
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

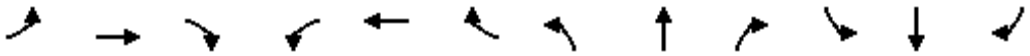
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	298	666	321	383	471	338	705	289	94	533
Future Volume (vph)	298	666	321	383	471	338	705	289	94	533
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	17.7	27.4	38.3	16.7	27.2	9.8	49.2	65.9	7.2	46.4
Actuated g/C Ratio	0.15	0.23	0.32	0.14	0.23	0.08	0.41	0.55	0.06	0.39
v/c Ratio	0.60	0.84	0.57	0.82	0.72	1.23	0.50	0.33	0.46	0.61
Control Delay	54.0	55.0	17.6	62.2	47.3	176.0	26.3	10.1	61.7	29.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.0	55.0	17.6	62.2	47.3	176.0	26.3	10.1	61.7	29.1
LOS	D	D	B	E	D	F	C	B	E	C
Approach Delay		45.4			53.4		60.8			32.5
Approach LOS		D			D		E			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.23	
Intersection Signal Delay: 49.1	Intersection LOS: D
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	298	666	321	383	471	86	338	705	289	94	533	269
Future Volume (veh/h)	298	666	321	383	471	86	338	705	289	94	533	269
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		0.97	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	304	680	328	391	481	88	345	719	295	96	544	274
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	480	803	625	448	641	116	587	1561	900	147	689	346
Arrive On Green	0.14	0.23	0.23	0.13	0.21	0.21	0.06	0.14	0.14	0.04	0.30	0.30
Sat Flow, veh/h	3456	3554	1575	3456	2987	543	3456	3554	1580	3456	2277	1144
Grp Volume(v), veh/h	304	680	328	391	285	284	345	719	295	96	424	394
Grp Sat Flow(s),veh/h/ln	1728	1777	1575	1728	1777	1753	1728	1777	1580	1728	1777	1645
Q Serve(g_s), s	10.0	22.0	5.4	13.3	18.0	18.2	11.7	22.2	15.7	3.3	26.2	26.3
Cycle Q Clear(g_c), s	10.0	22.0	5.4	13.3	18.0	18.2	11.7	22.2	15.7	3.3	26.2	26.3
Prop In Lane	1.00		1.00	1.00		0.31	1.00		1.00	1.00		0.70
Lane Grp Cap(c), veh/h	480	803	625	448	381	376	587	1561	900	147	538	498
V/C Ratio(X)	0.63	0.85	0.52	0.87	0.75	0.76	0.59	0.46	0.33	0.65	0.79	0.79
Avail Cap(c_a), veh/h	480	829	637	518	546	539	587	1561	900	233	657	609
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	44.5	11.3	51.2	44.1	44.2	52.5	38.3	22.1	56.6	38.3	38.4
Incr Delay (d2), s/veh	2.1	8.8	1.4	12.3	6.2	6.6	1.0	0.9	0.9	1.8	11.2	12.1
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	4.4	10.6	3.8	6.5	8.6	8.6	5.5	10.8	6.8	1.5	13.0	12.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.9	53.2	12.8	63.6	50.3	50.8	53.5	39.2	23.1	58.4	49.5	50.5
LnGrp LOS	D	D	B	E	D	D	D	D	C	E	D	D
Approach Vol, veh/h		1312			960			1359			914	
Approach Delay, s/veh		42.6			55.8			39.3			50.9	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.6	32.4	25.4	41.6	22.0	31.0	9.3	57.7
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	15.3	24.0	13.7	28.3	12.0	20.2	5.3	24.2
Green Ext Time (p_c), s	0.3	2.9	0.0	8.0	0.0	5.5	0.0	11.0

Intersection Summary	
HCM 6th Ctrl Delay	46.1
HCM 6th LOS	D

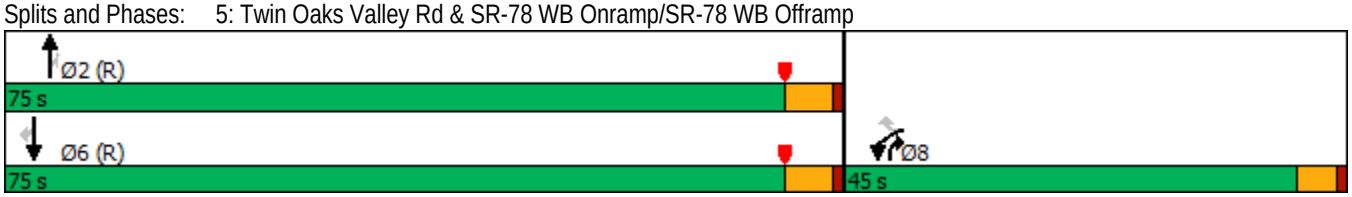
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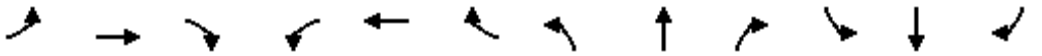
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	433	338	1042	449	1004	327
Future Volume (vph)	433	338	1042	449	1004	327
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	22.6	22.6	87.5	110.8	87.5	87.5
Actuated g/C Ratio	0.19	0.19	0.73	0.92	0.73	0.73
v/c Ratio	0.68	0.52	0.29	0.32	0.28	0.27
Control Delay	50.7	24.6	8.6	1.7	8.9	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.7	24.6	8.6	1.7	8.9	3.6
LOS	D	C	A	A	A	A
Approach Delay			6.5		7.6	
Approach LOS			A		A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 50.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	433	0	338	0	1042	449	0	1004	327
Future Volume (veh/h)	0	0	0	433	0	338	0	1042	449	0	1004	327
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				442	0	345	0	1063	458	0	1024	0
Peak Hour Factor				0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				534	0	431	0	3896	1425	0	3896	
Arrive On Green				0.15	0.00	0.15	0.00	1.00	1.00	0.00	0.76	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1547	0	5274	1585
Grp Volume(v), veh/h				442	0	345	0	1063	458	0	1024	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1547	0	1702	1585
Q Serve(g_s), s				14.9	0.0	14.3	0.0	0.0	0.0	0.0	7.1	0.0
Cycle Q Clear(g_c), s				14.9	0.0	14.3	0.0	0.0	0.0	0.0	7.1	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				534	0	431	0	3896	1425	0	3896	
V/C Ratio(X)				0.83	0.00	0.80	0.00	0.27	0.32	0.00	0.26	
Avail Cap(c_a), veh/h				1163	0	939	0	3896	1425	0	3896	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.87	0.87	0.00	0.71	0.00
Uniform Delay (d), s/veh				49.2	0.0	48.9	0.0	0.0	0.0	0.0	4.2	0.0
Incr Delay (d2), s/veh				1.3	0.0	1.3	0.0	0.2	0.5	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				6.5	0.0	5.1	0.0	0.1	0.2	0.0	2.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				50.5	0.0	50.3	0.0	0.2	0.5	0.0	4.3	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					787			1521			1024	A
Approach Delay, s/veh					50.4			0.3			4.3	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	96.9		96.9		23.1			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	2.0		9.1		16.9			
Green Ext Time (p_c), s	7.6		5.9		1.7			

Intersection Summary		
HCM 6th Ctrl Delay	13.3	
HCM 6th LOS	B	

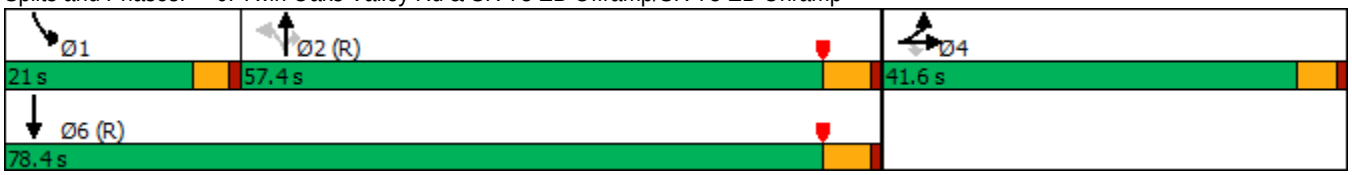
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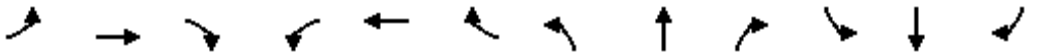
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	143	11	216	1347	499	283	1154
Future Volume (vph)	143	11	216	1347	499	283	1154
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	21.6	21.6	21.6	69.4	69.4	14.9	88.5
Actuated g/C Ratio	0.18	0.18	0.18	0.58	0.58	0.12	0.74
v/c Ratio	0.44	0.39	0.38	0.48	0.59	0.70	0.32
Control Delay	45.4	19.6	19.1	18.1	23.7	53.5	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.4	19.6	19.1	18.1	23.7	53.5	11.0
LOS	D	B	B	B	C	D	B
Approach Delay		28.3		19.6			19.4
Approach LOS		C		B			B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 102 (85%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 57.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	143	11	216	0	0	0	0	1347	499	283	1154	0
Future Volume (veh/h)	143	11	216	0	0	0	0	1347	499	283	1154	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	105	0	285				0	1418	525	298	1215	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	198	0	352				60	3413	1044	357	4119	0
Arrive On Green	0.11	0.00	0.11				0.00	0.67	0.67	0.21	1.00	0.00
Sat Flow, veh/h	1781	0	3170				460	5106	1561	3456	5274	0
Grp Volume(v), veh/h	105	0	285				0	1418	525	298	1215	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				460	1702	1561	1728	1702	0
Q Serve(g_s), s	6.7	0.0	10.5				0.0	15.3	20.2	9.9	0.0	0.0
Cycle Q Clear(g_c), s	6.7	0.0	10.5				0.0	15.3	20.2	9.9	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	198	0	352				60	3413	1044	357	4119	0
V/C Ratio(X)	0.53	0.00	0.81				0.00	0.42	0.50	0.84	0.30	0.00
Avail Cap(c_a), veh/h	549	0	977				60	3413	1044	484	4119	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.92	0.92	0.00
Uniform Delay (d), s/veh	50.4	0.0	52.1				0.0	9.1	9.9	46.6	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	1.7				0.0	0.4	1.7	8.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	4.3				0.0	5.5	6.9	4.3	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.2	0.0	53.8				0.0	9.5	11.7	55.1	0.2	0.0
LnGrp LOS	D	A	D				A	A	B	E	A	A
Approach Vol, veh/h		390						1943			1513	
Approach Delay, s/veh		53.1						10.1			11.0	
Approach LOS		D						B			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	16.6	85.5		17.9		102.1
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	11.9	22.2		12.5		2.0
Green Ext Time (p_c), s	0.5	10.4		0.8		7.5

Intersection Summary		
HCM 6th Ctrl Delay		14.8
HCM 6th LOS		B

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	419	0	0	227
Future Vol, veh/h	0	0	419	0	0	227
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	455	0	0	247

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	579	228	0	0	455	0
Stage 1	455	-	-	-	-	-
Stage 2	124	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	446	775	-	-	1102	-
Stage 1	606	-	-	-	-	-
Stage 2	888	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	446	775	-	-	1102	-
Mov Cap-2 Maneuver	446	-	-	-	-	-
Stage 1	606	-	-	-	-	-
Stage 2	888	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1102	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1467	1063	0	0	16
Future Vol, veh/h	0	1467	1063	0	0	16
Conflicting Peds, #/hr	0	0	0	4	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1512	1096	0	0	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	553
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	408
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	406
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	406
HCM Lane V/C Ratio	-	-	-	0.041
HCM Control Delay (s)	-	-	-	14.2
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

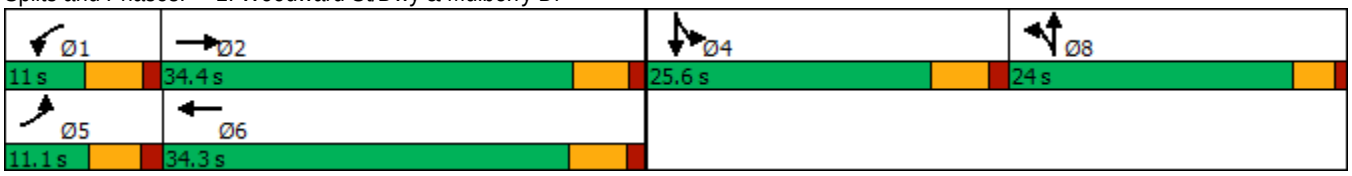
APPENDIX C

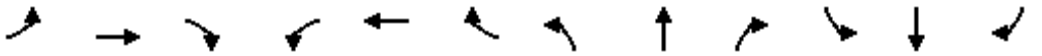
PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS – EXISTING + PROJECT

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	228	24	185	60	0		
Future Volume (vph)	228	24	185	60	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	25.0	6.4	25.7	9.8	9.8		
Actuated g/C Ratio	0.56	0.14	0.58	0.22	0.22		
v/c Ratio	0.30	0.11	0.19	0.17	0.05		
Control Delay	13.0	26.0	10.0	19.4	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.0	26.0	10.0	19.4	0.1		
LOS	B	C	B	B	A		
Approach Delay	13.0		11.9		11.3		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 44.3	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.30	
Intersection Signal Delay: 12.3	Intersection LOS: B
Intersection Capacity Utilization 33.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	228	42	24	185	0	60	0	43	0	0	0
Future Volume (veh/h)	0	228	42	24	185	0	60	0	43	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	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	0	259	48	27	210	0	68	0	49	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	6	434	80	60	949	0	266	0	237	0	7	0
Arrive On Green	0.00	0.28	0.28	0.03	0.51	0.00	0.15	0.00	0.15	0.00	0.00	0.00
Sat Flow, veh/h	1781	1529	283	1781	1870	0	1778	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	307	27	210	0	68	0	49	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1812	1781	1870	0	1778	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	4.1	0.4	1.7	0.0	0.9	0.0	0.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	4.1	0.4	1.7	0.0	0.9	0.0	0.8	0.0	0.0	0.0
Prop In Lane	1.00		0.16	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	6	0	514	60	949	0	266	0	237	0	7	0
V/C Ratio(X)	0.00	0.00	0.60	0.45	0.22	0.00	0.26	0.00	0.21	0.00	0.00	0.00
Avail Cap(c_a), veh/h	382	0	1886	363	1920	0	1272	0	1134	0	1338	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.6	13.3	3.8	0.0	10.5	0.0	10.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.1	1.9	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	1.1	0.2	0.3	0.0	0.3	0.0	0.2	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	9.7	15.2	3.9	0.0	10.7	0.0	10.6	0.0	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		307			237			117			0	
Approach Delay, s/veh		9.7			5.2			10.7			0.0	
Approach LOS		A			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.2	13.5		0.0	0.0	19.8		8.2				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.4	6.1		0.0	0.0	3.7		2.9				
Green Ext Time (p_c), s	0.0	1.9		0.0	0.0	1.2		0.2				

Intersection Summary			
HCM 6th Ctrl Delay		8.3	
HCM 6th LOS		A	

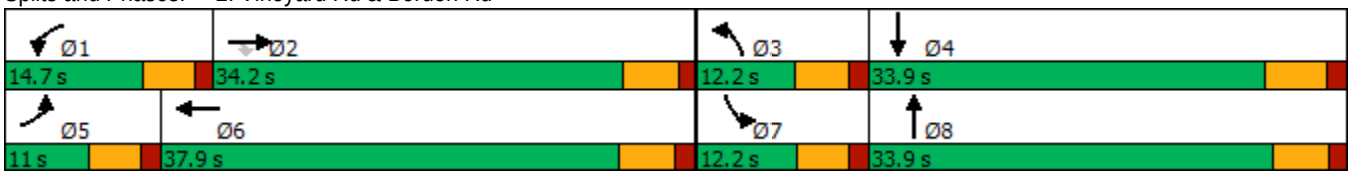
Notes

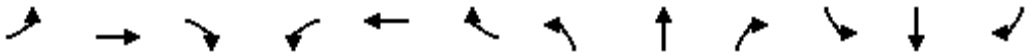
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	23	331	5	106	543	13	31	45	108
Future Volume (vph)	23	331	5	106	543	13	31	45	108
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	6.3	28.1	28.1	8.7	35.2	7.3	11.2	6.6	15.5
Actuated g/C Ratio	0.09	0.41	0.41	0.13	0.52	0.11	0.16	0.10	0.23
v/c Ratio	0.17	0.50	0.01	0.54	0.69	0.08	0.32	0.30	0.41
Control Delay	38.1	22.2	0.0	42.2	22.7	36.3	15.0	39.1	23.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	22.2	0.0	42.2	22.7	36.3	15.0	39.1	23.0
LOS	D	C	A	D	C	D	B	D	C
Approach Delay		22.9			25.8		17.7		26.7
Approach LOS		C			C		B		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 68	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 24.5	Intersection LOS: C
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	331	5	106	543	22	13	31	58	45	108	40
Future Volume (veh/h)	23	331	5	106	543	22	13	31	58	45	108	40
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		0.94	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	27	385	6	123	631	26	15	36	67	52	126	47
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, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	65	654	552	185	740	31	46	68	126	104	196	73
Arrive On Green	0.04	0.35	0.35	0.10	0.42	0.42	0.03	0.12	0.12	0.06	0.15	0.15
Sat Flow, veh/h	1781	1870	1578	1781	1783	73	1781	560	1042	1781	1290	481
Grp Volume(v), veh/h	27	385	6	123	0	657	15	0	103	52	0	173
Grp Sat Flow(s),veh/h/ln	1781	1870	1578	1781	0	1857	1781	0	1601	1781	0	1771
Q Serve(g_s), s	0.9	9.8	0.1	3.9	0.0	18.7	0.5	0.0	3.5	1.7	0.0	5.4
Cycle Q Clear(g_c), s	0.9	9.8	0.1	3.9	0.0	18.7	0.5	0.0	3.5	1.7	0.0	5.4
Prop In Lane	1.00		1.00	1.00		0.04	1.00		0.65	1.00		0.27
Lane Grp Cap(c), veh/h	65	654	552	185	0	771	46	0	194	104	0	269
V/C Ratio(X)	0.42	0.59	0.01	0.67	0.00	0.85	0.33	0.00	0.53	0.50	0.00	0.64
Avail Cap(c_a), veh/h	183	930	785	299	0	1032	214	0	783	217	0	851
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.5	15.5	12.4	25.2	0.0	15.4	27.9	0.0	24.1	26.6	0.0	23.2
Incr Delay (d2), s/veh	1.6	0.8	0.0	1.5	0.0	5.4	1.5	0.0	2.2	1.4	0.0	2.5
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	0.4	3.9	0.0	1.6	0.0	7.9	0.2	0.0	1.4	0.7	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.1	16.4	12.4	26.7	0.0	20.8	29.4	0.0	26.3	28.0	0.0	25.8
LnGrp LOS	C	B	B	C	A	C	C	A	C	C	A	C
Approach Vol, veh/h		418			780			118			225	
Approach Delay, s/veh		17.1			21.7			26.7			26.3	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	25.9	6.7	14.8	7.1	29.7	8.5	13.0
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	5.9	11.8	2.5	7.4	2.9	20.7	3.7	5.5
Green Ext Time (p_c), s	0.0	2.2	0.0	0.9	0.0	3.5	0.0	0.5

Intersection Summary	
HCM 6th Ctrl Delay	21.5
HCM 6th LOS	C

Notes

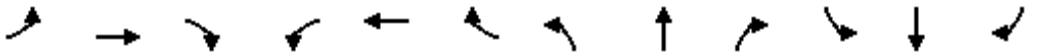
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	18	442	34	574	775	104	24	58	398	99	383
Future Volume (vph)	18	442	34	574	775	104	24	58	398	99	383
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	41.7	63.0	63.0	9.0	33.0	33.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	34.8%	52.5%	52.5%	7.5%	27.5%	27.5%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	4.9	23.2	23.2	48.3	70.1	70.1	4.9	19.5	19.5	10.4	28.5
Actuated g/C Ratio	0.04	0.19	0.19	0.40	0.58	0.58	0.04	0.16	0.16	0.09	0.24
v/c Ratio	0.31	0.79	0.12	0.63	0.46	0.14	0.50	0.15	0.79	0.79	0.82
Control Delay	67.1	55.0	0.7	34.5	17.3	3.1	78.3	59.0	30.7	86.8	52.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.1	55.0	0.7	34.5	17.3	3.1	78.3	59.0	30.7	86.8	52.4
LOS	E	E	A	C	B	A	E	E	C	F	D
Approach Delay		51.8			23.1			36.5			58.6
Approach LOS		D			C			D			E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 36.5	Intersection LOS: D
Intersection Capacity Utilization 71.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	442	34	574	775	104	24	58	398	99	383	65
Future Volume (veh/h)	18	442	34	574	775	104	24	58	398	99	383	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	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	1870	1870	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	22	539	41	700	945	127	29	71	0	121	467	79
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	27	1128	392	751	2077	904	33	464		146	540	91
Arrive On Green	0.02	0.32	0.32	0.27	0.58	0.58	0.02	0.16	0.00	0.08	0.22	0.22
Sat Flow, veh/h	1781	3554	1236	2765	3554	1547	1425	2843	1268	1781	2426	408
Grp Volume(v), veh/h	22	539	41	700	945	127	29	71	0	121	272	274
Grp Sat Flow(s),veh/h/ln	1781	1777	1236	1382	1777	1547	1425	1421	1268	1781	1421	1412
Q Serve(g_s), s	1.5	14.6	2.4	29.6	18.1	4.5	2.4	2.6	0.0	8.0	22.1	22.4
Cycle Q Clear(g_c), s	1.5	14.6	2.4	29.6	18.1	4.5	2.4	2.6	0.0	8.0	22.1	22.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.29
Lane Grp Cap(c), veh/h	27	1128	392	751	2077	904	33	464		146	316	314
V/C Ratio(X)	0.82	0.48	0.10	0.93	0.45	0.14	0.89	0.15		0.83	0.86	0.87
Avail Cap(c_a), veh/h	74	1128	392	869	2077	904	59	656		163	399	397
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	58.9	33.0	21.0	42.6	14.1	11.3	58.5	43.1	0.0	54.2	44.9	45.0
Incr Delay (d2), s/veh	19.7	0.4	0.2	14.5	0.7	0.3	23.9	0.1	0.0	23.6	14.4	15.6
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	0.8	6.4	0.9	11.5	7.3	1.6	1.1	0.9	0.0	4.6	9.0	9.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	78.6	33.4	21.2	57.1	14.8	11.6	82.3	43.1	0.0	77.8	59.3	60.6
LnGrp LOS	E	C	C	E	B	B	F	D		E	E	E
Approach Vol, veh/h		602			1772			100	A		667	
Approach Delay, s/veh		34.2			31.3			54.5			63.2	
Approach LOS		C			C			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	37.9	43.4	6.7	32.0	5.8	75.4	13.9	24.9
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	37.7	* 25	5.0	33.7	5.0	57.7	11.0	27.7
Max Q Clear Time (g_c+I1), s	31.6	16.6	4.4	24.4	3.5	20.1	10.0	4.6
Green Ext Time (p_c), s	0.9	3.0	0.0	2.3	0.0	13.0	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	39.4
HCM 6th LOS	D

Notes

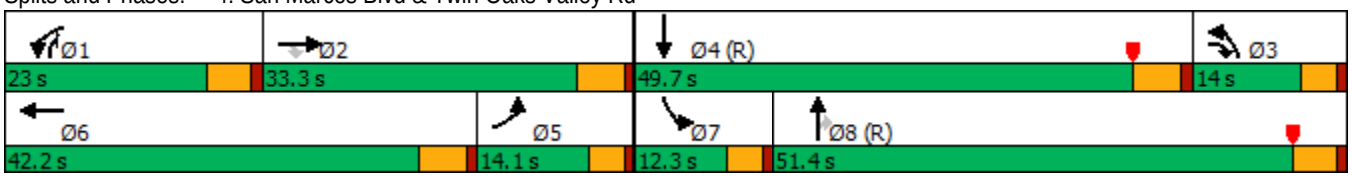
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

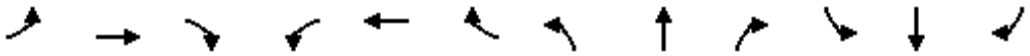
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	146	367	234	439	519	188	455	460	106	786
Future Volume (vph)	146	367	234	439	519	188	455	460	106	786
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	12.0	20.6	31.1	17.5	26.9	9.4	55.0	72.5	7.4	52.7
Actuated g/C Ratio	0.10	0.17	0.26	0.15	0.22	0.08	0.46	0.60	0.06	0.44
v/c Ratio	0.43	0.62	0.49	0.89	0.71	0.71	0.29	0.47	0.51	0.73
Control Delay	54.8	50.0	15.0	65.3	41.5	73.5	24.8	11.4	63.0	30.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	50.0	15.0	65.3	41.5	73.5	24.8	11.4	63.0	30.9
LOS	D	D	B	E	D	E	C	B	E	C
Approach Delay		40.0			52.0		27.5			33.8
Approach LOS		D			D		C			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 37.7	Intersection LOS: D
Intersection Capacity Utilization 76.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	146	367	234	439	519	32	188	455	460	106	786	300
Future Volume (veh/h)	146	367	234	439	519	32	188	455	460	106	786	300
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	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	149	374	239	448	530	33	192	464	469	108	802	306
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	352	600	511	500	710	44	542	1696	985	160	900	343
Arrive On Green	0.10	0.17	0.17	0.14	0.21	0.21	0.05	0.16	0.16	0.05	0.36	0.36
Sat Flow, veh/h	3456	3554	1556	3456	3392	211	3456	3554	1583	3456	2516	959
Grp Volume(v), veh/h	149	374	239	448	277	286	192	464	469	108	566	542
Grp Sat Flow(s),veh/h/ln	1728	1777	1556	1728	1777	1826	1728	1777	1583	1728	1777	1698
Q Serve(g_s), s	4.9	11.7	4.1	15.3	17.5	17.6	6.4	13.8	24.0	3.7	36.0	36.1
Cycle Q Clear(g_c), s	4.9	11.7	4.1	15.3	17.5	17.6	6.4	13.8	24.0	3.7	36.0	36.1
Prop In Lane	1.00		1.00	1.00		0.12	1.00		1.00	1.00		0.56
Lane Grp Cap(c), veh/h	352	600	511	500	372	382	542	1696	985	160	636	607
V/C Ratio(X)	0.42	0.62	0.47	0.90	0.74	0.75	0.35	0.27	0.48	0.67	0.89	0.89
Avail Cap(c_a), veh/h	352	829	612	518	546	561	542	1696	985	233	657	628
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.6	46.3	13.9	50.4	44.4	44.5	51.0	32.2	21.1	56.3	36.3	36.3
Incr Delay (d2), s/veh	0.3	2.2	1.4	17.0	6.0	6.0	0.1	0.4	1.6	1.8	17.1	17.9
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	2.1	5.4	3.2	7.8	8.3	8.6	2.9	6.7	10.5	1.7	18.4	17.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.9	48.5	15.2	67.4	50.5	50.5	51.2	32.6	22.7	58.2	53.4	54.2
LnGrp LOS	D	D	B	E	D	D	D	C	C	E	D	D
Approach Vol, veh/h		762			1011			1125			1216	
Approach Delay, s/veh		38.5			58.0			31.7			54.2	
Approach LOS		D			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.4	25.6	23.8	48.2	17.5	30.4	9.8	62.3
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	17.3	13.7	8.4	38.1	6.9	19.6	5.7	26.0
Green Ext Time (p_c), s	0.1	5.0	0.0	4.8	0.1	5.5	0.0	9.1

Intersection Summary	
HCM 6th Ctrl Delay	46.1
HCM 6th LOS	D

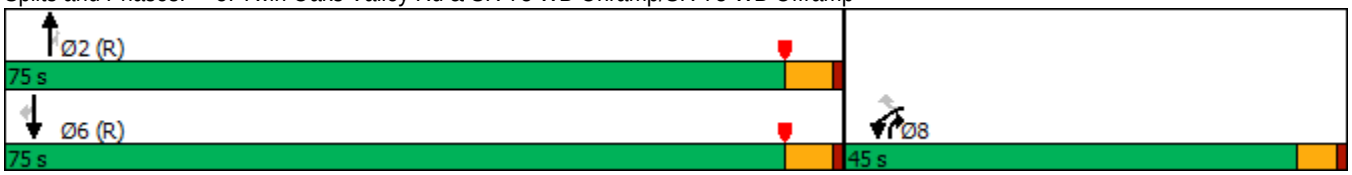
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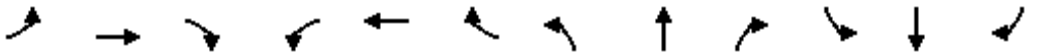
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	457	214	985	444	1061	439
Future Volume (vph)	457	214	985	444	1061	439
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	22.9	22.9	87.2	110.8	87.2	87.2
Actuated g/C Ratio	0.19	0.19	0.73	0.92	0.73	0.73
v/c Ratio	0.76	0.35	0.29	0.34	0.31	0.38
Control Delay	53.6	14.2	4.5	1.2	8.4	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.6	14.2	4.5	1.2	8.4	3.7
LOS	D	B	A	A	A	A
Approach Delay			3.5		7.0	
Approach LOS			A		A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 51.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	457	0	214	0	985	444	0	1061	439
Future Volume (veh/h)	0	0	0	457	0	214	0	985	444	0	1061	439
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				497	0	233	0	1071	483	0	1153	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				583	0	471	0	3823	1427	0	3823	
Arrive On Green				0.17	0.00	0.17	0.00	1.00	1.00	0.00	1.00	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1548	0	5274	1585
Grp Volume(v), veh/h				497	0	233	0	1071	483	0	1153	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1548	0	1702	1585
Q Serve(g_s), s				16.8	0.0	9.1	0.0	0.1	0.1	0.0	0.2	0.0
Cycle Q Clear(g_c), s				16.8	0.0	9.1	0.0	0.1	0.1	0.0	0.2	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				583	0	471	0	3823	1427	0	3823	
V/C Ratio(X)				0.85	0.00	0.49	0.00	0.28	0.34	0.00	0.30	
Avail Cap(c_a), veh/h				1163	0	939	0	3823	1427	0	3823	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.33	1.33	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.86	0.86	0.00	0.59	0.00
Uniform Delay (d), s/veh				48.4	0.0	45.2	0.0	0.1	0.0	0.0	0.1	0.0
Incr Delay (d2), s/veh				1.4	0.0	0.3	0.0	0.2	0.6	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				7.3	0.0	3.2	0.0	0.1	0.3	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				49.8	0.0	45.5	0.0	0.2	0.6	0.0	0.2	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					730			1554			1153	A
Approach Delay, s/veh					48.5			0.3			0.2	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	95.2		95.2		24.8			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	2.1		2.2		18.8			
Green Ext Time (p_c), s	7.7		7.0		1.5			

Intersection Summary		
HCM 6th Ctrl Delay	10.5	
HCM 6th LOS	B	

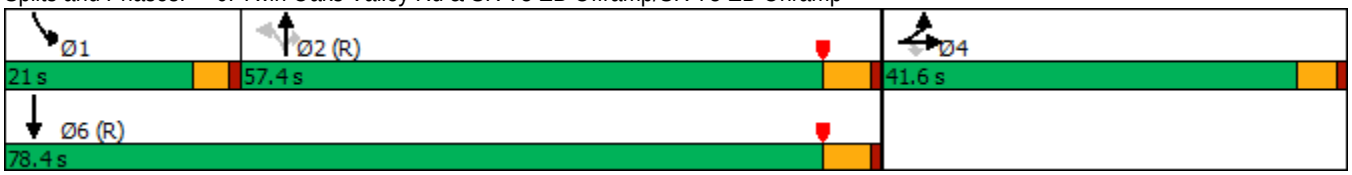
Notes

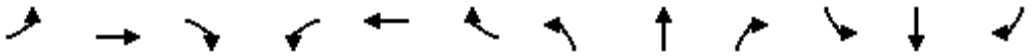
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	429	3	481	974	523	358	1183
Future Volume (vph)	429	3	481	974	523	358	1183
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	29.2	29.2	29.2	60.6	60.6	16.1	80.9
Actuated g/C Ratio	0.24	0.24	0.24	0.50	0.50	0.13	0.67
v/c Ratio	0.81	0.75	0.73	0.40	0.70	0.81	0.36
Control Delay	57.8	42.7	41.0	20.0	30.6	59.0	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.8	42.7	41.0	20.0	30.6	59.0	9.7
LOS	E	D	D	C	C	E	A
Approach Delay		47.4		23.7			21.1
Approach LOS		D		C			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 92 (77%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 28.2	Intersection LOS: C
Intersection Capacity Utilization 71.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	429	3	481	0	0	0	0	974	523	358	1183	0
Future Volume (veh/h)	429	3	481	0	0	0	0	974	523	358	1183	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	612	0	326				0	1015	545	373	1232	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	818	0	364				60	2704	827	426	3512	0
Arrive On Green	0.23	0.00	0.23				0.00	0.53	0.53	0.25	1.00	0.00
Sat Flow, veh/h	3563	0	1585				452	5106	1562	3456	5274	0
Grp Volume(v), veh/h	612	0	326				0	1015	545	373	1232	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				452	1702	1562	1728	1702	0
Q Serve(g_s), s	19.2	0.0	23.9				0.0	14.0	30.3	12.4	0.0	0.0
Cycle Q Clear(g_c), s	19.2	0.0	23.9				0.0	14.0	30.3	12.4	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	818	0	364				60	2704	827	426	3512	0
V/C Ratio(X)	0.75	0.00	0.90				0.00	0.38	0.66	0.88	0.35	0.00
Avail Cap(c_a), veh/h	1098	0	489				60	2704	827	484	3512	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.89	0.89	0.00
Uniform Delay (d), s/veh	43.0	0.0	44.8				0.0	16.6	20.4	44.3	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	12.9				0.0	0.4	4.1	13.7	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.6	0.0	10.7				0.0	5.5	11.7	5.5	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.2	0.0	57.7				0.0	17.0	24.5	58.0	0.2	0.0
LnGrp LOS	D	A	E				A	B	C	E	A	A
Approach Vol, veh/h		938						1560			1605	
Approach Delay, s/veh		48.9						19.6			13.7	
Approach LOS		D						B			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	19.0	68.9		32.2		87.8
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	14.4	32.3		25.9		2.0
Green Ext Time (p_c), s	0.3	6.4		1.6		7.7

Intersection Summary		
HCM 6th Ctrl Delay		24.0
HCM 6th LOS		C

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	7	174	6	2	528
Future Vol, veh/h	17	7	174	6	2	528
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	8	189	7	2	574

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	484	98	0	0	196	0
Stage 1	193	-	-	-	-	-
Stage 2	291	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	512	939	-	-	1374	-
Stage 1	821	-	-	-	-	-
Stage 2	733	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	511	939	-	-	1374	-
Mov Cap-2 Maneuver	511	-	-	-	-	-
Stage 1	821	-	-	-	-	-
Stage 2	732	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	511	939	1374	-
HCM Lane V/C Ratio	-	-	0.036	0.008	0.002	-
HCM Control Delay (s)	-	-	12.3	8.9	7.6	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	936	1442	2	0	45
Future Vol, veh/h	0	936	1442	2	0	45
Conflicting Peds, #/hr	0	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1064	1639	2	0	51

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	823
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	272
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	271
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

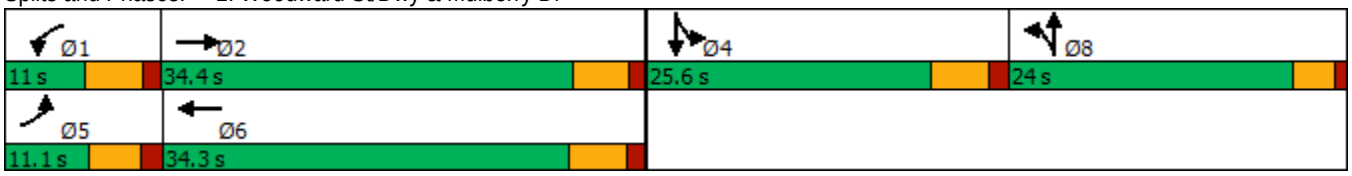
Approach	EB	WB	SB
HCM Control Delay, s	0	0	21.3
HCM LOS			C

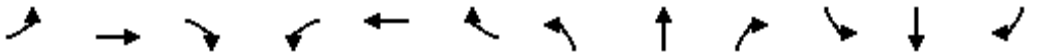
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	271
HCM Lane V/C Ratio	-	-	-	0.189
HCM Control Delay (s)	-	-	-	21.3
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.7

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	164	37	146	31	0		
Future Volume (vph)	164	37	146	31	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	27.9	6.3	31.3	9.7	9.7		
Actuated g/C Ratio	0.63	0.14	0.70	0.22	0.22		
v/c Ratio	0.21	0.17	0.13	0.09	0.02		
Control Delay	13.8	27.1	9.3	20.1	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.8	27.1	9.3	20.1	0.1		
LOS	B	C	A	C	A		
Approach Delay	13.8		12.9		12.5		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 44.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.21	
Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 34.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	164	46	37	146	0	31	0	19	0	0	0
Future Volume (veh/h)	0	164	46	37	146	0	31	0	19	0	0	0
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	0	189	53	43	168	0	36	0	22	0	0	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	386	108	92	997	0	164	0	146	0	7	0
Arrive On Green	0.00	0.27	0.27	0.05	0.53	0.00	0.09	0.00	0.09	0.00	0.00	0.00
Sat Flow, veh/h	1781	1405	394	1781	1870	0	1775	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	242	43	168	0	36	0	22	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1799	1781	1870	0	1775	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	2.9	0.6	1.2	0.0	0.5	0.0	0.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	2.9	0.6	1.2	0.0	0.5	0.0	0.3	0.0	0.0	0.0
Prop In Lane	1.00		0.22	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	7	0	494	92	997	0	164	0	146	0	7	0
V/C Ratio(X)	0.00	0.00	0.49	0.47	0.17	0.00	0.22	0.00	0.15	0.00	0.00	0.00
Avail Cap(c_a), veh/h	417	0	2042	396	2094	0	1385	0	1237	0	1459	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	7.8	11.8	3.1	0.0	10.8	0.0	10.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.8	1.4	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	0.7	0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	8.5	13.2	3.1	0.0	11.0	0.0	10.9	0.0	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		242			211			58			0	
Approach Delay, s/veh		8.5			5.2			11.0			0.0	
Approach LOS		A			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	12.6		0.0	0.0	19.3		6.4				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.6	4.9		0.0	0.0	3.2		2.5				
Green Ext Time (p_c), s	0.0	1.4		0.0	0.0	0.9		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		7.4
HCM 6th LOS		A

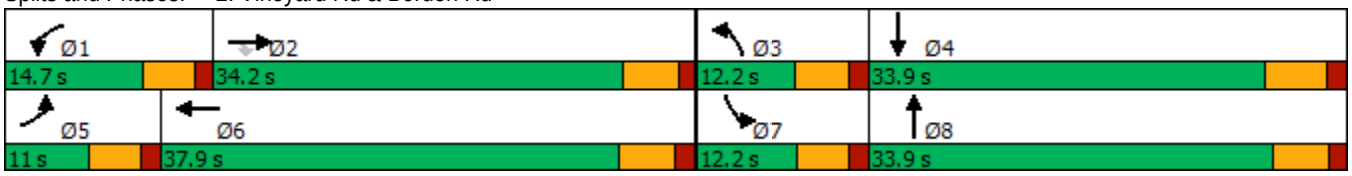
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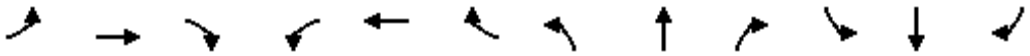
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	37	344	13	51	307	10	93	23	51
Future Volume (vph)	37	344	13	51	307	10	93	23	51
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	7.0	21.3	21.3	8.5	24.4	8.1	12.8	7.1	13.9
Actuated g/C Ratio	0.12	0.38	0.38	0.15	0.43	0.14	0.23	0.13	0.25
v/c Ratio	0.18	0.53	0.02	0.21	0.46	0.04	0.43	0.11	0.17
Control Delay	34.6	22.1	0.1	31.9	18.1	33.5	20.1	34.3	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	22.1	0.1	31.9	18.1	33.5	20.1	34.3	15.8
LOS	C	C	A	C	B	C	C	C	B
Approach Delay		22.5			19.9		20.8		20.4
Approach LOS		C			B		C		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 56.3	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 21.1	Intersection LOS: C
Intersection Capacity Utilization 55.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	344	13	51	307	31	10	93	75	23	51	19
Future Volume (veh/h)	37	344	13	51	307	31	10	93	75	23	51	19
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		0.98	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	374	14	55	334	34	11	101	82	25	55	21
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	93	510	432	137	492	50	36	143	116	64	210	80
Arrive On Green	0.05	0.27	0.27	0.08	0.30	0.30	0.02	0.15	0.15	0.04	0.16	0.16
Sat Flow, veh/h	1781	1870	1585	1781	1665	170	1781	955	776	1781	1283	490
Grp Volume(v), veh/h	40	374	14	55	0	368	11	0	183	25	0	76
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1835	1781	0	1731	1781	0	1772
Q Serve(g_s), s	1.0	8.4	0.3	1.4	0.0	8.1	0.3	0.0	4.6	0.6	0.0	1.7
Cycle Q Clear(g_c), s	1.0	8.4	0.3	1.4	0.0	8.1	0.3	0.0	4.6	0.6	0.0	1.7
Prop In Lane	1.00		1.00	1.00		0.09	1.00		0.45	1.00		0.28
Lane Grp Cap(c), veh/h	93	510	432	137	0	542	36	0	259	64	0	290
V/C Ratio(X)	0.43	0.73	0.03	0.40	0.00	0.68	0.31	0.00	0.71	0.39	0.00	0.26
Avail Cap(c_a), veh/h	232	1178	998	379	0	1291	271	0	1071	275	0	1078
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.2	15.2	12.3	20.2	0.0	14.3	22.2	0.0	18.6	21.7	0.0	16.8
Incr Delay (d2), s/veh	1.2	2.1	0.0	0.7	0.0	1.5	1.8	0.0	3.5	1.5	0.0	0.5
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	0.4	3.3	0.1	0.5	0.0	3.0	0.1	0.0	1.9	0.3	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.3	17.3	12.3	20.9	0.0	15.8	24.1	0.0	22.1	23.2	0.0	17.3
LnGrp LOS	C	B	B	C	A	B	C	A	C	C	A	B
Approach Vol, veh/h		428			423			194			101	
Approach Delay, s/veh		17.6			16.5			22.2			18.8	
Approach LOS		B			B			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.4	18.1	6.1	13.4	7.4	19.1	6.7	12.8
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	3.4	10.4	2.3	3.7	3.0	10.1	2.6	6.6
Green Ext Time (p_c), s	0.0	2.2	0.0	0.3	0.0	2.3	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	18.1
HCM 6th LOS	B

Notes

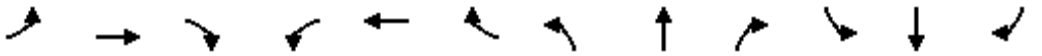
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	110	843	71	293	679	96	58	240	603	23	154
Future Volume (vph)	110	843	71	293	679	96	58	240	603	23	154
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	39.7	61.0	61.0	11.0	35.0	35.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	33.1%	50.8%	50.8%	9.2%	29.2%	29.2%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	5.0	25.0	25.0	53.3	73.3	73.3	6.8	20.4	20.4	6.2	18.3
Actuated g/C Ratio	0.04	0.21	0.21	0.44	0.61	0.61	0.06	0.17	0.17	0.05	0.15
v/c Ratio	1.58	1.19	0.22	0.25	0.33	0.10	0.76	0.52	0.86	0.26	0.49
Control Delay	351.6	140.8	4.5	24.0	13.5	3.2	90.2	62.3	38.8	61.1	38.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	351.6	140.8	4.5	24.0	13.5	3.2	90.2	62.3	38.8	61.1	38.8
LOS	F	F	A	C	B	A	F	E	D	E	D
Approach Delay		154.1			15.5			48.3			41.0
Approach LOS		F			B			D			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.58	
Intersection Signal Delay: 70.5	Intersection LOS: E
Intersection Capacity Utilization 85.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	843	71	293	679	96	58	240	603	23	154	59
Future Volume (veh/h)	110	843	71	293	679	96	58	240	603	23	154	59
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		0.97
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	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	115	878	74	305	707	100	60	250	0	24	160	61
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	1912	670	357	2262	994	72	427		30	235	86
Arrive On Green	0.04	0.54	0.54	0.13	0.64	0.64	0.05	0.15	0.00	0.02	0.12	0.12
Sat Flow, veh/h	1781	3554	1245	2765	3554	1562	1425	2843	1268	1781	2022	737
Grp Volume(v), veh/h	115	878	74	305	707	100	60	250	0	24	110	111
Grp Sat Flow(s),veh/h/ln	1781	1777	1245	1382	1777	1562	1425	1421	1268	1781	1421	1338
Q Serve(g_s), s	5.0	18.2	2.5	13.0	10.8	3.0	5.0	9.8	0.0	1.6	8.9	9.6
Cycle Q Clear(g_c), s	5.0	18.2	2.5	13.0	10.8	3.0	5.0	9.8	0.0	1.6	8.9	9.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.55
Lane Grp Cap(c), veh/h	74	1912	670	357	2262	994	72	427		30	165	156
V/C Ratio(X)	1.55	0.46	0.11	0.85	0.31	0.10	0.83	0.59		0.81	0.67	0.71
Avail Cap(c_a), veh/h	74	1912	670	822	2262	994	83	704		163	399	376
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	57.5	17.0	7.1	51.1	9.9	8.5	56.5	47.5	0.0	58.8	50.8	51.1
Incr Delay (d2), s/veh	303.0	0.2	0.1	2.3	0.4	0.2	39.9	0.5	0.0	17.4	4.6	5.9
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	8.5	7.4	1.0	4.6	4.2	1.0	2.6	3.5	0.0	0.9	3.4	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	360.5	17.3	7.2	53.4	10.3	8.7	96.4	48.0	0.0	76.3	55.3	57.0
LnGrp LOS	F	B	A	D	B	A	F	D		E	E	E
Approach Vol, veh/h		1067			1112			310	A		245	
Approach Delay, s/veh		53.6			22.0			57.3			58.1	
Approach LOS		D			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.8	69.9	10.1	19.3	9.0	81.7	6.0	23.3
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	35.7	* 25	7.0	33.7	5.0	55.7	11.0	29.7
Max Q Clear Time (g_c+I1), s	15.0	20.2	7.0	11.6	7.0	12.8	3.6	11.8
Green Ext Time (p_c), s	0.5	3.1	0.0	1.2	0.0	9.1	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	41.5
HCM 6th LOS	D

Notes

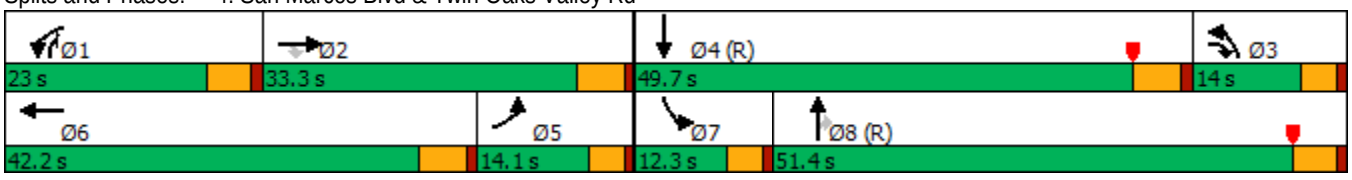
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

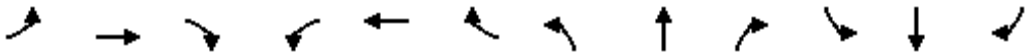
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	298	670	321	390	473	338	705	306	98	533
Future Volume (vph)	298	670	321	390	473	338	705	306	98	533
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	17.7	27.4	38.3	16.8	27.3	9.8	49.0	65.8	7.3	46.2
Actuated g/C Ratio	0.15	0.23	0.32	0.14	0.23	0.08	0.41	0.55	0.06	0.38
v/c Ratio	0.60	0.85	0.57	0.83	0.72	1.23	0.50	0.35	0.48	0.61
Control Delay	54.1	55.3	17.7	62.8	47.3	176.0	26.4	10.4	62.2	29.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	55.3	17.7	62.8	47.3	176.0	26.4	10.4	62.2	29.2
LOS	D	E	B	E	D	F	C	B	E	C
Approach Delay		45.6			53.6		60.3			32.8
Approach LOS		D			D		E			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.23	
Intersection Signal Delay: 49.1	Intersection LOS: D
Intersection Capacity Utilization 79.9%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	298	670	321	390	473	88	338	705	306	98	533	269
Future Volume (veh/h)	298	670	321	390	473	88	338	705	306	98	533	269
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		0.97	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	304	684	328	398	483	90	345	719	312	100	544	274
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	483	804	622	455	642	119	579	1548	897	151	689	346
Arrive On Green	0.14	0.23	0.23	0.13	0.22	0.22	0.06	0.14	0.14	0.04	0.30	0.30
Sat Flow, veh/h	3456	3554	1575	3456	2977	551	3456	3554	1580	3456	2277	1144
Grp Volume(v), veh/h	304	684	328	398	287	286	345	719	312	100	424	394
Grp Sat Flow(s),veh/h/ln	1728	1777	1575	1728	1777	1752	1728	1777	1580	1728	1777	1645
Q Serve(g_s), s	10.0	22.1	5.5	13.6	18.1	18.4	11.7	22.3	16.6	3.4	26.2	26.3
Cycle Q Clear(g_c), s	10.0	22.1	5.5	13.6	18.1	18.4	11.7	22.3	16.6	3.4	26.2	26.3
Prop In Lane	1.00		1.00	1.00		0.31	1.00		1.00	1.00		0.70
Lane Grp Cap(c), veh/h	483	804	622	455	383	378	579	1548	897	151	538	498
V/C Ratio(X)	0.63	0.85	0.53	0.87	0.75	0.76	0.60	0.46	0.35	0.66	0.79	0.79
Avail Cap(c_a), veh/h	483	829	633	518	546	539	579	1548	897	233	657	609
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.7	44.5	11.4	51.1	44.0	44.1	52.7	38.5	22.5	56.5	38.3	38.4
Incr Delay (d2), s/veh	2.0	9.0	1.5	12.9	6.2	6.6	1.1	0.9	1.0	1.8	11.2	12.1
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	4.4	10.7	3.8	6.7	8.6	8.7	5.5	10.8	7.2	1.5	13.0	12.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.7	53.5	12.9	64.0	50.2	50.7	53.8	39.5	23.5	58.3	49.5	50.5
LnGrp LOS	D	D	B	E	D	D	D	D	C	E	D	D
Approach Vol, veh/h		1316			971			1376			918	
Approach Delay, s/veh		42.7			56.0			39.4			50.9	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.8	32.5	25.1	41.6	22.1	31.2	9.5	57.3
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	15.6	24.1	13.7	28.3	12.0	20.4	5.4	24.3
Green Ext Time (p_c), s	0.2	2.8	0.0	8.0	0.0	5.5	0.0	11.2

Intersection Summary	
HCM 6th Ctrl Delay	46.2
HCM 6th LOS	D

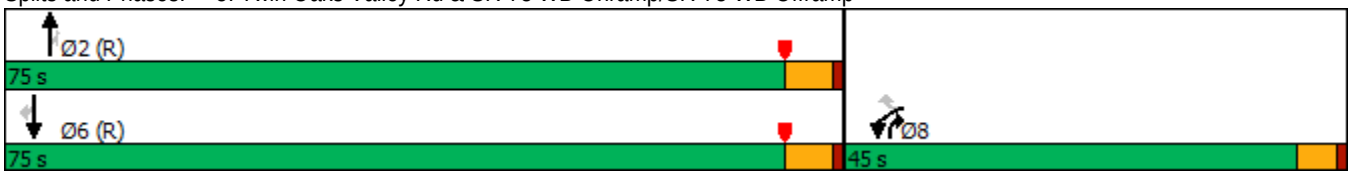
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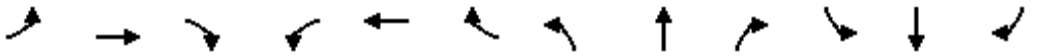
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	433	346	1052	449	1008	330
Future Volume (vph)	433	346	1052	449	1008	330
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	22.5	22.5	87.6	110.8	87.6	87.6
Actuated g/C Ratio	0.19	0.19	0.73	0.92	0.73	0.73
v/c Ratio	0.69	0.54	0.29	0.32	0.28	0.28
Control Delay	50.8	25.9	8.5	1.7	8.9	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	25.9	8.5	1.7	8.9	3.6
LOS	D	C	A	A	A	A
Approach Delay			6.5		7.6	
Approach LOS			A		A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 51.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	433	0	346	0	1052	449	0	1008	330
Future Volume (veh/h)	0	0	0	433	0	346	0	1052	449	0	1008	330
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				442	0	353	0	1073	458	0	1029	0
Peak Hour Factor				0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				534	0	431	0	3895	1425	0	3895	
Arrive On Green				0.15	0.00	0.15	0.00	1.00	1.00	0.00	0.76	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1547	0	5274	1585
Grp Volume(v), veh/h				442	0	353	0	1073	458	0	1029	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1547	0	1702	1585
Q Serve(g_s), s				14.9	0.0	14.7	0.0	0.0	0.0	0.0	7.2	0.0
Cycle Q Clear(g_c), s				14.9	0.0	14.7	0.0	0.0	0.0	0.0	7.2	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				534	0	431	0	3895	1425	0	3895	
V/C Ratio(X)				0.83	0.00	0.82	0.00	0.28	0.32	0.00	0.26	
Avail Cap(c_a), veh/h				1163	0	939	0	3895	1425	0	3895	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.87	0.87	0.00	0.70	0.00
Uniform Delay (d), s/veh				49.2	0.0	49.1	0.0	0.0	0.0	0.0	4.2	0.0
Incr Delay (d2), s/veh				1.3	0.0	1.5	0.0	0.2	0.5	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				6.5	0.0	5.2	0.0	0.1	0.2	0.0	2.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				50.4	0.0	50.6	0.0	0.2	0.5	0.0	4.3	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					795			1531			1029	A
Approach Delay, s/veh					50.5			0.3			4.3	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	96.8		96.8		23.2			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	2.0		9.2		16.9			
Green Ext Time (p_c), s	7.7		5.9		1.7			

Intersection Summary		
HCM 6th Ctrl Delay	13.4	
HCM 6th LOS	B	

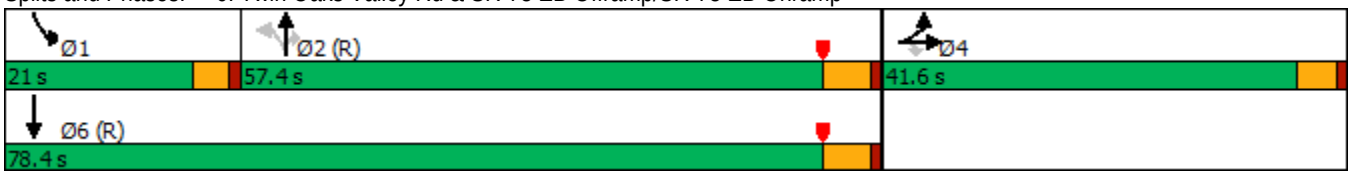
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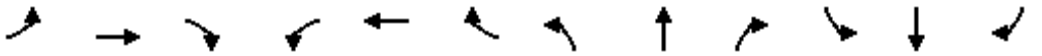
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	151	11	216	1349	499	286	1155
Future Volume (vph)	151	11	216	1349	499	286	1155
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	21.7	21.7	21.7	69.2	69.2	15.0	88.4
Actuated g/C Ratio	0.18	0.18	0.18	0.58	0.58	0.12	0.74
v/c Ratio	0.45	0.40	0.39	0.48	0.59	0.70	0.32
Control Delay	45.6	20.1	19.5	18.2	23.8	53.5	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.6	20.1	19.5	18.2	23.8	53.5	11.1
LOS	D	C	B	B	C	D	B
Approach Delay		28.7		19.7			19.5
Approach LOS		C		B			B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 102 (85%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 20.5	Intersection LOS: C
Intersection Capacity Utilization 58.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	151	11	216	0	0	0	0	1349	499	286	1155	0
Future Volume (veh/h)	151	11	216	0	0	0	0	1349	499	286	1155	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	110	0	287				0	1420	525	301	1216	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	199	0	354				60	3405	1041	359	4115	0
Arrive On Green	0.11	0.00	0.11				0.00	0.67	0.67	0.21	1.00	0.00
Sat Flow, veh/h	1781	0	3170				459	5106	1561	3456	5274	0
Grp Volume(v), veh/h	110	0	287				0	1420	525	301	1216	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				459	1702	1561	1728	1702	0
Q Serve(g_s), s	7.0	0.0	10.6				0.0	15.4	20.2	10.0	0.0	0.0
Cycle Q Clear(g_c), s	7.0	0.0	10.6				0.0	15.4	20.2	10.0	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	199	0	354				60	3405	1041	359	4115	0
V/C Ratio(X)	0.55	0.00	0.81				0.00	0.42	0.50	0.84	0.30	0.00
Avail Cap(c_a), veh/h	549	0	977				60	3405	1041	484	4115	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.92	0.92	0.00
Uniform Delay (d), s/veh	50.5	0.0	52.1				0.0	9.2	10.0	46.5	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	1.7				0.0	0.4	1.7	8.6	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	4.3				0.0	5.5	7.0	4.3	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.4	0.0	53.8				0.0	9.6	11.8	55.2	0.2	0.0
LnGrp LOS	D	A	D				A	A	B	E	A	A
Approach Vol, veh/h		397						1945			1517	
Approach Delay, s/veh		53.1						10.2			11.1	
Approach LOS		D						B			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	16.7	85.3		18.0		102.0
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	12.0	22.2		12.6		2.0
Green Ext Time (p_c), s	0.5	10.4		0.8		7.5

Intersection Summary		
HCM 6th Ctrl Delay		15.0
HCM 6th LOS		B

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	3	419	27	8	227
Future Vol, veh/h	8	3	419	27	8	227
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	3	455	29	9	247

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	612	242	0	0	484	0
Stage 1	470	-	-	-	-	-
Stage 2	142	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	425	759	-	-	1075	-
Stage 1	595	-	-	-	-	-
Stage 2	870	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	422	759	-	-	1075	-
Mov Cap-2 Maneuver	422	-	-	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	863	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.6	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	422	759	1075	-
HCM Lane V/C Ratio	-	-	0.021	0.004	0.008	-
HCM Control Delay (s)	-	-	13.7	9.8	8.4	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1467	1063	4	0	21
Future Vol, veh/h	0	1467	1063	4	0	21
Conflicting Peds, #/hr	0	0	0	4	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1512	1096	4	0	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	555
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	407
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	405
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.4
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	405
HCM Lane V/C Ratio	-	-	-	0.053
HCM Control Delay (s)	-	-	-	14.4
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.2

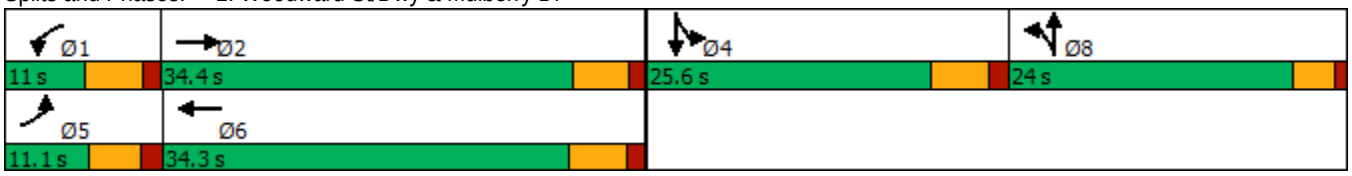
APPENDIX D

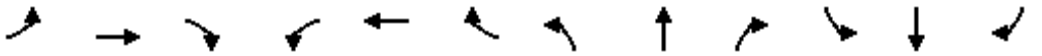
PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS – EXISTING + CUMULATIVE PROJECTS

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	250	30	200	60	0		
Future Volume (vph)	250	30	200	60	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	26.0	6.3	29.4	9.7	9.7		
Actuated g/C Ratio	0.55	0.13	0.62	0.20	0.20		
v/c Ratio	0.34	0.14	0.20	0.19	0.07		
Control Delay	14.6	28.9	9.4	21.9	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	14.6	28.9	9.4	21.9	0.1		
LOS	B	C	A	C	A		
Approach Delay	14.6		11.9		12.0		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 47.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 13.2	Intersection LOS: B
Intersection Capacity Utilization 38.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	250	50	30	200	0	60	0	50	0	0	0
Future Volume (veh/h)	0	250	50	30	200	0	60	0	50	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	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	0	284	57	34	227	0	68	0	57	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	6	453	91	73	977	0	270	0	241	0	6	0
Arrive On Green	0.00	0.30	0.30	0.04	0.52	0.00	0.15	0.00	0.15	0.00	0.00	0.00
Sat Flow, veh/h	1781	1506	302	1781	1870	0	1778	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	341	34	227	0	68	0	57	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1808	1781	1870	0	1778	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	4.8	0.5	1.9	0.0	1.0	0.0	0.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	4.8	0.5	1.9	0.0	1.0	0.0	0.9	0.0	0.0	0.0
Prop In Lane	1.00		0.17	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	6	0	544	73	977	0	270	0	241	0	6	0
V/C Ratio(X)	0.00	0.00	0.63	0.46	0.23	0.00	0.25	0.00	0.24	0.00	0.00	0.00
Avail Cap(c_a), veh/h	363	0	1785	345	1821	0	1206	0	1076	0	1269	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.9	13.8	3.8	0.0	11.0	0.0	11.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.2	1.7	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	1.4	0.2	0.3	0.0	0.3	0.0	0.3	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	10.1	15.5	4.0	0.0	11.2	0.0	11.2	0.0	0.0	0.0
LnGrp LOS	A	A	B	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		341			261			125			0	
Approach Delay, s/veh		10.1			5.5			11.2			0.0	
Approach LOS		B			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.5	14.5		0.0	0.0	21.0		8.5				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.5	6.8		0.0	0.0	3.9		3.0				
Green Ext Time (p_c), s	0.0	2.1		0.0	0.0	1.3		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			8.6									
HCM 6th LOS			A									

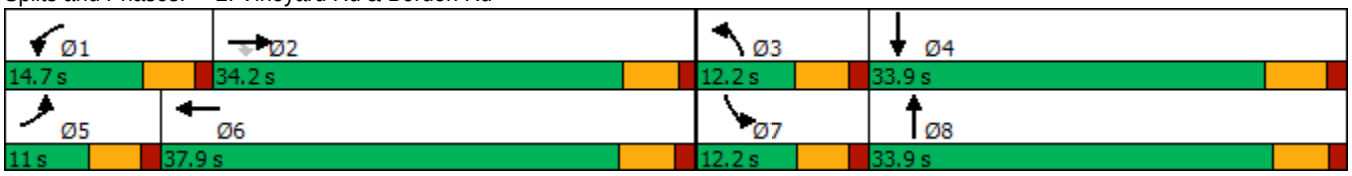
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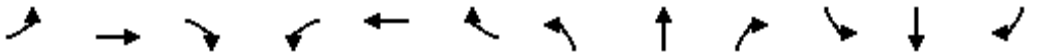
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	30	350	10	130	570	20	40	50	140
Future Volume (vph)	30	350	10	130	570	20	40	50	140
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	6.4	23.6	23.6	9.5	34.5	7.4	13.4	6.8	15.7
Actuated g/C Ratio	0.09	0.34	0.34	0.14	0.50	0.11	0.19	0.10	0.23
v/c Ratio	0.22	0.65	0.02	0.63	0.76	0.12	0.34	0.34	0.53
Control Delay	40.3	27.8	0.1	46.7	27.3	38.1	14.1	41.4	27.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.3	27.8	0.1	46.7	27.3	38.1	14.1	41.4	27.8
LOS	D	C	A	D	C	D	B	D	C
Approach Delay		28.0			30.7		17.8		30.6
Approach LOS		C			C		B		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 69.5	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 28.9	Intersection LOS: C
Intersection Capacity Utilization 67.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	350	10	130	570	30	20	40	70	50	140	50
Future Volume (veh/h)	30	350	10	130	570	30	20	40	70	50	140	50
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		0.95	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	35	407	12	151	663	35	23	47	81	58	163	58
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, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	77	673	568	189	743	39	65	89	154	106	225	80
Arrive On Green	0.04	0.36	0.36	0.11	0.42	0.42	0.04	0.15	0.15	0.06	0.17	0.17
Sat Flow, veh/h	1781	1870	1578	1781	1760	93	1781	594	1023	1781	1309	466
Grp Volume(v), veh/h	35	407	12	151	0	698	23	0	128	58	0	221
Grp Sat Flow(s),veh/h/ln	1781	1870	1578	1781	0	1853	1781	0	1617	1781	0	1775
Q Serve(g_s), s	1.3	11.8	0.3	5.5	0.0	23.1	0.8	0.0	4.8	2.1	0.0	7.8
Cycle Q Clear(g_c), s	1.3	11.8	0.3	5.5	0.0	23.1	0.8	0.0	4.8	2.1	0.0	7.8
Prop In Lane	1.00		1.00	1.00		0.05	1.00		0.63	1.00		0.26
Lane Grp Cap(c), veh/h	77	673	568	189	0	782	65	0	244	106	0	306
V/C Ratio(X)	0.46	0.60	0.02	0.80	0.00	0.89	0.35	0.00	0.53	0.55	0.00	0.72
Avail Cap(c_a), veh/h	162	820	692	264	0	908	188	0	697	191	0	751
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.9	17.3	13.7	28.9	0.0	17.7	31.1	0.0	25.9	30.2	0.0	25.9
Incr Delay (d2), s/veh	1.6	0.9	0.0	7.4	0.0	10.1	1.2	0.0	1.8	1.6	0.0	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	0.6	4.8	0.1	2.6	0.0	10.9	0.4	0.0	1.9	0.9	0.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.5	18.2	13.7	36.2	0.0	27.9	32.3	0.0	27.7	31.9	0.0	29.1
LnGrp LOS	C	B	B	D	A	C	C	A	C	C	A	C
Approach Vol, veh/h		454			849			151			279	
Approach Delay, s/veh		19.2			29.3			28.4			29.7	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	29.3	7.6	17.3	7.8	33.4	9.0	15.9
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	7.5	13.8	2.8	9.8	3.3	25.1	4.1	6.8
Green Ext Time (p_c), s	0.0	2.2	0.0	1.2	0.0	2.8	0.0	0.7

Intersection Summary	
HCM 6th Ctrl Delay	26.7
HCM 6th LOS	C

Notes

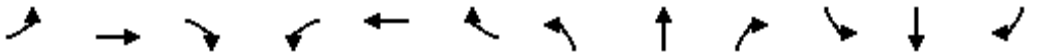
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	20	490	40	670	850	110	30	60	470	110	410
Future Volume (vph)	20	490	40	670	850	110	30	60	470	110	410
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	41.7	63.0	63.0	9.0	33.0	33.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	34.8%	52.5%	52.5%	7.5%	27.5%	27.5%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	4.9	24.0	24.0	44.5	67.0	67.0	5.0	22.3	22.3	10.7	29.8
Actuated g/C Ratio	0.04	0.20	0.20	0.37	0.56	0.56	0.04	0.19	0.19	0.09	0.25
v/c Ratio	0.33	0.85	0.14	0.80	0.52	0.15	0.63	0.14	0.82	0.85	0.84
Control Delay	68.6	58.3	0.8	43.0	19.7	3.2	87.5	51.4	24.8	95.4	53.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.6	58.3	0.8	43.0	19.7	3.2	87.5	51.4	24.8	95.4	53.1
LOS	E	E	A	D	B	A	F	D	C	F	D
Approach Delay		54.5			28.2			31.1			61.0
Approach LOS		D			C			C			E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 38.8	Intersection LOS: D
Intersection Capacity Utilization 76.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	490	40	670	850	110	30	60	470	110	410	70
Future Volume (veh/h)	20	490	40	670	850	110	30	60	470	110	410	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	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	1870	1870	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	24	598	49	817	1037	134	37	73	0	134	500	85
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	30	925	321	854	2002	871	43	499		160	570	96
Arrive On Green	0.02	0.26	0.26	0.31	0.56	0.56	0.03	0.18	0.00	0.09	0.23	0.23
Sat Flow, veh/h	1781	3554	1233	2765	3554	1546	1425	2843	1268	1781	2424	410
Grp Volume(v), veh/h	24	598	49	817	1037	134	37	73	0	134	292	293
Grp Sat Flow(s),veh/h/ln	1781	1777	1233	1382	1777	1546	1425	1421	1268	1781	1421	1412
Q Serve(g_s), s	1.6	18.0	3.1	34.8	21.6	5.0	3.1	2.6	0.0	8.9	23.8	24.0
Cycle Q Clear(g_c), s	1.6	18.0	3.1	34.8	21.6	5.0	3.1	2.6	0.0	8.9	23.8	24.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.29
Lane Grp Cap(c), veh/h	30	925	321	854	2002	871	43	499		160	334	332
V/C Ratio(X)	0.81	0.65	0.15	0.96	0.52	0.15	0.86	0.15		0.84	0.87	0.88
Avail Cap(c_a), veh/h	74	925	321	869	2002	871	59	656		163	399	397
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	58.8	39.5	25.0	40.7	16.2	12.5	57.9	41.9	0.0	53.8	44.2	44.3
Incr Delay (d2), s/veh	17.6	1.8	0.3	20.4	1.0	0.4	46.0	0.0	0.0	28.3	16.8	18.0
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	0.9	8.1	1.1	14.1	8.8	1.8	1.7	0.9	0.0	5.2	9.9	10.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	76.4	41.3	25.3	61.1	17.1	12.9	104.0	41.9	0.0	82.0	61.0	62.3
LnGrp LOS	E	D	C	E	B	B	F	D		F	E	E
Approach Vol, veh/h		671			1988			110	A		719	
Approach Delay, s/veh		41.4			34.9			62.8			65.4	
Approach LOS		D			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	42.4	36.5	7.6	33.5	6.0	72.9	14.8	26.4
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	37.7	* 25	5.0	33.7	5.0	57.7	11.0	27.7
Max Q Clear Time (g_c+I1), s	36.8	20.0	5.1	26.0	3.6	23.6	10.9	4.6
Green Ext Time (p_c), s	0.3	2.3	0.0	2.2	0.0	14.1	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	43.3
HCM 6th LOS	D

Notes

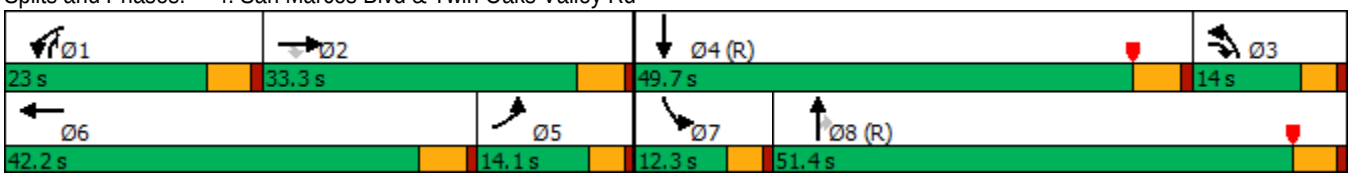
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

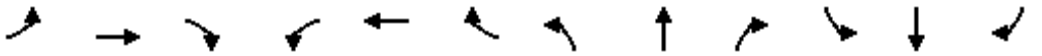
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	160	490	270	610	700	210	530	660	140	910
Future Volume (vph)	160	490	270	610	700	210	530	660	140	910
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	10.0	24.4	35.1	18.0	33.2	9.6	50.3	68.3	7.8	48.2
Actuated g/C Ratio	0.08	0.20	0.29	0.15	0.28	0.08	0.42	0.57	0.06	0.40
v/c Ratio	0.57	0.70	0.52	1.21	0.78	0.78	0.36	0.72	0.64	0.90
Control Delay	61.3	49.5	16.0	147.8	37.7	74.9	25.9	23.1	68.5	43.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.3	49.5	16.0	147.8	37.7	74.9	25.9	23.1	68.5	43.0
LOS	E	D	B	F	D	E	C	C	E	D
Approach Delay		41.7			87.5		31.9			45.6
Approach LOS		D			F		C			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.21	
Intersection Signal Delay: 52.3	Intersection LOS: D
Intersection Capacity Utilization 89.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	490	270	610	700	40	210	530	660	140	910	320
Future Volume (veh/h)	160	490	270	610	700	40	210	530	660	140	910	320
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	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	163	500	276	622	714	41	214	541	673	143	929	327
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	293	702	483	518	888	51	383	1538	923	197	955	334
Arrive On Green	0.08	0.20	0.20	0.15	0.26	0.26	0.04	0.14	0.14	0.06	0.37	0.37
Sat Flow, veh/h	3456	3554	1558	3456	3411	196	3456	3554	1583	3456	2581	904
Grp Volume(v), veh/h	163	500	276	622	372	383	214	541	673	143	638	618
Grp Sat Flow(s),veh/h/ln	1728	1777	1558	1728	1777	1829	1728	1777	1583	1728	1777	1708
Q Serve(g_s), s	5.4	15.8	5.0	18.0	23.5	23.5	7.3	16.5	37.4	4.9	42.4	42.9
Cycle Q Clear(g_c), s	5.4	15.8	5.0	18.0	23.5	23.5	7.3	16.5	37.4	4.9	42.4	42.9
Prop In Lane	1.00		1.00	1.00		0.11	1.00		1.00	1.00		0.53
Lane Grp Cap(c), veh/h	293	702	483	518	462	476	383	1538	923	197	657	632
V/C Ratio(X)	0.56	0.71	0.57	1.20	0.80	0.80	0.56	0.35	0.73	0.72	0.97	0.98
Avail Cap(c_a), veh/h	293	829	539	518	546	563	383	1538	923	233	657	632
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.7	45.0	15.1	51.0	41.5	41.5	54.9	36.2	27.6	55.6	37.2	37.3
Incr Delay (d2), s/veh	1.4	3.4	2.2	107.4	9.3	9.1	1.1	0.6	4.8	6.6	28.6	30.8
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	2.4	7.3	3.9	15.5	11.4	11.8	3.4	8.0	16.9	2.3	23.3	22.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.1	48.4	17.4	158.4	50.8	50.6	56.0	36.8	32.3	62.2	65.8	68.1
LnGrp LOS	D	D	B	F	D	D	E	D	C	E	E	E
Approach Vol, veh/h		939			1377			1428			1399	
Approach Delay, s/veh		40.3			99.4			37.6			66.4	
Approach LOS		D			F			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	29.0	18.3	49.7	15.5	36.5	11.1	56.9
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	20.0	17.8	9.3	44.9	7.4	25.5	6.9	39.4
Green Ext Time (p_c), s	0.0	5.1	0.0	0.0	0.1	5.7	0.0	5.2

Intersection Summary	
HCM 6th Ctrl Delay	62.5
HCM 6th LOS	E

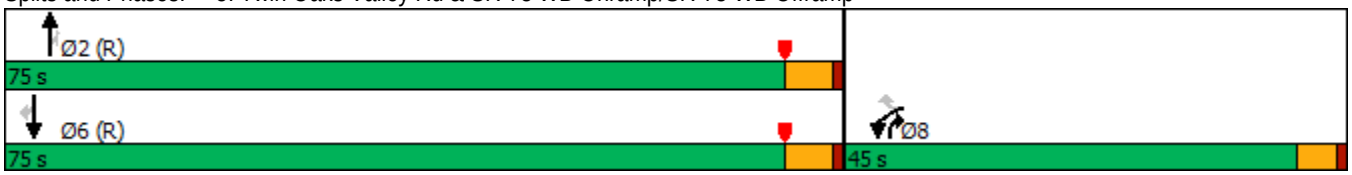
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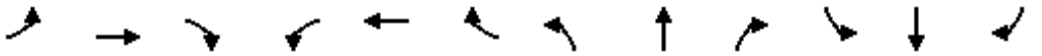
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	520	240	1200	500	1280	470
Future Volume (vph)	520	240	1200	500	1280	470
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	25.6	25.6	84.5	110.8	84.5	84.5
Actuated g/C Ratio	0.21	0.21	0.70	0.92	0.70	0.70
v/c Ratio	0.77	0.39	0.36	0.38	0.39	0.41
Control Delay	51.7	26.4	5.6	1.2	8.6	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.7	26.4	5.6	1.2	8.6	2.9
LOS	D	C	A	A	A	A
Approach Delay			4.3		7.1	
Approach LOS			A		A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 53.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	520	0	240	0	1200	500	0	1280	470
Future Volume (veh/h)	0	0	0	520	0	240	0	1200	500	0	1280	470
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				565	0	261	0	1304	543	0	1391	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				654	0	528	0	3718	1428	0	3718	
Arrive On Green				0.19	0.00	0.19	0.00	0.97	0.97	0.00	0.97	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1548	0	5274	1585
Grp Volume(v), veh/h				565	0	261	0	1304	543	0	1391	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1548	0	1702	1585
Q Serve(g_s), s				19.0	0.0	10.0	0.0	1.5	0.8	0.0	1.6	0.0
Cycle Q Clear(g_c), s				19.0	0.0	10.0	0.0	1.5	0.8	0.0	1.6	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				654	0	528	0	3718	1428	0	3718	
V/C Ratio(X)				0.86	0.00	0.49	0.00	0.35	0.38	0.00	0.37	
Avail Cap(c_a), veh/h				1163	0	939	0	3718	1428	0	3718	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.33	1.33	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.79	0.79	0.00	0.23	0.00
Uniform Delay (d), s/veh				47.1	0.0	43.5	0.0	0.5	0.1	0.0	0.5	0.0
Incr Delay (d2), s/veh				1.4	0.0	0.3	0.0	0.2	0.6	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				8.3	0.0	3.5	0.0	0.4	0.6	0.0	0.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				48.5	0.0	43.8	0.0	0.7	0.7	0.0	0.6	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					826			1847			1391	A
Approach Delay, s/veh					47.0			0.7			0.6	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	92.7		92.7		27.3			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	3.5		3.6		21.0			
Green Ext Time (p_c), s	10.5		9.3		1.7			

Intersection Summary	
HCM 6th Ctrl Delay	10.1
HCM 6th LOS	B

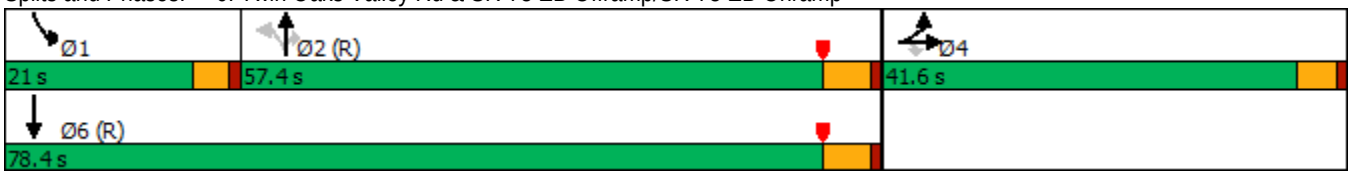
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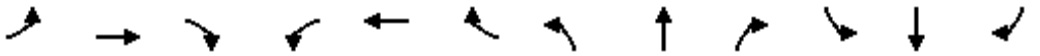
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	500	5	550	1140	570	390	1390
Future Volume (vph)	500	5	550	1140	570	390	1390
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	32.0	32.0	32.0	57.5	57.5	16.5	78.1
Actuated g/C Ratio	0.27	0.27	0.27	0.48	0.48	0.14	0.65
v/c Ratio	0.85	0.85	0.79	0.49	0.80	0.86	0.44
Control Delay	59.2	54.5	46.6	23.0	37.7	64.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.2	54.5	46.6	23.0	37.7	64.5	10.9
LOS	E	D	D	C	D	E	B
Approach Delay		53.6		27.9			22.6
Approach LOS		D		C			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 92 (77%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 31.8	Intersection LOS: C
Intersection Capacity Utilization 78.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	500	5	550	0	0	0	0	1140	570	390	1390	0
Future Volume (veh/h)	500	5	550	0	0	0	0	1140	570	390	1390	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	709	0	375				0	1188	594	406	1448	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	926	0	412				60	2508	767	455	3358	0
Arrive On Green	0.26	0.00	0.26				0.00	0.49	0.49	0.26	1.00	0.00
Sat Flow, veh/h	3563	0	1585				368	5106	1562	3456	5274	0
Grp Volume(v), veh/h	709	0	375				0	1188	594	406	1448	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				368	1702	1562	1728	1702	0
Q Serve(g_s), s	22.1	0.0	27.5				0.0	18.5	37.5	13.6	0.0	0.0
Cycle Q Clear(g_c), s	22.1	0.0	27.5				0.0	18.5	37.5	13.6	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	926	0	412				60	2508	767	455	3358	0
V/C Ratio(X)	0.77	0.00	0.91				0.00	0.47	0.77	0.89	0.43	0.00
Avail Cap(c_a), veh/h	1098	0	489				60	2508	767	484	3358	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.86	0.86	0.00
Uniform Delay (d), s/veh	41.0	0.0	43.1				0.0	20.2	25.1	43.4	0.0	0.0
Incr Delay (d2), s/veh	2.2	0.0	17.7				0.0	0.6	7.5	15.9	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.9	0.0	12.7				0.0	7.4	15.1	6.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.2	0.0	60.8				0.0	20.9	32.6	59.3	0.3	0.0
LnGrp LOS	D	A	E				A	C	C	E	A	A
Approach Vol, veh/h		1084						1782			1854	
Approach Delay, s/veh		49.3						24.8			13.3	
Approach LOS		D						C			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	20.0	64.2		35.8		84.2
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	15.6	39.5		29.5		2.0
Green Ext Time (p_c), s	0.2	6.1		1.6		9.9

Intersection Summary	
HCM 6th Ctrl Delay	25.9
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	190	0	0	590
Future Vol, veh/h	0	0	190	0	0	590
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	207	0	0	641

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	528	104	0	0	207	0
Stage 1	207	-	-	-	-	-
Stage 2	321	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	480	931	-	-	1361	-
Stage 1	807	-	-	-	-	-
Stage 2	708	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	480	931	-	-	1361	-
Mov Cap-2 Maneuver	480	-	-	-	-	-
Stage 1	807	-	-	-	-	-
Stage 2	708	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1361	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1070	1630	1	0	35
Future Vol, veh/h	0	1070	1630	1	0	35
Conflicting Peds, #/hr	0	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1216	1852	1	0	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	929
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	231
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	231
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

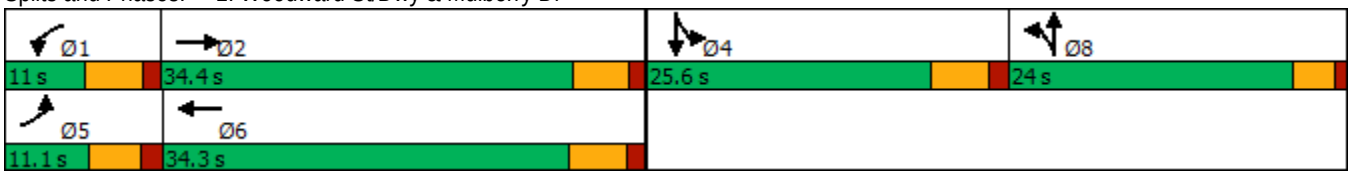
Approach	EB	WB	SB
HCM Control Delay, s	0	0	23.8
HCM LOS			C

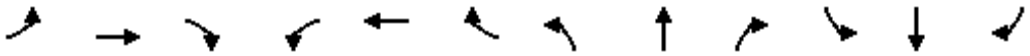
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	231
HCM Lane V/C Ratio	-	-	-	0.172
HCM Control Delay (s)	-	-	-	23.8
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.6

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	180	40	160	30	0		
Future Volume (vph)	180	40	160	30	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	28.4	6.4	31.9	9.7	9.7		
Actuated g/C Ratio	0.63	0.14	0.71	0.22	0.22		
v/c Ratio	0.23	0.18	0.14	0.09	0.02		
Control Delay	13.7	27.6	9.1	20.5	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.7	27.6	9.1	20.5	0.1		
LOS	B	C	A	C	A		
Approach Delay	13.7		12.8		12.2		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 44.9	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.23	
Intersection Signal Delay: 13.2	Intersection LOS: B
Intersection Capacity Utilization 35.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	180	50	40	160	0	30	0	20	0	0	0
Future Volume (veh/h)	0	180	50	40	160	0	30	0	20	0	0	0
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	0	207	57	46	184	0	34	0	23	0	0	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	387	107	97	1001	0	162	0	144	0	7	0
Arrive On Green	0.00	0.27	0.27	0.05	0.54	0.00	0.09	0.00	0.09	0.00	0.00	0.00
Sat Flow, veh/h	1781	1411	389	1781	1870	0	1775	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	264	46	184	0	34	0	23	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1800	1781	1870	0	1775	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	3.2	0.6	1.3	0.0	0.5	0.0	0.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	3.2	0.6	1.3	0.0	0.5	0.0	0.3	0.0	0.0	0.0
Prop In Lane	1.00		0.22	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	7	0	494	97	1001	0	162	0	144	0	7	0
V/C Ratio(X)	0.00	0.00	0.53	0.47	0.18	0.00	0.21	0.00	0.16	0.00	0.00	0.00
Avail Cap(c_a), veh/h	416	0	2039	395	2090	0	1382	0	1234	0	1456	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	7.9	11.8	3.1	0.0	10.8	0.0	10.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.9	1.3	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	0.8	0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	8.8	13.1	3.2	0.0	11.1	0.0	11.0	0.0	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		264			230			57			0	
Approach Delay, s/veh		8.8			5.2			11.0			0.0	
Approach LOS		A			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.7	12.6		0.0	0.0	19.3		6.3				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.6	5.2		0.0	0.0	3.3		2.5				
Green Ext Time (p_c), s	0.0	1.6		0.0	0.0	1.0		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		7.5
HCM 6th LOS		A

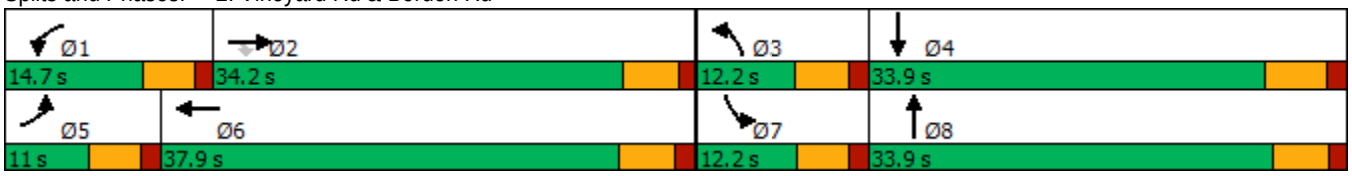
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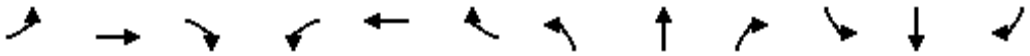
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	40	360	20	60	320	10	120	30	60
Future Volume (vph)	40	360	20	60	320	10	120	30	60
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	7.2	20.9	20.9	8.9	21.5	8.4	14.6	7.4	15.9
Actuated g/C Ratio	0.12	0.36	0.36	0.15	0.37	0.15	0.25	0.13	0.28
v/c Ratio	0.19	0.58	0.03	0.24	0.57	0.04	0.49	0.15	0.17
Control Delay	36.7	23.7	0.1	33.8	21.9	35.4	22.1	35.9	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.7	23.7	0.1	33.8	21.9	35.4	22.1	35.9	17.1
LOS	D	C	A	C	C	D	C	D	B
Approach Delay		23.8			23.6		22.7		22.3
Approach LOS		C			C		C		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 57.8	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 23.4	Intersection LOS: C
Intersection Capacity Utilization 58.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	360	20	60	320	40	10	120	90	30	60	20
Future Volume (veh/h)	40	360	20	60	320	40	10	120	90	30	60	20
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		0.98	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	391	22	65	348	43	11	130	98	33	65	22
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	96	514	436	147	491	61	35	179	135	78	270	91
Arrive On Green	0.05	0.28	0.28	0.08	0.30	0.30	0.02	0.18	0.18	0.04	0.20	0.20
Sat Flow, veh/h	1781	1870	1585	1781	1627	201	1781	990	746	1781	1330	450
Grp Volume(v), veh/h	43	391	22	65	0	391	11	0	228	33	0	87
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1828	1781	0	1736	1781	0	1781
Q Serve(g_s), s	1.2	9.8	0.5	1.8	0.0	9.7	0.3	0.0	6.3	0.9	0.0	2.1
Cycle Q Clear(g_c), s	1.2	9.8	0.5	1.8	0.0	9.7	0.3	0.0	6.3	0.9	0.0	2.1
Prop In Lane	1.00		1.00	1.00		0.11	1.00		0.43	1.00		0.25
Lane Grp Cap(c), veh/h	96	514	436	147	0	552	35	0	313	78	0	361
V/C Ratio(X)	0.45	0.76	0.05	0.44	0.00	0.71	0.31	0.00	0.73	0.42	0.00	0.24
Avail Cap(c_a), veh/h	209	1060	898	341	0	1157	244	0	967	247	0	974
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.5	17.0	13.6	22.4	0.0	15.9	24.7	0.0	19.8	23.8	0.0	17.1
Incr Delay (d2), s/veh	1.2	2.3	0.0	0.8	0.0	1.7	1.8	0.0	3.2	1.3	0.0	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	0.5	4.0	0.2	0.7	0.0	3.8	0.1	0.0	2.6	0.4	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.7	19.4	13.7	23.1	0.0	17.6	26.6	0.0	23.0	25.2	0.0	17.4
LnGrp LOS	C	B	B	C	A	B	C	A	C	C	A	B
Approach Vol, veh/h		456			456			239			120	
Approach Delay, s/veh		19.6			18.3			23.2			19.6	
Approach LOS		B			B			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.1	19.6	6.2	16.3	7.7	21.0	7.3	15.1
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	3.8	11.8	2.3	4.1	3.2	11.7	2.9	8.3
Green Ext Time (p_c), s	0.0	2.3	0.0	0.4	0.0	2.4	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	19.8
HCM 6th LOS	B

Notes

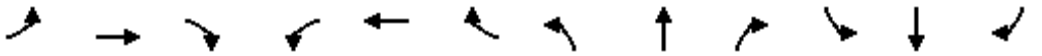
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	120	930	80	340	750	110	70	240	720	25	170
Future Volume (vph)	120	930	80	340	750	110	70	240	720	25	170
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	39.7	61.0	61.0	11.0	35.0	35.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	33.1%	50.8%	50.8%	9.2%	29.2%	29.2%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	5.0	25.0	25.0	47.2	67.2	67.2	7.0	26.4	26.4	6.3	22.2
Actuated g/C Ratio	0.04	0.21	0.21	0.39	0.56	0.56	0.06	0.22	0.22	0.05	0.18
v/c Ratio	1.71	1.31	0.24	0.33	0.39	0.12	0.89	0.40	0.93	0.28	0.45
Control Delay	405.9	189.6	6.0	28.5	17.1	3.3	92.7	55.1	39.7	61.4	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	405.9	189.6	6.0	28.5	17.1	3.3	92.7	55.1	39.7	61.4	36.5
LOS	F	F	A	C	B	A	F	E	D	E	D
Approach Delay		199.6			19.1			46.9			38.9
Approach LOS		F			B			D			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.71	
Intersection Signal Delay: 84.8	Intersection LOS: F
Intersection Capacity Utilization 96.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	930	80	340	750	110	70	240	720	25	170	60
Future Volume (veh/h)	120	930	80	340	750	110	70	240	720	25	170	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		0.97
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	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	125	969	83	354	781	115	73	250	0	26	177	62
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	1799	630	407	2212	972	83	463		32	254	85
Arrive On Green	0.04	0.51	0.51	0.15	0.62	0.62	0.06	0.16	0.00	0.02	0.12	0.12
Sat Flow, veh/h	1781	3554	1244	2765	3554	1562	1425	2843	1268	1781	2071	697
Grp Volume(v), veh/h	125	969	83	354	781	115	73	250	0	26	119	120
Grp Sat Flow(s),veh/h/ln	1781	1777	1244	1382	1777	1562	1425	1421	1268	1781	1421	1347
Q Serve(g_s), s	5.0	22.2	3.1	15.0	12.8	3.6	6.1	9.7	0.0	1.7	9.6	10.3
Cycle Q Clear(g_c), s	5.0	22.2	3.1	15.0	12.8	3.6	6.1	9.7	0.0	1.7	9.6	10.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.52
Lane Grp Cap(c), veh/h	74	1799	630	407	2212	972	83	463		32	174	165
V/C Ratio(X)	1.68	0.54	0.13	0.87	0.35	0.12	0.88	0.54		0.81	0.68	0.73
Avail Cap(c_a), veh/h	74	1799	630	822	2212	972	83	704		163	399	378
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	57.5	20.1	8.2	50.0	11.0	9.2	56.1	46.1	0.0	58.7	50.4	50.7
Incr Delay (d2), s/veh	359.1	0.4	0.1	2.3	0.4	0.2	58.6	0.4	0.0	15.7	4.7	6.0
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	9.7	9.1	1.2	5.3	5.0	1.3	3.5	3.5	0.0	0.9	3.7	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	416.6	20.5	8.4	52.3	11.4	9.5	114.6	46.5	0.0	74.4	55.1	56.7
LnGrp LOS	F	C	A	D	B	A	F	D		E	E	E
Approach Vol, veh/h		1177			1250			323	A		265	
Approach Delay, s/veh		61.7			22.8			61.9			57.7	
Approach LOS		E			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	66.0	11.0	20.0	9.0	80.0	6.2	24.8
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	35.7	* 25	7.0	33.7	5.0	55.7	11.0	29.7
Max Q Clear Time (g_c+I1), s	17.0	24.2	8.1	12.3	7.0	14.8	3.7	11.7
Green Ext Time (p_c), s	0.6	0.6	0.0	1.3	0.0	10.3	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	45.3
HCM 6th LOS	D

Notes

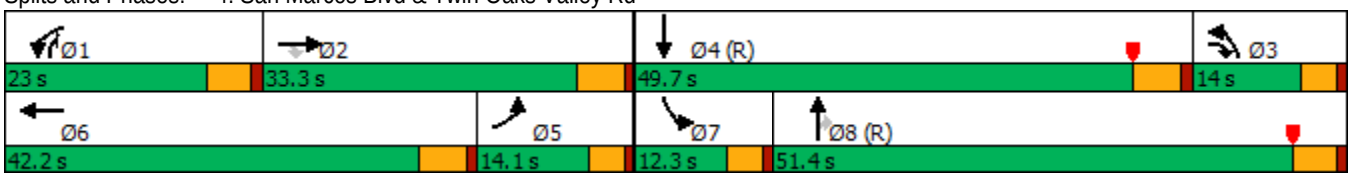
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

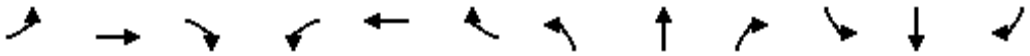
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	320	900	370	550	640	390	820	420	130	620
Future Volume (vph)	320	900	370	550	640	390	820	420	130	620
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	13.1	28.0	38.9	18.0	33.7	9.8	46.8	64.8	7.7	44.4
Actuated g/C Ratio	0.11	0.23	0.32	0.15	0.28	0.08	0.39	0.54	0.06	0.37
v/c Ratio	0.88	1.11	0.66	1.09	0.79	1.42	0.61	0.48	0.61	0.72
Control Delay	77.5	109.7	23.0	111.9	46.1	249.8	33.0	16.5	66.7	33.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.5	109.7	23.0	111.9	46.1	249.8	33.0	16.5	66.7	33.6
LOS	E	F	C	F	D	F	C	B	E	C
Approach Delay		83.0			73.7		80.6			37.8
Approach LOS		F			E		F			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 105	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.42	
Intersection Signal Delay: 71.7	Intersection LOS: E
Intersection Capacity Utilization 94.6%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	900	370	550	640	120	390	820	420	130	620	290
Future Volume (veh/h)	320	900	370	550	640	120	390	820	420	130	620	290
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		0.97	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	327	918	378	561	653	122	398	837	429	133	633	296
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	390	829	552	518	797	149	402	1422	869	187	768	359
Arrive On Green	0.11	0.23	0.23	0.15	0.27	0.27	0.04	0.13	0.13	0.05	0.33	0.33
Sat Flow, veh/h	3456	3554	1575	3456	2975	555	3456	3554	1579	3456	2338	1093
Grp Volume(v), veh/h	327	918	378	561	390	385	398	837	429	133	481	448
Grp Sat Flow(s),veh/h/ln	1728	1777	1575	1728	1777	1753	1728	1777	1579	1728	1777	1655
Q Serve(g_s), s	11.1	28.0	7.3	18.0	24.7	24.7	13.8	26.6	23.3	4.5	29.9	29.9
Cycle Q Clear(g_c), s	11.1	28.0	7.3	18.0	24.7	24.7	13.8	26.6	23.3	4.5	29.9	29.9
Prop In Lane	1.00		1.00	1.00		0.32	1.00		1.00	1.00		0.66
Lane Grp Cap(c), veh/h	390	829	552	518	476	470	402	1422	869	187	584	544
V/C Ratio(X)	0.84	1.11	0.68	1.08	0.82	0.82	0.99	0.59	0.49	0.71	0.82	0.82
Avail Cap(c_a), veh/h	390	829	552	518	546	539	402	1422	869	233	657	612
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.2	46.0	13.9	51.0	41.2	41.2	57.6	42.8	25.2	55.8	37.1	37.1
Incr Delay (d2), s/veh	14.2	64.9	4.4	63.6	10.3	10.5	39.7	1.6	1.8	4.8	12.5	13.3
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	5.6	19.7	5.4	12.3	12.1	12.0	8.7	13.0	10.2	2.1	14.9	14.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.3	110.9	18.3	114.6	51.4	51.7	97.4	44.4	27.0	60.6	49.6	50.4
LnGrp LOS	E	F	B	F	D	D	F	D	C	E	D	D
Approach Vol, veh/h		1623			1336			1664			1062	
Approach Delay, s/veh		80.3			78.0			52.6			51.3	
Approach LOS		F			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	33.3	19.0	44.7	18.8	37.5	10.7	53.0
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	20.0	30.0	15.8	31.9	13.1	26.7	6.5	28.6
Green Ext Time (p_c), s	0.0	0.0	0.0	7.5	0.0	5.4	0.0	11.6

Intersection Summary	
HCM 6th Ctrl Delay	66.2
HCM 6th LOS	E

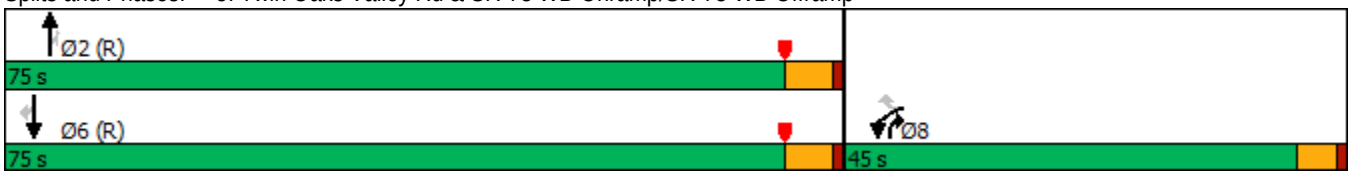
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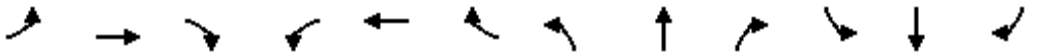
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	490	380	1270	510	1220	360
Future Volume (vph)	490	380	1270	510	1220	360
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	23.4	23.4	86.7	110.8	86.7	86.7
Actuated g/C Ratio	0.20	0.20	0.72	0.92	0.72	0.72
v/c Ratio	0.75	0.63	0.35	0.36	0.34	0.30
Control Delay	52.5	37.3	7.4	1.4	11.8	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	37.3	7.4	1.4	11.8	5.0
LOS	D	D	A	A	B	A
Approach Delay			5.7		10.2	
Approach LOS			A		B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 15.7	Intersection LOS: B
Intersection Capacity Utilization 52.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	490	0	380	0	1270	510	0	1220	360
Future Volume (veh/h)	0	0	0	490	0	380	0	1270	510	0	1220	360
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				500	0	388	0	1296	520	0	1245	0
Peak Hour Factor				0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				596	0	481	0	3804	1426	0	3804	
Arrive On Green				0.17	0.00	0.17	0.00	1.00	1.00	0.00	0.99	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1547	0	5274	1585
Grp Volume(v), veh/h				500	0	388	0	1296	520	0	1245	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1547	0	1702	1585
Q Serve(g_s), s				16.8	0.0	16.0	0.0	0.0	0.0	0.0	0.4	0.0
Cycle Q Clear(g_c), s				16.8	0.0	16.0	0.0	0.0	0.0	0.0	0.4	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				596	0	481	0	3804	1426	0	3804	
V/C Ratio(X)				0.84	0.00	0.81	0.00	0.34	0.36	0.00	0.33	
Avail Cap(c_a), veh/h				1163	0	939	0	3804	1426	0	3804	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.81	0.81	0.00	0.47	0.00
Uniform Delay (d), s/veh				48.0	0.0	47.7	0.0	0.0	0.0	0.0	0.1	0.0
Incr Delay (d2), s/veh				1.2	0.0	1.2	0.0	0.2	0.6	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				7.3	0.0	5.6	0.0	0.1	0.2	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				49.3	0.0	49.0	0.0	0.2	0.6	0.0	0.2	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					888			1816			1245	A
Approach Delay, s/veh					49.1			0.3			0.2	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	94.7		94.7		25.3			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	2.0		2.4		18.8			
Green Ext Time (p_c), s	10.3		7.8		1.9			

Intersection Summary		
HCM 6th Ctrl Delay	11.3	
HCM 6th LOS	B	

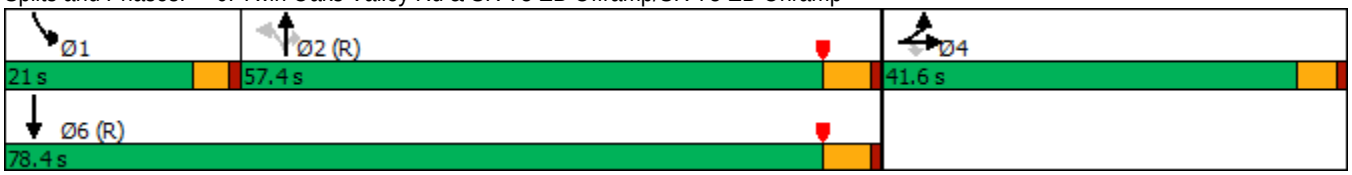
Notes

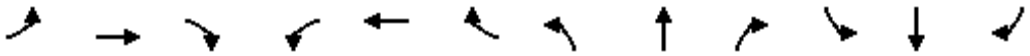
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	170	15	250	1580	540	320	1360
Future Volume (vph)	170	15	250	1580	540	320	1360
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	18.8	18.8	18.8	71.5	71.5	15.6	91.3
Actuated g/C Ratio	0.16	0.16	0.16	0.60	0.60	0.13	0.76
v/c Ratio	0.60	0.56	0.52	0.55	0.62	0.76	0.37
Control Delay	55.0	38.1	31.6	17.3	22.2	52.6	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.0	38.1	31.6	17.3	22.2	52.6	9.2
LOS	D	D	C	B	C	D	A
Approach Delay		41.9		18.5			17.5
Approach LOS		D		B			B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 102 (85%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 20.5	Intersection LOS: C
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	15	250	0	0	0	0	1580	540	320	1360	0
Future Volume (veh/h)	170	15	250	0	0	0	0	1580	540	320	1360	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	125	0	332				0	1663	568	337	1432	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	225	0	401				60	3280	1003	393	4039	0
Arrive On Green	0.13	0.00	0.13				0.00	0.64	0.64	0.23	1.00	0.00
Sat Flow, veh/h	1781	0	3170				374	5106	1561	3456	5274	0
Grp Volume(v), veh/h	125	0	332				0	1663	568	337	1432	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				374	1702	1561	1728	1702	0
Q Serve(g_s), s	7.9	0.0	12.3				0.0	20.7	24.5	11.2	0.0	0.0
Cycle Q Clear(g_c), s	7.9	0.0	12.3				0.0	20.7	24.5	11.2	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	225	0	401				60	3280	1003	393	4039	0
V/C Ratio(X)	0.56	0.00	0.83				0.00	0.51	0.57	0.86	0.35	0.00
Avail Cap(c_a), veh/h	549	0	977				60	3280	1003	484	4039	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.89	0.89	0.00
Uniform Delay (d), s/veh	49.2	0.0	51.1				0.0	11.4	12.1	45.4	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	1.7				0.0	0.6	2.3	10.9	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	0.0	5.0				0.0	7.6	8.7	4.9	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.0	0.0	52.9				0.0	11.9	14.4	56.3	0.2	0.0
LnGrp LOS	D	A	D				A	B	B	E	A	A
Approach Vol, veh/h		457						2231			1769	
Approach Delay, s/veh		52.1						12.6			10.9	
Approach LOS		D						B			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	17.9	82.4		19.8		100.2
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	13.2	26.5		14.3		2.0
Green Ext Time (p_c), s	0.4	12.1		0.9		9.7

Intersection Summary		
HCM 6th Ctrl Delay		16.0
HCM 6th LOS		B

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	470	0	0	255
Future Vol, veh/h	0	0	470	0	0	255
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	511	0	0	277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	650	256	0	0	511	0
Stage 1	511	-	-	-	-	-
Stage 2	139	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	402	743	-	-	1050	-
Stage 1	567	-	-	-	-	-
Stage 2	873	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	402	743	-	-	1050	-
Mov Cap-2 Maneuver	402	-	-	-	-	-
Stage 1	567	-	-	-	-	-
Stage 2	873	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1050	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1675	1200	0	0	16
Future Vol, veh/h	0	1675	1200	0	0	16
Conflicting Peds, #/hr	0	0	0	4	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1727	1237	0	0	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	624
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	367
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	365
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	15.3
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	365
HCM Lane V/C Ratio	-	-	-	0.045
HCM Control Delay (s)	-	-	-	15.3
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.1

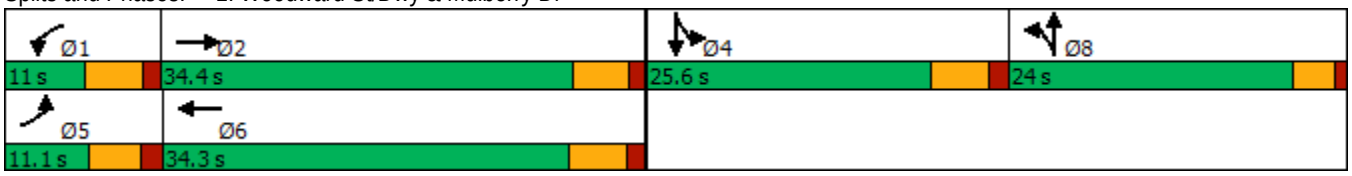
APPENDIX E

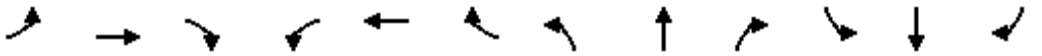
PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS – EXISTING + CUMULATIVE PROJECTS + PROJECT

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	250	30	200	63	0		
Future Volume (vph)	250	30	200	63	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	26.0	6.3	29.3	9.7	9.7		
Actuated g/C Ratio	0.55	0.13	0.62	0.20	0.20		
v/c Ratio	0.34	0.14	0.20	0.20	0.07		
Control Delay	14.7	28.8	9.4	22.0	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	14.7	28.8	9.4	22.0	0.1		
LOS	B	C	A	C	A		
Approach Delay	14.7		12.0		12.3		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 47.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 38.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	250	51	30	200	0	63	0	50	0	0	0
Future Volume (veh/h)	0	250	51	30	200	0	63	0	50	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	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	0	284	58	34	227	0	72	0	57	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	6	452	92	73	975	0	275	0	245	0	6	0
Arrive On Green	0.00	0.30	0.30	0.04	0.52	0.00	0.15	0.00	0.15	0.00	0.00	0.00
Sat Flow, veh/h	1781	1501	307	1781	1870	0	1778	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	342	34	227	0	72	0	57	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1807	1781	1870	0	1778	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	4.8	0.6	2.0	0.0	1.1	0.0	0.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	4.8	0.6	2.0	0.0	1.1	0.0	0.9	0.0	0.0	0.0
Prop In Lane	1.00		0.17	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	6	0	544	73	975	0	275	0	245	0	6	0
V/C Ratio(X)	0.00	0.00	0.63	0.46	0.23	0.00	0.26	0.00	0.23	0.00	0.00	0.00
Avail Cap(c_a), veh/h	361	0	1776	343	1812	0	1200	0	1070	0	1263	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.9	13.9	3.9	0.0	11.0	0.0	11.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.2	1.7	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	1.4	0.2	0.3	0.0	0.3	0.0	0.3	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	10.1	15.6	4.0	0.0	11.2	0.0	11.2	0.0	0.0	0.0
LnGrp LOS	A	A	B	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		342			261			129			0	
Approach Delay, s/veh		10.1			5.5			11.2			0.0	
Approach LOS		B			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.5	14.5		0.0	0.0	21.0		8.6				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.6	6.8		0.0	0.0	4.0		3.1				
Green Ext Time (p_c), s	0.0	2.1		0.0	0.0	1.3		0.2				

Intersection Summary		
HCM 6th Ctrl Delay		8.7
HCM 6th LOS		A

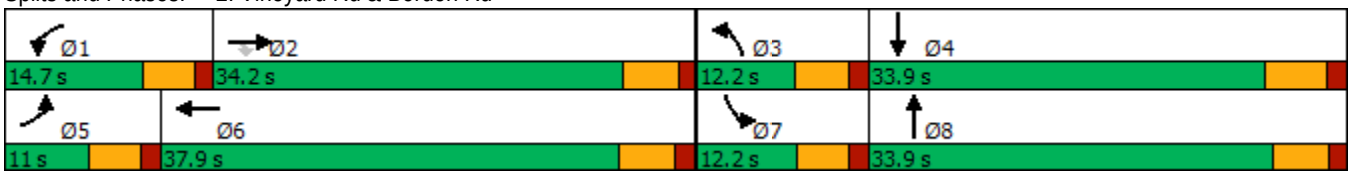
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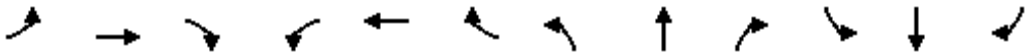
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	30	350	10	130	570	20	42	50	140
Future Volume (vph)	30	350	10	130	570	20	42	50	140
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	6.4	23.6	23.6	9.5	34.5	7.4	13.4	6.8	15.7
Actuated g/C Ratio	0.09	0.34	0.34	0.14	0.50	0.11	0.19	0.10	0.23
v/c Ratio	0.22	0.65	0.02	0.63	0.76	0.12	0.35	0.34	0.53
Control Delay	40.3	27.8	0.1	46.8	27.3	38.1	14.1	41.4	27.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.3	27.8	0.1	46.8	27.3	38.1	14.1	41.4	27.8
LOS	D	C	A	D	C	D	B	D	C
Approach Delay		28.0			30.8		17.7		30.6
Approach LOS		C			C		B		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 69.5	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 28.8	Intersection LOS: C
Intersection Capacity Utilization 67.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	350	10	130	570	30	20	42	72	50	140	50
Future Volume (veh/h)	30	350	10	130	570	30	20	42	72	50	140	50
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		0.95	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	35	407	12	151	663	35	23	49	84	58	163	58
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, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	77	673	568	189	743	39	65	90	154	106	225	80
Arrive On Green	0.04	0.36	0.36	0.11	0.42	0.42	0.04	0.15	0.15	0.06	0.17	0.17
Sat Flow, veh/h	1781	1870	1578	1781	1760	93	1781	596	1022	1781	1309	466
Grp Volume(v), veh/h	35	407	12	151	0	698	23	0	133	58	0	221
Grp Sat Flow(s),veh/h/ln	1781	1870	1578	1781	0	1853	1781	0	1618	1781	0	1775
Q Serve(g_s), s	1.3	11.8	0.3	5.5	0.0	23.1	0.8	0.0	5.0	2.1	0.0	7.8
Cycle Q Clear(g_c), s	1.3	11.8	0.3	5.5	0.0	23.1	0.8	0.0	5.0	2.1	0.0	7.8
Prop In Lane	1.00		1.00	1.00		0.05	1.00		0.63	1.00		0.26
Lane Grp Cap(c), veh/h	77	673	568	189	0	782	65	0	244	106	0	306
V/C Ratio(X)	0.46	0.60	0.02	0.80	0.00	0.89	0.35	0.00	0.55	0.55	0.00	0.72
Avail Cap(c_a), veh/h	162	820	692	264	0	908	188	0	697	191	0	751
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.9	17.3	13.7	28.9	0.0	17.7	31.1	0.0	26.0	30.2	0.0	25.9
Incr Delay (d2), s/veh	1.6	0.9	0.0	7.4	0.0	10.1	1.2	0.0	1.9	1.6	0.0	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	0.6	4.8	0.1	2.6	0.0	10.9	0.4	0.0	2.0	0.9	0.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.5	18.2	13.7	36.2	0.0	27.9	32.3	0.0	27.9	31.9	0.0	29.1
LnGrp LOS	C	B	B	D	A	C	C	A	C	C	A	C
Approach Vol, veh/h		454			849			156			279	
Approach Delay, s/veh		19.2			29.3			28.5			29.7	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	29.3	7.6	17.3	7.8	33.4	9.0	15.9
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	7.5	13.8	2.8	9.8	3.3	25.1	4.1	7.0
Green Ext Time (p_c), s	0.0	2.2	0.0	1.2	0.0	2.8	0.0	0.7

Intersection Summary	
HCM 6th Ctrl Delay	26.7
HCM 6th LOS	C

Notes

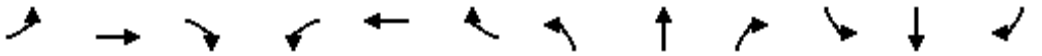
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	20	490	40	679	852	110	30	66	470	113	424
Future Volume (vph)	20	490	40	679	852	110	30	66	470	113	424
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	41.7	63.0	63.0	9.0	33.0	33.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	34.8%	52.5%	52.5%	7.5%	27.5%	27.5%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	4.9	24.0	24.0	44.0	66.6	66.6	5.0	22.7	22.7	10.7	30.2
Actuated g/C Ratio	0.04	0.20	0.20	0.37	0.56	0.56	0.04	0.19	0.19	0.09	0.25
v/c Ratio	0.33	0.85	0.14	0.82	0.53	0.15	0.63	0.15	0.81	0.87	0.86
Control Delay	68.6	58.3	0.8	44.3	20.0	3.3	87.8	51.3	24.5	98.4	54.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.6	58.3	0.8	44.3	20.0	3.3	87.8	51.3	24.5	98.4	54.1
LOS	E	E	A	D	B	A	F	D	C	F	D
Approach Delay		54.5			28.9			31.0			62.3
Approach LOS		D			C			C			E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 39.5	Intersection LOS: D
Intersection Capacity Utilization 77.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	490	40	679	852	110	30	66	470	113	424	72
Future Volume (veh/h)	20	490	40	679	852	110	30	66	470	113	424	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	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	1870	1870	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	24	598	49	828	1039	134	37	80	0	138	517	88
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	30	892	309	862	1980	861	43	511		163	584	99
Arrive On Green	0.02	0.25	0.25	0.31	0.56	0.56	0.03	0.18	0.00	0.09	0.24	0.24
Sat Flow, veh/h	1781	3554	1232	2765	3554	1546	1425	2843	1268	1781	2423	410
Grp Volume(v), veh/h	24	598	49	828	1039	134	37	80	0	138	302	303
Grp Sat Flow(s),veh/h/ln	1781	1777	1232	1382	1777	1546	1425	1421	1268	1781	1421	1412
Q Serve(g_s), s	1.6	18.2	3.2	35.3	22.0	5.0	3.1	2.9	0.0	9.2	24.6	24.8
Cycle Q Clear(g_c), s	1.6	18.2	3.2	35.3	22.0	5.0	3.1	2.9	0.0	9.2	24.6	24.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.29
Lane Grp Cap(c), veh/h	30	892	309	862	1980	861	43	511		163	343	341
V/C Ratio(X)	0.81	0.67	0.16	0.96	0.52	0.16	0.86	0.16		0.85	0.88	0.89
Avail Cap(c_a), veh/h	74	892	309	869	1980	861	59	656		163	399	397
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	58.8	40.5	25.7	40.6	16.6	12.9	57.9	41.5	0.0	53.7	43.9	44.0
Incr Delay (d2), s/veh	17.6	2.2	0.3	21.2	1.0	0.4	46.0	0.1	0.0	30.1	18.1	19.2
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	0.9	8.2	1.1	14.4	9.0	1.8	1.7	1.0	0.0	5.5	10.3	10.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	76.4	42.7	26.0	61.7	17.6	13.3	104.0	41.6	0.0	83.7	62.0	63.2
LnGrp LOS	E	D	C	E	B	B	F	D		F	E	E
Approach Vol, veh/h		671			2001			117	A		743	
Approach Delay, s/veh		42.7			35.6			61.3			66.5	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	42.7	35.4	7.6	34.2	6.0	72.2	15.0	26.9
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	37.7	* 25	5.0	33.7	5.0	57.7	11.0	27.7
Max Q Clear Time (g_c+I1), s	37.3	20.2	5.1	26.8	3.6	24.0	11.2	4.9
Green Ext Time (p_c), s	0.1	2.2	0.0	2.1	0.0	14.1	0.0	0.3

Intersection Summary	
HCM 6th Ctrl Delay	44.3
HCM 6th LOS	D

Notes

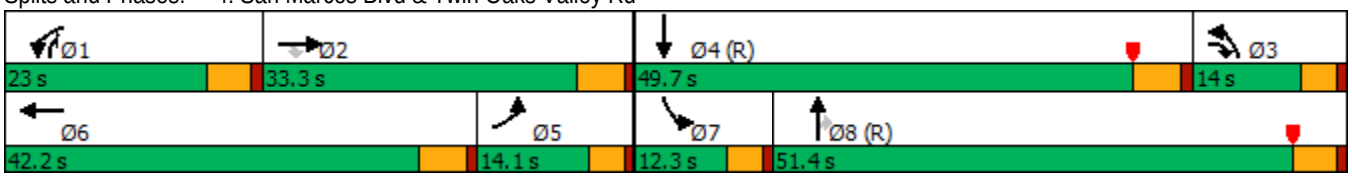
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

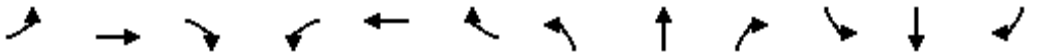
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	160	491	270	625	703	210	530	664	141	910
Future Volume (vph)	160	491	270	625	703	210	530	664	141	910
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	10.0	24.5	35.1	18.0	33.3	9.6	50.2	68.2	7.8	48.2
Actuated g/C Ratio	0.08	0.20	0.29	0.15	0.28	0.08	0.42	0.57	0.06	0.40
v/c Ratio	0.57	0.69	0.52	1.24	0.78	0.78	0.37	0.72	0.65	0.90
Control Delay	61.4	49.4	16.0	159.5	37.3	74.7	25.9	23.4	68.8	43.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.4	49.4	16.0	159.5	37.3	74.7	25.9	23.4	68.8	43.2
LOS	E	D	B	F	D	E	C	C	E	D
Approach Delay		41.7			93.0		32.0			45.9
Approach LOS		D			F		C			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.24	
Intersection Signal Delay: 54.0	Intersection LOS: D
Intersection Capacity Utilization 89.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	491	270	625	703	43	210	530	664	141	910	320
Future Volume (veh/h)	160	491	270	625	703	43	210	530	664	141	910	320
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	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	163	501	276	638	717	44	214	541	678	144	929	327
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	289	703	483	518	889	55	382	1536	922	198	955	334
Arrive On Green	0.08	0.20	0.20	0.15	0.26	0.26	0.04	0.14	0.14	0.06	0.37	0.37
Sat Flow, veh/h	3456	3554	1558	3456	3395	208	3456	3554	1583	3456	2581	904
Grp Volume(v), veh/h	163	501	276	638	375	386	214	541	678	144	638	618
Grp Sat Flow(s),veh/h/ln	1728	1777	1558	1728	1777	1827	1728	1777	1583	1728	1777	1708
Q Serve(g_s), s	5.4	15.8	5.0	18.0	23.7	23.7	7.3	16.5	37.8	4.9	42.4	42.9
Cycle Q Clear(g_c), s	5.4	15.8	5.0	18.0	23.7	23.7	7.3	16.5	37.8	4.9	42.4	42.9
Prop In Lane	1.00		1.00	1.00		0.11	1.00		1.00	1.00		0.53
Lane Grp Cap(c), veh/h	289	703	483	518	465	478	382	1536	922	198	657	632
V/C Ratio(X)	0.56	0.71	0.57	1.23	0.81	0.81	0.56	0.35	0.74	0.73	0.97	0.98
Avail Cap(c_a), veh/h	289	829	539	518	546	562	382	1536	922	233	657	632
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.9	45.0	15.1	51.0	41.4	41.5	54.9	36.3	27.7	55.6	37.2	37.3
Incr Delay (d2), s/veh	1.6	3.5	2.2	119.9	9.4	9.3	1.1	0.6	4.9	6.7	28.6	30.8
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	2.4	7.3	3.9	16.4	11.5	11.9	3.4	8.0	17.1	2.3	23.3	22.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.5	48.4	17.4	170.9	50.9	50.7	56.0	36.9	32.6	62.4	65.8	68.1
LnGrp LOS	D	D	B	F	D	D	E	D	C	E	E	E
Approach Vol, veh/h		940			1399			1433			1400	
Approach Delay, s/veh		40.3			105.6			37.7			66.4	
Approach LOS		D			F			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	29.0	18.3	49.7	15.3	36.7	11.1	56.9
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	20.0	17.8	9.3	44.9	7.4	25.7	6.9	39.8
Green Ext Time (p_c), s	0.0	5.1	0.0	0.0	0.1	5.7	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	64.3
HCM 6th LOS	E

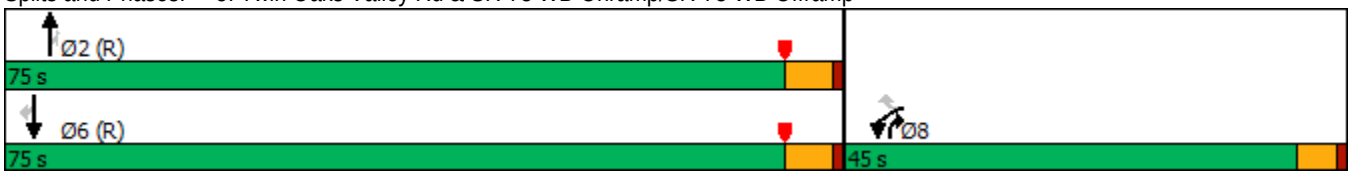
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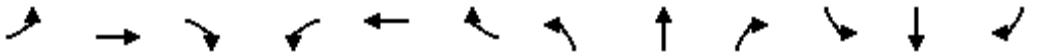
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	520	242	1202	500	1289	477
Future Volume (vph)	520	242	1202	500	1289	477
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	25.6	25.6	84.5	110.8	84.5	84.5
Actuated g/C Ratio	0.21	0.21	0.70	0.92	0.70	0.70
v/c Ratio	0.77	0.39	0.36	0.38	0.39	0.42
Control Delay	51.7	26.7	5.6	1.2	8.8	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.7	26.7	5.6	1.2	8.8	3.0
LOS	D	C	A	A	A	A
Approach Delay			4.3		7.2	
Approach LOS			A		A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 53.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	520	0	242	0	1202	500	0	1289	477
Future Volume (veh/h)	0	0	0	520	0	242	0	1202	500	0	1289	477
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				565	0	263	0	1307	543	0	1401	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				654	0	528	0	3718	1428	0	3718	
Arrive On Green				0.19	0.00	0.19	0.00	0.97	0.97	0.00	0.97	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1548	0	5274	1585
Grp Volume(v), veh/h				565	0	263	0	1307	543	0	1401	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1548	0	1702	1585
Q Serve(g_s), s				19.0	0.0	10.1	0.0	1.5	0.8	0.0	1.6	0.0
Cycle Q Clear(g_c), s				19.0	0.0	10.1	0.0	1.5	0.8	0.0	1.6	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				654	0	528	0	3718	1428	0	3718	
V/C Ratio(X)				0.86	0.00	0.50	0.00	0.35	0.38	0.00	0.38	
Avail Cap(c_a), veh/h				1163	0	939	0	3718	1428	0	3718	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.33	1.33	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.79	0.79	0.00	0.20	0.00
Uniform Delay (d), s/veh				47.1	0.0	43.5	0.0	0.5	0.1	0.0	0.5	0.0
Incr Delay (d2), s/veh				1.4	0.0	0.3	0.0	0.2	0.6	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				8.3	0.0	3.5	0.0	0.4	0.6	0.0	0.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				48.5	0.0	43.8	0.0	0.7	0.7	0.0	0.6	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					828			1850			1401	A
Approach Delay, s/veh					47.0			0.7			0.6	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	92.7		92.7		27.3			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	3.5		3.6		21.0			
Green Ext Time (p_c), s	10.5		9.4		1.7			

Intersection Summary	
HCM 6th Ctrl Delay	10.1
HCM 6th LOS	B

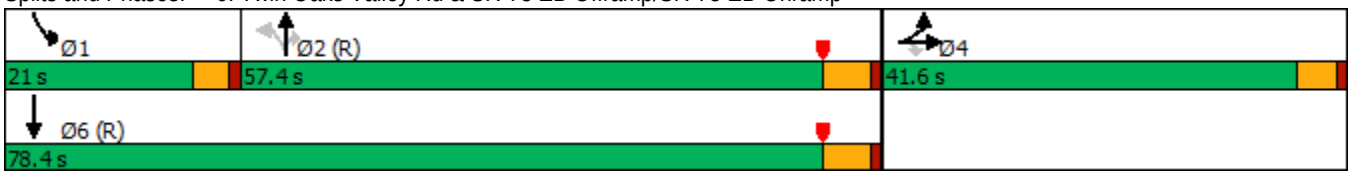
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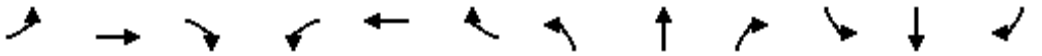
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	502	5	550	1140	570	397	1392
Future Volume (vph)	502	5	550	1140	570	397	1392
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	32.0	32.0	32.0	57.3	57.3	16.5	78.1
Actuated g/C Ratio	0.27	0.27	0.27	0.48	0.48	0.14	0.65
v/c Ratio	0.85	0.85	0.79	0.49	0.80	0.88	0.44
Control Delay	59.5	54.3	46.4	23.0	37.9	65.4	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.5	54.3	46.4	23.0	37.9	65.4	10.8
LOS	E	D	D	C	D	E	B
Approach Delay		53.6		28.0			23.0
Approach LOS		D		C			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 92 (77%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 32.0	Intersection LOS: C
Intersection Capacity Utilization 78.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	502	5	550	0	0	0	0	1140	570	397	1392	0
Future Volume (veh/h)	502	5	550	0	0	0	0	1140	570	397	1392	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	711	0	375				0	1188	594	414	1450	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	926	0	412				60	2497	764	462	3358	0
Arrive On Green	0.26	0.00	0.26				0.00	0.49	0.49	0.27	1.00	0.00
Sat Flow, veh/h	3563	0	1585				367	5106	1562	3456	5274	0
Grp Volume(v), veh/h	711	0	375				0	1188	594	414	1450	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				367	1702	1562	1728	1702	0
Q Serve(g_s), s	22.1	0.0	27.5				0.0	18.6	37.6	13.9	0.0	0.0
Cycle Q Clear(g_c), s	22.1	0.0	27.5				0.0	18.6	37.6	13.9	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	926	0	412				60	2497	764	462	3358	0
V/C Ratio(X)	0.77	0.00	0.91				0.00	0.48	0.78	0.90	0.43	0.00
Avail Cap(c_a), veh/h	1098	0	489				60	2497	764	484	3358	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.86	0.86	0.00
Uniform Delay (d), s/veh	41.1	0.0	43.1				0.0	20.4	25.3	43.2	0.0	0.0
Incr Delay (d2), s/veh	2.2	0.0	17.7				0.0	0.7	7.7	16.6	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.0	0.0	12.7				0.0	7.5	15.2	6.1	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.3	0.0	60.7				0.0	21.1	32.9	59.8	0.3	0.0
LnGrp LOS	D	A	E				A	C	C	E	A	A
Approach Vol, veh/h		1086						1782			1864	
Approach Delay, s/veh		49.3						25.0			13.6	
Approach LOS		D						C			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	20.2	64.0		35.8		84.2
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	15.9	39.6		29.5		2.0
Green Ext Time (p_c), s	0.2	6.1		1.7		9.9

Intersection Summary	
HCM 6th Ctrl Delay	26.1
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	7	190	6	2	590
Future Vol, veh/h	17	7	190	6	2	590
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	8	207	7	2	641

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	536	107	0	0	214	0
Stage 1	211	-	-	-	-	-
Stage 2	325	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	475	926	-	-	1353	-
Stage 1	804	-	-	-	-	-
Stage 2	705	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	475	926	-	-	1353	-
Mov Cap-2 Maneuver	475	-	-	-	-	-
Stage 1	804	-	-	-	-	-
Stage 2	704	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	475	926	1353	-
HCM Lane V/C Ratio	-	-	0.039	0.008	0.002	-
HCM Control Delay (s)	-	-	12.9	8.9	7.7	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1070	1630	2	0	45
Future Vol, veh/h	0	1070	1630	2	0	45
Conflicting Peds, #/hr	0	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1216	1852	2	0	51

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	929
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	231
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	231
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

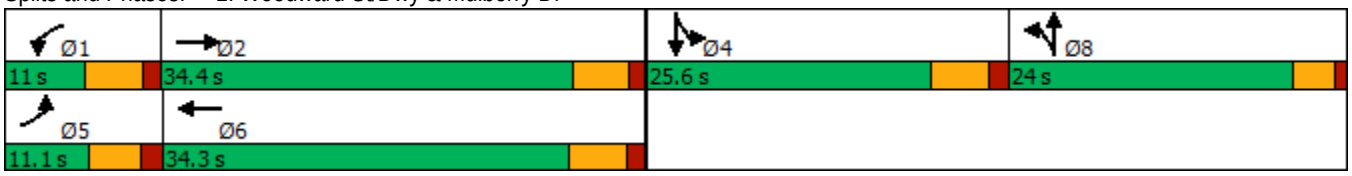
Approach	EB	WB	SB
HCM Control Delay, s	0	0	25
HCM LOS			D

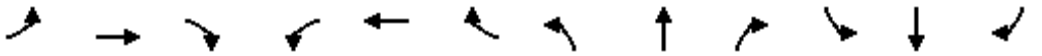
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	231
HCM Lane V/C Ratio	-	-	-	0.221
HCM Control Delay (s)	-	-	-	25
HCM Lane LOS	-	-	-	D
HCM 95th %tile Q(veh)	-	-	-	0.8

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	180	40	160	32	0		
Future Volume (vph)	180	40	160	32	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	28.3	6.4	31.8	9.7	9.7		
Actuated g/C Ratio	0.63	0.14	0.71	0.22	0.22		
v/c Ratio	0.24	0.18	0.14	0.10	0.02		
Control Delay	13.6	27.6	9.0	20.5	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.6	27.6	9.0	20.5	0.1		
LOS	B	C	A	C	A		
Approach Delay	13.6		12.8		12.7		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 44.8	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.24	
Intersection Signal Delay: 13.2	Intersection LOS: B
Intersection Capacity Utilization 35.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	180	54	40	160	0	32	0	20	0	0	0
Future Volume (veh/h)	0	180	54	40	160	0	32	0	20	0	0	0
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	0	207	62	46	184	0	37	0	23	0	0	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	377	113	97	997	0	168	0	150	0	7	0
Arrive On Green	0.00	0.27	0.27	0.05	0.53	0.00	0.09	0.00	0.09	0.00	0.00	0.00
Sat Flow, veh/h	1781	1381	414	1781	1870	0	1775	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	269	46	184	0	37	0	23	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1795	1781	1870	0	1775	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	3.3	0.6	1.3	0.0	0.5	0.0	0.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	3.3	0.6	1.3	0.0	0.5	0.0	0.3	0.0	0.0	0.0
Prop In Lane	1.00		0.23	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	7	0	490	97	997	0	168	0	150	0	7	0
V/C Ratio(X)	0.00	0.00	0.55	0.47	0.18	0.00	0.22	0.00	0.15	0.00	0.00	0.00
Avail Cap(c_a), veh/h	414	0	2025	394	2081	0	1376	0	1229	0	1450	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.0	11.8	3.1	0.0	10.8	0.0	10.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.0	1.3	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	0.9	0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	9.0	13.2	3.2	0.0	11.0	0.0	10.9	0.0	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		269			230			60			0	
Approach Delay, s/veh		9.0			5.2			11.0			0.0	
Approach LOS		A			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.7	12.6		0.0	0.0	19.4		6.4				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.6	5.3		0.0	0.0	3.3		2.5				
Green Ext Time (p_c), s	0.0	1.6		0.0	0.0	1.0		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		7.6
HCM 6th LOS		A

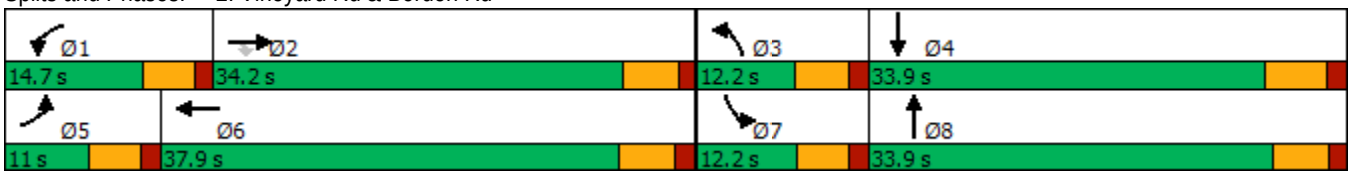
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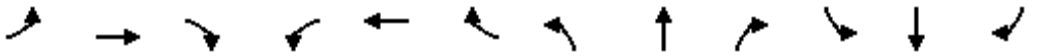
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	40	360	20	62	320	10	121	30	62
Future Volume (vph)	40	360	20	62	320	10	121	30	62
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	7.3	20.7	20.7	9.0	21.3	8.5	14.7	7.5	16.0
Actuated g/C Ratio	0.13	0.36	0.36	0.16	0.37	0.15	0.25	0.13	0.28
v/c Ratio	0.19	0.59	0.03	0.24	0.58	0.04	0.49	0.14	0.18
Control Delay	36.7	23.9	0.1	33.9	22.0	35.4	22.2	36.0	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.7	23.9	0.1	33.9	22.0	35.4	22.2	36.0	17.2
LOS	D	C	A	C	C	D	C	D	B
Approach Delay		23.9			23.8		22.8		22.3
Approach LOS		C			C		C		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 57.8	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 58.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	360	20	62	320	40	10	121	91	30	62	20
Future Volume (veh/h)	40	360	20	62	320	40	10	121	91	30	62	20
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		0.98	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	391	22	67	348	43	11	132	99	33	67	22
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	95	514	435	149	493	61	35	181	136	78	274	90
Arrive On Green	0.05	0.27	0.27	0.08	0.30	0.30	0.02	0.18	0.18	0.04	0.20	0.20
Sat Flow, veh/h	1781	1870	1585	1781	1627	201	1781	992	744	1781	1342	441
Grp Volume(v), veh/h	43	391	22	67	0	391	11	0	231	33	0	89
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1828	1781	0	1736	1781	0	1783
Q Serve(g_s), s	1.2	9.9	0.5	1.8	0.0	9.8	0.3	0.0	6.5	0.9	0.0	2.2
Cycle Q Clear(g_c), s	1.2	9.9	0.5	1.8	0.0	9.8	0.3	0.0	6.5	0.9	0.0	2.2
Prop In Lane	1.00		1.00	1.00		0.11	1.00		0.43	1.00		0.25
Lane Grp Cap(c), veh/h	95	514	435	149	0	554	35	0	317	78	0	365
V/C Ratio(X)	0.45	0.76	0.05	0.45	0.00	0.71	0.31	0.00	0.73	0.42	0.00	0.24
Avail Cap(c_a), veh/h	207	1053	892	339	0	1150	242	0	961	245	0	969
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.6	17.1	13.7	22.5	0.0	15.9	24.9	0.0	19.9	24.0	0.0	17.2
Incr Delay (d2), s/veh	1.2	2.4	0.0	0.8	0.0	1.7	1.8	0.0	3.2	1.3	0.0	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	0.5	4.0	0.2	0.7	0.0	3.8	0.1	0.0	2.6	0.4	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.9	19.5	13.8	23.3	0.0	17.6	26.7	0.0	23.1	25.3	0.0	17.5
LnGrp LOS	C	B	B	C	A	B	C	A	C	C	A	B
Approach Vol, veh/h		456			458			242			122	
Approach Delay, s/veh		19.7			18.4			23.2			19.6	
Approach LOS		B			B			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.2	19.6	6.2	16.4	7.8	21.1	7.4	15.3
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	3.8	11.9	2.3	4.2	3.2	11.8	2.9	8.5
Green Ext Time (p_c), s	0.0	2.3	0.0	0.4	0.0	2.4	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	19.9
HCM 6th LOS	B

Notes

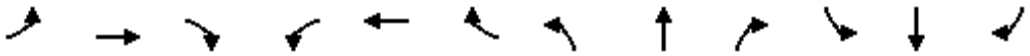
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	122	930	80	344	751	110	70	265	720	27	176
Future Volume (vph)	122	930	80	344	751	110	70	265	720	27	176
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	39.7	61.0	61.0	11.0	35.0	35.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	33.1%	50.8%	50.8%	9.2%	29.2%	29.2%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	5.0	25.0	25.0	46.9	66.9	66.9	7.0	26.6	26.6	6.4	22.5
Actuated g/C Ratio	0.04	0.21	0.21	0.39	0.56	0.56	0.06	0.22	0.22	0.05	0.19
v/c Ratio	1.74	1.31	0.24	0.33	0.40	0.13	0.89	0.44	0.93	0.30	0.46
Control Delay	416.9	189.6	6.0	28.8	17.3	3.3	92.2	55.5	39.2	61.9	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	416.9	189.6	6.0	28.8	17.3	3.3	92.2	55.5	39.2	61.9	37.0
LOS	F	F	A	C	B	A	F	E	D	E	D
Approach Delay		201.2			19.3			46.9			39.6
Approach LOS		F			B			D			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.74	
Intersection Signal Delay: 85.0	Intersection LOS: F
Intersection Capacity Utilization 96.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	930	80	344	751	110	70	265	720	27	176	61
Future Volume (veh/h)	122	930	80	344	751	110	70	265	720	27	176	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		0.97
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	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	127	969	83	358	782	115	73	276	0	28	183	64
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	1783	624	411	2202	968	83	466		35	260	87
Arrive On Green	0.04	0.50	0.50	0.15	0.62	0.62	0.06	0.16	0.00	0.02	0.13	0.13
Sat Flow, veh/h	1781	3554	1244	2765	3554	1562	1425	2843	1268	1781	2072	697
Grp Volume(v), veh/h	127	969	83	358	782	115	73	276	0	28	123	124
Grp Sat Flow(s),veh/h/ln	1781	1777	1244	1382	1777	1562	1425	1421	1268	1781	1421	1347
Q Serve(g_s), s	5.0	22.4	3.1	15.2	12.9	3.6	6.1	10.8	0.0	1.9	10.0	10.6
Cycle Q Clear(g_c), s	5.0	22.4	3.1	15.2	12.9	3.6	6.1	10.8	0.0	1.9	10.0	10.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.52
Lane Grp Cap(c), veh/h	74	1783	624	411	2202	968	83	466		35	178	169
V/C Ratio(X)	1.71	0.54	0.13	0.87	0.36	0.12	0.88	0.59		0.80	0.69	0.73
Avail Cap(c_a), veh/h	74	1783	624	822	2202	968	83	704		163	399	378
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	57.5	20.5	8.4	50.0	11.1	9.4	56.1	46.4	0.0	58.6	50.3	50.5
Incr Delay (d2), s/veh	370.4	0.4	0.1	2.3	0.4	0.3	58.6	0.4	0.0	14.2	4.7	6.0
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	9.9	9.2	1.2	5.4	5.0	1.3	3.5	3.8	0.0	1.0	3.8	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	427.9	20.9	8.6	52.2	11.6	9.6	114.6	46.9	0.0	72.8	55.0	56.6
LnGrp LOS	F	C	A	D	B	A	F	D		E	E	E
Approach Vol, veh/h		1179			1255			349	A		275	
Approach Delay, s/veh		63.9			23.0			61.1			57.5	
Approach LOS		E			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.1	65.5	11.0	20.3	9.0	79.7	6.4	25.0
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	35.7	* 25	7.0	33.7	5.0	55.7	11.0	29.7
Max Q Clear Time (g_c+I1), s	17.2	24.4	8.1	12.6	7.0	14.9	3.9	12.8
Green Ext Time (p_c), s	0.6	0.4	0.0	1.4	0.0	10.4	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	46.2
HCM 6th LOS	D

Notes

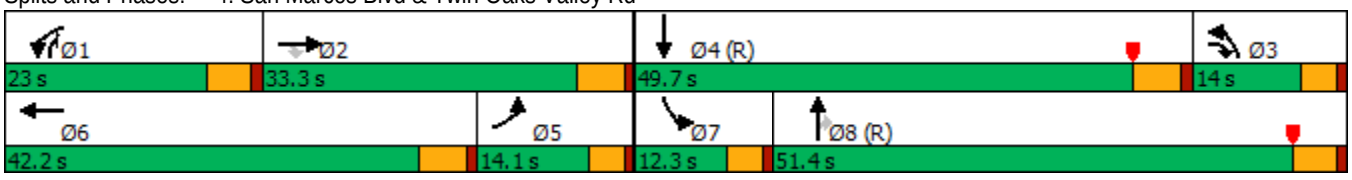
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

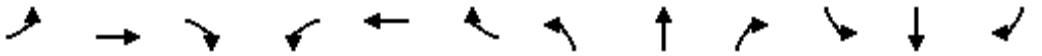
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	320	904	370	557	642	390	820	437	134	620
Future Volume (vph)	320	904	370	557	642	390	820	437	134	620
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	13.0	28.0	38.9	18.0	33.8	9.8	46.8	64.8	7.7	44.4
Actuated g/C Ratio	0.11	0.23	0.32	0.15	0.28	0.08	0.39	0.54	0.06	0.37
v/c Ratio	0.88	1.12	0.66	1.11	0.79	1.42	0.61	0.50	0.62	0.72
Control Delay	78.1	111.4	23.0	116.2	46.2	249.6	32.9	17.1	67.4	33.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.1	111.4	23.0	116.2	46.2	249.6	32.9	17.1	67.4	33.6
LOS	E	F	C	F	D	F	C	B	E	C
Approach Delay		84.1			75.7		80.0			38.0
Approach LOS		F			E		F			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 105	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.42	
Intersection Signal Delay: 72.3	Intersection LOS: E
Intersection Capacity Utilization 95.0%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	904	370	557	642	122	390	820	437	134	620	290
Future Volume (veh/h)	320	904	370	557	642	122	390	820	437	134	620	290
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		0.97	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	327	922	378	568	655	124	398	837	446	137	633	296
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	387	829	552	518	798	151	402	1417	868	191	768	359
Arrive On Green	0.11	0.23	0.23	0.15	0.27	0.27	0.04	0.13	0.13	0.06	0.33	0.33
Sat Flow, veh/h	3456	3554	1575	3456	2968	561	3456	3554	1579	3456	2338	1093
Grp Volume(v), veh/h	327	922	378	568	392	387	398	837	446	137	481	448
Grp Sat Flow(s),veh/h/ln	1728	1777	1575	1728	1777	1752	1728	1777	1579	1728	1777	1655
Q Serve(g_s), s	11.1	28.0	7.3	18.0	24.8	24.9	13.8	26.6	24.4	4.7	29.9	29.9
Cycle Q Clear(g_c), s	11.1	28.0	7.3	18.0	24.8	24.9	13.8	26.6	24.4	4.7	29.9	29.9
Prop In Lane	1.00		1.00	1.00		0.32	1.00		1.00	1.00		0.66
Lane Grp Cap(c), veh/h	387	829	552	518	478	471	402	1417	868	191	584	544
V/C Ratio(X)	0.85	1.11	0.68	1.10	0.82	0.82	0.99	0.59	0.51	0.72	0.82	0.82
Avail Cap(c_a), veh/h	387	829	552	518	546	539	402	1417	868	233	657	612
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.3	46.0	13.9	51.0	41.1	41.2	57.6	42.9	25.6	55.8	37.1	37.1
Incr Delay (d2), s/veh	15.0	66.7	4.4	68.2	10.4	10.7	39.7	1.7	2.0	5.5	12.5	13.3
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	5.6	19.9	5.4	12.7	12.2	12.1	8.7	13.0	10.7	2.2	14.9	14.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.3	112.7	18.3	119.2	51.5	51.8	97.4	44.5	27.6	61.2	49.6	50.4
LnGrp LOS	E	F	B	F	D	D	F	D	C	E	D	D
Approach Vol, veh/h		1627			1347			1681			1066	
Approach Delay, s/veh		81.6			80.1			52.5			51.4	
Approach LOS		F			F			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	33.3	19.0	44.7	18.7	37.6	10.8	52.9
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	20.0	30.0	15.8	31.9	13.1	26.9	6.7	28.6
Green Ext Time (p_c), s	0.0	0.0	0.0	7.5	0.0	5.4	0.0	11.7

Intersection Summary	
HCM 6th Ctrl Delay	67.1
HCM 6th LOS	E

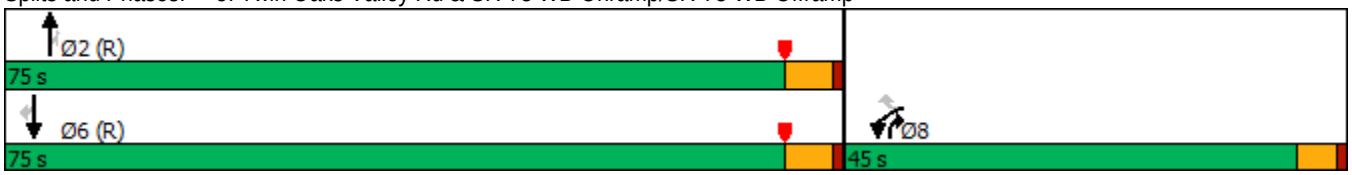
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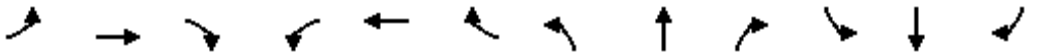
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	490	388	1280	510	1224	363
Future Volume (vph)	490	388	1280	510	1224	363
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	23.4	23.4	86.7	110.8	86.7	86.7
Actuated g/C Ratio	0.20	0.20	0.72	0.92	0.72	0.72
v/c Ratio	0.75	0.64	0.36	0.36	0.34	0.30
Control Delay	52.5	38.2	7.4	1.3	11.8	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	38.2	7.4	1.3	11.8	5.1
LOS	D	D	A	A	B	A
Approach Delay			5.7		10.3	
Approach LOS			A		B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 15.8	Intersection LOS: B
Intersection Capacity Utilization 52.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	490	0	388	0	1280	510	0	1224	363
Future Volume (veh/h)	0	0	0	490	0	388	0	1280	510	0	1224	363
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				500	0	396	0	1306	520	0	1249	0
Peak Hour Factor				0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				596	0	481	0	3804	1426	0	3804	
Arrive On Green				0.17	0.00	0.17	0.00	1.00	1.00	0.00	0.99	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1547	0	5274	1585
Grp Volume(v), veh/h				500	0	396	0	1306	520	0	1249	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1547	0	1702	1585
Q Serve(g_s), s				16.8	0.0	16.4	0.0	0.0	0.0	0.0	0.4	0.0
Cycle Q Clear(g_c), s				16.8	0.0	16.4	0.0	0.0	0.0	0.0	0.4	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				596	0	481	0	3804	1426	0	3804	
V/C Ratio(X)				0.84	0.00	0.82	0.00	0.34	0.36	0.00	0.33	
Avail Cap(c_a), veh/h				1163	0	939	0	3804	1426	0	3804	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.81	0.81	0.00	0.46	0.00
Uniform Delay (d), s/veh				48.0	0.0	47.9	0.0	0.0	0.0	0.0	0.1	0.0
Incr Delay (d2), s/veh				1.2	0.0	1.4	0.0	0.2	0.6	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				7.3	0.0	5.8	0.0	0.1	0.2	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				49.3	0.0	49.2	0.0	0.2	0.6	0.0	0.2	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					896			1826			1249	A
Approach Delay, s/veh					49.3			0.3			0.2	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	94.7		94.7		25.3			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	2.0		2.4		18.8			
Green Ext Time (p_c), s	10.4		7.8		1.9			

Intersection Summary		
HCM 6th Ctrl Delay	11.3	
HCM 6th LOS	B	

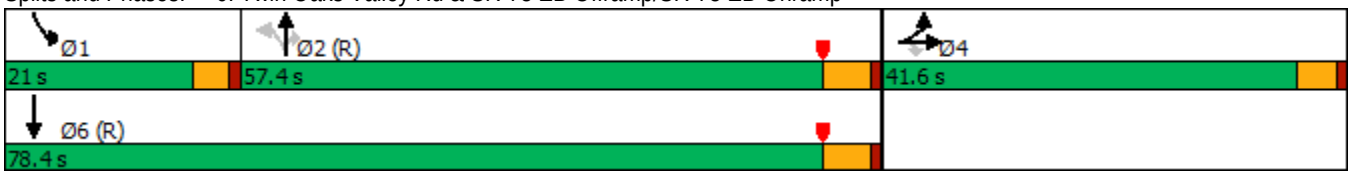
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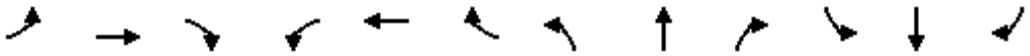
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	178	15	250	1582	540	323	1361
Future Volume (vph)	178	15	250	1582	540	323	1361
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	18.9	18.9	18.9	71.3	71.3	15.7	91.2
Actuated g/C Ratio	0.16	0.16	0.16	0.59	0.59	0.13	0.76
v/c Ratio	0.61	0.56	0.52	0.55	0.62	0.76	0.37
Control Delay	55.0	38.4	32.2	17.4	22.3	52.8	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.0	38.4	32.2	17.4	22.3	52.8	9.3
LOS	D	D	C	B	C	D	A
Approach Delay		42.1		18.6			17.6
Approach LOS		D		B			B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 102 (85%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 20.7	Intersection LOS: C
Intersection Capacity Utilization 62.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	178	15	250	0	0	0	0	1582	540	323	1361	0
Future Volume (veh/h)	178	15	250	0	0	0	0	1582	540	323	1361	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	130	0	335				0	1665	568	340	1433	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	227	0	404				60	3270	1000	396	4034	0
Arrive On Green	0.13	0.00	0.13				0.00	0.64	0.64	0.23	1.00	0.00
Sat Flow, veh/h	1781	0	3170				373	5106	1561	3456	5274	0
Grp Volume(v), veh/h	130	0	335				0	1665	568	340	1433	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				373	1702	1561	1728	1702	0
Q Serve(g_s), s	8.2	0.0	12.4				0.0	20.9	24.7	11.3	0.0	0.0
Cycle Q Clear(g_c), s	8.2	0.0	12.4				0.0	20.9	24.7	11.3	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	227	0	404				60	3270	1000	396	4034	0
V/C Ratio(X)	0.57	0.00	0.83				0.00	0.51	0.57	0.86	0.36	0.00
Avail Cap(c_a), veh/h	549	0	977				60	3270	1000	484	4034	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.89	0.89	0.00
Uniform Delay (d), s/veh	49.3	0.0	51.1				0.0	11.5	12.2	45.3	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	1.7				0.0	0.6	2.3	11.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	5.0				0.0	7.7	8.8	4.9	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.1	0.0	52.8				0.0	12.1	14.5	56.5	0.2	0.0
LnGrp LOS	D	A	D				A	B	B	E	A	A
Approach Vol, veh/h		465						2233			1773	
Approach Delay, s/veh		52.0						12.7			11.0	
Approach LOS		D						B			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	18.0	82.2		19.9		100.1
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	13.3	26.7		14.4		2.0
Green Ext Time (p_c), s	0.4	12.1		0.9		9.7

Intersection Summary		
HCM 6th Ctrl Delay		16.1
HCM 6th LOS		B

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	3	470	27	8	255
Future Vol, veh/h	8	3	470	27	8	255
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	3	511	29	9	277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	683	270	0	0	540	0
Stage 1	526	-	-	-	-	-
Stage 2	157	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	383	728	-	-	1025	-
Stage 1	557	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	380	728	-	-	1025	-
Mov Cap-2 Maneuver	380	-	-	-	-	-
Stage 1	557	-	-	-	-	-
Stage 2	847	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.4	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	380	728	1025	-
HCM Lane V/C Ratio	-	-	0.023	0.004	0.008	-
HCM Control Delay (s)	-	-	14.7	10	8.5	-
HCM Lane LOS	-	-	B	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1675	1200	4	0	21
Future Vol, veh/h	0	1675	1200	4	0	21
Conflicting Peds, #/hr	0	0	0	4	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1727	1237	4	0	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	626
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	366
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	364
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	364
HCM Lane V/C Ratio	-	-	-	0.059
HCM Control Delay (s)	-	-	-	15.5
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.2

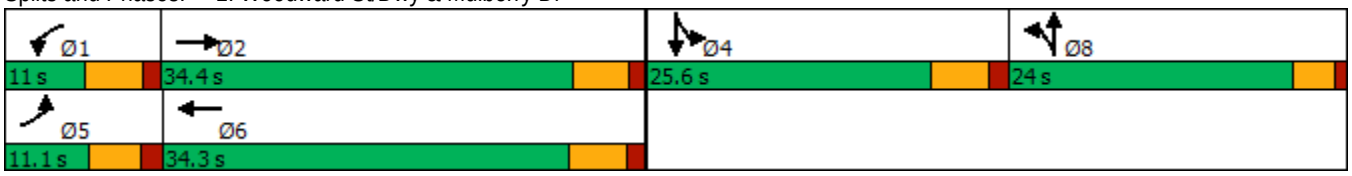
APPENDIX F

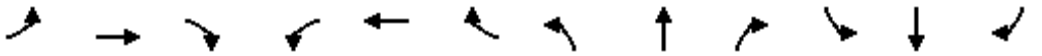
PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS – YEAR 2035

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	280	30	230	70	0		
Future Volume (vph)	280	30	230	70	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	26.2	6.3	29.4	9.8	9.8		
Actuated g/C Ratio	0.55	0.13	0.62	0.21	0.21		
v/c Ratio	0.37	0.14	0.23	0.22	0.07		
Control Delay	15.1	29.1	9.6	22.3	0.2		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	15.1	29.1	9.6	22.3	0.2		
LOS	B	C	A	C	A		
Approach Delay	15.1		11.8		13.1		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 47.6	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.37	
Intersection Signal Delay: 13.6	Intersection LOS: B
Intersection Capacity Utilization 39.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	280	50	30	230	0	70	0	50	0	0	0
Future Volume (veh/h)	0	280	50	30	230	0	70	0	50	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	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	0	318	57	34	261	0	80	0	57	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	6	489	88	73	993	0	279	0	249	0	6	0
Arrive On Green	0.00	0.32	0.32	0.04	0.53	0.00	0.16	0.00	0.16	0.00	0.00	0.00
Sat Flow, veh/h	1781	1538	276	1781	1870	0	1777	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	375	34	261	0	80	0	57	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1814	1781	1870	0	1777	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	5.5	0.6	2.3	0.0	1.2	0.0	1.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	5.5	0.6	2.3	0.0	1.2	0.0	1.0	0.0	0.0	0.0
Prop In Lane	1.00		0.15	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	6	0	577	73	993	0	279	0	249	0	6	0
V/C Ratio(X)	0.00	0.00	0.65	0.47	0.26	0.00	0.29	0.00	0.23	0.00	0.00	0.00
Avail Cap(c_a), veh/h	347	0	1715	330	1744	0	1155	0	1030	0	1215	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	9.0	14.4	3.9	0.0	11.5	0.0	11.3	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.2	1.7	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	1.6	0.2	0.4	0.0	0.4	0.0	0.3	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	10.3	16.1	4.1	0.0	11.7	0.0	11.5	0.0	0.0	0.0
LnGrp LOS	A	A	B	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		375			295			137			0	
Approach Delay, s/veh		10.3			5.5			11.6			0.0	
Approach LOS		B			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	15.4		0.0	0.0	21.9		8.8				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.6	7.5		0.0	0.0	4.3		3.2				
Green Ext Time (p_c), s	0.0	2.3		0.0	0.0	1.5		0.3				

Intersection Summary			
HCM 6th Ctrl Delay		8.7	
HCM 6th LOS		A	

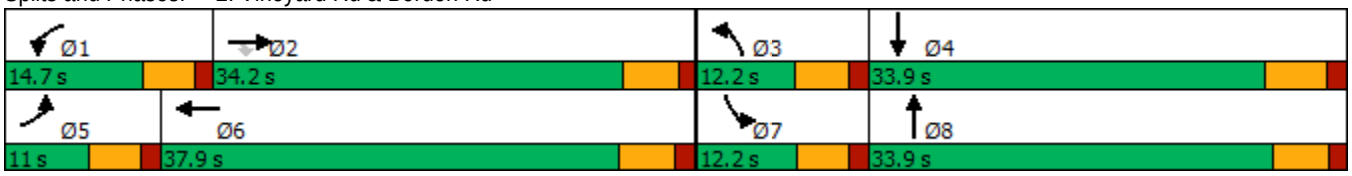
Notes

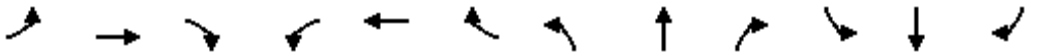
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	60	350	10	160	570	20	70	110	250
Future Volume (vph)	60	350	10	160	570	20	70	110	250
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	6.2	26.9	26.9	10.0	33.2	7.2	15.6	7.3	23.4
Actuated g/C Ratio	0.08	0.33	0.33	0.12	0.41	0.09	0.19	0.09	0.29
v/c Ratio	0.52	0.66	0.02	0.85	0.97	0.15	0.47	0.81	0.77
Control Delay	55.8	30.8	0.1	72.2	54.5	41.7	22.2	76.7	37.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.8	30.8	0.1	72.2	54.5	41.7	22.2	76.7	37.5
LOS	E	C	A	E	D	D	C	E	D
Approach Delay		33.6			58.1		24.5		46.9
Approach LOS		C			E		C		D

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 80.9	
Natural Cycle: 105	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 46.6	Intersection LOS: D
Intersection Capacity Utilization 82.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	350	10	160	570	60	20	70	80	110	250	100
Future Volume (veh/h)	60	350	10	160	570	60	20	70	80	110	250	100
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		0.96	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	407	12	186	663	70	23	81	93	128	291	116
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, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	613	517	208	641	68	62	167	192	151	335	134
Arrive On Green	0.06	0.33	0.33	0.12	0.39	0.39	0.03	0.22	0.22	0.08	0.26	0.26
Sat Flow, veh/h	1781	1870	1578	1781	1662	176	1781	774	889	1781	1265	504
Grp Volume(v), veh/h	70	407	12	186	0	733	23	0	174	128	0	407
Grp Sat Flow(s),veh/h/ln	1781	1870	1578	1781	0	1838	1781	0	1662	1781	0	1769
Q Serve(g_s), s	3.2	15.7	0.4	8.6	0.0	32.4	1.1	0.0	7.7	6.0	0.0	18.4
Cycle Q Clear(g_c), s	3.2	15.7	0.4	8.6	0.0	32.4	1.1	0.0	7.7	6.0	0.0	18.4
Prop In Lane	1.00		1.00	1.00		0.10	1.00		0.53	1.00		0.29
Lane Grp Cap(c), veh/h	102	613	517	208	0	709	62	0	359	151	0	469
V/C Ratio(X)	0.68	0.66	0.02	0.89	0.00	1.03	0.37	0.00	0.48	0.85	0.00	0.87
Avail Cap(c_a), veh/h	127	646	545	208	0	709	148	0	564	151	0	590
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.8	24.3	19.1	36.6	0.0	25.8	39.6	0.0	28.8	37.9	0.0	29.5
Incr Delay (d2), s/veh	6.3	2.4	0.0	34.4	0.0	42.8	1.4	0.0	1.0	32.9	0.0	11.0
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	1.6	7.1	0.2	5.7	0.0	21.6	0.5	0.0	3.1	3.9	0.0	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.1	26.7	19.1	71.0	0.0	68.6	41.0	0.0	29.8	70.9	0.0	40.5
LnGrp LOS	D	C	B	E	A	F	D	A	C	E	A	D
Approach Vol, veh/h		489			919			197			535	
Approach Delay, s/veh		29.1			69.1			31.1			47.7	
Approach LOS		C			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	33.0	8.1	28.1	9.8	37.9	12.2	24.1
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	10.6	17.7	3.1	20.4	5.2	34.4	8.0	9.7
Green Ext Time (p_c), s	0.0	1.9	0.0	1.5	0.0	0.0	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	51.1
HCM 6th LOS	D

Notes

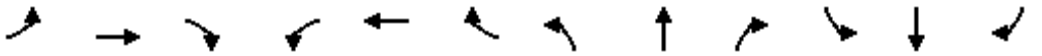
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	20	520	40	750	900	120	30	60	530	110	430
Future Volume (vph)	20	520	40	750	900	120	30	60	530	110	430
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	41.7	63.0	63.0	9.0	33.0	33.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	34.8%	52.5%	52.5%	7.5%	27.5%	27.5%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	4.9	24.4	24.4	43.5	66.5	66.5	5.0	22.9	22.9	10.7	30.3
Actuated g/C Ratio	0.04	0.20	0.20	0.36	0.55	0.55	0.04	0.19	0.19	0.09	0.25
v/c Ratio	0.33	0.88	0.13	0.92	0.56	0.16	0.63	0.14	0.85	0.85	0.86
Control Delay	68.6	61.1	0.8	53.3	20.6	3.2	85.2	50.8	25.2	95.4	54.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.6	61.1	0.8	53.3	20.6	3.2	85.2	50.8	25.2	95.4	54.4
LOS	E	E	A	D	C	A	F	D	C	F	D
Approach Delay		57.2			33.3			30.6			61.8
Approach LOS		E			C			C			E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 41.6	Intersection LOS: D
Intersection Capacity Utilization 80.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	520	40	750	900	120	30	60	530	110	430	70
Future Volume (veh/h)	20	520	40	750	900	120	30	60	530	110	430	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	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	1870	1870	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	24	634	49	915	1098	146	37	73	0	134	524	85
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	30	880	305	869	1976	860	43	519		160	591	96
Arrive On Green	0.02	0.25	0.25	0.31	0.56	0.56	0.03	0.18	0.00	0.09	0.24	0.24
Sat Flow, veh/h	1781	3554	1232	2765	3554	1546	1425	2843	1268	1781	2442	394
Grp Volume(v), veh/h	24	634	49	915	1098	146	37	73	0	134	304	305
Grp Sat Flow(s),veh/h/ln	1781	1777	1232	1382	1777	1546	1425	1421	1268	1781	1421	1415
Q Serve(g_s), s	1.6	19.6	3.2	37.7	23.8	5.6	3.1	2.6	0.0	8.9	24.7	25.0
Cycle Q Clear(g_c), s	1.6	19.6	3.2	37.7	23.8	5.6	3.1	2.6	0.0	8.9	24.7	25.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.28
Lane Grp Cap(c), veh/h	30	880	305	869	1976	860	43	519		160	344	343
V/C Ratio(X)	0.81	0.72	0.16	1.05	0.56	0.17	0.86	0.14		0.84	0.88	0.89
Avail Cap(c_a), veh/h	74	880	305	869	1976	860	59	656		163	399	397
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	58.8	41.3	26.0	41.2	17.1	13.1	57.9	41.1	0.0	53.8	43.8	43.9
Incr Delay (d2), s/veh	17.6	3.1	0.3	45.6	1.1	0.4	46.0	0.0	0.0	28.3	18.4	19.4
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	0.9	8.9	1.2	18.1	9.8	2.0	1.7	0.9	0.0	5.2	10.4	10.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	76.4	44.5	26.3	86.8	18.2	13.5	104.0	41.2	0.0	82.0	62.2	63.3
LnGrp LOS	E	D	C	F	B	B	F	D		F	E	E
Approach Vol, veh/h		707			2159			110	A		743	
Approach Delay, s/veh		44.3			47.0			62.3			66.2	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	43.0	35.0	7.6	34.4	6.0	72.0	14.8	27.2
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	37.7	* 25	5.0	33.7	5.0	57.7	11.0	27.7
Max Q Clear Time (g_c+I1), s	39.7	21.6	5.1	27.0	3.6	25.8	10.9	4.6
Green Ext Time (p_c), s	0.0	1.7	0.0	2.1	0.0	14.7	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	50.8
HCM 6th LOS	D

Notes

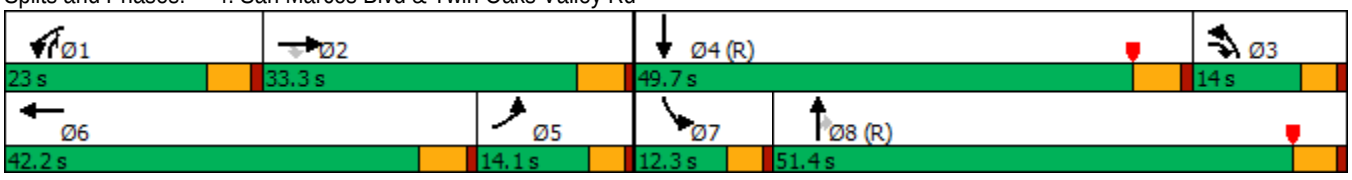
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

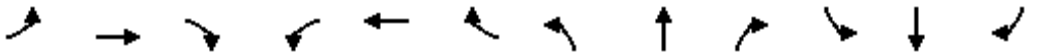
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	180	520	290	660	740	230	630	710	160	1080
Future Volume (vph)	180	520	290	660	740	230	630	710	160	1080
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	9.9	25.2	36.0	18.0	34.1	9.7	49.4	67.4	7.9	47.3
Actuated g/C Ratio	0.08	0.21	0.30	0.15	0.28	0.08	0.41	0.56	0.07	0.39
v/c Ratio	0.65	0.72	0.55	1.31	0.80	0.85	0.44	0.78	0.72	1.08
Control Delay	64.7	49.6	17.2	185.8	34.7	85.4	32.7	32.7	73.3	84.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.7	49.6	17.2	185.8	34.7	85.4	32.7	32.7	73.3	84.0
LOS	E	D	B	F	C	F	C	C	E	F
Approach Delay		42.9			103.9		40.4			83.0
Approach LOS		D			F		D			F

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.31	
Intersection Signal Delay: 69.4	Intersection LOS: E
Intersection Capacity Utilization 98.5%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	520	290	660	740	40	230	630	710	160	1080	370
Future Volume (veh/h)	180	520	290	660	740	40	230	630	710	160	1080	370
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	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	184	531	296	673	755	41	235	643	724	163	1102	378
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	284	724	483	518	921	50	361	1495	904	217	965	326
Arrive On Green	0.08	0.20	0.20	0.15	0.27	0.27	0.03	0.14	0.14	0.06	0.37	0.37
Sat Flow, veh/h	3456	3554	1558	3456	3423	186	3456	3554	1583	3456	2608	881
Grp Volume(v), veh/h	184	531	296	673	392	404	235	643	724	163	745	735
Grp Sat Flow(s),veh/h/ln	1728	1777	1558	1728	1777	1832	1728	1777	1583	1728	1777	1712
Q Serve(g_s), s	6.2	16.8	5.4	18.0	24.8	24.8	8.1	19.9	41.3	5.6	44.4	44.4
Cycle Q Clear(g_c), s	6.2	16.8	5.4	18.0	24.8	24.8	8.1	19.9	41.3	5.6	44.4	44.4
Prop In Lane	1.00		1.00	1.00		0.10	1.00		1.00	1.00		0.51
Lane Grp Cap(c), veh/h	284	724	483	518	478	493	361	1495	904	217	657	633
V/C Ratio(X)	0.65	0.73	0.61	1.30	0.82	0.82	0.65	0.43	0.80	0.75	1.13	1.16
Avail Cap(c_a), veh/h	285	829	529	518	546	563	361	1495	904	233	657	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.4	44.7	15.4	51.0	41.1	41.1	55.8	38.5	29.6	55.3	37.8	37.8
Incr Delay (d2), s/veh	4.0	4.0	2.9	148.0	10.3	10.1	2.9	0.8	6.7	10.1	78.0	88.8
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	2.8	7.8	4.4	18.4	12.2	12.5	3.8	9.7	19.0	2.7	33.1	33.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.4	48.7	18.3	199.0	51.4	51.2	58.7	39.3	36.3	65.4	115.8	126.6
LnGrp LOS	E	D	B	F	D	D	E	D	D	E	F	F
Approach Vol, veh/h		1011			1469			1602			1643	
Approach Delay, s/veh		41.4			119.0			40.8			115.6	
Approach LOS		D			F			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	29.8	17.5	49.7	15.2	37.6	11.7	55.5
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	20.0	18.8	10.1	46.4	8.2	26.8	7.6	43.3
Green Ext Time (p_c), s	0.0	4.9	0.0	0.0	0.1	5.5	0.0	2.6

Intersection Summary	
HCM 6th Ctrl Delay	82.4
HCM 6th LOS	F

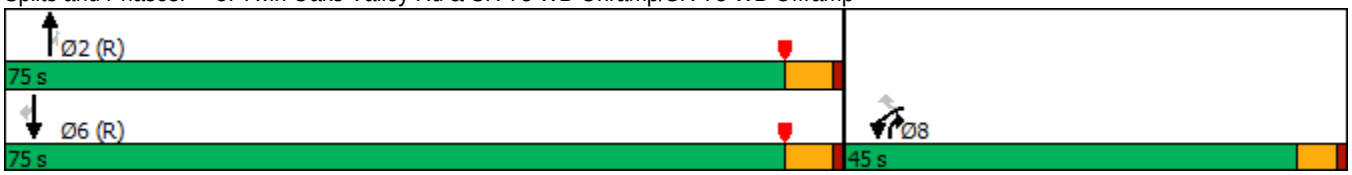
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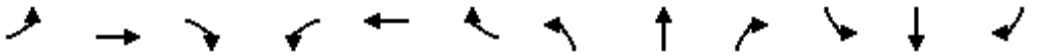
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	550	240	1420	530	1520	720
Future Volume (vph)	550	240	1420	530	1520	720
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	26.9	26.9	83.2	110.8	83.2	83.2
Actuated g/C Ratio	0.22	0.22	0.69	0.92	0.69	0.69
v/c Ratio	0.78	0.39	0.44	0.40	0.47	0.60
Control Delay	50.9	32.2	6.0	0.7	6.9	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.9	32.2	6.0	0.7	6.9	2.7
LOS	D	C	A	A	A	A
Approach Delay			4.6		5.5	
Approach LOS			A		A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 11.5	Intersection LOS: B
Intersection Capacity Utilization 54.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	550	0	240	0	1420	530	0	1520	720
Future Volume (veh/h)	0	0	0	550	0	240	0	1420	530	0	1520	720
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				598	0	261	0	1543	576	0	1652	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				688	0	555	0	3669	1428	0	3669	
Arrive On Green				0.20	0.00	0.20	0.00	0.96	0.96	0.00	0.96	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1548	0	5274	1585
Grp Volume(v), veh/h				598	0	261	0	1543	576	0	1652	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1548	0	1702	1585
Q Serve(g_s), s				20.1	0.0	9.9	0.0	2.7	1.1	0.0	3.0	0.0
Cycle Q Clear(g_c), s				20.1	0.0	9.9	0.0	2.7	1.1	0.0	3.0	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				688	0	555	0	3669	1428	0	3669	
V/C Ratio(X)				0.87	0.00	0.47	0.00	0.42	0.40	0.00	0.45	
Avail Cap(c_a), veh/h				1163	0	939	0	3669	1428	0	3669	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.33	1.33	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.55	0.55	0.00	0.09	0.00
Uniform Delay (d), s/veh				46.6	0.0	42.5	0.0	0.8	0.1	0.0	0.8	0.0
Incr Delay (d2), s/veh				1.8	0.0	0.2	0.0	0.2	0.5	0.0	0.0	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				8.8	0.0	3.4	0.0	0.6	0.8	0.0	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				48.4	0.0	42.7	0.0	1.0	0.5	0.0	0.9	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					859			2119			1652	A
Approach Delay, s/veh					46.6			0.9			0.9	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	91.5		91.5		28.5			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	4.7		5.0		22.1			
Green Ext Time (p_c), s	13.9		12.4		1.8			

Intersection Summary		
HCM 6th Ctrl Delay	9.4	
HCM 6th LOS	A	

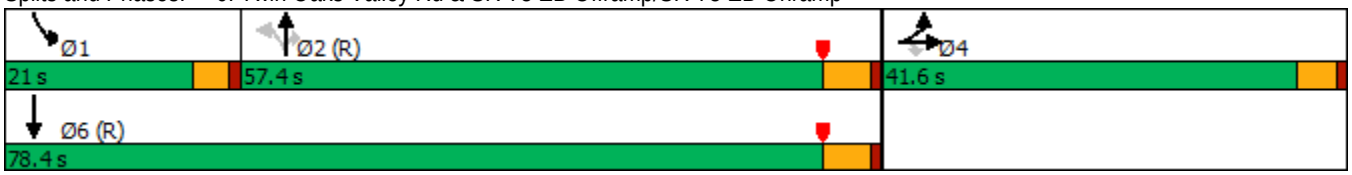
Notes

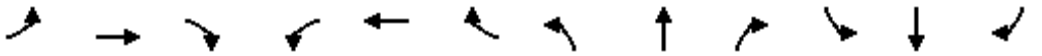
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	630	10	710	1500	630	420	1820
Future Volume (vph)	630	10	710	1500	630	420	1820
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	37.0	37.0	37.0	52.1	52.1	16.8	73.1
Actuated g/C Ratio	0.31	0.31	0.31	0.43	0.43	0.14	0.61
v/c Ratio	0.95	0.99	0.88	0.71	0.97	0.91	0.61
Control Delay	70.1	79.3	54.3	29.9	63.1	74.0	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	70.1	79.3	54.3	29.9	63.1	74.0	14.6
LOS	E	E	D	C	E	E	B
Approach Delay		68.2		39.7			25.8
Approach LOS		E		D			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 92 (77%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 41.0	Intersection LOS: D
Intersection Capacity Utilization 88.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	630	10	710	0	0	0	0	1500	630	420	1820	0
Future Volume (veh/h)	630	10	710	0	0	0	0	1500	630	420	1820	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	903	0	483				0	1562	656	438	1896	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	1098	0	489				60	2220	679	481	3110	0
Arrive On Green	0.31	0.00	0.31				0.00	0.43	0.43	0.28	1.00	0.00
Sat Flow, veh/h	3563	0	1585				238	5106	1561	3456	5274	0
Grp Volume(v), veh/h	903	0	483				0	1562	656	438	1896	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				238	1702	1561	1728	1702	0
Q Serve(g_s), s	28.2	0.0	36.4				0.0	29.9	49.2	14.7	0.0	0.0
Cycle Q Clear(g_c), s	28.2	0.0	36.4				0.0	29.9	49.2	14.7	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1098	0	489				60	2220	679	481	3110	0
V/C Ratio(X)	0.82	0.00	0.99				0.00	0.70	0.97	0.91	0.61	0.00
Avail Cap(c_a), veh/h	1098	0	489				60	2220	679	484	3110	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.82	0.82	0.00
Uniform Delay (d), s/veh	38.4	0.0	41.3				0.0	27.6	33.1	42.6	0.0	0.0
Incr Delay (d2), s/veh	4.8	0.0	37.5				0.0	1.9	27.2	18.2	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.9	0.0	19.1				0.0	12.4	23.2	6.6	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.3	0.0	78.8				0.0	29.5	60.3	60.7	0.7	0.0
LnGrp LOS	D	A	E				A	C	E	E	A	A
Approach Vol, veh/h		1386						2218			2334	
Approach Delay, s/veh		55.6						38.6			12.0	
Approach LOS		E						D			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	20.9	57.5		41.6		78.4
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	16.7	51.2		38.4		2.0
Green Ext Time (p_c), s	0.0	0.8		0.0		16.4

Intersection Summary		
HCM 6th Ctrl Delay		32.1
HCM 6th LOS		C

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	200	0	0	610
Future Vol, veh/h	0	0	200	0	0	610
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	217	0	0	663

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	549	109	0	0	217	0
Stage 1	217	-	-	-	-	-
Stage 2	332	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	466	924	-	-	1350	-
Stage 1	798	-	-	-	-	-
Stage 2	699	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	466	924	-	-	1350	-
Mov Cap-2 Maneuver	466	-	-	-	-	-
Stage 1	798	-	-	-	-	-
Stage 2	699	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1350	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1160	1770	1	0	35
Future Vol, veh/h	0	1160	1770	1	0	35
Conflicting Peds, #/hr	0	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1318	2011	1	0	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1008
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	205
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	205
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

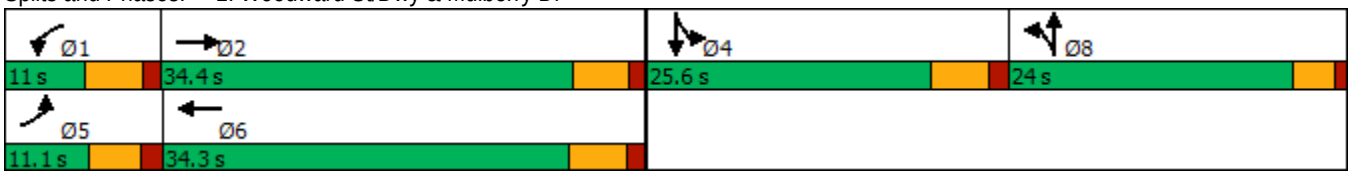
Approach	EB	WB	SB
HCM Control Delay, s	0	0	26.7
HCM LOS			D

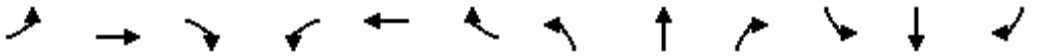
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	205
HCM Lane V/C Ratio	-	-	-	0.194
HCM Control Delay (s)	-	-	-	26.7
HCM Lane LOS	-	-	-	D
HCM 95th %tile Q(veh)	-	-	-	0.7

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	200	40	180	30	0		
Future Volume (vph)	200	40	180	30	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	29.1	6.4	32.5	9.8	9.8		
Actuated g/C Ratio	0.64	0.14	0.71	0.22	0.22		
v/c Ratio	0.25	0.18	0.16	0.09	0.03		
Control Delay	13.6	28.2	8.9	21.1	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.6	28.2	8.9	21.1	0.1		
LOS	B	C	A	C	A		
Approach Delay	13.6		12.4		12.6		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 45.5	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.25	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 36.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	200	50	40	180	0	30	0	20	0	0	0
Future Volume (veh/h)	0	200	50	40	180	0	30	0	20	0	0	0
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	0	230	57	46	207	0	34	0	23	0	0	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	407	101	97	1009	0	161	0	144	0	7	0
Arrive On Green	0.00	0.28	0.28	0.05	0.54	0.00	0.09	0.00	0.09	0.00	0.00	0.00
Sat Flow, veh/h	1781	1447	358	1781	1870	0	1775	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	287	46	207	0	34	0	23	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1805	1781	1870	0	1775	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	3.5	0.7	1.5	0.0	0.5	0.0	0.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	3.5	0.7	1.5	0.0	0.5	0.0	0.3	0.0	0.0	0.0
Prop In Lane	1.00		0.20	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	7	0	507	97	1009	0	161	0	144	0	7	0
V/C Ratio(X)	0.00	0.00	0.57	0.47	0.21	0.00	0.21	0.00	0.16	0.00	0.00	0.00
Avail Cap(c_a), veh/h	412	0	2022	391	2067	0	1367	0	1221	0	1440	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.0	11.9	3.1	0.0	10.9	0.0	10.9	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.0	1.3	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	0.9	0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	9.0	13.3	3.2	0.0	11.2	0.0	11.1	0.0	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		287			253			57			0	
Approach Delay, s/veh		9.0			5.0			11.1			0.0	
Approach LOS		A			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.7	12.9		0.0	0.0	19.6		6.4				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.7	5.5		0.0	0.0	3.5		2.5				
Green Ext Time (p_c), s	0.0	1.7		0.0	0.0	1.2		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		7.5
HCM 6th LOS		A

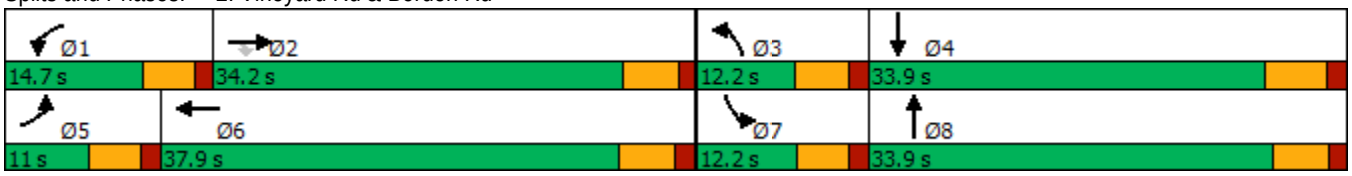
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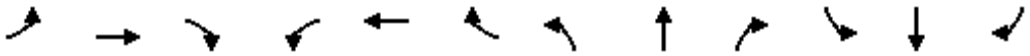
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	90	360	20	70	320	10	210	60	110
Future Volume (vph)	90	360	20	70	320	10	210	60	110
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	6.5	25.2	25.2	8.4	22.7	7.6	19.2	7.0	25.4
Actuated g/C Ratio	0.09	0.34	0.34	0.11	0.31	0.10	0.26	0.09	0.34
v/c Ratio	0.64	0.62	0.03	0.38	0.78	0.06	0.73	0.39	0.28
Control Delay	60.5	30.0	0.1	42.5	34.7	39.6	34.6	45.5	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.5	30.0	0.1	42.5	34.7	39.6	34.6	45.5	18.3
LOS	E	C	A	D	C	D	C	D	B
Approach Delay		34.6			35.9		34.8		25.7
Approach LOS		C			D		C		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 74.2	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 33.7	Intersection LOS: C
Intersection Capacity Utilization 67.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	360	20	70	320	80	10	210	110	60	110	50
Future Volume (veh/h)	90	360	20	70	320	80	10	210	110	60	110	50
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		0.98	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	98	391	22	76	348	87	11	228	120	65	120	54
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	135	544	461	142	421	105	34	281	148	113	347	156
Arrive On Green	0.08	0.29	0.29	0.08	0.29	0.29	0.02	0.24	0.24	0.06	0.29	0.29
Sat Flow, veh/h	1781	1870	1585	1781	1436	359	1781	1154	607	1781	1215	547
Grp Volume(v), veh/h	98	391	22	76	0	435	11	0	348	65	0	174
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1795	1781	0	1761	1781	0	1762
Q Serve(g_s), s	3.6	12.4	0.7	2.7	0.0	15.0	0.4	0.0	12.4	2.4	0.0	5.2
Cycle Q Clear(g_c), s	3.6	12.4	0.7	2.7	0.0	15.0	0.4	0.0	12.4	2.4	0.0	5.2
Prop In Lane	1.00		1.00	1.00		0.20	1.00		0.34	1.00		0.31
Lane Grp Cap(c), veh/h	135	544	461	142	0	527	34	0	429	113	0	504
V/C Ratio(X)	0.73	0.72	0.05	0.54	0.00	0.83	0.32	0.00	0.81	0.58	0.00	0.35
Avail Cap(c_a), veh/h	161	818	693	263	0	877	188	0	757	191	0	744
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.0	21.1	16.9	29.3	0.0	21.8	32.1	0.0	23.6	30.2	0.0	18.8
Incr Delay (d2), s/veh	9.3	1.8	0.0	1.2	0.0	3.4	1.9	0.0	3.7	1.7	0.0	0.4
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	1.8	5.3	0.2	1.2	0.0	6.3	0.2	0.0	5.2	1.0	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.2	22.9	16.9	30.5	0.0	25.2	34.0	0.0	27.4	31.9	0.0	19.2
LnGrp LOS	D	C	B	C	A	C	C	A	C	C	A	B
Approach Vol, veh/h		511			511			359			239	
Approach Delay, s/veh		25.7			26.0			27.6			22.6	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.2	24.8	6.5	24.9	10.0	25.0	9.3	22.0
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	4.7	14.4	2.4	7.2	5.6	17.0	4.4	14.4
Green Ext Time (p_c), s	0.0	2.1	0.0	0.9	0.0	2.5	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	25.8
HCM 6th LOS	C

Notes

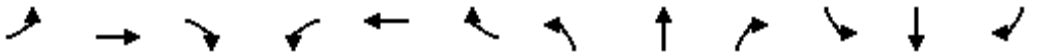
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	120	980	80	390	790	110	70	250	800	25	170
Future Volume (vph)	120	980	80	390	790	110	70	250	800	25	170
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	39.7	61.0	61.0	11.0	35.0	35.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	33.1%	50.8%	50.8%	9.2%	29.2%	29.2%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	5.0	25.0	25.0	43.9	63.9	63.9	7.0	29.7	29.7	6.3	25.5
Actuated g/C Ratio	0.04	0.21	0.21	0.37	0.53	0.53	0.06	0.25	0.25	0.05	0.21
v/c Ratio	1.71	1.39	0.24	0.40	0.44	0.13	0.89	0.37	1.01	0.28	0.39
Control Delay	405.9	218.6	6.0	31.0	18.8	3.3	85.4	51.6	53.6	61.4	34.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	405.9	218.6	6.0	31.0	18.8	3.3	85.4	51.6	53.6	61.4	34.2
LOS	F	F	A	C	B	A	F	D	D	E	C
Approach Delay		223.3			21.2			55.2			36.8
Approach LOS		F			C			E			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.71	
Intersection Signal Delay: 94.1	Intersection LOS: F
Intersection Capacity Utilization 104.5%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	980	80	390	790	110	70	250	800	25	170	60
Future Volume (veh/h)	120	980	80	390	790	110	70	250	800	25	170	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		0.97
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	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	125	1021	83	406	823	115	73	260	0	26	177	62
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	1731	606	460	2212	972	83	463		32	254	85
Arrive On Green	0.04	0.49	0.49	0.17	0.62	0.62	0.06	0.16	0.00	0.02	0.12	0.12
Sat Flow, veh/h	1781	3554	1244	2765	3554	1562	1425	2843	1268	1781	2071	697
Grp Volume(v), veh/h	125	1021	83	406	823	115	73	260	0	26	119	120
Grp Sat Flow(s),veh/h/ln	1781	1777	1244	1382	1777	1562	1425	1421	1268	1781	1421	1347
Q Serve(g_s), s	5.0	24.8	3.2	17.2	13.7	3.6	6.1	10.1	0.0	1.7	9.6	10.3
Cycle Q Clear(g_c), s	5.0	24.8	3.2	17.2	13.7	3.6	6.1	10.1	0.0	1.7	9.6	10.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.52
Lane Grp Cap(c), veh/h	74	1731	606	460	2212	972	83	463		32	174	165
V/C Ratio(X)	1.68	0.59	0.14	0.88	0.37	0.12	0.88	0.56		0.81	0.68	0.73
Avail Cap(c_a), veh/h	74	1731	606	822	2212	972	83	704		163	399	378
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	57.5	22.1	9.1	48.9	11.1	9.2	56.1	46.3	0.0	58.7	50.4	50.7
Incr Delay (d2), s/veh	359.1	0.6	0.1	2.3	0.5	0.2	58.6	0.4	0.0	15.7	4.7	6.0
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	9.7	10.3	1.3	6.1	5.3	1.3	3.5	3.6	0.0	0.9	3.7	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	416.6	22.8	9.3	51.2	11.6	9.5	114.6	46.7	0.0	74.4	55.1	56.7
LnGrp LOS	F	C	A	D	B	A	F	D		E	E	E
Approach Vol, veh/h		1229			1344			333	A		265	
Approach Delay, s/veh		61.9			23.4			61.6			57.7	
Approach LOS		E			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.2	63.8	11.0	20.0	9.0	80.0	6.2	24.8
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	35.7	* 25	7.0	33.7	5.0	55.7	11.0	29.7
Max Q Clear Time (g_c+I1), s	19.2	26.8	8.1	12.3	7.0	15.7	3.7	12.1
Green Ext Time (p_c), s	0.7	0.0	0.0	1.3	0.0	11.0	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	45.2
HCM 6th LOS	D

Notes

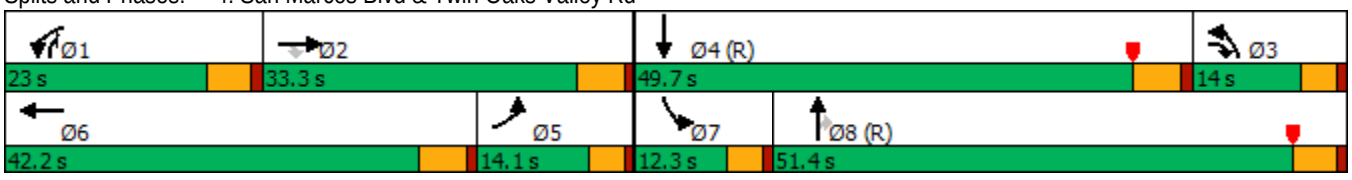
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

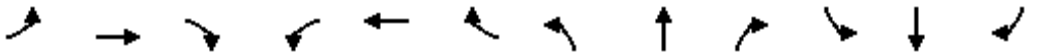
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	360	950	400	600	670	420	970	450	140	730
Future Volume (vph)	360	950	400	600	670	420	970	450	140	730
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	12.3	28.0	38.9	18.0	34.5	9.8	46.7	64.7	7.8	44.4
Actuated g/C Ratio	0.10	0.23	0.32	0.15	0.29	0.08	0.39	0.54	0.06	0.37
v/c Ratio	1.04	1.17	0.71	1.19	0.82	1.53	0.72	0.52	0.64	0.84
Control Delay	111.8	132.1	26.1	145.1	44.8	294.8	37.9	20.6	68.5	39.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	111.8	132.1	26.1	145.1	44.8	294.8	37.9	20.6	68.5	39.5
LOS	F	F	C	F	D	F	D	C	E	D
Approach Delay		103.1			87.7		92.3			42.9
Approach LOS		F			F		F			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 115	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.53	
Intersection Signal Delay: 84.6	Intersection LOS: F
Intersection Capacity Utilization 102.6%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	360	950	400	600	670	130	420	970	450	140	730	330
Future Volume (veh/h)	360	950	400	600	670	130	420	970	450	140	730	330
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		0.97	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	367	969	408	612	684	133	429	990	459	143	745	337
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	359	829	509	518	818	159	308	1411	865	197	842	380
Arrive On Green	0.10	0.23	0.23	0.15	0.28	0.28	0.03	0.13	0.13	0.06	0.36	0.36
Sat Flow, veh/h	3456	3554	1575	3456	2953	574	3456	3554	1579	3456	2367	1070
Grp Volume(v), veh/h	367	969	408	612	411	406	429	990	459	143	559	523
Grp Sat Flow(s),veh/h/ln	1728	1777	1575	1728	1777	1750	1728	1777	1579	1728	1777	1660
Q Serve(g_s), s	12.5	28.0	14.0	18.0	26.1	26.2	10.7	32.0	25.2	4.9	35.5	35.6
Cycle Q Clear(g_c), s	12.5	28.0	14.0	18.0	26.1	26.2	10.7	32.0	25.2	4.9	35.5	35.6
Prop In Lane	1.00		1.00	1.00		0.33	1.00		1.00	1.00		0.64
Lane Grp Cap(c), veh/h	359	829	509	518	492	485	308	1411	865	197	632	590
V/C Ratio(X)	1.02	1.17	0.80	1.18	0.84	0.84	1.39	0.70	0.53	0.72	0.88	0.89
Avail Cap(c_a), veh/h	359	829	509	518	546	538	308	1411	865	233	657	614
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.88	0.88	0.88	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.8	46.0	20.3	51.0	40.8	40.8	58.2	45.3	26.0	55.6	36.3	36.4
Incr Delay (d2), s/veh	53.3	88.7	10.0	99.8	11.6	11.9	192.5	2.6	2.1	6.6	16.5	17.6
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	8.1	22.5	5.9	14.9	12.9	12.8	13.2	15.8	11.1	2.3	18.1	17.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	107.0	134.7	30.3	150.8	52.5	52.8	250.7	47.9	28.0	62.2	52.9	54.0
LnGrp LOS	F	F	C	F	D	D	F	D	C	E	D	D
Approach Vol, veh/h		1744			1429			1878			1225	
Approach Delay, s/veh		104.5			94.7			89.4			54.4	
Approach LOS		F			F			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	33.3	15.7	48.0	17.8	38.5	11.1	52.6
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	20.0	30.0	12.7	37.6	14.5	28.2	6.9	34.0
Green Ext Time (p_c), s	0.0	0.0	0.0	5.1	0.0	5.0	0.0	9.7

Intersection Summary	
HCM 6th Ctrl Delay	88.0
HCM 6th LOS	F

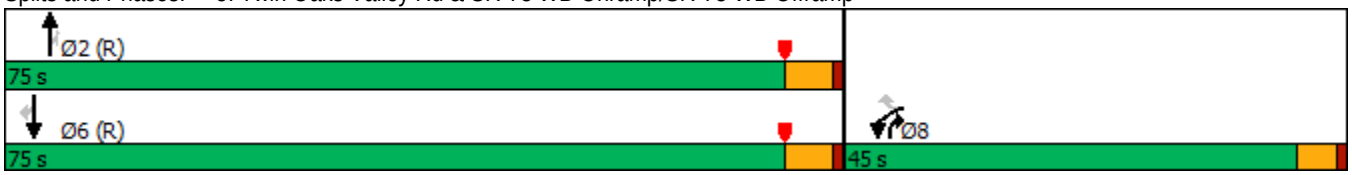
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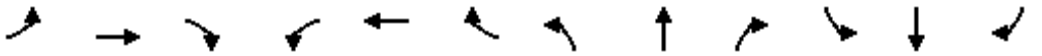
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	520	380	1500	540	1450	550
Future Volume (vph)	520	380	1500	540	1450	550
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	24.7	24.7	85.4	110.8	85.4	85.4
Actuated g/C Ratio	0.21	0.21	0.71	0.92	0.71	0.71
v/c Ratio	0.75	0.63	0.42	0.39	0.41	0.44
Control Delay	51.5	41.5	6.1	0.8	9.1	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.5	41.5	6.1	0.9	9.1	2.5
LOS	D	D	A	A	A	A
Approach Delay			4.7		7.3	
Approach LOS			A		A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 13.5	Intersection LOS: B
Intersection Capacity Utilization 53.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	520	0	380	0	1500	540	0	1450	550
Future Volume (veh/h)	0	0	0	520	0	380	0	1500	540	0	1450	550
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				531	0	388	0	1531	551	0	1480	0
Peak Hour Factor				0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				627	0	506	0	3758	1426	0	3758	
Arrive On Green				0.18	0.00	0.18	0.00	1.00	1.00	0.00	0.98	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1546	0	5274	1585
Grp Volume(v), veh/h				531	0	388	0	1531	551	0	1480	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1546	0	1702	1585
Q Serve(g_s), s				17.8	0.0	15.9	0.0	0.0	0.0	0.0	1.2	0.0
Cycle Q Clear(g_c), s				17.8	0.0	15.9	0.0	0.0	0.0	0.0	1.2	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				627	0	506	0	3758	1426	0	3758	
V/C Ratio(X)				0.85	0.00	0.77	0.00	0.41	0.39	0.00	0.39	
Avail Cap(c_a), veh/h				1163	0	939	0	3758	1426	0	3758	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.59	0.59	0.00	0.28	0.00
Uniform Delay (d), s/veh				47.5	0.0	46.7	0.0	0.0	0.0	0.0	0.3	0.0
Incr Delay (d2), s/veh				1.2	0.0	0.9	0.0	0.2	0.5	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				7.8	0.0	5.6	0.0	0.1	0.2	0.0	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				48.7	0.0	47.6	0.0	0.2	0.5	0.0	0.4	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					919			2082			1480	A
Approach Delay, s/veh					48.3			0.3			0.4	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	93.6		93.6		26.4			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	2.0		3.2		19.8			
Green Ext Time (p_c), s	13.6		10.3		2.0			

Intersection Summary	
HCM 6th Ctrl Delay	10.2
HCM 6th LOS	B

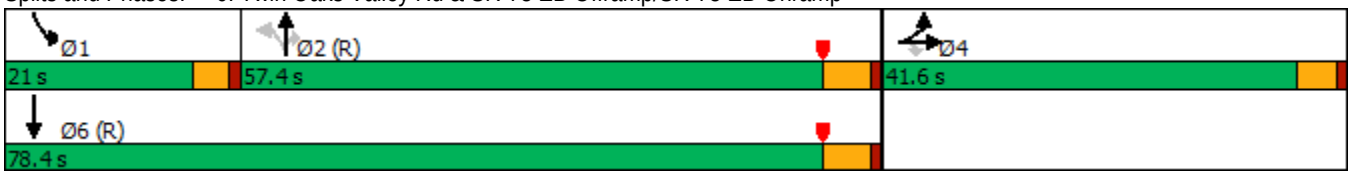
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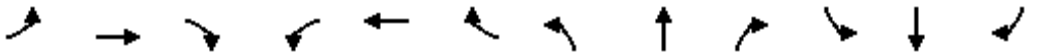
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	210	20	320	2070	600	340	1780
Future Volume (vph)	210	20	320	2070	600	340	1780
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	21.4	21.4	21.4	68.6	68.6	15.9	88.7
Actuated g/C Ratio	0.18	0.18	0.18	0.57	0.57	0.13	0.74
v/c Ratio	0.66	0.69	0.60	0.75	0.71	0.79	0.50
Control Delay	55.2	53.3	36.9	23.2	27.0	63.0	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	55.2	53.3	36.9	23.2	27.0	63.0	11.1
LOS	E	D	D	C	C	E	B
Approach Delay		48.6		24.1			19.4
Approach LOS		D		C			B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 102 (85%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 24.8	Intersection LOS: C
Intersection Capacity Utilization 71.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	20	320	0	0	0	0	2070	600	340	1780	0
Future Volume (veh/h)	210	20	320	0	0	0	0	2070	600	340	1780	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	154	0	422				0	2179	632	358	1874	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	278	0	494				60	3101	948	412	3889	0
Arrive On Green	0.16	0.00	0.16				0.00	0.61	0.61	0.24	1.00	0.00
Sat Flow, veh/h	1781	0	3170				244	5106	1561	3456	5274	0
Grp Volume(v), veh/h	154	0	422				0	2179	632	358	1874	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				244	1702	1561	1728	1702	0
Q Serve(g_s), s	9.6	0.0	15.6				0.0	35.1	32.1	11.9	0.0	0.0
Cycle Q Clear(g_c), s	9.6	0.0	15.6				0.0	35.1	32.1	11.9	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	278	0	494				60	3101	948	412	3889	0
V/C Ratio(X)	0.55	0.00	0.85				0.00	0.70	0.67	0.87	0.48	0.00
Avail Cap(c_a), veh/h	549	0	977				60	3101	948	484	3889	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.86	0.86	0.00
Uniform Delay (d), s/veh	46.8	0.0	49.3				0.0	16.1	15.5	44.8	0.0	0.0
Incr Delay (d2), s/veh	0.6	0.0	1.7				0.0	1.4	3.7	12.1	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	6.3				0.0	13.3	11.8	5.2	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.4	0.0	51.0				0.0	17.5	19.3	56.9	0.4	0.0
LnGrp LOS	D	A	D				A	B	B	E	A	A
Approach Vol, veh/h		576						2811			2232	
Approach Delay, s/veh		50.0						17.9			9.4	
Approach LOS		D						B			A	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	18.5	78.2		23.3		96.7
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	13.9	37.1		17.6		2.0
Green Ext Time (p_c), s	0.4	11.4		1.2		16.0

Intersection Summary			
HCM 6th Ctrl Delay			17.8
HCM 6th LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	480	0	0	255
Future Vol, veh/h	0	0	480	0	0	255
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	522	0	0	277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	661	261	0	0	522	0
Stage 1	522	-	-	-	-	-
Stage 2	139	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	395	738	-	-	1041	-
Stage 1	560	-	-	-	-	-
Stage 2	873	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	395	738	-	-	1041	-
Mov Cap-2 Maneuver	395	-	-	-	-	-
Stage 1	560	-	-	-	-	-
Stage 2	873	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1041	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1805	1290	0	0	16
Future Vol, veh/h	0	1805	1290	0	0	16
Conflicting Peds, #/hr	0	0	0	4	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1861	1330	0	0	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	670
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	343
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	341
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	16.1
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	341
HCM Lane V/C Ratio	-	-	-	0.048
HCM Control Delay (s)	-	-	-	16.1
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.2

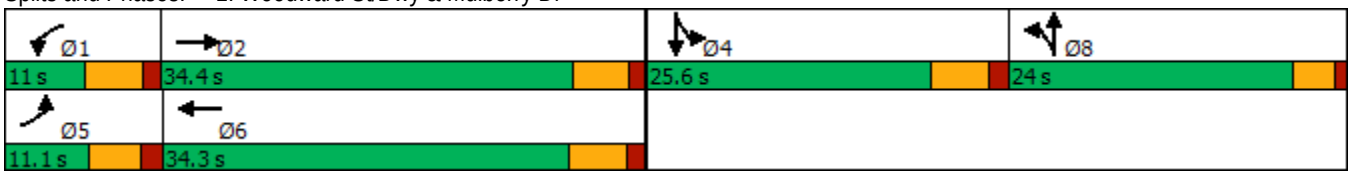
APPENDIX G

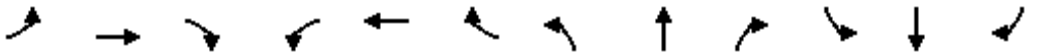
PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS – YEAR 2035 + PROJECT

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	280	30	230	73	0		
Future Volume (vph)	280	30	230	73	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	26.0	6.3	29.2	9.9	9.9		
Actuated g/C Ratio	0.55	0.13	0.62	0.21	0.21		
v/c Ratio	0.38	0.14	0.23	0.23	0.07		
Control Delay	15.1	29.1	9.6	22.3	0.2		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	15.1	29.1	9.6	22.3	0.2		
LOS	B	C	A	C	A		
Approach Delay	15.1		11.9		13.3		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 47.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.38	
Intersection Signal Delay: 13.6	Intersection LOS: B
Intersection Capacity Utilization 40.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	280	51	30	230	0	73	0	50	0	0	0
Future Volume (veh/h)	0	280	51	30	230	0	73	0	50	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	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	0	318	58	34	261	0	83	0	57	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	6	488	89	73	993	0	282	0	251	0	6	0
Arrive On Green	0.00	0.32	0.32	0.04	0.53	0.00	0.16	0.00	0.16	0.00	0.00	0.00
Sat Flow, veh/h	1781	1533	280	1781	1870	0	1777	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	376	34	261	0	83	0	57	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1813	1781	1870	0	1777	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	5.5	0.6	2.4	0.0	1.3	0.0	1.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	5.5	0.6	2.4	0.0	1.3	0.0	1.0	0.0	0.0	0.0
Prop In Lane	1.00		0.15	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	6	0	577	73	993	0	282	0	251	0	6	0
V/C Ratio(X)	0.00	0.00	0.65	0.47	0.26	0.00	0.29	0.00	0.23	0.00	0.00	0.00
Avail Cap(c_a), veh/h	346	0	1708	329	1738	0	1151	0	1026	0	1211	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	9.1	14.5	4.0	0.0	11.5	0.0	11.3	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.3	1.7	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	1.6	0.2	0.4	0.0	0.4	0.0	0.3	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	10.3	16.2	4.1	0.0	11.7	0.0	11.5	0.0	0.0	0.0
LnGrp LOS	A	A	B	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		376			295			140			0	
Approach Delay, s/veh		10.3			5.5			11.6			0.0	
Approach LOS		B			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	15.4		0.0	0.0	22.0		8.9				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.6	7.5		0.0	0.0	4.4		3.3				
Green Ext Time (p_c), s	0.0	2.3		0.0	0.0	1.5		0.3				

Intersection Summary			
HCM 6th Ctrl Delay		8.8	
HCM 6th LOS		A	

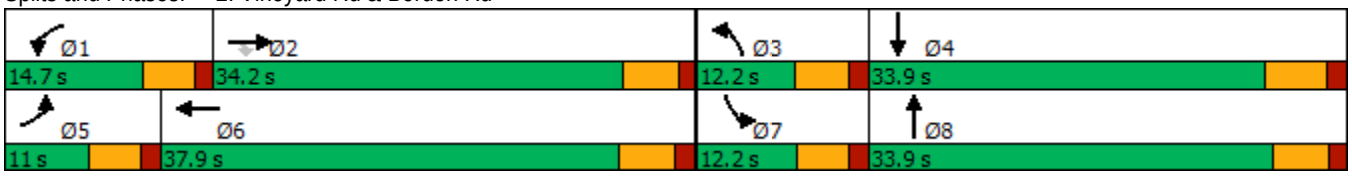
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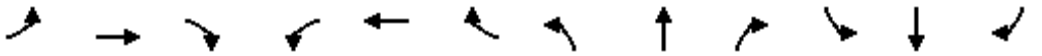
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	60	350	10	160	570	20	72	110	250
Future Volume (vph)	60	350	10	160	570	20	72	110	250
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	6.1	26.9	26.9	10.0	33.2	7.2	15.7	7.3	23.5
Actuated g/C Ratio	0.08	0.33	0.33	0.12	0.41	0.09	0.19	0.09	0.29
v/c Ratio	0.52	0.66	0.02	0.85	0.97	0.15	0.48	0.81	0.77
Control Delay	55.9	30.8	0.1	72.3	54.9	41.7	22.8	76.9	37.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.9	30.8	0.1	72.3	54.9	41.7	22.8	76.9	37.3
LOS	E	C	A	E	D	D	C	E	D
Approach Delay		33.7			58.4		24.9		46.8
Approach LOS		C			E		C		D

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 81	
Natural Cycle: 105	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 46.7	Intersection LOS: D
Intersection Capacity Utilization 82.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	350	10	160	570	60	20	72	82	110	250	100
Future Volume (veh/h)	60	350	10	160	570	60	20	72	82	110	250	100
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		0.96	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	407	12	186	663	70	23	84	95	128	291	116
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, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	613	517	208	641	68	62	169	191	151	335	134
Arrive On Green	0.06	0.33	0.33	0.12	0.39	0.39	0.03	0.22	0.22	0.08	0.26	0.26
Sat Flow, veh/h	1781	1870	1578	1781	1662	176	1781	781	883	1781	1265	504
Grp Volume(v), veh/h	70	407	12	186	0	733	23	0	179	128	0	407
Grp Sat Flow(s),veh/h/ln	1781	1870	1578	1781	0	1838	1781	0	1664	1781	0	1769
Q Serve(g_s), s	3.2	15.7	0.4	8.6	0.0	32.4	1.1	0.0	7.9	6.0	0.0	18.4
Cycle Q Clear(g_c), s	3.2	15.7	0.4	8.6	0.0	32.4	1.1	0.0	7.9	6.0	0.0	18.4
Prop In Lane	1.00		1.00	1.00		0.10	1.00		0.53	1.00		0.29
Lane Grp Cap(c), veh/h	102	613	517	208	0	709	62	0	360	151	0	469
V/C Ratio(X)	0.68	0.66	0.02	0.89	0.00	1.03	0.37	0.00	0.50	0.85	0.00	0.87
Avail Cap(c_a), veh/h	127	646	545	208	0	709	148	0	565	151	0	590
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.8	24.3	19.1	36.6	0.0	25.8	39.6	0.0	28.9	37.9	0.0	29.5
Incr Delay (d2), s/veh	6.3	2.4	0.0	34.4	0.0	42.8	1.4	0.0	1.1	32.9	0.0	11.0
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	1.6	7.1	0.2	5.7	0.0	21.6	0.5	0.0	3.2	3.9	0.0	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.1	26.7	19.1	71.0	0.0	68.6	41.0	0.0	30.0	70.9	0.0	40.5
LnGrp LOS	D	C	B	E	A	F	D	A	C	E	A	D
Approach Vol, veh/h		489			919			202			535	
Approach Delay, s/veh		29.1			69.1			31.2			47.7	
Approach LOS		C			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	33.0	8.1	28.1	9.8	37.9	12.2	24.1
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	10.6	17.7	3.1	20.4	5.2	34.4	8.0	9.9
Green Ext Time (p_c), s	0.0	1.9	0.0	1.5	0.0	0.0	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	51.1
HCM 6th LOS	D

Notes

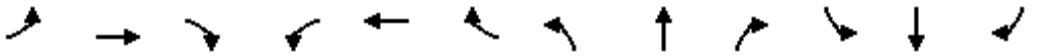
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	20	520	40	759	902	120	30	66	530	113	444
Future Volume (vph)	20	520	40	759	902	120	30	66	530	113	444
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	41.7	63.0	63.0	9.0	33.0	33.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	34.8%	52.5%	52.5%	7.5%	27.5%	27.5%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	4.9	24.4	24.4	42.9	65.9	65.9	5.0	23.4	23.4	10.7	30.9
Actuated g/C Ratio	0.04	0.20	0.20	0.36	0.55	0.55	0.04	0.20	0.20	0.09	0.26
v/c Ratio	0.33	0.88	0.13	0.94	0.57	0.16	0.63	0.15	0.85	0.87	0.87
Control Delay	68.6	61.1	0.8	57.3	21.0	3.2	85.1	50.8	25.0	98.4	55.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.6	61.1	0.8	57.3	21.0	3.2	85.1	50.8	25.0	98.4	55.1
LOS	E	E	A	E	C	A	F	D	C	F	E
Approach Delay		57.2			35.3			30.6			62.9
Approach LOS		E			D			C			E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 42.8	Intersection LOS: D
Intersection Capacity Utilization 81.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	520	40	759	902	120	30	66	530	113	444	72
Future Volume (veh/h)	20	520	40	759	902	120	30	66	530	113	444	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	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	1870	1870	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	24	634	49	926	1100	146	37	80	0	138	541	88
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	30	859	298	869	1955	850	43	530		163	606	98
Arrive On Green	0.02	0.24	0.24	0.31	0.55	0.55	0.03	0.19	0.00	0.09	0.25	0.25
Sat Flow, veh/h	1781	3554	1231	2765	3554	1546	1425	2843	1268	1781	2441	396
Grp Volume(v), veh/h	24	634	49	926	1100	146	37	80	0	138	314	315
Grp Sat Flow(s),veh/h/ln	1781	1777	1231	1382	1777	1546	1425	1421	1268	1781	1421	1415
Q Serve(g_s), s	1.6	19.8	3.2	37.7	24.2	5.6	3.1	2.8	0.0	9.2	25.6	25.8
Cycle Q Clear(g_c), s	1.6	19.8	3.2	37.7	24.2	5.6	3.1	2.8	0.0	9.2	25.6	25.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.28
Lane Grp Cap(c), veh/h	30	859	298	869	1955	850	43	530		163	353	351
V/C Ratio(X)	0.81	0.74	0.16	1.07	0.56	0.17	0.86	0.15		0.85	0.89	0.90
Avail Cap(c_a), veh/h	74	859	298	869	1955	850	59	656		163	399	397
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	58.8	42.0	26.4	41.2	17.6	13.4	57.9	40.9	0.0	53.7	43.5	43.6
Incr Delay (d2), s/veh	17.6	3.6	0.4	49.8	1.2	0.4	46.0	0.0	0.0	30.1	19.8	20.8
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	0.9	9.1	1.2	18.6	10.0	2.1	1.7	1.0	0.0	5.5	10.9	11.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	76.4	45.6	26.8	90.9	18.8	13.8	104.0	40.9	0.0	83.7	63.3	64.4
LnGrp LOS	E	D	C	F	B	B	F	D		F	E	E
Approach Vol, veh/h		707			2172			117	A		767	
Approach Delay, s/veh		45.4			49.2			60.8			67.4	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	43.0	34.3	7.6	35.1	6.0	71.3	15.0	27.7
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	37.7	* 25	5.0	33.7	5.0	57.7	11.0	27.7
Max Q Clear Time (g_c+I1), s	39.7	21.8	5.1	27.8	3.6	26.2	11.2	4.8
Green Ext Time (p_c), s	0.0	1.6	0.0	2.0	0.0	14.7	0.0	0.3

Intersection Summary	
HCM 6th Ctrl Delay	52.6
HCM 6th LOS	D

Notes

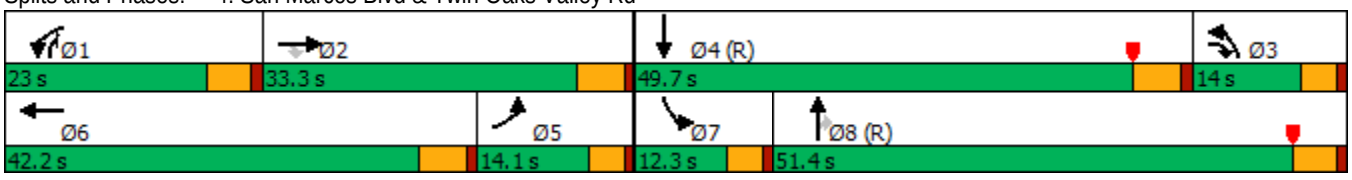
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

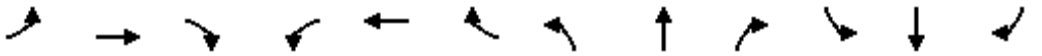
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	180	521	290	675	743	230	630	714	161	1080
Future Volume (vph)	180	521	290	675	743	230	630	714	161	1080
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	9.9	25.2	36.1	18.0	34.2	9.7	49.4	67.4	7.9	47.2
Actuated g/C Ratio	0.08	0.21	0.30	0.15	0.28	0.08	0.41	0.56	0.07	0.39
v/c Ratio	0.65	0.72	0.55	1.34	0.80	0.85	0.44	0.79	0.73	1.08
Control Delay	65.0	49.6	17.2	198.3	34.6	85.4	32.8	33.0	73.6	84.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.0	49.6	17.2	198.3	34.6	85.4	32.8	33.0	73.6	84.4
LOS	E	D	B	F	C	F	C	C	E	F
Approach Delay		42.9			110.2		40.6			83.3
Approach LOS		D			F		D			F

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.34	
Intersection Signal Delay: 71.3	Intersection LOS: E
Intersection Capacity Utilization 99.0%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	521	290	675	743	43	230	630	714	161	1080	370
Future Volume (veh/h)	180	521	290	675	743	43	230	630	714	161	1080	370
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	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	184	532	296	689	758	44	235	643	729	164	1102	378
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	280	725	483	518	922	54	360	1494	903	218	965	326
Arrive On Green	0.08	0.20	0.20	0.15	0.27	0.27	0.03	0.14	0.14	0.06	0.37	0.37
Sat Flow, veh/h	3456	3554	1558	3456	3408	198	3456	3554	1583	3456	2608	881
Grp Volume(v), veh/h	184	532	296	689	395	407	235	643	729	164	745	735
Grp Sat Flow(s),veh/h/ln	1728	1777	1558	1728	1777	1829	1728	1777	1583	1728	1777	1712
Q Serve(g_s), s	6.2	16.8	5.4	18.0	25.0	25.0	8.1	19.9	41.6	5.6	44.4	44.4
Cycle Q Clear(g_c), s	6.2	16.8	5.4	18.0	25.0	25.0	8.1	19.9	41.6	5.6	44.4	44.4
Prop In Lane	1.00		1.00	1.00		0.11	1.00		1.00	1.00		0.51
Lane Grp Cap(c), veh/h	280	725	483	518	481	495	360	1494	903	218	657	633
V/C Ratio(X)	0.66	0.73	0.61	1.33	0.82	0.82	0.65	0.43	0.81	0.75	1.13	1.16
Avail Cap(c_a), veh/h	285	829	529	518	546	562	360	1494	903	233	657	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.5	44.7	15.4	51.0	41.0	41.1	55.8	38.5	29.7	55.3	37.8	37.8
Incr Delay (d2), s/veh	4.2	4.0	2.9	161.0	10.5	10.3	3.0	0.8	7.0	10.3	78.0	88.8
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	2.9	7.8	4.4	19.3	12.3	12.6	3.8	9.7	19.2	2.8	33.1	33.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.7	48.7	18.3	212.0	51.6	51.4	58.8	39.3	36.7	65.6	115.8	126.6
LnGrp LOS	E	D	B	F	D	D	E	D	D	E	F	F
Approach Vol, veh/h		1012			1491			1607			1644	
Approach Delay, s/veh		41.4			125.7			41.0			115.6	
Approach LOS		D			F			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	29.8	17.5	49.7	15.0	37.8	11.8	55.4
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	20.0	18.8	10.1	46.4	8.2	27.0	7.6	43.6
Green Ext Time (p_c), s	0.0	4.9	0.0	0.0	0.1	5.4	0.0	2.4

Intersection Summary	
HCM 6th Ctrl Delay	84.3
HCM 6th LOS	F

Notes

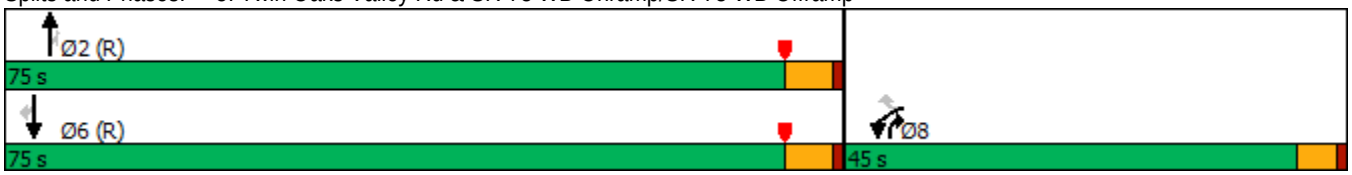
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

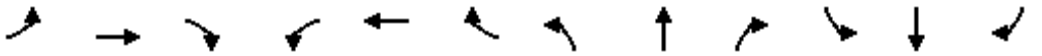
Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	550	242	1422	530	1529	727
Future Volume (vph)	550	242	1422	530	1529	727
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	26.9	26.9	83.2	110.8	83.2	83.2
Actuated g/C Ratio	0.22	0.22	0.69	0.92	0.69	0.69
v/c Ratio	0.78	0.40	0.44	0.40	0.47	0.60
Control Delay	50.9	32.5	6.1	0.7	6.8	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.9	32.5	6.1	0.7	6.8	2.7
LOS	D	C	A	A	A	A
Approach Delay			4.6		5.5	
Approach LOS			A		A	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 11.4 — Intersection LOS: B
Intersection Capacity Utilization 54.3% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	550	0	242	0	1422	530	0	1529	727
Future Volume (veh/h)	0	0	0	550	0	242	0	1422	530	0	1529	727
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				598	0	263	0	1546	576	0	1662	0
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				688	0	555	0	3669	1428	0	3669	
Arrive On Green				0.20	0.00	0.20	0.00	0.96	0.96	0.00	0.96	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1548	0	5274	1585
Grp Volume(v), veh/h				598	0	263	0	1546	576	0	1662	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1548	0	1702	1585
Q Serve(g_s), s				20.1	0.0	10.0	0.0	2.7	1.1	0.0	3.1	0.0
Cycle Q Clear(g_c), s				20.1	0.0	10.0	0.0	2.7	1.1	0.0	3.1	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				688	0	555	0	3669	1428	0	3669	
V/C Ratio(X)				0.87	0.00	0.47	0.00	0.42	0.40	0.00	0.45	
Avail Cap(c_a), veh/h				1163	0	939	0	3669	1428	0	3669	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.33	1.33	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.55	0.55	0.00	0.09	0.00
Uniform Delay (d), s/veh				46.6	0.0	42.5	0.0	0.8	0.1	0.0	0.8	0.0
Incr Delay (d2), s/veh				1.8	0.0	0.2	0.0	0.2	0.5	0.0	0.0	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				8.8	0.0	3.5	0.0	0.6	0.8	0.0	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				48.4	0.0	42.7	0.0	1.0	0.5	0.0	0.9	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					861			2122			1662	A
Approach Delay, s/veh					46.6			0.9			0.9	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	91.5		91.5		28.5			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	4.7		5.1		22.1			
Green Ext Time (p_c), s	14.0		12.6		1.8			

Intersection Summary	
HCM 6th Ctrl Delay	9.4
HCM 6th LOS	A

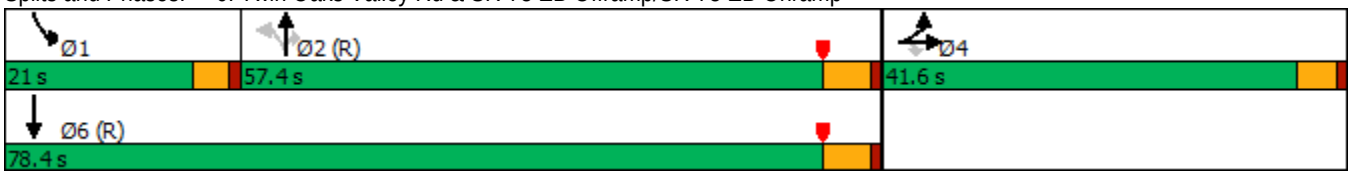
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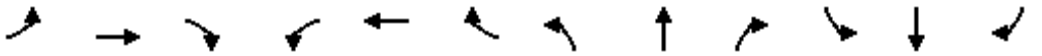
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	632	10	710	1500	630	427	1822
Future Volume (vph)	632	10	710	1500	630	427	1822
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	37.0	37.0	37.0	52.1	52.1	16.8	73.1
Actuated g/C Ratio	0.31	0.31	0.31	0.43	0.43	0.14	0.61
v/c Ratio	0.95	0.97	0.89	0.71	0.97	0.93	0.61
Control Delay	70.5	75.8	56.2	29.9	63.1	76.1	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	70.5	75.8	56.2	29.9	63.1	76.1	14.7
LOS	E	E	E	C	E	E	B
Approach Delay		67.7		39.7			26.4
Approach LOS		E		D			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 92 (77%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 41.1	Intersection LOS: D
Intersection Capacity Utilization 88.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	632	10	710	0	0	0	0	1500	630	427	1822	0
Future Volume (veh/h)	632	10	710	0	0	0	0	1500	630	427	1822	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	905	0	483				0	1562	656	445	1898	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	1098	0	489				60	2217	678	484	3110	0
Arrive On Green	0.31	0.00	0.31				0.00	0.43	0.43	0.28	1.00	0.00
Sat Flow, veh/h	3563	0	1585				238	5106	1561	3456	5274	0
Grp Volume(v), veh/h	905	0	483				0	1562	656	445	1898	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				238	1702	1561	1728	1702	0
Q Serve(g_s), s	28.3	0.0	36.4				0.0	29.9	49.2	15.0	0.0	0.0
Cycle Q Clear(g_c), s	28.3	0.0	36.4				0.0	29.9	49.2	15.0	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1098	0	489				60	2217	678	484	3110	0
V/C Ratio(X)	0.82	0.00	0.99				0.00	0.70	0.97	0.92	0.61	0.00
Avail Cap(c_a), veh/h	1098	0	489				60	2217	678	484	3110	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.81	0.81	0.00
Uniform Delay (d), s/veh	38.5	0.0	41.3				0.0	27.7	33.1	42.5	0.0	0.0
Incr Delay (d2), s/veh	4.9	0.0	37.5				0.0	1.9	27.6	19.6	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.0	0.0	19.1				0.0	12.4	23.2	6.8	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.4	0.0	78.8				0.0	29.6	60.7	62.1	0.7	0.0
LnGrp LOS	D	A	E				A	C	E	E	A	A
Approach Vol, veh/h		1388						2218			2343	
Approach Delay, s/veh		55.7						38.8			12.4	
Approach LOS		E						D			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	21.0	57.4		41.6		78.4
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	17.0	51.2		38.4		2.0
Green Ext Time (p_c), s	0.0	0.7		0.0		16.4

Intersection Summary			
HCM 6th Ctrl Delay			32.3
HCM 6th LOS			C

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	7	200	6	2	610
Future Vol, veh/h	17	7	200	6	2	610
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	8	217	7	2	663

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	557	112	0	0	224	0
Stage 1	221	-	-	-	-	-
Stage 2	336	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	460	920	-	-	1342	-
Stage 1	795	-	-	-	-	-
Stage 2	696	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	460	920	-	-	1342	-
Mov Cap-2 Maneuver	460	-	-	-	-	-
Stage 1	795	-	-	-	-	-
Stage 2	695	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	460	920	1342	-
HCM Lane V/C Ratio	-	-	0.04	0.008	0.002	-
HCM Control Delay (s)	-	-	13.2	8.9	7.7	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1160	1770	2	0	45
Future Vol, veh/h	0	1160	1770	2	0	45
Conflicting Peds, #/hr	0	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1318	2011	2	0	51

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1009
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	205
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	205
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

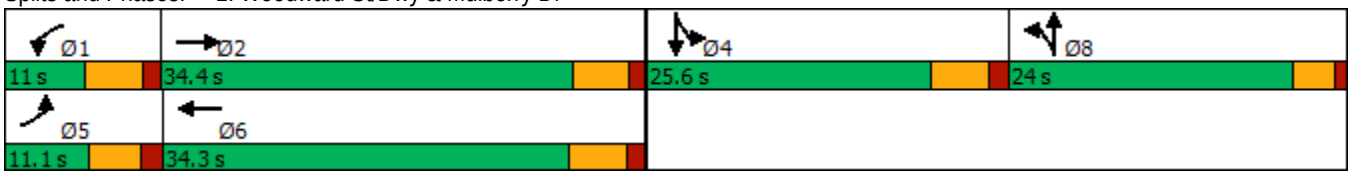
Approach	EB	WB	SB
HCM Control Delay, s	0	0	28.3
HCM LOS			D

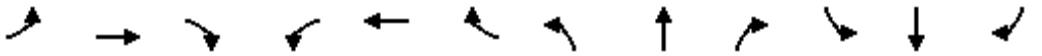
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	205
HCM Lane V/C Ratio	-	-	-	0.249
HCM Control Delay (s)	-	-	-	28.3
HCM Lane LOS	-	-	-	D
HCM 95th %tile Q(veh)	-	-	-	0.9

Lane Group	EBT	WBL	WBT	NBL	NBT	Ø4	Ø5
Lane Configurations							
Traffic Volume (vph)	200	40	180	32	0		
Future Volume (vph)	200	40	180	32	0		
Turn Type	NA	Prot	NA	Split	NA		
Protected Phases	2	1	6	8	8	4	5
Permitted Phases							
Detector Phase	2	1	6	8	8		
Switch Phase							
Minimum Initial (s)	7.0	5.0	7.0	7.0	7.0	5.0	6.0
Minimum Split (s)	25.3	10.3	32.6	24.0	24.0	25.6	11.1
Total Split (s)	34.4	11.0	34.3	24.0	24.0	25.6	11.1
Total Split (%)	36.2%	11.6%	36.1%	25.3%	25.3%	27%	12%
Yellow Time (s)	4.0	4.0	4.1	3.0	3.0	4.1	3.6
All-Red Time (s)	1.3	1.3	1.5	1.0	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.3	5.3	5.6	4.0	4.0		
Lead/Lag	Lag	Lead	Lag				Lead
Lead-Lag Optimize?							
Recall Mode	Min	None	Min	None	None	None	None
Act Effct Green (s)	29.0	6.4	32.4	9.8	9.8		
Actuated g/C Ratio	0.64	0.14	0.71	0.22	0.22		
v/c Ratio	0.25	0.18	0.16	0.10	0.03		
Control Delay	13.5	28.1	8.8	21.1	0.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.5	28.1	8.8	21.1	0.1		
LOS	B	C	A	C	A		
Approach Delay	13.5		12.3		13.0		
Approach LOS	B		B		B		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 45.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.25	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 36.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Woodward St/Dwy & Mulberry Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	200	54	40	180	0	32	0	20	0	0	0
Future Volume (veh/h)	0	200	54	40	180	0	32	0	20	0	0	0
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	0	230	62	46	207	0	37	0	23	0	0	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	402	108	97	1010	0	168	0	150	0	7	0
Arrive On Green	0.00	0.28	0.28	0.05	0.54	0.00	0.09	0.00	0.09	0.00	0.00	0.00
Sat Flow, veh/h	1781	1418	382	1781	1870	0	1775	0	1585	0	1870	0
Grp Volume(v), veh/h	0	0	292	46	207	0	37	0	23	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1801	1781	1870	0	1775	0	1585	0	1870	0
Q Serve(g_s), s	0.0	0.0	3.6	0.7	1.5	0.0	0.5	0.0	0.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	3.6	0.7	1.5	0.0	0.5	0.0	0.4	0.0	0.0	0.0
Prop In Lane	1.00		0.21	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	7	0	511	97	1010	0	168	0	150	0	7	0
V/C Ratio(X)	0.00	0.00	0.57	0.48	0.21	0.00	0.22	0.00	0.15	0.00	0.00	0.00
Avail Cap(c_a), veh/h	407	0	1996	387	2045	0	1352	0	1208	0	1425	0
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)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.0	12.1	3.1	0.0	11.0	0.0	10.9	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.0	1.3	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0
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	0.0	0.0	1.0	0.2	0.1	0.0	0.2	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	9.1	13.4	3.2	0.0	11.2	0.0	11.1	0.0	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	B	A	A	A
Approach Vol, veh/h		292			253			60			0	
Approach Delay, s/veh		9.1			5.1			11.2			0.0	
Approach LOS		A			A			B				

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.7	13.0		0.0	0.0	19.8		6.5				
Change Period (Y+Rc), s	* 5.3	* 5.6		5.6	5.1	5.6		4.0				
Max Green Setting (Gmax), s	* 5.7	* 29		20.0	6.0	28.7		20.0				
Max Q Clear Time (g_c+I1), s	2.7	5.6		0.0	0.0	3.5		2.5				
Green Ext Time (p_c), s	0.0	1.8		0.0	0.0	1.2		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		7.6
HCM 6th LOS		A

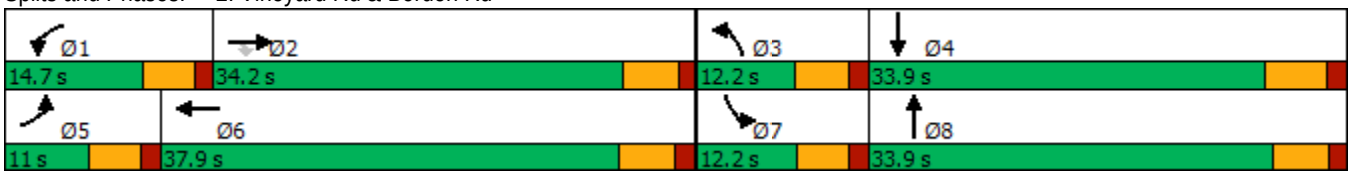
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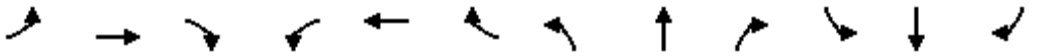
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	90	360	20	72	320	10	211	60	112
Future Volume (vph)	90	360	20	72	320	10	211	60	112
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	25.2	25.2	11.9	25.5	12.2	30.4	11.1	33.9
Total Split (s)	11.0	34.2	34.2	14.7	37.9	12.2	33.9	12.2	33.9
Total Split (%)	11.6%	36.0%	36.0%	15.5%	39.9%	12.8%	35.7%	12.8%	35.7%
Yellow Time (s)	3.6	4.0	4.0	3.6	4.0	3.7	4.0	3.6	4.4
All-Red Time (s)	1.4	1.2	1.2	1.3	1.5	1.5	1.4	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.2	5.2	4.9	5.5	5.2	5.4	5.1	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	Min	Min	None	Min	None	None	None	None
Act Effct Green (s)	6.5	25.2	25.2	8.5	22.7	7.6	19.2	7.0	25.5
Actuated g/C Ratio	0.09	0.34	0.34	0.11	0.31	0.10	0.26	0.09	0.34
v/c Ratio	0.64	0.62	0.03	0.39	0.78	0.06	0.73	0.39	0.28
Control Delay	60.6	30.1	0.1	42.7	34.7	39.7	34.6	45.5	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.6	30.1	0.1	42.7	34.7	39.7	34.6	45.5	18.3
LOS	E	C	A	D	C	D	C	D	B
Approach Delay		34.7			35.9		34.8		25.7
Approach LOS		C			D		C		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 74.3	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 33.8	Intersection LOS: C
Intersection Capacity Utilization 67.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Vineyard Rd & Borden Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	360	20	72	320	80	10	211	111	60	112	50
Future Volume (veh/h)	90	360	20	72	320	80	10	211	111	60	112	50
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		0.98	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	98	391	22	78	348	87	11	229	121	65	122	54
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	134	542	460	143	421	105	34	282	149	112	351	155
Arrive On Green	0.08	0.29	0.29	0.08	0.29	0.29	0.02	0.24	0.24	0.06	0.29	0.29
Sat Flow, veh/h	1781	1870	1585	1781	1436	359	1781	1152	609	1781	1222	541
Grp Volume(v), veh/h	98	391	22	78	0	435	11	0	350	65	0	176
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1795	1781	0	1761	1781	0	1763
Q Serve(g_s), s	3.6	12.5	0.7	2.8	0.0	15.0	0.4	0.0	12.5	2.4	0.0	5.3
Cycle Q Clear(g_c), s	3.6	12.5	0.7	2.8	0.0	15.0	0.4	0.0	12.5	2.4	0.0	5.3
Prop In Lane	1.00		1.00	1.00		0.20	1.00		0.35	1.00		0.31
Lane Grp Cap(c), veh/h	134	542	460	143	0	526	34	0	431	112	0	506
V/C Ratio(X)	0.73	0.72	0.05	0.54	0.00	0.83	0.32	0.00	0.81	0.58	0.00	0.35
Avail Cap(c_a), veh/h	161	816	692	263	0	875	188	0	755	190	0	743
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.1	21.2	17.0	29.4	0.0	21.9	32.2	0.0	23.7	30.3	0.0	18.8
Incr Delay (d2), s/veh	9.4	1.8	0.0	1.2	0.0	3.4	1.9	0.0	3.7	1.7	0.0	0.4
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	1.8	5.3	0.2	1.2	0.0	6.3	0.2	0.0	5.3	1.0	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.4	23.0	17.0	30.6	0.0	25.3	34.1	0.0	27.4	32.0	0.0	19.2
LnGrp LOS	D	C	B	C	A	C	C	A	C	C	A	B
Approach Vol, veh/h		511			513			361			241	
Approach Delay, s/veh		25.9			26.1			27.6			22.6	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.2	24.8	6.5	25.0	10.0	25.0	9.3	22.2
Change Period (Y+Rc), s	* 4.9	* 5.5	* 5.2	5.9	* 5	5.5	5.1	* 5.9
Max Green Setting (Gmax), s	* 9.8	* 29	* 7	28.0	* 6	32.4	7.1	* 29
Max Q Clear Time (g_c+I1), s	4.8	14.5	2.4	7.3	5.6	17.0	4.4	14.5
Green Ext Time (p_c), s	0.0	2.1	0.0	0.9	0.0	2.5	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	25.9
HCM 6th LOS	C

Notes

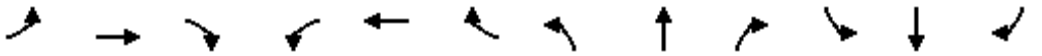
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	122	980	80	394	791	110	70	275	800	27	176
Future Volume (vph)	122	980	80	394	791	110	70	275	800	27	176
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases			2			6			8		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	5.0	5.0	3.0	5.0
Minimum Split (s)	7.0	30.3	30.3	19.0	25.3	25.3	7.0	10.3	10.3	7.0	30.3
Total Split (s)	9.0	30.3	30.3	39.7	61.0	61.0	11.0	35.0	35.0	15.0	39.0
Total Split (%)	7.5%	25.3%	25.3%	33.1%	50.8%	50.8%	9.2%	29.2%	29.2%	12.5%	32.5%
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3	4.3	3.0	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?											
Recall Mode	None	Min	Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	5.0	25.0	25.0	43.8	63.8	63.8	7.0	29.7	29.7	6.4	25.6
Actuated g/C Ratio	0.04	0.21	0.21	0.36	0.53	0.53	0.06	0.25	0.25	0.05	0.21
v/c Ratio	1.74	1.39	0.24	0.41	0.44	0.13	0.89	0.41	1.01	0.30	0.41
Control Delay	416.9	218.6	6.0	31.2	18.9	3.4	85.0	52.0	53.6	61.9	34.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	416.9	218.6	6.0	31.2	18.9	3.4	85.0	52.0	53.6	61.9	34.8
LOS	F	F	A	C	B	A	F	D	D	E	C
Approach Delay		224.7			21.3			55.1			37.6
Approach LOS		F			C			E			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 67 (56%), Referenced to phase 1:WBL and 6:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.74	
Intersection Signal Delay: 94.2	Intersection LOS: F
Intersection Capacity Utilization 104.5%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 3: San Marcos Blvd/Woodward St & Mission Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	980	80	394	791	110	70	275	800	27	176	61
Future Volume (veh/h)	122	980	80	394	791	110	70	275	800	27	176	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		0.97
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	1496	1496	1870	1870	1496	1496	1496	1870	1496	1870
Adj Flow Rate, veh/h	127	1021	83	410	824	115	73	286	0	28	183	64
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	1716	601	464	2202	968	83	466		35	260	87
Arrive On Green	0.04	0.48	0.48	0.17	0.62	0.62	0.06	0.16	0.00	0.02	0.13	0.13
Sat Flow, veh/h	1781	3554	1244	2765	3554	1562	1425	2843	1268	1781	2072	697
Grp Volume(v), veh/h	127	1021	83	410	824	115	73	286	0	28	123	124
Grp Sat Flow(s),veh/h/ln	1781	1777	1244	1382	1777	1562	1425	1421	1268	1781	1421	1347
Q Serve(g_s), s	5.0	25.0	3.3	17.4	13.8	3.6	6.1	11.2	0.0	1.9	10.0	10.6
Cycle Q Clear(g_c), s	5.0	25.0	3.3	17.4	13.8	3.6	6.1	11.2	0.0	1.9	10.0	10.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.52
Lane Grp Cap(c), veh/h	74	1716	601	464	2202	968	83	466		35	178	169
V/C Ratio(X)	1.71	0.60	0.14	0.88	0.37	0.12	0.88	0.61		0.80	0.69	0.73
Avail Cap(c_a), veh/h	74	1716	601	822	2202	968	83	704		163	399	378
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	57.5	22.5	9.3	48.8	11.3	9.4	56.1	46.6	0.0	58.6	50.3	50.5
Incr Delay (d2), s/veh	370.4	0.7	0.1	2.3	0.5	0.3	58.6	0.5	0.0	14.2	4.7	6.0
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	9.9	10.4	1.3	6.1	5.4	1.3	3.5	4.0	0.0	1.0	3.8	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	427.9	23.2	9.5	51.1	11.8	9.6	114.6	47.1	0.0	72.8	55.0	56.6
LnGrp LOS	F	C	A	D	B	A	F	D		E	E	E
Approach Vol, veh/h		1231			1349			359	A		275	
Approach Delay, s/veh		64.0			23.5			60.8			57.5	
Approach LOS		E			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.4	63.2	11.0	20.3	9.0	79.7	6.4	25.0
Change Period (Y+Rc), s	5.3	* 5.3	4.0	5.3	4.0	5.3	4.0	5.3
Max Green Setting (Gmax), s	35.7	* 25	7.0	33.7	5.0	55.7	11.0	29.7
Max Q Clear Time (g_c+I1), s	19.4	27.0	8.1	12.6	7.0	15.8	3.9	13.2
Green Ext Time (p_c), s	0.7	0.0	0.0	1.4	0.0	11.0	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	46.1
HCM 6th LOS	D

Notes

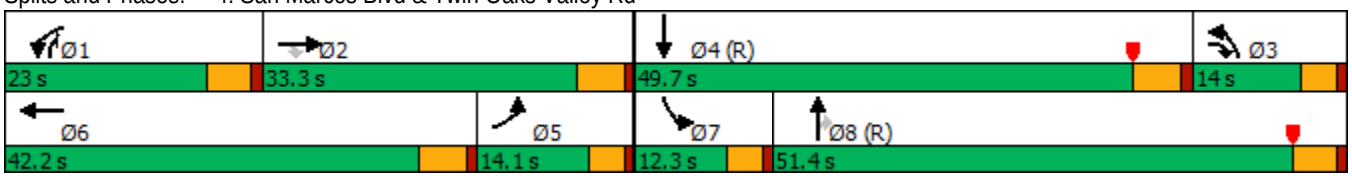
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

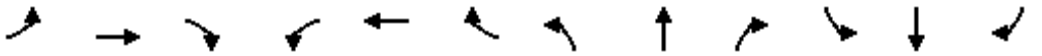
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	360	954	400	607	672	420	970	467	144	730
Future Volume (vph)	360	954	400	607	672	420	970	467	144	730
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2	3	1	6	3	8	1	7	4
Permitted Phases			2					8		
Detector Phase	5	2	3	1	6	3	8	1	7	4
Switch Phase										
Minimum Initial (s)	3.0	7.0	3.0	3.0	7.0	3.0	7.0	3.0	3.0	7.0
Minimum Split (s)	7.2	33.3	7.2	8.0	28.3	7.2	33.3	8.0	7.2	33.3
Total Split (s)	14.1	33.3	14.0	23.0	42.2	14.0	51.4	23.0	12.3	49.7
Total Split (%)	11.8%	27.8%	11.7%	19.2%	35.2%	11.7%	42.8%	19.2%	10.3%	41.4%
Yellow Time (s)	3.2	4.3	3.2	4.0	4.3	3.2	4.0	4.0	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	5.3	4.2	5.0	5.3	4.2	5.0	5.0	4.2	5.3
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?										
Recall Mode	None	Min	None	None	Min	None	C-Min	None	None	C-Min
Act Effct Green (s)	12.3	28.0	38.9	18.0	34.5	9.8	46.7	64.7	7.8	44.4
Actuated g/C Ratio	0.10	0.23	0.32	0.15	0.29	0.08	0.39	0.54	0.06	0.37
v/c Ratio	1.05	1.18	0.71	1.20	0.82	1.53	0.72	0.54	0.66	0.84
Control Delay	113.3	134.0	26.1	150.2	45.0	294.5	37.5	21.1	69.4	39.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	113.3	134.0	26.1	150.2	45.0	294.5	37.5	21.1	69.4	39.5
LOS	F	F	C	F	D	F	D	C	E	D
Approach Delay		104.5			90.2		91.5			43.1
Approach LOS		F			F		F			D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 45 (38%), Referenced to phase 4:SBT and 8:NBT, Start of Yellow	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.53	
Intersection Signal Delay: 85.4	Intersection LOS: F
Intersection Capacity Utilization 102.9%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 4: San Marcos Blvd & Twin Oaks Valley Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	360	954	400	607	672	132	420	970	467	144	730	330
Future Volume (veh/h)	360	954	400	607	672	132	420	970	467	144	730	330
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		0.97	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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	367	973	408	619	686	135	429	990	477	147	745	337
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	356	829	509	518	818	161	308	1407	863	201	842	380
Arrive On Green	0.10	0.23	0.23	0.15	0.28	0.28	0.03	0.13	0.13	0.06	0.36	0.36
Sat Flow, veh/h	3456	3554	1575	3456	2946	579	3456	3554	1579	3456	2367	1070
Grp Volume(v), veh/h	367	973	408	619	413	408	429	990	477	147	559	523
Grp Sat Flow(s),veh/h/ln	1728	1777	1575	1728	1777	1748	1728	1777	1579	1728	1777	1660
Q Serve(g_s), s	12.4	28.0	14.0	18.0	26.3	26.3	10.7	32.0	26.3	5.0	35.5	35.6
Cycle Q Clear(g_c), s	12.4	28.0	14.0	18.0	26.3	26.3	10.7	32.0	26.3	5.0	35.5	35.6
Prop In Lane	1.00		1.00	1.00		0.33	1.00		1.00	1.00		0.64
Lane Grp Cap(c), veh/h	356	829	509	518	494	486	308	1407	863	201	632	590
V/C Ratio(X)	1.03	1.17	0.80	1.19	0.84	0.84	1.39	0.70	0.55	0.73	0.88	0.89
Avail Cap(c_a), veh/h	356	829	509	518	546	538	308	1407	863	233	657	614
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.88	0.88	0.88	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.8	46.0	20.3	51.0	40.8	40.8	58.2	45.4	26.4	55.6	36.3	36.4
Incr Delay (d2), s/veh	55.7	90.7	10.0	105.1	11.8	12.1	192.5	2.6	2.2	7.3	16.5	17.6
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	8.1	22.7	5.9	15.3	13.0	12.9	13.2	15.8	11.6	2.4	18.1	17.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	109.5	136.7	30.3	156.1	52.6	52.9	250.7	48.0	28.6	62.9	52.9	54.0
LnGrp LOS	F	F	C	F	D	D	F	D	C	E	D	D
Approach Vol, veh/h		1748			1440			1896			1229	
Approach Delay, s/veh		106.2			97.2			89.0			54.5	
Approach LOS		F			F			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	33.3	15.7	48.0	17.7	38.6	11.2	52.5
Change Period (Y+Rc), s	5.0	5.3	5.0	* 5.3	5.3	* 5.3	* 4.2	5.0
Max Green Setting (Gmax), s	18.0	28.0	9.8	* 44	9.9	* 37	* 8.1	46.4
Max Q Clear Time (g_c+I1), s	20.0	30.0	12.7	37.6	14.4	28.3	7.0	34.0
Green Ext Time (p_c), s	0.0	0.0	0.0	5.1	0.0	5.0	0.0	9.7

Intersection Summary	
HCM 6th Ctrl Delay	88.9
HCM 6th LOS	F

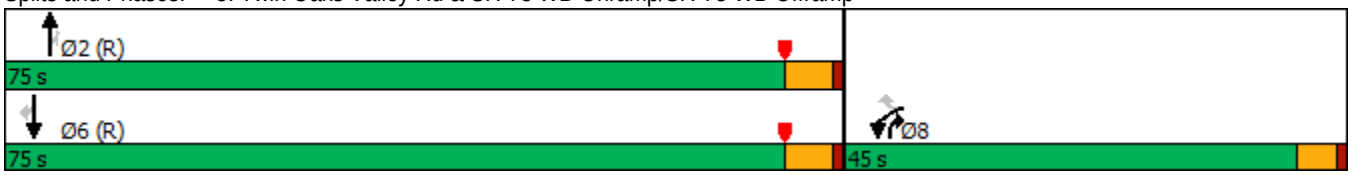
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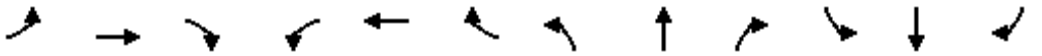
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	NBR	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	520	388	1510	540	1454	553
Future Volume (vph)	520	388	1510	540	1454	553
Turn Type	Prot	Perm	NA	pm+ov	NA	Perm
Protected Phases	8		2	8	6	
Permitted Phases		8		2		6
Detector Phase	8	8	2	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	11.0	5.0	5.0	5.0
Minimum Split (s)	9.6	9.6	42.3	9.6	10.3	10.3
Total Split (s)	45.0	45.0	75.0	45.0	75.0	75.0
Total Split (%)	37.5%	37.5%	62.5%	37.5%	62.5%	62.5%
Yellow Time (s)	3.6	3.6	4.3	3.6	4.3	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.3	4.6	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	None	C-Min	C-Min
Act Effct Green (s)	24.7	24.7	85.4	110.8	85.4	85.4
Actuated g/C Ratio	0.21	0.21	0.71	0.92	0.71	0.71
v/c Ratio	0.75	0.64	0.43	0.39	0.41	0.45
Control Delay	51.5	42.1	6.2	0.8	9.1	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.5	42.1	6.2	0.9	9.1	2.6
LOS	D	D	A	A	A	A
Approach Delay			4.8		7.3	
Approach LOS			A		A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 13.6	Intersection LOS: B
Intersection Capacity Utilization 53.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Twin Oaks Valley Rd & SR-78 WB Onramp/SR-78 WB Offramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	520	0	388	0	1510	540	0	1454	553
Future Volume (veh/h)	0	0	0	520	0	388	0	1510	540	0	1454	553
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				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
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1870	0	1870	0	1870	1870	0	1870	1870
Adj Flow Rate, veh/h				531	0	396	0	1541	551	0	1484	0
Peak Hour Factor				0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %				2	0	2	0	2	2	0	2	2
Cap, veh/h				628	0	507	0	3757	1426	0	3757	
Arrive On Green				0.18	0.00	0.18	0.00	1.00	1.00	0.00	0.98	0.00
Sat Flow, veh/h				3456	0	2790	0	5274	1546	0	5274	1585
Grp Volume(v), veh/h				531	0	396	0	1541	551	0	1484	0
Grp Sat Flow(s),veh/h/ln				1728	0	1395	0	1702	1546	0	1702	1585
Q Serve(g_s), s				17.8	0.0	16.2	0.0	0.0	0.0	0.0	1.2	0.0
Cycle Q Clear(g_c), s				17.8	0.0	16.2	0.0	0.0	0.0	0.0	1.2	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				628	0	507	0	3757	1426	0	3757	
V/C Ratio(X)				0.85	0.00	0.78	0.00	0.41	0.39	0.00	0.39	
Avail Cap(c_a), veh/h				1163	0	939	0	3757	1426	0	3757	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.58	0.58	0.00	0.27	0.00
Uniform Delay (d), s/veh				47.5	0.0	46.8	0.0	0.0	0.0	0.0	0.4	0.0
Incr Delay (d2), s/veh				1.2	0.0	1.0	0.0	0.2	0.5	0.0	0.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				7.8	0.0	5.7	0.0	0.1	0.2	0.0	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				48.7	0.0	47.8	0.0	0.2	0.5	0.0	0.4	0.0
LnGrp LOS				D	A	D	A	A	A	A	A	
Approach Vol, veh/h					927			2092			1484	A
Approach Delay, s/veh					48.3			0.3			0.4	
Approach LOS					D			A			A	

Timer - Assigned Phs	2		6		8			
Phs Duration (G+Y+Rc), s	93.6		93.6		26.4			
Change Period (Y+Rc), s	5.3		5.3		4.6			
Max Green Setting (Gmax), s	69.7		69.7		40.4			
Max Q Clear Time (g_c+I1), s	2.0		3.2		19.8			
Green Ext Time (p_c), s	13.7		10.3		2.0			

Intersection Summary		
HCM 6th Ctrl Delay	10.2	
HCM 6th LOS	B	

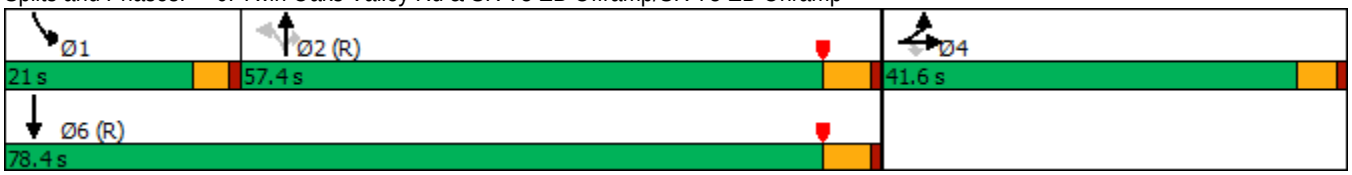
Notes

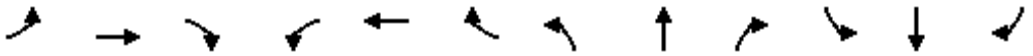
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	218	20	320	2072	600	343	1781
Future Volume (vph)	218	20	320	2072	600	343	1781
Turn Type	Split	NA	Perm	NA	Perm	Prot	NA
Protected Phases	4	4		2		1	6
Permitted Phases			4		2		
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0	5.0	6.0
Minimum Split (s)	41.6	41.6	41.6	24.3	24.3	9.2	24.3
Total Split (s)	41.6	41.6	41.6	57.4	57.4	21.0	78.4
Total Split (%)	34.7%	34.7%	34.7%	47.8%	47.8%	17.5%	65.3%
Yellow Time (s)	3.6	3.6	3.6	4.3	4.3	3.2	4.3
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	5.3	5.3	4.2	5.3
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	21.6	21.6	21.6	68.3	68.3	16.0	88.5
Actuated g/C Ratio	0.18	0.18	0.18	0.57	0.57	0.13	0.74
v/c Ratio	0.68	0.69	0.59	0.75	0.72	0.79	0.50
Control Delay	55.6	53.3	36.6	23.4	27.2	63.0	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	55.6	53.3	36.6	23.4	27.2	63.0	11.3
LOS	E	D	D	C	C	E	B
Approach Delay		48.7		24.3			19.6
Approach LOS		D		C			B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 102 (85%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 25.0	Intersection LOS: C
Intersection Capacity Utilization 71.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Twin Oaks Valley Rd & SR-78 EB Offramp/SR-78 EB Onramp





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	218	20	320	0	0	0	0	2072	600	343	1781	0
Future Volume (veh/h)	218	20	320	0	0	0	0	2072	600	343	1781	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	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
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870				1870	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	160	0	425				0	2181	632	361	1875	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2				2	2	2	2	2	0
Cap, veh/h	280	0	497				60	3091	945	415	3884	0
Arrive On Green	0.16	0.00	0.16				0.00	0.61	0.61	0.24	1.00	0.00
Sat Flow, veh/h	1781	0	3170				243	5106	1561	3456	5274	0
Grp Volume(v), veh/h	160	0	425				0	2181	632	361	1875	0
Grp Sat Flow(s),veh/h/ln	1781	0	1585				243	1702	1561	1728	1702	0
Q Serve(g_s), s	10.0	0.0	15.7				0.0	35.3	32.2	12.0	0.0	0.0
Cycle Q Clear(g_c), s	10.0	0.0	15.7				0.0	35.3	32.2	12.0	0.0	0.0
Prop In Lane	1.00		1.00				1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	280	0	497				60	3091	945	415	3884	0
V/C Ratio(X)	0.57	0.00	0.85				0.00	0.71	0.67	0.87	0.48	0.00
Avail Cap(c_a), veh/h	549	0	977				60	3091	945	484	3884	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.86	0.86	0.00
Uniform Delay (d), s/veh	46.9	0.0	49.3				0.0	16.3	15.7	44.7	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	1.7				0.0	1.4	3.7	12.4	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	0.0	6.3				0.0	13.4	11.9	5.2	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.5	0.0	50.9				0.0	17.7	19.4	57.0	0.4	0.0
LnGrp LOS	D	A	D				A	B	B	E	A	A
Approach Vol, veh/h		585						2813			2236	
Approach Delay, s/veh		50.0						18.1			9.5	
Approach LOS		D						B			A	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	18.6	78.0		23.4		96.6
Change Period (Y+Rc), s	* 4.2	5.3		4.6		5.3
Max Green Setting (Gmax), s	* 17	52.1		37.0		73.1
Max Q Clear Time (g_c+I1), s	14.0	37.3		17.7		2.0
Green Ext Time (p_c), s	0.4	11.3		1.2		16.0

Intersection Summary		
HCM 6th Ctrl Delay		18.0
HCM 6th LOS		B

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	3	480	27	8	255
Future Vol, veh/h	8	3	480	27	8	255
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	3	522	29	9	277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	694	276	0	0	551	0
Stage 1	537	-	-	-	-	-
Stage 2	157	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	377	721	-	-	1015	-
Stage 1	550	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	374	721	-	-	1015	-
Mov Cap-2 Maneuver	374	-	-	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	847	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.6	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	374	721	1015	-
HCM Lane V/C Ratio	-	-	0.023	0.005	0.009	-
HCM Control Delay (s)	-	-	14.9	10	8.6	-
HCM Lane LOS	-	-	B	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1805	1290	4	0	21
Future Vol, veh/h	0	1805	1290	4	0	21
Conflicting Peds, #/hr	0	0	0	4	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1861	1330	4	0	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	672
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	342
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	340
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	16.3
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	340
HCM Lane V/C Ratio	-	-	-	0.064
HCM Control Delay (s)	-	-	-	16.3
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.2

APPENDIX H

CITY OF SAN MARCOS SPEED SURVEY ON WOODWARD STREET, CITY OF SAN MARCOS'S MINIMUM SIGHT DISTANCE STANDARDS, CITY TRAFFIC ENGINEER EMAIL DATED JUNE 26, 2019, SPEED SURVEY ON MISSION ROAD AND SIGHT CORRIDOR EASEMENT AGREEMENT

CITY OF SAN MARCOS
ENGINEERING AND TRAFFIC SURVEY

STREET: WOODWARD STREET
LIMITS: MISSION ROAD AND BORDEN ROAD

DATE OF SURVEY: 12/14/16
PREPARED BY: R. GARCIA
REVIEWED BY: M.RAFAEL

A. PREVAILING DATA:

DIRECTIONS:	: NORTH/SOUTH
WEATHER CONDITION:	: CLEAR, SUNNY
LOCATION OF SURVEY:	: MID-BLOCK
85TH PERCENTILE:	: 38 MPH
10 MPH PACE:	: 31-40 MPH
PERCENT IN PACE:	: 82%
POSTED SPEED LIMIT (ON DATE OF SURVEY)	: 35 MPH
SPEED LIMIT CHANGE:	: YES
RECOMMENDED SPEED LIMIT:	: 40

B. ACCIDENT HISTORY:

NO. OF MONTHS COVERED:	: 36
TOTAL ACCIDENTS:	: 4
COLLISION RATE:	: 0.72 ACCIDENTS/MILLION VEHICLE MILES (MVM)

CALIFORNIA STATEWIDE COLLISION RATE: 1.03 ACCIDENTS/MVM
(2010, DISTRICT 11, URBAN, 2 AND 3 LANES)

C. TRAFFIC FACTORS:

AVERAGE DAILY TRAFFIC:	: 8281 VEHICLES PER DAY (VPD)
LENGTH OF SEGMENT:	: 0.61 MILES
LANE CONFIGURATION:	: 2 LANES DIVIDED

D. EXISTING ROAD CONDITIONS:

X-WALKS - CNTRL/UNCNRL:	: YES/NO	HORIZONTAL ALIGNMENT: STRAIGHT
PEDESTRIANS/BICYCLES:	: LOW/LOW	VERTICAL ALIGNMENT: MODERATE
SIDEWALKS/BIKE LANES:	: YES/YES	INTERSECTIONS: LOW
ON-STREET PARKING:	: YES	DRIVEWAYS: YES

E. ADJACENT LAND USE:
SINGLE FAMILY RESIDENCES, APARTMENTS, OPEN SPACE

F. TRAFFIC ENGINEER'S RECOMMENDATION (EXPLANATION):
THIS SPEED ZONE SATIFIES THE CONDITIONS OF SECTION 627 OF THE CALIFORNIA VEHICLE CODE AND HAS BEEN PREPARED AND EVALUATED IN ACCORDANCE WITH THE CALIFORNIA MANUAL OF TRAFFIC CONTROL DEVICES, SECTION 2B.13 (2014). A SPEED LIMIT POSTING OF 40 MPH IS FOUND TO BE APPROPRIATE AND JUSTIFIED BASED ON THE NEAREST 5 MPH INCREMENT OF THE 85TH PERCENTILE SPEED BEING 38 MPH.

APPROVED AND CERTIFIED BY: _____ 2/6/17
CITY ENGINEER, MATT LITTLE — DATE



VEHICLE SPOT SPEED STUDY

SPEED RANGES	NUMBER OF VEHICLES	PERCENT OF TOTAL	PERCENT ACCUMULATION
15	0	0.0%	0%
16	0	0.0%	0%
17	0	0.0%	0%
18	0	0.0%	0%
19	0	0.0%	0%
20	0	0.0%	0%
21	0	0.0%	0%
22	0	0.0%	0%
23	0	0.0%	0%
24	0	0.0%	0%
25	1	0.8%	1%
26	0	0.0%	1%
27	2	1.6%	2%
28	4	3.2%	6%
29	1	0.8%	6%
30	4	3.2%	10%
31	8	6.3%	16%
32	14	11.1%	27%
33	7	5.6%	33%
34	15	11.9%	44%
POSTED SPEED **35**	11	8.7%	53%
36	9	7.1%	60%
37	16	12.7%	73%
38	15	11.9%	85%
39	3	2.4%	87%
40	5	4.0%	91%
41	5	4.0%	95%
42	3	2.4%	98%
43	0	0.0%	98%
44	1	0.8%	98%
45	2	1.6%	100%
46	0	0.0%	100%
47	0	0.0%	100%
48	0	0.0%	100%
49	0	0.0%	100%
50	0	0.0%	100%
51	0	0.0%	100%
52	0	0.0%	100%
53	0	0.0%	100%
54	0	0.0%	100%
55	0	0.0%	100%
56	0	0.0%	100%
57	0	0.0%	100%
58	0	0.0%	100%
59	0	0.0%	100%
60	0	0.0%	100%
61	0	0.0%	100%
62	0	0.0%	100%
63	0	0.0%	100%
64	0	0.0%	100%
65	0	0.0%	100%
66	0	0.0%	100%
67	0	0.0%	100%
68	0	0.0%	100%
69	0	0.0%	100%
70	0	0.0%	100%

TOTAL VEHICLES: *126*

RECORDER: RAISA G.

LOCATION: WOODWARD ST FROM MISSION RD TO BORDEN RD

APPROACH: NB/SB

SURFACE: DRY

WEATHER: CLEAR, SUNNY

DATE: 12/14/16

TIME: 11:10-11:50 AM

SURVEY STATISTICS

POSTED SPEED:	*35*	MPH
AVERAGE SPEED:	*35*	MPH
MEDIAN SPEED: (50th PERCENTILE)	*35*	MPH
MODAL SPEED:	*37*	MPH
85TH PERCENTILE SPEED:	*38*	MPH
10 MPH PACE:	*31 - 40*	MPH
PERCENT IN PACE:	*82%*	
PERCENT ENFORCEABLE:	*0%*	

COMMENTS:



RADAR SPOT SPEED STUDY FIELD SHEET

LOCATION: WOODWARD ST FROM MISSION RD TO BORDEN RD APPROACH: NB/SB SURFACE: DRY

DATE: 12/14/16 TIME: 11:10-11:50 AM WEATHER: CLEAR, SUNNY *POSTED SPEED:* 35 RECORDER: RAISA G.

"X"= PASSENGER CARS *"B"= BUSES* *"T"= TRUCKS*

MPH	NORTHBOUND	SOUTHBOUND
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		X
26		
27	X	X
28	X	X X X
29	X	
30	X X X	X
31	X X X X	X X X X
32	X X X X X	X X X X X X X X X
33	X X X	X X X X
34	X X X X X X X X X X	X X X X X
35	X X X X X X	X X X X X
36	X X X X X	X X X X
37	X X X X X	X X X X X X X X X X X
38	X X X X X X X X	X X X X X X X
39	X	X X
40	X X X	X X
41	X X	X X X
42	X	X X
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44		X
45	X	X
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REGISTERED PROFESSIONAL ENGINEER
MATT LITTLE
NO. 60569
EXP. 12-31-2018
CIVIL
STATE OF CALIFORNIA

COMMENTS:

STATE OF CALIFORNIA)
COUNTY OF SAN DIEGO) SS.
CITY OF SAN MARCOS)

I, Phillip Scollick, City Clerk, for the City of San Marcos, California, hereby certify, under penalty of perjury, that the attached and foregoing is a true and correct copy of the ENGINEERING AND TRAFFIC SURVEY SUMMARY, dated December 14, 2016 for WOODWARD STREET, FROM MISSION ROAD TO BORDEN ROAD.

2/9/2017

Phillip Scollick Date
City Clerk
City of San Marcos

CITY OF SAN MARCOS
ENGINEERING DIVISION

1 Civic Center Dr., San Marcos, CA 92069-2918 (760) 744-1050 FAX (760) 591-4135

AN APPLICANT'S GUIDE TO PROCEDURES FOR:

SIGHT DISTANCE MINIMUM

Sight distance as listed below are designed to enable a vehicle,:

1. while turning left or right, to accelerate to the operating speed of the street without causing approaching vehicles to reduce speed by more than 10 miles per hour.

2. while turning left, to clear the near half of the street without conflicting with vehicles approaching from the left.

The distance requirements are based on a 3.5 ft. driver eye height and 4.25 ft. object height for passenger cars; a 6.0 ft. driver's eye height and 4.25 ft. object height for semi-trailers.

The operating speed on each approach, in order of desirability, is assumed to be: a) the 85th percentile speed; b) the speed limit if based on an engineering study; or c) in the case of a new facility, 80 percent of the design speed.

When the criteria for sight distances cannot be met, the City will prohibit turns by exiting vehicles when appropriate or require additional speed change lane length. These standards apply to accesses onto City streets and State highways.

Safe Sight Distance (ft.) for Passenger Cars Exiting from Private Accesses or Public Streets onto Two-Lane Roads

Speed (mph)	Safe Sight Distance - Left[1] (d_1)	Safe Sight Distance - Right[1] (d_2)
20	150	130
25	240	200
30	350	260
35	430	350
40	530	440
45	610	570
50	740	700
55	830	860
60	950	1050

Measured from the driver's eye ten feet back of the Flowline or pavement edge.

Narasimha Prasad

From: Bausback, Kurt <kbausback@kbhome.com>
Sent: Wednesday, June 26, 2019 11:26 AM
To: Sally Schifman; Ryan Russell; Michael Levin; Narasimha Prasad; John A. Boarman; Matt Simmons (matt.simmons@cciconnect.com); jason.greminger (jason.greminger@cciconnect.com)
Cc: Alex Merritt; Jeffrey Forrest
Subject: FW: Site distance at Woodward

Importance: High

Team,

Please see below email from the City. In the email they have stated:

"We have determined that both intersectional and stopping sight distances for the proposed Mission 316 West project driveway have been satisfied based on our field review. "

I know it is short notice but is everyone available for a conference call at 12:00 today?

Thank you,

Kurt Bausback
KB Home Coastal
Director, Planning and Entitlements
9915 Mira Mesa Blvd. Suite 100
San Diego, CA. 92131
Office: 858.877.4262
Cell: 760.473.0609

From: Rafael, Michael <MRafael@san-marcos.net>
Sent: Wednesday, June 26, 2019 11:19 AM
To: Michael Levin <mlevin@excelengineering.net>; Quezada, Jonathan <JQuezada@san-marcos.net>; Bausback, Kurt <kbausback@kbhome.com>
Cc: Kuey, Peter <PKuey@san-marcos.net>; Abboud, Nicholas <NAbboud@san-marcos.net>
Subject: RE: Site distance at Woodward

EXTERNAL EMAIL: Do not click links or open attachments unless you recognize the source of the email.

Hi Michael,

We have determined that both intersectional and stopping sight distances for the proposed Mission 316 West project driveway have been satisfied based on our field review. Thanks.

Michael Rafael, PE, TE | Senior Civil Engineer - Transportation
City of San Marcos | 1 Civic Center Drive, San Marcos CA 92069
T: (760) 744-1050, ext. 3274
mrafael@san-marcos.net | **www.san-marcos.net**

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From: Michael Levin [mailto:mlevin@excelengineering.net]
Sent: Tuesday, June 25, 2019 4:47 PM
To: Quezada, Jonathan; Bausback, Kurt (kbausback@kbhome.com)
Cc: Kuey, Peter; Abboud, Nicholas; Rafael, Michael
Subject: Re: Site distance at Woodward

Thanks Jonathan. I would be happy to meet you in the field if you would like.

Sent via the Samsung Galaxy S8 Active, an AT&T 5G Evolution capable smartphone

-------- Original message --------
From: "Quezada, Jonathan" <JQuezada@san-marcos.net>
Date: 6/25/19 4:45 PM (GMT-08:00)
To: Michael Levin <mlevin@excelengineering.net>, "Bausback, Kurt (kbausback@kbhome.com)" <kbausback@kbhome.com>
Cc: "Kuey, Peter" <PKuey@san-marcos.net>, "Abboud, Nicholas" <NAbboud@san-marcos.net>, "Rafael, Michael" <MRafael@san-marcos.net>
Subject: RE: Site distance at Woodward

Mike and Kurt,

We will be providing you feedback tomorrow on the site distance exhibit provided after confirming dimensions with field observations.

Thanks,

Jonathan Quezada, E.I.T.| Assistant Engineer
City of San Marcos | 1 Civic Center Drive, San Marcos CA 92069
T: (760) 744-1050 x3216 | | **C:** (760) 891-6126 |
jquezada@san-marcos.net | **www.san-marcos.net**

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From: Michael Levin [mailto:mlevin@excelengineering.net]
Sent: Monday, June 24, 2019 10:42 AM
To: Rafael, Michael
Cc: Bausback, Kurt (kbausback@kbhome.com); Quezada, Jonathan; Kuey, Peter; Abboud, Nicholas; Bausback, Kurt (kbausback@kbhome.com)
Subject: RE: Site distance at Woodward

Thanks Michael

Attached find the profile for the site distance at the Mission 316 West Project. The profile of Woodard is within this study and the vertical curve is what is the limiting factor in the study.

Michael Levin, PLS
Co-President
Excel *Engineering*
440 State Place
Escondido, CA 92029
(760) 745-8118 ext. 211
(760) 745-1890 fax
mdlevin@excelengineering.net

From: Rafael, Michael <MRafael@san-marcos.net>
Sent: Monday, June 24, 2019 10:33 AM
To: Michael Levin <mlevin@excelengineering.net>
Cc: Bausback, Kurt (kbausback@kbhome.com) <kbausback@kbhome.com>; Quezada, Jonathan <JQuezada@san-marcos.net>; Kuey, Peter <PKuey@san-marcos.net>; Abboud, Nicholas <NAbboud@san-marcos.net>
Subject: RE: Site distance at Woodward

Hi Michael,

Thanks for your email. Based on the information you provided, we will need a site distance exhibit showing the stopping/corner sight distances for the proposed driveway on Woodward Street. There is also an existing vertical curve that may reduce the required sight distance. Please coordinate with Jonathan Quezada (land development project engineer) on submittal of the site distance exhibit. Thanks.

Michael Rafael, PE, TE | Senior Civil Engineer - Transportation
City of San Marcos | 1 Civic Center Drive, San Marcos CA 92069
T: (760) 744-1050, ext. 3274
mrafael@san-marcos.net | **www.san-marcos.net**

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From: Michael Levin [mailto:mlevin@excelengineering.net]
Sent: Friday, June 21, 2019 4:50 PM
To: Rafael, Michael

Cc: Bausback, Kurt (kbausback@kbhome.com)
Subject: Site distance at Woodward

Hi Michael

I left you a message a bit ago but thought I would also follow up with an email.

The site distance analysis for our drive at Woodward for the Mission 316 West project provides 460 feet of site distance, based on the speed survey data you provided the Corner site distance we would need 490 feet.

In discussing this with LLG the sites driveway does meet stopping site distance which requires 440 feet, We would have 20 feet excess length for stopping site distance. Would the City consider the use of stopping site distance for the driveway .

Thanks

Michael Levin, PLS
Co-President
Excel *Engineering*
440 State Place
Escondido, CA 92029
(760) 745-8118 ext. 211
(760) 745-1890 fax
mdlevin@excelengineering.net

From: Rafael, Michael <MRafael@san-marcos.net>
Sent: Monday, June 17, 2019 9:48 AM
To: Michael Levin <mlevin@excelengineering.net>
Cc: Kuey, Peter <PKuey@san-marcos.net>; Quezada, Jonathan <JQuezada@san-marcos.net>; Holder, Bradley <BHolder@san-marcos.net>; Abboud, Nicholas <NAbboud@san-marcos.net>
Subject: RE: Question on City's site distance

Hi Michael,

Thanks for your email. In calculating intersection sight distance, the 85th percentile speed shall be used to determine the required sight distance based on the City' standard. Based on the current engineering survey, the 85th percentile speed is 38 MPH (see attached). The design speed of a street is typically higher than the 85th percentile speed. Also, the existing crest vertical curve on Woodward Street may further reduce the required sight distance.

Michael Rafael, PE, TE | Senior Civil Engineer - Transportation
City of San Marcos | 1 Civic Center Drive, San Marcos CA 92069
T: (760) 744-1050, ext. 3274
mrafael@san-marcos.net | **www.san-marcos.net**

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From: Michael Levin [mailto:mlevin@excelengineering.net]
Sent: Friday, June 14, 2019 9:04 AM
To: Rafael, Michael
Subject: RE: Question on City's site distance

Hi Michael

Just following up on my question below

Thanks

Michael Levin, PLS
Co-President
Excel *Engineering*
440 State Place
Escondido, CA 92029
(760) 745-8118 ext. 211
(760) 745-1890 fax
mdlevin@excelengineering.net

From: Michael Levin
Sent: Wednesday, June 5, 2019 4:08 PM
To: MRafael@san-marcos.net
Subject: FW: Question on City's site distance

Michael Levin, PLS
Co-President
Excel *Engineering*
440 State Place
Escondido, CA 92029
(760) 745-8118 ext. 211
(760) 745-1890 fax
mdlevin@excelengineering.net

From: Michael Levin
Sent: Wednesday, June 5, 2019 12:06 PM
To: mrafael@san-marcos.net
Subject: Question on City's site distance

Hi Michael

I have what I hope is a quick question for you on the attached minimum site distance standards. In the section that I have highlighted. Item C. refers to new facilities I was hoping to get some clarity on that.

The reason I am asking I am looking at Woodward Street and working on a driveway opening. Researching the improvements they are relatively current. The plans match the current urban standards for design. The street design was done for 40mph.

Would that be considered a new facility.

I have attached a google image also of the street area.

Thanks very much for your feedback.

Michael Levin, PLS
Co-President
Excel *Engineering*
440 State Place
Escondido, CA 92029
(760) 745-8118 ext. 211
(760) 745-1890 fax
mdlevin@excelengineering.net



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Relationships

888-KB-HOMES
kbhome.com
Make an eDifference. Consider the environment before printing this email.

Linscott, Law & Greenspan, Engineers
4542 Ruffner Street, Suite 100, San Diego, CA 92111

Speed Statistics by Hour

Location: E. Mission Road, East of Woodward Street
Direction: Westbound Volume
Date Range: **Wednesday April 10, 2019**

Vehicles = 10457
Maximum = 67.7 mph, **Minimum** = 9.3 mph, **Mean** = 41.4 mph
85% Speed = 45.69 mph, **95% Speed** = 48.54 mph, **Median** = 41.44 mph

Hour Bins:

Time	Bin	Min	Max	Mean	Median	85%	95%
0000	33 0.316%	32.6	56.4	41.6	41.7	46.3	50.6
0100	18 0.172%	35.2	55.4	43.1	42.9	47.8	55.4
0200	19 0.182%	31.1	44.8	38.7	39.0	43.7	44.8
0300	34 0.325%	17.5	57.5	40.5	40.9	47.1	56.1
0400	68 0.650%	22.8	56.4	40.9	41.4	46.0	48.6
0500	171 1.635%	30.7	60.4	42.6	42.6	46.8	49.9
0600	481 4.600%	20.1	56.4	42.8	42.6	46.9	49.9
0700	1143 10.93%	20.4	56.2	40.7	40.8	45.5	48.4
0800	1130 10.81%	9.3	64.6	40.7	41.1	45.3	48.2
0900	583 5.575%	19.0	54.6	41.9	41.7	45.9	48.6
1000	475 4.542%	12.9	55.0	42.1	42.2	46.3	48.9
1100	477 4.562%	13.6	58.8	41.7	41.4	45.6	48.5
1200	485 4.638%	15.1	58.2	42.4	42.3	46.3	48.9
1300	498 4.762%	28.4	56.6	42.2	41.9	45.9	48.7
1400	563 5.384%	16.3	57.3	41.8	41.4	45.9	48.8
1500	907 8.674%	10.5	56.0	39.9	40.0	43.9	46.4
1600	871 8.329%	13.7	61.7	41.4	41.4	45.8	48.4
1700	885 8.463%	28.6	65.8	41.9	41.6	46.1	49.0
1800	613 5.862%	29.2	57.6	41.5	41.4	45.3	47.5
1900	406 3.883%	16.6	57.2	41.2	41.1	45.4	48.3
2000	255 2.439%	31.0	58.6	41.8	41.7	45.6	48.5
2100	210 2.008%	29.2	61.3	42.3	41.8	46.4	50.1
2200	91 0.870%	10.1	67.7	42.5	42.4	47.9	55.5
2300	41 0.392%	28.5	53.8	42.1	42.2	47.5	52.9
----	**10457 100.0%**	**9.3**	**67.7**	**41.4**	**41.4**	**45.7**	**48.5**

Report Generated by "Count Data" all rights reserved

MAP No. 16111

CITY OF SAN MARCOS TSM 14-001

IN THE CITY OF SAN MARCOS, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA

CONSISTING OF 1 LOT FOR CONDOMINIUM PURPOSES FOR A TOTAL OF 93 AIRSPACE UNITS

OWNER'S STATEMENT

WE HEREBY STATE THAT WE ARE THE OWNERS OF OR ARE INTERESTED IN THE LAND SUBDIVIDED BY THIS MAP, AND WE CONSENT TO THE PREPARATION AND RECORDATION OF SAID MAP, CONSISTING OF 4 SHEETS AND DESCRIBED IN THE CAPTION THEREOF.

WE HEREBY RELINQUISH AND WAIVED ALL ACCESS RIGHTS FROM LOT 1 IN AND TO MISSION ROAD, EXCEPT AT ACCESS OPENINGS AS SHOWN ON SAID MAP.

WE HEREBY OFFER TO THE CITY ONSITE ~~ACCESS TO ENTER THE ASSOCIATION MAINTENANCE AREA AND THE CONDOMINIUM COMMON AREA FOR UTILITY FACILITIES ACCESS, MAINTENANCE AND REPAIR ACCESS~~ EMERGENCY ACCESS AND OTHER GENERAL MUNICIPAL ACCESS. (BLANKET EASEMENT IN NATURE)

WE ALSO HEREBY OFFER TO THE CITY SITE CORRIDOR EASEMENT AS SHOWN ON SAID MAP.

KB HOME CALIFORNIA LLC, A DELAWARE LIMITED LIABILITY COMPANY

BY _____ DATE 3/7/16
KURT BAUSBACK
DIRECTOR, FORWARD PLANNING

NOTARY ACKNOWLEDGMENT

A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THE DOCUMENT, TO WHICH THIS CERTIFICATE IS ATTACHED, AND NOT THE TRUTHFULNESS, ACCURACY, OR VALIDITY OF THAT DOCUMENT.

STATE OF CALIFORNIA) SS
COUNTY OF San Diego)

ON March 7, 2016, BEFORE ME, Deborah T. Drake, NOTARY PUBLIC, PERSONALLY APPEARED Kurt Richard Bausback, WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.

I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.

WITNESS MY HAND AND ~~SEAL~~: OFFICIAL SEAL.

SIGNATURE Deborah T Drake
NOTARY PUBLIC IN AND FOR SAID STATE

Deborah T. Drake
PRINT NAME

DEBORAH T. DRAKE
Commission # 2050730
Notary Public - California
San Diego County
My Comm. Expires Nov 30, 2017

MY COMMISSION NUMBER: 2050730

MY COMMISSION EXPIRES: NOV. 30, 2017

MY PRINCIPAL PLACE OF BUSINESS IS IN San Diego COUNTY.

SIGNATURE OMISSIONS

THE SIGNATURE(S) OF THE PARTIES LISTED BELOW, OWNER(S) OF EASEMENTS PER DOCUMENTS NOTED BELOW HAVE BEEN OMITTED UNDER THE PROVISIONS OF SECTION (a)(3)(A)(i) OF THE SUBDIVISION MAP ACT, THEIR INTEREST IS SUCH THAT IT CANNOT RIPEN INTO A FEE TITLE AND SAID SIGNATURES ARE NOT REQUIRED BY THE GOVERNING BODY.

1. SAN DIEGO GAS & ELECTRIC, AS HOLDER OF EASEMENTS, RECORDED: MAY 14, 1945 IN BOOK 1865, PAGE 355; MAY 16, 1945 IN BOOK 1869, PAGE 279; OCTOBER 19, 1948 IN BOOK 2985, PAGE 373; OCTOBER 26, 1948 IN BOOK 2596, PAGE 49; OCTOBER 27, 1948 IN BOOK 2998, PAGE 152; APRIL 4, 1955 IN BOOK 5591, PAGE 585; APRIL 4, 1955 IN BOOK 5592, PAGE 19; FEBRUARY 6, 1991 AS INSTRUMENT NO. 91-053273, MARCH 4, 2016 AS DOCUMENT NO. 2016-0096526, ALL OF OFFICIAL RECORDS.

2. CITY OF SAN MARCOS, AS HOLDER OF EASEMENTS, RECORDED AUGUST 3, 1990 AS INST. NO. 90-426004 AND AUGUST 6, 1993 AS INST. NO. 93-511749 BOTH OFFICIAL RECORDS.

3. COUNTY OF SAN DIEGO, AS HOLDER OF EASEMENT, RECORDED AUGUST 4, 1961 AS INST. NO. 134211 OF OFFICIAL RECORDS.

4. "RECIPROCAL STREET EASEMENT AGREEMENT" BY AND BETWEEN KB HOME CALIFORNIA LLC, A DELAWARE LIMITED LIABILITY CO. AND CA REZA SAN MARCOS LLC, A CALIFORNIA LIMITED LIABILITY CO., RECORDED MAY 06, 2015 AS DOC. NO. 2015-0225380 OF OFFICIAL RECORDS.

LEGAL DESCRIPTION

THE MAP HEREINBEFORE REFERRED TO IS A SUBDIVISION OF:

PARCEL C OF CERTIFICATE OF COMPLIANCE RECORDED OCTOBER 2, 2015 AS DOC. NO. 2015-0520560; PARCEL 2 OF PARCEL MAP NO. 10177; PORTION OF THE WESTERLY 140.00 FEET OF LOT 4 IN BLOCK 52 OF THE RANCHO LOS VALLECITOS DE SAN MARCOS, MAP NO. 806. ALL IN THE CITY OF SAN MARCOS, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA.

SUBDIVISION GUARANTEE FURNISHED BY FIDELITY NATIONAL TITLE COMPANY, GUARANTEE NO. 23063871, DATED MARCH 4, 2016.

THE TOTAL NUMBER OF LOT IS ONE (1) RESIDENTIAL.
THE TOTAL GROSS AREA IS 6.744 ACRES.

BONDS & ASSESSMENTS CERTIFICATES

WE, COUNTY TREASURER-TAX COLLECTOR OF THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AND DIRECTOR OF PUBLIC WORKS OF SAID COUNTY, HEREBY CERTIFY THAT THERE ARE NO UNPAID SPECIAL ASSESSMENTS OR BONDS WHICH MAY BE PAID IN FULL, SHOWN BY THE BOOKS OF OUR OFFICES, AGAINST THE TRACT OR SUBDIVISION OR ANY PART THEREOF SHOWN ON THE ANNEXED MAP AND DESCRIBED IN THE CAPTION THEREOF.

DAN McALLISTER, COUNTY
TREASURER-TAX COLLECTOR

BY _____ DEPUTY
DATED 06/07/2016

RICHARD E. CROMPTON,
DIRECTOR OF PUBLIC WORKS

BY _____ DEPUTY
DATED 5-23-16

WE, DAN McALLISTER AND JACK GRIFFIN, FISCAL AGENTS OF THE CITY OF SAN MARCOS, STATE OF CALIFORNIA, HEREBY CERTIFY THAT THERE ARE NO UNPAID SPECIAL ASSESSMENTS OR BONDS WHICH MAY BE PAID IN FULL, SHOWN BY THE BOOKS OF THIS OFFICE, AGAINST THE TRACT OR SUBDIVISION OR ANY PART THEREOF SHOWN ON THE ANNEXED MAP AND DESCRIBED IN THE CAPTION THEREOF.

DAN McALLISTER, COUNTY
TREASURER-TAX COLLECTOR

BY _____ DEPUTY
DATED _____

JACK GRIFFIN,
CITY MANAGER

BY _____ DEPUTY
DATED 4/20/2016

CITY CLERK'S STATEMENT

I, PHILLIP SCOLLICK, CITY CLERK FOR THE CITY OF SAN MARCOS, STATE OF CALIFORNIA, HEREBY CERTIFY THAT THE COUNCIL OF SAID CITY HAS APPROVED THIS MAP AND HAS ACCEPTED ON BEHALF OF THE CITY, SUBJECT TO IMPROVEMENTS: THE RELINQUISHMENT OF ALL ACCESS RIGHTS FROM LOT 1 IN AND TO MISSION ROAD EXCEPT AS SHOWN, SITE CORRIDOR EASEMENT, ONSITE ~~ACCESS TO ENTER THE ASSOCIATION MAINTENANCE AREA AND THE CONDOMINIUM COMMON AREA FOR UTILITY FACILITIES ACCESS, MAINTENANCE AND REPAIR ACCESS~~ EMERGENCY ACCESS AND OTHER GENERAL MUNICIPAL ACCESS, ALL AS SHOWN ON SAID MAP.

BY _____ DATE 5/18/16
PHILLIP SCOLLICK, CITY CLERK, CITY OF SAN MARCOS

NOTE

THIS SUBDIVISION IS A CONDOMINIUM PROJECT AS DEFINED IN SECTION 1350 ET SEQ. OF THE CIVIL CODE OF THE STATE OF CALIFORNIA, CONTAINING A MAXIMUM OF 93 DWELLING UNITS AND IS FILED PURSUANT TO THE SUBDIVISION MAP ACT.

SURVEYOR'S CERTIFICATE

I, MICHAEL D. LEVIN, A LICENSED LAND SURVEYOR OF THE STATE OF CALIFORNIA, HEREBY CERTIFY THAT THE SURVEY OF THIS SUBDIVISION WAS MADE BY ME OR UNDER MY DIRECTION ON AUGUST 2015 AND THAT SAID SURVEY IS TRUE AND COMPLETE AS SHOWN, THAT ALL STAKES, MONUMENTS AND MARKS FOUND, TOGETHER WITH THOSE SET, ARE OF THE CHARACTER INDICATED AND OCCUPY THE POSITIONS SHOWN THEREON. I WILL SET ALL OTHER MONUMENTS OF THE CHARACTER AND AT THE POSITION INDICATED BY THE LEGEND IN THIS MAP WITHIN THIRTY (30) DAYS AFTER THE COMPLETION OF THE REQUIRED IMPROVEMENTS AND THEIR ACCEPTANCE BY THE CITY OF SAN MARCOS, AND ALL SUCH MONUMENTS ARE OR WILL BE SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED. (SEE LEGEND ON SHEET 2)

BY _____ 5-20-16
(MICHAEL D. LEVIN L.S. 6896) DATE
MY REGISTRATION EXPIRES 06/30/17

LICENSED LAND SURVEYOR
Michael D. Levin
No. 6896
STATE OF CALIFORNIA

CITY ENGINEER'S STATEMENT

I, MATT LITTLE, CITY ENGINEER, CERTIFY THAT I HAVE EXAMINED THIS MAP; THAT THE SUBDIVISION IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE TENTATIVE MAP, AND ANY APPROVED ALTERATIONS THEREOF; THAT ALL THE PROVISIONS OF THE SUBDIVISION MAP ACT AND THE SUBDIVISION ORDINANCE OF THE CITY OF SAN MARCOS HAVE BEEN COMPLIED WITH

DATE 5/20/16

REGISTERED PROFESSIONAL ENGINEER
MATTHEW T LITTLE
No. 060569 EXP. 12/31/16
CIVIL STATE OF CALIFORNIA

MATT LITTLE, CITY ENGINEER
R.C.E. 60569, EXP. 12/31/16

REGISTERED PROFESSIONAL ENGINEER
MATTHEW T. LITTLE
No. 60569
Exp 12/31/16
CIVIL
STATE OF CALIFORNIA

CITY SURVEYOR'S STATEMENT

I, DALE K. BREWER, PROFESSIONAL LAND SURVEYOR, HAVE EXAMINED THIS MAP AND I AM SATISFIED THAT IT IS TECHNICALLY CORRECT.

DATE 4/20/16

DALE K. BREWER, CITY SURVEYOR
P.L.S. 5653, EXP. 09/30/17

LICENSED LAND SURVEYOR
Dale K. Brewer
No. 5653
STATE OF CALIFORNIA

APPROVED AS TO FORM THIS 16th DAY OF May, 2016.

HELEN HOLMES PEAK
CITY ATTORNEY

TAX DEPOSIT CERTIFICATE

I, DAVID HALL, CLERK OF THE BOARD OF SUPERVISORS, HEREBY CERTIFY THAT THE PROVISIONS OF THE SUBDIVISION MAP ACT (DIVISION 2 OF TITLE 7 OF THE GOVERNMENT CODE) REGARDING (A) DEPOSITS FOR TAXES, AND (B) CERTIFICATION OF THE ABSENCE OF LIENS FOR UNPAID STATE, COUNTY, MUNICIPAL OR LOCAL TAXES OR SPECIAL ASSESSMENTS COLLECTED AS TAXES EXCEPT THOSE NOT YET PAYABLE, HAVE BEEN COMPLIED WITH.

DATE 06/08/2016

DAVID HALL (DEPUTY)
CLERK OF THE BOARD OF SUPERVISORS

RECORDER'S CERTIFICATE

FILE NO. 2016-7000234

I, ERNEST J. DRONENBURG, JR., RECORDER OF THE COUNTY OF SAN DIEGO, CALIFORNIA, HEREBY CERTIFY THAT I HAVE ACCEPTED FOR RECORDATION THIS MAP FILED AT THE REQUEST OF MICHAEL D. LEVIN THIS 8th DAY OF JUNE, 2016, AT 3:37 O'CLOCK P.M.

ERNEST J. DRONENBURG, JR.,
COUNTY RECORDER

BY _____ DEPUTY

FEE $16.00
M.F. _____

EXCEL ENGINEERING
440 STATE PLACE
ESCONDIDO, CA 92029
PHONE (760) 745-8118

A.P.N. 220-210-10, 41 & 46	G.P. 15-00016	I.P. 15-00011	V.W.D. W.O. 149977

CALIFORNIA COORD. INDEX 354-1719

MAP No. 16111

CITY OF SAN MARCOS TSM 14-001

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS PROJECT IS BETWEEN SURVEY CONTROL POINT #1024 AND SURVEY CONTROL POINT #1077 AS SHOWN ON RECORD OF SURVEY 13928, RECORDED OCTOBER 1, 1992 AS FILE NO. 92-625379.

THE COMBINED FACTOR FOR THIS PROJECT IS BASED ON SURVEY CONTROL POINT #1024, BEING 0.999938891 GROUND TO GRID.

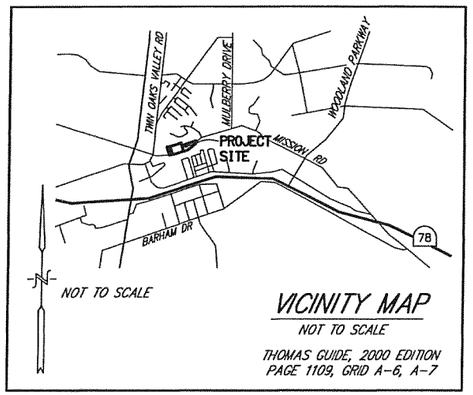
(IE N 54° 45' 30" E)

LEGEND

○	SET 2" x 24" IRON PIPE WITH BRASS DISC STAMPED "LS 6896"
□	SET LEAD AND TAG MARKED "L.S. 6896" ON TOP OF CURB
●	FOUND MONUMENT AS NOTED
■	FOUND 3" BRASS DISC IN WELL MONUMENT AS NOTED
▲	FOUND 3" BRASS DISC STAMPED LS 5653 IN WELL MONUMENT ACCEPTED PER ROS 14825
(R)	RADIAL BEARING
( )	RECORD DATA AS NOTED
[ ]	RECORD DATA PER MAP 14483, FILE NO. 2002-1001345
{ }	RECORD DATA PER ROS 14825, FILE NO. 95-110240
< >	RECORD DATA PER PM 10177, FILE NO. 80-204014
(( ))	RECORD DATA PER ROS 17012, FILE NO. 2001-0382797
[[ ]]	RECORD DATA PER ROS 17686, FILE NO. 2003-080826
DD#1	RECORD DATA PER BOOK 817, PAGE 111, RECORDED JAN. 19, 1920
DD#2	RECORD DATA PER C.O.C. ADJUSTMENT PLAT, FILE NO. 1999-0631820, RECORDED SEPT. 15, 1999
DD#3	RECORD DATA PER C.O.C. ADJUSTMENT PLAT, FILE NO. 2015-0520560, RECORDED OCT. 2, 2015

1. UNLESS OTHERWISE NOTED A 3/4" IRON PIPE WITH DISC MARKED "L.S. 6896" WILL BE SET FLUSH AT ALL LOT CORNERS, ANGLE POINTS AND POINTS OF CURVE. WHERE A PIPE CANNOT BE SET DUE TO CONCRETE, A LEAD AND TAG MARKED "L.S. 6896" WILL BE SET FLUSH IN ITS PLACE.

———	PROPERTY LINE
———	STREET RIGHT-OF-WAY LINE
—— – ——	STREET CENTERLINE
– — – —	ADJACENT PROPERTY LINE
– – – – – –	EASEMENT LINE
//////////	ACCESS RELINQUISHED



VICINITY MAP
NOT TO SCALE
THOMAS GUIDE, 2000 EDITION
PAGE 1109, GRID A-6, A-7

EXISTING EASEMENTS TO BE QUITCLAIMED AFTER NEW FACILITIES ARE IN PLACED.

(1) AN EASEMENT GRANTED TO SAN DIEGO GAS AND ELECTRIC COMPANY FOR PUBLIC UTILITIES, INGRESS, EGRESS AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED MAY 14, 1945 IN BOOK 1865, PAGE 355 OF OFFICIAL RECORDS.

(2) AN EASEMENT GRANTED TO SAN DIEGO GAS AND ELECTRIC COMPANY FOR THE PURPOSE OF PUBLIC UTILITIES, INGRESS, EGRESS AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED OCTOBER 19, 1948 IN BOOK 2985, PAGE 373 OF OFFICIAL RECORDS.

(3) AN EASEMENT GRANTED TO SAN DIEGO GAS AND ELECTRIC COMPANY FOR THE PURPOSE OF PUBLIC UTILITIES, INGRESS, EGRESS AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED APRIL 4, 1955 IN BOOK 5592, PAGE 19 OF OFFICIAL RECORDS.

(4) AN EASEMENT GRANTED TO SAN DIEGO GAS AND ELECTRIC COMPANY FOR POLES WITH WIRES AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED MAY 16, 1945 IN BOOK 1869, PAGE 279 OF OFFICIAL RECORDS.
(SURVEYOR'S NOTE: SAID DOCUMENT DESCRIBES THE CENTERLINE OF THE EASEMENT WITHOUT PROVIDING A WIDTH DIMENSION. THE CENTERLINE OF SAID EASEMENT IS SHOWN HEREON.)

(5) AN EASEMENT GRANTED TO SAN DIEGO GAS AND ELECTRIC COMPANY FOR PUBLIC UTILITIES, INGRESS, EGRESS AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED OCTOBER 27, 1948 IN BOOK 2998, PAGE 152 OF OFFICIAL RECORDS.
(SURVEYOR'S NOTE: SAID DOCUMENT DESCRIBES THE EASEMENT AS LYING ALONG THE EASTERLY PROPERTY LINE OF THE SUBJECT PROPERTY WITHOUT PROVIDING A WIDTH DIMENSION. THE EASEMENT IS SHOWN AS SUCH HEREON.)

(6) AN EASEMENT GRANTED TO SAN DIEGO GAS AND ELECTRIC COMPANY FOR PUBLIC UTILITIES, INGRESS, EGRESS AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED APRIL 4, 1955 IN BOOK 5591, PAGE 585 OF OFFICIAL RECORDS.

(7) AN EASEMENT GRANTED TO SAN DIEGO GAS AND ELECTRIC COMPANY FOR THE PURPOSE OF PUBLIC UTILITIES, INGRESS, EGRESS AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED OCTOBER 26, 1948 IN BOOK 2596, PAGE 49 OF OFFICIAL RECORDS.
(SURVEYOR'S NOTE: SAID DOCUMENT DESCRIBES THE EASEMENT AS IMMEDIATELY ADJACENT TO THE WESTERLY LINE OF THE PROPERTY LINE OF THE SUBJECT PROPERTY WITHOUT PROVIDING A WIDTH DIMENSION. THE EASEMENT IS SHOWN AS SUCH HEREON.)

(8) AN EASEMENT GRANTED TO SAN DIEGO GAS AND ELECTRIC COMPANY FOR THE PURPOSE OF PUBLIC UTILITIES, INGRESS, EGRESS AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED FEBRUARY 6, 1991 AS INSTRUMENT NO. 91-053273 OF OFFICIAL RECORDS.

EXISTING EASEMENTS

△1 AN EASEMENT GRANTED TO THE CITY OF SAN MARCOS FOR THE PURPOSE OF PUBLIC HIGHWAY AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED AUGUST 3, 1990 AS INSTRUMENT NO. 90-426004 OF OFFICIAL RECORDS.

△2 AN EASEMENT GRANTED TO COUNTY OF SAN DIEGO FOR THE PURPOSE OF COUNTY HIGHWAY AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED AUGUST 4, 1961 AS INSTRUMENT NO. 134211 OF OFFICIAL RECORDS

△3 AN EASEMENT GRANTED TO THE CITY OF SAN MARCOS FOR THE PURPOSE OF PUBLIC HIGHWAY AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT RECORDED AUGUST 6, 1993 AS INSTRUMENT NO. 93-511749 OF OFFICIAL RECORDS.

△4 AN EASEMENT TO CLEAR VEGETATION AND BRUSH, COMBUSTIBLE MATERIALS AND/OR POTENTIAL HAZARDS FOR FIRE CONTROL PURPOSES, PURSUANT AND SUBJECT TO THE TERMS AND PROVISIONS OF THE GRANT OF EASEMENT RECORDED MAY 6, 2015, AS INSTRUMENT NO. 2015-0225379 OFFICIAL RECORDS.

△5 AN EASEMENT FOR STREET, PURSUANT AND SUBJECT TO THE TERMS AND PROVISIONS OF THE RECIPROCAL STREET EASEMENT AGREEMENT RECORDED MAY 6, 2015, AS INSTRUMENT NO. 2015-0225380 OFFICIAL RECORDS.

AN EASEMENT GRANTED TO SAN DIEGO GAS AND ELECTRIC COMPANY FOR THE PURPOSE OF UNDERGROUND FACILITIES AND APPURTENANCES FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY, PIPELINES AND APPURTENANCES FOR ANY AND ALL PURPOSES, COMMUNICATION FACILITIES AND APPURTENANCES, AS SET FORTH IN A DOCUMENT RECORDED MARCH 4, 2016 AS DOCUMENT NO. 2016-0096526 OF OFFICIAL RECORDS.
(SURVEYOR'S NOTE: NOT PLOTTABLE)

LINE DATA		
NO	BEARING	LENGTH
L1	N73°20'58"E	130.82'
L2	N36°04'47"E	213.93'
L3	N73°20'57"E	113.91'
L4	N36°04'47"E	176.54'
L5	N16°50'23"W (N16°55'28"W	74.00' DD#3)
L6	N73°50'58"E	140.00'
L7	N79°48'07"E	187.71'
L8	N83°35'11"W	42.00'

CURVE DATA			
NO	DELTA/BRG	RADIUS	LENGTH
C1	04°11'12"	1776.86'	129.84'
C2	03°18'00"	1747.00'	100.62'
C3	13°17'06"	1337.00'	310.00'
C4	10°30'01" (DD#3 10°30'01"	1337.00' 1337.00'	245.03' 245.03')
C5	07°07'31" (DD#3 07°09'07"	1463.00' 1463.00'	181.94' 182.62')
C6	01°56'44"	1463.00'	49.68'
C7	01°47'12"	1463.00'	45.62'
C8	02°21'19"	1337.00'	54.96'
C9	02°28'50"	1337.00'	57.89'
C10	10°03'06"	1463.00'	256.66'
C11	01°00'49"	1463.00'	25.88'
C12	04°32'48"	1776.86'	141.00'
C13	04°37'00" [04°37'00"	1747.00' 1747.00'	140.76' 140.77']
C14	07°55'00"	1747.00'	241.39'
C15	23°47'07"	1337.00'	555.03'

STREET CENTERLINE DATA				
NO	DELTA/BRG	RADIUS	LENGTH	REMARK
1	Δ=09°33'48" {Δ=09°33'53"	1400.00' 1400.00'	233.68' 233.71'}	
2	N24°37'52"W (N24°40'00"W	-- --	187.31' 187.19'	PER MAP 13752)
3	Δ=14°12'32" {Δ=14°12'33"	1400.00' 1400.00'	347.19' 347.20'}	
4	N49°33'50"E {N49°03'49"E	-- --	201.32' 201.32'}	
5	Δ=23°47'07" {Δ=23°47'07"	1400.00' 1400.00'	581.18' 581.18'}	
6	N73°20'57"E {N72°50'56"E	-- --	113.91' 113.91'}	
7	Δ=33°22'35" {Δ=33°22'34"	1810.00' 1810.00'	1054.38' 1054.37'}	
8	N13°30'24"E ((N13°11'06"E	-- --	128.50' 128.49'))	
9	Δ=07°06'37" ((Δ=07°06'37"	800.00' 800.00'	99.28' 99.28'))	

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CALIFORNIA COORD. INDEX 354-1719

MAP No. 16111

CITY OF SAN MARCOS TSM 14-001

SHEET 3 OF 4 SHEETS

PROCEDURE OF SURVEY

SMVC024
FOUND 3" BRASS DISC IN STANDARD STREET WELL MONUMENT ENCLOSURE, PUNCHED, RECORD PER ROS 13928
NORTHING: 1994791.628
EASTING: 6277262.902

BASIS OF BEARINGS
(N54°45'30"E 11236.97' GRID ROS 13928)
(N54°45'30"E 11237.66' GROUND ROS 13928)
N54°45'30"E 11237.62' GROUND

SMVC077
FOUND 3" BRASS DISC IN STANDARD STREET WELL MONUMENT ENCLOSURE, STAMPED "LS5486", RECORD PER ROS 13928
NORTHING: 2001275.642
EASTING: 6286440.437

FOUND 2" IP WITH DISC STAMPED LS4822, RECORD PER MAP 14483, ACCEPTED AS THE NORTHWEST CORNER OF LOT 3 OF SAID MAP AND ALSO THE NORTHWEST CORNER OF LOT 4 OF MAP 806

FOUND 1" IP WITH DISC STAMPED LS4822, RECORD PER MAP 14483, ACCEPTED AS THE NORTHWESTERLY CORNER OF LOT 2 OF SAID MAP AND A POINT ON LINE OF LOT 4 OF MAP 806

<N72°45'31"E 657.07'>
[N73°46'28"E 657.01']
N73°45'40"E 656.89'

FOUND 2" IP WITH DISC STAMPED LS4822, RECORD PER MAP 14483, ACCEPTED AS A PROPERTY CORNER.

(N73°39'29"E 665.54' PER MAP 13752)
N73°45'40"E 665.79'

FOUND 3/4" IP WITH PLASTIC PLUG MARKED "RCE28846" AS SHOWN ON MAP 13752 ACCEPTED AS A POINT ON THE EASTERLY LINE OF LOT 3

SMVC024
-0°30'37.967"
CCS NAD83 GRID NORTH
GEODETIC NORTH, N.T.S.
SCALE: 1"=100'

(N16°55'54"W 918.35' PER MAP 13752)
N16°49'26"W 918.50'
823.52'

ACCEPTED AS CENTERLINE INTERSECTION OF VINEYARD AND MISSION ROADS PER ROS 14825.
CENTERLINE PER ROS 14825
CENTERLINE PER ROS 17012
FOUND 3" BRASS DISC, NO STAMP, IN WELL MONUMENT PER ROS 17012, ACCEPTED AS A POINT ON CENTERLINE OF MISSION ROAD.
((6.64'))
6.66'
((13.27'))
13.27'
((2.53'))
2.51'
2.51'
22.44'
N73°16'28"W
FOUND 3" BRASS DISC, NO STAMP, IN WELL MONUMENT PER ROS 17012, ACCEPTED AS CENTERLINE INTERSECTION OF VINEYARD AND MISSION ROADS PER ROS 17012.
ACCEPTED AS END OF CURVE

DETAIL "A"
NOT TO SCALE

Δ=30°38'40" (Δ=30°43'00" PER MAP 13752)
R=200.00'
L=106.97' (L=107.22' PER MAP 13752)
FALCON PLACE
N30°29'06"W (R) DD#3

MAP 13752
3" BRASS DISC STAMPED LS5406, RECORD PER MAP 13752, ACCEPTED AS THE BEGINNING OF CURVE ON THE CENTERLINE OF FALCON PLACE.
LOT 29
LOT C
N33°18'39"W (R)

VINEYARD ROAD
CENTERLINE PER ROS 17012
51.00'
42.00'
CENTERLINE PER ROS 14825

LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7
MAP 14483

N71°46'56"E 6748.35'
(TIE LINE ONLY)
[342.26']
343.26'
N16°52'59"W 1098.22'
[N16°52'22"W 1098.22']

FOUND 1" IP WITH DISC STAMPED LS4822, RECORD PER MAP 14483, ACCEPTED AS THE SOUTHERLY CORNER OF LOT 2 OF SAID MAP AND A POINT ON LINE OF LOT 4 OF MAP 806

FOUND LEAD AND DISC STAMPED RCE21121, IN LIEU OF 1/2" IRON PIN PER PM 10177, ACCEPTED AS THE NORTHWEST CORNER OF PARCEL 2

FOUND 1/2" REBAR AND CAP MARKED RCE21121, RECORD PER PM 10177, ACCEPTED AS THE NORTHEAST CORNER OF PARCEL 2

FOUND 2" IP WITH DISC STAMPED LS4822, RECORD PER MAP 14483, NOT ACCEPTED, N71°02'18"E 4.97' FROM POSITION SHOWN HEREON

[223.97']
224.02'
(N80°21'10"E 141.46' DD#2)
[N81°22'57"E]
[141.47']
N81°22'08"E
141.46'

FOUND 2" IP WITH DISC STAMPED LS4822, RECORD PER MAP 14483, ACCEPTED AS SOUTHWESTERLY CORNER OF LOT 1 OF SAID MAP AND A POINT ON LINE OF LOT 4 OF MAP 806

PM 10177
PARCEL 2

MAP 806 BLOCK 52 POR. OF LOT 3

150.00'
<140.00'>
[140.00']

CORRECT SOUTHWEST CORNER OF LOT 3, BLOCK 52, MAP 806, POSITION ESTABLISH AT INTERSECTION OF THE WESTERLY LINE OF SAID LOT 3 AND THE 100' RIGHT-OF-WAY WIDTH OF GRAND AVENUE PER MAP 806.

N16°52'59"W 360.00'
<360.00'>
[352.98']
352.52'
358.95'
[358.99']

(TIE LINE ONLY)
N26°54'27"E 4709.13'

<N16°08'36"W 1138.99'>
N17°08'57"W 1139.14'
749.07'

<N72°20'00"E 392.08'>
N73°20'58"E 392.43'
17.00'
63'
27.12'
14.86'
R=1747.00'
N16°52'59"W 28.61'
[[L=719.38']]
L=719.37'

<126.70'>
127.00'
4.97'
390.00'
<390.00'>
280.00' (280.00' DD#3)
232.25'[232.25'DD#3]
198.25'[198.70']
6.0'
6.0'
169.31'
N73°20'58"E

N72°09'08"E 661.08'
N71°03'18"E 589.02'
589.68' DD#3)
(N70°56'16"E
(N49°27'47"E DD#3)
N49°33'50"E 201.32'
63.00'
63.00'
N49°33'50"E 201.32'
(N36°04'47"E 384.12' PER ROS 14825)
17.00'
17.00'
17.00'
N73°20'58"E 258.62'
352.54'

C1 C2 C3 C4 C5 C6 C7 C8 C10 C11 C13 C14 C15
L1 L2 L3 L4 L5 L6 L7 L8

FOUND 3" BRASS DISC STAMPED LS6215 IN WELL MONUMENT PER ROS 17012, ACCEPTED AS BEGIN/END OF CURVE OF CENTERLINE OF VINEYARD ROAD.
FOUND 1" IRON PIPE WITH TAG STAMPED RCE20159 PER ROS 17686, ACCEPTED AS POINTS ON RIGHT-OF-WAY.
Δ=07°06'37"
R=842.00'
L=104.49'
N13°30'24"E 33.76'
[[N12°30'53"E 33.88']]
Δ=88°38'53"[[Δ=88°40'16"]]
R=35.00'
L=54.15'[[L=54.17']]
[[Δ=23°35'36"]]
Δ=23°35'34"
SEE DETAIL "A" ABOVE RIGHT
FOUND 1" IRON PIPE WITH TAG STAMPED RCE20159 PER ROS 17686, ACCEPTED AS POINTS ON RIGHT-OF-WAY.
FOUND 1" IP WITH TAG STAMPED RCE20159 PER ROS 17686, ACCEPTED AS POINT ON RIGHT-OF-WAY
CONSTRUCTION CENTERLINE PER ROS 14825
CENTERLINE PER PM 10177
SEARCHED NOTHING FOUND
MISSION ROAD

CONSTRUCTION CENTERLINE PER ROS 14825
CORRECT SOUTHEAST CORNER OF LOT 3, BLOCK 52, MAP 806, POSITION ESTABLISH AT OFFSETS PER MAP 806.
INCORRECT SOUTHEAST CORNER OF LOT 3, AS SHOWN PER LS 475, POSITION ESTABLISH AT RECORD DISTANCE AND ANGLE PER ROS 14825
CENTERLINE PER ROS 14825
CORRECT SOUTHERLY CORNER OF LOT 3, BLOCK 52, MAP 806, POSITION ESTABLISH AT OFFSET FROM THE CENTERLINE OF GRAND AVENUE PER MAP 806.
SOUTHERLY CORNER OF LOT 3, AS SHOWN INCORRECTLY ON LS 475, POSITION ESTABLISHED AT RECORD DISTANCE PER ROS 14825
(GRAND AVENUE)
A.T. & S.F. R.R.

INCORRECT SOUTHWEST CORNER OF LOT 3, BLOCK 52, MAP 806, POSITION ESTABLISH AT INTERSECTION OF THE WESTERLY LINE OF SAID LOT 3 AND THE 33' RIGHT-OF-WAY OF GRAND AVENUE PER LS 475.
SOUTHEAST CORNER OF PARCEL 2 OF PM 10177, POSITION ESTABLISHED AT THE INTERSECTION OF 50' ROW OF MISSION ROAD AND THE EASTERLY LINE OF LOT 2

NOTE
1. SEE SHEET 2 FOR LINE, CURVE AND STREET CENTERLINE DATA TABLES, BASIS OF BEARINGS, MONUMENT NOTES, LEGEND, EASEMENT NOTES AND VICINITY MAP.

SCALE: 1"=100'
0 100 200 300 400

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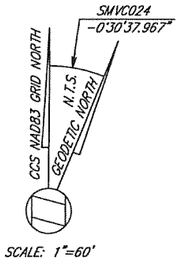
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CALIFORNIA COORD. INDEX 354-1719

MAP No. 16111

CITY OF SAN MARCOS TSM 14-001

SHEET 4 OF 4 SHEETS



MAP 14483
LOT 1

N72°46'22"E 520.33'

MAP 14483
LOT 6

N17°08'57"W 121.08'

20.34'

MAP 13752
LOT C

N71°03'18"E 589.02'

N33°18'39"W (R)

Δ=07°07'31"
R=1463.00'
L=181.94'

Δ=14°12'32"
R=1400.00'
L=347.19'

1.26'

63'

63'

ACCESS OPENING
34.00'

142.69'

N49°33'50"E 201.32'

N49°33'50"E 201.32'

N81°22'08"E 141.46'

162.56'

150'

MAP 806

BLOCK 52

LOT 5

N16°52'59"W 358.95'

L2

50'

45.00'

L1

N16°52'59"W 150.80'

17'

151.39'

153.74'

202.81'

N16°52'59"W

N10°23'15"W (R)

LOT 1
6.744 ACRES GROSS / 293,753.21 SQ.FT. GROSS
6.684 ACRES NET / 291,159.37 SQ.FT. NET

SIGHT CORRIDOR EASEMENT DEDICATED HEREON.

N75°29'41"E 588.51'
419.17'

113.91'
N73°20'57"E

L=241.39'

R=1747.00'

Δ=07°55'00"

C1

84.88'

N08°44'03"W (R)

SEE DETAIL 'A'
TO THE RIGHT

Δ=33°22'35"
R=1810.00'
L=1054.38'

1.26'

63'

63'

113.91'
N73°20'57"E

N19°24'33"W (R)

84.46'

C2

Δ=23°47'07" R=1337.00' L=555.03'

Δ=23°47'07" R=1400.00' L=581.18'

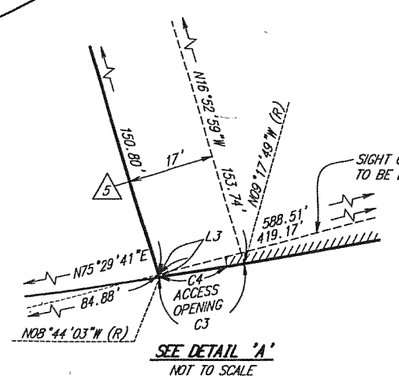
MISSION ROAD

LINE TABLE

NO.	BEARING	LENGTH
L1	N73°07'01"E	17.00'
L2	N73°07'01"E	50.00'
L3	N16°52'59"W	0.59'

CURVE TABLE

NO.	DELTA	RADIUS	LENGTH
C1	01°39'12"	1747.00'	50.41'
C2	02°45'30"	1337.00'	64.37'
C3	00°33'46"	1747.00'	17.16'
C4	00°26'53"	1747.00'	13.66'



EASEMENT NOTE

1. BLANKET EASEMENT FOR ONSITE ~~ACCESS TO ENTER THE ASSOCIATION MAINTENANCE AREA AND THE CONDOMINIUM COMMON AREA FOR UTILITY FACILITIES ACCESS, MAINTENANCE AND REPAIR ACCESS,~~ EMERGENCY ACCESS AND OTHER GENERAL MUNICIPAL ACCESS, GRANTED HEREON.

NOTE

1. SEE SHEET 2 FOR MONUMENT, EASEMENT NOTES AND LEGEND.

SCALE: 1"=60'

0 60 120 180 240

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CALIFORNIA COORD. INDEX 354-1719

Appendix H

Tribal Consultation Notifications

Native American Heritage Commission
Native American Contact List
San Diego County
3/29/2018

Agua Caliente Band of Cahuilla Indians
Patricia Garcia-Plotkin, Director
5401 Dinah Shore Drive — Cahuilla
Palm Springs, CA, 92264 — Luiseno
Phone: (760) 699 - 6907
Fax: (760) 699-6924
ACBCI-THPO@aguacaliente.net

Agua Caliente Band of Cahuilla Indians
Jeff Grubbe, Chairperson
5401 Dinah Shore Drive — Cahuilla
Palm Springs, CA, 92264 — Luiseno
Phone: (760) 699 - 6800
Fax: (760) 699-6919

Barona Group of the Capitan Grande
Edwin Romero, Chairperson
1095 Barona Road — Kumeyaay
Lakeside, CA, 92040
Phone: (619) 443 - 6612
Fax: (619) 443-0681
cloyd@barona-nsn.gov

Campo Band of Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 — Kumeyaay
Campo, CA, 91906
Phone: (619) 478 - 9046
Fax: (619) 478-5818
rgoff@campo-nsn.gov

Ewiiaapaayp Tribal Office
Michael Garcia, Vice Chairperson
4054 Willows Road — Kumeyaay
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
michaelg@leaningrock.net

Ewiiaapaayp Tribal Office
Robert Pinto, Chairperson
4054 Willows Road — Kumeyaay
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
wmicklin@leaningrock.net

Iipay Nation of Santa Ysabel
Virgil Perez, Chairperson
P.O. Box 130 — Kumeyaay
Santa Ysabel, CA, 92070
Phone: (760) 765 - 0845
Fax: (760) 765-0320

Iipay Nation of Santa Ysabel
Clint Linton, Director of Cultural Resources
P.O. Box 507 — Kumeyaay
Santa Ysabel, CA, 92070
Phone: (760) 803 - 5694
cjlinton73@aol.com

Inaja Band of Mission Indians
Rebecca Osuna, Chairperson
2005 S. Escondido Blvd. — Kumeyaay
Escondido, CA, 92025
Phone: (760) 737 - 7628
Fax: (760) 747-8568

Jamul Indian Village
Erica Pinto, Chairperson
P.O. Box 612 — Kumeyaay
Jamul, CA, 91935
Phone: (619) 669 - 4785
Fax: (619) 669-4817
mohusky@jiv-nsn.gov

Kwaaymii Laguna Band of Mission Indians
Carmen Lucas,
P.O. Box 775 — Kumeyaay
Pine Valley, CA, 91962
Phone: (619) 709 - 4207

La Jolla Band of Luiseno Indians
Thomas Rodriguez, Chairperson
22000 Highway 76 — Luiseno
Pauma Valley, CA, 92061
Phone: (760) 742 - 3771

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed 1210 E. Mission Road Project, San Diego County.

La Posta Band of Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road Kumeyaay
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
jmiller@LPtribe.net

La Posta Band of Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road Kumeyaay
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
LP13boots@aol.com

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302 Kumeyaay
Boulevard, CA, 91905
Phone: (619) 766 - 4930
Fax: (619) 766-4957

Mesa Grande Band of Mission Indians
Mario Morales, Cultural Resources Representative
PMB 366 35008 Pala Temecula Rd. Kumeyaay
Pala, CA, 92059
Phone: (760) 622 - 1336

Mesa Grande Band of Mission Indians
Virgil Oyos, Chairperson
P.O Box 270 Kumeyaay
Santa Ysabel, CA, 92070
Phone: (760) 782 - 3818
Fax: (760) 782-9092
mesagrandeband@msn.com

Pala Band of Mission Indians
Shasta Gaughen, Tribal Historic Preservation Officer
PMB 50, 35008 Pala Temecula Rd. Cupeno Luiseno
Pala, CA, 92059
Phone: (760) 891 - 3515
Fax: (760) 742-3189
sgaughen@palatribe.com

Pauma Band of Luiseno Indians - Pauma & Yuima Reservation
Temet Aguilar, Chairperson
P.O. Box 369 Luiseno
Pauma Valley, CA, 92061
Phone: (760) 742 - 1289
Fax: (760) 742-3422
bennaecalac@aol.com

Pechanga Band of Mission Indians
Mark Macarro, Chairperson
P.O. Box 1477 Luiseno
Temecula, CA, 92593
Phone: (951) 770 - 6000
Fax: (951) 695-1778
epreston@pechanga-nsn.gov

Pechanga Band of Mission Indians
Paul Macarro, Cultural Resources Coordinator
P.O. Box 1477 Luiseno
Temecula, CA, 92593
Phone: (951) 770 - 6306
Fax: (951) 506-9491
pmacarro@pechanga-nsn.gov

Rincon Band of Mission Indians
Bo Mazzetti, Chairperson
1 West Tribal Road Luiseno
Valley Center, CA, 92082
Phone: (760) 749 - 1051
Fax: (760) 749-5144
bomazzetti@aol.com

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Rincon Band of Mission Indians
Jim McPherson, Tribal Historic Preservation Officer
1 West Tribal Road — Luiseno
Valley Center, CA, 92082
Phone: (760) 749 - 1051
Fax: (760) 749-5144
vwhipple@rincontribe.org

San Luis Rey Band of Mission Indians
San Luis Rey, Tribal Council
1889 Sunset Drive — Luiseno
Vista, CA, 92081
Phone: (760) 724 - 8505
Fax: (760) 724-2172
cjmojado@slrmissionindians.org

San Luis Rey Band of Mission Indians
1889 Sunset Drive — Luiseno
Vista, CA, 92081
Phone: (760) 724 - 8505
Fax: (760) 724-2172
cjmojado@slrmissionindians.org

San Pasqual Band of Mission Indians
John Flores, Environmental Coordinator
P. O. Box 365 — Kumeyaay
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
johnf@sanpasqualtribe.org

San Pasqual Band of Mission Indians
Allen E. Lawson, Chairperson
P.O. Box 365 — Kumeyaay
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
allenl@sanpasqualtribe.org

Soboba Band of Luiseno Indians
Carrie Garcia, Cultural Resources Manager
P. O. Box 487 — Cahuilla
San Jacinto, CA, 92583 — Luiseno
Phone: (951) 654 - 2765
Fax: (951) 654-4198
carrieg@soboba-nsn.gov

Soboba Band of Luiseno Indians
Scott Cozart, Chairperson
P. O. Box 487 — Cahuilla
San Jacinto, CA, 92583 — Luiseno
Phone: (951) 654 - 2765
Fax: (951) 654-4198
jontiveros@soboba-nsn.gov

Soboba Band of Luiseno Indians
Joseph Ontiveros, Cultural Resource Department
P.O. BOX 487 — Cahuilla
San Jacinto, CA, 92581 — Luiseno
Phone: (951) 663 - 5279
Fax: (951) 654-4198
jontiveros@soboba-nsn.gov

Sycuan Band of the Kumeyaay Nation
Cody J. Martinez, Chairperson
1 Kwaaypaay Court — Kumeyaay
El Cajon, CA, 92019
Phone: (619) 445 - 2613
Fax: (619) 445-1927
ssilva@sycuan-nsn.gov

Sycuan Band of the Kumeyaay Nation
Lisa Haws, Cultural Resources Manager
1 Kwaaypaay Court — Kumeyaay
El Cajon, CA, 92019
Phone: (619) 312 - 1935
lhaws@sycuan-nsn.gov

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Viejas Band of Kumeyaay Indians
Julie Hagen,
1 Viejas Grade Road
Alpine, CA, 91901
Phone: (619) 445 - 3810
Fax: (619) 445-5337
jhagen@viejas-nsn.gov

Kumeyaay

Viejas Band of Kumeyaay Indians
Robert Welch, Chairperson
1 Viejas Grade Road
Alpine, CA, 91901
Phone: (619) 445 - 3810
Fax: (619) 445-5337
jhagen@viejas-nsn.gov

Kumeyaay

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Patricia Garcia-Plotkin
Agua Caliente Band of Cahuilla Indians
5401 Dinah Shore Drive
Palm Springs, CA 92264

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

This letter serves as an invitation to participate in consultation with the City per Senate Bill 18 for the above referenced project. Under Section 65352.3 of the Government Code you have 90 days to request participation.

The project site is located in the City of San Marcos Richland Neighborhood and within the Heart of the City and Richmar Specific Plan Areas and comprises of 67 multi-family dwelling units located on the approximately 3.71 acres situated on the northeast corner of Mission Rd. and Woodward St. (Vicinity Map enclosed). The site is currently vacant. The proposed size and location of the facility is demonstrated on the enclosed project site plan.

If you have any information that would be relevant to our analysis of the proposed project's potential effect on cultural resources, please provide a written response mailed to me at the address given below or svandrew@san-marcos.net. If you have any questions, please feel free to contact me at 760-744-1050 extension 3237.

Thank you for taking the time to review our request.

Sincerely,

S Vandrew

Susan Vandrew Rodriquez
Associate Planner
City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Jeff Grubbe
Agua Caliente Band of Cahuilla Indians
5401 Dinah Shore Drive
Palm Springs, CA 92264

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Edwin Romero
Barona Group of the Capitan Grande
1095 Barona Road
Lakeside, CA 92040

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Ralph Goff
Campo Band of Mission Indians
36190 Church Rd., Ste 1
Campo, CA 91906

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Michael Garcia
Ewiiaapaayp Tribe
4054 Willows Rd
Alpine, CA 91901

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Robert Pinto
Ewiiaapaayp Tribe
4054 Willows Rd
Alpine, CA 91901

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
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City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Virgil Perez
Iipay Nation of Santa Ysabel
PO Box 130
Santa Ysabel, CA 92070

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Clint Linton
Iipay Nation of Santa Ysabel
PO Box 130
Santa Ysabel, CA 92070

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Sincerely,

S Vandrew

Susan Vandrew Rodriquez
Associate Planner
City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Rebecca Osuna
Inaja Band of Mission Indians
2005 S. Escondido Blvd.
Escondido, CA 92025

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Thank you for taking the time to review our request.

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S Vandrew

Susan Vandrew Rodriquez
Associate Planner
City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Erica Pinto
Jamul Indian Village
P.O. Box 612
Jamul, CA 91935

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Thank you for taking the time to review our request.

Sincerely,

S Vandrew

Susan Vandrew Rodriquez
Associate Planner
City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Carmen Lucas
Kwaaymii Laguna Band of Mission Indians
P.O. Box 775
Pine Valley, CA 91962

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Susan Vandrew Rodriquez
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City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Thomas Rodriguez
La Jolla Band of Luiseno Indians
22000 Highway 76
Pauma Valley, CA 92061

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
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City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Javaughn Miller
La Posta Band of Mission Indians
8 Crestwood Rd.
Boulevard, CA 91905

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Gwendolyn Parada
La Posta Band of Mission Indians
8 Crestwood Rd.
Boulevard, CA 91905

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
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Associate Planner
City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Angela Elliott-Santos
Manzanita Band of Kumeyaay Nation
PO Box 1302
Boulevard, CA 91905

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

This letter serves as an invitation to participate in consultation with the City per Senate Bill 18 for the above referenced project. Under Section 65352.3 of the Government Code you have 90 days to request participation.

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Thank you for taking the time to review our request.

Sincerely,

S Vandrew

Susan Vandrew Rodriquez
Associate Planner
City of San Marcos Native American Liaison

Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Mario Morales
Mesa Grande Band of Mission Indians
PO Box 270
Santa Ysabel, CA 92070

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Virgil Oyos
Mesa Grande Band of Mission Indians
PO Box 270
Santa Ysabel, CA 92070

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Shasta Gaughen
Pala Band of Mission Indians
PMB 50, 35008 Pala Temecula Rd.
Pala, CA 92059

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Temet Aguilar
Pauma Band of Luiseno Indians-Pauma & Yuima
P.O.Box 369, Ext. 303
Pauma Valley, CA 92061

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Mark Macarro
Pechanga Band of Mission Indians
P.O. Box 1477
Temecula, CA 92593

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

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Pechanga Band of Mission Indians
P.O. Box 1477
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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Bo Mazzetti
Rincon Band of Mission Indians
1 West Tribal Road
Valley Center, CA 92082

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Jim McPherson
Rincon Band of Mission Indians
1 West Tribal Road
Valley Center, CA 92082

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Project Site Plan

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

San Luis Rey, Tribal Council
San Luis Rey Band of Mission Indians
1889 Sunset Drive
Vista, CA 92081

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

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Vista, CA 92081

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Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

John Flores
San Pasqual Band of Mission Indians
PO Box 365
Valley Center, CA 92082

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Allen Lawson
San Pasqual Band of Mission Indians
PO Box 365
Valley Center, CA 92082

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Enclosures (2): Vicinity Map
Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Carrie Garcia
Soboba Band of Luiseno Indians
PO Box 487
San Jacinto, CA 92581

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Scott Cozart
Soboba Band of Luiseno Indians
PO Box 487
San Jacinto, CA 92581

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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Project Site Plan

Vicinity Map:



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DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

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Soboba Band of Luiseno Indians
PO Box 487
San Jacinto, CA 92581

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Project Site Plan

Vicinity Map:



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Cody Martinez
Sycuan Band of the Kumeyaay Nation
1 Kwaaypaay Court
El Cajon, CA 92019

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Lisa Haws
Sycuan Band of the Kumeyaay Nation
1 Kwaaypaay Court
El Cajon, CA 92019

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Julie Hagen
Viejas Band of Kumeyaay Indians
1 Viejas Grade Road
Alpine, CA 91901

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 18, 2018

Robert Welch
Viejas Band of Kumeyaay Indians
1 Viejas Grade Road
Alpine, CA 91901

Subject: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd & Woodward St., San Marcos, CA; APN: 220-210-50-00

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SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 26, 2019

San Luis Rey, Tribal Council
San Luis Rey Band of Mission Indians
1889 Sunset Drive
Vista, CA 92081

RE: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd. & Woodward St., San Marcos, CA
APN: 220-210-50-00; Longitude/Latitude: 33.142913/-117.159481

Dear Cultural Resources Representative:

The City of San Marcos ("City") hereby notifies you that it is proposing to conduct a project located in the geographic area traditionally and culturally affiliated with the provided California Native American Tribe (see description below and attached map).

The vacant project site is located in the City of San Marcos Richland Neighborhood and within the Heart of the City and Richmar Specific Plan Areas and comprises of 67 multi-family dwelling units located on the approximately 3.71 acres situated on the northeast corner of Mission Road and Woodward Street. The proposed size and location of the facility is demonstrated on the enclosed project site plan.

Under California state law, the project is subject to the California Environmental Quality Act, and the City may have to prepare an environmental document consisting of 1) a negative declaration, 2) a mitigated negative declaration, or 3) an environmental impact report. State Assembly Bill 52 (Public Resources Code Section 21080.3.1) now allows California Native American tribes 30 days to request consultation regarding possible significant effects that implementation of the proposed project may have on tribal cultural resources. The request must be in writing to the City and must identify a lead contact person. The City will begin the consultation process within 30 days of receiving the tribe's request for consultation. The consultation may include a discussion concerning the type of environmental review necessary for the project, the significance of tribal cultural resources discovered, the significance of the project's impacts on tribal cultural resources, and, if necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend.

The consultation does not limit the ability of the tribe to submit information to the City regarding the significance of the tribal cultural resources, the significance of the project's impact on tribal cultural resources, or any appropriate measures to mitigate the potential impacts. If you wish to informally submit information, written comments may be sent to the City Development Services Department, Planning Division, 1 Civic Center Drive, San Marcos CA 92069, or to svandrew@san-marcos.net.

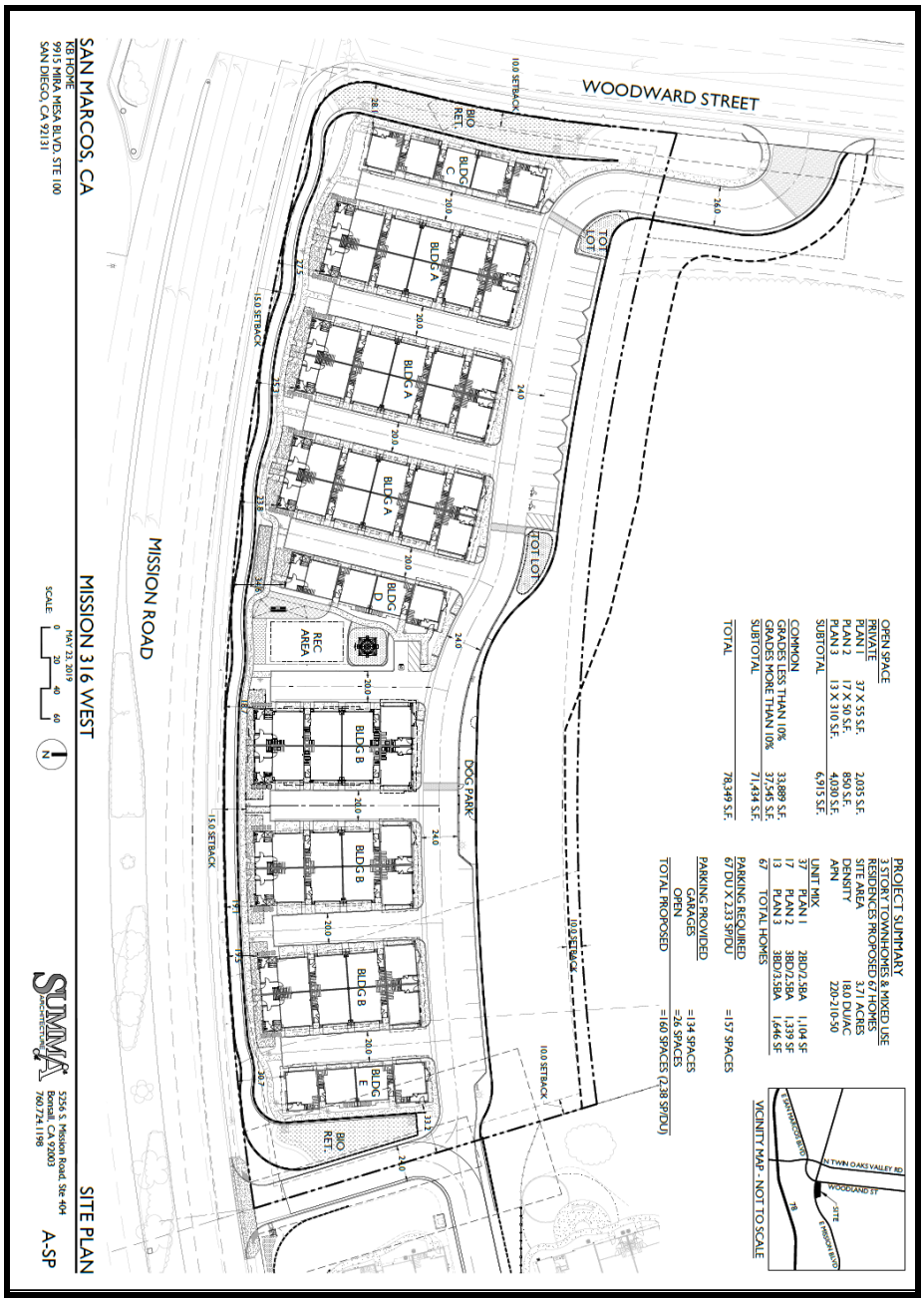
Please feel free to contact me if you have any questions concerning this proposed project or what is being requested in this letter.

Sincerely,

Susan Vandrew Rodriguez
Planning Division
City of San Marcos Native American Liaison

Enclosure (1): Proposed Project Site Plan

PROPOSED PROJECT SITE PLAN



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 26, 2019

Bo Mazzatti
Rincon Band of Mission Indians
1 West Tribal Road
Valley Center, CA 92082

RE: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd. & Woodward St., San Marcos, CA
APN: 220-210-50-00; Longitude/Latitude: 33.142913/-117.159481

Dear Cultural Resources Representative:

The City of San Marcos ("City") hereby notifies you that it is proposing to conduct a project located in the geographic area traditionally and culturally affiliated with the provided California Native American Tribe (see description below and attached map).

The vacant project site is located in the City of San Marcos Richland Neighborhood and within the Heart of the City and Richmar Specific Plan Areas and comprises of 67 multi-family dwelling units located on the approximately 3.71 acres situated on the northeast corner of Mission Road and Woodward Street. The proposed size and location of the facility is demonstrated on the enclosed project site plan.

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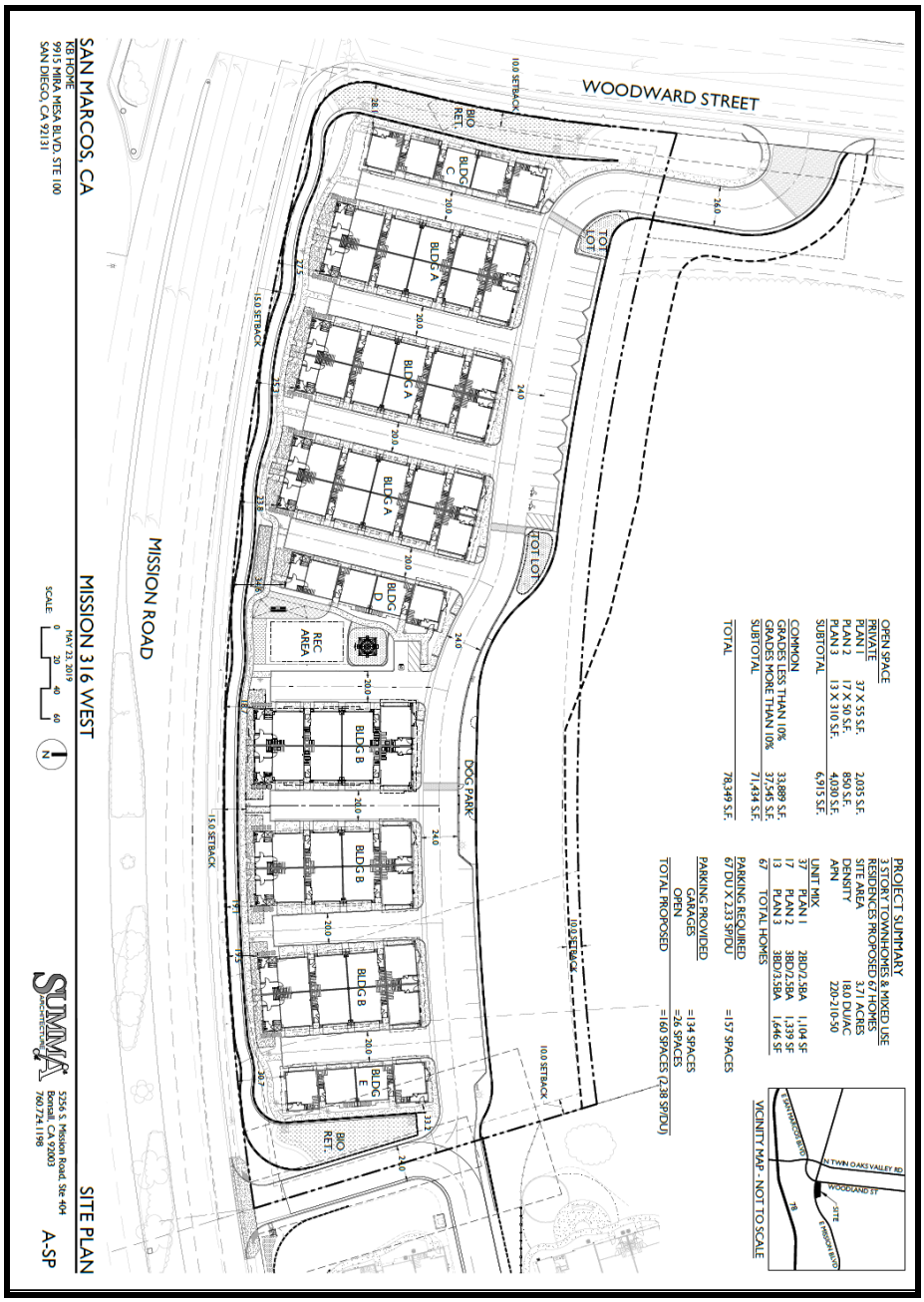
Please feel free to contact me if you have any questions concerning this proposed project or what is being requested in this letter.

Sincerely,

Susan Vandrew Rodriguez
Planning Division
City of San Marcos Native American Liaison

Enclosure (1): Proposed Project Site Plan

PROPOSED PROJECT SITE PLAN



SAN MARCOS
DISCOVER LIFE'S POSSIBILITIES

June 26, 2019

Mario Morales
Mesa Grande Band of Mission Indians
35008 Pala Temecula Road
Pala, CA 92059

RE: SP18-0003 and SP18-0005; Mission 316 West/KB Homes
Northeast corner of Mission Rd. & Woodward St., San Marcos, CA
APN: 220-210-50-00; Longitude/Latitude: 33.142913/-117.159481

Dear Cultural Resources Representative:

The City of San Marcos ("City") hereby notifies you that it is proposing to conduct a project located in the geographic area traditionally and culturally affiliated with the provided California Native American Tribe (see description below and attached map).

The vacant project site is located in the City of San Marcos Richland Neighborhood and within the Heart of the City and Richmar Specific Plan Areas and comprises of 67 multi-family dwelling units located on the approximately 3.71 acres situated on the northeast corner of Mission Road and Woodward Street. The proposed size and location of the facility is demonstrated on the enclosed project site plan.

Under California state law, the project is subject to the California Environmental Quality Act, and the City may have to prepare an environmental document consisting of 1) a negative declaration, 2) a mitigated negative declaration, or 3) an environmental impact report. State Assembly Bill 52 (Public Resources Code Section 21080.3.1) now allows California Native American tribes 30 days to request consultation regarding possible significant effects that implementation of the proposed project may have on tribal cultural resources. The request must be in writing to the City and must identify a lead contact person. The City will begin the consultation process within 30 days of receiving the tribe's request for consultation. The consultation may include a discussion concerning the type of environmental review necessary for the project, the significance of tribal cultural resources discovered, the significance of the project's impacts on tribal cultural resources, and, if necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend.

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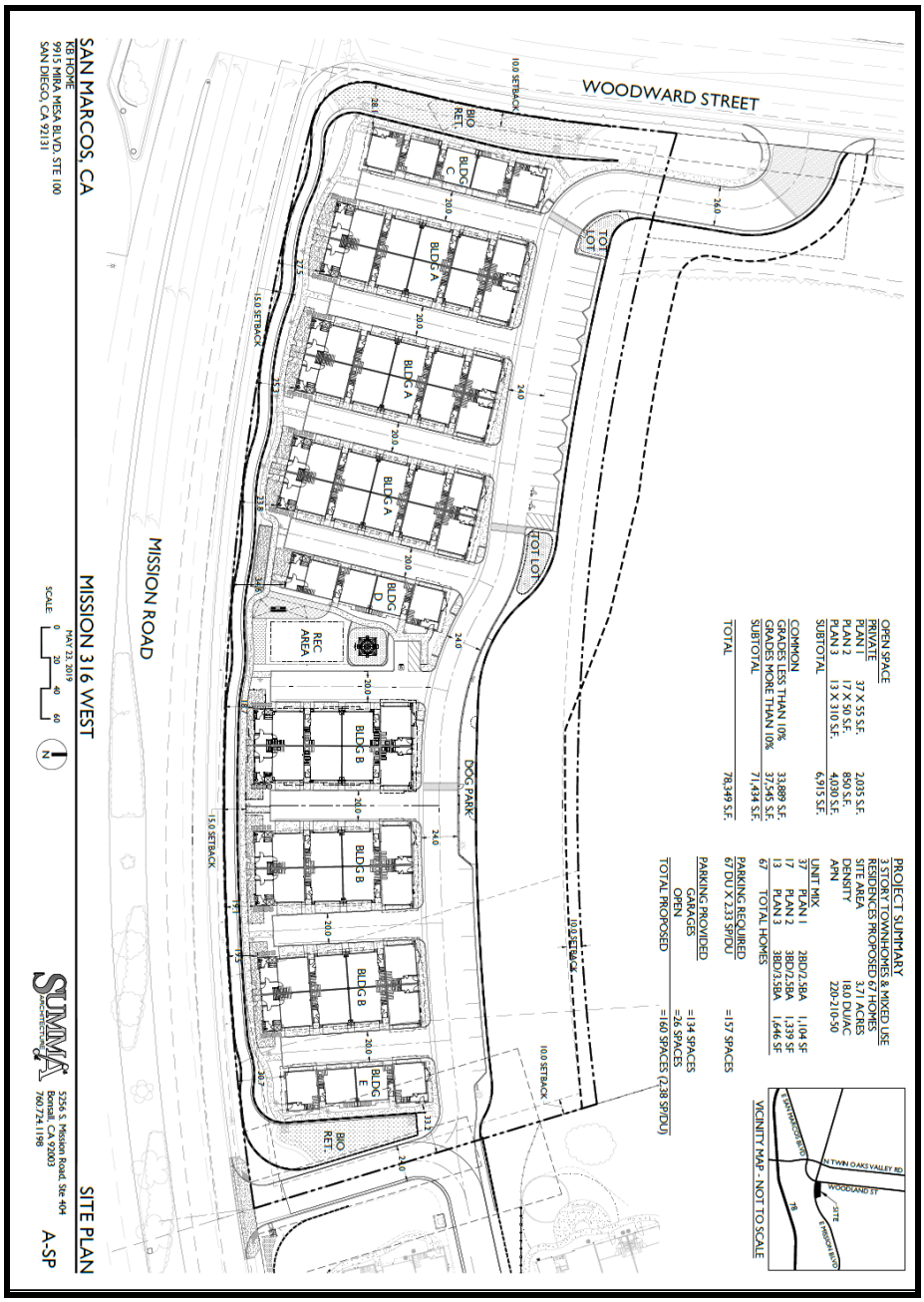
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Sincerely,

Susan Vandrew Rodriguez
Planning Division
City of San Marcos Native American Liaison

Enclosure (1): Proposed Project Site Plan

PROPOSED PROJECT SITE PLAN



PECHANGA CULTURAL RESOURCES
Temecula Band of Luiseño Mission Indians

Post Office. Box 2183 • Temecula, CA 92593
Telephone (951) 770-6300 • Fax (951) 506-9491

Chairperson:
Neal Ibanez

Vice Chairperson:
Bridgett Barcello

Committee Members:
Andrew Masiel, Sr.
Darlene Miranda
Evie Gerber
Richard B. Scearce, III
Robert Villalobos

Director:
Gary DuBois

Coordinator:
Paul Macarro

Planning Specialist:
Tuba Ebru Ozdil

June 28, 2018

RECEIVED
JUL 02 2018
CITY OF SAN MARCOS
PLANNING DIVISION

VIA E-MAIL and USPS

Susan Vandrew Rodriquez, Associate Planner
City of San Marcos
1 Civic Center Drive
San Marcos, CA 92069

Re: Pechanga Tribe Request for Consultation Pursuant to SB 18 for SP18-0003 and SP18-0005 [APN: 220-210-50-00]

Dear Ms. Rodriquez,

This letter is written on behalf of the Pechanga Band of Luiseño Indians (hereinafter, "the Tribe"), a federally recognized Indian tribe and sovereign government, in response to the SB18 notice provided by the City of San Marcos. This letter serves as the Tribe's formal request for consultation under SB 18 for this Project. At this time, we do not have sufficient information to engage in meaningful consultation, as required by SB 18. As such, the Tribe hereby invokes its right to consult with the City of San Marcos under SB 18 and after reviewing the information requested below, we may request additional consultation, which may include a face-to-face meeting.

Further, the Tribe formally requests, pursuant to Public Resources Code §21092.2, to be notified and involved in the entire CEQA environmental review process for the duration of the above referenced project (the "Project"). Please add the Tribe to your distribution list(s) for public notices and circulation of all documents, including environmental review documents, archeological reports, and all documents pertaining to this Project. The Tribe further requests to be directly notified of all public hearings and scheduled approvals concerning this Project. Please also incorporate these comments into the record of approval for this Project.

The Pechanga Tribe asserts that the Project area is part of '*Atáaxum* (Luiseño), and therefore the Tribe's, aboriginal territory as evidenced by the existence of '*Atáaxum* place names, *tóota yixélval* (rock art, pictographs, petroglyphs), and an extensive Luiseño artifact record in the vicinity of the Project. This culturally sensitive area is affiliated with the Pechanga Band of Luiseño Indians because of the Tribe's cultural ties to this area as well as extensive history with both this Project and other projects within the area. During our consultation we will provide more specific, confidential information on the resources located on and near this Project.

The Tribe has not received any documents for this Project. Please provide us copies of all available documents [reports, drafts, etc.] as soon as possible so that we may review them.

As you know, the SB 18 consultation process is ongoing and continues for the duration of the Project. As such, under both CEQA and SB 18 we look forward to working closely with the City of San Marcos on ensuring that a full, comprehensive environmental review of the Project's impacts is completed. Further, we hope to assist the City with ensuring that the Project is designed to avoid impacts to cultural resources, as mandated by CEQA, in addition to developing mitigation measures addressing the culturally appropriate and respectful treatment of human remains, cultural resources and inadvertent discoveries.

In addition to those rights granted to the Tribe under SB 18, the Tribe reserves the right to fully participate in the environmental review process, as well as to provide further comment on the Project's impacts to cultural resources and potential mitigation for such impacts.

The Pechanga Tribe looks forward to working together with the City of San Marcos in protecting the invaluable Pechanga cultural resources found in the Project area. Please contact me at 951-770-6313 or at eozdil@pechanga-nsn.gov once you have had a chance to review these comments so that we might address the issues concerning the mitigation language. Thank you.

Sincerely,



Tuba Ebru Ozdil
Cultural Analyst

cc Pechanga Office of the General Counsel

RINCON BAND OF LUISEÑO INDIANS

Cultural Resources Department

1 W. Tribal Road · Valley Center, California 92082 ·
(760) 297-2635 Fax:(760) 692-1498

July 27, 2018

Susan Vandrew Rodriguez
City of San Marcos

Re: SP18-0003 and SP18-0005 (Mission 316 West/KB Homes)

Dear Ms. Vandrew Rodriguez,

This letter is written on behalf of the Rincon Band of Luiseño Indians. We have received your notification regarding the SP18-0003 and SP18-0005 (Mission 316 West/KB Homes) and we thank you for the opportunity to consult on this project. The identified location is within the Territory of the Luiseño people, and is also within Rincon's specific area of Historic interest.

Embedded in the Luiseño territory are Rincon's history, culture and identity. Rincon has knowledge of one Luiseño Place Name, *Náaxwalki*, within a mile radius from the project area. We would like to request SB18 consultation at this time in order to learn more about the project and any potential impacts to cultural resources. A cultural study, to include an archaeological record search, is recommended. The cultural study should be conducted by a qualified archeologist that meets the Secretary of Interior Standards and by a Luiseño tribal monitor.

If you have additional questions or concerns please do not hesitate to contact our office at your convenience at (760) 297-2635.

Thank you for the opportunity to protect and preserve our cultural assets.

Sincerely,

Destiny Colocho
Tribal Historic Preservation Officer
Rincon Cultural Resources Department

Bo Mazzetti, Tribal Chairman | Tishmall Turner, Vice Chairwoman | Steve Stallings, Council Member | Laurie E. Gonzalez, Council Member | Alfonso Kolb, Council Member

PALA TRIBAL HISTORIC PRESERVATION OFFICE

PMB 50, 35008 Pala Temecula Road
Pala, CA 92059
760-891-3510 Office | 760-742-3189 Fax

PALA THPO

August 30, 2018

Susan Rodriguez
City of San Marcos
1 Civic Center Drive
San Marcos, CA 92069

Re: SP18-0003 and SP18-0005 Mission 316 West/ KB Homes

Dear Ms. Rodriguez:

The Pala Band of Mission Indians Tribal Historic Preservation Office has received your notification of the project referenced above. This letter constitutes our response on behalf of Robert Smith, Tribal Chairman.

We have consulted our maps and determined that the project as described is not within the boundaries of the recognized Pala Indian Reservation. The project is also beyond the boundaries of the territory that the tribe considers its Traditional Use Area (TUA). It is, however, situated in close proximity to the Reservation and information generated would likely be useful in better understanding regional culture and history. Therefore, we request as a courtesy to be kept in the information loop as the project progresses and would appreciate being maintained on the receiving list for project updates, reports of investigations, and/or any documentation that might be generated regarding previously reported or newly discovered sites. Further, if the project boundaries are modified to extend beyond the currently proposed limits, we do request updated information and the opportunity to respond to your changes.

Finally, we recommend that Approved Cultural Monitors be present on-site during all survey and all ground-disturbing activities. If you do not have access to an Approved Cultural Resource Monitor, contact us and we will work with you to identify appropriately trained individuals.

We appreciate involvement with your initiative and look forward to working with you on future efforts. If you have questions or need additional information, please do not hesitate to contact me by telephone at 760-891-3515 or by e-mail at sgaughen@palatribe.com.

Sincerely,

Shasta C. Gaughen, Ph.D.
Tribal Historic Preservation Officer
Pala Band of Mission Indians

VIEJAS
TRIBAL GOVERNMENT

P.O Box 908
Alpine, CA 91903
#1 Viejas Grade Road
Alpine, CA 91901

Phone: 6194453810
Fax: 6194455337
viejas.com

RECEIVED
JUL 05 2018
CITY OF SAN MARCOS
PLANNING DIVISION

June 27, 2018

Susan Vandrew Rodriguez
Associate Planner
City of San Marcos
1 Civic Center Drive
San Marcos, CA 92069

RE: Mission 316 West/KB Homes

Dear Ms. Rodriguez,

The Viejas Band of Kumeyaay Indians ("Viejas") has reviewed the proposed project and at this time we have determined that the project site has cultural significance or ties to the Kumeyaay Nation. We recommend that you notify the:

San Pasqual Band of Mission Indians
P.O. Box 365
Valley Center, Ca 92082

Additionally, we request, as appropriate, the following:

- All NEPA/CEQA/NAGPRA laws be followed
- Immediately contact San Pasqual on any changes or inadvertent discoveries.

Thank you for your collaboration and support in preserving our Tribal cultural resources. I look forward to hearing from you. Please call me at 619-659-2312 or Ernest Pingleton at 619-659-2314, or email, rteran@viejas-nsn.gov or epingleton@viejas-nsn.gov, for scheduling. Thank you.

Sincerely,

Ray Teran, Resource Management
VIEJAS BAND OF KUMEYAAY INDIANS

Cc: San Pasqual

From: Cultural Pauma [cultural@pauma-nsn.gov]
Sent: Thursday, July 19, 2018 8:35 AM
To: Vandrew Rodriguez, Susan
Cc: Dixon, Patti; Jeremy Zagarella
Subject: Mission Rd & Woodward St Project

Ms. Vandrew Rodriguez,

The Cultural Office of the Pauma Band of Luiseno Indians has received your June 18 notice for a project at the Northeast corner of Mission Rd and Woodward St. Please provide us with a copy of the Cultural Study to review and comment on.

Thank you,

Mr. Chris Devers
Cultural Liaison
Pauma Band of Luiseno Indians

Appendix I

Air Quality and Greenhouse Gas Study



Mission 316 West

Air Quality and Greenhouse Gas Study

prepared by

City of San Marcos
Planning Division
1 Civic Center Drive
San Marcos, California 92069
Contact: Joseph Farace, Principal Planner

prepared with the assistance of

Rincon Consultants, Inc.
2215 Faraday Avenue, Suite A
Carlsbad, California 92008

June 2019

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

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Appendix A CalEEMod Air Quality and Greenhouse Gas Model Worksheets and Math Equations

1 Project Description

1.1 Introduction

This report details the analysis of potential air quality and greenhouse gas (GHG) impacts of a proposed multi-family residential project (project) located at 206 E. Mission Road on Assessor's Parcel Number (APN) 220-210-50 (project site), on the east side of Woodward Street and north of Mission Road in the City of San Marcos, California. The report has been prepared by Rincon Consultants, Inc. under contract to KB Home for use by the City of San Marcos in support of environmental documentation being prepared for the project pursuant to the California Environmental Quality Act (CEQA). The purpose of this study is to analyze the project's air quality and GHG emissions, as well as the associated impacts. This analysis considers both temporary impacts that would result from project construction and long-term impacts associated with operation of the project.

1.2 Project Summary

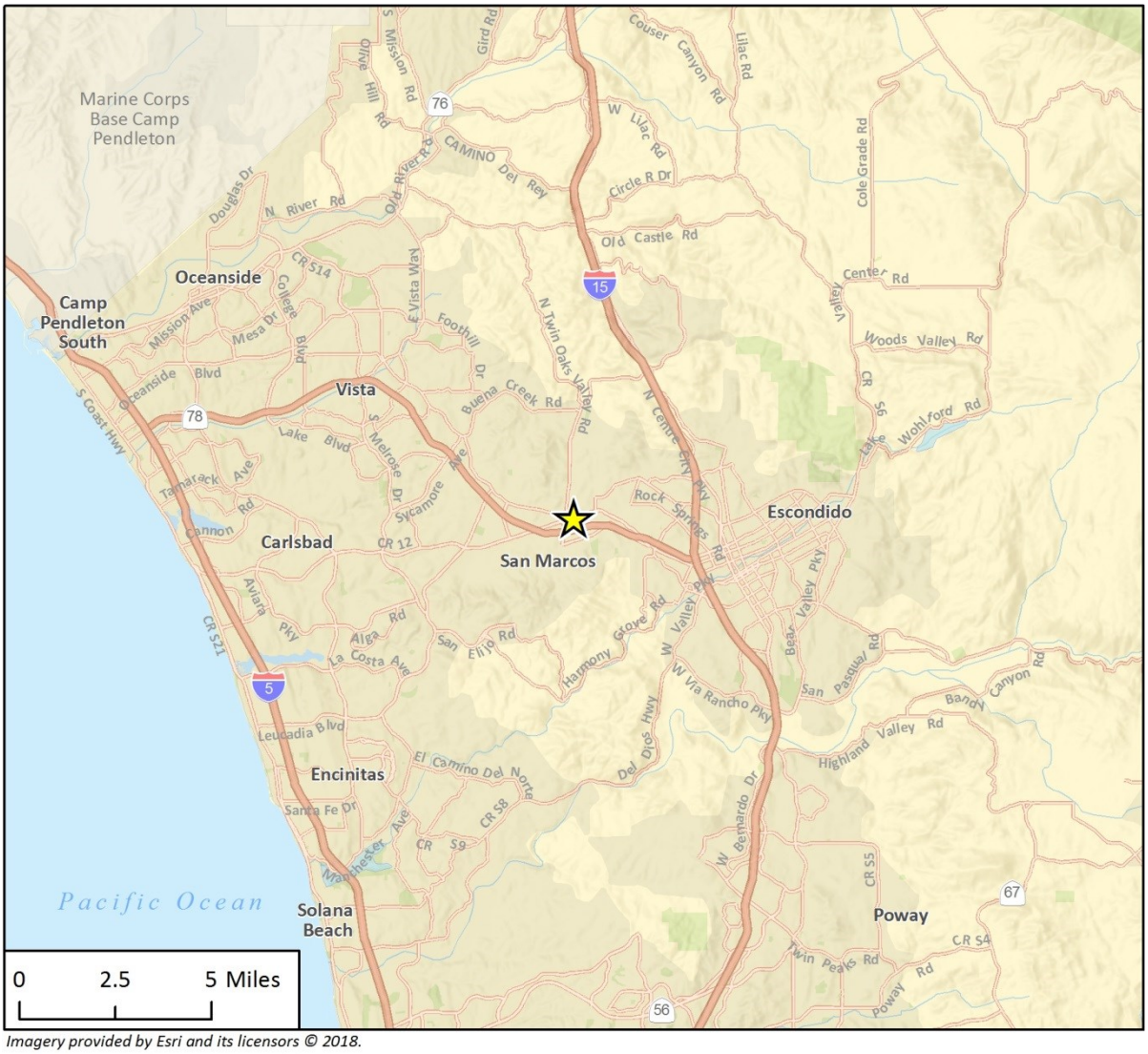
The project site is a corner lot that encompasses 3.71 acres. The site is currently vacant and has non-native and disturbed vegetation on site. The site is located to the west of a similar multi-family residential development and is north, across E. Mission Road, of the City of San Marcos City Hall (1 Civic Center Drive) and library (2 Civic Center Drive), as well as the Inland Rail line. The site is bordered on the west by Woodward Street and on the south by E. Mission Road. The regional location of the site and existing site conditions are shown in Figure 1 and Figure 2, respectively.

The proposed project would involve the construction of 67 multi-family residential dwelling units with three layouts which consist of 1,104 square-foot two-bedroom units, 1,339 square-foot three-bedroom units, and 1,646 square-foot three-bedroom units. The units would be spread out over nine buildings, three-stories in height, with the garage on the ground level. The project includes 134 garage parking spaces and 27 open parking spaces, totaling 161 parking spaces for the development. Bicycle parking would be available in the garages. Common and private open spaces would be provided in the form of a recreational area in the center of the site and balconies in each of the dwelling units. The project would contain Energy Star© appliances, low-flow plumbing fixtures, and weather-based irrigation controls for reduced water use.

Two biofiltration basins would be placed along the western and eastern boundary of the site. The site plan includes landscaping along the perimeter of the site and within the recreational home owners association (HOA) space. The recreational area includes an open turf area, a barbeque counter with seating and shade structures, and landscaping. Access to the site is provided by two driveways located on Woodward Street and E. Mission Road. Figure 3 shows the proposed project site plan.

Proposed development would require site preparation and grading, including blasting, due to the topographical features of the site. A total of 25,200 cubic yards of soil would be cut from the site, with 13,400 cubic yards used onsite as fill and an over-excavation of 19,300 cubic yards. An excess of 39,200 cubic yards of soil would be exported. Construction is expected to occur over 21 months, based on an applicant provided construction schedule, with project operation scheduled for 2022.

Figure 1 Regional Location



Imagery provided by Esri and its licensors © 2018.

Figure 2 Project Location



Imagery provided by Google and its licensors © 2019.

Figure 3 Project Site Plan



2 Air Quality

2.1 Background

2.1.1 Local Climate and Meteorology

The project area is located in the San Diego Air Basin (SDAB), which is bordered by the Pacific Ocean to the west, the South Coast Air Basin (SCAB) to the north, the Salton Sea Air Basin to the east, and the United States/Mexico border to the south. Regional wind patterns are dominated by onshore sea breezes during the day, and winds generally slow or reverse direction toward the sea at night. Temperature and precipitation can vary widely in the SDAB, where average annual precipitation ranges from approximately 10 inches in the coastal and inland areas to over 30 inches in the mountains. In general, milder annual temperatures are experienced in the maritime and coastal areas, whereas the interior and desert areas experience warmer summers and cooler winters. The project site is located approximately nine miles inland from the coast in an interior valley.

High air pollution levels in coastal communities of San Diego can often occur when polluted air from the SCAB, particularly from Los Angeles, travels southwest over the ocean at night and is brought on shore into San Diego by the sea breeze during the day (SDAPCD 2015). Ozone (O_3) and its precursor emissions (reactive organic gases (ROG) and nitrogen oxides (NO_X)) are also transported to San Diego during relatively mild Santa Ana weather conditions. However, during strong Santa Ana weather conditions, pollutants are pushed away from San Diego far out to sea.

Air pollutant emission sources in the SDAB are typically grouped into two categories: stationary and mobile sources. Mobile source emissions can be attributed to vehicles and transportation-related activities. Stationary sources can be divided into two major subcategories: point and area sources. Point source emissions originate from manufacturing and industrial processes, while area emissions are generated from residential heaters, small engines, and other consumer products. Both major emissions categories are widely distributed within SDAB and may have a cumulative effect.

2.1.2 Air Quality Regulation

The federal and State governments have established ambient air quality standards for the protection of public health. The United State Environmental Protection Agency (U.S. EPA) is the federal agency designated to administer air quality regulation, while the California Air Resources Board (CARB) is the state equivalent in the California EPA (CalEPA). County-level Air Pollution Control Districts (APCD) provide local management of air quality. CARB has established air quality standards and is responsible for the control of mobile emission sources, while the local APCDs are responsible for enforcing standards and regulating stationary sources. CARB has established 14 air basins statewide, including the SDAB.

The U.S. EPA has set primary national ambient air quality standards (NAAQS) for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter with a diameter of up to ten microns (PM_{10}) and up to 2.5 microns ($PM_{2.5}$), and lead (Pb). Primary standards are those levels of air quality deemed necessary, with an adequate margin of safety, to protect public health. In addition, California has established health-based ambient air quality standards for these and

other pollutants, some of which are more stringent than the federal standards. Table 1 lists the current federal and state standards for regulated pollutants.

Table 1 Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Primary Standards	California Standard
Ozone	1-Hour	–	0.09 ppm
	8-Hour	0.070 ppm	0.070 ppm
Carbon Monoxide	8-Hour	9.00 ppm	9.00 ppm
	1-Hour	35.00 ppm	20.00 ppm
Nitrogen Dioxide	Annual	0.053 ppm	0.030 ppm
	1-Hour	0.100 ppm	0.180 ppm
Sulfur Dioxide	Annual	0.030 ppm	–
	24-Hour	0.14 ppm	0.04 ppm
	1-Hour	0.075 ppm	0.25 ppm
PM_{10}	Annual	–	20 $\mu g/m^3$
	24-Hour	150 $\mu g/m^3$	50 $\mu g/m^3$
PM_{25}	Annual	12 $\mu g/m^3$	12 $\mu g/m^3$
	24-Hour	35 $\mu g/m^3$	–
Lead	30-Day Average	–	1.5 $\mu g/m^3$
	3-Month Average	0.15 $\mu g/m^3$	–

ppm = parts per million;
$\mu g/m^3$ = micrograms per cubic meter
Source: CARB, May 2016, Ambient Air Quality Standards
http://www.arb.ca.gov/research/aaqs/aaqs2.pdf

The San Diego Air Pollution Control District (SDAPCD) is the designated air quality control agency for the SDAB. The SDAB is designated a nonattainment area for the federal and State eight-hour ozone standards, State one-hour ozone standards, and for State PM_{10} and $PM_{2.5}$. The SDAB is designated unclassifiable or in attainment for all other federal and State standards (SDAPCD 2017).

Characteristics of O_3, CO, NO_2, and suspended particulates are described below.

Ozone

Ozone is produced by a photochemical reaction (triggered by sunlight) between NO_X and ROG[1]. NO_X is formed during the combustion of fuels, while reactive organic gases are formed during combustion and evaporation of organic solvents (San Diego County 2007). Because O_3 requires

[1] Organic compound precursors of ozone are routinely described by a number of variations of three terms: hydrocarbons (HC), organic gases (OG), and organic compounds (OC). These terms are often modified by adjectives such as total, reactive, or volatile, and result in a rather confusing array of acronyms: HC, THC (total hydrocarbons), RHC (reactive hydrocarbons), TOG (total organic gases), ROG (reactive organic gases), TOC (total organic compounds), ROC (reactive organic compounds), and VOC (volatile organic compounds). While most of these differ in some significant way from a chemical perspective, from an air quality perspective two groups are important: non-photochemically reactive in the lower atmosphere, or photochemically reactive in the lower atmosphere (HC, RHC, ROG, ROC, and VOC). SDAPCD uses the term VOC to denote organic precursors.

sunlight to form, it mostly occurs in substantial concentrations between the months of April and October. Ozone is a pungent, colorless, toxic gas with direct health effects on humans including respiratory and eye irritation and possible changes in lung functions. Groups most sensitive to O_3 include children, the elderly, people with respiratory disorders, and people who exercise strenuously outdoors (U.S. EPA 2017a).

Carbon Monoxide

CO is a local pollutant that is found in high concentrations only near fuel combustion equipment and other sources of CO. The primary source of CO, a colorless, odorless, poisonous gas, is automobile traffic (San Diego County 2007). Elevated concentrations, therefore, are usually only found near areas of high traffic volumes. CO's health effects are related to its affinity for hemoglobin in the blood. At high concentrations, CO reduces the amount of oxygen in the blood, causing heart difficulty in people with chronic diseases, reduced lung capacity, and impaired mental abilities (U.S. EPA 2016a).

Nitrogen Dioxide

NO_2 is a by-product of fuel combustion, with the primary source being motor vehicles and industrial boilers and furnaces (San Diego County 2007). The principal form of nitrogen oxide produced by combustion is nitric oxide (NO), but NO reacts rapidly to form NO_2, creating the mixture of NO and NO_2 commonly called NO_X. Nitrogen dioxide is an acute irritant. Exposure to high concentrations of NO_2 can aggravate respiratory diseases such as asthma and increase susceptibility to respiratory infections. Those with asthma, as well as children and the elderly, face greater risks of NO_2 health effects (U.S. EPA 2016b). NO_2 absorbs blue light and causes a reddish-brown cast to the atmosphere and reduced visibility. It can also contribute to the formation of ozone/smog and acid rain.

Suspended Particulates

Atmospheric particulate matter is comprised of finely divided solids and liquids such as dust, soot, aerosols, fumes, and mists. The particulates that are of concern are PM_{10} (which measures no more than 10 microns in diameter) and $PM_{2.5}$, (a fine particulate measuring no more than 2.5 microns in diameter). The characteristics, sources, and potential health effects associated with the small particulates (PM_{10} and $PM_{2.5}$) can be different. Major man-made sources of PM_{10} are agricultural operations, industrial processes, combustion of fossil fuels, construction, demolition operations, and entrainment of road dust into the atmosphere (San Diego County 2007). Natural sources include windblown dust, wildfire smoke, and sea spray salt. The finer $PM_{2.5}$ particulates are generally associated with combustion processes as well as being formed in the atmosphere as a secondary pollutant through chemical reactions. $PM_{2.5}$ is more likely to penetrate deeply into the lungs and poses a serious health threat to all groups, but particularly to the elderly, children, and those with respiratory problems. More than half of the small and fine particulate matter that is inhaled into the lungs remains there, which can cause permanent lung damage (U.S. EPA 2016c). These materials can damage health by interfering with the body's mechanisms for clearing the respiratory tract or by acting as carriers of an absorbed toxic substance.

2.1.3 Current Air Quality

CARB operates a network of air quality monitoring stations throughout the SDAB. The purpose of the monitoring stations is to measure ambient concentrations of pollutants and determine whether ambient air quality meets the California and federal standards. The monitoring station located

closest to the project site is the Escondido - E. Valley Parkway, located approximately five miles west of the project site. Table 2 indicates the number of days that each standard has been exceeded at the Escondido - E. Valley Parkway station or the Camp Pendleton station for years which data is unavailable at the Escondido – E. Valley Parkway station. The ambient air quality in the area exceeded the Federal 8-hour Ozone standard on multiple days from 2014 through 2017, the one-hour Ozone standard on one day in 2014 and two days in 2017, and $PM_{2.5}$ on one day in 2014. The area did not exceed other air quality standards in 2017.

Table 2 Ambient Air Quality at the Monitoring Station

Pollutant	2014	2015	2016[1]	2017[1]
8 Hour Ozone (ppm), 8-Hr Average	0.079	0.071	0.073	.081
Number of days of State and Federal exceedances (>0.070)	7	2	4	4
Ozone (ppm), Worst Hour	0.099	0.079	0.083	.094
Number of days of State exceedances (>0.09 ppm)	1	0	0	2
Number of days of Federal exceedances (>0.112 ppm)	0	0	0	0
Nitrogen Dioxide (ppm) - Worst Hour (Federal Measurements)[1]	0.063	0.060	0.072	0.063
Number of days of State exceedances (>.18 ppm)	0	0	0	0
Number of days of Federal exceedances (0.10 ppm)	0	0	0	0
Particulate Matter 10 microns, μg/m^3, Worst 24 Hours	43	30	*	*
Number of days above Federal standard (>150 μg/m^3)	0	0	0	0
Particulate Matter <2.5 microns, μg/m^3, Worst 24 Hours	77.5	29.4	28.8	26.0
Number of days above Federal standard (>35 μg/m^3)	1	0	0	0

[1] Data from the Camp Pendleton Monitoring Station.

* No data available

Source: CARB, Top 4 Annual Air Quality Data Summaries available at https://www.arb.ca.gov/adam/topfour/topfourdisplay.php

2.1.4 Air Quality Management Plan

The federal Clean Air Act Amendments (CAAA) mandates that states submit and implement a State Implementation Plan (SIP) for areas not meeting air quality standards. The SIP includes pollution control measures to demonstrate how the standards will be met through those measures. The SIP is established by incorporating measures established during the preparation of Air Quality Management Plans (AQMPs) and adopted rules and regulations by each local APCD, which are submitted for approval to the CARB and the U.S. EPA. The goal of an AQMP is to reduce pollutant concentrations below the National Ambient Air Quality Standards (NAAQS) through the implementation of air pollutant emissions controls.

The San Diego Regional Air Quality Strategy (RAQS) was developed pursuant to California Clean Air Act (CCAA) requirements. The RAQS was initially adopted in 1991 and was updated in 1995, 1998, 2001, 2004, 2009, and most recently in December 2016 (SDAPCD 2016). The RAQS identifies feasible

emission control measures to provide progress in San Diego County toward attaining the State ozone standard. The pollutants addressed in the RAQS are volatile organic compounds (VOCs) and NO_X, precursors to the photochemical formation of ozone (the primary component of smog). The RAQS was initially adopted by the SDAPCD Board on June 30, 1992, and amended on March 2, 1993, in response to CARB comments. At present, no attainment plan for PM_{10} or $PM_{2.5}$ is required by the state regulations. However, SDAPCD has adopted measures to reduce particulate matter in San Diego County. These measures range from regulation against open burning to incentive programs that introduce cleaner technology. These measures can be found in a report titled "Measures to Reduce Particulate Matter in San Diego County" (2005) found on the SDAPCD website (http://www.sdapcd.org).

The RAQS relies on information from the CARB and San Diego Association of Governments (SANDAG), including mobile and area source emissions, as well as information regarding projected growth in the County, to project future emissions and then determine from that the strategies necessary for the reduction of emissions through regulatory controls. The CARB mobile source emission projections and SANDAG growth projections are based on population and vehicle trends and land use plans developed by the cities and the County as part of the development of the individual General Plans. As such, projects that propose development consistent with the growth anticipated by the general plans would be consistent with the RAQS. In the event that a project would propose development which is less dense than anticipated within the General Plan, the project would likewise be consistent with the RAQS. If a project proposes development that is greater than that anticipated in the General Plan and SANDAG's growth projections, the project might be in conflict with the RAQS and SIP and might have a potentially significant impact on air quality.

The SIP relies on the same information from SANDAG to develop emission inventories and emission reduction strategies that are included in the attainment demonstration for the air basin. The SIP also includes rules and regulations that have been adopted by the SDAPCD to control emissions from stationary sources. These SIP-approved rules may be used as a guideline to determine whether a project's emissions would have the potential to conflict with the SIP and thereby hinder attainment of the NAAQS for ozone.

2.1.5 City of San Marcos General Plan

The San Marcos General Plan (2011) contains goals, policies, and recommendations that represent a shared vision for the future of the City. It establishes a framework for ensuring that changes to the built environment, whether public or private, aid in maintaining or improving specific communities while enhancing community qualities as a place for living, recreating, and working. The General Plan Conservation Open Space Element, Land Use and Community Design Element, and Mobility Element contain policies related to the City's sustainable land development goals. Policies specifically related to air quality are as follows:

- **COS-4.1:** Continue to work with the U.S. EPA, California Air Resources Board, SANDAG, and the SDAPCD to meet State and federal ambient air quality standards.
- **COS-4.2:** Require new sensitive-use development, such as schools, day care centers and hospitals, located near mobile and stationary toxic air contaminants be designed with consideration of site and building orientation, location of trees, and incorporation of appropriate technology (i.e., ventilation and filtration) for improved air quality to lessen any potential health risks.

- **COS-4.5:** Encourage energy conservation and the use of alternative energy sources within the community.
- **LU – 2.1:** Promote compact development patterns that reduce air pollution and automobile dependence and facilitate walking, bicycling, and transit use.
- **LU – 2.4**: Encourage retrofits to existing buildings to promote energy efficiency and indoor air quality.
- **M – 3.1:** Develop an integrated, multimodal circulation system that accommodates transit, bicycles, pedestrians, and vehicles; provides opportunities to reduce air pollution and greenhouse gas emissions; and reinforces the role of the street as a public space that unites the City.

2.1.6 Sensitive Receptors

As discussed in Section 2.1.4, *Air Quality Management Plan*, ambient air quality standards have been established to represent the levels of air quality considered sufficient, with a margin of safety, to protect public health and welfare. They are designed to protect that segment of the public most susceptible to respiratory distress, such as sensitive receptors defined as preschool through 12th grade, hospitals, resident care facilities, day-care centers, and residents (San Diego County 2007). Sensitive receptors that may be affected by air quality impacts associated with project construction and operation include the San Marcos Civic Center located approximately 1,000 feet southwest of the project site along East San Marcos Boulevard, multi- family residences located approximately 500 feet east of the site along East Mission Road, and single-family residences located approximately 700 feet north east of the site along Silk Mill Place. The nearest school is Mission Hills High School (1 Mission Hills Ct.), located approximately 0.9 miles east of the project site along East Mission Road. The San Marcos Senior Center (111 Richmar Ave) is located approximately 0.3 miles northwest of the project site along West Mission Road.

2.2 Impact Analysis

2.2.1 Significance Thresholds and Methodology

State Thresholds

Pursuant to Appendix G of the CEQA Guidelines, impacts related to air quality would be significant if the project would:

- Conflict with or obstruct implementation of the applicable air quality plan
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard
- Expose sensitive receptors to substantial pollutant concentrations
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people

Regional Thresholds

The SDAPCD has adopted numerical thresholds to analyze the significance of a project's construction and operational emissions. These thresholds are designed such that a project consistent with the thresholds would not have an individually or cumulatively significant impact to

the SDAB's air quality. These thresholds are also used by planning agencies and local jurisdictions for comparative purposes when evaluating projects under CEQA. Thus, a project that does not exceed these SDAPCD thresholds would have a less than significant impact in regard to the second and third items listed above. The significance thresholds for temporary construction and long-term operational emissions in the SDAB are shown in Table 3, and apply to the project site.

Table 3 SDAPCD Screening Level Significance Thresholds

	Total Emissions	
Pollutant	**Lbs. per Day**	**Tons per Year**
ROG/VOCs	75[1]	13.7[2]
NO_x	250	40
CO	550	100
SO_x	250	40
PM_{10}	100	15
$PM_{2.5}$	55[3]	10[3]

[1] Threshold for VOCs based on the threshold of significance for VOCs from the SCAQMD for the Coachella Valley.

[2] 13.7 tons per year threshold based on 75 lbs/day multiplied by 365 days/year and divided by 2,000 lbs/ton.

[3] EPA "Proposed Rule to Implement the Fine Particle National Ambient Air Quality Standards" published September 8, 2005. Also used by the SCAQMD.

Source: San Diego County. March 2007. *County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements: Air Quality*. Accessed June 2018 at: http://www.sandiegocounty.gov/content/dam/sdc/pds/ProjectPlanning/docs/AQ-Guidelines.pdf.

San Diego County CO Emissions Significance Thresholds

CO emissions are the result of the combustion process, and therefore primarily associated with mobile source emissions (vehicles). CO concentrations tend to be higher in urban areas where there are many mobile-source emissions. CO "hotspots" or pockets where the CO concentration exceeds the NAAQS and/or CAAQS, have been found to occur only at signalized intersections that operate at or below level of service (LOS) E with peak-hour trips for that intersection exceeding 3,000 trips (San Diego County 2007). Pursuant to the County's CEQA Significance Determination Thresholds, a site-specific CO hotspot analysis should be performed to determine if health standards are potentially violated and to identify any affected sensitive receptor if a proposed development would:

- Place receptors within 500 feet of a signalized intersection operating at or below LOS E (peak-hour trips exceeding 3,000 trips)
- Cause road intersections to operate at or below a LOS E (with intersection peak-hour trips exceeding 3,000)
- Result in emissions of CO that when totaled with the ambient concentrations, will exceed 1-hour concentration of 20 ppm or an 8-hour average of 9 ppm

Methodology

Air quality modeling was performed in general accordance with the statutory requirements outlined in the SDAPCD 2016 RAQS to identify both construction and operational emissions associated with the proposed project. All emissions were calculated using the California Emissions Estimator Model

(CalEEMod) software version 2016.3.2, which incorporates current air emission data, planning methods, and protocols.

Construction emissions were modeled in CalEEMod to begin in December 2019 and be completed in August 2021, consistent with the construction schedule provided by the applicant. Construction activities such as site preparation, grading, and excavation would generate diesel and dust emissions. The use of construction equipment would generate criteria air pollutant emissions. For modeling purposes, it was assumed that all construction equipment used would be diesel-powered. Construction emissions associated with development of the proposed project were quantified by estimating the types and quantity of equipment that would be used on site during each of the construction phases, as provided by the time frame and equipment lists provided by the applicant. CalEEMod defaults were used if equipment type was unknown for any construction phase. Construction emissions were analyzed using the regional thresholds established by the SDAPCD and published under Rule 20.2 (SDAPCD Rules and Regulations).

Project construction is anticipated to be completed by August 2021, and fully operational by 2022. Operational emissions include mobile source emissions, energy emissions, and area source emissions. Mobile source emissions are generated by motor vehicle trips associated with operation of the project. Emissions attributed to energy use include electricity and natural gas consumption for the residential units. Area source emissions are generated by landscape maintenance equipment, use of consumer products, and painting. To determine whether a regional air quality impact would occur, the increase in emissions was compared with the SDAPCD recommended regional thresholds for operational emissions.

Consistency with Applicable Regulatory Requirements

SDAPCD Rules

The project would be required to comply with SDAPCD Rules 52, 54, and 55, which identify measures to reduce fugitive dust and is required to be implemented at all construction sites located within the SDAB. The following conditions, which are required to reduce fugitive dust in compliance with SDAPCD Rules 52, 54, and 55 were included in CalEEMod for site preparation and grading phases of construction.

1. **Minimization of Disturbance.** Construction contractors should minimize the area disturbed by clearing, grading, earth moving, or excavation operations to prevent excessive amounts of dust.
2. **Soil Treatment.** Construction contractors should treat all graded and excavated material, exposed soil areas and active portions of the construction site, including unpaved onsite roadways to minimize fugitive dust. Treatment shall include, but not necessarily be limited to, periodic watering, application of environmentally safe soil stabilization materials, and/or roll compaction as appropriate. Watering shall be done as often as necessary, and at least twice daily, preferably in the late morning and after work is done for the day.
3. **Soil Stabilization.** Construction contractors should monitor all graded and/or excavated inactive areas of the construction site at least weekly for dust stabilization. Soil stabilization methods, such as water and roll compaction, and environmentally safe dust control materials shall be applied to portions of the construction site that are inactive for over four days. If no further grading or excavation operations are planned for the area, the area shall be seeded and watered until landscape growth is evident, or periodically treated with environmentally safe dust suppressants, to prevent excessive fugitive dust.

4. **Street Sweeping.** Construction contractors should sweep all visible roadway dust as result of active operations at the conclusion of each work day when active operations cease, or every 24 hours for continuous operations.

The architectural coating phase involves the greatest release of ROG. The emissions modeling for the project assumes the use of low-VOC paint (50 grams per liter [g/L] for flat coatings, 100 g/L for non-flat coatings, and 150 g/L for non-flat high gloss coatings) as required by SDAPCD Rule 67.0.1.

2.2.2 Project Impacts

Temporary Construction Impacts

The project applicant provided the construction schedule, which states that construction would commence in December 2019 and would be completed by August 2021 (approximately 21 months total). In addition, approximately 25,200 cy of fill material would be cut from the project site with approximately 13,400 cy of this cut fill used as fill on-site and an additional 19,300 cy over-excavation occurring (39,200 cy would be exported). No fill would be imported. Proposed construction phases and associated durations include the following:

- Site Preparation (four days)
- Grading (19 weeks)
- Building Construction (61 weeks)
- Paving (four weeks)
- Architectural Coating (14 weeks)

Emissions associated with the construction period were estimated using the CalEEMod v. 2016.3.2 based on the projected maximum amount of equipment that would be used on-site at any given time during construction activities.

Table 4 summarizes maximum daily and annual emissions of pollutants throughout the construction period of the project. Emissions of ROG, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$ would not exceed SDAPCD screening level thresholds during project construction, assuming adherence to the conditions listed above required by SDAPCD Rules 52, 54, 55, and 67. As such, emissions generated from temporary construction activities would not expose sensitive receptors (the closest being single-family residences located approximately 700 feet from the project site) to substantial pollutant concentrations.

Table 4 Maximum Daily Estimated Construction Emissions (lbs/day)

	Maximum Emissions[1]					
Emissions Source	**ROG**	**NO_x**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Daily Construction Emissions (lb/day)						
2019 Maximum	5.2	57.8	25.0	<0.1	10.4	6.4
2020 Maximum	52.0	67.7	36.5	0.1	10.2	2.4
2021 Maximum	51.6	41.1	37.9	<0.1	4.2	2.3
SDAPCD Screening Level Thresholds	75	250	550	250	100	55

Threshold Exceeded?	No	No	No	No	No	No
Annual Construction Emissions (tons/yr)						
2019 Maximum	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2020 Maximum	0.6	3.8	2.5	<0.1	0.4	0.2
2021 Maximum	1.0	2.0	1.8	<0.1	0.2	0.1
SDAPCD Screening Level Thresholds	13.7	40	100	40	15	10
Threshold Exceeded?	No	No	No	No	No	No

Notes: All calculations were made using CalEEMod v.2016.3.2. See Appendix A for calculations. Site Preparation, Grading, Paving, Building Construction, and Architectural Coating totals include worker trips, soil export hauling trips, construction vehicle emissions and fugitive dust. Totals may not add up due to rounding. Emission data is pulled from "mitigated" results that include compliance with regulations and project design features as described in Section 1.2.

[1] Grading phases incorporate anticipated emissions reductions from the conditions listed above, which are required by SDAPCD Rules 52, 54, and 55 to reduce fugitive dust. The architectural coating phases incorporate anticipated emissions reductions from the conditions listed above, which are required by SDAPCD Rule 67.

2.2.3 Long-Term Regional Impacts

Operational Air Pollutant Emissions

Table 5 summarizes emissions associated with operation of the project. The majority of operational emissions generated would be due to mobile emissions from vehicle trips to and from the project site. As shown in Table 5, emissions generated during the operation of project would not exceed SDAPCD screening level thresholds for ROG, NO_X, CO, SO_X, PM_{10}, or $PM_{2.5}$. As such, emissions generated from operation of the project would not expose sensitive receptors (the nearest located approximately 700 feet from the project site) to substantial pollutant concentrations.

Table 5 Project Operational Emissions (lbs/day)

	Estimated Emissions (lbs/day)					
Emissions Source	**ROG**	**NO_x**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Area	2.8	0.1	5.5	<0.1	<0.1	<0.1
Energy	<0.1	0.2	0.1	<0.1	<0.1	<0.1
Mobile	0.8	2.9	7.4	<0.1	2.1	0.6
Project Total	3.5	3.2	13.0	<0.1	2.1	0.6
SDAPCD Screening Level Thresholds	75	250	550	250	100	55
Threshold Exceeded?	No	No	No	No	No	No

See Appendix A for CalEEMod output. Note: Estimate emissions are from Winter operational emissions, with the exception of mobile ROG which is from Summer operational emissions. Numbers may not add up due to rounding.

Carbon Monoxide Hotspot Analysis

As previously discussed, carbon monoxide is a colorless, odorless, poisonous gas that may be found in high concentrations near areas of high traffic volumes. CO emissions are a function of vehicle idling time, meteorological conditions, and traffic flow. The San Diego Air Basin is in attainment of State and federal CO standards. The Escondido - E. Valley Parkway monitoring station (600 E Valley Parkway) is located closest to the project site that provides CO data. The maximum 8-hour average CO level recorded in 2015 was 3.10 ppm, which is well below the 9 ppm State and federal eight-hour standard.

A CO hotspot analysis is required if a proposed development would cause a road intersection to operate at or below a LOS E with intersection peak-hour traffic exceeding 3,000 trips.

The traffic study prepared for the project studies three intersections in the vicinity of the project site, as well as the proposed driveway for the project (LLG 2018). The project would generate approximately 536 daily trips once fully operational, which would include 43 peak morning trips and 54 peak afternoon trips on the roadways surrounding the project site. Table 6 provides a summary of existing and existing plus project intersection LOS based on the traffic study.

The additional traffic generated during project operation would not cause intersections in the vicinity of the project site to operate at or below LOS E, and project-generated trips would not cause intersections in the vicinity to exceed 3,000 peak-hour trips. Therefore, a CO hotspot analysis is not required, and project-generated trips would not result in, or substantially contribute to, CO concentrations that exceed the eight-hour ambient air quality standards along area roadways and intersections.

Table 6 Existing Plus Project Intersection Segment Level of Service Summary

Roadway Segment	Existing LOS		Existing + Project LOS		Significant Impact?
	AM Peak	PM Peak	AM Peak	PM Peak	
Woodward St. and Mulberry Dr.	A	A	B	B	No
Borden Rd. and Vineyard Rd.	B	B	B	B	No
San Marcos Blvd. and Woodward St/Mission Rd.	D	C	D	C	No
San Marcos Blvd. and N. Twin Oaks Rd.	D	D	D	D	No
SR 78 west bound ramps and Twin Oaks Rd.	B	C	B	C	No
SR 78 east bound ramps and Twin Oaks Rd.	C	B	C	B	No

Source: LLG 2018

Odors

SDAPCD Rule 51, commonly referred to as the public nuisance rule, prohibits emissions from any source whatsoever in such quantities of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to the public health or damage to property. The potential for an operation to result in odor complaints from a “considerable” number of persons in the area would be considered to be a significant, adverse odor impact.

The project would involve the temporary use of diesel-powered construction equipment, which would generate exhaust that may be noticeable for short durations at adjacent properties. However, construction activities would be temporary; therefore, this impact would be less than significant and no mitigation would be necessary.

Land uses, and facilities typically associated with odor complaints include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, refineries, landfills, dairies, and fiberglass molding. The operation of the proposed multi-family residential dwellings is not typically associated with objectionable odors. The project site is adjacent to existing multi- and single-family uses, and the proposed project would generate similar odors. The nearest potential sensitive receptors are approximately 700 feet from the site and it is unlikely that the odors from this particular project would be distinguishable from existing sources, given the existing adjacent uses and the vehicle emissions associated with adjacent roadways. Therefore, the project would not generate objectionable odors.

Toxic Air Contaminants (TACs)

CARB's *Air Quality and Land Use Handbook: A Community Health Perspective* (2005) recommends against siting sensitive new land uses within 500 feet of freeways, urban roads with 100,000 vehicles per day, or rural roads with 50,000 vehicles per day. The primary concern with respect to heavy-traffic roadway adjacency is the long-term effect of TACs (primarily diesel exhaust particulates), on sensitive receptors. The primary source of diesel particulate matter (DPM) is heavy-duty trucks on freeways and high-volume arterial roadways. The project site is approximately 1,700 feet north of CA-78 and is not located within 500 feet of other high-volume roadways. According to the TIA completed for the project (LLG 2018), the project would add 536 daily trips once fully operational, and no project-related significant impacts were identified. Therefore, the proposed project would not generate vehicle trips that would expose existing sensitive receptors to substantial pollutant contaminants.

Generation of DPM from construction projects typically occurs in a single area for a temporary period. Project-related construction DPM emissions would occur over an approximately 21-months during which grading, structural and site work, and paving phases would occur. The dose a receptor is exposed to is the primary factor used to determine health risk. Dose is a function of the concentration of a substance or substances in the environment and the extent of exposure that person has with the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the Maximally Exposed Individual. The risks estimated for a Maximally Exposed Individual are higher if a fixed exposure occurs over a longer period of time. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments, which determine the exposure of sensitive receptors to toxic emissions, should be based on a 30-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project (OEHHA 2015). Thus, if the duration of proposed construction activities near any specific sensitive receptor was one year, the exposure would be approximately 3 percent of the total exposure period used for health risk calculation.

As project construction would not be anticipated to persist for numerous years, DPM generated by project construction is not expected to create conditions where the probability is greater than 10 in 1 million of contracting cancer for the Maximally Exposed Individual or to generate ground-level concentrations of non-carcinogenic TACs that exceed a Hazard Index greater than 1 for the Maximally Exposed Individual. Additionally, with ongoing implementation of U.S. EPA and CARB requirements for cleaner fuels, off-road diesel engine retrofits, and new low-emission diesel engine types, the DPM emissions of individual equipment would be substantially reduced over the years as the project construction continues. Therefore, project construction would not expose sensitive receptors to substantial pollutant concentrations.

RAQS Consistency

The RAQS relies on information from CARB and SANDAG, including projected growth in the County, mobile, area, and all other source emissions to project future emissions and determine from that the strategies necessary for the reduction of stationary source emissions through regulatory controls. Projects that propose development that is consistent with the growth anticipated by the County's General Plan is consistent with the RAQS.

According to demographic and socioeconomic estimates provided by the SANDAG Data Surfer database, the City of San Marcos is forecast to add 7,233 multi-family residential units by between 2012 and 2050, a 74 percent increase that would bring the overall multi-family residential inventory from 9,738 units to 16,971 units (SANDAG 2015). The 67 proposed units would account for 0.9 percent[2] of the additional multi-family residential units forecast by SANDAG. The project is not anticipated to provide new employment opportunities. The project would result in growth in residential units that is consistent with the City's General Plan. Therefore, the project is consistent with the RAQS.

2.3 Conclusion

Implementation of the proposed project would not result in any air quality exceedances of applicable short-term construction and long-term operational screening level thresholds. The project would not generate impacts related to CO hotspots, TACs, or odors, and the project would be consistent with RAQs. Therefore, no additional measures beyond those required by SDAPCD rules are needed to reduce project air quality impacts.

[2] Project residential units as percentage of SANDAG multi-family unit forecast for City of San Marcos (67 project units / [16,971 2050 units – 9,738 2012 units]) * 100 = 0.9 percent.

3 Greenhouse Gases

3.1 Background

This section analyzes GHG emissions associated with the project and potential impacts related to climate change.

3.1.1 Climate Change and Greenhouse Gases

Climate change is the observed increase in the average temperature of Earth's atmosphere and oceans along with other substantial changes in climate (such as wind patterns, precipitation, and storms) over an extended period of time. The term "climate change" is often used interchangeably with the term "global warming," but "climate change" is preferred to "global warming" because it helps convey that there are other changes in addition to rising temperatures. The baseline against which these changes are measured originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. The global climate is continuously changing, as evidenced by repeated episodes of substantial warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. However, scientists have observed acceleration in the rate of warming during the past 150 years. Per the United Nations Intergovernmental Panel on Climate Change (IPCC 2014), the understanding of anthropogenic warming and cooling influences on climate has led to a high confidence (95 percent or greater chance) that the global average net effect of human activities has been the dominant cause of warming since the mid-20th century (IPCC 2014).

Gases that absorb and re-emit infrared radiation in the atmosphere are called GHGs. The gases that are widely seen as the principal contributors to human-induced climate change include carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), fluorinated gases such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Water vapor is excluded from the list of GHG because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation.

GHGs are emitted by both natural processes and human activities. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills.

Man-made GHGs, many of which have greater heat-absorption potential than CO_2, include fluorinated gases and SF_6 (California Environmental Protection Agency [CalEPA] 2006). Different types of GHGs have varying global warming potentials (GWPs). The GWP of a GHG is the potential of a gas or aerosol to trap heat in the atmosphere over a specified timescale (generally, 100 years). Because GHGs absorb different amounts of heat, a common reference gas (CO_2) is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as "carbon dioxide equivalent" (CO_2e), and is the amount of a GHG emitted multiplied by its GWP. CO_2 has a 100-year GWP of one. By contrast, CH_4 has a GWP of 25, meaning its global warming effect is 25 times greater than CO_2 on a molecule per molecule basis (IPCC 2007).

3.1.2 Greenhouse Gas Emissions Inventory

Worldwide anthropogenic emissions of GHG were approximately 46,000 million metric tons (MMT, or gigatonne) of CO_2e in 2010 (IPCC 2014). CO_2 emissions from fossil fuel combustion and industrial processes contributed about 65 percent of total emissions in 2010. Of anthropogenic GHGs, CO_2 was the most abundant accounting for 76 percent of total 2010 emissions. CH_4 emissions accounted for 16 percent of the 2010 total, while N_2O and fluorinated gases account for 6 and 2 percent respectively (IPCC 2014).

Total U.S. GHG emissions were 6,511.3 million metric tons (MMT or gigatonne) CO_2e in 2016 (U.S. EPA 2018). Total U.S. emissions have increased by 2.4 percent since 1990; emissions decreased by 1.9 percent from 2015 to 2016 (U.S. EPA 2018). The decrease from 2015 to 2016 was due to was a result of multiple factors, including: (1) substitution from coal to natural gas consumption in the electric power sector; and (2) warmer winter conditions in 2016 resulting in a decreased demand for heating fuel in the residential and commercial sectors; (U.S. EPA 2018). Since 1990, U.S. emissions have increased at an average annual rate of 0.1 percent. In 2015, the industrial and transportation end-use sectors accounted for 29.1 percent and 28.5 percent of CO_2 emissions (with electricity-related emissions distributed), respectively. Meanwhile, the residential and commercial end-use sectors accounted for 15 percent and 16 percent of CO_2 emissions, respectively (U.S. EPA 2018).

Based on the CARB California Greenhouse Gas Inventory for 2000-2016, California produced 429.4 MMT of CO_2e in 2016 (CARB 2018). The major source of GHG in California is transportation, contributing 41 percent of the state's total GHG emissions. Industrial sources are the second largest source of the state's GHG emissions, contributing 23 percent of the state's GHG emissions (CARB 2018). California emissions are due in part to its large size and large population compared to other states. However, the state's mild climate reduces California's per capita fuel use and GHG emissions as compared to other states. The CARB has projected statewide unregulated GHG emissions for the year 2020 would be 509 MMT of CO_2e (CARB 2018) absent any GHG reduction programs or legislation. Incorporating projected reductions from State and local activities, the CARB's target emissions for 2020 is 431 MMT of CO2e (CARB 2018).

3.1.3 Potential Effects of Climate Change

Globally, climate change has the potential to affect numerous environmental resources through potential impacts related to future air, land, and water temperatures and precipitation patterns. Scientific modeling predicts that continued GHG emissions at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. Long-term trends have found that each of the past three decades has been warmer than all the previous decades in the instrumental record, and the decade from 2000 through 2010 has been the warmest. The global combined land and ocean temperature data show an increase of about 0.89°C (0.69°C–1.08°C) over the period 1901–2012 and about 0.72°C (0.49°C–0.89°C) over the period 1951–2012 when described by a linear trend. Several independently analyzed data records of global and regional Land-Surface Air Temperature (LSAT) obtained from station observations are in agreement that LSAT, as well as sea surface temperatures, has increased. In addition to these findings, there are identifiable signs that global warming is currently taking place, including substantial ice loss in the Arctic over the past two decades (IPCC 2014).

Potential impacts of climate change in California may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years

(CalEPA 2010). Below is a summary of some of the potential effects that could be experienced in California as a result of climate change.

Air Quality

Higher temperatures, which are conducive to air pollution formation, could worsen air quality in many areas of California. Climate change may increase the concentration of ground-level O_3, but the magnitude of the effect, and therefore its indirect effects, are uncertain. If higher temperatures are accompanied by drier conditions, the potential for large wildfires could increase, which, in turn, would further worsen air quality. However, if higher temperatures are accompanied by wetter, rather than drier conditions, the rains would tend to temporarily clear the air of particulate pollution and reduce the incidence of large wildfires, thereby ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state (California Energy Commission 2009).

Water Supply

Analysis of paleoclimatic data (such as tree-ring reconstructions of stream flow and precipitation) indicates a history of naturally and widely varying hydrologic conditions in California and the west, including a pattern of recurring and extended droughts. Uncertainty remains with respect to the overall impact of climate change on future water supplies in California. However, the average early spring snowpack in the Sierra Nevada decreased by about 10 percent during the last century, a loss of 1.5 million acre-feet of snowpack storage. During the same period, sea level rose eight inches along California's coast. California's temperature has risen 1°F, mostly at night and during the winter, with higher elevations experiencing the highest increase. Many Southern California cities have experienced their lowest recorded annual precipitation twice within the past decade. In a span of only two years, Los Angeles experienced both its driest and wettest years on record (California Department of Water Resources [DWR] 2008; California Climate Change Center [CCCC] 2009).

This uncertainty complicates the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood. The Sierra snowpack provides the majority of California's water supply by accumulating snow during the state's wet winters and releasing it slowly during the state's dry springs and summers. Based upon historical data and modeling DWR projects that the Sierra snowpack will experience a 25 to 40 percent reduction from its historic average by 2050, and 40 to 65 percent by 2100. Climate change is also anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing the total snowpack (DWR 2008, 2013).

Hydrology and Sea Level Rise

As discussed above, climate change could potentially affect: the amount of snowfall, rainfall, and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for salt water intrusion. According to The Impacts of Sea-Level Rise on the California Coast, prepared by the CCCC, climate change has the potential to induce substantial sea level rise in the coming century (CCCC 2009). The rising sea level increases the likelihood and risk of flooding. The rate of increase of global mean sea levels over the 2001-2010 decade, as observed by satellites, ocean buoys and land gauges, was approximately 3.2 millimeters (mm) per year, which is double the observed 20th century trend of 1.6 mm per year (World Meteorological Organization

[WMO] 2013). As a result, sea levels averaged over the last decade were about 8 inches higher than those of 1880 (WMO, 2013). Sea levels are rising faster now than in the previous two millennia, and the rise is expected to accelerate, even with robust GHG emission control measures. The most recent IPCC report (2013) predicts a mean sea–level rise of 11-38 inches by 2100. This prediction is more than 50 percent higher than earlier projections of 7-23 inches, when comparing the same emissions scenarios and time periods. A rise in sea levels could result in coastal flooding and erosion and could jeopardize California's water supply due to salt water intrusion. In addition, increased CO_2 emissions can cause oceans to acidify due to the carbonic acid it forms. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events.

Agriculture

California has a $30 billion annual agricultural industry that produces half of the country's fruits and vegetables. Higher CO_2 levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, water demand could increase; crop-yield could be threatened by a less reliable water supply; and greater air pollution could render plants more susceptible to pest and disease outbreaks. In addition, temperature increases could change the time of year certain crops, such as wine grapes, bloom or ripen, and thereby affect their quality (CCCC 2006).

Ecosystems and Wildlife

Climate change and the potential resulting changes in weather patterns could have ecological effects on the local and global levels. Increasing concentrations of GHGs are likely to accelerate the rate and severity of climate change impacts. Scientists project that the average global surface temperature could rise by 1.0-4.5°F (0.6-2.5°C) in the next 50 years, and 2.2-10°F (1.4-5.8°C) during the next century, with substantial regional variation. Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Rising temperatures could have four major impacts on plants and animals: (1) timing of ecological events; (2) geographic range; (3) species' composition within communities; and (4) ecosystem processes, such as carbon cycling and storage (Parmesan 2006).

3.1.4 Regulatory Setting

The following regulations address both climate change and GHG emissions.

California Regulations

CARB is responsible for the coordination and oversight of State and local air pollution control programs in California. California has numerous regulations aimed at reducing the State's GHG emissions. Some of these initiatives are summarized below.

California Advanced Clean Cars Program

AB 1493 (2002), California's Advanced Clean Cars program (referred to as "Pavley"), requires CARB to develop and adopt regulations to achieve "the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." On June 30, 2009, the U.S. EPA granted the waiver of Clean Air Act preemption to California for its greenhouse gas emission standards for motor vehicles beginning with the 2009 model year. Pavley I regulates model years from 2009 to 2016 and Pavley II, which is now referred to as "LEV (Low Emission Vehicle) III GHG" regulates model years from 2017 to 2025.

The Advanced Clean Cars program coordinates the goals of the Low Emissions Vehicles (LEV), Zero Emissions Vehicles (ZEV), and Clean Fuels Outlet programs, and would provide major reductions in GHG emissions. By 2025, when the rules will be fully implemented, new automobiles will emit 34 percent fewer GHGs and 75 percent fewer smog-forming emissions from their model year 2016 levels (CARB 2011).

Executive Order S-03-05

In 2005, the Governor issued Executive Order (EO) S-3-05, which identifies Statewide GHG emission reduction targets to achieve long-term climate stabilization as follows:

- Reduce GHG emissions to 1990 levels by 2020; and
- Reduce GHG emissions to 80 percent below 1990 levels by 2050.

In response to EO S-3-05, California Environmental Protection Agency (CalEPA) created the Climate Action Team, which in March 2006 published the Climate Action Team Report that identified a list of strategies that various State agencies could pursue to reduce GHG emissions and ensure that the emission reduction targets in EO S-3-05 are met. The strategies include the reduction of passenger and light duty truck emissions, the reduction of idling times for diesel trucks, an overhaul of shipping technology/infrastructure, increased use of alternative fuels, increased recycling, and landfill methane capture.

Executive Order B-55-18

In 2018, the Governor expanded upon EO S-3-05 by issuing Executive Order B-55-18 and creating a statewide goal of carbon neutrality by 2045. EO B-55-18 identifies the California Air Resources Board as the lead agency to develop a framework for implementation and progress tracking toward this goal.

Assembly Bill 32

California's major initiative for reducing GHG emissions is outlined in Assembly Bill 32 (AB 32), the "California Global Warming Solutions Act of 2006," signed into law in 2006. AB 32 codifies the statewide goal of reducing GHG emissions to 1990 levels by 2020 and requires CARB to prepare a Scoping Plan that outlines the main State strategies for reducing GHGs to meet the 2020 deadline. In addition, AB 32 requires CARB to adopt regulations to require reporting and verification of statewide GHG emissions. Based on this guidance, CARB approved a 1990 statewide GHG level and 2020 limit of 427 MMT of CO_2e. The Scoping Plan was approved by the CARB on December 11, 2008 and included measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted since approval of the Scoping Plan.

In May 2014, CARB approved the first update to the AB 32 Scoping Plan. The 2013 Scoping Plan update defines CARB's climate change priorities for the next five years and sets the groundwork to reach post-2020 statewide goals. The update highlights California's progress toward meeting the "near-term" 2020 GHG emission reduction goals defined in the original Scoping Plan. It also evaluates how to align the State's longer-term GHG reduction strategies with other State policy priorities, such as for water, waste, natural resources, clean energy, transportation, and land use (CARB 2014).

Senate Bill 32

On September 8, 2016, Governor Brown signed Senate Bill 32 (SB 32) into law, codifying the goals in EO B-30-15 by requiring the State to further reduce GHGs to 40 percent below 1990 levels by 2030. On December 14, 2017, CARB adopted the 2017 Scoping Plan, which provides a framework for achieving the 2030 target. The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program, as well as implementation of recently adopted policies and policies, such as SB 350 and SB 1383 (see below). The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2013 Scoping Plan Update, the 2017 Scoping Plan does not provide project-level thresholds for land use development. Instead, it recommends that local governments adopt policies and locally-appropriate quantitative thresholds consistent with a statewide per capita goal of six metric tons (MT) of CO_2e by 2030 and two MT of CO_2e by 2050 (CARB 2017b). As stated in the 2017 Scoping Plan, these goals may be appropriate for plan-level analyses (city, county, subregional, or regional level), but not for specific individual projects because they include all emissions sectors in the State.

Senate Bill 97

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an environmental issue that requires analysis in CEQA documents. In March 2010, the California Resources Agency (Resources Agency) adopted amendments to the CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and climate change impacts.

Senate Bill 375

SB 375, signed in August 2008, enhances the state's ability to reach AB 32 goals by directing the CARB to develop regional GHG emission reduction targets to be achieved from passenger vehicles for 2020 and 2035. In addition, SB 375 directs each of the state's 18 major Metropolitan Planning Organizations (MPO) to prepare a "sustainable communities strategy" (SCS) that contains a growth strategy to meet these emission targets for inclusion in the Regional Transportation Plan (RTP). On September 23, 2010, the CARB adopted final regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035.

Senate Bill 1383

Adopted in September 2016, SB 1383 requires the CARB to approve and begin implementing a comprehensive strategy to reduce emissions of short-lived climate pollutants. The bill requires the strategy to achieve the following reduction targets by 2030:

- Methane – 40% below 2013 levels
- Hydrofluorocarbons – 40% below 2013 levels
- Anthropogenic black carbon – 50% below 2013 levels

The bill also requires CalRecycle, in consultation with the State board, to adopt regulations that achieve specified targets for reducing organic waste in landfills.

Senate Bill 350

Adopted on October 7, 2015, SB 350 supports the reduction of GHG emissions from the electricity sector through a number of measures, including requiring electricity providers to achieve a 50 percent renewables portfolio standard by 2030 and a cumulative doubling of statewide energy efficiency savings from retail electricity and natural gas by 2030.

Senate Bill 100

Adopted on September 10, 2018, SB 100 increases the renewable electricity targets set forth in SB 350 by requiring electricity providers to achieve a 60 percent renewable portfolio standard by 2030 and 100 percent GHG-free electricity portfolio by 2045.

California Environmental Quality Act

Pursuant to the requirements of SB 97, the Resources Agency has adopted amendments to the *CEQA Guidelines* for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted *CEQA Guidelines* include CEQA Sections 15183.5 and 15064.4 and provide general regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts. To date, a variety of air districts have adopted quantitative significance thresholds for GHGs.

SB 743

Pursuant to the requirements of SB 743, the Resources Agency has adopted amendments to the CEQA Guidelines Section 15064.4 to further clarify the requirements for analysis and mitigation of GHG emissions in CEQA documents to reflect recent published case law.

Regional Regulations

San Diego County Greenhouse Gas Inventory

The University of San Diego, School of Law's Energy Policy Initiative Center prepared a regional GHG inventory (EPIC 2013) for San Diego County. This San Diego County Greenhouse Gas Inventory took into account the unique characteristics of the region in calculating emissions. The study found that emissions of GHGs must be reduced by 33 percent below business as usual (BAU) in order for San Diego County to achieve 1990 emission levels by 2020.

San Diego Forward: The Regional Plan

SANDAG adopted *San Diego Forward: The Regional Plan* in 2015, which combines the Regional Comprehensive Plan (RCP) from 2004 with the 2050 RTP/SCS (Regional Plan). The Regional Plan serves as the blueprint for growth in the San Diego region and SANDAG's planned investments in transportation infrastructure to provide more choices, strengthen the economy, promote a healthy environment, and support thriving communities. The Regional Plan sets forth the following six general objectives: Habitat and Open Space Preservation, Regional Economic Prosperity, Environmental Stewardship, Providing Mobility Choices, Partnerships/Collaboration with neighboring entities, and creating Healthy and Complete Communities.

The Regional Plan charts a course towards lowering GHG emissions and includes the following five building blocks:

- A land use pattern that accommodates our region's future employment and housing needs, and protects sensitive habitats, cultural resources, and resource areas
- A transportation network of public transit, managed lanes and highways, local streets, bikeways, and walkways built and maintained with reasonably expected funding
- Managing demands on our transportation system (also known as Transportation Demand Management, or TDM) in ways that reduce or eliminate traffic congestion during peak periods of demand
- Managing our transportation system (also known as Transportation System Management, or TSM) through measures that maximize the overall efficiency of the transportation network
- Innovative pricing policies and other measures designed to reduce the number of miles people travel in their vehicles, as well as traffic congestion during peak periods of demand

Local Regulations

City of San Marcos General Plan

The City's General Plan Mobility Element includes smart growth and land use planning principles designed to reduce vehicle miles traveled (VMT), which would result in a reduction in GHG emissions (San Marcos 2013). Policies relevant to the project intended to encourage multimodal circulation, which subsequently contribute to GHG emission reductions, are as follows:

- **Policy M-1.3:** Require new developments to prepare and implement Transportation Demand Management (TDM) programs to minimize vehicle trip generation and promote alternative modes of travel within the City.
- **Policy M-3.1**: Develop an integrated, multimodal circulation system that accommodates transit, bicycles, pedestrians, and vehicles; provides opportunities to reduce air pollution and greenhouse gas emissions; and reinforces the role of the street as a public space that unites the City.

The City's General Plan Conservation Open Space Element also contains policies relevant to the project in addressing GHG reductions, which are provided below (San Marcos 2013).

- **Policy COS-4.5:** Encourage energy conservation and the use of alternative energy sources within the community.
- **Policy COS-4.9:** Encourage use and retrofitting of existing buildings under Title 24 of the California Building Energy Code.

City of San Marcos Climate Action Plan

The City of San Marcos adopted a Climate Action Plan (CAP) in September 2013. The San Marcos CAP explains that the environmental review of GHG impacts of proposed development projects can be streamlined by CEQA Guidelines Sections 15152 and 15183.5 if the project can illustrate its consistency with the CAP guidelines and measures. The San Marcos CAP contains comprehensive implementation actions related to transportation, land, energy, and water uses, as well as managing wastewater and solid waste generation.

The City's CAP establishes GHG emissions targets for years 2020 and 2030, consistent with statewide goals identified in AB 32 and Executive Order S-03-05 (San Marcos 2013). However, the CAP was adopted prior to passage of SB 32 and therefore additional analysis is needed to demonstrate consistency with the GHG reduction target associated with SB 32.

The City's CAP includes two methods to evaluate the GHG impacts associate with proposed development projects in the City. The first methodology is to prove a projects consistency with the CAP by using the City's CAP Consistency Worksheet (Appendix E of the CAP), which contains a list of project-specific measures. A project is determined to be consistent with the City's CAP if it complies with all the measures listed in the Consistency Worksheet, and no further analysis is required. However, if a project is not consistent with the City's CAP, further analysis based on GHG efficiency thresholds would be required.

Recent Court Rulings

Center for Biological Diversity v. California Department of Fish and Wildlife (Case No. 217763)

The California Supreme Court's decision published on November 30, 2015, in the Center for Biological Diversity v. California Department of Fish and Wildlife evaluated the methodology used to analyze GHG emissions in an EIR prepared for the Newhall Ranch development project that included approximately 20,885 dwelling units with 58,000 residents on 12,000 acres of undeveloped land in Los Angeles County. The EIR used a business as usual (BAU) approach to evaluate whether the project would be consistent with the AB 32 Scoping Plan. The Court found that there was insufficient evidence in the record of that project to explain how a project reducing its GHG emissions by the same percentage as the BAU reduction identified for the State to meet its statewide targets supported a conclusion that the project impacts were below a level of significance.

The California Supreme Court suggested regulatory consistency as a pathway to compliance, by stating that a lead agency might assess consistency with the states GHG reduction goals by evaluating for compliance with regulations designed to reduce GHG emissions. This approach is consistent with CEQA Guidelines Section 15064.4(b), which provides that a determination of an impact is not cumulatively considerable to the extent to which the project complies with regulations or requirements implementing a statewide, regional, or local plan to reduce or mitigate GHG emissions. The Court also found that a lead agency may rely on numerical and efficiency-based thresholds of significance for GHG emissions, if supported by substantial evidence.

Golden Door Properties, LLC v. County of San Diego/Sierra Club, LLC v. County of San Diego (Case No. 072406)

The Fourth District Court of Appeal decision published on September 28, 2018, in the Golden Door Properties, LLC v. County of San Diego evaluated the County of San Diego's 2016 Guidance Document's GHG efficiency metric which establishes a generally applicable threshold of significance for proposed projects. The Court held that the County of San Diego is barred from using its 2016 climate change analysis guidance document's threshold of significance for GHG analysis of 4.9 metric tons of CO_2e per service population per year. The Court stated that the document violated CEQA because it was not formally adopted by ordinance, rule, resolution or regulation through a public review process. The Court also found that the threshold was not supported by substantial evidence that adequately explained how its service population threshold that was derived from statewide data could constitute an appropriate GHG metric to be used for all projects in unincorporated San Diego County. Nevertheless, lead agencies may make project-specific GHG threshold determinations.

3.2 Impact Analysis

3.2.1 CEQA GHG Analysis

Based on Appendix G of the *State CEQA Guidelines*, impacts related to GHG emissions from the project would be significant if the project would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; and/or
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHG.

The majority of individual projects do not generate sufficient GHG emissions to directly influence climate change. However, physical changes caused by a project can contribute incrementally to cumulative effects that are significant, even if individual changes resulting from a project are limited. The issue of climate change typically involves an analysis of whether a project's contribution towards an impact would be cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines, Section 15064[h][1]).

According to the CEQA Guidelines, projects can tier off a qualified GHG reduction plan, which allows for project-level evaluation of GHG emissions through the comparison of the project's consistency with the GHG reduction policies included in a qualified GHG reduction plan. This approach is considered by the Association of Environmental Professionals (AEP) in their white paper, Beyond Newhall and 2020, to be the most defensible approach presently available under CEQA to determine the significance of a project's GHG emissions impact on the environment (2016). The CEQA Guidelines define the requirements necessary to qualify as a comprehensive plan for the reduction of GHG emissions (CEQA Guidelines, Section 15183.5):

1. Quantify existing and projected GHG emissions within the plan area
2. Establish a reduction target based on substantial evidence, where GHG emission are not cumulatively considerable)
3. Identify and analyze sector specific GHG emissions from Plan activities
4. Specify policies and actions (measures) that local jurisdictions will enact and implement over time to achieve the specified reduction target
5. Establish a tool to monitor progress and amend if necessary
6. Adopt in a public process following environmental review

A key aspect of a qualified GHG reduction plan is substantial evidence that the identified reduction target establishes a threshold where GHG emissions are not cumulatively considerable. The AEP Beyond Newhall White Paper identifies this criterion as being a local target that aligns with the statewide legislative targets. The City of San Marcos has an adopted CAP with a 2020 target that is consistent with AB 32 (establishes a target of statewide GHG emissions to be reduced to 1990 levels by the year 2020). Thus, the adopted CAP qualifies as GHG reduction plan under CEQA for the period up to 2020. However, the proposed project has an operational year or horizon year of 2021 and as such, the project level analysis, supported by substantial evidence, should be completed to determine the project's consistency with (i.e. non-interference) 2030 statewide target set in SB 32.

Because the proposed project has an operational year (horizon year) after 2020, it is evaluated for consistency with the statewide SB 32 State targets. The GHG emission target set in SB 32 is a 40 percent reduction from 1990 levels, significantly more stringent than the AB 32 target of achieving 1990 levels. Therefore, if the project is found to be consistent with SB 32 targets it is considered consistent with AB 32 targets as well.

Based on current industry best practices and our professional experience, we propose evaluating whether the proposed project may generate a quantity of GHG emissions that would contribute to a significant impact on the environment by comparing the project's calculated construction and operational emissions against a project-specific efficiency threshold derived from the SB 32 target (AEP 2016, p.33). Due to the evolving nature of CEQA case law and interpretations, best practices are subject to change.

3.2.2 GHG Efficiency Thresholds

Efficiency thresholds are quantitative thresholds based on a measurement of GHG efficiency for a given project, regardless of the amount of mass emissions. These thresholds identify the emission level below which new development would not interfere with attainment of statewide GHG reduction targets. A project that attains such an efficiency target, with or without mitigation, would result in less than significant GHG emissions. A locally-appropriate 2030 project-specific threshold is derived from CARB's recommendations in the 2017 Climate Change Scoping Plan Update, as discussed below.

With the release of the 2017 Climate Change Scoping Plan Update, CARB recognized the need to balance population growth with emissions reductions and in doing so, provided a new local plan level methodology for target setting that provides consistency with state GHG reduction goals using per capita efficiency thresholds. A project-specific efficiency threshold can be calculated by dividing statewide GHG emissions by the sum of statewide jobs and residents. However, not all statewide emission sources are present in the project area (e.g., mining). Accordingly, consistent with the concerns raised in the Golden Door (2018) and Newhall Ranch (2015) decisions regarding the correlation between state and local conditions, the 2030 statewide inventory target was modified with substantial evidence provided to establish a locally-appropriate, evidence-based, residential project-specific threshold consistent with California's SB 32 targets.

To develop this threshold, the local planning area is first evaluated to determine emissions sectors that are present and will be directly affected by potential land-use changes. A description of major sources of emissions that are included in the State Scoping Plan emissions sectors and representative sources in San Marcos can be found in Table 7.

According to the 2013 San Marcos Climate Action Plan, Agricultural Sector GHG emissions have been deemed 'de minimis', or insignificant, and removed from local GHG inventory accounting because they would cause an efficiency threshold based only on statewide inventories to overstate the efficiency level needed for a residential project unique to San Marcos. Therefore, the Agricultural Emissions Sector is considered locally inappropriate and removed. Minimal Industrial Sector source emissions are present in the San Marcos planning area and cannot be disaggregated from their respective Scoping Plan categories, therefore Industrial emissions are removed to retain a more conservative locally-appropriate target. Additionally, Cap and Trade emissions reductions occur independent of any local jurisdictional land use decisions and are also excluded from the locally-appropriate target.

After removing Agricultural, Industrial, and Cap and Trade emissions, the remaining emissions sectors with sources within the San Marcos planning area are then summed to create a locally-appropriate emissions total for a residential project in San Marcos. This locally-appropriate emissions total is divided by the statewide 2030 service person population to determine a locally-appropriate, project-level threshold of 3.2 MT of CO_2e per service population that is consistent with SB 32 targets, as shown in Table 7 and Table 8.

The service population attributed to this project is based on data specific to San Marcos. Not all 67-unit multifamily residential projects in California produce the same service population. In San Marcos, Census data reports that an average of 3.11 persons live in each dwelling. (US Census Bureau 2017) By making informed planning decisions on where to locate the 67 residential units, San Marcos provides housing for 209 residents in an efficient manner that promotes the ability of the State to achieve its SB 32 GHG emissions reductions target.

Table 7 SB 32 Scoping Plan Emissions Sector Targets

GHG Emissions Sector[1]	2030 State Emissions Target[1]	Locally Appropriate[2]	Project Specific	Major Sources[3]
Residential and Commercial	38	Yes	Yes	Natural gas end uses, including space and water heating of buildings
Electric Power	53	Yes	Yes	Electricity uses, including lighting, appliances, machinery and heating
High GWP	11	Yes	Yes	SF6 from power stations, HFCs from refrigerants and air conditioning[4]
Recycling and Waste	8	Yes	Yes	Waste generated by residential, commercial, and other facilities
Transportation	103	Yes	Yes	Passenger, heavy duty, and other vehicle emissions
Industrial	83	No	No	Oil, gas, and hydrogen production, refineries, general fuel use, mining[5] operations do not occur substantially within the City and are not a part of the proposed project
Agriculture	24	No	No	Enteric fermentation, crop residue burning, manure management do not occur substantially within the City and are not included in the proposed project[7]
Cap and Trade Reductions	-60	No	No	Reductions from facilities emitting more than 10,000 MT CO_2e per year[6].
Total	**260**	**No**	**No**	**All emissions sectors**
Scoping Plan Target (All Sectors)	260	No	No	All emissions sectors
Locally Inapplicable Sector (Industrial)	-83	No	No	Oil, gas, and hydrogen production, refineries, general fuel use[5]
Locally Inapplicable Sector (Agriculture)	-24	No	No	Enteric fermentation, crop residue burning, manure management[7]
Locally Inapplicable Sector (Cap and Trade)	60	No	No	Reductions from facilities emitting more than 10,000 MT CO_2e per year[6]
2030 Locally Applicable Emissions Sectors	213	Yes	Yes	Emissions applicable to the local planning area

[1] All State targets in MMT CO2e, see CARB 2017 Climate Change Scoping Plan, Page 31 for sector details (CARB 2017)

[2] Locally appropriate is defined as having significant emissions in Scoping Plan Categorization categories within the planning area.

[3] See CARB GHG Emissions Inventory Scoping Plan Categorization for details, https://www.arb.ca.gov/cc/inventory/data/data.htm

[4] SF_6 is used primarily as an insulator in electrical substations while HFCs can be found in many residential and commercial refrigeration and air conditioning units. HFCs are in the process of being phased out through 2036 in most developed countries.

[5] The majority of this sector is not applicable to the local planning area and any potential applicable subsectors cannot be disaggregated due to CARB accounting methods. Therefore, the entire sector has been removed to ensure a more conservative target.

[6] Cap and Trade is excluded as reductions will occur independent of local project land use decisions and are therefore not locally appropriate.

[7] The 2013 San Marcos Climate Action Plan identified agricultural emissions as 'de minimis', or insignificant, and are excluded as an emissions sector. Therefore, this sector is considered not locally appropriate.

Table 8 SB 32 Locally-Appropriate Project-Specific Threshold

Source		Metric
California 2017 Climate Change Scoping Plan	California 2030 Population[1]	43,939,250
	California 2030 Employment Projection[2]	23,459,500
	Service Population	**67,398,750**
Locally-Appropriate 2030 Project Threshold	2030 Locally-Appropriate Emissions Sectors (MT CO2e)	213,000,000
	2030 Service Population	67,398,750
	2030 Service Person Target (MT of CO_2e per Service Person)	**3.2**[2]

[1] California Department of Finance State Population Projections, http://www.dof.ca.gov/Forecasting/Demographics/projections/

[2] Average of employment range projections under implementation scenario, CARB 2017 Climate Change Scoping Plan Update, Page 55 (CARB 2017)

[3] Total of 3.16 has been rounded up per Scoping Plan general methodology. Lead agencies may determine this threshold as they deem appropriate

At this time, the State has codified a target of reducing emissions to 40 percent below 1990 emissions levels by 2030 (SB 32) and has developed a Scoping Plan to demonstrate how the State will achieve the 2030 target and make substantial progress toward the 2050 goal of 80% reductions in 1990 GHG emission levels set by EO S-3-05. In the recently signed EO S-55-18, which identifies a new goal of carbon neutrality by 2045 and supersedes the goal established by EO S-3-05, CARB has been tasked with including a pathway toward EO B-55-18 goals in the next Scoping Plan update.

While State and regional regulators of energy and transportation systems, along with the State's Cap and Trade program, are designed to be set at limits to achieve most of the reductions needed to hit the State's long term targets, local governments can do their fair share toward meeting the State's targets by siting and approving projects that accommodate planned population growth and projects that are GHG-efficient.

The AEP Climate Change Committee recommends that CEQA GHG analyses evaluate project emissions in light of the trajectory of state climate change legislation and assess their "substantial progress" toward achieving long-term reduction targets identified in available plans, legislation, or EOs. Consistent with AEP Climate Change Committee recommendations, horizon year (2021) GHG impacts are analyzed in terms of whether the project would impede "substantial progress" toward meeting the reduction goal identified in SB 32 and EO S-55-18. As SB 32 is considered an interim target toward meeting the 2045 State goal, consistency with SB 32 would be considered contributing substantial progress toward meeting the State's long-term 2045 goals. Avoiding interference with, and making substantial progress toward, these long-term State targets is important as these targets have been set at levels that reduce California's fair share of emissions toward international targets that will stabilize global climate change effects and avoid the adverse environmental consequences described herein. (Executive Order B-55-18)

As shown in Table 8, a locally-appropriate 2030 project threshold consistent with SB 32 targets is calculated to be 3.2 MT of CO2e per service population. For this project-specific analysis, the project would be compliant with the SB 32 target if project emissions are below the locally-appropriate 3.2 MT CO2e per service population threshold, which is substantial progress toward climate stabilizing targets in 2045.

3.2.3 SB 32 Consistency

As outlined in 2.2.1 Impact Analysis, the San Marcos CAP qualifies as an AB 32 GHG reduction plan under CEQA and can be used to evaluate a projects consistency with State GHG reduction targets for 2020. However, the CAP is not consistent with SB 32 and therefore additional analysis is needed to evaluate GHG emissions associated for projects with a horizon year that extends past 2020.

Accordingly, Table 8 identifies the locally-appropriate threshold for 2030 of 3.2 MT of CO_2e per service person based on SB 32 Scoping Plan data. The proposed project would have no impact on agricultural or industrial sector land uses or emissions; therefore, these emissions from these sectors are not included when deriving a locally-appropriate target. This approach creates both more conservative and locally-appropriate thresholds when evaluating consistency with SB 32 targets (AEP 2016, p.6-7).

CalEEMod version 2016.3.2 was used to calculate total project emissions. The analysis focuses on CO_2, N_2O, and CH_4 since these are the GHG emissions that onsite development would generate in the largest quantities. Fluorinated gases, such as HFCs, PFCs, and SF_6, were also considered for the analysis. However, the proposed project entails residential-commercial mixed-uses that would not generate substantial amounts of fluorinated gases since these gases are primarily associated with industrial processes, such as aluminum and semiconductor manufacturing. Calculations were based on the methodologies recommended by the California Air Pollution Control Officers Association [CAPCOA] (2008) *CEQA and Climate Change* white paper and included the use of the California Climate Action Registry (CCAR) General Reporting Protocol (CCAR 2009). This analysis is also unique to a San Marcos residential project by use of Census population data identifying San Marcos's unique population per unit.

3.2.4 Project Impacts

Construction Emissions

Construction of the project would generate temporary GHG emissions primarily as a result of operation of construction equipment on-site, as well as from vehicles transporting construction workers to and from the project site and heavy trucks to import earth materials on-site. Site preparation and grading typically generate the greatest amount of emissions due to the use of grading equipment and soil hauling.

The project applicant provided the construction schedule, which states that construction would commence in December 2019 and would be completed by August 2021 (approximately 21 months total). In addition, approximately 25,200 cy of fill material would be cut from the project site with approximately 13,400 cy of this cut fill used as fill on-site (39,200 cy would be exported). No fill would be imported. Proposed construction phases and associated durations include the following:

- Site Preparation (four days)
- Grading (19 weeks)
- Building Construction (61 weeks)
- Paving (four weeks)
- Architectural Coating (14 weeks)

Emissions associated with the construction period were estimated using the CalEEMod v. 2016.3.2 based on the projected maximum amount of equipment that would be used on-site at any given

time during construction activities. The construction-related emissions were amortized over a 30-year period in conjunction with the proposed project's operational emissions as recommended by AEP (2007). See Appendix A for results from the CalEEMod GHG emissions modelling.

The total GHG emissions associated with the project are shown in Table 9. Both total emissions and emissions amortized over 30 years are provided.

Table 9 Estimated Construction Emissions of Greenhouse Gases

	Emissions (MT of CO_2e)
2019	4.6
2020	673.1
2021	385.1
Total	1062.8
Annual amortized over 30 years	35.4

See Appendix A for CalEEMod results

Operational Emissions

CalEEMod calculates operational emissions from the project, which include CO_2, N_2O, and CH_4. Energy-related emissions include emissions from electricity and natural gas use. The emissions factors for natural gas combustion are based on EPA's AP-42 (Compilation of Air Pollutant Emissions Factors) and CCAR. Electricity emissions are calculated by multiplying the energy use times the carbon intensity of the utility district per kilowatt hour (CAPCOA 2016). The default electricity consumption values in CalEEMod include the CEC-sponsored California Commercial End Use Survey (CEUS) and Residential Appliance Saturation Survey (RASS) studies.

Emissions associated with area sources, including consumer products, landscape maintenance, and architectural coating were calculated in CalEEMod and utilize standard emission rates from CARB, U.S. EPA, and district supplied emission factor values (CAPCOA 2016).

Emissions from waste generation were also calculated in CalEEMod and are based on the IPCC's methods for quantifying GHG emissions from solid waste using the degradable organic content of waste (CAPCOA 2016). Waste disposal rates by land use and overall composition of municipal solid waste in California was primarily based on data provided by the California Department of Resources Recycling and Recovery (CalRecycle).

Emissions from water and wastewater use calculated in CalEEMod were based on the default electricity intensity from the California Energy Commission's 2006 Refining Estimates of Water-Related Energy Use in California using the average values for Southern California.

For mobile sources, CO_2 and CH_4 emissions from vehicle trips to and from the project site were quantified using CalEEMod. Because CalEEMod does not calculate N_2O emissions from mobile sources, N_2O emissions were quantified using the CCAR General Reporting Protocol (CCAR 2009) direct emissions factors for mobile combustion. Trips rates in CalEEMod were adjusted based on trip generation numbers from the traffic report completed for the proposed project (LLG 2018). These trip rates were used to derive total annual mileage in CalEEMod. Emission rates for N_2O emissions were based on vehicle mix output generated by CalEEMod and the emission factors found in the CCAR General Reporting Protocol.

Combined Construction, Stationary, and Mobile Source Emissions

Table 10 combines the amortized construction, operational, and mobile GHG emissions associated with the project and establishes a per service person GHG emissions efficiency rate of 3.1 MT CO_2e per service person per year. New emissions would not exceed the locally-appropriate project-specific SB 32 threshold of 3.2 MT CO_2e per service person per year; therefore, the project would not generate a substantial increase in GHG emissions and would not conflict with the statewide long-term emissions reduction targets adopted by SB 32.

Table 10 Project Net Annual Emissions at Buildout

Emission Source	Annual Emissions (MT of CO_2e)
Construction	35.4
Operational	
Area	0.8
Energy	149.6
Solid Waste	15.5
Water	28.6
Mobile	
CO_2 and CH_4	392.3
N_2O	19.4
Total Project Emissions	**641.6**
Project Service Population (SP)	209
Project Emissions per Service Population (MT CO2e/SP/year)	3.1
Project Specific Efficiency Threshold (MT CO_2e/SP/year)	3.2
Exceed Project Specific SB 32 Threshold?	No

Source: Calculations were made in CalEEMod; see Appendix A for full model output. Values have been rounded to the nearest tenth

In September 2018, the Governor issued Executive Order B-55-18, declaring the goal of carbon neutrality for the State on or before 2045. The Executive Order's 2045 level expresses the pace and magnitude of reduction efforts that the scientific community believes necessary to stabilize the climate and mitigate the more serious adverse effects of climate change. This scientific information has important value to policymakers and citizens in considering the long-term emissions impacts of a development such as the proposed project. As affirmed by the California Supreme Court in Cleveland National Forest Foundation v. San Diego Association of Governments (2018), "there are presently no reliable means of forecasting how future technological developments or state legislative actions to reduce greenhouse gas emissions may affect future emissions in any one planning jurisdiction…. Lead agencies can only guess how future technical developments or state (or federal or international) actions may affect emissions from the myriad of sources beyond their control. (See Marin Mun. Water Dist. v. KG Land California Corp (1991) 235 Cal.App.3d 1652, 1663 [CEQA does not require analysis of potential impacts from possible future development that are too speculative to evaluate].)" *(Cleveland National Forest Foundation v. San Diego Association of Governments (2017) 3 C5th 497,517)* While definitive quantitative long-term emissions analysis are

speculative at this point, Mission 316 development is designed as an all-electric and EV-ready community to fully utilize existing legislation for long-term carbon intensity reduction in utility electricity mix portfolios. As SB 100 requires electricity providers to reduce the GHG emissions of provided electricity to zero by 2045, the proposed development emissions will be reduced in tandem. Additionally, all homes in the proposed project will be designed to accommodate electric vehicle chargers under CalGreen Title 24 Building Code Standards, in preparation of the electrification of the transportation sector. Therefore, under existing legislation and as shown in Table 11, long term operational emissions from the Mission 316 development are expected to maintain a downward trend relative to the emissions at build-out.

Table 11 Project Net Annual Emissions in 2045 (Informational)

Emission Source	Annual Emissions (MT of CO_2e)
Construction	35.4
Operational	
Area	0.8
Energy	48.4
Solid Waste	15.5
Water	4.8
Mobile	
CO_2 and CH_4	292.6
N_2O	19.4
Total Project Emissions	**416.9**
Project Service Population (SP)	209
Project Emissions per Service Population (MT CO2e/SP/year)	2.0

Source: Calculations were made in CalEEMod; see Appendix A for full model output. Values have been rounded to the nearest tenth

Consistency with SANDAG's 2050 RTP/SCS

The proposed project involves the construction of a 67-unit apartment complex. Based on the 2017 average household rate for the City of 3.11 persons per household (US Census Bureau 2017), the proposed project would add approximately 209 residents (3.11 x 67 = 209) to the project site (US Census Bureau 2017). No employment opportunities are expected due to implementation of this project, therefore the net increase in service population at the project site is approximately 209. It is likely that some residents of the proposed project would relocate from within the City of San Marcos, resulting in less direct population growth than what is accounted for here. Nonetheless, based on the City's estimated 2018 population of 95,768, the 209 project residents would increase the City's population to about 95,977 residents (CDOF 2018). In its 2015 publication of San Diego Forward: The Regional Plan, SANDAG forecasts that the City's population will increase to 113,015 by 2050 — an increase of 17,247 persons relative to the 2018 population (CDOF 2018). Even assuming that all project residents are new to the City, the project would contribute less than one and one quarter of one percent to the City's projected population growth. Therefore, the project would not cause the region to exceed growth projections.

Additionally, the SANDAG region is forecast to experience 94,196,529 annual VMT in the year 2050. This is an increase of 14,907,426 annual VMT, or 14.0% over 2012 levels (SANDAG 2015). With the addition of 209 residents in the proposed project, VMT is expected to increase by 965,213 miles per year, well within the projected growth for the region.

The project also promotes goals and policies within the 2050 RTP/SCS. The project's consistency with applicable policies is detailed in Table 12.

Table 12 RTP/SCS Consistency

RTP/SCS Policy	Project Consistency
Provide convenient travel choices including transit, intercity and high-speed trains, driving, ridesharing, walking, and biking	The project is located conveniently adjacent to transit stops and train stations as well as across E. Mission Road from the San Marcos Library and Civic Center. This provides convenient transportation choices.
Increase the use of transit, ridesharing, walking and biking in major corridors and communities	The proximity of the project to the Civic Center, transit stops, and a train station will increase the use of alternative modes of transportation.
Ensure access to jobs, services, and recreation for populations with fewer transportation choices	The project is across E. Mission Road for the Civic Center and about 0.7 miles north of CSU San Marcos, providing easy access to job centers, education, and recreational areas.
Reduce greenhouse gas emission from vehicles and continue to improve air quality in the region	The project would promote the use of alternative modes of transportation due to its location, which would reduce greenhouse gas emissions.

Cumulative Impacts

Impacts associated with GHG emissions are cumulative by nature and understood on a global scale, as the accumulation of GHGs in the atmosphere contributes to climate change. The vast majority of individual projects do not generate sufficient GHG emissions to create an individual project-specific impact through a direct influence on climate change. Therefore, the issue of climate change typically involves an analysis of whether a project's contribution toward an impact is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (State CEQA Guidelines, Section 15355).

As shown in Table 10, project would result in an emissions rate of 3.1 MT CO2e per service person per year, under the locally-appropriate 3.2 MT CO2e threshold consistent with SB 32 targets. Additionally, as shown in Table 11, long-term emissions trends would continue in a downward trajectory under current legislation, in tandem with the State decarbonization of the electricity sector. Therefore, the project would be in compliance with AB 32 and SB 32 significance thresholds, would not interfere with and make substantial progress toward statewide long-term 2045 reduction goals that will stabilize climate change through the State making its fair share contribution toward GHG reduction targets.

3.3 Conclusion

The project is a residential development at a site served by public transit, with similar residential uses in the vicinity. The project would result in an overall GHG emissions rate of 3.1 MT CO_2e per service person per year through implementation and operation; therefore, the project would be consistent with SB 32 and AB 32 efficiency thresholds. The project would support statewide reduction goals set forth in SB 32 which is substantial progress toward the State's ultimate 2045 goal of carbon neutrality. Accordingly, the project would not contribute to cumulatively significant GHG emissions. Therefore, no additional mitigation measures are recommended.

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Appendix A

CalEEMod Air Quality and Greenhouse Gas Model Worksheets and Math Equations

Mission 316 West

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	75.24	1000sqft	1.73	75,240.00	0
City Park	0.21	Acre	0.21	9,147.60	0
Condo/Townhouse	67.00	Dwelling Unit	1.76	85,009.00	192

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2022
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	665.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 Emissions Factor updated to reflect most recent data

Land Use - Per project plans

Construction Phase - Per client provided construction schedule

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Per client provided construction equipment

Off-road Equipment - Per client provided construction plans

Off-road Equipment - Per client provided construction plans

Off-road Equipment - Per client provided construction plans

Off-road Equipment - Per client provided construction equipment

Off-road Equipment - Per client provided equipment list

Off-road Equipment - Per client provided construction equipment

Off-road Equipment - Per client provided construction plans

Off-road Equipment - Per client provided construction equipment

Trips and VMT - Trips updated to reflect two phases of grading

Grading - per client site plans of cy removed,

Architectural Coating - Architectual coating size updated to reflect completed over 4 phases

Vehicle Trips - Per traffic study

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Woodstoves - per client response to questionarre

Area Coating -

Energy Use - Project not using natural gas

Water And Wastewater -

Solid Waste - Per project plans

Sequestration -

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Area Mitigation -

Energy Mitigation -

Water Mitigation -

Fleet Mix -

Mission 316 West - San Diego County, Annual

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Parking	4,514.00	344.00
tblArchitecturalCoating	ConstArea_Parking	4,514.00	344.00
tblArchitecturalCoating	ConstArea_Parking	4,514.00	344.00
tblArchitecturalCoating	ConstArea_Parking	4,514.00	344.00
tblArchitecturalCoating	ConstArea_Residential_Exterior	57,381.00	11,306.00
tblArchitecturalCoating	ConstArea_Residential_Exterior	57,381.00	11,306.00
tblArchitecturalCoating	ConstArea_Residential_Exterior	57,381.00	11,306.00
tblArchitecturalCoating	ConstArea_Residential_Exterior	57,381.00	11,306.00
tblArchitecturalCoating	ConstArea_Residential_Interior	172,143.00	33,919.00
tblArchitecturalCoating	ConstArea_Residential_Interior	172,143.00	33,919.00
tblArchitecturalCoating	ConstArea_Residential_Interior	172,143.00	33,919.00
tblArchitecturalCoating	ConstArea_Residential_Interior	172,143.00	33,919.00
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True
tblConstructionPhase	NumDays	18.00	13.00
tblConstructionPhase	NumDays	18.00	11.00
tblConstructionPhase	NumDays	18.00	11.00
tblConstructionPhase	NumDays	18.00	11.00
tblConstructionPhase	NumDays	230.00	139.00
tblConstructionPhase	NumDays	230.00	112.00
tblConstructionPhase	NumDays	230.00	112.00
tblConstructionPhase	NumDays	230.00	117.00
tblConstructionPhase	NumDays	8.00	45.00
tblConstructionPhase	NumDays	8.00	55.00
tblConstructionPhase	NumDays	18.00	8.00
tblConstructionPhase	NumDays	18.00	14.00
tblFireplaces	FireplaceDayYear	82.00	0.00

tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	3,078.40	0.00
tblFireplaces	NumberGas	36.85	0.00
tblFireplaces	NumberNoFireplace	6.70	67.00
tblFireplaces	NumberWood	23.45	0.00
tblGrading	MaterialExported	0.00	39,200.00
tblLandUse	LandUseSquareFeet	67,000.00	85,009.00
tblLandUse	LotAcreage	4.19	1.76
tblOffRoadEquipment	HorsePower	187.00	293.00
tblOffRoadEquipment	HorsePower	187.00	268.00
tblOffRoadEquipment	HorsePower	187.00	293.00
tblOffRoadEquipment	HorsePower	187.00	268.00
tblOffRoadEquipment	HorsePower	247.00	173.00
tblOffRoadEquipment	HorsePower	247.00	173.00
tblOffRoadEquipment	HorsePower	97.00	299.00
tblOffRoadEquipment	HorsePower	97.00	299.00
tblOffRoadEquipment	HorsePower	85.00	387.00
tblOffRoadEquipment	HorsePower	367.00	363.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblProjectCharacteristics	CO2IntensityFactor	720.49	665.49
tblSolidWaste	SolidWasteGenerationRate	0.02	0.00

tblTripsAndVMT	WorkerTripNumber	15.00	8.00
tblTripsAndVMT	WorkerTripNumber	18.00	15.00
tblTripsAndVMT	WorkerTripNumber	13.00	10.00
tblTripsAndVMT	WorkerTripNumber	15.00	10.00
tblTripsAndVMT	WorkerTripNumber	15.00	10.00
tblVehicleTrips	ST_TR	22.75	0.00
tblVehicleTrips	ST_TR	5.67	8.00
tblVehicleTrips	SU_TR	16.74	0.00
tblVehicleTrips	SU_TR	4.84	8.00
tblVehicleTrips	WD_TR	1.89	0.00
tblVehicleTrips	WD_TR	5.81	8.00
tblWoodstoves	NumberCatalytic	3.35	0.00
tblWoodstoves	NumberNoncatalytic	3.35	0.00
tblWoodstoves	WoodstoveDayYear	82.00	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	5.1900e-003	0.0578	0.0250	5.0000e-005	0.0221	2.6200e-003	0.0247	0.0104	2.4100e-003	0.0128	0.0000	4.5621	4.5621	1.4300e-003	0.0000	4.5977
2020	0.6316	3.7761	2.4811	7.3100e-003	0.4515	0.1397	0.5912	0.1815	0.1312	0.3127	0.0000	670.2362	670.2362	0.1128	0.0000	673.0569
2021	1.0286	1.9783	1.8185	4.3300e-003	0.1178	0.0841	0.2019	0.0318	0.0803	0.1120	0.0000	383.7958	383.7958	0.0513	0.0000	385.0780
Maximum	**1.0286**	**3.7761**	**2.4811**	**7.3100e-003**	**0.4515**	**0.1397**	**0.5912**	**0.1815**	**0.1312**	**0.3127**	**0.0000**	**670.2362**	**670.2362**	**0.1128**	**0.0000**	**673.0569**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	5.1900e-003	0.0578	0.0250	5.0000e-005	8.6600e-003	2.6200e-003	0.0113	4.0600e-003	2.4100e-003	6.4700e-003	0.0000	4.5621	4.5621	1.4300e-003	0.0000	4.5977
2020	0.6316	3.7761	2.4811	7.3100e-003	0.2543	0.1397	0.3940	0.0920	0.1312	0.2232	0.0000	670.2357	670.2357	0.1128	0.0000	673.0564
2021	1.0286	1.9783	1.8185	4.3300e-003	0.1178	0.0841	0.2019	0.0318	0.0803	0.1120	0.0000	383.7955	383.7955	0.0513	0.0000	385.0778
Maximum	**1.0286**	**3.7761**	**2.4811**	**7.3100e-003**	**0.2543**	**0.1397**	**0.3940**	**0.0920**	**0.1312**	**0.2232**	**0.0000**	**670.2357**	**670.2357**	**0.1128**	**0.0000**	**673.0564**

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**35.62**	**0.00**	**25.76**	**42.85**	**0.00**	**21.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**12-30-2019**	**3-29-2020**	2.3546	2.3546
2	**3-30-2020**	**6-29-2020**	0.6433	0.6433
3	**6-30-2020**	**9-29-2020**	1.7696	1.7696
4	**9-30-2020**	**12-29-2020**	1.9613	1.9613
5	**12-30-2020**	**3-29-2021**	1.3152	1.3152
6	**3-30-2021**	**6-29-2021**	1.0883	1.0883
7	**6-30-2021**	**9-29-2021**	0.5845	0.5845
		Highest	2.3546	2.3546

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4877	5.7500e-003	0.4987	3.0000e-005		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	0.8140	0.8140	7.9000e-004	0.0000	0.8337
Energy	5.2000e-003	0.0444	0.0189	2.8000e-004		3.5900e-003	3.5900e-003		3.5900e-003	3.5900e-003	0.0000	153.0194	153.0194	5.4100e-003	1.8600e-003	153.7087
Mobile	0.1528	0.6838	1.8464	6.5100e-003	0.5768	5.4400e-003	0.5822	0.1544	5.0800e-003	0.1595	0.0000	600.5955	600.5955	0.0312	0.0000	601.3748
Waste						0.0000	0.0000		0.0000	0.0000	6.2562	0.0000	6.2562	0.3697	0.0000	15.4994
Water						0.0000	0.0000		0.0000	0.0000	1.3849	27.2267	28.6116	0.1434	3.6000e-003	33.2714
Total	**0.6457**	**0.7340**	**2.3640**	**6.8200e-003**	**0.5768**	**0.0118**	**0.5885**	**0.1544**	**0.0114**	**0.1659**	**7.6411**	**781.6556**	**789.2967**	**0.5505**	**5.4600e-003**	**804.6879**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4877	5.7500e-003	0.4987	3.0000e-005		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	0.8140	0.8140	7.9000e-004	0.0000	0.8337
Energy	4.8300e-003	0.0413	0.0176	2.6000e-004		3.3400e-003	3.3400e-003		3.3400e-003	3.3400e-003	0.0000	148.9120	148.9120	5.3200e-003	1.7900e-003	149.5778
Mobile	0.1285	0.5366	1.3186	4.2400e-003	0.3637	3.6500e-003	0.3674	0.0974	3.4000e-003	0.1008	0.0000	391.7742	391.7742	0.0219	0.0000	392.3221
Waste						0.0000	0.0000		0.0000	0.0000	6.2562	0.0000	6.2562	0.3697	0.0000	15.4994
Water						0.0000	0.0000		0.0000	0.0000	1.1079	23.7951	24.9030	0.1148	2.9000e-003	28.6384
Total	**0.6210**	**0.5836**	**1.8348**	**4.5300e-003**	**0.3637**	**9.7400e-003**	**0.3735**	**0.0974**	**9.4900e-003**	**0.1069**	**7.3641**	**565.2952**	**572.6594**	**0.5126**	**4.6900e-003**	**586.8714**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**3.82**	**20.49**	**22.39**	**33.58**	**36.93**	**17.32**	**36.54**	**36.93**	**16.90**	**35.55**	**3.62**	**27.68**	**27.45**	**6.89**	**14.10**	**27.07**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	12/30/2019	1/3/2020	5	5	
2	Grading	Grading	1/6/2020	3/6/2020	5	45	
3	Grading Phase 2	Grading	3/9/2020	5/22/2020	5	55	
4	Paving	Paving	6/12/2020	6/23/2020	5	8	
5	Building Construction	Building Construction	6/24/2020	11/26/2020	5	112	
6	Paving Phase 2	Paving	9/7/2020	9/24/2020	5	14	
7	Building Construction Phase 2	Building Construction	9/24/2020	2/26/2021	5	112	
8	Architectural Coating	Architectural Coating	10/9/2020	10/23/2020	5	11	
9	Building Construction Phase 3	Building Construction	12/15/2020	5/26/2021	5	117	
10	Architectural Coating Phase 2	Architectural Coating	1/11/2021	1/27/2021	5	13	
11	Building Construction Phase 4	Building Construction	2/15/2021	8/26/2021	5	139	
12	Architectural Coating Phase 3	Architectural Coating	4/12/2021	4/26/2021	5	11	
13	Architectural Coating Phase 4	Architectural Coating	7/9/2021	7/23/2021	5	11	

Acres of Grading (Site Preparation Phase): 7.5

Acres of Grading (Grading Phase): 78.75

Acres of Paving: 1.73

Residential Indoor: 33,919; Residential Outdoor: 11,306; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 344 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Grading	Crushing/Proc. Equipment	1	4.00	387	0.78
Grading	Graders	1	8.00	293	0.41
Grading	Graders	1	4.00	268	0.41
Grading	Rubber Tired Dozers	1	6.00	173	0.40
Grading	Scrapers	1	8.00	363	0.48
Grading	Tractors/Loaders/Backhoes	1	4.00	299	0.37
Grading Phase 2	Graders	1	8.00	293	0.41
Grading Phase 2	Graders	1	4.00	268	0.41
Grading Phase 2	Rubber Tired Dozers	1	6.00	173	0.40
Grading Phase 2	Tractors/Loaders/Backhoes	1	4.00	299	0.37
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction	Forklifts	1	7.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving Phase 2	Pavers	1	8.00	130	0.42
Paving Phase 2	Paving Equipment	1	8.00	132	0.36
Paving Phase 2	Rollers	1	8.00	80	0.38
Paving Phase 2	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction Phase 2	Forklifts	1	7.00	89	0.20
Building Construction Phase 2	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction Phase 2	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction Phase 3	Forklifts	1	7.00	89	0.20
Building Construction Phase 3	Tractors/Loaders/Backhoes	1	6.00	97	0.37

Building Construction Phase 3	Welders	1	8.00	46	0.45
Architectural Coating Phase 2	Air Compressors	1	6.00	78	0.48
Building Construction Phase 4	Forklifts	1	7.00	89	0.20
Building Construction Phase 4	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction Phase 4	Welders	1	8.00	46	0.45
Architectural Coating Phase 3	Air Compressors	1	6.00	78	0.48
Architectural Coating Phase 4	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving Phase 2	Cement and Mortar Mixers	2	6.00	9	0.56
Building Construction Phase 4	Cranes	1	7.00	231	0.29
Building Construction	Cranes	1	7.00	231	0.29
Building Construction Phase 2	Cranes	1	7.00	231	0.29
Building Construction Phase 3	Cranes	1	7.00	231	0.29
Grading	Excavators	1	8.00	158	0.38
Grading Phase 2	Excavators	1	8.00	158	0.38
Building Construction Phase 4	Generator Sets	1	8.00	84	0.74
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction Phase 2	Generator Sets	1	8.00	84	0.74
Building Construction Phase 3	Generator Sets	1	8.00	84	0.74
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	6	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	7	15.00	0.00	4,900.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading Phase 2	5	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	84.00	21.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving Phase 2	6	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction Phase 2	5	84.00	21.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	17.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction Phase 3	5	84.00	21.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating Phase 2	1	17.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction Phase 4	5	84.00	21.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating Phase 3	1	17.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating Phase 4	1	17.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0220	0.0000	0.0220	0.0104	0.0000	0.0104	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.1600e-003	0.0578	0.0248	5.0000e-005		2.6200e-003	2.6200e-003		2.4100e-003	2.4100e-003	0.0000	4.5022	4.5022	1.4200e-003	0.0000	4.5378
Total	**5.1600e-003**	**0.0578**	**0.0248**	**5.0000e-005**	**0.0220**	**2.6200e-003**	**0.0247**	**0.0104**	**2.4100e-003**	**0.0128**	**0.0000**	**4.5022**	**4.5022**	**1.4200e-003**	**0.0000**	**4.5378**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.3000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0599	0.0599	0.0000	0.0000	0.0599
Total	**3.0000e-005**	**2.0000e-005**	**2.3000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0599**	**0.0599**	**0.0000**	**0.0000**	**0.0599**

3.2 Site Preparation - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					8.6000e-003	0.0000	8.6000e-003	4.0400e-003	0.0000	4.0400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.1600e-003	0.0578	0.0248	5.0000e-005		2.6200e-003	2.6200e-003		2.4100e-003	2.4100e-003	0.0000	4.5022	4.5022	1.4200e-003	0.0000	4.5378
Total	**5.1600e-003**	**0.0578**	**0.0248**	**5.0000e-005**	**8.6000e-003**	**2.6200e-003**	**0.0112**	**4.0400e-003**	**2.4100e-003**	**6.4500e-003**	**0.0000**	**4.5022**	**4.5022**	**1.4200e-003**	**0.0000**	**4.5378**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.3000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0599	0.0599	0.0000	0.0000	0.0599
Total	**3.0000e-005**	**2.0000e-005**	**2.3000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0599**	**0.0599**	**0.0000**	**0.0000**	**0.0599**

3.2 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0311	0.0000	0.0311	0.0153	0.0000	0.0153	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3400e-003	0.0809	0.0355	8.0000e-005		3.6600e-003	3.6600e-003		3.3700e-003	3.3700e-003	0.0000	6.6065	6.6065	2.1400e-003	0.0000	6.6599
Total	**7.3400e-003**	**0.0809**	**0.0355**	**8.0000e-005**	**0.0311**	**3.6600e-003**	**0.0347**	**0.0153**	**3.3700e-003**	**0.0187**	**0.0000**	**6.6065**	**6.6065**	**2.1400e-003**	**0.0000**	**6.6599**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-005	3.0000e-005	3.2000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0870	0.0870	0.0000	0.0000	0.0871
Total	**4.0000e-005**	**3.0000e-005**	**3.2000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0870**	**0.0870**	**0.0000**	**0.0000**	**0.0871**

3.2 Site Preparation - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0121	0.0000	0.0121	5.9800e-003	0.0000	5.9800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3400e-003	0.0809	0.0355	8.0000e-005		3.6600e-003	3.6600e-003		3.3700e-003	3.3700e-003	0.0000	6.6065	6.6065	2.1400e-003	0.0000	6.6599
Total	**7.3400e-003**	**0.0809**	**0.0355**	**8.0000e-005**	**0.0121**	**3.6600e-003**	**0.0158**	**5.9800e-003**	**3.3700e-003**	**9.3500e-003**	**0.0000**	**6.6065**	**6.6065**	**2.1400e-003**	**0.0000**	**6.6599**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-005	3.0000e-005	3.2000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0870	0.0870	0.0000	0.0000	0.0871
Total	**4.0000e-005**	**3.0000e-005**	**3.2000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0870**	**0.0870**	**0.0000**	**0.0000**	**0.0871**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1461	0.0000	0.1461	0.0608	0.0000	0.0608	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0860	0.8331	0.5201	1.3000e-003		0.0350	0.0350		0.0325	0.0325	0.0000	118.6132	118.6132	0.0297	0.0000	119.3565
Total	**0.0860**	**0.8331**	**0.5201**	**1.3000e-003**	**0.1461**	**0.0350**	**0.1812**	**0.0608**	**0.0325**	**0.0933**	**0.0000**	**118.6132**	**118.6132**	**0.0297**	**0.0000**	**119.3565**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0196	0.6969	0.1596	1.9000e-003	0.0419	2.2000e-003	0.0441	0.0115	2.1000e-003	0.0136	0.0000	188.9560	188.9560	0.0170	0.0000	189.3814
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2400e-003	9.2000e-004	9.0300e-003	3.0000e-005	2.7100e-003	2.0000e-005	2.7300e-003	7.2000e-004	2.0000e-005	7.4000e-004	0.0000	2.4465	2.4465	7.0000e-005	0.0000	2.4483
Total	**0.0208**	**0.6978**	**0.1687**	**1.9300e-003**	**0.0446**	**2.2200e-003**	**0.0469**	**0.0122**	**2.1200e-003**	**0.0144**	**0.0000**	**191.4024**	**191.4024**	**0.0171**	**0.0000**	**191.8297**

3.3 Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0570	0.0000	0.0570	0.0237	0.0000	0.0237	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0860	0.8331	0.5201	1.3000e-003		0.0350	0.0350		0.0325	0.0325	0.0000	118.6131	118.6131	0.0297	0.0000	119.3564
Total	**0.0860**	**0.8331**	**0.5201**	**1.3000e-003**	**0.0570**	**0.0350**	**0.0920**	**0.0237**	**0.0325**	**0.0563**	**0.0000**	**118.6131**	**118.6131**	**0.0297**	**0.0000**	**119.3564**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0196	0.6969	0.1596	1.9000e-003	0.0419	2.2000e-003	0.0441	0.0115	2.1000e-003	0.0136	0.0000	188.9560	188.9560	0.0170	0.0000	189.3814
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2400e-003	9.2000e-004	9.0300e-003	3.0000e-005	2.7100e-003	2.0000e-005	2.7300e-003	7.2000e-004	2.0000e-005	7.4000e-004	0.0000	2.4465	2.4465	7.0000e-005	0.0000	2.4483
Total	**0.0208**	**0.6978**	**0.1687**	**1.9300e-003**	**0.0446**	**2.2200e-003**	**0.0469**	**0.0122**	**2.1200e-003**	**0.0144**	**0.0000**	**191.4024**	**191.4024**	**0.0171**	**0.0000**	**191.8297**

3.4 Grading Phase 2 - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1461	0.0000	0.1461	0.0706	0.0000	0.0706	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0576	0.5669	0.3538	8.1000e-004		0.0258	0.0258		0.0237	0.0237	0.0000	71.0318	71.0318	0.0230	0.0000	71.6061
Total	**0.0576**	**0.5669**	**0.3538**	**8.1000e-004**	**0.1461**	**0.0258**	**0.1718**	**0.0706**	**0.0237**	**0.0943**	**0.0000**	**71.0318**	**71.0318**	**0.0230**	**0.0000**	**71.6061**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0100e-003	7.5000e-004	7.3600e-003	2.0000e-005	2.2100e-003	2.0000e-005	2.2200e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.9934	1.9934	6.0000e-005	0.0000	1.9949
Total	**1.0100e-003**	**7.5000e-004**	**7.3600e-003**	**2.0000e-005**	**2.2100e-003**	**2.0000e-005**	**2.2200e-003**	**5.9000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.9934**	**1.9934**	**6.0000e-005**	**0.0000**	**1.9949**

3.4 Grading Phase 2 - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0570	0.0000	0.0570	0.0276	0.0000	0.0276	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0576	0.5669	0.3538	8.1000e-004		0.0258	0.0258		0.0237	0.0237	0.0000	71.0317	71.0317	0.0230	0.0000	71.6061
Total	**0.0576**	**0.5669**	**0.3538**	**8.1000e-004**	**0.0570**	**0.0258**	**0.0827**	**0.0276**	**0.0237**	**0.0512**	**0.0000**	**71.0317**	**71.0317**	**0.0230**	**0.0000**	**71.6061**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0100e-003	7.5000e-004	7.3600e-003	2.0000e-005	2.2100e-003	2.0000e-005	2.2200e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.9934	1.9934	6.0000e-005	0.0000	1.9949
Total	**1.0100e-003**	**7.5000e-004**	**7.3600e-003**	**2.0000e-005**	**2.2100e-003**	**2.0000e-005**	**2.2200e-003**	**5.9000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.9934**	**1.9934**	**6.0000e-005**	**0.0000**	**1.9949**

3.5 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.9000e-003	0.0388	0.0403	6.0000e-005		2.1200e-003	2.1200e-003		1.9600e-003	1.9600e-003	0.0000	5.3720	5.3720	1.6800e-003	0.0000	5.4140
Paving	2.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**6.1700e-003**	**0.0388**	**0.0403**	**6.0000e-005**		**2.1200e-003**	**2.1200e-003**		**1.9600e-003**	**1.9600e-003**	**0.0000**	**5.3720**	**5.3720**	**1.6800e-003**	**0.0000**	**5.4140**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.0700e-003	0.0000	3.2000e-004	0.0000	3.2000e-004	9.0000e-005	0.0000	9.0000e-005	0.0000	0.2900	0.2900	1.0000e-005	0.0000	0.2902
Total	**1.5000e-004**	**1.1000e-004**	**1.0700e-003**	**0.0000**	**3.2000e-004**	**0.0000**	**3.2000e-004**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2900**	**0.2900**	**1.0000e-005**	**0.0000**	**0.2902**

3.5 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.9000e-003	0.0388	0.0403	6.0000e-005		2.1200e-003	2.1200e-003		1.9600e-003	1.9600e-003	0.0000	5.3720	5.3720	1.6800e-003	0.0000	5.4139
Paving	2.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**6.1700e-003**	**0.0388**	**0.0403**	**6.0000e-005**		**2.1200e-003**	**2.1200e-003**		**1.9600e-003**	**1.9600e-003**	**0.0000**	**5.3720**	**5.3720**	**1.6800e-003**	**0.0000**	**5.4139**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.0700e-003	0.0000	3.2000e-004	0.0000	3.2000e-004	9.0000e-005	0.0000	9.0000e-005	0.0000	0.2900	0.2900	1.0000e-005	0.0000	0.2902
Total	**1.5000e-004**	**1.1000e-004**	**1.0700e-003**	**0.0000**	**3.2000e-004**	**0.0000**	**3.2000e-004**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2900**	**0.2900**	**1.0000e-005**	**0.0000**	**0.2902**

3.6 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0796	0.6990	0.5637	1.0000e-003		0.0371	0.0371		0.0354	0.0354	0.0000	85.0714	85.0714	0.0172	0.0000	85.5016
Total	**0.0796**	**0.6990**	**0.5637**	**1.0000e-003**		**0.0371**	**0.0371**		**0.0354**	**0.0354**	**0.0000**	**85.0714**	**85.0714**	**0.0172**	**0.0000**	**85.5016**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4800e-003	0.1341	0.0356	3.2000e-004	7.8100e-003	6.5000e-004	8.4600e-003	2.2500e-003	6.3000e-004	2.8800e-003	0.0000	31.0301	31.0301	2.3800e-003	0.0000	31.0896
Worker	0.0173	0.0128	0.1259	3.8000e-004	0.0377	2.7000e-004	0.0380	0.0100	2.5000e-004	0.0103	0.0000	34.0981	34.0981	1.0200e-003	0.0000	34.1237
Total	**0.0218**	**0.1469**	**0.1615**	**7.0000e-004**	**0.0455**	**9.2000e-004**	**0.0465**	**0.0123**	**8.8000e-004**	**0.0132**	**0.0000**	**65.1282**	**65.1282**	**3.4000e-003**	**0.0000**	**65.2133**

3.6 Building Construction - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0796	0.6990	0.5637	1.0000e-003		0.0371	0.0371		0.0354	0.0354	0.0000	85.0713	85.0713	0.0172	0.0000	85.5015
Total	**0.0796**	**0.6990**	**0.5637**	**1.0000e-003**		**0.0371**	**0.0371**		**0.0354**	**0.0354**	**0.0000**	**85.0713**	**85.0713**	**0.0172**	**0.0000**	**85.5015**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4800e-003	0.1341	0.0356	3.2000e-004	7.8100e-003	6.5000e-004	8.4600e-003	2.2500e-003	6.3000e-004	2.8800e-003	0.0000	31.0301	31.0301	2.3800e-003	0.0000	31.0896
Worker	0.0173	0.0128	0.1259	3.8000e-004	0.0377	2.7000e-004	0.0380	0.0100	2.5000e-004	0.0103	0.0000	34.0981	34.0981	1.0200e-003	0.0000	34.1237
Total	**0.0218**	**0.1469**	**0.1615**	**7.0000e-004**	**0.0455**	**9.2000e-004**	**0.0465**	**0.0123**	**8.8000e-004**	**0.0132**	**0.0000**	**65.1282**	**65.1282**	**3.4000e-003**	**0.0000**	**65.2133**

3.7 Paving Phase 2 - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.8300e-003	0.0678	0.0705	1.1000e-004		3.7200e-003	3.7200e-003		3.4300e-003	3.4300e-003	0.0000	9.4010	9.4010	2.9300e-003	0.0000	9.4744
Paving	2.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.1000e-003**	**0.0678**	**0.0705**	**1.1000e-004**		**3.7200e-003**	**3.7200e-003**		**3.4300e-003**	**3.4300e-003**	**0.0000**	**9.4010**	**9.4010**	**2.9300e-003**	**0.0000**	**9.4744**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6000e-004	1.9000e-004	1.8700e-003	1.0000e-005	5.6000e-004	0.0000	5.7000e-004	1.5000e-004	0.0000	1.5000e-004	0.0000	0.5074	0.5074	2.0000e-005	0.0000	0.5078
Total	**2.6000e-004**	**1.9000e-004**	**1.8700e-003**	**1.0000e-005**	**5.6000e-004**	**0.0000**	**5.7000e-004**	**1.5000e-004**	**0.0000**	**1.5000e-004**	**0.0000**	**0.5074**	**0.5074**	**2.0000e-005**	**0.0000**	**0.5078**

3.7 Paving Phase 2 - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.8300e-003	0.0678	0.0705	1.1000e-004		3.7200e-003	3.7200e-003		3.4300e-003	3.4300e-003	0.0000	9.4010	9.4010	2.9300e-003	0.0000	9.4744
Paving	2.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.1000e-003**	**0.0678**	**0.0705**	**1.1000e-004**		**3.7200e-003**	**3.7200e-003**		**3.4300e-003**	**3.4300e-003**	**0.0000**	**9.4010**	**9.4010**	**2.9300e-003**	**0.0000**	**9.4744**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6000e-004	1.9000e-004	1.8700e-003	1.0000e-005	5.6000e-004	0.0000	5.7000e-004	1.5000e-004	0.0000	1.5000e-004	0.0000	0.5074	0.5074	2.0000e-005	0.0000	0.5078
Total	**2.6000e-004**	**1.9000e-004**	**1.8700e-003**	**1.0000e-005**	**5.6000e-004**	**0.0000**	**5.7000e-004**	**1.5000e-004**	**0.0000**	**1.5000e-004**	**0.0000**	**0.5074**	**0.5074**	**2.0000e-005**	**0.0000**	**0.5078**

3.8 Building Construction Phase 2 - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0505	0.4431	0.3573	6.3000e-004		0.0235	0.0235		0.0224	0.0224	0.0000	53.9292	53.9292	0.0109	0.0000	54.2019
Total	**0.0505**	**0.4431**	**0.3573**	**6.3000e-004**		**0.0235**	**0.0235**		**0.0224**	**0.0224**	**0.0000**	**53.9292**	**53.9292**	**0.0109**	**0.0000**	**54.2019**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.8400e-003	0.0850	0.0226	2.0000e-004	4.9500e-003	4.1000e-004	5.3600e-003	1.4300e-003	4.0000e-004	1.8300e-003	0.0000	19.6709	19.6709	1.5100e-003	0.0000	19.7086
Worker	0.0110	8.1400e-003	0.0798	2.4000e-004	0.0239	1.7000e-004	0.0241	6.3500e-003	1.6000e-004	6.5100e-003	0.0000	21.6158	21.6158	6.5000e-004	0.0000	21.6320
Total	**0.0138**	**0.0931**	**0.1024**	**4.4000e-004**	**0.0289**	**5.8000e-004**	**0.0295**	**7.7800e-003**	**5.6000e-004**	**8.3400e-003**	**0.0000**	**41.2867**	**41.2867**	**2.1600e-003**	**0.0000**	**41.3406**

3.8 Building Construction Phase 2 - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0505	0.4431	0.3573	6.3000e-004		0.0235	0.0235		0.0224	0.0224	0.0000	53.9291	53.9291	0.0109	0.0000	54.2019
Total	**0.0505**	**0.4431**	**0.3573**	**6.3000e-004**		**0.0235**	**0.0235**		**0.0224**	**0.0224**	**0.0000**	**53.9291**	**53.9291**	**0.0109**	**0.0000**	**54.2019**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.8400e-003	0.0850	0.0226	2.0000e-004	4.9500e-003	4.1000e-004	5.3600e-003	1.4300e-003	4.0000e-004	1.8300e-003	0.0000	19.6709	19.6709	1.5100e-003	0.0000	19.7086
Worker	0.0110	8.1400e-003	0.0798	2.4000e-004	0.0239	1.7000e-004	0.0241	6.3500e-003	1.6000e-004	6.5100e-003	0.0000	21.6158	21.6158	6.5000e-004	0.0000	21.6320
Total	**0.0138**	**0.0931**	**0.1024**	**4.4000e-004**	**0.0289**	**5.8000e-004**	**0.0295**	**7.7800e-003**	**5.6000e-004**	**8.3400e-003**	**0.0000**	**41.2867**	**41.2867**	**2.1600e-003**	**0.0000**	**41.3406**

3.8 Building Construction Phase 2 - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0261	0.2331	0.2020	3.7000e-004		0.0117	0.0117		0.0112	0.0112	0.0000	31.1432	31.1432	6.1700e-003	0.0000	31.2975
Total	**0.0261**	**0.2331**	**0.2020**	**3.7000e-004**		**0.0117**	**0.0117**		**0.0112**	**0.0112**	**0.0000**	**31.1432**	**31.1432**	**6.1700e-003**	**0.0000**	**31.2975**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.3300e-003	0.0442	0.0118	1.2000e-004	2.8600e-003	9.0000e-005	2.9500e-003	8.2000e-004	9.0000e-005	9.1000e-004	0.0000	11.2550	11.2550	8.4000e-004	0.0000	11.2759
Worker	5.9900e-003	4.2700e-003	0.0430	1.3000e-004	0.0138	1.0000e-004	0.0139	3.6700e-003	9.0000e-005	3.7600e-003	0.0000	12.0630	12.0630	3.5000e-004	0.0000	12.0716
Total	**7.3200e-003**	**0.0485**	**0.0548**	**2.5000e-004**	**0.0167**	**1.9000e-004**	**0.0169**	**4.4900e-003**	**1.8000e-004**	**4.6700e-003**	**0.0000**	**23.3180**	**23.3180**	**1.1900e-003**	**0.0000**	**23.3475**

3.8 Building Construction Phase 2 - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0261	0.2331	0.2020	3.7000e-004		0.0117	0.0117		0.0112	0.0112	0.0000	31.1432	31.1432	6.1700e-003	0.0000	31.2975
Total	**0.0261**	**0.2331**	**0.2020**	**3.7000e-004**		**0.0117**	**0.0117**		**0.0112**	**0.0112**	**0.0000**	**31.1432**	**31.1432**	**6.1700e-003**	**0.0000**	**31.2975**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.3300e-003	0.0442	0.0118	1.2000e-004	2.8600e-003	9.0000e-005	2.9500e-003	8.2000e-004	9.0000e-005	9.1000e-004	0.0000	11.2550	11.2550	8.4000e-004	0.0000	11.2759
Worker	5.9900e-003	4.2700e-003	0.0430	1.3000e-004	0.0138	1.0000e-004	0.0139	3.6700e-003	9.0000e-005	3.7600e-003	0.0000	12.0630	12.0630	3.5000e-004	0.0000	12.0716
Total	**7.3200e-003**	**0.0485**	**0.0548**	**2.5000e-004**	**0.0167**	**1.9000e-004**	**0.0169**	**4.4900e-003**	**1.8000e-004**	**4.6700e-003**	**0.0000**	**23.3180**	**23.3180**	**1.1900e-003**	**0.0000**	**23.3475**

3.9 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2640					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.3300e-003	9.2600e-003	0.0101	2.0000e-005		6.1000e-004	6.1000e-004		6.1000e-004	6.1000e-004	0.0000	1.4043	1.4043	1.1000e-004	0.0000	1.4070
Total	**0.2654**	**9.2600e-003**	**0.0101**	**2.0000e-005**		**6.1000e-004**	**6.1000e-004**		**6.1000e-004**	**6.1000e-004**	**0.0000**	**1.4043**	**1.4043**	**1.1000e-004**	**0.0000**	**1.4070**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.4000e-004	2.6000e-004	2.5000e-003	1.0000e-005	7.5000e-004	1.0000e-005	7.6000e-004	2.0000e-004	0.0000	2.0000e-004	0.0000	0.6778	0.6778	2.0000e-005	0.0000	0.6783
Total	**3.4000e-004**	**2.6000e-004**	**2.5000e-003**	**1.0000e-005**	**7.5000e-004**	**1.0000e-005**	**7.6000e-004**	**2.0000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6778**	**0.6778**	**2.0000e-005**	**0.0000**	**0.6783**

3.9 Architectural Coating - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2640					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.3300e-003	9.2600e-003	0.0101	2.0000e-005		6.1000e-004	6.1000e-004		6.1000e-004	6.1000e-004	0.0000	1.4043	1.4043	1.1000e-004	0.0000	1.4070
Total	**0.2654**	**9.2600e-003**	**0.0101**	**2.0000e-005**		**6.1000e-004**	**6.1000e-004**		**6.1000e-004**	**6.1000e-004**	**0.0000**	**1.4043**	**1.4043**	**1.1000e-004**	**0.0000**	**1.4070**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.4000e-004	2.6000e-004	2.5000e-003	1.0000e-005	7.5000e-004	1.0000e-005	7.6000e-004	2.0000e-004	0.0000	2.0000e-004	0.0000	0.6778	0.6778	2.0000e-005	0.0000	0.6783
Total	**3.4000e-004**	**2.6000e-004**	**2.5000e-003**	**1.0000e-005**	**7.5000e-004**	**1.0000e-005**	**7.6000e-004**	**2.0000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6778**	**0.6778**	**2.0000e-005**	**0.0000**	**0.6783**

3.10 Building Construction Phase 3 - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.2400e-003	0.0811	0.0654	1.2000e-004		4.3000e-003	4.3000e-003		4.1100e-003	4.1100e-003	0.0000	9.8744	9.8744	2.0000e-003	0.0000	9.9243
Total	**9.2400e-003**	**0.0811**	**0.0654**	**1.2000e-004**		**4.3000e-003**	**4.3000e-003**		**4.1100e-003**	**4.1100e-003**	**0.0000**	**9.8744**	**9.8744**	**2.0000e-003**	**0.0000**	**9.9243**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.2000e-004	0.0156	4.1300e-003	4.0000e-005	9.1000e-004	8.0000e-005	9.8000e-004	2.6000e-004	7.0000e-005	3.3000e-004	0.0000	3.6017	3.6017	2.8000e-004	0.0000	3.6086
Worker	2.0100e-003	1.4900e-003	0.0146	4.0000e-005	4.3800e-003	3.0000e-005	4.4100e-003	1.1600e-003	3.0000e-005	1.1900e-003	0.0000	3.9578	3.9578	1.2000e-004	0.0000	3.9608
Total	**2.5300e-003**	**0.0171**	**0.0187**	**8.0000e-005**	**5.2900e-003**	**1.1000e-004**	**5.3900e-003**	**1.4200e-003**	**1.0000e-004**	**1.5200e-003**	**0.0000**	**7.5595**	**7.5595**	**4.0000e-004**	**0.0000**	**7.5694**

3.10 Building Construction Phase 3 - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.2400e-003	0.0811	0.0654	1.2000e-004		4.3000e-003	4.3000e-003		4.1100e-003	4.1100e-003	0.0000	9.8744	9.8744	2.0000e-003	0.0000	9.9243
Total	**9.2400e-003**	**0.0811**	**0.0654**	**1.2000e-004**		**4.3000e-003**	**4.3000e-003**		**4.1100e-003**	**4.1100e-003**	**0.0000**	**9.8744**	**9.8744**	**2.0000e-003**	**0.0000**	**9.9243**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.2000e-004	0.0156	4.1300e-003	4.0000e-005	9.1000e-004	8.0000e-005	9.8000e-004	2.6000e-004	7.0000e-005	3.3000e-004	0.0000	3.6017	3.6017	2.8000e-004	0.0000	3.6086
Worker	2.0100e-003	1.4900e-003	0.0146	4.0000e-005	4.3800e-003	3.0000e-005	4.4100e-003	1.1600e-003	3.0000e-005	1.1900e-003	0.0000	3.9578	3.9578	1.2000e-004	0.0000	3.9608
Total	**2.5300e-003**	**0.0171**	**0.0187**	**8.0000e-005**	**5.2900e-003**	**1.1000e-004**	**5.3900e-003**	**1.4200e-003**	**1.0000e-004**	**1.5200e-003**	**0.0000**	**7.5595**	**7.5595**	**4.0000e-004**	**0.0000**	**7.5694**

3.10 Building Construction Phase 3 - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0663	0.5913	0.5125	9.3000e-004		0.0297	0.0297		0.0283	0.0283	0.0000	78.9974	78.9974	0.0157	0.0000	79.3887
Total	**0.0663**	**0.5913**	**0.5125**	**9.3000e-004**		**0.0297**	**0.0297**		**0.0283**	**0.0283**	**0.0000**	**78.9974**	**78.9974**	**0.0157**	**0.0000**	**79.3887**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.3800e-003	0.1122	0.0299	2.9000e-004	7.2500e-003	2.4000e-004	7.4900e-003	2.0900e-003	2.3000e-004	2.3200e-003	0.0000	28.5493	28.5493	2.1200e-003	0.0000	28.6022
Worker	0.0152	0.0108	0.1091	3.4000e-004	0.0350	2.5000e-004	0.0353	9.3100e-003	2.3000e-004	9.5400e-003	0.0000	30.5988	30.5988	8.8000e-004	0.0000	30.6208
Total	**0.0186**	**0.1231**	**0.1391**	**6.3000e-004**	**0.0423**	**4.9000e-004**	**0.0428**	**0.0114**	**4.6000e-004**	**0.0119**	**0.0000**	**59.1481**	**59.1481**	**3.0000e-003**	**0.0000**	**59.2230**

3.10 Building Construction Phase 3 - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0663	0.5913	0.5125	9.3000e-004		0.0297	0.0297		0.0283	0.0283	0.0000	78.9973	78.9973	0.0157	0.0000	79.3887
Total	**0.0663**	**0.5913**	**0.5125**	**9.3000e-004**		**0.0297**	**0.0297**		**0.0283**	**0.0283**	**0.0000**	**78.9973**	**78.9973**	**0.0157**	**0.0000**	**79.3887**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.3800e-003	0.1122	0.0299	2.9000e-004	7.2500e-003	2.4000e-004	7.4900e-003	2.0900e-003	2.3000e-004	2.3200e-003	0.0000	28.5493	28.5493	2.1200e-003	0.0000	28.6022
Worker	0.0152	0.0108	0.1091	3.4000e-004	0.0350	2.5000e-004	0.0353	9.3100e-003	2.3000e-004	9.5400e-003	0.0000	30.5988	30.5988	8.8000e-004	0.0000	30.6208
Total	**0.0186**	**0.1231**	**0.1391**	**6.3000e-004**	**0.0423**	**4.9000e-004**	**0.0428**	**0.0114**	**4.6000e-004**	**0.0119**	**0.0000**	**59.1481**	**59.1481**	**3.0000e-003**	**0.0000**	**59.2230**

3.11 Architectural Coating Phase 2 - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2640					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.4200e-003	9.9200e-003	0.0118	2.0000e-005		6.1000e-004	6.1000e-004		6.1000e-004	6.1000e-004	0.0000	1.6596	1.6596	1.1000e-004	0.0000	1.6625
Total	**0.2654**	**9.9200e-003**	**0.0118**	**2.0000e-005**		**6.1000e-004**	**6.1000e-004**		**6.1000e-004**	**6.1000e-004**	**0.0000**	**1.6596**	**1.6596**	**1.1000e-004**	**0.0000**	**1.6625**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.8000e-004	2.7000e-004	2.7600e-003	1.0000e-005	8.9000e-004	1.0000e-005	8.9000e-004	2.4000e-004	1.0000e-005	2.4000e-004	0.0000	0.7741	0.7741	2.0000e-005	0.0000	0.7746
Total	**3.8000e-004**	**2.7000e-004**	**2.7600e-003**	**1.0000e-005**	**8.9000e-004**	**1.0000e-005**	**8.9000e-004**	**2.4000e-004**	**1.0000e-005**	**2.4000e-004**	**0.0000**	**0.7741**	**0.7741**	**2.0000e-005**	**0.0000**	**0.7746**

3.11 Architectural Coating Phase 2 - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2640					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.4200e-003	9.9200e-003	0.0118	2.0000e-005		6.1000e-004	6.1000e-004		6.1000e-004	6.1000e-004	0.0000	1.6596	1.6596	1.1000e-004	0.0000	1.6625
Total	**0.2654**	**9.9200e-003**	**0.0118**	**2.0000e-005**		**6.1000e-004**	**6.1000e-004**		**6.1000e-004**	**6.1000e-004**	**0.0000**	**1.6596**	**1.6596**	**1.1000e-004**	**0.0000**	**1.6625**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.8000e-004	2.7000e-004	2.7600e-003	1.0000e-005	8.9000e-004	1.0000e-005	8.9000e-004	2.4000e-004	1.0000e-005	2.4000e-004	0.0000	0.7741	0.7741	2.0000e-005	0.0000	0.7746
Total	**3.8000e-004**	**2.7000e-004**	**2.7600e-003**	**1.0000e-005**	**8.9000e-004**	**1.0000e-005**	**8.9000e-004**	**2.4000e-004**	**1.0000e-005**	**2.4000e-004**	**0.0000**	**0.7741**	**0.7741**	**2.0000e-005**	**0.0000**	**0.7746**

3.12 Building Construction Phase 4 - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0886	0.7903	0.6850	1.2400e-003		0.0397	0.0397		0.0379	0.0379	0.0000	105.5831	105.5831	0.0209	0.0000	106.1061
Total	**0.0886**	**0.7903**	**0.6850**	**1.2400e-003**		**0.0397**	**0.0397**		**0.0379**	**0.0379**	**0.0000**	**105.5831**	**105.5831**	**0.0209**	**0.0000**	**106.1061**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.5100e-003	0.1500	0.0400	3.9000e-004	9.6900e-003	3.2000e-004	0.0100	2.8000e-003	3.0000e-004	3.1000e-003	0.0000	38.1572	38.1572	2.8300e-003	0.0000	38.2280
Worker	0.0203	0.0145	0.1459	4.5000e-004	0.0468	3.3000e-004	0.0472	0.0124	3.1000e-004	0.0128	0.0000	40.8965	40.8965	1.1700e-003	0.0000	40.9258
Total	**0.0248**	**0.1645**	**0.1859**	**8.4000e-004**	**0.0565**	**6.5000e-004**	**0.0572**	**0.0152**	**6.1000e-004**	**0.0159**	**0.0000**	**79.0537**	**79.0537**	**4.0000e-003**	**0.0000**	**79.1538**

3.12 Building Construction Phase 4 - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0886	0.7903	0.6850	1.2400e-003		0.0397	0.0397		0.0379	0.0379	0.0000	105.5830	105.5830	0.0209	0.0000	106.1060
Total	**0.0886**	**0.7903**	**0.6850**	**1.2400e-003**		**0.0397**	**0.0397**		**0.0379**	**0.0379**	**0.0000**	**105.5830**	**105.5830**	**0.0209**	**0.0000**	**106.1060**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.5100e-003	0.1500	0.0400	3.9000e-004	9.6900e-003	3.2000e-004	0.0100	2.8000e-003	3.0000e-004	3.1000e-003	0.0000	38.1572	38.1572	2.8300e-003	0.0000	38.2280
Worker	0.0203	0.0145	0.1459	4.5000e-004	0.0468	3.3000e-004	0.0472	0.0124	3.1000e-004	0.0128	0.0000	40.8965	40.8965	1.1700e-003	0.0000	40.9258
Total	**0.0248**	**0.1645**	**0.1859**	**8.4000e-004**	**0.0565**	**6.5000e-004**	**0.0572**	**0.0152**	**6.1000e-004**	**0.0159**	**0.0000**	**79.0537**	**79.0537**	**4.0000e-003**	**0.0000**	**79.1538**

3.13 Architectural Coating Phase 3 - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2640					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.2000e-003	8.4000e-003	0.0100	2.0000e-005		5.2000e-004	5.2000e-004		5.2000e-004	5.2000e-004	0.0000	1.4043	1.4043	1.0000e-004	0.0000	1.4067
Total	**0.2652**	**8.4000e-003**	**0.0100**	**2.0000e-005**		**5.2000e-004**	**5.2000e-004**		**5.2000e-004**	**5.2000e-004**	**0.0000**	**1.4043**	**1.4043**	**1.0000e-004**	**0.0000**	**1.4067**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.3000e-004	2.3000e-004	2.3400e-003	1.0000e-005	7.5000e-004	1.0000e-005	7.6000e-004	2.0000e-004	0.0000	2.0000e-004	0.0000	0.6550	0.6550	2.0000e-005	0.0000	0.6555
Total	**3.3000e-004**	**2.3000e-004**	**2.3400e-003**	**1.0000e-005**	**7.5000e-004**	**1.0000e-005**	**7.6000e-004**	**2.0000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6550**	**0.6550**	**2.0000e-005**	**0.0000**	**0.6555**

3.13 Architectural Coating Phase 3 - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2640					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.2000e-003	8.4000e-003	0.0100	2.0000e-005		5.2000e-004	5.2000e-004		5.2000e-004	5.2000e-004	0.0000	1.4043	1.4043	1.0000e-004	0.0000	1.4067
Total	**0.2652**	**8.4000e-003**	**0.0100**	**2.0000e-005**		**5.2000e-004**	**5.2000e-004**		**5.2000e-004**	**5.2000e-004**	**0.0000**	**1.4043**	**1.4043**	**1.0000e-004**	**0.0000**	**1.4067**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.3000e-004	2.3000e-004	2.3400e-003	1.0000e-005	7.5000e-004	1.0000e-005	7.6000e-004	2.0000e-004	0.0000	2.0000e-004	0.0000	0.6550	0.6550	2.0000e-005	0.0000	0.6555
Total	**3.3000e-004**	**2.3000e-004**	**2.3400e-003**	**1.0000e-005**	**7.5000e-004**	**1.0000e-005**	**7.6000e-004**	**2.0000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6550**	**0.6550**	**2.0000e-005**	**0.0000**	**0.6555**

3.14 Architectural Coating Phase 4 - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2640					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.2000e-003	8.4000e-003	0.0100	2.0000e-005		5.2000e-004	5.2000e-004		5.2000e-004	5.2000e-004	0.0000	1.4043	1.4043	1.0000e-004	0.0000	1.4067
Total	**0.2652**	**8.4000e-003**	**0.0100**	**2.0000e-005**		**5.2000e-004**	**5.2000e-004**		**5.2000e-004**	**5.2000e-004**	**0.0000**	**1.4043**	**1.4043**	**1.0000e-004**	**0.0000**	**1.4067**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.3000e-004	2.3000e-004	2.3400e-003	1.0000e-005	7.5000e-004	1.0000e-005	7.6000e-004	2.0000e-004	0.0000	2.0000e-004	0.0000	0.6550	0.6550	2.0000e-005	0.0000	0.6555
Total	**3.3000e-004**	**2.3000e-004**	**2.3400e-003**	**1.0000e-005**	**7.5000e-004**	**1.0000e-005**	**7.6000e-004**	**2.0000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6550**	**0.6550**	**2.0000e-005**	**0.0000**	**0.6555**

3.14 Architectural Coating Phase 4 - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2640					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.2000e-003	8.4000e-003	0.0100	2.0000e-005		5.2000e-004	5.2000e-004		5.2000e-004	5.2000e-004	0.0000	1.4043	1.4043	1.0000e-004	0.0000	1.4067
Total	**0.2652**	**8.4000e-003**	**0.0100**	**2.0000e-005**		**5.2000e-004**	**5.2000e-004**		**5.2000e-004**	**5.2000e-004**	**0.0000**	**1.4043**	**1.4043**	**1.0000e-004**	**0.0000**	**1.4067**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.3000e-004	2.3000e-004	2.3400e-003	1.0000e-005	7.5000e-004	1.0000e-005	7.6000e-004	2.0000e-004	0.0000	2.0000e-004	0.0000	0.6550	0.6550	2.0000e-005	0.0000	0.6555
Total	**3.3000e-004**	**2.3000e-004**	**2.3400e-003**	**1.0000e-005**	**7.5000e-004**	**1.0000e-005**	**7.6000e-004**	**2.0000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6550**	**0.6550**	**2.0000e-005**	**0.0000**	**0.6555**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Improve Destination Accessibility

Increase Transit Accessibility

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1285	0.5366	1.3186	4.2400e-003	0.3637	3.6500e-003	0.3674	0.0974	3.4000e-003	0.1008	0.0000	391.7742	391.7742	0.0219	0.0000	392.3221
Unmitigated	0.1528	0.6838	1.8464	6.5100e-003	0.5768	5.4400e-003	0.5822	0.1544	5.0800e-003	0.1595	0.0000	600.5955	600.5955	0.0312	0.0000	601.3748

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Condo/Townhouse	536.00	536.00	536.00	1,530,443	965,213
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	536.00	536.00	536.00	1,530,443	965,213

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	9.50	7.30	7.30	33.00	48.00	19.00	66	28	6
Condo/Townhouse	10.80	7.30	7.50	41.60	18.80	39.60	86	11	3
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.598645	0.040929	0.181073	0.106149	0.015683	0.005479	0.016317	0.023976	0.001926	0.001932	0.006016	0.000753	0.001122
Condo/Townhouse	0.598645	0.040929	0.181073	0.106149	0.015683	0.005479	0.016317	0.023976	0.001926	0.001932	0.006016	0.000753	0.001122
Other Asphalt Surfaces	0.598645	0.040929	0.181073	0.106149	0.015683	0.005479	0.016317	0.023976	0.001926	0.001932	0.006016	0.000753	0.001122

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	101.1358	101.1358	4.4100e-003	9.1000e-004	101.5177
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	101.5953	101.5953	4.4300e-003	9.2000e-004	101.9790
NaturalGas Mitigated	4.8300e-003	0.0413	0.0176	2.6000e-004		3.3400e-003	3.3400e-003		3.3400e-003	3.3400e-003	0.0000	47.7762	47.7762	9.2000e-004	8.8000e-004	48.0601
NaturalGas Unmitigated	5.2000e-003	0.0444	0.0189	2.8000e-004		3.5900e-003	3.5900e-003		3.5900e-003	3.5900e-003	0.0000	51.4241	51.4241	9.9000e-004	9.4000e-004	51.7297

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	963651	5.2000e-003	0.0444	0.0189	2.8000e-004		3.5900e-003	3.5900e-003		3.5900e-003	3.5900e-003	0.0000	51.4241	51.4241	9.9000e-004	9.4000e-004	51.7297
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**5.2000e-003**	**0.0444**	**0.0189**	**2.8000e-004**		**3.5900e-003**	**3.5900e-003**		**3.5900e-003**	**3.5900e-003**	**0.0000**	**51.4241**	**51.4241**	**9.9000e-004**	**9.4000e-004**	**51.7297**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	895292	4.8300e-003	0.0413	0.0176	2.6000e-004		3.3400e-003	3.3400e-003		3.3400e-003	3.3400e-003	0.0000	47.7762	47.7762	9.2000e-004	8.8000e-004	48.0601
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**4.8300e-003**	**0.0413**	**0.0176**	**2.6000e-004**		**3.3400e-003**	**3.3400e-003**		**3.3400e-003**	**3.3400e-003**	**0.0000**	**47.7762**	**47.7762**	**9.2000e-004**	**8.8000e-004**	**48.0601**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	336563	101.5953	4.4300e-003	9.2000e-004	101.9790
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**101.5953**	**4.4300e-003**	**9.2000e-004**	**101.9790**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	335041	101.1358	4.4100e-003	9.1000e-004	101.5177
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**101.1358**	**4.4100e-003**	**9.1000e-004**	**101.5177**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

No Hearths Installed

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4877	5.7500e-003	0.4987	3.0000e-005		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	0.8140	0.8140	7.9000e-004	0.0000	0.8337
Unmitigated	0.4877	5.7500e-003	0.4987	3.0000e-005		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	0.8140	0.8140	7.9000e-004	0.0000	0.8337

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1356					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3370					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0151	5.7500e-003	0.4987	3.0000e-005		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	0.8140	0.8140	7.9000e-004	0.0000	0.8337
Total	**0.4877**	**5.7500e-003**	**0.4987**	**3.0000e-005**		**2.7500e-003**	**2.7500e-003**		**2.7500e-003**	**2.7500e-003**	**0.0000**	**0.8140**	**0.8140**	**7.9000e-004**	**0.0000**	**0.8337**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1356					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3370					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0151	5.7500e-003	0.4987	3.0000e-005		2.7500e-003	2.7500e-003		2.7500e-003	2.7500e-003	0.0000	0.8140	0.8140	7.9000e-004	0.0000	0.8337
Total	**0.4877**	**5.7500e-003**	**0.4987**	**3.0000e-005**		**2.7500e-003**	**2.7500e-003**		**2.7500e-003**	**2.7500e-003**	**0.0000**	**0.8140**	**0.8140**	**7.9000e-004**	**0.0000**	**0.8337**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	24.9030	0.1148	2.9000e-003	28.6384
Unmitigated	28.6116	0.1434	3.6000e-003	33.2714

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0.250211	0.8391	4.0000e-005	1.0000e-005	0.8423
Condo/Townhouse	4.36532 / 2.75205	27.7724	0.1434	3.6000e-003	32.4291
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**28.6116**	**0.1434**	**3.6100e-003**	**33.2714**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0.250211	0.8391	4.0000e-005	1.0000e-005	0.8423
Condo/Townhouse	3.49226 / 2.75205	24.0639	0.1148	2.8900e-003	27.7961
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**24.9030**	**0.1148**	**2.9000e-003**	**28.6384**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	6.2562	0.3697	0.0000	15.4994
Unmitigated	6.2562	0.3697	0.0000	15.4994

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	30.82	6.2562	0.3697	0.0000	15.4994
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**6.2562**	**0.3697**	**0.0000**	**15.4994**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	30.82	6.2562	0.3697	0.0000	15.4994
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**6.2562**	**0.3697**	**0.0000**	**15.4994**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Greenhouse Gas Emission Worksheet

N_2O Mobile Emissions

Mission 316 West - San Marcos, CA

From CalEEMod v.2016.3.1 Vehicle Fleet Mix Output:

Annual VMT: 965,213

Vehicle Type	Percent Type	CH_4 Emission Factor (g/mile)*	CH_4 Emissions (g/mile)**	N_2O Emission Factor (g/mile)*	N_2O Emissions (g/mile)**
Light Auto	59.9%	0.04	0.0239458	0.04	0.0239458
Light Truck < 3750 lbs	4.1%	0.05	0.00204645	0.06	0.00245574
Light Truck 3751-5750 lbs	18.1%	0.05	0.00905365	0.06	0.01086438
Med Truck 5751-8500 lbs	10.6%	0.12	0.01273788	0.2	0.0212298
Lite-Heavy Truck 8501-10,000 lbs	1.6%	0.12	0.00188196	0.2	0.0031366
Lite-Heavy Truck 10,001-14,000 lbs	0.5%	0.09	0.00049311	0.125	0.000684875
Med-Heavy Truck 14,001-33,000 lbs	1.6%	0.06	0.00097902	0.05	0.00081585
Heavy-Heavy Truck 33,001-60,000 lbs	2.4%	0.06	0.00143856	0.05	0.0011988
Other Bus	0.2%	0.06	0.00011592	0.05	0.0000966
Urban Bus	0.2%	0.06	0.00011592	0.05	0.0000966
Motorcycle	0.6%	0.09	0.00054144	0.01	0.00006016
School Bus	0.1%	0.06	0.00004518	0.05	0.00003765
Motor Home	0.1%	0.09	0.00010098	0.125	0.00014025
Total	**100.0%**		**0.05349587**		**0.064763105**

Total Emissions (metric tons) =
Emission Factor by Vehicle Mix (g/mi) x Annual VMT(mi) x 0.000001 metric tons/g

Conversion to Carbon Dioxide Equivalency (CO_2e) Units based on Global Warming Potential (GWP)

CH_4	21	GWP
N_2O	310	GWP
1 ton (short, US) =	0.90718474	metric ton

Annual Mobile Emissions:

	Total Emissions		Total CO2e units	
N_2O Emissions:	0.0625	metric tons N_2O	**19.38**	metric tons CO_2e
		Project Total:	***19.38***	***metric tons CO_2e***

References

* from Table C.4: Methane and Nitrous Oxide Emission Factors for Mobile Sources by Vehicle and Fuel Type (g/mile).
in California Climate Action Registry General Reporting Protocol, Reporting Entity-Wide Greenhouse Gas Emissions, Version 3.1, January 2009.
Assume Model year 2000-present, gasoline fueled.

** Source: California Climate Action Registry General Reporting Protocol, Reporting Entity-Wide Greenhouse Gas Emissions, Version 3.1, January 2009.

*** CalEEMod v.2016.3.1 results for mobile sources.

Appendix J

Geotechnical Update

GEOTECHNICAL UPDATE FOR
MISSION 316 WEST
(FORMERLY URBAN VINEYARDS)
SAN MARCOS, SAN DIEGO COUNTY, CALIFORNIA

FOR

KB HOME COASTAL, INC.
9915 MIRA MESA BOULEVARD, SUITE 100
SAN DIEGO, CALIFORNIA 92131

W.O. 6878-A-SC MAY 23, 2018

GeoSoils, Inc.

Geotechnical • Geologic • Coastal • Environmental

5741 Palmer Way • Carlsbad, California 92010 • (760) 438-3155 • FAX (760) 931-0915 • www.geosoilsinc.com

May 23, 2018

W.O. 6878-A-SC

KB Home Coastal, Inc.
9915 Mira Mesa Boulevard, Suite 100
San Diego, California 92131

Attention: Mr. Kurt Bausback

Subject: Geotechnical Update for Mission 316 West (Formerly Urban Vineyards), San Marcos, San Diego County, California

Dear Mr. Bausback:

In accordance with your request and authorization, GeoSoils, Inc. (GSI) has prepared the following update of foundation design and construction recommendations for residential development at the subject site. This update has been prepared with respect the governing building code (2016 edition of the California Building Code) for this project, current plans, and the standards of geotechnical practice. GSI's scope of services included a review of the referenced reports/plans, engineering and geologic analysis, and preparation of this update report.

Unless specifically superceded in the text of this report, the conclusions and recommendations presented in GSI (2017), and Pacific Soils & Engineering, Inc. (PSE, 2005), are considered valid and applicable with respect to the subject site, unless specifically superceded herein, and should be properly incorporated into the design and construction phases of site development.

Based upon our field exploration, geologic, and geotechnical engineering analysis, the proposed development appears feasible from a soils engineering and geologic viewpoint, provided that the recommendations presented in the text of this report are properly incorporated into the design and construction of the project.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact our office.

Respectfully submitted,

GeoSoils, Inc.





Robert G. Crisman
Engineering Geologist, CEG 1934

David W. Skelly
Civil Engineer, RCE 47857

RGC/TAG/DWS/jh

Distribution: (3) Addressee

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Appendix A - References . . . . . Rear of Text
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GEOTECHNICAL UPDATE FOR
MISSION 316 WEST
(FORMERLY URBAN VIEWPOINT)
SAN MARCOS, SAN DIEGO COUNTY, CALIFORNIA

SCOPE OF SERVICES

The scope of our services has included the following:

1. Review of readily available published literature, aerial photographs, and maps of the vicinity (see Appendix A).

2. Site reconnaissance mapping.

3. General areal seismicity evaluation.

4. Geotechnical update of existing recommendations as necessary, per Code and City standards.

5. Analysis of existing field and laboratory data relative to the proposed development.

6. Appropriate engineering and geologic analyses of data collected, and the preparation of this summary report and accompaniments.

SITE DESCRIPTION/PROPOSED DEVELOPMENT

The site consists of an irregular shaped, approximately 4- to 5-acre site located on the north side of Mission Road, east of Vineyard Road (aka Woodward Street), in the City of San Marcos, San Diego County, California. Topographically, the site is situated on a relatively steep, to gentle, south facing slope, with gradients locally as steep as 1:1 (horizontal:vertical [h:v]). Previous grading operations appear to have created terracing into the existing natural slope, with graded, south-facing slopes descending toward Mission Road. Elevations range from approximately 640 feet above Mean Sea Level (MSL) to the north (highest point of a planned retaining wall), down to approximately 585 feet MSL, along Mission Road, for a total relief on the order of ±60 feet.

As indicated on a schematic site plan (see Plate 1), prepared by Excel Engineering (EE, 2017), the site will be prepared for the construction of approximately 67 three-story dwelling units, associated underground, surface improvements, and a park area. Typical cut and fill grading techniques are anticipated in order to bring the site to the desired grades. Maximum cut and fill thicknesses, on the order of approximately 35 feet and 10 feet, respectively, are currently anticipated. Graded slopes are anticipated up to heights of approximately 15 feet, and likely at gradients of 1.5:1 (h:v) or flatter for cut slopes, and

2:1 (h:v) for fill slopes. A large retaining wall (5 to 35 feet in height) is indicated along the north side of the project, and will likely consist of a combination of masonry and tie-back type retaining walls. Bioretention basins are also anticipated. Sewer lines are anticipated to be at depths on the order of 8 to 10 feet (bottom of pipe) below finish grades.

PREVIOUS WORK

A preliminary geotechnical investigation and grading plan review for a larger property that includes the subject site, was prepared in 2005, by Pacific Soils Engineering, Inc. (PSE, 2005). Site exploration, including geologic mapping, excavation and logging of 10 exploratory test pits (see Appendix B), laboratory testing, and provided preliminary conclusions and recommendations for site earthwork (including rock hardness and rippability), foundation design and construction, and retaining wall design and construction.

Geotechnical reports performed for an adjacent site, on the east side of the subject site, were completed by others (GeoTek; 2013a, 2013b, and 2014). These studies included geologic mapping, the interpretation of 12 air track borings, four seismic refraction surveys, seven test pit explorations, and associated laboratory testing. The findings summarized in the GeoTek evaluations (GeoTek; 2013a, 2013b, and 2014) are considered relevant to the development of the subject site, as the adjacent property (evaluated by GeoTek) is immediately adjacent to, contains similar topography and geologic conditions to the subject site.

In April of 2015, a third-party feasibility review of the project was performed by GSI (GSI, 2015). The purpose of this summary report was to provide a preliminary review of site conditions and the available report/plans (see Appendix A), in order to evaluate the feasibility of this project from a geotechnical perspective. The scope of services performed in preparation of GSI (2015) included a review of readily available geologic and geotechnical data (both published and proprietary), a field review of site conditions, analysis of data, and preparation of GSI (2015).

A schematic site plan was prepared for the subject site (EE, 2017), and only includes the southern portion of the area evaluated in preparation of PSE (2005). The attached geotechnical map (Plate 1) uses EE (2017) as a base.

Site Geology/Soil Conditions

Earth Materials

PSE (2005) indicates that the majority of the site is underlain at depth by dense, granitic bedrock. Surficial deposits consisting of undocumented fill and topsoil/colluvium were noted to mantle the bedrock, and are anticipated to vary in depth up to approximately 10 feet, or less, in thickness.

Based on our observations and review, surficial soils (including fills, and topsoil/colluvium) predominantly consist of silty to clayey sands with variable amounts of rock fragments. Per the USCS (Sowers and Sowers, 1979), these soils would be classified as silty sand (SM), or clayey sand (SC), and likely contain localized areas of boulder size rock fragments.

Bedrock generally consists of dense, fractured, granitic rock. Our site reconnaissance, a review of PSE (2005) and GeoTek (2014), indicate that granitic rock is fractured and weathered along a high angle, rectangular joint system. Weathering is variable, with numerous outcrops of hard rock visible within the upper elevations of the site. Based on our experience, and as logged in PSE (2005) and GeoTek (2014), granitic soils generally break to silty/clayey sands and sands with rock fragments upon excavation, near the surface, becoming more rocky with depth until refusal on hard rock is encountered. Refusal depths ranged from approximately 2 to 18 feet below existing grades (using a track mounted excavator), with the deeper refusal depths generally within the lower elevations of the site, near Mission Road. A discussion of rock hardness and fill quality is provided in a later section of this report.

Soil Expansion Potential

Samples of topsoil and granitic bedrock, obtained in preparation of PSE (2005), were evaluated to range from low expansive (expansion index between 21 and 50, per ASTM D-4828) for topsoil/colluvium, to very low expansive (expansion index of 20, or less), for soils derived from bedrock excavation. Higher expansive soils, while not identified by testing, were suggested to occur onsite (PSE, 2005). Based on our observations and the type of bedrock, overall soil expansion is anticipated to generally be very low, with some lessor amounts of low, to perhaps medium expansive materials potentially generated from layers within the topsoil/colluvium, existing fill, or within residual soil developed on top of bedrock. Based on the existing soil conditions, it is anticipated that adequately blended fill soils supporting the planned structures should not meet the criteria of detrimentally expansive soils as defined in Section 1803.5.2 of the 2016 CBC. Should higher expansive soils be encountered, these soils may either be; exported from the site, placed no closer than 7 feet from any finish pad grade, or foundations on these lots should be provided with a foundation design in accordance with the Wire Reinforcement Institute (WRI), or the Post Tension Institute (PTI) methods, per Section Sections 1808.6.1 or 1808.6.2 of the 2016 CBC (CBSC, 2016a). Any import soil necessary to complete site grading is recommended to be very low expansive (E.I. less than or equal to 20), and a plasticitiy index (P.I.) of 15, or less.

Corrosion Potential

The corrosion potential for onsite soils was evaluated by PSE (2005). As indicated, site soils are moderately corrosive to buried metal, and present a “negligible” sulfate exposure (per Table 4.2.1 of ACI 318) to concrete. As with all grading projects, additional expansion and corrosive soil evaluations would be recommended at the completion of earthwork.

Groundwater

According to PSE (2005), groundwater was encountered as localized seepage within bedrock, at depths ranging from approximately 5 to 17 feet below existing grades, or at elevations ranging from approximately 585 feet to 590 feet above MSL, with water elevations dropping from east to west, adjacent to Mission Road. The lowest site elevation (approximately 585 feet MSL) generally occurs at the southwest corner of the property, near the intersection of Vineyard and Mission Road, where standing, or ponded water, was not observed. A review of monitoring well data in the vicinity (Geotracker, 2015) indicates a water table, within the adjacent alluvial (i.e., non-bedrock) aquifer to the south, at an approximate elevation of approximately 555 feet MSL, or about 30 feet below the site. Based on the available data, regional groundwater should not significantly affect site development, if properly planned for. Bedrock encountered onsite has permeability characteristics and/or fracture systems that could be susceptible under certain conditions to groundwater seepage, which is indicated by the observed, localized seepage. Irrigation of any cut slopes could result in local areas of seepage from the slope face(s), and saturated soils. Should removal operations encounter overly wet soils within colluvial, or swale areas, special handling, and/or additional time would be necessary in order to adequately process/moisture condition (dry-back) this material to a compactive state. The use of subdrains within colluvial, swale, or removal areas, and stabilization fills with subdrains or "toe drains" along the toe of cut slopes, would likely be recommended.

Geologic Hazards

Adverse geologic structures (faults, landslides, adversely oriented discontinuities [fractures, joints], etc.) or secondary seismic hazards that would preclude project development were not noted during our review. Other seismic hazards, such as liquefaction, fault rupture, etc., are not anticipated to significantly affect site development, or may be mitigated, based on the available data, by the recommended remedial grading.

PSE (2005) noted a potential for seismically induced rockfall, that could potentially occur for granitic boulders exposed in steep cut slopes. PSE (2005) recommended review by a consultant familiar with rockfall mitigation. Consideration of catchment fences, removal during grading, and/or rock bolting of any problematic areas was also discussed.

EARTHWORK DISCUSSION

General

All grading should conform to the guidelines presented in the 2016 CBC (CBSC, 2016a), the City of San Marcos requirements, and as recommended herein. When code references are not equivalent, the more stringent code should be followed. Unless specifically superceded herein, recommendations presented in PSE (2005) are considered valid and applicable. During earthwork construction, all site preparation and the general grading

procedures of the contractor should be observed and the fill selectively tested by a representative(s) of GSI. If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and, if warranted, modified and/or additional recommendations will be offered. All applicable requirements of local and national construction and general industry safety orders, the Occupational Safety and Health Act (OSHA), and the Construction Safety Act should be met.

Based on our review of EXCEL (2017), typical cut and fill grading techniques are anticipated in order to bring the site to plan grades. The current site plan indicates fills and cuts ranging on the order of approximately 10 and 35 feet in thickness, respectively. In consideration of remedial removal depths in fill areas, and overexcavation in cut areas (building pads and deep utilities), maximum fill and cut thicknesses are anticipated to be a much as 20 to 45 feet, respectively.

Bioretention basins are also anticipated. Sewer lines are anticipated to be at depths on the order of 8 to 10 feet (bottom of pipe) below finish grades, with maximum trench depths/excavation below existing grades ranging up to possibly 35 to 45 feet.

Removals

PSE (2005) indicates that the removal of earth material unsuitable for the support of fills and structures shall consist of undocumented fill, topsoils/colluvium, and any highly weathered bedrock. Removal depths appear to range on the order of 1 to approximately 10 feet across the site, and will likely vary locally due to previous episodes of site grading and excavation, as well as depth to hard granitic rock (core stones).

Undercuts/Overexcavation

Transition lots should be undercut at least 3 feet, or 2 feet below all foundations, whichever is greater, and at least one-third of the maximum fill thickness across the lot (i.e., maximum:minimum fill ratio of 3:1, or flatter). Cut lots should also be undercut in order to provide uniform foundation support, facilitate trenching, and to mitigate perched water conditions. The depth of overexcavation on cut lots should be 3 feet from finish grade, or 2 feet below all foundations, whichever is more. All undercuts should be sloped to drain away from the building area toward the street, or other approved area. Homeowners and any interested/affected parties should be notified of the potential to encounter hard and/or oversize rock at shallow depths, which may affect any proposed subsurface structures.

Due to rock hardness issues and to facilitate utility construction, streets may be undercut to a minimum depth of at least 1 foot below the lowest utility invert elevation. Undercutting fill areas in streets where plan fills are relatively shallow (i.e., less than approximately 10 feet thick) may also be considered to facilitate trenching for underground utilities. Undercutting for any planned subsurface structures (i.e., pool/spa, wall, landscaping, etc.) should also be considered.

Rock Hardness/Rippability

PSE (2005) indicates that excavation into surficial soils (i.e., topsoils, colluvium, existing fill), and weathered portions of granitic bedrock can be excavated with "conventional equipment," and that blasting will be required in the unweathered rock.

For the adjacent site, GeoTek (2014) also indicates that surficial soils (undocumented fill, topsoil/colluvium, and near surface weathered bedrock) can be excavated with "heavy duty" equipment in good working order. Rippability studies, including air track and seismic refraction surveys, summarized in GeoTek (2014) indicate that cut areas appear generally rippable to marginally rippable within 10 to 20 feet of existing grades. Core stones and hard spots occur throughout, and will require special handling.

A review of EE (2017), PSE (2005), and Geotek (2014) indicates that non-rippable bedrock will generally be encountered in cut areas and utility excavation along the northern portion of the site. Dense, surficial outcrops of "non-rippable" rock occur throughout the site. Cut slopes will be difficult, if not impossible to establish landscaping.

In order to facilitate footing excavation, and underground utility construction, building pads should be undercut as indicated in the preceding section regarding undercuts/overexcavation. Consideration should be given to undercutting the streets to at least 1 foot below the lowest utility invert elevation, to facilitate utility construction.

Fill Placement

1. Subsequent to ground preparation, fill materials should be brought to at least optimum moisture content, placed in thin 6- to 8-inch lifts, and mechanically compacted to obtain a minimum relative compaction of 95 percent of the laboratory standard.

2. Fill materials should be cleansed of major vegetation, oversized rock ($\geq$ 12 inches) and debris prior to placement.

3. Any import materials should be observed and deemed suitable by the soils engineer prior to placement on the site. Foundation designs may be altered if import materials have a greater expansion value than the onsite materials encountered in this investigation.

4. Recommendations for the treatment of rock in fill are presented in PSE (2005) and are considered valid and applicable, unless specifically superceded in this report.

Fill Quality

Surficial onsite soils (undocumented fill, and topsoil/colluvium) generally consist of admixtures of silty sand and clayey sand, with cobble to boulder size rock fragments.

Rippable zones of bedrock will likely generate poor quality fill consisting of rock fragments and silty sand to sand (DG), and the presence of oversize material (12-inch plus) may not be precluded. In zones of non-rippable rock, depending on shot spacing and overburden thickness, blasting operations will generate rock fragments of assorted sizes, including oversize material (i.e., >12 inches). Based on available areas for rock disposal (i.e., deep fills), further reducing the size of oversize rock may be necessary. The use of a rock crusher may also be considered. The governing agency for utilities may have more restrictive guidelines for backfill (i.e., 3- or 4-inch minus material), and this should be considered during project planning.

A review of PSE (2005) indicates that excavation will produce admixtures of soil and rock fragments, with oversize (i.e., 12-inch plus) material produced locally within surficial soil deposits, and from cut excavation. Typical guidelines for fill placement on "rock" jobs generally include placement of oversize (i.e., 12-inch and larger) material no closer than 10 feet below finish grade, and 1 foot below the deepest utility, and the placement of 12-inch minus material within 15 feet of slope faces. Based on the anticipated excavation difficulty with respect to 12-inch minus material within building footings, and larger material within utility trenches, consideration should be given to 6-inch minus material within the upper 3 feet, and 12-inch minus within the upper 10 feet, or within areas where trenching will occur. Hold down depths of oversize material should also consider other improvements, such as swimming pools/spas, as well as disclosure issues. The governing agency may not allow the placement of fill materials greater than 12 inches in longest dimension, based on strict interpretation of Code. Rock placement guidelines are presented in PSE (2005).

Shrinkage/Bulking

In general, surficial soils (undocumented fill, topsoil/colluvium, etc.) will likely shrink as a result of recompaction, while excavation into granitic bedrock will likely bulk. PSE (2005) provides a shrinkage factor of 10 to 15 percent for topsoils (colluvium), 5 to 8 percent for undocumented fill surficial soils, 10 to 18 percent bulking for rippable bedrock, and 18 to 25 percent for drill and shoot bedrock. Based on our experience, we suggest the use of the following criteria for bedrock, on a preliminary basis:

Granitic Bedrock

25% rock/75% earth	4% to 12% shrinkage
50% rock/50% earth	1% to 9% shrinkage
75% rock/25% earth	7% to 17% bulking
100% rock (drill and shoot zones)	33% bulking

Slopes

Graded fill slopes are anticipated up to heights of approximately 15 feet, at gradients of 2:1 (h:v) or less. PSE (2005) indicates an adequate factor of safety for both gross and surficial stability. The site plan by EE (2017) indicates that the perimeter wall along the

northern boundary of the project daylights at existing grade. As such, cut slopes are not indicated. A stability analysis of natural slope over retaining wall configurations (including wedge plane failure analysis) was not evaluated in preparation of PSE (2005) and should be included in the scope of any future planning/site work.

Stabilization of cut slope faces may be warranted for drainage, planting, or surficial stability conditions, including wedge type failures. PSE (2005) recommended further evaluation of slope stability with respect to the existing cut slope along Vineyard, with respect to rock fall hazards, "if not stabilized with a tie back wall system." A review of EE (2017) indicates a large retaining wall (5 to 35 feet in height) located along the north side of the project, and will likely consist of a combination of masonry and tie-back type retaining walls.

Proposed graded slopes present the following concerns with respect to overall slope stability:

- The presence of desilting basins, or other retention structures, and the potential for water seepage and the resultant loss of soil strength.

- The potential for block failure along daylighted joint planes, or wedge failure along intersecting joint planes exposed at the face of cut slopes.

- Permeability characteristics and/or fracture systems that could be susceptible under certain conditions to groundwater seepage.

- Irrigation of cut slopes resulting in local areas of seepage from the slope face(s), or toe, and saturated soils.

- The potential for retaining walls at the toe and tops of slopes.

- Setbacks of structures or deepened footings for structures located above slope/wall combinations.

Based on the above, further evaluation of graded slope stability is recommended. In general, less complex slopes (i.e., no basins, high angle jointing, less than 30 feet in height, etc.) appear to be generally stable, assuming that these slopes are properly constructed and routinely maintained under the prevailing climatic conditions (semi-arid).

Subdrainage

Due to the potential for strong contrasts in permeability between fill and bedrock, subdrainage of any stability fills, perimeter slopes, walls, etc. will likely be necessary. Based on the topographic configuration of the site, "canyon" type subdrains are not anticipated. Shallower, toe of slope drains should also be anticipated along the toes of cut slopes in order to mitigate the potential for perched water conditions in these areas.

Perimeter Conditions

Based on a review of EE (2017), perimeter conditions generally appear to consist of natural slopes descending from property lines, or open space, or fill slope/wall combinations descending to property lines.

In general, for fill slopes descending to property lines, removals should be completed above a 1:1 projection beginning at the property line, or a point located at least 5 feet laterally from any adjacent street, or any nearby utility. Relatively deep removals adjacent to property line may necessitate the use of structural setbacks within the building area. Based on the site conditions, significant setbacks are not anticipated.

For cut slopes descending from property lines, significant property line issues are not indicated. However, should cut slopes require stabilization fills based on conditions exposed during grading, offsite grading, or other mitigation may be recommended. It should be noted that site geology generally consists of fractured granitic rock. At present, the potential for the construction of stability slopes is considered low, based on the available information. As indicated above, stability fills may be considered to facilitate planting, or mitigate seepage from fractures or daylighted jointing/discontinuities at the slope face.

RECOMMENDATIONS - FOUNDATIONS

General

Preliminary recommendations for foundation design and construction are provided in the following sections. These preliminary recommendations have been developed from our understanding of the currently planned site development, site observations, a review of the existing body of geotechnical work (see Appendix A), review of data, and engineering analyses. Foundation design should be re-evaluated at the conclusion of site grading/remedial earthwork for the as-graded soil conditions. Although not anticipated, revisions to these recommendations may be necessary. In the event that the information concerning the proposed development plan is not correct, or any changes in the design, location or loading conditions of the proposed residential structures are made, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report are modified or approved in writing by this office.

The information and recommendations presented in this section are not meant to supercede design by the project structural engineer or civil engineer specializing in structural design. Upon request, GSI could provide additional input/consultation regarding soil parameters, as related to foundation design.

Foundation/Mechanically Stabilized Earth (MSE) Wall Interactions

Plans indicate that some building foundations/improvements will be located in close proximity to planned MSE walls onsite. MSE walls are flexible systems and as such, structures, or pools will not readily tolerate differential movement imparted from these adjacent flexible systems. Mitigation would typically include deepened foundations, soil cement treatments, etc. and more onerous foundation design with respect to differential settlement. No mitigation would increase the potential for settlement and distress to any settlement sensitive improvement located above the walls grid zone, or within the walls surcharge zone.

Based on our review of EE (2017), MSE wall locations appear to be in close proximity to some planned buildings. As such, the "surcharge zone" behind the wall, defined as the zone above a 1:1 (h:v) projection up and away from the heel of the MSE walls reinforced zone may encroach within some building footprints. For these units, a deepened foundation, and/or more onerous foundation design should be anticipated. It should be noted that the use of soil cement treatments may also be considered, but is not desired by the client. Recommendations for more onerous foundation design parameters, are provided in later sections of this report.

Preliminary Foundation Design

From a geotechnical viewpoint, foundation design/construction should minimally conform to the following:

1. The foundation systems should be designed and constructed in accordance with guidelines presented in the 2016 CBC (CBSC, 2016a).

2. An allowable bearing value of 2,000 pounds per square foot (psf) may be used for the design of footings that maintain a minimum width of 15 inches and a minimum depth of 18 inches (below the lowest adjacent grade for three-story structures [i.e., two floor loads]), and are founded entirely into approved engineered fill. This value may be increased by 20 percent for each additional 12 inches in footing depth, or width, to a maximum value of 3,500 psf for footings founded into approved engineered fill, compacted to at least 95 percent relative compaction. This value may be increased by one-third when considering short duration seismic or wind loads. Isolated pad footings should have a minimum dimension of at least 24 inches square and a minimum embedment of 24 inches below the lowest adjacent grade (soil subgrade) into approved engineered fill. Foundation embedment depth excludes concrete slabs-on-grade, and/or slab underlayment. The allowable bearing value for foundations located within the surcharge zone for any adjacent MSE wall, and not pile supported, should be reduced from 2,000 psf, to 1,500 psf, with a maximum bearing of 2,500 psf.

3. For foundations deriving passive resistance from engineered fill, a passive earth pressure may be computed as an equivalent fluid having a density of 300 pounds per cubic feet (pcf), with a maximum earth pressure of 3,000 psf for compacted very low expansive engineered fill, at a minimum 95 percent relative compaction. Passive earth pressure for foundations located within the surcharge zone for any adjacent MSE wall, and not pile supported, should be reduced to 150 psf (max 1,500 psf).

4. The upper 6 inches of passive pressure should be neglected if not confined by slabs or pavement.

5. For lateral sliding resistance, a 0.35 coefficient of friction may be utilized for a concrete to soil contact when multiplied by the dead load.

6. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

7. All footing setbacks from slopes should comply with Figure 1808.7.1 of the 2016 CBC. GSI recommends a minimum horizontal setback distance of 7 feet as measured from the bottom, outboard edge of the footing to the slope face, if applicable.

8. Footings for structures adjacent to CMU retaining walls should be deepened so as to extend below a 1:1 projection up from the heel of the retaining wall. Alternatively, the retaining wall may be designed for the applicable surcharge. Setbacks from mechanically stabilized earth (MSE) walls should be measured from the heel of the reinforced zone, and may necessitate a deepened footing in some cases. Please see additional discussions herein, regarding setbacks, settlements and deepened foundations for foundations adjacent to MSE walls.

Seismic Design

General

It is important to keep in perspective that in the event of an upper bound (maximum probable) or credible earthquake occurring on any of the nearby major faults, strong ground shaking would occur in the subject site's general area. Potential damage to any structure(s) would likely be greatest from the vibrations and impelling force caused by the inertia of a structure's mass than from those induced by the hazards listed above. This potential would be no greater than that for other existing structures and improvements in the immediate vicinity.

Seismic Shaking Parameters

Based on the site conditions, the following table summarizes the updated site-specific design criteria obtained from the 2016 CBC (CBSC, 2016a), Chapter 16 Structural Design, Section 1613, Earthquake Loads. The computer program "U.S. Seismic Design Maps, provided by the United States Geologic Survey (USGS, 2017) was utilized for design.

Please note that the following table indicates that two (2) site classes may exist onsite at the completion of grading. Site class "C" would be applicable in areas where the as-built thickness of fill is less than 10 feet, as measured from the bottom of the footing to the removal/overexcavation bottom, while site class "D" will be applicable in areas where the as-built thickness of fill is greater than 10 feet from bottom of footing to base of fill. Based on a review of Excel (2017), "B" sites would be considered as building pads located closer to the northern property line, while "D" sites would be considered as building pads for units near the southern property line. Once as-built conditions are known, the total number of "B" vs "C" building sites would be re-evaluated.

2016 CBC SEISMIC DESIGN PARAMETERS			
PARAMETER	**VALUE (<10 feet fill)**	**VALUE (>10 feet fill)**	**2016 CBC AND/OR REFERENCE**
Risk Category	I, II, III	I, II, or III	Table 1604.5
Site Class	C	D	Section 1613.3.2/ASCE 7-10 (Chapter 20)
Spectral Response - (0.2 sec), S_s	1.018 g	1.018 g	Figure 1613.3.1(1)
Spectral Response - (1 sec), S_1	0.398 g	0.398 g	Figure 1613.3.1(2)
Site Coefficient, F_a	1.000	1.093	Table 1613.3.3(1)
Site Coefficient, F_v	1.402	1.604	Table1613.3.3(2)
Maximum Considered Earthquake Spectral Response Acceleration (0.2 sec), S_{MS}	1.018	1.113 g	Section 1613.3.3 (Eqn 16-37)
Maximum Considered Earthquake Spectral Response Acceleration (1 sec), S_{M1}	0.558	0.639 g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (0.2 sec), S_{DS}	0.679 g	0.742 g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.372 g	0.426 g	Section 1613.3.4 (Eqn 16-40)
PGA_M	0.388	0.426 g	ASCE 7-10 (Eqn 11.8.1)
Seismic Design Category	D	D	Section 1613.3.5/ASCE 7-10 (Table 11.6-1 or 11.6-2)

GENERAL DESIGN PARAMETERS	
PARAMETER	**VALUE**
Rose Canyon Fault - "B" Fault [(1)]	13.0 mi (21.0 km)[(2)]
Upper Bound Earthquake (Rose Canyon)	M_w = 7.2[(1)]
[(1)] - Cao, et al. (2003) [(2)] From Blake (2000a)	

Conformance to the criteria above for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur in the event of a large earthquake. The primary goal of seismic design is to protect life, not to eliminate all damage, since such design may be economically prohibitive. Cumulative effects of seismic events are not addressed in the 2016 CBC (CBSC, 2016a) and regular maintenance and repair following locally significant seismic events (i.e., M_w5.5) will likely be necessary, as is the case in all of southern California.

Foundation Settlement

General

Based on the current grading plan (Excel, 2017), and provided that the earthwork and foundation recommendations in this report are adhered, foundations bearing on approved engineered fill should also be minimally designed to accommodate a total static settlement of 2 inches and a differential static settlement of 1 inch over a 40-foot horizontal span (angular distortion = 1/480), and up to ½ inch of seismic differential settlement over a 40-foot horizontal span (seismic angular distortion = 1/960).

Static and seismic differential settlement should be evaluated independently of each other, are not additive, and assume that the maximum to minium as-built fill thickness across a given building pad is no greater than a ratio of about 3 to 1.

Foundation Settlement in Proximity to MSE Walls

Where buildings are in close proximity to plan mechanically stabilized earth (MSE) walls, and are potentially not pile/caisson supported, foundations should be minimally designed to accommodate a total static settlement of 3 inches, and a differential static settlement of 1½ inch over a 40-foot horizontal span (static angular distortion = 1/320), and up to ½ inch of seismic differential settlement (seismic angular distortion = 1/960).

Static and seismic differential settlement should be evaluated independently of each other, are not additive, and assume that the maximum to minium as-built fill thickness across a given building pad is no greater than a ratio of about 3 to 1.

PRELIMINARY FOUNDATION CONSTRUCTION RECOMMENDATIONS

General

The following foundation construction recommendations are presented as a minimum criteria from a soils engineering viewpoint (i.e., excluding MSE/building interactions). The following foundation construction recommendations are intended to support planned improvements underlain by at least 7 feet of non-detrimentally expansive soils (i.e., E.I.<21 and P.I. <15). Although not anticipated based on the available data, should foundations be underlain by expansive soils they will require specific design to mitigate expansive soil effects as required in Sections 1808.6.1 or 1808.6.2 of the 2016 CBC.

Conventional Foundation Systems

The following recommendations are for "conventional" concrete slab on grade foundation systems.

1. The foundation systems should be designed and constructed in accordance with guidelines presented in the 2016 CBC (CBSC, 2016a).

2. Exterior and interior footings should be founded into engineered fill at a minimum depth of 24 inches below the lowest adjacent grade (for three story structures), and a minimum width of 15 inches. Isolated, interior pad footings (confined by floor slabs) should be at least 24 inches square, and founded at least 24 inches into approved compacted fill (excluding slab thickness, underlayment, etc.). Exterior column and pad footings, should be at least 24 inches, square, and founded at a minimum depth of 24 inches into properly engineered fill. All continuous footings should be minimally reinforced with four No. 4 reinforcing bars, two placed near the top and two placed near the bottom of the footing. Isolated pad footing should be reinforced per the structural engineer.

3. All interior and exterior column footings, and perimeter wall footings, should be tied together via grade beams in at least one direction. The grade beam should be at least 12 inches square in cross section, and should be provided with a minimum of two No. 4 reinforcing bars at the top, and two No. 4 reinforcing bar at the bottom of the grade beam. The base of the reinforced grade beam should be at the same elevation as the adjoining footings.

4. A grade beam, reinforced as previously recommended and at least 12 inches square, should be provided across large (garage) entrances. The base of the reinforced grade beam should be at the same elevation as the adjoining footings.

5. Floor slabs should have a minimum thickness of 5 inches and be reinforced (at a minimum) with No. 3 rebars at 18 inches on center (each way), placed at mid-height

in the slab. Actual reinforcement should be based on structural considerations and local codes. Concrete shrinkage cracking may be reduced by addition of fiber mech into the concrete and careful control of concrete water-to-cement ratios. Slabs should have crack control joints with appropriate spacings as designed by the structural engineer. Concrete slab-on-grade floor underlayment and concrete mix design should conform to the recommendations in the "Soil Moisture Considerations" section of this report if the transmission of water or vapor through the slab is unwanted. Recommendations for vehicular pavements are provided in a later section of this report.

6. All slab reinforcement should be supported to ensure proper mid-slab height positioning during placement of the concrete. "Hooking" of reinforcement is not an acceptable method of positioning.

7. Specific slab subgrade pre-moistening is recommended for these soil conditions. Prior to the placement of underlayment sand and vapor retarder, GSI recommends that the slab subgrade materials be moisture conditioned to at least optimum moisture content to a minimum depth of 12 inches. Slab subgrade moisture content should be evaluated by the geotechnical consultant within 72 hours of the placement of the underlayment sand and vapor retarder.

8. Soils generated from footing excavations to be used onsite should be compacted to a minimum relative compaction of 95 percent of the laboratory standard (ASTM D 1557), whether the soils are to be placed inside the foundation perimeter or in the yard/right-of-way areas. This material must not alter positive drainage patterns that direct drainage away from the structural areas and toward the street.

9. Reinforced concrete mix design should conform to "Exposure Class C1" in Tables 19.3.2.1 of ACI 318, since concrete would likely be exposed to moisture.

Stiffened Shallow Foundations

For the mitigation of potential adverse differential settlements for foundations/slabs overlying any adjacent surcharge zone for an MSE wall, mat type, or post tensioned slab foundations may be used for any unit located within the surcharge zone behind any planned MSE wall.

For a typical slab-on-grade designed with interior ribs, or stiffeners, the slab should minimally be at least 5 inches thick. The ribs should be provided in both transverse and longitudinal directions. The interior rib spacing and depth should be provided by the project structural engineer. The perimeter beams, however, should be embedded at least 24 inches in consideration of the building type. The embedment depth should be measured downward from the lowest adjacent grade surface to the bottom of the beam. The actual slab thickness should be determined by the project structural engineer and be

based on the soil parameters presented herein (including anticipated differential settlements for foundations within MSE wall surcharge zones), and the anticipated loading, and use.

Structural Mat Foundations - Design and Construction

For a mat foundation located within the surcharge zone and bearing uniformly on compacted fill at 95 percent relative compaction (per ASTM D 1557), a maximum allowable vertical net bearing capacity of 1,500 psf is recommended. This value may be increased by one-third for short-term loads including wind or seismic and include a factor-of-safety of 3.0 for bearing capacity. Reinforcement should be designed in accordance with local codes and structural considerations. Mat-type slab foundations should be designed in accordance with 2016 CBC (CBSC, 2016a) criteria for the expansive soil conditions prevalent onsite. Mat-type foundations may be designed with either interior ribs or uniform thickness (Uniform Thickness Foundation [UTF]). The typical designs include either Wire Reinforcement Institute (WRI, 2017) type or post-tensioned. When using the WRI method (WRI, 2017), the effective plasticity should be P.I. = 10.

For very low expansive soil conditions, vertical moduli of subgrade reaction (K_s)of 150 pounds per cubic inch (psi/in or pci) may be used in the design of mat foundations. This value is a unit value for a 1-foot square footing and should be reduced in accordance with the following equation when used with the design of larger foundations. This is assumed that the foundation/slab is underlain with compacted fill with an average relative compaction of 95 percent (per ASTM D 1557), overlying dense bedrock.

$$K_R = K_S\left[\frac{B+1}{2B}\right]^2$$

where: K_S = unit subgrade modulus
K_R = reduced subgrade modulus
B = minimum or smallest foundation width of the mat (in feet)

Structural mat-type foundation slab thickness should be at least 5 inches, and reinforced per the structural consultant. Perimeter grade beams (if utilized) should be embedded at least 24 inches below the lowest adjacent grade into properly compacted fill. The need and arrangement of grade beams will be in accordance with the structural consultant's recommendations. Alternative uniform thickness mat slabs may be used in the design if the structural consultant can demonstrate that the alternative is equivalent to the recommended mat slab/footing. All mat-type designs should resist expansive soil conditions as explained herein.

Post-Tensioned Foundations

Post-tension (PT) foundations may be considered for foundations located within the surcharge zone behind any planned MSE wall. Please note that PT foundations will not likely perform as well when compared to a caisson and grade beam foundation. As such, the potential for adverse settlements and resultant distress would be greater.

The PT foundation designer may elect to exceed these minimal recommendations to increase slab stiffness performance. PT design may be either ribbed or mat-type. The latter is also referred to as uniform thickness foundation (UTF). The use of a UTF is an alternative to the traditional ribbed-type. The UTF offers a reduction in grade beams (i.e., that method typically uses a single perimeter grade beam), but has a thicker slab than the ribbed-type.

The information and recommendations presented in this section are not meant to supercede design by a registered structural engineer or civil engineer qualified to perform post-tensioned design. PT foundations should be designed using sound engineering practice and be in accordance with local and 2016 CBC requirements. Upon request, GSI can provide additional data/consultation regarding soil parameters as related to post-tensioned foundation design.

Perimeter Cut-Off Walls

Perimeter cut-off walls should be 12 inches deep for the anticipated very low expansive soil conditions. The cut-off walls may be integrated into the slab design or independent of the slab. The cut-off walls should be a minimum of 12 inches thick. The bottom of the perimeter cut-off wall should be designed to resist tension, using cable or reinforcement per the structural engineer.

Post-Tensioned Foundation Design

The following recommendations for design of post-tensioned slabs have been prepared in general compliance with the requirements of the recent Post Tensioning Institute's (PTI's) publication titled "Design of Post-Tensioned Slabs on Ground, Third Edition" (PTI, 2004), together with it's subsequent addendums (PTI, 2008).

Soil Support Parameters

The recommendations for soil support parameters have been provided based on the typical soil index properties for soils that are very low to high in expansion potential. The soil index properties are typically the upper bound values based on our experience and practice in the southern California area. The following table presents suggested minimum coefficients to be used in the Post-Tensioning Institute design method.

Thornthwaite Moisture Index	-20 inches/year
Correction Factor for Irrigation	20 inches/year
Depth to Constant Soil Suction	7 feet
Constant soil Suction (pf)	3.6
Moisture Velocity	0.7 inches/month
Plasticity Index (P.I.)	<15

Based on the above, the recommended soil support parameters are tabulated below:

TABLE 1 - POST-TENSION FOUNDATION DESIGN

DESIGN PARAMETER[3]	VERY LOW TO LOW EXPANSION POTENTIAL (E.I. 0-50)
e_m center lift	9.0 feet
e_m edge lift	5.2 feet
y_m center lift	0.4 inches
y_m edge lift	0.7 inch
Bearing Value [1]	1,500 psf [1]
Lateral Pressure	150 psf
Subgrade Modulus (k)	150 pci/inch
Minimum Perimeter Footing Embedment [2]	24 inches

[1] Internal bearing values within the perimeter of the post-tension slab for very low to low expansive soil conditions, may be increased to 2,000 psf for a minimum embedment of 12 inches, then by 20 percent for each additional foot of embedment to a maximum of 2,500 psf.
[2] As measured below the lowest adjacent compacted subgrade surface (not including slab underlayment layer thickness).
[3] Post-tension slab design should also be evaluated with respect to the potential differential settlements provided in this report.
Note: The use of open bottom raised planters adjacent to foundations will require more onerous foundation design parameters.

Deepened footings/edges around the slab perimeter must be used to minimize non-uniform surface moisture migration (from an outside source) beneath the slab. An edge depth of 12 inches should be considered a minimum. The bottom of the deepened footing/edge should be designed to resist tension, using cable or reinforcement per the structural engineer.

The parameters are considered minimums and may not be adequate to represent all expansive soils/drainage conditions such as adverse drainage and/or improper landscaping and maintenance. The above parameters are applicable provided the structure has positive drainage that is maintained away from the structure. In addition, no trees with significant root systems are to be planted within 15 feet of the perimeter of foundations. Therefore, it is important that information regarding drainage, site

maintenance, trees, settlements, and effects of expansive soils be passed on to future all interested/affected parties. The values tabulated above may not be appropriate to account for possible differential settlement of the slab due to other factors, such as excessive settlements. Please refer to the previous section on foundation settlements for design values. If a stiffer slab is desired, alternative Post-Tensioning Institute ([PTI] third edition) parameters may be recommended.

SLAB SUBGRADE PRE-MOISTENING

Pre-moistening of the slab subgrade soil is recommended for these soil conditions. The moisture content of the subgrade soils should be equal to or greater than optimum moisture to a depth equivalent to the exterior footing depth in the slab areas (typically 12 inches for very low to low expansive soils). Pre-moistening and/or pre-soaking should be evaluated by the soils engineer 72 hours prior to vapor retarder placement. In summary:

EXPANSION INDEX	PAD SOIL MOISTURE	CONSTRUCTION METHOD	SOIL MOISTURE RETENTION
Very Low (0-20) to Low (21-50)	Upper 12 inches of pad at or above soil optimum moisture	Wetting and/or reprocessing	Periodically wet or cover with plastic after trenching. Evaluation 72 hours prior to placement of concrete.

SOIL MOISTURE CONSIDERATIONS

GSI has evaluated the potential for vapor or water transmission through the slabs, in light of typical floor coverings and improvements, and the current California Civil Code (State of California, 2018). Generally, slab moisture emission rates range from about 2 to 27 lbs/1,000 square feet from a typical slab (Kanare, 2005), while most floor covering manufacturers recommend about 3 lbs/24 hours as an upper limit. Thus, the client will need to evaluate the following in light of a cost versus benefit analysis (tenant complaints and repairs/replacement), along with disclosure to owners.

Considering the site conditions, anticipated typical water vapor transmission rates, and floor coverings and improvements (to be chosen by the client) that can tolerate those rates without distress, the following alternatives are provided:

1. Increasing the minimum thickness of the slab.

2. Concrete slab underlayment should consist of a 15-mil vapor retarder, or equivalent, with all laps sealed per the 2016 CBC (CBSC, 2016a) and the manufacturer's

recommendation. The vapor retarder should comply with the ASTM E 1745 - Class A criteria, and be installed in accordance with ACI 302.1R-04, and ASTM D 1643.

3. The 15-mil vapor retarder (ASTM E 1745 - Class A) shall be installed per the recommendations of the manufacturer, including all penetrations (i.e., pipe, ducting, rebar, etc.).

4. The vapor retarder should be underlain with 2 inches of clean sand (SE > 30), and should be overlain by a 2-inch thick layer of clean sand (SE > 30), for a total thickness of 4 inches. The lower sand layer may be omitted if the subgrade soils have an SE > 30, and not more than 10% passes the No. 200 sieve.

5. For a 5-inch thick slab, the maximum water/cement ratio should be 0.6, alternatively a 4-inch thick slab, using concrete with a maximum water/cement ratio of 0.50 may also be considered, and using concrete with a maximum water/cement ratio of 0.5 for a 5-inch slab will further improve performance. This does not supercede the 2016 CBC (CBSC, 2016a) for corrosion or other corrosive requirements. Additional concrete mix design recommendations should be provided by the structural consultant and/or waterproofing specialist. Concrete finishing and workablity should be addressed by the structural consultant and a waterproofing specialist.

6. Where slab water/cement ratios are as indicated above, and/or admixtures used, the structural consultant should also make changes to the concrete in the grade beams and footings in-kind, so that the concrete used in the foundation and slabs are designed and/or treated for more uniform moisture protection.

7. Owner(s) should be specifically advised which areas are suitable for tile flooring, wood flooring, or other types of water/vapor-sensitive flooring and which are not suitable. In all planned floor areas, flooring shall be installed per the manufactures recommendations.

8. Additional recommendations regarding water or vapor transmission should be provided by the architect/structural engineer/slab or foundation designer and should be consistent with the specified floor coverings indicated by the architect.

Regardless of the mitigation selected, some limited moisture/moisture vapor transmission through the slab should be anticipated, and areas potentially using moisture sensitive floor coverings and/or moisture sensitive storage, should be identified Construction crews may require special training for installation of certain product(s), as well as concrete finishing techniques. The use of specialized product(s) should be approved by the slab designer and water-proofing consultant. A technical representative of the flooring contractor should review the slab and moisture retarder plans and provide comment prior to the construction of the foundations or improvements.

WALL DESIGN PARAMETERS

Mechanically Stabilized Earth (MSE) Walls

Based on our review, it is our understanding that proposed development includes the construction of several Mechanically Stabilized Earth, or MSE retaining walls, on the order of approximately 12 to 14 feet in height. Graded slopes, ranging on the order of 3 to 32 feet in height, and at gradients of 2:1 (h:v) or flatter, are planned above the wall(s).

The MSE retaining wall design parameters, provided herein, assume that either non-expansive soils (typically Class 2 permeable filter material or Class 3 aggregate base) or select soil import materials (up to and including an E.I. of < 20, a P.I. ≤15, and <20 percent passing the No. 200 sieve, and 100 percent 3-inch minus material), or suitable native soils meeting select criteria, are used to backfill any MSE retaining walls within the "reinforced zone." Based on the available data (Geocon, 2005) and our site observations, suitable, non-detrimentally expansive, granular soils occur onsite and may be suitable for use in wall construction, provided laboratory testing indicates acceptable expansion and plasticity indices, grain size, and strength characteristics (as evaluated by the geotechnical engineer and wall designer). Owing to the need for such testing, there is inherently some associated delay in construction and job progress. This should be considered during planning and design. The type of backfill, should be specified by the wall designer, and clearly shown on the plans.

Onsite Soil Suitability

Onsite earth materials primarily consist of localized undocumented fill, topsoil, colluvium, and granitic bedrock. These materials appear to predominantly consist of silty sands, and sands, with variable amounts of rock fragments and are generally considered non-detrimentally expansive (i.e., expansion index [E.I.] less than 20 and a plasticity index [P.I.] less than 15). Based on a review of laboratory testing completed on selected samples of topsoil, colluvium, and bedrock, granular soils generated from planned excavations into any of these material may generate potentially suitable materials. However, due to the variability of earth materials throughout the site, the related soil parameters should be anticipated as non-uniform. Wall backfill derived from surficial soil deposits (topsoil, colluvium, etc.) will have a greater potential for increased fines and lower strengths, locally, and the selected materials should be adequately evaluated for suitability prior to use. Soils generated from excavation into granitic bedrock will generate variable amounts of rock fragments, with the overall percentage and average size of the fragments increasing with the depth of excavation. Suitable soils (generated from onsite bedrock) for use in wall construction should consist of 3 inch minus material, with enough granular fines to fill any voids. Select grading to stockpile suitable, granular soils generated during grading of the site may be performed, and is recommended.

Guidelines for MSE Retaining Wall Design/Construction

General

MSE retaining walls are, by nature, a flexible system and, as such, not suited for every slope support condition. This will need to be considered and ultimately determined by the project design civil engineer and client.

The following recommendations are specific to MSE retaining wall design and construction. These recommendations have been provided in an effort to achieve the most desirable and efficient means of construction. Some of these do not deal specifically with geotechnical aspects, but do have significant effects on the quality of the end product. As project geotechnical consultants, we feel that strong consideration should be given to these recommendations. If more onerous project specifications are required by the manufacturer or governing agency, then those guidelines should be followed.

Compared to conventional retaining walls, MSE retaining walls require significantly more geotechnical observation and testing. The costs for these services depend on wall size, conscientiousness of the contractor, the number of backfill sources, and other factors. GSI should evaluate the geotechnical aspects of the wall layouts (offsets, cross-section, alignments) prior to construction. This approval by the geotechnical consultant should be sought (in writing) prior to 100 percent submittal by the wall designer.

Design

As part of MSEW (Mechanically Stabilized Earth Wall design, MSE retaining wall design may be generally subdivided into three components: 1.) Foundation Zone, 2.) Retained Zone, and 3.) Reinforced Zone (i.e., the zone containing the grid reinforcement layers).

1. On a preliminary basis, a cohesion of c=0, a phi angle of 30 degrees, and a unit weight of 131 pcf, may be used in the design of the “foundation” zone.

2. On a preliminary basis, a cohesion of c=0, a phi angle of 30 degrees, and a unit weight of 131 pcf, may be used in the design of the “retained” zone.

3. On a preliminary basis, a cohesion of c=0, a phi angle of 30 degrees, and a unit weight of 131 pcf, may be used in the design of the “reinforced” zone.

4. A site acceleration (PGAm) of 0.426g (site class “D”) was evaluated using USGS (2018) methodology and may be used for the evaluation of seismic stability.

5. The recommended equivalent fluid pressure for design of the MSE retaining walls should be 45 pcf for level backfill and 58 pcf for 2:1 backfill, assuming the use of granular backfill material (E.I. $\leq$20, P.I. $\leq$ 15, $\geq$30 degrees, c = 0 psf, and

≤20 percent passing the No. 200 sieve). These equivalent fluid pressures are based solely on static soil conditions and do not include seismic loading, expansive soil pressures, earthwork surcharge, or traffic loading which will need to be included, as necessary.

6. An evaluation of global stability (i.e., static and seismic) is typically not performed by the wall designer. Once preliminary plans/calculations are completed, the geotechnical consultant should review global stability with respect to a factor of safety of 1.5 (static) and 1.1 (seismic).

Foundation Construction

1. Prior to excavation for the wall base, the alignment and grade for the wall should be established in the field by the project civil engineer or project surveyor.

2. The contractor should have a qualified grade checker onsite to continually verify the gradient (or batter) and alignment of the base excavation and wall during construction.

3. Defective segments or wall units should not be utilized.

4. The project surveyor should spot-check wall gradient (face-of-wall slope) and alignment and using this data, the civil design/wall designer should evaluate if the wall installation is per plan.

5. When locating the base of the wall, structural setbacks established by the governing agency, and/or geotechnical engineer should be followed.

6. Walls should be founded on engineered fill approved by this office, or dense, suitable bedrock. GSI recommends that the MSE wall footings be embedded at least 1 foot into suitable bearing material for adequate lateral support.

7. Prior to placement of the MSE wall units, the excavation for the wall base should be observed by representatives of this firm, and should be a minimum of 12 inches into approved engineered fill or bedrock. However, deeper excavation may be necessary due to the depth of removals , and or setbacks from the face of adjacent, descending slopes.

8. A crushed stone leveling pad may be used to provide a uniform surface for the wall base.

9. If it is necessary to locally deepen the wall base to obtain suitable bearing materials, the contractor should consult the project design engineer to determine if the wall location or design of the wall is affected.

10. MSE retaining wall height at the terminal ends of the wall should not exceed 4 feet, unless lateral support is provided.

Backfill

1. Fill placed within the geotextile reinforcement zone, and in front of the MSE retaining walls, should be compacted to a minimum of 95 percent relative compaction unless otherwise specified by the manufacturer. Any backfill other than the "unit core fill (¾ inch crushed rock or stone)" should be placed in controlled lifts not to exceed 6 inches in thickness, and moisture-conditioned as necessary to achieve at least optimum moisture content. Backfill within and immediately behind the walls should also be as indicated on the (precise and rough) grading plans.

2. Backfill materials should be free draining, and free from organic materials, with an E.I. less than 20, a Plasticity Index less than 15, and a maximum of 20 percent fines passing the No. 200 sieve. Lifts should be placed horizontally and compaction equipment should not be allowed to damage the geotextile reinforcement, where utilized.

3. If gravel or other select granular material is used as backfill within or behind the MSE retaining wall, it should be capped with a minimum 18 inches compacted fill composed of relatively impervious material. A layer of filter fabric (Mirafi 140N or approved equivalent) should separate the gravel from the soil cap.

4. During construction, the unfilled section of wall should not be stacked more than 2 feet above the fill behind the wall. If gravel is used to fill the wall, the wall may be stacked 3 feet above adjacent grades. The maximum gravel size should be less than ¾ inch. If this option is selected, additional review with respect to drainage and potential for backfill scouring and/or piping at the face of the wall should be performed. Gravel (if used) should be separated from any adjacent soil with filter fabric (Mirafi 140N or approved equivalent).

5. Adequate space should be provided both behind and in front of the wall so that sufficient compaction can be obtained for all backfill. The slope of the MSE retaining walls and benching (in cross-section and alignment) should be in accordance with the manufacturer's recommendations and as approved by the geotechnical consultant.

Wall Back Drains

A drainage system should be installed for all MSE retaining walls in excess of 3 feet in overall height. The design of the system will depend on specific conditions. For most cases, a Schedule 40 perforated drain pipe (Schedule 40 or approved equivalent), encased in clean crushed ½- to ¾-inch gravel, and wrapped in Mirafi 140N filter fabric (or

approved equivalent) is adequate. The drain should be placed at the heel of the wall, i.e., inside, rear edge of the reinforced zone. In areas where bedrock and/or perched water are exposed in the backcut of the geotextile reinforced zone, a secondary backdrain system, of similar construction, should be placed at the toe of the backcut and along zones of perched water seepage. If necessary, outlets may pass below the base of the wall at a minimum 2 percent gradient. Outlets should be tight-lined via a solid drain pipe (Schedule 40 or approved equivalent) that drain toward an approved outlet area in accordance with the design civil engineer's recommendations. A concrete cut-off wall should be constructed at the connection between solid and perforated drain pipes to force seepage water into the solid pipe. The cut-off wall should surround the pipe connection and extend at least 12 inches beyond the outer edge of the pipe (in all directions [360 degrees]). The trenches for the solid drain pipe should be backfilled with either compacted fill material or gravel. If gravel is used, it should be separated from the surrounding soils with Mirafi 140N filter fabric and should be capped with at least 12 inches of compacted fill material. Seepage should be anticipated below all MSE retaining walls, and this should be disclosed to all interested/affected parties.

Materials and Wall Construction

Only sound MSE retaining wall units/members and components that meet all required specifications should be used for construction of the walls. Wall units/members should be free of honeycombing, cracks, broken lugs, or slumped bearing surfaces. All geotextile reinforcement should comply with the required technical specifications. Geotextile reinforcement should be placed horizontally to the required length/width behind. The strong axis of the geotextile reinforcement should be placed perpendicular to the wall alignment if uniaxial geogrid is used.

Structural Setbacks from Proposed MSE Retaining Walls

Slope and structural setbacks from the heel of walls and/or geogrid will be necessary, owing to potential deflection/movement. The necessary setbacks should be defined by the various project consultants and approved by the governing agencies prior to final design. At a minimum, the building setback should be up at a 1:1 (h:v) projection from the heel of the MSE wall reinforced (grid) zone, and should be shown on the precise grading plans by the design civil engineer. Building setback mitigation may be accomplished by deepening any adjoining foundations through this zone of 1:1 projection, provided this does not disturb any geogrid. Appurtenant structures, including pools, utilities, and landscaping, should not disrupt the geogrid behind the walls. All structures proposed within the setback zone will be subject to both horizontal and vertical deflections and potential distressed. All construction proposed within the setback area should be reviewed by the design civil engineer and geotechnical consultant. This review should be provided in writing to the Client prior to installation in the field. Homeowners and all interested parties should be notified of the setback zones.

Other Considerations

- Surcharge loads (slopes, traffic, etc.) should be applied by the design engineer as necessary.

- GSI recommends that geotextile reinforcement is not placed beneath appurtenant structures or improvements that require significant excavation that could damage the geotextile reinforcement. Appurtenant structures, should not disrupt the geotextile reinforcement behind the walls. Relatively deep underground utilities (i.e., greater than 2 to 3 feet in depth) should be located above a 1½:1 (h:v) projection down and away from the rear of the uppermost layer of geotextile reinforcement such that any future trenching for repairs would not damage the geotextile reinforcement. All structures proposed within the setback zones will be subject to both horizontal and vertical deflections and potential distress. All construction proposed within the setback area should be reviewed by the design civil engineer and geotechnical consultant. This review should be provided in writing to the Client, prior to installation in the field.

- The alternative use of paver stone flatwork should be considered where Portland Cement Concrete (PCC) concrete hardscape (walkways, patios, etc.) are planned above a 1:1 (h:v) projection up from the heel of MSE retaining walls reinforced zone. Paver stone flatwork is more capable of tolerating the ground deformations related to MSE retaining walls. Structures/improvements that are settlement sensitive should not be placed in the setback zone.

- Wall drainage should be reviewed by this office as plans become available. The gravel pad provided for the support of the base course should be adequately drained.

- As with any settlement-sensitive structure, setbacks from adjacent descending slopes should be included in the wall design. A setback (lateral distance) equivalent to H/3 (where H is the height of the slope) should be provided for top of slope improvements. The setback should minimally be 7 feet and need not be greater than 40 feet. A setback (lateral distance) equivalent to H/2 (where H is the height of the slope) should be provided from the outside bottom edge of the wall for toe of slope improvements. The setback need not be more than 15 feet for these conditions.

- Periodic testing of earth materials will be recommended in order to evaluate that soils with the minimum strength parameters are provided during construction of the walls.

Review of MSE Retaining Wall Plans and Structural Calculations

Proposed wall configurations should be reviewed for global stability. MSE retaining walls must meet City, County, local code, and slope stability factors-of-safety of 1.5 and 1.1 for static and seismic conditions, respectively. Criteria for residential use (limitations of land use) within geotextile reinforced backfill areas should be provided by the wall designer and reviewed by both the Client and the project geotechnical, and civil consultants. These limitations should be disclosed to all interested/affected parties.

Additional Testing

The parameters provided are preliminary, based on the available data, as exact wall locations, design, and the nature of earth materials used in wall construction are determined, additional testing during earthwork is recommended in order to evaluate and/or modify the preliminary design values provided.

Conventional Retaining Walls

The design parameters provided below assume that either very low expansive soils (typically Class 2 permeable filter material or Class 3 aggregate base) or native onsite materials with an expansion index up to 20 are used to backfill any retaining wall. The type of backfill (i.e., select or native), should be specified by the wall designer, and clearly shown on the plans. Building walls, below grade, should be water-proofed. Waterproofing may also be provided for site retaining walls in order to reduce the potential for efflorescence staining. Recommendations for specialty walls, or mechanically stabilized earth (MSE) walls (i.e., crib, earthstone, geogrid, etc.) can be provided on request.

Preliminary Retaining Wall Foundation Design

Preliminary foundation design for retaining walls should incorporate the following recommendations:

Minimum Footing Embedment - 18 inches below the lowest adjacent grade (excluding landscape layer [upper 6 inches]).

Minimum Footing Width - 24 inches

Allowable Bearing Pressure - An allowable bearing pressure of 3,000 pcf may be used in the preliminary design of retaining wall foundations provided that the footing maintains a minimum width of 24 inches and extends at least 18 inches into approved engineered fill overlying dense formational materials. This pressure may be increased by one-third for short-term wind and/or seismic loads. Note: for walls used in bioretention construction, the allowable bearing pressure should be reduced to 1,000 pcf.

Passive Earth Pressure - A passive earth pressure of 300 pcf with a maximum earth pressure of 3,000 psf may be used in the preliminary design of retaining wall foundations provided the foundation is embedded into properly compacted silty to clayey sand fill. Note: for walls used in bioretention construction, the passive pressure should be reduced to 150 pcf.

Lateral Sliding Resistance - A 0.35 coefficient of friction may be utilized for a concrete to soil contact when multiplied by the dead load. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third. Note: for walls used in bioretention construction, the coefficient of friction should be reduced to 0.25 pcf.

Backfill Soil Density - Soil densities ranging between 125 pcf and 135 pcf may be used in the design of retaining wall foundations. This assumes an average engineered fill compaction of at least 90-95 percent of the laboratory standard (ASTM D 1557).

Any retaining wall footings near the perimeter of the site will likely need to be deepened into suitable formation, if lateral removals (within the foundations influence) cannot be completed to provide adequate vertical and lateral bearing support. All retaining wall footing setbacks from slopes should comply with Figure 1808.7.1 of the 2016 CBC. GSI recommends a minimum horizontal setback distance of 7 feet as measured from the bottom, outboard edge of the footing to the slope face.

Restrained Walls

Any retaining walls that will be restrained prior to placing and compacting backfill material or that have re-entrant or male corners, should be designed for an at-rest equivalent fluid pressure (EFP) of 59 pcf and 65 pcf for select and very low expansive native backfill, respectively (level backfill). The design should include any applicable surcharge loading. For areas of male or re-entrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall (2H) laterally from the corner.

Cantilevered Walls

The recommendations presented below are for cantilevered retaining walls up to 10 feet high. Design parameters for walls less than 3 feet in height may be superceded by County of San Diego regional standard design. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These do not include other superimposed loading conditions due to traffic, structures, seismic events or adverse geologic conditions. When wall configurations are finalized, the appropriate loading conditions for superimposed loads can be provided upon request.

For preliminary planning purposes, the structural consultant/wall designer should incorporate the surcharge of traffic on the back of retaining walls where vehicular traffic could occur within horizontal distance "H" from the back of the retaining wall (where "H" equals the wall height). The traffic surcharge may be taken as 100 psf/ft in the upper 5 feet of backfill for light truck and cars traffic. This does not include the surcharge of parked vehicles which should be evaluated at a higher surcharge to account for the effects of seismic loading. Equivalent fluid pressures for the design of cantilevered retaining walls are provided in the following table:

SURFACE SLOPE OF RETAINED MATERIAL (HORIZONTAL:VERTICAL)	EQUIVALENT FLUID WEIGHT P.C.F. (SELECT BACKFILL)[2]	EQUIVALENT FLUID WEIGHT P.C.F. (APPROVED NATIVE BACKFILL)[3][4]
Level[1]	38	45
2 to 1	52	58
1.5 to 1	--	65 (granite slope)

[1] Level backfill behind a retaining wall is defined as compacted earth materials, properly drained, without a slope for a distance of 2H behind the wall, where H is the height of the wall.
[2] SE $\geq$ 30, P.I. < 15, E.I. < 21, and $\leq$ 10% passing No. 200 sieve.
[3] E.I. = 0 to 30, SE $\geq$ 20, P.I. < 20, and $\leq$ 20% passing No. 200 sieve; confirmation testing required.
[4] Equivalent fluid pressures for 1.5:1 and 1:1 slopes are for cut slopes exposing competent granitic bedrock.

Pier and Grade Beam Foundations

For walls supported on pier and grade beam foundations. The grade beam should be at a minimum of 12 inches by 12 inches in cross section (reinforced per the structural engineer), supported by drilled caissons, 12 inches minimum in diameter, and with a minimum embedment length of 7 feet below the bottom of the grade beam. The strength of the concrete and grout should be evaluated by the structural engineer of record. The proper ASTM tests for the concrete and mortar should be provided along with the slump quantities. The concrete used should be appropriate to mitigate sulfate corrosion, as warranted. The design of the grade beam and caissons should be in accordance with the recommendations of the project structural engineer, and include the utilization of the following geotechnical parameters:

Creep Zone: (Where applicable) 5-foot vertical zone below the slope face and projected upward parallel to the slope face.

Creep Load: (Where applicable) The creep load projected on the area of the grade beam should be taken as an equivalent fluid approach, having a density of 60 pcf. For the caisson, it should be taken as a uniform 900 pounds per linear foot of caisson's depth, located above the creep zone.

Point of Fixity: Located a distance of 1.5 times the caisson's diameter, below surface grade, or the creep zone (where applicable).

Passive Resistance: Passive earth pressure of 300 psf (fill), or 4000 psf (bedrock) per foot of depth per foot of caisson diameter, to a maximum value of 3,000 (fill), or 4,000 psf (bedrock) may be used to determine caisson depth and spacing, provided that they meet or exceed the minimum requirements stated above. To determine the total lateral resistance, the contribution of the creep prone zone above the point of fixity, to passive resistance, should be disregarded.

Allowable Axial Capacity:

Shaft capacity: 300 psf, or 400 psf applied below the point of fixity over the surface area of the shaft in approved compacted fill or bedrock, respectively.

Tip capacity: 3,000 psf, or 4,500 psf in approved compacted fill, or bedrock, respectively. This assumes the absence of water in the drilled shafts and the bottom of the drilled shaft will be free of all loose soil or debris.

Earthquake Loads (Seismic Surcharge)

For engineered retaining walls, GSI recommends that the walls be evaluated for a seismic surcharge (in general accordance with 2016 CBC requirements). The site walls in this category should maintain an overturning Factor-of-Safety (FOS) of approximately 1.25 when the seismic surcharge (increment), is applied. For restrained walls, the seismic surcharge should be applied as a uniform surcharge load from the bottom of the footing (excluding shear keys) to the top of the backfill at the heel of the wall footing. This seismic surcharge pressure (seismic increment) may be taken as 15H where "H" for retained walls is the dimension previously noted as the height of the backfill to the bottom of the footing. The resultant force should be applied at a distance 0.6 H up from the bottom of the footing. For the evaluation of the seismic surcharge, the bearing pressure may exceed the static value by one-third, considering the transient nature of this surcharge. For cantilevered walls the pressure should be an inverted triangular distribution using 15H. Reference for the seismic surcharge is Section 1802.2 of the 2016 CBC. Please note this is for local wall stability only.

The 15H is derived from a Mononobe-Okabe solution for both restrained cantilever walls. This accounts for the increased lateral pressure due to shakedown or movement of the sand fill soil in the zone of influence from the wall or roughly a 45 - /2 plane away from the back of the wall. The 15H seismic surcharge is derived from the formula:

$P_h =$ $\bullet a_h \bullet {}_tH$

Where: P_h = Seismic increment

a_h = Probabilistic horizontal site acceleration with a percentage of "g"

$_t$ = Total unit weight (125 to 130 pcf for site soils at 90 percent relative compaction).

H = Height of the wall from the bottom of the footing or point of pile fixity.

Retaining Wall Backfill and Drainage

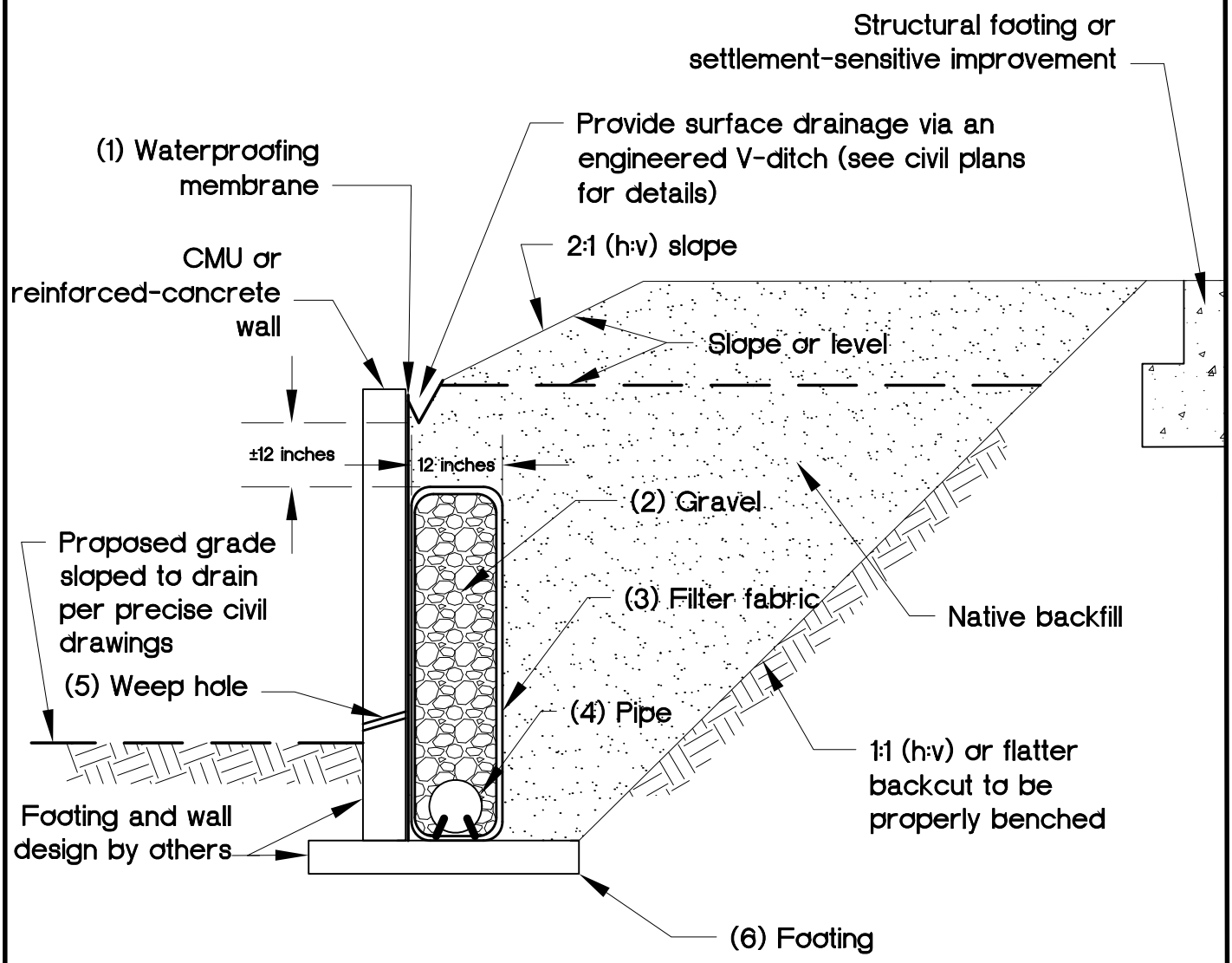
Positive drainage must be provided behind all retaining walls in the form of gravel wrapped in geofabric and outlets. A backdrain system is considered necessary for retaining walls that are 2 feet or greater in height. Details 1, 2, and 3, present the backdrainage options discussed below. Backdrains should consist of a 4-inch diameter perforated PVC or ABS pipe encased in either Class 2 permeable filter material or ¾-inch to 1½-inch gravel wrapped in approved filter fabric (Mirafi 140 or equivalent). For low expansive backfill, the filter material should extend a minimum of 1 horizontal foot behind the base of the walls and upward at least 1 foot. This material should be continuous (i.e., full height) behind the wall, and it should be constructed in accordance with the enclosed Detail 1 (Typical Retaining Wall Backfill and Drainage Detail). For limited access and confined areas, (panel) drainage behind the wall may be constructed in accordance with Detail 2

Retaining Wall Backfill and Subdrain Detail Geotextile Drain). Any materials (if encountered) with an expansion index (E.I.) potential of greater than 50 should not be used as backfill for retaining walls. For more onerous expansive situations, backfill and drainage behind the retaining wall should conform with Detail 3 (Retaining Wall And Subdrain Detail Clean Sand Backfill).

Outlets should consist of a 4-inch diameter solid PVC or ABS pipe spaced no greater than ±100 feet apart, with a minimum of two outlets, one on each end. The use of weep holes, only, in walls higher than 2 feet, is not recommended. The surface of the backfill should be sealed by pavement or the top 18 inches compacted with native soil (E.I. $\leq$ 50). Proper surface drainage should also be provided. For additional mitigation, consideration should be given to applying a water-proof membrane to the back of all retaining structures. The use of a waterstop should be considered for all concrete and masonry joints.

Wall/Retaining Wall Footing Transitions

Site walls are anticipated to be founded on footings designed in accordance with the recommendations in this report. Should wall footings transition from cut to fill, the civil designer may specify either:



(1) Waterproofing membrane.

(2) Gravel: Clean, crushed, ¾ to 1½ inch.

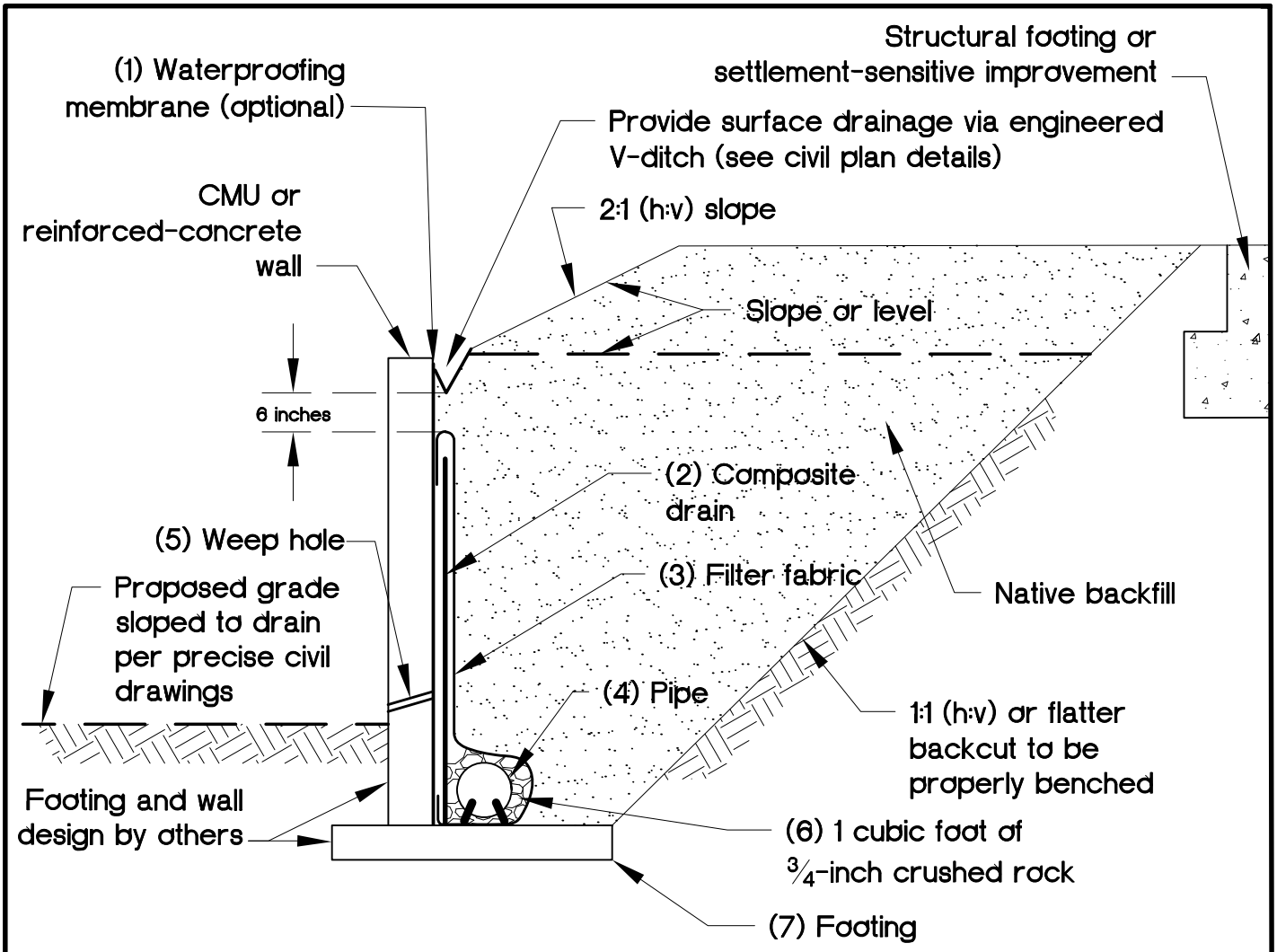
(3) Filter fabric: Mirafi 140N or approved equivalent.

(4) Pipe: 4-inch-diameter perforated PVC, Schedule 40, or approved alternative with minimum of 1 percent gradient sloped to suitable, approved outlet point (perforations down).

(5) Weep hole: Minimum 2-inch diameter placed at 20-foot centers along the wall and placed 3 inches above finished surface. Design civil engineer to provide drainage at toe of wall. No weep holes for below-grade walls.

(6) Footing: If bench is created behind the footing greater than the footing width, use level fill or cut natural earth materials. An additional "heel" drain will likely be required by geotechnical consultant.

GeoSoils, Inc.	RETAINING WALL DETAIL – ALTERNATIVE A	Detail 1



(1) Waterproofing membrane (optional): Liquid boot or approved mastic equivalent.

(2) Drain: Miradrain 6000 or J-drain 200 or equivalent for non-waterproofed walls; Miradrain 6200 or J-drain 200 or equivalent for waterproofed walls (all perforations down).

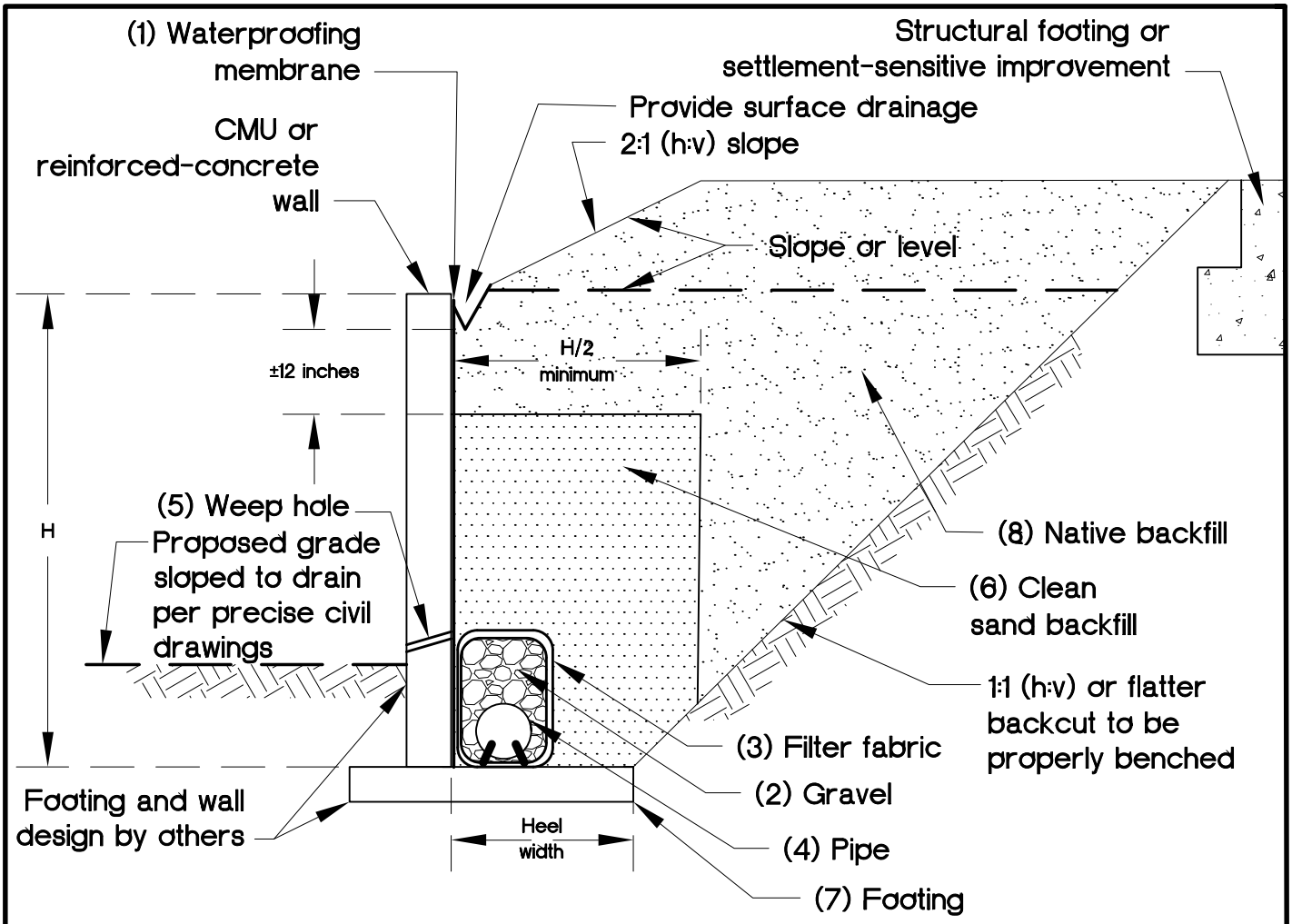
(3) Filter fabric: Mirafi 140N or approved equivalent; place fabric flap behind core.

(4) Pipe: 4-inch-diameter perforated PVC, Schedule 40, or approved alternative with minimum of 1 percent gradient to proper outlet point (perforations down).

(5) Weep hole: Minimum 2-inch diameter placed at 20-foot centers along the wall and placed 3 inches above finished surface. Design civil engineer to provide drainage at toe of wall. No weep holes for below-grade walls.

(6) Gravel: Clean, crushed, ¾ to 1½ inch.

(7) Footing: If bench is created behind the footing greater than the footing width, use level fill or cut natural earth materials. An additional "heel" drain will likely be required by geotechnical consultant.



(1) Waterproofing membrane: Liquid boot or approved masticequivalent.

(2) Gravel: Clean, crushed, ¾ to 1½ inch.

(3) Filter fabric: Mirafi 140N or approved equivalent.

(4) Pipe: 4-inch-diameter perforated PVC, Schedule 40, or approved alternative with minimum of 1 percent gradient to proper outlet point (perforations down).

(5) Weep hole: Minimum 2-inch diameter placed at 20-foot centers along the wall and placed 3 inches above finished surface. Design civil engineer to provide drainage at toe of wall. No weep holes for below-grade walls.

(6) Clean sand backfill: Must have sand equivalent value (S.E.) of 35 or greater; can be densified by water jetting upon approval by geotechnical engineer.

(7) Footing: If bench is created behind the footing greater than the footing width, use level fill or cut natural earth materials. An additional "heel" drain will likely be required by geotechnical consultant.

(8) Native backfill: If E.I. <21 and S.E. ≥35 then all sand requirements also may not be required and will be reviewed by the geotechnical consultant.

GeoSoils, Inc.	RETAINING WALL DETAIL – ALTERNATIVE C	Detail 3

a) A minimum of a 2-foot overexcavation and recompaction of cut materials for a distance of 2H, from the point of transition.

b) Increase of the amount of reinforcing steel and wall detailing (i.e., expansion joints or crack control joints) such that a angular distortion of 1/360 for a distance of 2H on either side of the transition may be accommodated. Expansion joints should be placed no greater than 20 feet on-center, in accordance with the structural engineer's/wall designer's recommendations, regardless of whether or not transition conditions exist. Expansion joints should be sealed with a flexible, non-shrink grout.

c) Embed the footings entirely into native formational material (i.e., deepened footings).

If transitions from cut to fill transect the wall footing alignment at an angle of less than 45 degrees (plan view), then the designer should follow recommendation "a" (above) and until such transition is between 45 and 90 degrees to the wall alignment.

PRELIMINARY PAVEMENT DESIGN

Based on the relatively sandy and granular nature of site soils, pavement sections will likely default to County minimums for a given traffic index/street type. Actual resistance value testing of soil subgrades should be performed at the completion of street utility construction in order to evaluate actual pavement sections.

STORM WATER TREATMENT

The as-built condition of the site will likely consist of compacted fill overlying dense, impermeable granitic bedrock, with moisture and settlement sensitive improvements located in close proximity, or adjacent to planned storm water treatment basins. Based on current criteria presented in the City BMP Design Manual, storm water treatment should be in accordance with hydrologic soil group "D" conditions, i.e., no infiltration design, using lined basins and a "flow through" treatment system. BMP plans and details should be reviewed for comment as they are developed.

DEVELOPMENT CRITERIA

Slope Deformation

Compacted fill slopes designed using customary factors of safety for gross or surficial stability and constructed in general accordance with the design specifications should be expected to undergo some differential vertical heave or settlement in combination with differential lateral movement in the out-of-slope direction, after grading. This

post-construction movement occurs in two forms: slope creep, and lateral fill extension (LFE). Slope creep is caused by alternate wetting and drying of the fill soils which results in slow downslope movement. This type of movement is expected to occur throughout the life of the slope, and is anticipated to potentially affect improvements or structures (e.g., separations and/or cracking), placed near the top-of-slope, up to a maximum distance of approximately 15 feet from the top-of-slope, depending on the slope height. This movement generally results in rotation and differential settlement of improvements located within the creep zone. LFE occurs due to deep wetting from irrigation and rainfall on slopes comprised of expansive materials. Although some movement should be expected, long-term movement from this source may be minimized, but not eliminated, by placing the fill throughout the slope region, wet of the fill's optimum moisture content.

It is generally not practical to attempt to eliminate the effects of either slope creep or LFE. Suitable mitigative measures to reduce the potential of lateral deformation typically include: setback of improvements from the slope faces (per the 2016 CBC [CBSC, 2016a), positive structural separations (i.e., joints) between improvements, and stiffening and deepening of foundations. Expansion joints in walls should be placed no greater than 20 feet on-center, and in accordance with the structural engineer's recommendations. All of these measures are recommended for design of structures and improvements. The ramifications of the above conditions, and recommendations for mitigation, should be provided to each homeowner and/or any homeowners association.

Slope Maintenance and Planting

Water has been shown to weaken the inherent strength of all earth materials. Slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Over-watering should be avoided as it adversely affects site improvements, and causes perched groundwater conditions. Graded slopes constructed utilizing onsite materials would be erosive. Eroded debris may be minimized and surficial slope stability enhanced by establishing and maintaining a suitable vegetation cover soon after construction. Compaction to the face of fill slopes would tend to minimize short-term erosion until vegetation is established. Plants selected for landscaping should be light weight, deep rooted types that require little water and are capable of surviving the prevailing climate. Jute-type matting or other fibrous covers may aid in allowing the establishment of a sparse plant cover. Utilizing plants other than those recommended above will increase the potential for perched water, staining, mold, etc., to develop. A rodent control program to prevent burrowing should be implemented. Irrigation of natural (ungraded) slope areas is generally not recommended. These recommendations regarding plant type, irrigation practices, and rodent control should be provided to each homeowner. Over-steepening of slopes should be avoided during building construction activities and landscaping.

Drainage

Adequate lot surface drainage is a very important factor in reducing the likelihood of adverse performance of foundations, hardscape, and slopes. Surface drainage should be sufficient to prevent ponding of water anywhere on a lot, and especially near structures and tops of slopes. Lot surface drainage should be carefully taken into consideration during fine grading, landscaping, and building construction. Therefore, care should be taken that future landscaping or construction activities do not create adverse drainage conditions. Positive site drainage within lots and common areas should be provided and maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond and/or seep into the ground. In general, the area within 5 feet around a structure should slope away from the structure. We recommend that unpaved lawn and landscape areas have a minimum gradient of 1 percent sloping away from structures, and whenever possible, should be above adjacent paved areas. Consideration should be given to avoiding construction of planters adjacent to structures (buildings, pools, spas, etc.). Pad drainage should be directed toward the street or other approved area(s). Although not a geotechnical requirement, roof gutters, down spouts, or other appropriate means may be utilized to control roof drainage. Down spouts, or drainage devices should outlet a minimum of 5 feet from structures or into a subsurface drainage system. Areas of seepage may develop due to irrigation or heavy rainfall, and should be anticipated. Minimizing irrigation will lessen this potential. If areas of seepage develop, recommendations for minimizing this effect could be provided upon request.

Erosion Control

Cut and fill slopes will be subject to surficial erosion during and after grading. Onsite earth materials have a moderate to high erosion potential. Consideration should be given to providing hay bales and silt fences for the temporary control of surface water, from a geotechnical viewpoint.

Landscape Maintenance

Only the amount of irrigation necessary to sustain plant life should be provided. Over-watering the landscape areas will adversely affect proposed site improvements. We would recommend that any proposed open-bottom planters adjacent to proposed structures be eliminated for a minimum distance of 10 feet. As an alternative, closed-bottom type planters could be utilized. An outlet placed in the bottom of the planter, could be installed to direct drainage away from structures or any exterior concrete flatwork. If planters are constructed adjacent to structures, the sides and bottom of the planter should be provided with a moisture barrier to prevent penetration of irrigation water into the subgrade. Provisions should be made to drain the excess irrigation water from the planters without saturating the subgrade below or adjacent to the planters. Graded slope areas should be planted with drought resistant vegetation. Consideration should be given

to the type of vegetation chosen and their potential effect upon surface improvements (i.e., some trees will have an effect on concrete flatwork with their extensive root systems). From a geotechnical standpoint leaching is not recommended for establishing landscaping. If the surface soils are processed for the purpose of adding amendments, they should be recompacted to 95 percent minimum relative compaction.

Gutters and Downspouts

As previously discussed in the drainage section, the installation of gutters and downspouts should be considered to collect roof water that may otherwise infiltrate the soils adjacent to the structures. If utilized, the downspouts should be drained into PVC collector pipes or other non-erosive devices (e.g., paved swales or ditches; below grade, solid tight-lined PVC pipes; etc.), that will carry the water away from the house, to an appropriate outlet, in accordance with the recommendations of the design civil engineer. Downspouts and gutters are not a requirement; however, from a geotechnical viewpoint, provided that positive drainage is incorporated into project design (as discussed previously).

Subsurface and Surface Water

Subsurface and surface water are not anticipated to affect site development, provided that the recommendations contained in this report are incorporated into final design and construction and that prudent surface and subsurface drainage practices are incorporated into the construction plans. Perched groundwater conditions along zones of contrasting permeabilities may not be precluded from occurring in the future due to site irrigation, poor drainage conditions, or damaged utilities, and should be anticipated. Should perched groundwater conditions develop, this office could assess the affected area(s) and provide the appropriate recommendations to mitigate the observed groundwater conditions. Groundwater conditions may change with the introduction of irrigation, rainfall, or other factors.

Site Improvements

If in the future, any additional improvements (e.g., pools, spas, etc.) are planned for the site, recommendations concerning the geological or geotechnical aspects of design and construction of said improvements could be provided upon request. Pools and/or spas should not be constructed without specific design and construction recommendations from GSI, and this construction recommendation should be provided to the homeowners, any homeowners association, and/or other interested parties. This office should be notified in advance of any fill placement, grading of the site, or trench backfilling after rough grading has been completed. This includes any grading, utility trench and retaining wall backfills, flatwork, etc.

Tile Flooring

Tile flooring can crack, reflecting cracks in the concrete slab below the tile, although small cracks in a conventional slab may not be significant. Therefore, the designer should consider additional steel reinforcement for concrete slabs-on-grade where tile will be placed. The tile installer should consider installation methods that reduce possible cracking of the tile such as slipsheets. Slipsheets or a vinyl crack isolation membrane (approved by the Tile Council of America/Ceramic Tile Institute) are recommended between tile and concrete slabs on grade.

Additional Grading

This office should be notified in advance of any fill placement, supplemental regrading of the site, or trench backfilling after rough grading has been completed. This includes completion of grading in the street, driveway approaches, driveways, parking areas, and utility trench and retaining wall backfills.

Footing Trench Excavation

All footing excavations should be observed by a representative of this firm subsequent to trenching and prior to concrete form and reinforcement placement. The purpose of the observations is to evaluate that the excavations have been made into the recommended bearing material and to the minimum widths and depths recommended for construction. If loose or compressible materials are exposed within the footing excavation, a deeper footing or removal and recompaction of the subgrade materials would be recommended at that time. Footing trench spoil and any excess soils generated from utility trench excavations should be compacted to a minimum relative compaction of 90 percent, if not removed from the site.

Trenching/Temporary Construction Backcuts

Considering the nature of the onsite earth materials, it should be anticipated that caving or sloughing could be a factor in subsurface excavations and trenching. Shoring or excavating the trench walls/backcuts at the angle of repose (typically 25 to 45 degrees [except as specifically superceded within the text of this report]), should be anticipated. All excavations should be observed by an engineering geologist or soil engineer from GSI, prior to workers entering the excavation or trench, and minimally conform to CAL-OSHA, state, and local safety codes. Should adverse conditions exist, appropriate recommendations would be offered at that time. The above recommendations should be provided to any contractors and/or subcontractors, or homeowners, etc., that may perform such work.

Utility Trench Backfill

1. All interior utility trench backfill should be brought to at least 2 percent above optimum moisture content and then compacted to obtain a minimum relative compaction of 90 percent of the laboratory standard. As an alternative for shallow (12-inch to 18-inch) under-slab trenches, sand having a sand equivalent value of 30 or greater may be utilized and jetted or flooded into place. Observation, probing and testing should be provided to evaluate the desired results.

2. Exterior trenches adjacent to, and within areas extending below a 1:1 plane projected from the outside bottom edge of the footing, and all trenches beneath hardscape features and in slopes, should be compacted to at least 90 percent of the laboratory standard. Sand backfill, unless excavated from the trench, should not be used in these backfill areas. Compaction testing and observations, along with probing, should be accomplished to evaluate the desired results.

3. All trench excavations should conform to CAL-OSHA, state, and local safety codes.

4. Utilities crossing grade beams, perimeter beams, or footings should either pass below the footing or grade beam utilizing a hardened collar or foam spacer, or pass through the footing or grade beam in accordance with the recommendations of the structural engineer.

SUMMARY OF RECOMMENDATIONS REGARDING GEOTECHNICAL OBSERVATION AND TESTING

We recommend that observation and/or testing be performed by GSI at each of the following construction stages:

- During grading/recertification.

- During excavation.

- During placement of subdrains, toe drains, or other subdrainage devices, prior to placing fill and/or backfill.

- After excavation of building footings, retaining wall footings, and free standing walls footings, prior to the placement of reinforcing steel or concrete.

- Prior to pouring any slabs or flatwork, after presoaking/presaturation of building pads and other flatwork subgrade, before the placement of concrete, reinforcing steel, capillary break (i.e., sand, pea-gravel, etc.), or vapor retarders (i.e., visqueen, etc.).

- During retaining wall subdrain installation, prior to backfill placement.

- During placement of backfill for area drain, interior plumbing, utility line trenches, and retaining wall backfill.

- During slope construction/repair.

- When any unusual soil conditions are encountered during any construction operations, subsequent to the issuance of this report.

- When any developer or homeowner improvements, such as flatwork, spas, pools, walls, etc., are constructed, prior to construction.

- A report of geotechnical observation and testing should be provided at the conclusion of each of the above stages, in order to provide concise and clear documentation of site work, and/or to comply with code requirements.

- GSI should review project sales documents to homeowners/homeowners associations for geotechnical aspects, including irrigation practices, the conditions outlined above, etc., prior to any sales. At that stage, GSI will provide homeowners maintenance guidelines which should be incorporated into such documents.

ADDITIONAL PLAN REVIEW

Final project plans (grading, precise grading, foundation, retaining wall, landscaping, etc.), should be reviewed by this office prior to construction, so that construction is in accordance with the conclusions and recommendations of this report. Based on our review, supplemental recommendations and/or further geotechnical studies may be warranted. It should be noted that structural and landscape plans were not available for review at this time.

As previously indicated, engineering and geologic analysis related to slope stability/slope construction and the current plan, consisting of both two- and three-dimensional analyses should be performed once plans are further developed. Rock fall potential was discussed in preparation of PSE (2005), with a recommendation for additional studies by a qualified consultant.

OTHER DESIGN PROFESSIONALS/CONSULTANTS

The design civil engineer, structural engineer, post-tension designer, architect, landscape architect, wall designer, etc., should review the recommendations provided herein, incorporate those recommendations into all their respective plans, and by explicit

reference, make this report part of their project plans. This report presents minimum design criteria for the design of slabs, foundations and other elements possibly applicable to the project. These criteria should not be considered as substitutes for actual designs by the structural engineer/designer. Please note that the recommendations contained herein are not intended to preclude the transmission of water or vapor through the slab or foundation. The structural engineer/foundation and/or slab designer should provide recommendations to not allow water or vapor to enter into the structure so as to cause damage to another building component, or so as to limit the installation of the type of flooring materials typically used for the particular application.

The structural engineer/designer should analyze actual soil-structure interaction and consider, as needed, bearing, expansive soil influence, and strength, stiffness and deflections in the various slab, foundation, and other elements in order to develop appropriate, design-specific details. As conditions dictate, it is possible that other influences will also have to be considered. The structural engineer/designer should consider all applicable codes and authoritative sources where needed. If analyses by the structural engineer/designer result in less critical details than are provided herein as minimums, the minimums presented herein should be adopted. It is considered likely that some, more restrictive details will be required.

If the structural engineer/designer has any questions or requires further assistance, they should not hesitate to call or otherwise transmit their requests to GSI. In order to mitigate potential distress, the foundation and/or improvement's designer should confirm to GSI and the governing agency, in writing, that the proposed foundations and/or improvements can tolerate the amount of differential settlement and/or expansion characteristics and other design criteria specified herein.

LIMITATIONS

The conclusions and recommendations presented herein are professional opinions. These opinions have been derived in accordance with current standards of practice, and no warranty is express or implied. Standards of practice are subject to change with time. GSI assumes no responsibility or liability for work or testing performed by others, or their inaction; or work performed when GSI is not requested to be onsite, to evaluate if our recommendations have been properly implemented. Use of this report constitutes an agreement and consent by the user to all the limitations outlined above, notwithstanding any other agreements that may be in place. In addition, this report may be subject to review by the controlling authorities. Thus, this report brings to completion our scope of services for this portion of the project.

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

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APPENDIX B

TRACKHOE TEST PIT LOGS (PSE, 2005)

Work Order 401046

July 29, 2005

DESCRIPTION OF SUBSURFACE INVESTIGATION

PSE's current subsurface investigation was performed in April of 2005. This work consisted of excavating, logging and sampling of ten (10) trackhoe test pits (Appendix B).

Trackhoe test pit depths ranged from two (2) feet to eighteen (18) feet below existing grade.

Selected representative bulk samples were obtained from the exploratory excavations and delivered to PSE's laboratory for testing and analysis.

Work Order 401046

July 29, 2005

Work Order 401046
Date Excavated 4/12/05
Excavated by SDH
Equipment 330B CAT Excavator, 3 ft. bucket

TABLE I

LOG OF TRACKHOE TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
TP-1	0.0 – 6.0		**GRANITIC BEDROCK** (Kgr): coarse crystalline, orange-gray, moist to wet, moderately hard; highly weathered to 5.0 ft.; rootlets to 5.0 ft. @ 5.0 ft. slow seepage @ 6.0 ft. refusal TOTAL DEPTH 6.0 FT. WATER @ 5.0 FT., NO CAVING
TP-2	0.0 – 2.0	SM	**ARTIFICIAL FILL UNDOCUMENTED** (Qafu): SILTY SAND, red brown, moist, moderately dense; roots throughout.
	2.0 – 6.0		**GRANITIC BEDROCK** (Kgr): coarse crystalline, orange (weathered) gray (fresh), moist, moderately hard; moderately weathered to 4.0 ft.; variable joint spacing 1.0 ft. to 2". @ 4.0 ft. Joint: N24W; 50SW @ 6.0 ft. refusal TOTAL DEPTH 6.0 FT. NO WATER, NO CAVING

TABLE I continued

LOG OF TRACKHOE TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
TP-3	0.0 – 8.5		**GRANITIC BEDROCK** (Kgr): coarse crystalline, light orange-gray, moist, moderately hard; moderately weathered; massive. @ 8.5 ft. refusal TOTAL DEPTH 8.5 FT. NO WATER, NO CAVING
TP-4	0.0 – 3.0		**GRANITIC BEDROCK** (Kgr): coarse crystalline, light orange-gray, slightly moist, hard; moderately weathered to 2.0 ft.; massive. TOTAL DEPTH 3.0 FT. NO WATER, NO CAVING
TP-5	0.0 – 2.5	SM	**ARTIFICIAL FILL UNDOCUMENTED** (Qafu): SILTY SAND, fine- to coarse-grained, red brown, moist, moderately dense; few roots.
	2.5 – 3.5		**GRANITIC BEDROCK** (Kgr): coarse crystalline, light orange-gray, slightly moist, hard. @ 3.5 ft. refusal TOTAL DEPTH 3.0 FT. NO WATER, NO CAVING

TABLE I continued

LOG OF TRACKHOE TEST PITS

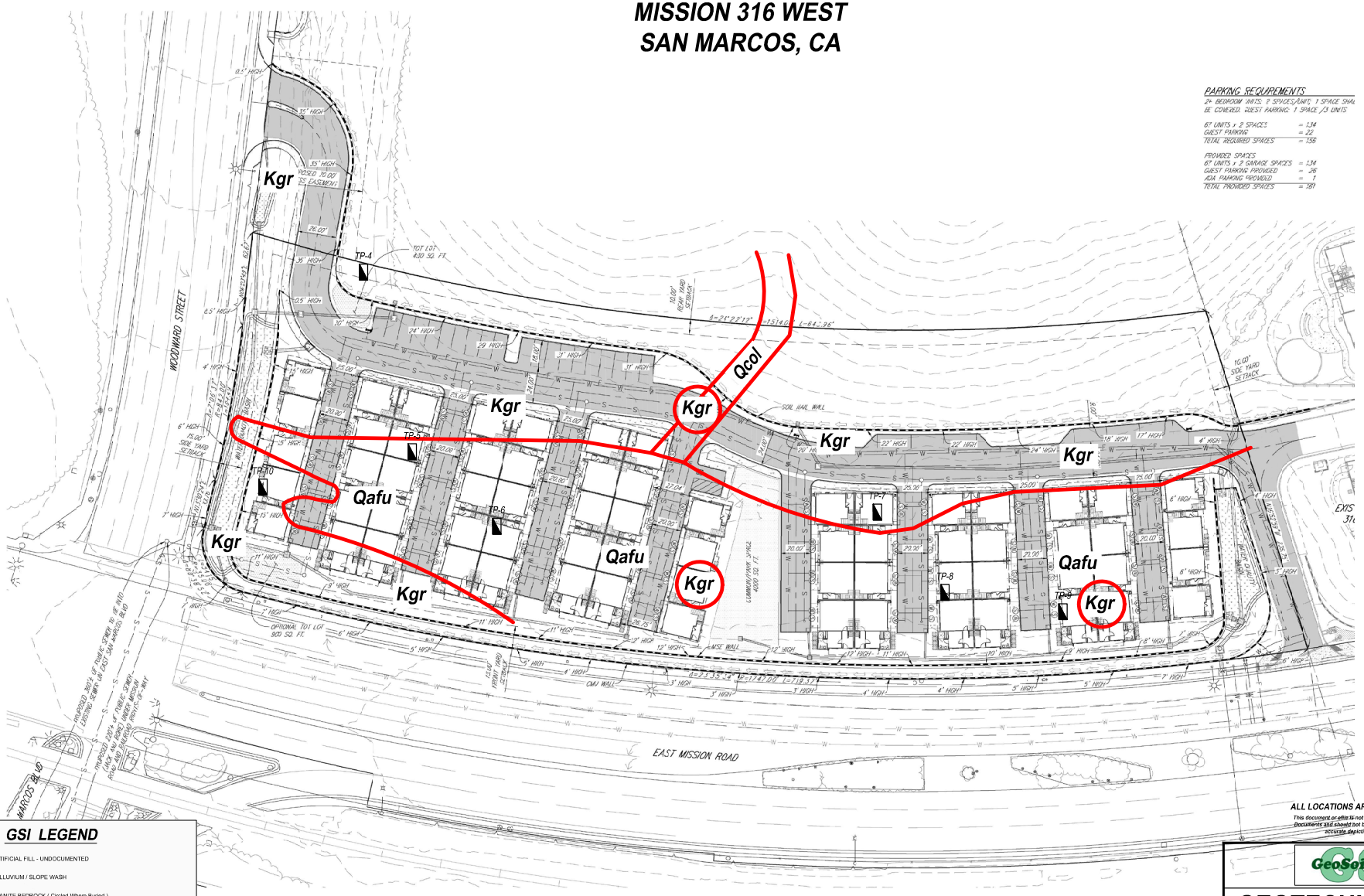
Test Pit No.	Depth (ft.)	USCS	Description
TP-6	0.0 – 7.0	SM	**ARTIFICIAL FILL UNDOCUMENTED** (Qafu): SILTY SAND, fine-grained, brown, slightly moist, loose; possible leach line; strong sewage smell. Caving throughout. TOTAL DEPTH 7.0 FT. NO WATER, CAVING AS NOTED
TP-7	0.0 – 2.0		**GRANITIC BEDROCK** (Kgr): coarse crystalline, olive gray, slightly moist, hard. @ 2.0 ft. refusal TOTAL DEPTH 2.0 FT. NO WATER, NO CAVING
TP-8	0.0 – 5.0 (variable)	SM	**ARTIFICIAL FILL UNDOCUMENTED** (Qafu): SILTY SAND, fine-grained, brown, dry, loose; few 2.0 ft. rocks throughout. Caving throughout.
	5.0 – 8.0 (variable)		**GRANITIC BEDROCK** (Kgr): coarse crystalline, light orange (weathered) olive (fresh), slightly moist, hard; top 2.0 ft. highly weathered. Joint: N32E; 64NW Random 2.0 ft. spacing or greater. @ 3.0 ft. to 8.0 ft. refusal TOTAL DEPTH 8.0 FT. NO WATER, CAVING AS NOTED

TABLE I continued

LOG OF TRACKHOE TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
TP-9	0.0 – 8.0	SM	**ARTIFICIAL FILL UNDOCUMENTED** (Qafu): SILTY SAND, fine-grained, red brown, dry to slightly moist, loose; rocks to 4.0 ft. diameter; debris and roots throughout. Caving throughout.
	8.0 – 10.0	SC	**TOPSOIL** (No Map Symbol): CLAYEY SAND, fine-grained, red, slightly moist; rootlets throughout.
	10.0 – 18.0		**GRANITIC BEDROCK** (Kgr): coarse crystalline, olive-light orange, moist to wet, moderately hard to hard; highly weathered. @ 17.0 ft. seepage @ 18.0 ft. refusal TOTAL DEPTH 18.0 FT. WATER AS NOTED, CAVING AS NOTED
TP-10	0.0 – 12.0		**GRANITIC BEDROCK** (Kgr): fine to coarse crystalline, olive gray to light orange, moist, moderately hard; highly weathered; 1" to 2" joint spacing; minor CLAY infill (joints). @ 4.0 ft. dominate joint set N70E;78NW @ 12.0 ft. refusal TOTAL DEPTH 12.0 FT. NO WATER, NO CAVING

SITE PLAN FOR
MISSION 316 WEST
SAN MARCOS, CA



GSI LEGEND

- Qafu – ARTIFICIAL FILL - UNDOCUMENTED
- Qcol – COLLUVIUM / SLOPE WASH
- Kgr – GRANITE BEDROCK (Circled Where Buried)
- ~ – APPROXIMATE LOCATION OF GEOLOGIC CONTACT
- TP-6 – APPROXIMATE LOCATION OF EXPLORATORY TEST PIT (PACIFIC SOILS, 2005)

ALL LOCATIONS ARE APPROXIMATE

This document or effigy is not a part of the Construction Documents and should not be relied upon as being an accurate depiction of design.

GeoSoils, Inc.

GEOTECHNICAL MAP
MISSION 316 WEST

Plate 1

W.O. 6878-A-SC	DATE: 5/18	SCALE: 1" = 30'

Appendix K

Fire Protection Plan

MISSION 316 WEST
FIRE PROTECTION PLAN

Prepared for:

San Marcos Fire Department
1 Civic Center Drive, Suite 100
San Marcos, California 92069

Applicant:

KB Home Coastal
9915 Mira Mesa Blvd., Suite 100
San Diego, California 92131
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MAY 2019

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Executive Summary

The proposed Mission 316 West Project includes 67 two-and-three-bedroom multi-family, residential airspace condominium units located within the City of San Marcos, California. The proposed development will be situated on one parcel covering 3.704 acres. An additional 0.64 acres would have fuel modification performed to reduce wildlife hazards, which would result in an approximately 4.34-acres project footprint. There is an easement adjustment of approximately 233 feet for the northwestern corner of the parcel to the north (APN 220-210-49) that will allow for travel to Woodward Street. The main entrance to the project site will be located at the southwestern corner of the property and intersects with East Mission Road. There is an additional entrance / exit to the project site, which is proposed to be located within the northwest portion of the project site and intersects with Woodward Street. The Project complies with Fire Code standards for private road widths and dead-end streets. The proposed development will include:

- A total of 67 two- and-three- bedroom multi-family, residential units (three-story condominiums). All structures to be built to enhanced ignition-resistant construction standards
- Driveways (streets), fire hydrants, and associated infrastructure
- All driveway turning radii designed to accommodate a Pierce 100-foot MDL Tiller and Body Assembly quintuple combination pumper (aerial ladder truck)
- Primary and secondary ingress/egress off of East Mission Road and Woodward Street
- Project will provide 100 feet of Zone A fuel modification with additional fire protection measures, including dual-tempered pane window upgrade for facades facing the natural open space; the parcel above the project site is planned for future development.
- The project would also hire a qualified San Marcos Fire Department-approved 3rd party fuel modification zone inspector to provide annual inspections.

The Mission 316 West property lies within an area considered a Non-Fire Hazard Severity Zone, as designated by the San Marcos Fire Department (SMFD) and California Department of Forestry and Fire Protection (CAL FIRE). Fire hazard designations are based on topography, vegetation, and weather, amongst other factors. In summary, the project is located in the North and Eastern portion of the City of San Marcos, adjacent to open space areas to the north and west, is currently undeveloped and vacant, and is covered primarily by Diegan coastal sage scrub cover. The terrain on, and within the vicinity of the project, is characterized by moderately steep slopes, with gradients reaching up to 18%. The area, like all of San Diego County, is subject to seasonal weather conditions that can heighten the likelihood of fire ignition and spread, and, considering the site's terrain and vegetation, may result in fast moving and moderate-intensity wildfire.

The project site is within the jurisdiction of the San Marcos Fire Department (SMFD). The SMFD operates two fire stations that would respond to an incident on the site, including Station Nos. 1 and 3. Response to the project site is expected to be less than 2 minute from Station No. 1, given its location less than 1.0 mile from the site. Access within the development may require up to an additional 30 seconds, resulting in an approximately 2.5 minute response time to the entire development. Station No. 3 will respond to an incident on the project site only if necessary. Therefore, emergencies within the project site can be responded to by SMFD's first and second arriving units (average maximum initial response of no more than 8 minutes for fire apparatus and 9 minutes for ambulance, 90% of calls) in accordance with the City's emergency response

standard. In addition, automatic/mutual aid agreements are in place with all surrounding communities and have been recently improved through the implementation of a computer aided dispatch system.

The project will be constructed to the 2016 California Fire Code and Building Code (Chapter 7A), as currently adopted by the City of San Marcos. Construction shall include enhanced ignition resistant features, including two sheets of 5/8-inch drywall or one layer of 5/8-inch type X gypsum sheathing applied behind the exterior covering or cladding on the exterior side of the framing, from the foundation to the roof, of each building's wall facing the north towards the wildland open interface vegetated hillside, new class-A fire rated roof and associated assembly, automatic interior fire sprinkler system, appropriate fire flow and water capacity, roads, and supporting infrastructure, and fuel modification areas.

1 Introduction

This Fire Protection Plan (FPP) has been prepared for the proposed Mission 316 West Project in San Marcos, California. The purpose of the FPP is to assess the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those impacts. Additionally, the purpose of this plan is to generate and memorialize the fire safety requirements of the Fire Authority Having Jurisdiction (FAHJ), namely the San Marcos Fire Department (SMFD). Requirements are based on site-specific characteristics and incorporate input from the project's developer/applicant (KB Home Coastal), project planners, engineers, and architects, as well as SMFD.

As part of the assessment, the plan has considered the property location and its topography, surrounding combustible vegetation (fuel types), climatic conditions, fire history and the proposed land use. The plan addresses water supply, access (including secondary/emergency access where applicable), structural ignitability and ignition resistive building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management. The plan identifies fuel modification zones and recommends the types and methods of treatment that will protect this project and its essential infrastructure. The FPP recommends measures that developer/builders will take to reduce the probability of structural ignition throughout the project.

The following tasks were performed toward completion of this plan:

- Gather site specific climate, terrain, and fuel data;
- Collect site photographs;
- Process and analyze the data using the latest GIS technology;
- Predict fire behavior using scientifically based fire behavior models, comparisons with actual wildfires (e.g., 2004 Emerald and 2014 Cocos Fires) in similar terrain and fuels, and experienced judgment;
- Analyze and guide design of proposed infrastructure;
- Analyze the existing emergency response capabilities;
- Assess the risk associated with the proposed project and the project site; and
- Prepare this FPP detailing how fire risk will be mitigated through a system of fuel modification and structural ignition resistance enhancements.

Field observations were utilized to augment existing digital site data in generating the fire behavior models and formulating the recommendations presented in this FPP. Refer to Appendix A for site photographs of existing site conditions.

This FPP is consistent with the City of San Marcos Municipal Code (Chapter 17.64- Fire Code). Further, it is consistent with the California Code of Regulations Titles 14 and 24 and the 2016 California Fire Code (CFC) and Building Code (Chapter 7A), Chapter 7A of the California Building Code (CBC) focuses primarily on preventing ember penetration into homes, a leading cause of structure loss from wildfires; thus, it is an important component of the requirements of this FPP.

1.1 Project Summary

1.1.1 Location

The Mission 316 West Project is located within the north and eastern portions of the City of San Marcos, San Diego County, surrounded by a mix of land uses. More specifically, the project site is situated east of San Marcos Boulevard/Woodward Street and North Twin Oaks Valley Road, west of Falcon Place, and north of East Mission Road on the south-facing slope of a small hill (Figure 1). The Mission 316 West Project site is currently situated on a total of two parcels: Assessor Parcel Number (APN): 220-210-50 and APN: 220-210-49. One entrance/exit at the southeastern end to project site will be located along East Mission Road and one entrance/exit at the northwestern end to the project site will be located along Woodward Street. Surrounding land uses include the City of San Marcos Civic Center and commercial development to the south, which includes the public library, the Veteran's Center, and City Hall. Existing residential developments surround the project site to the north, east, and southeast. Open spaces supporting natural vegetation communities are found to the north and to the west and northwest (across Woodward Street). The project site adjoins two privately owned properties: Mission 316 East development to the east (Assessor Parcel Number's (APN's): 220-210-10, 220-210-41, and 220-210-46) and Lot 5 (APN: 220-210-49). The entirety of the Mission 316 West property lies within the local responsibility area (LRA) Non- Fire Hazard Severity Zone, as statutorily designated by the SMFD and CAL FIRE (Figure 2).

1.1.2 Project Description

The Mission 316 West Project proposes to construct a maximum of 67 two-and-three bedroom residential units (three story condominium units) on one parcel within the limits of the City of San Marcos, California (Figure 3). The residential development encompasses 3.7 acres of undeveloped and vacant land. The plan area is proposed to be increase through a boundary easement adjustment on parcel 220-210-49. The existing site is comprised mainly of Diegan Coastal Sage Scrub and a variety of disturbed habitats on a moderately steep slope. In addition to the 67 proposed residential condominium units, the project will include lots dedicated to recreation and fuel modification zones (FMZ) to be managed by the Homeowners Association (HOA). Access to the development will be by driving westbound on East Mission Road, a six lane road with landscaped median, as well as driving northbound on Woodward Street, a four lane road without a center median. Appendix A provides photographs of the site in its current, undeveloped condition.

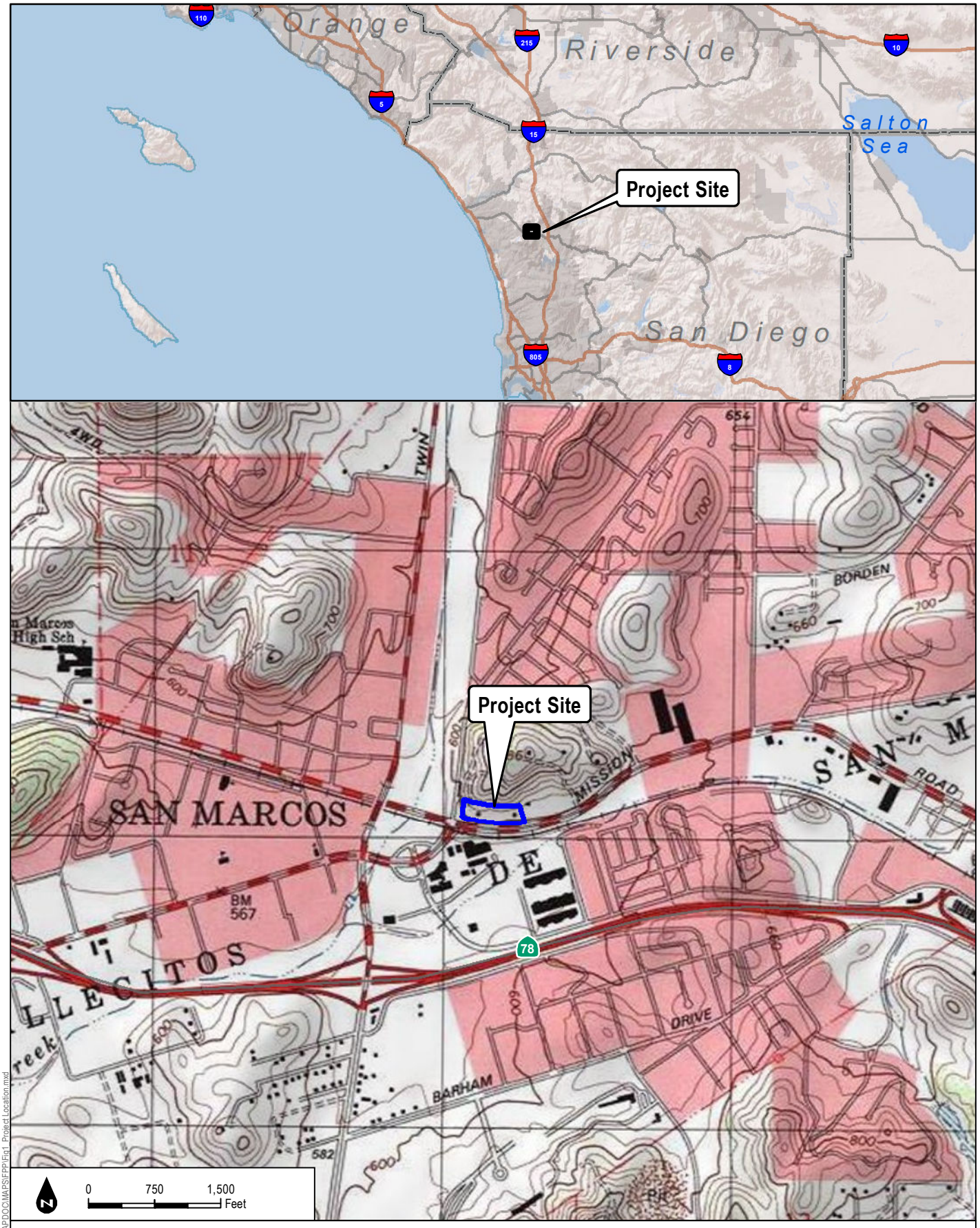
1.1.3 Current Land Use

The site is currently vacant and undeveloped, consisting of naturally vegetated slopes and disturbed land. The site has no current land use, except maybe for an occasional trespassing by pedestrian recreation. Previous land uses within the project area include a concrete pad located in the center of the site and an access driveway in the western part of the property accessed from Woodward Street.

1.1.4 Proposed Land Use

The Mission 316 West Project proposes to construct 67 two-and-three bedroom, three story condominium units on one parcel of the 3.70-acre property (an additional 0.64 acres would result in a gross/net acreage total of 4.34 acres). As indicated in Figure 3, public and private streets will provide access to the development in the southern portion of the property at a single entrance along East Mission Road, as well as in the northwestern portion of the property at a single entrance along northbound Woodward Street. In addition to the 67 dwelling units, the project will include fuel modification zones to be managed by the HOA. Access to the development includes an entrance in the southeastern corner of the project site for traffic driving westbound on East Mission Road, a six lane road (3 lanes on each side of a landscaped median), as well as another entrance for traffic driving northbound on Woodward Street, a four lane road (2 lanes going in each direction).

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SOURCE: USGS 7.5 Minute Series Topographic Maps

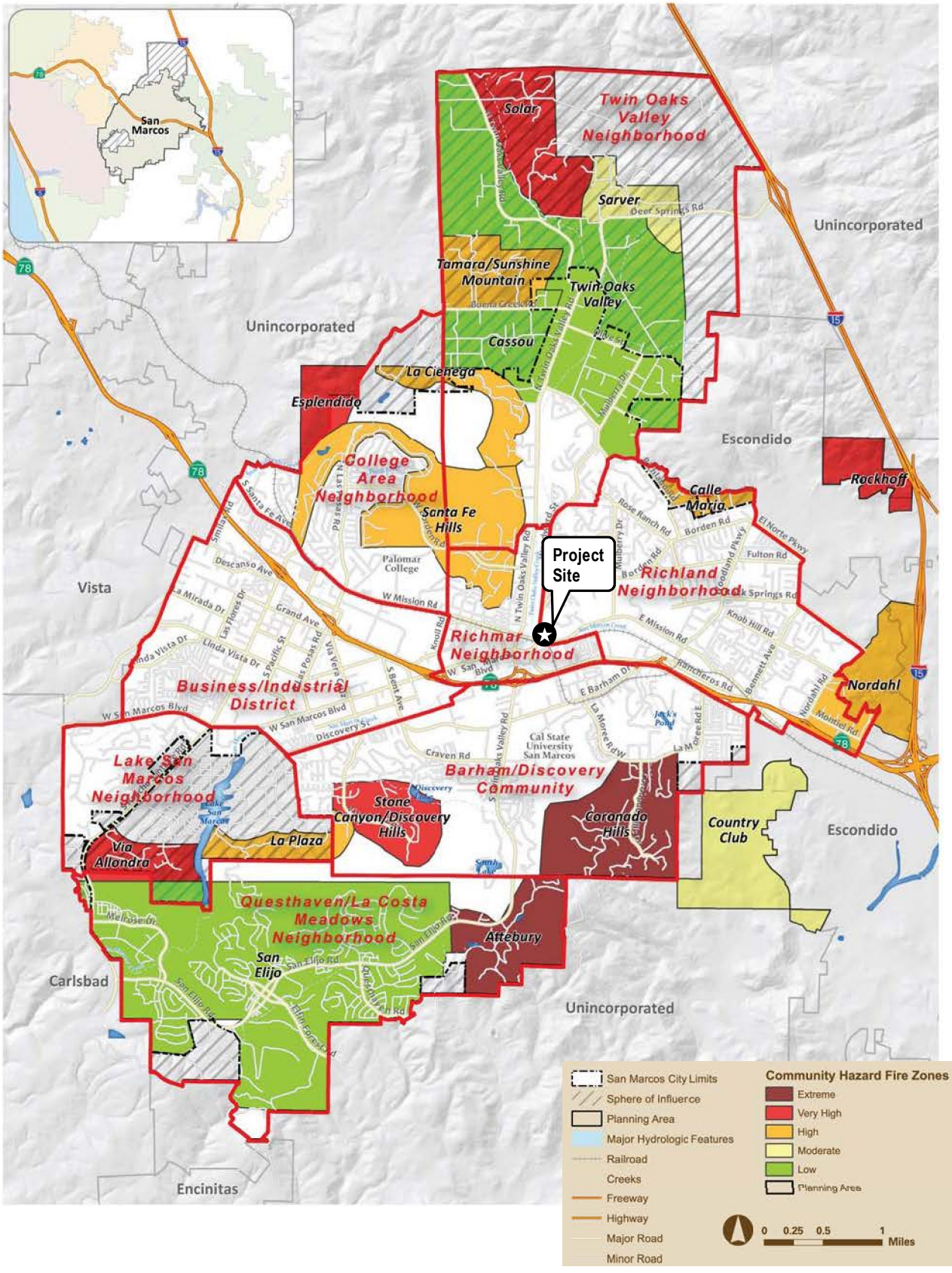
DUDEK

FIGURE 1
Project Location

MISSION 316 WEST PROJECT FIRE PROTECTION PLAN

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SOURCE: City of San Marcos

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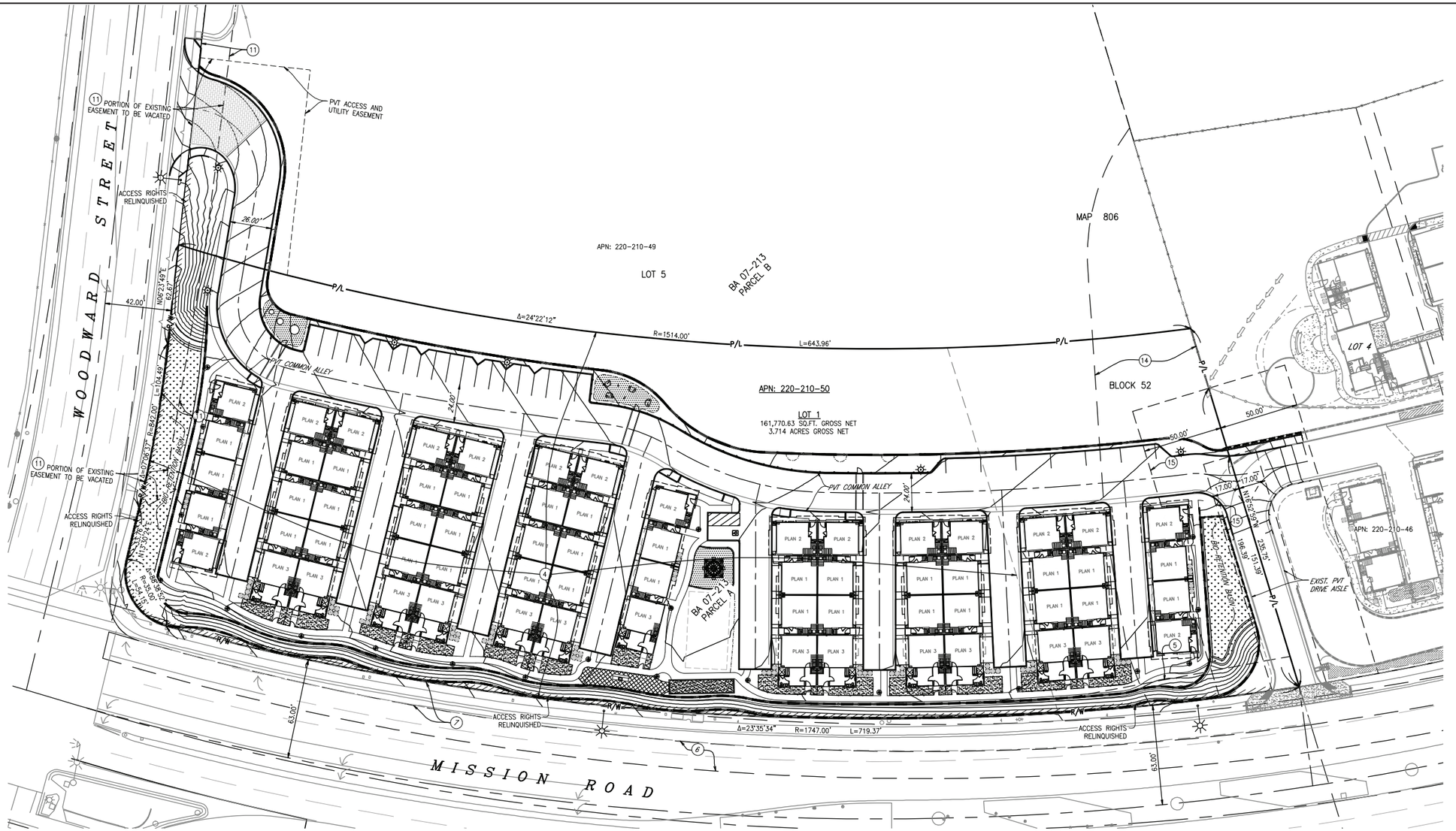
FIGURE 2

City of San Marcos Fire Hazard Severity Zones

MISSION 316 WEST PROJECT FIRE PROTECTION PLAN

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EXISTING EASEMENTS AS NOTED IN PRELIMINARY TITLE REPORT ORDER NO. OSA-5573862 (29), DATED 10/18/2017

(4) ITEM #4. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES, RECORDED OCTOBER 19, 1948 IN BOOK 2985, PAGE 237 OF OFFICIAL RECORDS.
IN FAVOR OF: SAN DIEGO GAS AND ELECTRIC COMPANY.

(5) ITEM #5. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES, RECORDED OCTOBER 20, 1948 IN BOOK 2988, PAGE 440 OF OFFICIAL RECORDS.
IN FAVOR OF: SAN DIEGO GAS AND ELECTRIC COMPANY.

(6) ITEM #6. AN EASEMENT FOR COUNTY HIGHWAY AND INCIDENTAL PURPOSES, RECORDED AUGUST 4, 1961 AS INSTRUMENT NO. 134124 AND 134128, BOTH OF OFFICIAL RECORDS.
IN FAVOR OF: THE COUNTY OF SAN DIEGO.

SURVEYOR'S NOTE: EASEMENT LIES SOUTHERLY OF PROPERTY AND DOES NOT EFFECT PROPERTY DIRECTLY.

(7) ITEM #7. AN EASEMENT FOR CONSTRUCTION, OPERATION AND MAINTENANCE OF A PUBLIC STREET OR STREETS, AND INCIDENTS THERETO, TOGETHER WITH EARTH EXCAVATIONS OR EMBANKMENTS, SLOPE OR SLOPES, DRAINAGE IMPROVEMENTS AND EASEMENTS AND INCIDENTAL PURPOSES, RECORDED MARCH 24, 1993 AS INSTRUMENT NO. 93-0179678 OF OFFICIAL RECORDS.
IN FAVOR OF: CITY OF SAN MARCOS.

SURVEYOR'S NOTE: EASEMENT LIES SOUTHERLY OF PROPERTY. THE NORTHERLY LINE OF SAID EASEMENT ESTABLISHES THE NORTHERLY LINE OF MISSION ROAD.

(11) ITEM #11. AN EASEMENT FOR DRAINAGE, SLOPE, PUBLIC STREET, UTILITY AND DRAINAGE AND INCIDENTAL PURPOSES, RECORDED MARCH 26, 2002 AS INSTRUMENT NO. 2002-0251944 OF OFFICIAL RECORDS.
IN FAVOR OF: CITY OF SAN MARCOS, A CHARTER CITY.
AFFECTS: THE LAND

SURVEYOR'S NOTE: THE PORTION OF SAID EASEMENT LYING WITHIN THE SUBDIVISION BOUNDARY WILL BE VACATED AS SHOWN ABOVE.

ITEM #13. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED GRANT OF EASEMENT RECORDED MAY 6, 2015 AS INSTRUMENT NO. 2015-0225378 OF OFFICIAL RECORDS.

THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.

(14) ITEM #14. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED GRANT OF EASEMENT RECORDED MAY 6, 2015 AS INSTRUMENT NO. 2015-0225379 OF OFFICIAL RECORDS.

(15) ITEM #15. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED RECIPROCAL STREET EASEMENT AGREEMENT RECORDED MAY 6, 2015 AS INSTRUMENT NO. 2015-0225380 OF OFFICIAL RECORDS.

LEGEND

- BOUNDARY LINE
- EXISTING RIGHT-OF-WAY LINE
- EXISTING LOT LINE
- EXISTING EASEMENT LINE
- CENTERLINE

SURVEYOR'S NOTE

ABUTTER'S RIGHTS OF ACCESS TO MISSION ROAD AND WOODWARD STREET TO BE RELINQUISHED WITH THE EXCEPTION OF THE TWO POINTS OF CONNECTION AS SHOWN HEREON.

SCALE: 1"=30'
0 30 60 90 120

SOURCE: Excel Engineering 2018

DUDEK

FIGURE 3
Proposed Site Plan

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2 Proposed Project Site Risk Analysis

2.1 Environmental Setting and Field Assessment

Dudek conducted a site evaluation on January 25, 2019, in order to confirm/acquire site information, document existing site conditions, and to determine potential actions for addressing the protection of the project's structures. While on site, Dudek's Fire Planners assessed the area's topography, natural vegetation and fuel loading, surrounding land use and general susceptibility to wildfire. Among the field tasks that were completed included:

- Topography evaluation
- Vegetation/fuel assessments
- Existing infrastructure evaluations
- Photograph documentation of the existing condition
- Off-site, adjacent property fuel and topography conditions
- Surrounding land use confirmations
- Necessary fire behavior modeling data collection
- Ingress/egress documentation
- Nearby Fire Station reconnaissance.

2.2 Site Characteristics and Fire Environment

Fire environments are dynamic systems and include many types of environmental factors and site characteristics. Fires can occur in any environment where conditions are conducive to ignition and fire movement. Areas of naturally vegetated open space are typically comprised of conditions that may be favorable to wildfire spread. The three major components of fire environment are topography, vegetation (fuels), and climate. The state of each of these components and their interactions with each other determines the potential characteristics and behavior of a fire at any given moment. It is important to note that wildland fire may transition to urban fire if structures are receptive to ignition. Structure ignition depends on a variety of factors and can be prevented through a layered system of protective features including fire resistive landscapes directly adjacent the structure(s), application of known ignition resistive materials and methods, and suitable infrastructure for firefighting purposes. Understanding the existing wildland vegetation and urban fuel conditions on and adjacent the site is necessary to understand the potential for fire within and around the Mission 316 West Project.

2.2.1 Topography

The site is located on the southern aspect of a small hill that is part of a southwest-northeast oriented ridgeline that continues beyond the project site. The entire property slopes upward from East Mission Road with gradients between 15 to 18%. An access road from Woodward Street currently exists in the southwestern boundary of the property, providing access to the vacant lot. Elevations on site range from 591 feet above mean sea level (amsl) on the southern boundary of the property along East Mission Road to just over 700 feet amsl along the northern edges of the property.

2.2.2 Climate

North San Diego County and the project area are influenced by the Pacific Ocean and are frequently under the influence of a seasonal, migratory subtropical high pressure cell known as the "Pacific High." Wet winters and dry summers with mild seasonal changes characterize the Southern California climate. This climate pattern is occasionally interrupted by extreme periods of hot weather, winter storms, or dry, easterly Santa Ana winds. The average high temperature for the project area is approximately 77°F, with daily highs in the summer and early fall months (July–October) exceeding 95°F. Precipitation typically occurs between December and March with average rainfall of 14 inches.

The prevailing wind pattern is from the west (on-shore), but the presence of the Pacific Ocean causes a diurnal wind pattern known as the land/sea breeze system. During the day, winds are from the west–southwest (sea) and at night winds are from the northeast (land), averaging 2 miles per hour (mph). During the summer season, the diurnal winds may average slightly higher (approximately 16 mph) than the winds during the winter season due to greater pressure gradient forces. Surface winds can also be influenced locally by topography and slope variations. The highest wind velocities are associated with downslope, canyon, and Santa Ana winds.

Typically the highest fire danger is produced by the high-pressure systems that occur in the Great Basin, which result in the Santa Ana winds of Southern California. Sustained wind speeds recorded during recent major fires in San Diego County exceeded 30 mph and may exceed 50 mph during extreme conditions. The Santa Ana wind conditions are a reversal of the prevailing southwesterly winds that usually occur on a region-wide basis during late summer and early fall. Santa Ana winds are warm winds that flow from the higher desert elevations in the north through the mountain passes and canyons. As they converge through the canyons, their velocities increase. Consequently, peak velocities are highest at the mouths of canyons and dissipate as they spread across valley floors. Santa Ana winds generally coincide with the regional drought period and the period of highest fire danger. The Mission 316 West Project site is affected by strong winds, such as Santa Ana winds.

2.2.3 Vegetation (Fuels)

Vegetative fuels on site are characteristic of the area and are primarily Diegan coastal sage scrub. (Rincon Consultants, Inc., 2019). Disturbed habitat and urban/developed land cover types are also present on site in small amounts. The area proposed for development and within the project grading limits will be converted to roads, structures, and landscaped vegetation following project completion. Vegetative fuels within proposed fuel modification zones consist primarily of coastal sage scrub, although these fuels will be modified as a result of development, altering their current structure and species composition. Areas outside of proposed development and fuel modification zones can be classified primarily as sage scrub, with pockets of light, flashy fuels or isolated clusters of larger chaparral shrubs. Beyond the sage-scrub chaparral areas to the northwest and south of the project site are narrow drainages with riparian habitat. The acreage of each on-site vegetation community or land cover type is provided in Table 1 and illustrated in Figure 4.

Table 1. Project Vegetation Communities and Land Cover Types

Vegetation Community or Land Cover Type	Acres
Diegan Coastal Sage Scrub	1.43
Urban/Developed	1.52
Disturbed Habitat Lands	1.07
Total	**4.02**

Source: Rincon Consultants, Inc. Biological Resources Assessment Report 2019. Refer to Rincon Consultants, Inc. Biological Resources Assessment Report for descriptions of the vegetation communities or land cover types.

2.2.4 Vegetation Dynamics (Fuel Loads)

The vegetation described above translates to fuel models used for fire behavior modeling, discussed in Chapter 4 of this FPP. Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (bark thickness, leaf size, branching patterns), and overall fuel loading. For example, the native shrub species that compose the coastal sage scrub and chaparral plant communities on site are considered to exhibit higher potential hazard (higher intensity heat and flame length) than grass dominated plant communities (fast moving, but lower intensity) if ignition occurred. The corresponding fuel models for each of these vegetation types are designed to capture these differences.

As described, vegetation plays a significant role in fire behavior, and is an important component to the fire behavior models discussed in this report. A critical factor to consider is the dynamic nature of vegetation communities. Fire presence and absence at varying cycles or regimes disrupts plant succession, setting plant communities to an earlier state where less fuel is present for a period of time as the plant community begins its succession again. In summary, high-frequency fires tend to convert shrublands to grasslands or maintain grasslands, and fire exclusion tends to convert grasslands to shrublands over time as shrubs sprout back or establish and are not disturbed by repeated fires. In general, biomass and associated fuel loading will increase over time, assuming that disturbance (e.g., fire, grazing, or farming) or fuel reduction efforts are not diligently implemented. It is possible to alter successional pathways for varying plant communities through manual alteration. This concept is a key component in the overall establishment and maintenance of the proposed FMZs for the project site. The FMZs will consist of irrigated and maintained landscapes that will be subject to regular "disturbance" in the form of maintenance and will not be allowed to accumulate excessive biomass over time, which results in reduced fire ignition, spread rates, and intensity.

2.2.5 Fire History

Fire history is an important component of a site-specific FPP. Fire History data provides valuable information regarding fire spread, fire frequency, ignition sources, and vegetation/fuel mosaics across a given landscape. One important use for this information is as a tool for pre-planning. It is advantageous to know which areas may have burned recently and therefore may provide a tactical defense position, what type of fire burned on the site, and how a fire may spread. Fire history represented in this FPP uses the Fire and Resource Assessment Program (FRAP) database. FRAP summarizes fire perimeter data dating to the late 1800s, but which is incomplete due to the fact that it only includes fires over 10 acres in size and has incomplete perimeter data, especially for the first half of the 20th century (Syphard and Keeley 2016). However, the data does provide a summary of recorded fires and can be used to show whether large fires have occurred in the Project area, which indicates whether they may be possible

in the future. According to available data from the CAL FIRE in the FRAP database[1], ten (10) fires have burned in the vicinity of the project site since the beginning of the historical fire data record. Recorded wildfires within 5 miles range from 12 acres to 40,248 (1943 Fire) acres, however, only one fire (Harmony Fire-1996) was larger than 9,359 acres and the average fire size is 635 acres (not including the 1943 Fire and Harmony Fire or fires smaller than 10 acres). The Cocos Fire (1,995 acres) is the most recent fire, which occurred approximately 1 mile south of the Project Site. SMFD may have data regarding smaller fires (less than 10 acres) that have occurred on the site that have not been included herein. No fires have burned on the project site. Table 2 summarizes the fire history for the area within 5 miles of the Mission 316 West Project site. Fire history for the general vicinity of the project site is illustrated in the map in Appendix B.

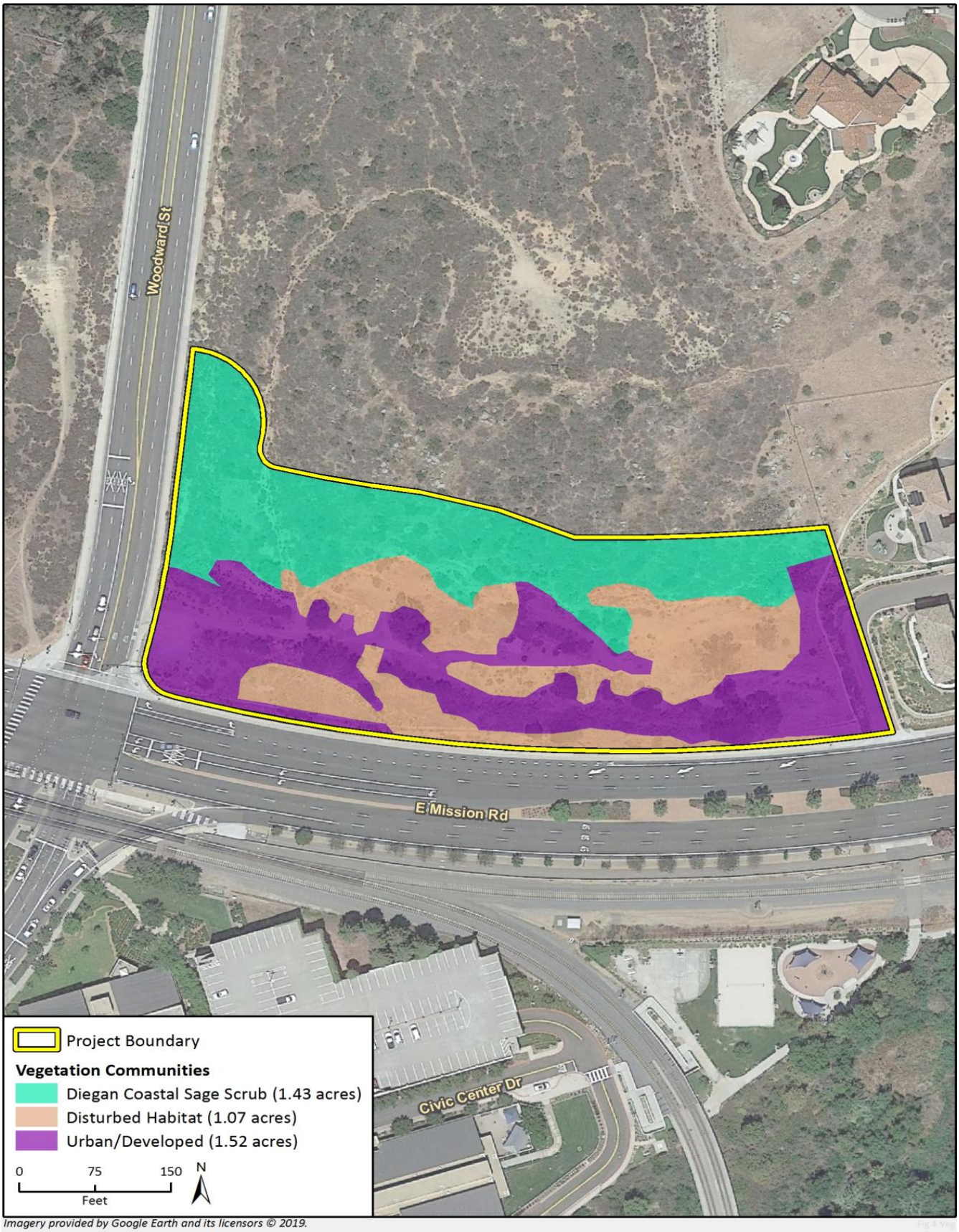
Table 2. Fire History within Five Miles of the Mission 316 West Project Site

Fire Year*	Fire Name	Interval (years)	Total Area Burned (acres)
1943	Un-named	N/A	40,248
1960	Outside Origin #29	17	746
1970	Un-named	10	1,916
1982	Local Assist #12	12	39
1988	Outside Origin #11	6	247
1994	Questhaven	6	65
1996	Harmony	2	9,359
2004	Emerald	8	12
2007	Coronado Hills	3	59
2014	Cocos	7	1,995

1 *CAL FIRE FRAP 2017

Based on an analysis of this fire history data set, specifically the years in which the fires burned, the average interval between wildfires in the area was calculated to be 7 years with intervals ranging between 2 to 17 years. Based on this analysis, it is expected that wildland areas in the vicinity of the project site will be subject to wildfire at least every 7 years with the realistic possibility of shorter interval occurrences, as observed in the fire history record. Based on fire history, wildfire risk for the project site is associated primarily with a Santa Ana wind-driven wildfire burning or spotting onto the site from the north or east, although a fire approaching from the south during more typical on-shore weather patterns is possible.

1 Based on polygon GIS data from CAL FIRE's FRAP, which includes data from CAL FIRE, USDA Forest Service Region 5, BLM, NPS, Contract Counties and other agencies. The data set is a comprehensive fire perimeter GIS layer for public and private lands throughout the state and covers fires 10 acres and greater between 1878–2017.



SOURCE: RINCON CONSULTANTS, INC. 2019

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FIGURE 4

Vegetation Land Cover Map

MISSION 316 WEST PROJECT FIRE PROTECTION PLAN

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3 Determination of Project Effects

FPPs provide an evaluation of the adverse environmental effects a proposed project may have from wildland fire. The FPP describes the project design features that would ensure that the project would not unnecessarily expose people or structures to a significant loss, injury or death involving wildland fires. Significance is determined by answering the following guidelines:

Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

According to the City's Fire Severity Zone Map, the proposed project is located in an area considered a Non-Fire Hazard Severity Zone, as designated by the SMFD and CAL FIRE. The wildland fire risk in the vicinity of the project site has been analyzed and it has been determined that wildfires may occur in wildland or naturally vegetated areas north of the project site and in areas off-site to the west and northwest of the project site, but would not be significantly increased in frequency, duration, or size with implementation of the project. The closest off-site fuels that form large fuel beds are located to the north of the site.

The site currently includes a variety of potential vegetation that could serve as fuel sources. The types of potential ignition sources that currently exist in the area include vehicle and roadway, the Sprinter ROW, and off-site residential neighborhoods. The proposed project would include the development of 67 two-and-three-bedroom residential, condominium units, on-site parking, and on-site circulation. As such, the site would be largely converted from readily ignited fuels to ignition resistant structures and landscaped areas. The proposed project would be developed to meet all existing development codes and fire codes, including landscaping and vegetation requirements as indicated in *Sec. 4907* of the City of San Marcos adopted California Fire Code. The project would include conversion of fuels to maintained urban development with designated landscaping and fuel modification areas. Fuel modification zones will be designed according to all applicable development codes and the San Marcos Fire Code, and indicated on the project site plan.

The project would introduce potential ignition sources, but would also include conversion of ignitable fuels to lower flammability landscape and include better access throughout the site, managed and maintained landscapes, more eyes and ears on the ground for early fire detection, and generally a reduction in the receptiveness of the areas landscape to ignition. Fires from off-site would not have continuous fuels across this site and would therefore be expected to burn around and/or over the site via spotting. Burning vegetation embers may land on project structures, but are not likely to result in ignition based on ember decay rates and the types of non-combustible and ignition resistant materials that will be used on site.

The project would comply with applicable ignition resistant fire and building codes, including two sheets of 5/8-inch drywall or one layer of 5/8-inch type X gypsum sheathing applied behind the exterior covering or cladding on the exterior side of the framing, from the foundation to the roof, of each building's wall facing the north towards the wildland open interface vegetated hillside, and would include a layered fire protection system inclusive of site-specific measures that will result in a project that is less susceptible to wildfire than surrounding landscapes and that would facilitate fire fighter and medical aid response.

Would the project result in inadequate emergency access?

The project would result in the development of a currently undeveloped area, including the development of site access. The project would involve the construction of new structures, roadways, and would generate new trips to

and from the project site. The project site would be accessible from public roadways and access into the site would be provided via two entrances, one westbound on East Mission Road and the second northbound on Woodward Street for vehicles and pedestrians. The project would be required to comply with the City's development review process, including review for compliance with the City's Development Code and Fire Code as well as compliance with applicable emergency access standards that would facilitate emergency vehicle access during project construction and operation. Additionally, an adequate water supply and an approved paved access roadway shall be installed prior to any combustibles on site.

The project applicant would be required to design, construct, and maintain structures, roadways, and facilities to comply with applicable local, regional, state, and federal requirements related to emergency access. Drive aisles, turning radii, and both access points would be designed with adequate emergency access. The project would be required to provide fire apparatus turnarounds on all access roadways over 150 feet in length, and provide a 28-foot inside turning radius on all corners. All access roadways would have a minimum of 24 feet in width throughout the project site, with a small amount of on-site parking for residents and guests along the main roadway through the interior of the project site. Driveways or alleys between buildings would have minimum widths of 20 feet. All access roadways would have a vertical clearance of at least 13'6" for the full 24-foot road width to allow access for fire apparatus. However, the alleys between buildings will have a vertical clearance of 13'6" for 20 feet of the width. The proposed site plan is subject to approval by the City and the City's Fire Department. Further, the project would be required to provide walking access to the rear of buildings, and ladder access for any windows facing the rear of the buildings.

The City and the SMFD will need to review proposed modifications to existing roadways to ensure that adequate emergency access or emergency response would be maintained. Additionally, emergency response procedures would be coordinated through the City in coordination with the police and fire departments. Adherence to these requirements would ensure that that the project would not result in inadequate emergency access.

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

Fire protection would be provided to the proposed project via the San Marcos Fire Department (SMFD). The SMFD provides fire protection and emergency medical services to the City of San Marcos and the San Marcos Fire Protection District (SMFPD). A staff of 83 full-time safety (including Chief Officers), 25 full-time non-safety, 18 full-time administration, 2 part-time administration, and 4 senior volunteers provides services to a population of approximately 96,000 in an area covering 33 square miles.

The project is projected to add an estimated maximum of 25 calls per year to the SMFD's existing call load. This estimate is a conservative estimate in that it uses San Diego County wide data, which incorporates call volumes from typically higher volume areas than would be expected from this site. The primary response (first in) would be provided by Station 1, located at 180 W. Mission Road San Marcos, California, approximately 0.6 miles west of the project site. The station houses one Paramedic Engine Company, one Truck Company, one Type 3 Engine, and one Paramedic Ambulance. The Project is projected to add an estimated 25 calls per year (0.07 calls per day) for a Station that currently responds to an existing call load of approximately 12 calls per day (4,365 calls per year in 2018). The addition of approximately 0.5 calls per week is considered insignificant based on that increase alone. This level of impact is not expected to require the construction of additional Fire Station facilities based on that increase alone. For perspective, urban fire stations that respond to five calls per day are considered average and 10 calls per day would be considered a busy station. Further, Station 1 can respond to the entire project within the

City's target response time standard (7.5 minutes) for first arriving. Therefore, no additional facilities would be needed for response coverage. A portion of the project's parcel tax revenue will be allocated to fire protection, which can be used to maintain current levels of protection without impacting existing citizens.

Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

The project will be served by the Vallecitos Water District and sufficient water supplies will be available to serve the project from the existing entitlements and resources, which will be consistent with SMFD requirements. The water distribution system is designed to yield a minimum residual pressure of 40 pounds per square inch (psi) during peak hour demands and a minimum residual pressure of 20 psi during maximum day demands plus fire flow. Each fire hydrant shall be capable of 1,500 gpm fire flow for minimum duration of three hours at 20 psi residual pressure.

The measures described in the responses to these significance questions are provided more detail in the following sections.

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4 Anticipated Fire Behavior

4.1 Fire Behavior Modeling

Following field data collection efforts and available data analysis, fire behavior modeling was conducted to document the type and intensity of fire that would be expected on and adjacent to the project site given characteristic site features such as topography, vegetation, and weather. Dudek utilized BehavePlus software package (Andrews, Bevins, and Seli 2004) to analyze potential fire behavior for the Mission 316 West Project site. As is customary for this type of analysis, three fire scenarios were evaluated, including one summer, onshore weather condition (west from the project site) and two extreme fall, offshore weather condition (northwest and northeast of the project site), with assumptions made for the pre- and post-project slope and fuel conditions. Results are provided below and a more detailed presentation of the modeling inputs and results is provided in Appendix C.

4.1.1 Fuel Model Output Results

The results from the BehavePlus fire behavior modeling analysis for pre- and post-project conditions are presented in Tables 3 and 4, respectively, and in Figure 5, BehavePlus Fire Behavior Analysis. As presented, wildfire behavior on the Mission 316 West Project site is expected to be primarily of moderate intensity throughout the sage scrub-chaparral dominated fuels, although two modeling runs incorporate a riparian forest area, where fire intensity is expected to be lower.

Table 3. BehavePlus Fire Behavior Modeling Results, Existing Conditions

Fire Scenario	Flame Length (feet)	Spread Rate (mph)[1]	Fireline Intensity (Btu/ft./s)	Spotting Distance[2] (Miles)
Scenario 1: 21% slope, Fall, Offshore, Extreme Winds				
Moderate load shrub/chaparral (Sh2)	8.3' (15.8')	0.24 (0.98)	558 (2,277)	0.4 (1.2)[3]
High load shrub/chaparral (Sh5)	25.3' (44.2')	1.98 (6.69)	6,355 (21,454)	0.8 (2.4)
Scenario 2: 5% slope, Summer, Onshore Winds				
Moderate load shrub/chaparral (Sh2)	2.3'	0.06	36	0.2
Riparian Vegetation (FM9)	5.3'	0.37	210	0.3
Scenario 3: 6% slope, Fall, Offshore, Extreme Winds				
Moderate load shrub/chaparral (Sh2)	8.4' (15.8')	0.25 (0.99)	575 (2,293)	0.3 (1.0)
High load shrub/chaparral (Sh5)	25.6' (44.4')	2.03 (6.74)	6,519 (21,620)	0.8 (2.3)
Riparian Vegetation (FM9)	5.9' (13.0')	0.34 (1.91)	269 (1,497)	0.2 (0.8)

Note:
1 mph = miles per hour
2 Spotting distance from a wind driven surface fire.
3 It should be noted that the wind mph in parenthesis represent peak gusts of 50 mph.

Table 4. BehavePlus Fire Behavior Modeling Results, Post-Project Conditions

Scenario	Flame Length (feet)	Spread Rate (mph[1])	Fireline Intensity (BTU/ft./second)	Spotting Distance[2] (miles)
Scenario 1: Fuel treatments on south-facing natural 21%slopes, 50 mph maximum winds				
Fuel modification zone A (FM8)	2.1 (3.0)	0.1 (0.2)	28 (62)	0.1 (0.3)[3]

Note:
1 mph = miles per hour
2 Spotting distance from a wind driven surface fire.
3 It should be noted that the wind mph in parenthesis represent peak gusts of 50 mph.

The majority of the site and adjacent areas were modeled as either a Sh2 Fuel Model or a Sh5 Fuel Model. The narrow drainages of riparian forest to the west and northwest of the Project site (Model Runs 2 and 3) were modeled as a Fuel Model 9. It should also be noted that the majority of hillsides adjacent to the Mission 316 West Project site slope upward, away from the development, which affects fire spread rates and results in a slower, less aggressive fire that "backs" down the hillside, under typical conditions. Fire behavior modeling outputs presented in this FPP assume fire movement uphill; therefore, the resulting values will likely be lower than those presented herein for development downhill from adjacent wildland areas. However, these extreme values are included to better understand worst-case fire scenarios.

Fires in sage scrub fuels and southern mixed chaparral are expected to move slower than those in grasslands, but produce significantly higher intensities and flame lengths. Flame lengths in non-managed sage scrub and chaparral fuels are expected to reach up to nearly 44.4 feet under extreme weather conditions, with spread rates reaching 6.7 mph. Riparian vegetation fires are expected to be lower intensity fires that would be expected to move slower than sage scrub, produce low to moderate heat, and result in up to 13-foot flame lengths under extreme weather conditions. Fires burning into brush thinning zones of the proposed FMZs are expected to be less intense and generate lower flame lengths.

The results presented in Tables 3 and 4 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

Based on the results of fire behavior modeling, a typical fire in the Mission 316 West vicinity will be a sage scrub-fueled fire that moves quickly, burning with moderate intensity. The fire is anticipated to be a wind-driven fire from the east or north during the fall. Flame lengths in the sage scrub fuels could reach 44.4 feet with spread rates reaching approximately 6.7 mph during fall conditions. A typical cause may be related to structure fires in the neighborhoods to the north and east or roadways (tossed cigarette, car fire, or electrical power line arching). Maximum spotting distance for both onshore and offshore wind-driven fires is projected to occur between 0.8 and 2.4 miles, respectively, downwind.

As previously mentioned, Dudek conducted modeling of the site for post-fuel modification zones. Typical fuel modification includes establishment of minimum 100-foot wide irrigated zone (Zone A) on the periphery of the project site, beginning at the structure. For modeling the post-FMZ treatment condition, the fuel model

assignment for coastal sage scrub was re-classified according to the specific fuels management (e.g., irrigated, fire resistive landscaping) treatment.

As depicted in Table 4, the FMZ areas experience a significant reduction in flame length and intensity. The 44-foot flame lengths predicted for sage scrub-chaparral habitat during pre-treatment modeling for fire scenarios 1 and 3 are reduced to approximately three feet by the time FMZ (Zone A) is reached. These reduction of flame lengths and intensities are assumed to occur within the 100 feet of fuel modification (all an irrigated Zone A).

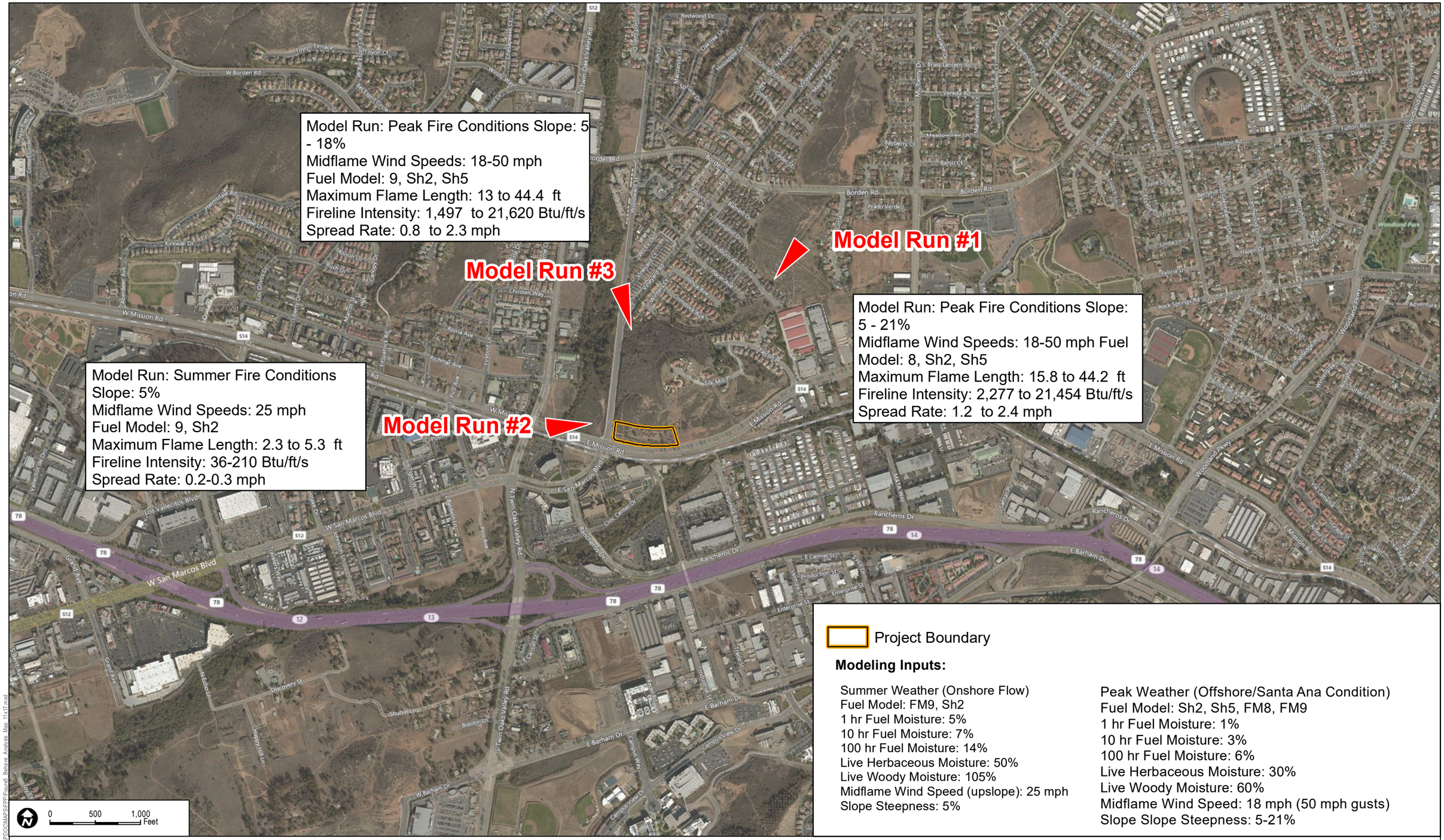
4.2 On-Site Risk Assessment

Given the climatic, vegetative, topographic characteristics, and local fire history of the area, the project site, once developed, is determined to be subject to occasional off-site wildfires. Potential for off-site wildfire encroaching on, or showering embers on the site is considered moderate, but risk of ignition from such encroachments or ember showers is considered low based on the type of construction and fire protection features that will be provided for the structures.

Wildland fire from the north, northeast, northwest, or west is possible given the existence of open space lands and ignition sources. The most significant wildfire threat is considered to be during Santa Ana conditions with wind-driven wildfire from the north or northeast along riparian corridors (e.g., San Marcos Creek watershed) or the ridgeline to the northeast that is covered with Diegan coastal sage scrub habitat. The following description summarizes details regarding the site's fire environment and general risk from wildland fire.

- This property is within an area subject to occasional weather extremes that may facilitate wildfire ignition and spread;
- Terrain within the vicinity of the project may facilitate the spread of fire due to steep, vegetation covered slopes. However, the project site is situated on the leeward side of a small hill, and therefore, less exposed to the direct pathway of an approaching fire;
- The predominant fuel type surrounding the project site is Diegan coastal sage scrub. Fuel loading will be different for north vs. south facing slopes. The fuel load for a southern aspect at a "climax" condition (at community maturity) is considered lighter than on north-facing adjacent slopes based on the southern exposure, which results in hotter and drier conditions and less vegetation growth. Southern facing slopes also become more prone to ignition due to the same factors;
- Santa Ana winds coinciding with the late fall vegetation drying have resulted in some of the largest and most severe wildland fires (e.g., 2007 Witch Fire and 2014 Cocos Fire) in San Diego County and California. However, fire history indicates wildfire has not occurred on the Project Area, as described in section 1.1.3.4.

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Project Boundary

Modeling Inputs:

Summer Weather (Onshore Flow)
Fuel Model: FM9, Sh2
1 hr Fuel Moisture: 5%
10 hr Fuel Moisture: 7%
100 hr Fuel Moisture: 14%
Live Herbaceous Moisture: 50%
Live Woody Moisture: 105%
Midflame Wind Speed (upslope): 25 mph
Slope Steepness: 5%

Peak Weather (Offshore/Santa Ana Condition)
Fuel Model: Sh2, Sh5, FM8, FM9
1 hr Fuel Moisture: 1%
10 hr Fuel Moisture: 3%
100 hr Fuel Moisture: 6%
Live Herbaceous Moisture: 30%
Live Woody Moisture: 60%
Midflame Wind Speed: 18 mph (50 mph gusts)
Slope Slope Steepness: 5-21%

SOURCE: AERIAL-BING MAPPING SERVICE 2018

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FIGURE 5

Behave Plus Analysis Map

MISSION 316 WEST PROJECT FIRE PROTECTION PLAN

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5 Emergency Response and Service

5.1 Emergency Response

The project is located within the jurisdiction of the San Marcos Fire Department (SMFD), and consequently, SMFD provides initial response. The SMFD jurisdictional response area encompasses approximately 33 square miles with a population of approximately 96,000 residents[2]. The SMFD currently operates four Fire Stations, two of which are analyzed herein due to their proximity to the proposed project site and could respond to an incident at the Mission 316 West Project site (Stations 1 and 3), although primary response would be from Station 1, with Station 3 responding as necessary.

Within the area's emergency services system, fire and emergency medical services are provided by Fire Departments (San Marcos Fire Department and Escondido Fire Department) County Service Areas (CSA), and CAL FIRE. Generally, each agency is responsible for structural fire protection and wildland fire protection within their area of responsibility. However, mutual aid agreements enable non-lead fire agencies to respond to fire emergencies outside their district boundaries. In the project area, fire agencies cooperate on a statewide master mutual aid agreement for wildland fires and there are mutual aid agreements in place with neighboring fire agencies (north zone agencies) and typically include interdependencies that exist among the region's fire protection agencies for structural and medical responses, but are primarily associated with the peripheral "edges" of each agency's boundary. These agreements are voluntary, as no local governmental agency can exert authority over another.

Table 5 presents a summary of the location, fire apparatus equipment, staffing levels, maximum travel distance, and estimated travel time for the two nearby SMFD stations that would respond to a fire or medical emergency at the Mission 316 West Project site. Travel distances are derived from Google road data while travel times are calculated applying the nationally recognized RAND Corporation formula used by the Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard: (T=0.65 + 1.7D), where T=time and D=distance). The response travel time formula discounts speed for intersections, vehicle deceleration and acceleration, and does not include turnout donning time.

Table 5. San Marcos Fire Department Responding Stations Summary

Station	Location	Equipment	Staffing	Maximum Travel Distance	Travel Time***
Station 1	180 W. Mission Road San Marcos, California	- Paramedic Engine Co. - Pierce 100-foot MDL Tiller and Body Assembly quintuple combination pumper. - Type 3 Engine - Paramedic Ambulance	On duty : 8	0.56 mi.**	1 minute 36 secs.**

[2] https://www.san-marcos.net/departments/public-safety/fire-department/department-overview

Table 5. San Marcos Fire Department Responding Stations Summary

Station	Location	Equipment	Staffing	Maximum Travel Distance	Travel Time***
Station 3	404 Woodland Pkwy San Marcos, California	- Paramedic Engine Co. - Type 3 Engine - Paramedic Ambulance	On-duty: 5	1.55 mi.*	3 minutes 18 secs.*

* Distance measured to entrance of the proposed development area at the southeastern end of East Mission Road.
** Distance measured to entrance of the proposed development area at the northwestern end of Woodward Street.
*** Assumes travel to the project entrance, and application of the ISO formula, T=0.65+1.7(Distance), a 35 mph travel speed, and does not include turnout time.

Based on the Mission 316 West Project site location in relation to existing SMFD stations, travel time to the site for the first responding engine from Station 1 is less than 2 minutes to project entrance, on Woodward Street. Travel within the development may reach up to 0.5 minute, based on the longest proposed road stretch of approximately 0.18 miles, resulting in response time of less than 2.5 minutes for the entire development. Secondary response would arrive in less than 4 minutes. Based on these calculations, emergencies within the project can be responded to by SMFD's first arriving unit (average maximum initial response of no more than 8 minutes for fire apparatus and 9 minutes for ambulance, 90% of calls) in accordance with the City's standard.

5.2 Emergency Service Level

The SMFD estimates approximately 11,486 total annual calls (Nailon, J. 2019) and a City population of approximately 96,000 (SMFD 2018). The per capita call volume is roughly 0.12 for City of San Marcos. Based on the proposed development plans, the project's estimated 207 residents (assumes an average of 3.09 occupants per residence for this type of community (SANDAG 2019) would generate roughly 25 calls per year, most of which are expected to be medical-related calls, consistent with typical emergency call statistics.

Service level requirements are not expected to be significantly impacted with the increase of approximately 25 calls per year or 0.06 calls per day for a station (SMFD Station 1) that currently responds to roughly 12 calls per day (4,364 calls[3] in 2018) in its primary service area. Therefore, the project is not expected to cause a decline in SFMD's emergency response times. Additional response, rounding out the effective firefighting force (the manpower needed to effectively fight a structure fire and/or respond to serious medical emergency) would be provided by Stations 3 and 4.

5.2.1 Cumulative Impacts on Fire Response

Cumulative impacts from multiple projects can cause fire response service decline and must be analyzed for each project. The Mission 316 West Project and its proposed usage by up to 207 residents is an increase in potential service demand of approximately 25 calls per year, well within the capacity of the existing Fire Stations that will service the Mission 316 West Project. Other future projects in the vicinity of Station 1 are not known at the time of this FPPs preparation, but when considered cumulatively, the potential impact of multiple projects is considered less than significant, mitigated by increased funding available from each project to the SMFD through property taxes

[3] Personal communication (e-mail) with J. Nailon, Fire Marshal and Dudek. February 25, 2019.

and other fees associated with each project, including the Mission 316 West Project. This funding would be utilized to maintain or enhance fire response capabilities.

6 Buildings, Infrastructure and Defensible Space

The City of San Marcos Municipal Code, Chapter 17.64 (2016 International Fire Code and 2016 California Fire and Building Codes adopted by reference with several modifications) governs the building, infrastructure, and defensible space requirements detailed in this FPP. The project will meet or exceed applicable codes or will provide alternative materials and/or methods. While these standards will provide a high level of protection to structures for the Mission 316 West Project, there is no guarantee that compliance with these standards will prevent damage or destruction of structures by fire in all cases.

A response map update in a format compatible with current department mapping shall be provided to the SMFD (Municipal Code Section 505.5).

The following summaries highlight important fire protection features. All underground utilities, hydrants, water mains, curbs, gutters, and sidewalks will be installed, and the drive surface shall be approved prior to combustibles being brought on site.

6.1 Access

6.1.1 Primary

The project would be accessible from public roadways. There are two primary project access roads for Mission 316 West, the first will be via a newly constructed driveway originating at the northwestern corner of the project site and intersecting with Woodward Street, a four lane road; the second will be via an already constructed driveway (for the already built Mission 316 East residential development to the east) originating at the southeastern corner of the project site and intersecting with East Mission Road, a six lane road with a landscaped median (Figure 3). An approximately 0.18 miles long continuous road will connect the two proposed driveway entrances, allowing residents to drive in from westbound East Mission Road and exit onto Woodward Street (and drive either north or south bound). The proposed private driveway entrance off of Woodward Street is approximately 26 feet in width, while the existing driveway entrance off of East Mission Road is approximately 24 feet in width.

Interior roads will be a minimum for 24 feet wide with 13'6" unobstructed vertical clearance, with the exception for two designated, parking areas, one located on the eastern side of the property, which will be approximately 32 feet wide with parallel parking on the north side of the roadway and the second located on the western side of the property, which will be approximately 42 feet wide with pull-in parking on the north side of the roadway. The widened portions of the driveway (32 to 42 feet driveway widths) would also provide as a staging area for fire apparatus. Driveways or alleys between buildings will be 20 feet wide with 13'6" vertical clearance for the entire alley length distance. A reflector or some other device approved by SMFD will be placed on the corner of each building warning emergency vehicles as they enter the alley of the low overhang on the building. .

The maximum grade for the proposed private street is less than 20%. Any road grade that exceeds 12% shall be constructed with Portland cement concrete and heavy broom finish perpendicular to path of vehicle travel.

6.1.2 Gates

Any access gates will comply with San Marcos Fire Code. Public roads will not be gated. Gates on private roads will comply with SMFD standards (CFC Section 503.5) for electric gates and will include a Knox box or code pad for emergency access. No community gates are planned for this development.

6.1.3 Maximum Dead-End Road Length

There are no dead-end roads. The Project's internal roadway and driveways are designed to enable vehicular traffic to enter and exit from either East Mission Road or Woodward Street. Both SMFD's 100-foot Aerial Tiller and quintuple combination pumper or Quint[4] have adequate room to access the residential structures from both.

6.1.4 Road Width and Circulation

On-site roads will be constructed to current City of San Marcos Road standards and 2016 CFC, including minimum 24-foot road widths unobstructed by parking, and shall be improved with asphalt paving materials that support the imposed loads of fire apparatus (not less than 75,000 lbs.). Turning radius for fire apparatus access roads will be 28 feet as measured on the inside edge of the improved width. There will be limited on-site parking along the northern edges of the property, including parallel parking on the eastern side of the property and straight-in parking on the western side of the development. Parking will be restricted throughout development by posting of signs stating "No Parking- Fire Lane CVC (California Vehicle Code) 22500.1" to preserve the unobstructed width for emergency response. Signs that are legally enforceable shall be posted at each entrance gate and throughout the property. Signs shall be securely mounted facing the direction towards oncoming traffic entering the area and clearly visible indicating that "violating vehicles will be towed at owner's expense." Prior to a final fire inspection for the proposed development, a written agreement for services with a towing company per CVC 22658(a) will be in place.

6.1.5 Surface

All fire access and vehicle roadways shall be designed and maintained to support the imposed loads not less than 75,000 pounds of fire apparatus and shall be provided with an approved paved surface as described above. All underground utilities, hydrants, water mains, curbs, gutters and sidewalks must be installed and the drive surface shall be approved prior to combustibles being brought on site (CFC Section 503.2).

6.1.6 Vertical Clearance

Minimum unobstructed vertical clearance of 13 feet 6 inches will be maintained for the entire required width for all streets, including driveways that require emergency vehicle access.

[4] A Quint is a fire service apparatus that serves the dual purpose of an engine and a ladder truck. SMFD's Quint is 40 feet long by 8.5 feet wide and has inside and outside turning radii of 28 feet and 42 feet, respectively, as specified on City's Hammerhead and Turning Radius templates. All roadway standards, including turning radii and turnaround, must designed and built to support the fire department's Quint.

6.1.7 Premise Identification

Identification of roads and structures will comply with SMFD and CFC, Section 505.1, as follows:

- Each Building shall have a minimum 12 inch address number, with 1-1/2 inch stroke. Number shall be mounted in visible locations and contrast in color to background. Each individual living unit shall have minimum 4-inch high address or unit numbers, ½-inch stroke, and 6 to 8 feet above grade.
- Streets and roads shall be identified with approved signs. Temporary signs shall be installed at each street intersection when construction of new roadways allows passage by vehicles. Signs shall be of an approved size, weather resistant and be maintained until replacement by permanent signs.

Two illuminated directory maps will be installed as follows: One at southeast end of development along the driveway entrance and one at the northwestern driveway entrance off Woodward Street. Final Location of directory maps and content shall be approved by fire department.

6.2 Ignition Resistant Construction and Fire Protection Systems

All new structures will be constructed to City of San Marcos Municipal Fire Code standards. Each of the proposed condominium buildings will comply with the enhanced ignition-resistant construction standards of the 2016 California Building Code (Chapter 7A). These requirements address roofs, eaves, exterior walls, vents, appendages, windows, and doors and result in hardened structures that have been proven to perform at high levels (resist ignition) during the typically short duration of exposure to burning vegetation from wildfires.

There are two primary concerns for structure ignition: 1) radiant and/or convective heat and 2) burning embers (NFPA 1144 2008, Ventura County Fire Protection District 2011, IBHS 2008, and others). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the WUI built to these codes have proven to be very ignition resistant. Likewise, radiant and convective heat impacts on structures have been minimized through the Chapter 7A exterior fire ratings for walls, windows and doors. Additionally, provisions for modified fuel areas separating wildland fuels from structures have reduced the number of fuel-related structure losses. As such, most of the primary components of the layered fire protection system provided the project are required by SMFD (San Marcos Municipal Code, Section 17.64.020 (c)) and state codes, but are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire and, with the inclusion of required interior sprinklers (required in the 2016 Building/Fire Code update), of extinguishing interior fires, should embers succeed in entering a structure. Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well, they were adopted into the code. The following project features are required for new development in WUI areas and form the basis of the system of protection necessary to minimize structural ignitions as well as providing adequate access by emergency responders:

1. Application of Chapter 7A, ignition resistant building requirements
2. New class-A fire rated roof and associated assembly. With the proposed class-A fire rated roof, there will be attic or void spaces above the third level living spaces requiring ventilation to the outside environment. The attic spaces will require either ember-resistant roof vents or a minimum 1/16-inch mesh and shall not

exceed 1/8-inch mesh for side ventilation (recommend BrandGuard, O'Hagin or similar vents). All vents used for this project will be approved by SMFD.

3. Minimum 1-hour rated exterior walls and doors; including two sheets of 5/8-inch drywall or one layer of 5/8-inch type X gypsum sheathing applied behind the exterior covering or cladding on the exterior side of the framing, from the foundation to the roof, of each building's wall facing the north towards the wildland open interface vegetated hillside.
4. Multi- pane glazing with a minimum of one tempered pane, fire-resistance rating of not less than 20 minutes when tested according to NFPA 257 (such as SaftiFirst, SuperLite 20-minute rated glass product), or be tested to meet the performance requirements of State Fire Marshal Standard 12-7A-2
5. Automatic, Interior Fire Sprinkler System to code for all habitable, multi-family residential dwellings and garages
6. Modern infrastructure, access roads, and water delivery system.

6.3 Fire Protection Systems

6.3.1 Water

Water service for the Mission 316 West Project site will be provided by Vallecitos Water District and will be consistent with SMFD requirements. The public water system will be through connections to existing water mains running along East Mission Road and Woodward Street. The water distribution system is designed to yield a minimum residual pressure of 40 pounds per square inch (psi) during peak hour demands and a minimum residual pressure of 20 psi during maximum day demands plus fire flow. Each fire hydrant shall be capable of 1,500 gpm fire flow for minimum duration of three hours at 20 psi residual pressure.

6.3.2 Fire Hydrants

Hydrants shall be located along fire access roadways as determined by the SMFD Fire Marshal to meet operational needs every 300 feet (on-center) of fire access roadways, regardless of parcel size, pursuant to the San Marcos Fire Code for multi-family residential (Section 17.64.140). Hydrants will be consistent with SMFD Design Standards (two 4-inch ports and one 2.5-inch port). Reflective blue dot hydrant markers shall be installed in the street to indicate location of the hydrant. Crash posts will be provided where needed in on-site areas where vehicles could strike fire hydrants or fire department connections.

6.3.3 Automatic Fire Sprinkler Systems

All structures will be protected by an automatic, interior fire sprinkler system. Fire sprinklers systems shall be in accordance with SMFD and National Fire Protection Association (NFPA) Standard 13-D. The requirements for NFPA 13-D systems are two-fold. First, a one-hour vertical separation is required between individual living units from floor level to underside of roof. Secondly, each unit must have its own dedicated and properly sized water meter for the NFPA 13-D system. The sprinkler system will be remotely supervised by an approved 24/7 central-station (NFPA 71). Fire sprinkler monitoring plans for each building will be submitted to SMFD for approval before installation.

6.3.4 Fire Alarm Systems

All residential units shall have electric-powered, hard-wired smoke detectors in compliance with SMFD and 2016 CFC and CBC.

6.4 Ongoing Building and Infrastructure Maintenance

The project HOA shall be responsible for long term funding and maintenance of private roads and fire protection systems, including fire sprinklers and private fire hydrants.

6.5 Pre-Construction Requirements

Prior to bringing combustible materials onto the site, utilities shall be in place, fire hydrants operational, an approved all-weather roadway in place, and fuel modification zones established and approved.

6.6 Defensible Space and Vegetation Management

6.6.1 Fuel Modification Zones

An important component of a fire protection system for this Project is the provision for ignition resistant landscapes and modified vegetation buffers. FMZs are designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures. Fuel modification for the Project would be needed for the entire northern periphery of the site. Figure 6 illustrates the minimum 100-foot FMZ Plan proposed for the Project Site, including a minimum 100-foot wide irrigated Zone A extending north from the proposed residences up to the property boundary line or an equivalent low fuel volume treatment for the off-site portions of the FMZ. In order to achieve a minimum 100-foot wide FMZ on the western portion of the development, a minimum of 25 feet of Zone A (irrigated zone) or an equivalent low fuel volume treatment zone will occur off site. This will require the creation of a recorded FMZ easement with the adjacent property owner for their respective parcel(s). Additionally, the 100-foot wide FMZ will be augmented with a vertical, noncombustible retaining wall ranging from 22 to 30 feet in height. This wall will serve as a physical fire barrier that will minimize the horizontal spread of a fire and reduce the direct impacts of flame, heat, and embers on the structures. Figures 6a and 6b illustrate the typical FMZ configuration for the driveway cross-section and the interior of the property cross-section, respectively.

6.6.1.1 SMFD Fuel Modification Zone Standards

The purpose of this section is to document SMFD's standards and make them available for reference. However, we are proposing a site-specific fuel modification zone program with additional measures that are consistent with the intent of the standards. SMFD is consistent with the 2016 California Fire Code (Section 4907 — Defensible Space), Government Code 51175 – 51189, and Public Resources Code 4291, which require that fuel modification zones be provided around every building that is designed primarily for human habitation or use. However, fuel modification, unlike the state-wide FMZ standard, consists of at least 150 feet, measured in a horizontal plane, from the exterior façade facing the open space area to the north of the Project site. A typical landscape/fuel

modification installation per the City's Fire Code consists of a 50-foot-wide irrigated zone (Zone A) and two, 50-foot wide thinned zones (Zones B and C) for a total of 150 feet in width.

To ensure long-term identification and maintenance, a fuel modification area shall be identified by a permanent zone marker meeting the approval of SMFD. All markers will be located along the perimeter of the fuel modification area at a minimum of 500 feet apart or at any direction change of the fuel modification zone boundary. FMZs will be maintained on at least an annual basis or more often as needed to maintain the fuel modification buffer function.

Zone A – Non-Flammable, Irrigated Zone (from structure outward to minimum 100 feet)

Zone A is applicable site wide and is measured from the structure outward to 100 feet (horizontal), or to the property line in all directions.

Zone A includes the following key components:

- Non-combustible surface (pavement, concrete, decomposed granite, etc.) or,
- Irrigated wet zone (water conserving irrigation systems with efficient drip emitters and "smart" controllers and use of California Friendly landscape concepts)
- High-leaf-moisture plants as ground cover, less than 4 inches high
- No tree crowns within 10 feet of structures (at maturity)
- Tree spacing of a minimum 10 feet between crowns
- No tree limb encroachment within 10 feet of a structure or chimney, including outside barbecues or fireplaces
- Tree maintenance includes climbing-up (canopy raising) 6 feet or one-third the height of the tree
- Shrubs less than 2 feet tall, on 5-foot centers
- Year-round maintenance
- Fire-resistive species composition
- No combustible fencing in rear or side yards
- Landscape Plan prepared and submitted in compliance with this plan.

6.6.1.2 Other Vegetation Management

Roadway-Adjacent Defensible Space

As required under SMFD Fire Code, an area of 20 feet from each side of fire apparatus access roads and driveways shall be improved to Zone A standards and maintained clear of all but fire-resistive vegetation. Because this project proposes to install a 33-foot high anchor wall on the east and north sides of the driveway entrance to Woodward Parkway (Figure 6a), a minimum 10-foot wide Zone A will be provided. The west side of the driveway will be improved to Zone A standards up to the street right-of-way. Roadside defensible space shall be maintained by the HOA. Vertical clearance of 13 feet 6 inches shall also be maintained along fire apparatus access roads and driveways.

Special Fuel Management Issues

Trees may be planted within FMZs as long as they conform to the County's Consolidated Fire Code, Section 4907.3 (SMFD has adopted the County standard). On the Project site, tree planting in the fuel modification zones and along

roadways is acceptable, as long as they meet the following restrictions as described below and in the Vegetation Management Section:

- For streetscape plantings, fire resistive trees can be planted 10 feet from edge of curb to center of tree trunk. Care should be given to the type of tree selected, that it will not encroach into the roadway, or produce a closed canopy effect.
- Crowns of trees located within defensible space shall maintain a minimum horizontal clearance of 10 feet for fire resistant trees. Mature trees shall be pruned to remove limbs one-third the height or 6 feet, whichever is less, above the ground surface adjacent to the trees.
- Dead wood and litter shall be regularly removed from trees.
- Ornamental trees shall be limited to groupings of 2–3 trees with canopies for each grouping separated horizontally as described in Table 6.

Table 6. Distance Between Tree Canopies by Percent Slope

Percent of Slope	Required Distances Between Edge of Mature Tree Canopies [1]
0–20	10 feet
21–40	20 feet
41+	30 feet

1 Determined from canopy dimensions as described in Sunset Western Garden Book (Current Edition)
2 2016 CFC Section 4907.3.1. County of San Diego.

Specific Landscaping Requirements

The following requirements are provided for HOA-maintained fuel modification zones. All landscaping shall be maintained by the HOA.

Plants used in the fuel modification areas or landscapes will include drought-tolerant, fire resistive trees, shrubs, and groundcovers. The planting list and spacing will be reviewed and approved by SMFD, included on submitted landscape plans. The plantings will be consistent with County of San Diego's Suggested Plant List for Defensible Space (Appendix D). The intent of the list is to provide examples of plants that are less prone to ignite or spread flames to other vegetation and combustible structures during a wildfire. Additional Plants can be added to the landscape plant material palette with the approval from SMFD.

Pre-Construction Requirements

- Perimeter fuel modification areas must be implemented and approved by the SMFD prior to combustible materials being brought on site.
- Existing flammable vegetation shall be reduced by 50% on vacant lots upon commencement of construction.
- Dead fuel, ladder fuel (fuel which can spread fire from ground to trees), and downed fuel shall be removed and trees/shrubs shall be properly limbed, pruned, and spaced per this plan.

Undesirable Plants

Certain plants are considered to be undesirable in the landscape due to characteristics that make them highly flammable. These characteristics can be physical or chemical. The plants included in the Prohibited Plant List

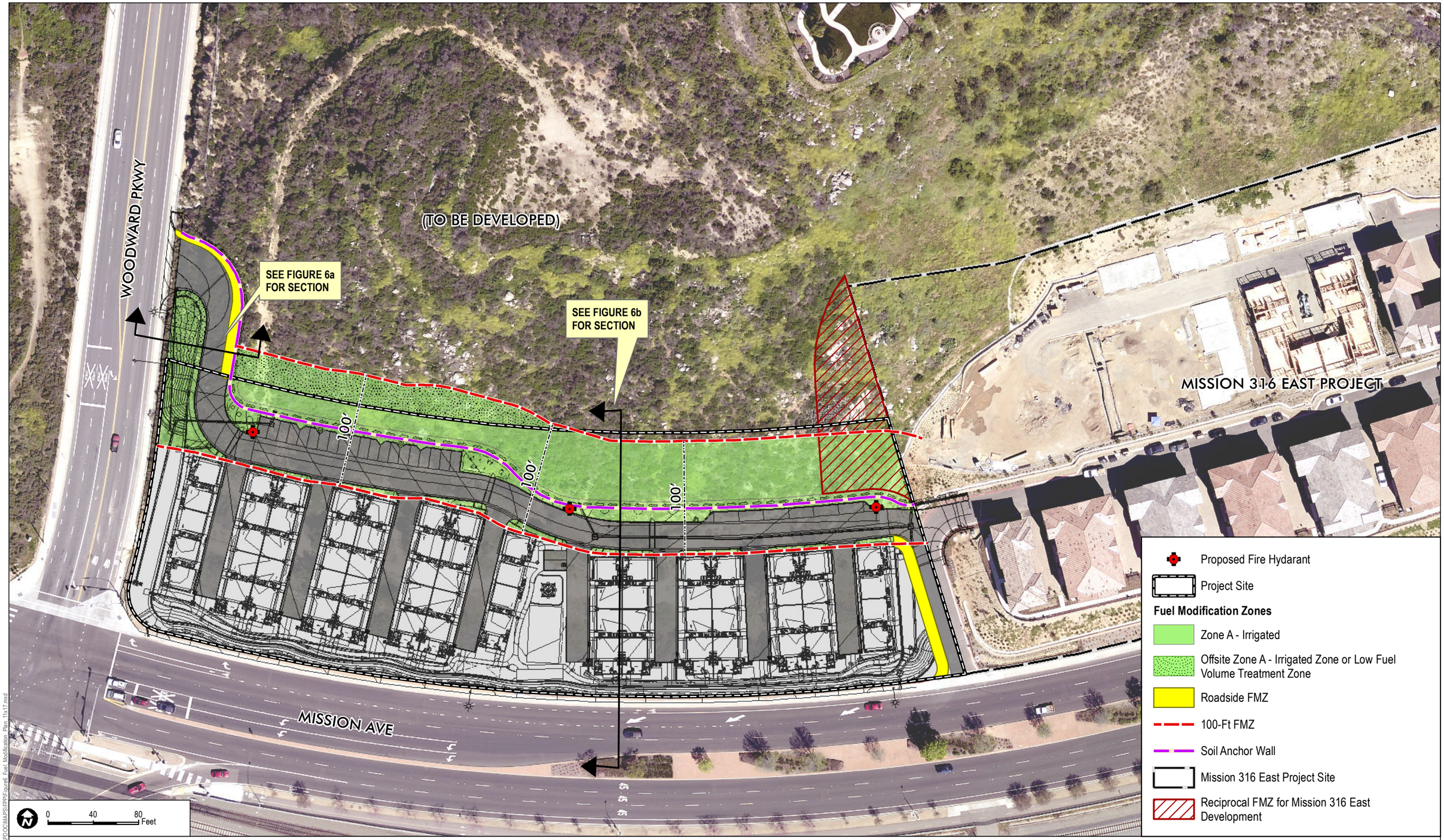
(Appendix E) are unacceptable from a fire safety standpoint, and shall not be planted on the site unless otherwise approved by the SMFD.

6.6.2 Fuel Modification Area Vegetation Maintenance

All fuel modification area vegetation management shall be completed annually by May 1 of each year and more often as needed for fire safety, as determined by the SMFD. The project HOA shall be responsible for all vegetation management throughout the common and FMZ easements areas of the project site. The project HOA shall be responsible for ensuring long-term funding and ongoing compliance with fuel modification and maintenance requirements throughout the private portions of the project site as well as the on all FMZ easements.

6.6.3 Annual Fuel Modification Zone Compliance Inspection

The Project HOA would obtain an FMZ inspection and report from a qualified SMFD-approved 3rd party inspector in May of each year certifying that vegetation management activities throughout the project site have been performed pursuant to this FPP.



SOURCE: AERIAL- SANGIS 2017; PROJECT-EXCEL ENGINEERING 2019

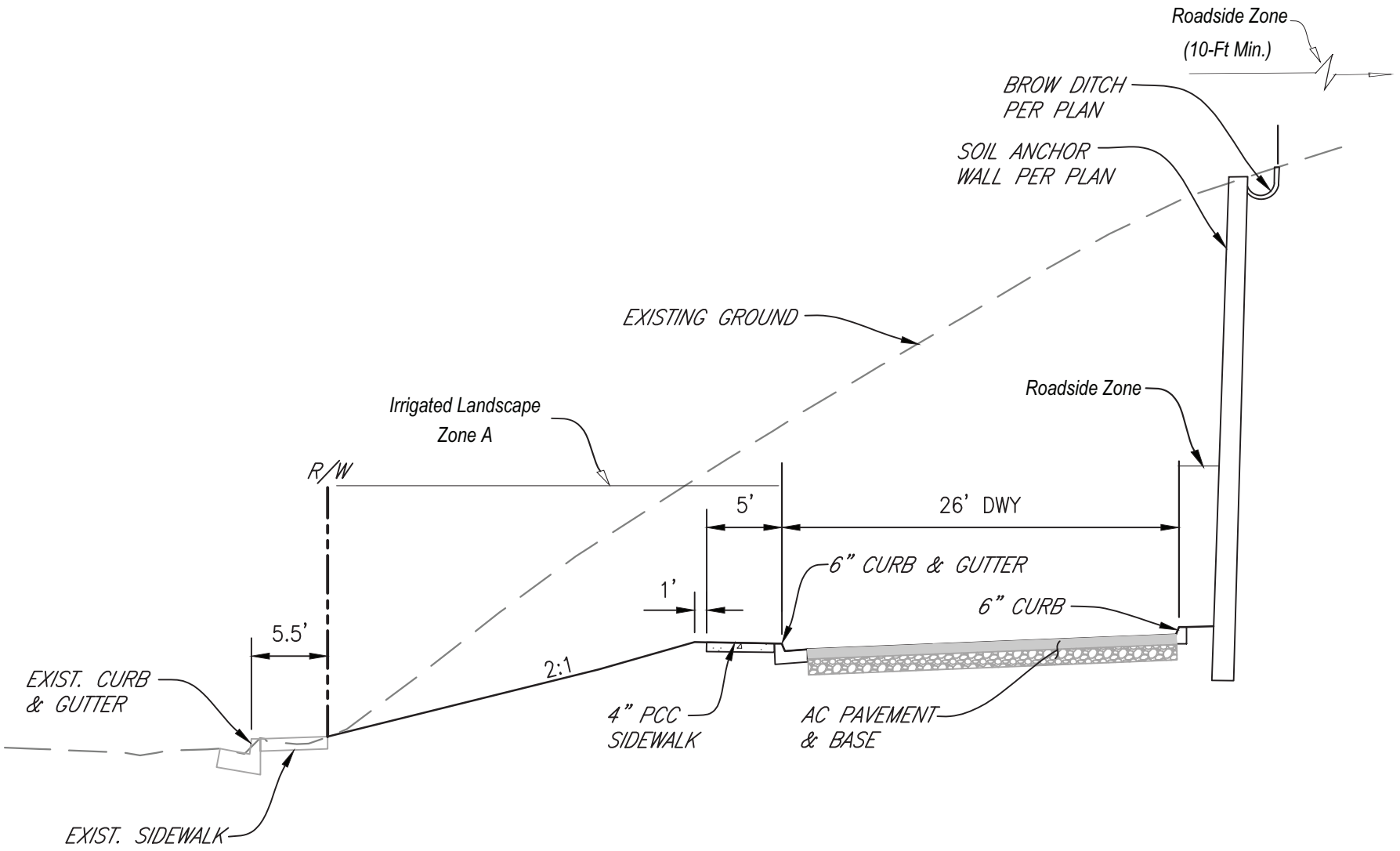
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FIGURE 6

Fuel Modification Plan

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Driveway Entrance Section

Not To Scale

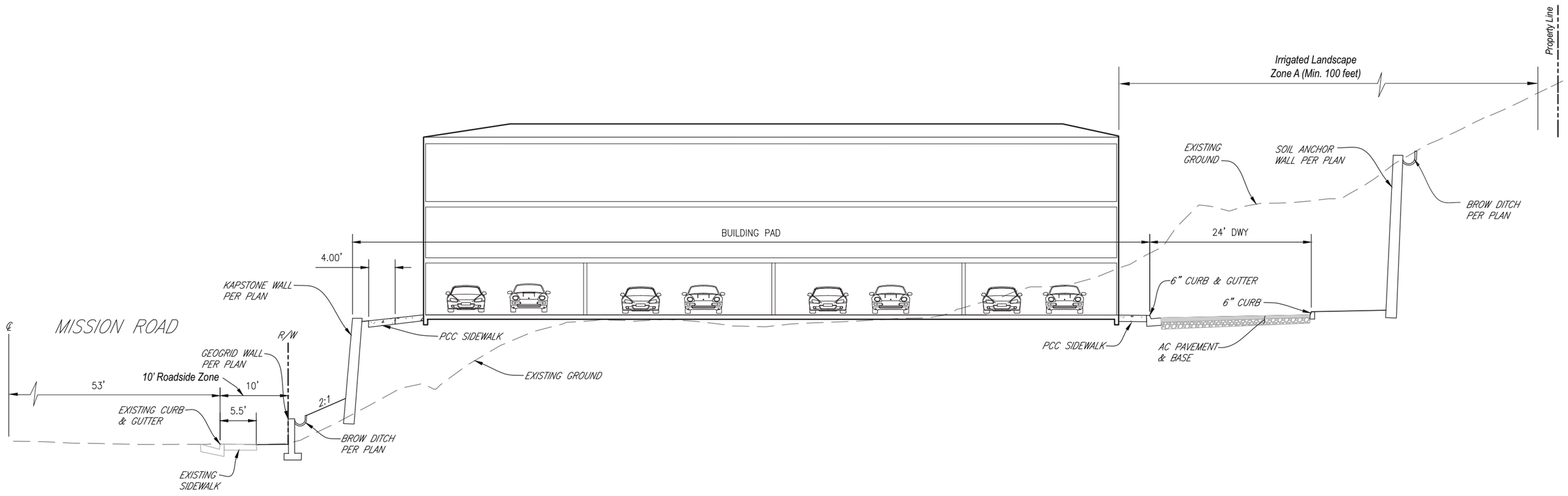
SOURCE: EXCEL ENGINEERING 2019

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FIGURE 6a

Entrance Driveway Section

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Project Section

Not To Scale

SOURCE: EXCEL ENGINEERING 2019

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FIGURE 6b
Project Section

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7 Alternative Materials and Methods for Non-Conforming Fuel Modification

As previously mentioned, due to site constraints, it is not feasible to achieve the standard FMZ width on the entire north side of the development. As such, this FPP describes additional measures that will be implemented to mitigate the non-conforming fire related threats and proposed reduced fuel modification zones. These measures are customized for this site based on the analysis results and focus on providing functional equivalency as a City-defined, full fuel modification zone.

The Project's property line can only provide an area between 75 and 107 feet of structural setback from off-site fuel beds. The eastern buildings are able to achieve up to 107 feet of FMZ up to the property line, while the western buildings are able to achieve up to approximately 75 feet of FMZ up to the property line. In order to achieve a minimum 100 feet of fuel modification on the western portion of the development, a minimum of 25 feet of Zone A (irrigated zone) or equivalent low fuel volume treatment zone will occur off site and will require the creation of a recorded FMZ easement with the adjacent property owner for their respective parcel(s). A 150-foot FMZ is more than typically required from wildland fuels including coastal sage scrub, chaparral and other high fire prone vegetation communities, however, standard fuel modification zones are 100 feet in many jurisdictions (or to property line – Public Resources Code 4291).

As experienced in numerous wildfires, including the most recent fire storms in San Diego County (2003, 2007, and 2017), homes in the WUI are potential fuel. The distance between the wildland fire that is consuming wildland fuel and the home ("urban fuel") is the primary factor for structure ignition (not including burning embers). The closer a fire is to a structure, the higher the level of heat exposure (Cohen 2000). However, studies indicate that given certain assumptions (e.g., 10 meters of low fuel landscape, no open windows), wildfire does not spread to homes unless the fuel and heat requirements (of the home) are sufficient for ignition and continued combustion (Cohen 1995, Alexander et al. 1998). Construction materials and methods can prevent or minimize ignitions. Similar case studies indicate that with nonflammable roofs and vegetation modification from 10–18 meters (roughly 32–60 feet) in southern California fires, 85–95% of the homes survived (Howard et al. 1973, Foote and Gilless 1996). Similarly, San Diego County after fire assessments indicate strongly that the building codes are working in preventing home loss: of 15,000 structures within the 2003 fire perimeter, 17% (1,050) were damaged or destroyed. However, of the 400 structures built to the 2001 codes (the most recent at the time), only 4% (16) were damaged or destroyed. Further, of the 8,300 homes that were within the 2007 fire perimeter, 17% were damaged or destroyed. A much smaller percentage (3%) of the 789 homes that were built to 2001 codes were impacted and an even smaller percentage (2%) of the 1,218 structures built to the 2004 Codes were impacted (IBHS 2008). Damage to the structures built to the latest codes is likely from flammable landscape plantings or objects next to structures or open windows or doors (Hunter 2007).

These results support Cohen's (2000) findings that if a community's homes have a sufficiently low home ignitability, the community can survive exposure to wildfire without major fire destruction. This provides the option of mitigating the wildland fire threat to homes/structures at the residential location without extensive wildland fuel reduction. Cohen's (1995) studies suggest, as a rule-of-thumb, larger flame lengths and widths require wider fuel modification zones to reduce structure ignition. For example, valid SIAM results indicate that a 20-foot high flame has minimal radiant heat to ignite a structure (bare wood) beyond 33 feet (horizontal distance). Whereas, a 70-foot-high flame may require about 130 feet of clearance to prevent structure ignitions from radiant heat (Cohen and Butler 1996). This study utilized bare

wood, which is more combustible than the ignition resistant exterior walls for structures built today. Fire behavior modeling conducted for this project indicates that fires in the moderate to high load shrub and chaparral north of the Project Site would result in roughly 16- to 44-foot flame lengths under fall, extreme weather conditions. The proposed FMZ is twice the length of the predicted flame length.

As indicated in this report, the FMZs and additional fire protection measures proposed for the northern portion of the development provide equivalent wildfire buffer, but are not standard zones. Rather, they are based on a variety of analysis criteria including predicted flame length, fire intensity (Btu), site topography and vegetation, extreme and typical weather, position of structures on pads, position of roadways, adjacent fuels, fire history, current vs. proposed land use, neighboring communities relative to the proposed project, and type of construction. The fire intensity research conducted by Cohen (1995), Cohen and Butler (1996), and Cohen and Saveland (1997) and Tran et al. (1992) supports the fuel modification alternatives proposed for this project.

7.1 Additional Structure Protection Measures

The following additional measures will be implemented to "mitigate" potential structure fire exposure related to the provided reduced FMZs for the north portion of the development. These measures are customized for this site, its unique topographical and vegetative conditions, and focus on providing functional equivalency as a full fuel modification zone. In order to provide compensating structural protection in the absence of a 150-foot wide FMZ, and in addition to the residences being built to the latest ignition resistant codes, these structures will also include the following features for additional fire prevention, protection, and suppression:

1. Windows will be upgraded on the preserved vegetation side of the structures to include dual pane, both panes tempered, exceeding the code requirement;
2. Annually hire a 3rd party inspector to evaluate whether designated FMZ areas meet the requirements of this FPP and SMFD.

The information provided herein supports the ability of the proposed structures and FMZs to withstand the predicted short duration, low to moderate intensity wildfire and ember shower that would be expected from wildfire burning in the vicinity of the site or within the site's landscape.

8 Homeowner's Association Wildfire Education Program

The residents and visitors of the Mission 316 West Project will be provided a proactive educational component disclosing the potential wildfire risk and this report's requirements. This educational information must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go" stance on evacuation.

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9 Conclusion

This FPP is submitted in support of an application for project entitlement of the Mission 316 West development project. It is submitted in compliance with requirements of the SMFD and City Fire Code. The requirements in this document meet fire safety, building design elements, fuel management/modification, and landscaping recommendations of the SMFD. Fire and Building Codes and other local, county, and state regulations in effect at the time of each building permit application supersede these recommendations unless the FPP recommendation is more restrictive. Where the project does not strictly comply with the Code, alternative materials and methods have been proposed that provide functional equivalency as the code intent.

The recommendations provided in this FPP have been designed specifically for the proposed construction of structures adjacent the WUI zone at the Mission 316 West Project site. The project site's fire protection system includes a redundant layering of protection methods that have been shown through post-fire damage assessments to reduce risk of structural ignition.

Modern infrastructure will be provided along with implementation of the latest ignition resistant construction methods and materials. Further, all structures are required to include interior sprinklers consistent with City of San Marcos Municipal Code, Section 17.64.200. Fuel modification will occur on exposed edges, north of the project site. The fuel modification zones will be maintained annually by the HOA. Maintenance includes removing all dead and dying materials and maintaining appropriate horizontal and vertical spacing. In addition, plants that establish or are introduced to the fuel modification zone that are not on the approved plant list will be removed.

Ultimately, it is the intent of this FPP to guide, through code and other project specific requirements, the construction of structures that are defensible from wildfire and, in turn, do not represent significant threat of ignition source for the adjacent native habitat. It must be noted that during extreme fire conditions, there are no guarantees that a given structure will not burn. Precautions and mitigating actions identified in this report are designed to reduce the likelihood that fire would impinge upon the proposed structures. There are no guarantees that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property. Implementation of the required enhanced construction features provided by the applicable codes and the mitigating fuel modification requirements provided in this FPP will accomplish the goal of this FPP to assist firefighters in their efforts to defend these structures and reduce the risk associated with this project's WUI location. For maximum benefit, the developer, contractors, engineers, and architects are responsible for proper implementation of the concepts and requirements set forth in this report. Homeowners and HOA are responsible to maintain their structures and landscaping as required by this report, the applicable Fire Code, and the SMFD.

Although the proposed development and landscape will be significantly improved in terms of ignition resistance, it should not be considered a shelter-in-place community. It is recommended that the homeowners or other occupants who may reside within the Mission 316 West development adopt a conservative approach to fire safety. This approach must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go[5]" stance on evacuation. Accordingly, occupants should evacuate the residence and the area as soon as they receive notice to evacuate, or sooner, if they feel threatened by wildfire or structure fire in a nearby residence. Fire is a dynamic and somewhat unpredictable occurrence and it is important for residents to educate themselves on practices that will improve their home survivability and their personal safety.

[5] International Fire Chiefs Association "Ready, Set, Go" website link: http://wildlandfirersg.org/

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10 List of Preparers

Project Manager

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Fire Protection Planner; San Diego County California Environmental Quality Act Consultant List
Dudek

Fire Behavior Modeling and Plan Preparer

Noah Stamm
Fire Protection Planner
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Appendix A

Representative Site Photograph Log

PHOTOGRAPH LOG

Mission 316 West Project



Photograph 1. View of eastern edge of property. Driveway is on the Mission 316 east property.



Photograph 2. View of eastern edge and ornamental trees. Note new development to the east and homes on ridgetop.



Photograph 3. View looking up hillside towards center of project site. Vegetation shown in photograph is Coastal Sage Scrub and disturbed habitats.



Photograph 4. Close up view of Coastal Sage Scrub habitat in eastern portion of project site.



Photograph 5. View across East Mission Road and landscaped median towards eastern portion of Project site.



Photograph 6. View across East Mission Road and landscaped median towards center of Project site.



Photograph 7. View across East Mission Road and landscaped median towards western portion of Project site.



Photograph 8. view looking north up Woodward Street at western portion of project site, standing at the intersection of Mission Road and Woodward Street.



Photograph 9. View of mixed chaparral on western facing slope above Woodward Street on the western side of the project site. Photograph taken facing northeast.



Photograph 10. View looking east towards southwestern corner of the property.



Photograph 11. Photograph of parking area within the southwestern corner of the property.



Photograph 12. View of mixed chaparral on wester facing slope on the west side the project site, above Woodward Street.



Photograph 13. Riparian habitat Off-site fuels) is located west of project area. Fuels modeled for Fire Run #2.



Photograph 14. Another view of Riparian habitat Off-site fuels) is located west/northwest of project area. Fuels modeled for Fire Run #2.



Photograph 15. Photograph of riparian habitat northwest of project area. Fuels modeled for Fire Run #3.



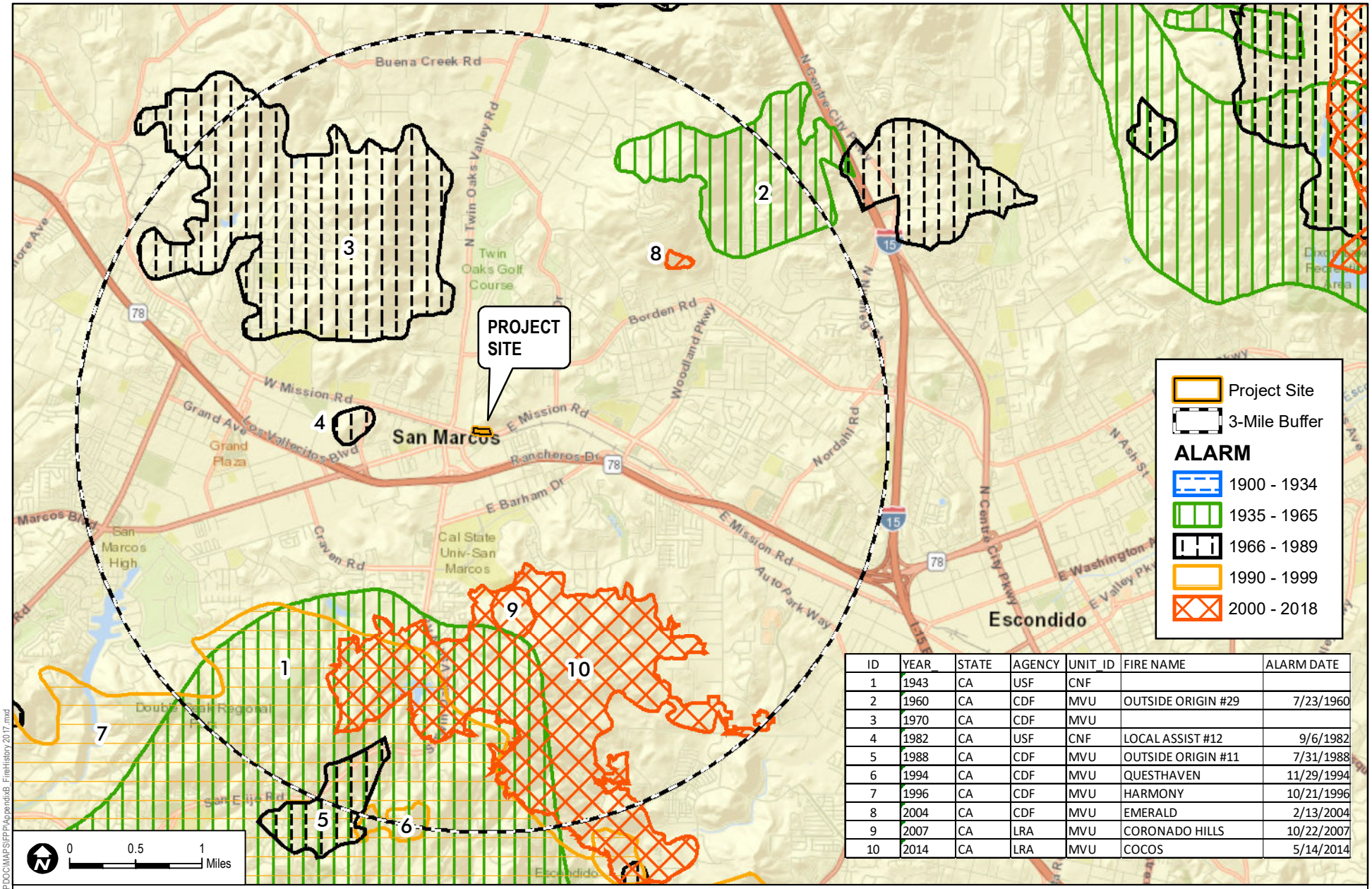
Photograph 16. Coastal sage scrub covered ridgetop is offsite and northeast of project area. Vegetation represents fuel type for Fire Run #1.



Photograph 17. Another view of Coastal sage scrub covered ridgetop along Borden Road, offsite and northeast of project area. Vegetation represents fuel type for Fire Run #1.

Appendix B

Fire History Map



ID	YEAR_	STATE	AGENCY	UNIT_ID	FIRE NAME	ALARM DATE
1	1943	CA	USF	CNF		
2	1960	CA	CDF	MVU	OUTSIDE ORIGIN #29	7/23/1960
3	1970	CA	CDF	MVU		
4	1982	CA	USF	CNF	LOCAL ASSIST #12	9/6/1982
5	1988	CA	CDF	MVU	OUTSIDE ORIGIN #11	7/31/1988
6	1994	CA	CDF	MVU	QUESTHAVEN	11/29/1994
7	1996	CA	CDF	MVU	HARMONY	10/21/1996
8	2004	CA	CDF	MVU	EMERALD	2/13/2004
9	2007	CA	LRA	MVU	CORONADO HILLS	10/22/2007
10	2014	CA	LRA	MVU	COCOS	5/14/2014

SOURCE: AERIAL- BING MAPPING SERVICE; FIRE DATA-CALFIRE 2017

DUDEK

APPENDIX B

Fire History Map

MISSION 316 WEST PROJECT FIRE PROTECTION PLAN

Path: Z:\Projects\11666\01\MAPDOC\MAPS\FPP\AppendixB_FireHistory 2017.mxd

Appendix C

BehavePlus Fire Behavior Analysis

APPENDIX C
Fire Behavior Modeling Summary
Mission 316 West FPP, San Marcos, CA

BEHAVEPLUS FIRE BEHAVIOR MODELING

Fire behavior modeling has been used by researchers for approximately 50+ years to predict how a fire will move through a given landscape (Linn 2003). The models have had varied complexities and applications throughout the years. One model has become the most widely used as the industry standard for predicting fire behavior on a given landscape. That model, known as "BEHAVE", was developed by the U. S. Government (USDA Forest Service, Rocky Mountain Research Station) and has been in use since 1984. Since that time, it has undergone continued research, improvements, and refinement. The current version, BehavePlus 6.0, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Grabner, et. al. 1994, Marsden-Smedley and Catchpole 1995, Grabner 1996, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, Behave is used to model fire behavior based on pre-fire conditions in an area that recently burned. Real-world fire behavior, documented during the wildfire, can then be compared to the prediction results of Behave and refinements to the fuel models incorporated, retested, and so on.

Fire behavior modeling conducted on this site includes a relatively high-level of detail and analysis which results in reasonably accurate representations of how wildfire may move through available fuels on and adjacent the property. Fire behavior calculations are based on site-specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. To objectively predict flame lengths, spread rates, and fireline intensities, this analysis incorporated predominant fuel characteristics, slope percentages, and representative fuel models observed on site. The BehavePlus fire behavior modeling system was used to analyze anticipated fire behavior within and adjacent to key areas just outside of the proposed lots.

Predicting wildland fire behavior is not an exact science. As such, the movement of a fire will likely never be fully predictable, especially considering the variations in weather and the limits of weather forecasting. Nevertheless, practiced and experienced judgment, coupled with a validated fire behavior modeling system, results in useful and accurate fire prevention planning information.

To be used effectively, the basic assumptions and limitations of BehavePlus must be understood.

- First, it must be realized that the fire model describes fire behavior only in the flaming front. The primary driving force in the predictive calculations is dead fuels less than one-quarter inch in diameter. These are the fine fuels that carry fire. Fuels greater than one inch have little effect while fuels greater than three inches have no effect on fire behavior.
- Second, the model bases calculations and descriptions on a wildfire spreading through surface fuels that are within six feet of the ground and contiguous to the ground. Surface fuels are often classified as grass, brush, litter, or slash.
- Third, the software assumes that weather and topography are uniform. However, because wildfires almost always burn under non-uniform conditions, length of projection period and choice of fuel model must be carefully considered to obtain useful predictions.
- Fourth, the BehavePlus fire behavior computer modeling system was not intended for determining sufficient fuel modification zone widths. However, it does provide the average length of the flames, which is a key element for determining "defensible space" distances for minimizing structure ignition.

Although BehavePlus has some limitations, it can still provide valuable fire behavior predictions which can be used as a tool in the decision-making process. In order to make reliable estimates of fire behavior, one must understand the relationship of fuels to the fire environment and be able to recognize the variations in these fuels. Natural fuels are made up of the various components of vegetation, both live and dead, that occur on a site. The type and quantity will depend upon the soil, climate, geographic features, and the fire history of the site. The major fuel groups of grass, shrub, trees, and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels. Fire behavior is affected by seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content, and chemical properties.

The seven fuel characteristics help define the 13 standard fire behavior fuel models[1] and the five custom fuel models developed for Southern California[2]. According to the model classifications, fuel models used in BehavePlus have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface to volume ratio. Observation of the fuels in the field (on site) determines which fuel models should be applied in BehavePlus. The following describes the distribution of fuel models among general vegetation types for the standard 13 fuel models and the custom Southern California fuel models:

[1] Anderson, Hal E. 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Forest Service Gen. Tech. Report INT-122. Intermountain Forest and Range Experiment Station, Ogden, UT.

[2] Weise, D.R. and J. Regelbrugge. 1997. Recent chaparral fuel modeling efforts. Prescribed Fire and Effects Research Unit, Riverside Fire Laboratory, Pacific Southwest Research Station. 5p.

- Grasses Fuel Models 1 through 3
- Brush Fuel Models 4 through 7, SCAL 14 through 18
- Timber Fuel Models 8 through 10
- Logging Slash Fuel Models 11 through 13

In addition, the aforementioned fuel characteristics were utilized in the recent development of 40 new fire behavior fuel models[3] developed for use in BehavePlus modeling efforts. These new models attempt to improve the accuracy of the standard 13 fuel models outside of severe fire season conditions, and to allow for the simulation of fuel treatment prescriptions. The following describes the distribution of fuel models among general vegetation types for the new 40 fuel models:

- Non-Burnable Models NB1, NB2, NB3, NB8, NB9
- Grass Models GR1 through GR9
- Grass-shrub Models GS1 through GS4
- Shrub Models SH1 through SH9
- Timber-understory Models TU1 through TU5
- Timber litter Models TL1 through TL9
- Slash blowdown Models SB1 through SB4

BehavePlus software was used in the development of this Mission 316 West Project (Proposed Project) Fire Protection Plan (FPP) in order to evaluate potential fire behavior for the Project site. Existing site conditions were evaluated, and local weather data was incorporated into the BehavePlus modeling runs.

FUEL MODELS

Dudek utilized the BehavePlus software package to analyze fire behavior potential for the Mission 316 West Project site in San Marcos, California. Analysis total of three fire scenarios were evaluated, including one summer, onshore weather condition (west of the Project Site) and two extreme fall, offshore weather condition (northwest and northeast of the Project Site). Fuels and terrain at and beyond this distance can produce flying embers that may affect the project, but defenses have been built into the structures to prevent ember penetration and to extinguish fires that may result from ember penetration. It is the fuels adjacent to and within fuel modification zones that would have the potential to affect the project's structures from a radiant and

[3] Scott, Joe H. and Robert E. Burgan. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

convective heat perspective as well as from direct flame impingement. BehavePlus software requires site-specific variables for surface fire spread analysis, including fuel type, fuel moisture, wind speed, and slope data. The output variables used in this analysis include flame length (feet), rate of spread (feet/minute), fireline intensity (BTU/feet/second), and spotting distance (miles). The following provides a description of the input variables used in processing the BehavePlus models for the Proposed Project site. In addition, data sources are cited and any assumptions made during the modeling process are described. Table 1 provides a description of the fuel model observed in the vicinity of the site that were subsequently used in the analysis for this project. Modeled areas include the riparian forest (FM9) that occur to the west / northwest of the Project site, moderate load chaparral (Sh2) that occur west and north of the Project site, and high load chaparral (Sh5) that occur, north and adjacent to the Project site. A total of three fire modeling scenarios were completed for the Project site. These sites were selected based on the strong likelihood of fire approaching from these directions during a Santa Ana wind-driven fire event (fire scenarios 1 and 3) and an on-shore weather pattern (fire scenario 2). Dudek also conducted modeling of the site for post-Fuel Modification Zones' (FMZ) recommendations for this project (Refer to Table 1 for post-FMZ fuel model descriptions). Fuel modification includes establishment of irrigated and thinned zones on the north side of the Project site. For modeling the post-FMZ treatment condition, the fuel model assignment was re-classified for the Zone A (Fuel Model 8).

Table 1
Existing Fuel Model Characteristics

Fuel Model	Description	Location	Fuel Bed Depth (Feet)
Sh2	Moderate Load, Dry Climate Shrub	Fuel type is concentrated on the south facing hillside north and above the Project site.	3.0 ft
Sh5	High Load, Dry Climate Shrub	Fuel type is concentrated on the south facing hillside adjacent and above the Project site.	8.0 ft
FM8	Irrigated Landscape	Fuel type will occur post development within Zone-A – min. 100-foot irrigated zone	<1.0 ft.
FM9	Riparian Forest woodland	Fuel type is concentrated across Woodward Street, west of the Project site.	>8.0 ft

Topography

Slope is a measure of angle in degrees from horizontal and can be presented in units of degrees or percent. Slope is important in fire behavior analysis as it affects the exposure of fuel beds. Additionally, fire burning uphill spreads faster than those burning on flat terrain or downhill as uphill vegetation is pre-heated and dried in advance of the flaming front, resulting in faster

ignition rates. Slope values ranging from 5–18% were measured around the perimeter of the proposed project site from U.S. Geological Survey (USGS) topographic maps.

Weather

The County of San Diego, Department of Planning and Land Use (County of San Diego 2010) developed guidelines to identify acceptable fire behavior modeling weather inputs for fire conditions during summer months and Santa Ana fire weather patterns. The County analyzed and processed fire weather from Remote Automated Weather Stations (RAWS) between April 15 to December 31 in order to represent the general limits of the fire season. Data provided by the County's analysis included temperature, relative humidity, and sustained wind speed and is categorized by weather zone, including Maritime, Coastal, Transitional, Interior, and Desert.

As identified in the County's guidelines, Dudek utilized the Fine Dead Fuel Moisture (FDFM) tool within BehavePlus fire behavior modeling software package to determine potential fuel moisture values to be input into the BehavePlus runs. The temperature, relative humidity, and wind speed data for the Transitional (County of San Diego 2010) weather zone were utilized for this FPP based on the project's location. Reference fuel moistures were calculated in the FDFM tool and were based on site-specific topographic data inputs. Table 2 summarizes the FDFM inputs and the resulting fine dead fuel moisture values.

Table 2
BehavePlus Fine Dead Fuel Moisture Calculation

Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
Dry Bulb Temperature	90 -109 deg. F	90 -109 deg. F
Relative Humidity	10 - 14 %	5 -9 %
Reference Fuel Moisture	2 %	1 %
Month	May June July	May June July
Time of Day	12:00 - 13:59	12:00 - 13:59
Elevation Difference	Level (within 1,000 ft.)	Level (within 1,000 ft.)
Slope	30% +	30% +
Aspect	East	East
Fuel Shading	Exposed (< and > 50% shading)	Exposed (< and > 50% shading)
Fuel Moisture Correction	1 %	1 %
Fine Dead Fuel Moisture	3 %	2 %

The weather variables presented in Table 3 are based on the calculated FDFM (Table 2) and the wind speed values identified in the County of San Diego standards.

Table 3
Weather Variables From County of San Diego Standards

Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
1h Moisture	3%	2%
10h Moisture	6%	3%
100h Moisture	8%	5%
Live Herbaceous Moisture	60%	30%
Live Woody Moisture	90%	50%
20-foot Wind Speed	19 mph	18 mph (sustained winds); 50 mph (gusty winds)

mph = miles per hour

In addition to the analyzing weather conditions using the County of San Diego's guidelines, historical weather data for the coastal region was utilized in determining appropriate fire behavior modeling inputs for the Project area. 50th and 97th percentile moisture values were derived from Remote Automated Weather Station (RAWS) and utilized in the fire behavior modeling efforts conducted in support of this report. Weather data sets from the Las Flores RAWS[4] were utilized in the fire modeling runs.

RAWS fuel moisture and wind speed data were processed utilizing the Fire Family Plus software package to determine atypical (97th percentile) and typical (50th percentile) weather conditions. Data from the RAWS was evaluated from August 1 through November 30 for each year between 1992 and 2017 (extent of available data record) for 97th percentile weather conditions and from June 1 through September 30 for each year between 1992 and 2017 for 50th percentile weather conditions.

Following analysis in Fire Family Plus, fuel moisture information was incorporated into the Initial Fuel Moisture file used as an input in BehavePlus. Wind speed data resulting from the Fire Family Plus analysis was also determined. Initial wind direction and wind speed values for the two BehavePlus runs were manually entered during the data input phase. The input wind speed and direction is roughly an average surface wind at 20 feet above the vegetation over the analysis area. Table 2 summarizes the wind and weather input variables used in the Fire BehavePlus modeling efforts.

[4] http://raws.wrh.noaa.gov/cgi-bin/roman/meso_base.cgi?stn=CAPC1&unit=0&time=LOCAL Latitude: 33.30944 Longitude: -117.42361; Elevation: 750 ft.)

To conservatively analyze potential fire behavior for the site, the weather variables derived from the Las Flores RAWS station were used in the fire behavior modeling efforts conducted in support of this FPP as they presented higher wind speed values. These variables used in the Fire Behavior Modeling are presented below in Table 4.

Table 4
Weather Variables Used in Fire Behavior Modeling From Las Flores RAWS Analysis

Model Variable	Summer Weather (Onshore Winds)	Fall Weather (Offshore Winds)
Fuel Models	FM9, Sh2	FM 8, FM9, Sh1, Sh2, Sh5
1 h fuel moisture	5%	1%
10 h fuel moisture	7%	3%
100 h fuel moisture	14%	5%
Live herbaceous moisture	50%	30%
Live woody moisture	105%	60%
20 ft. wind speed	25 mph (sustained winds)	18 mph (sustained winds); 50 mph (gusty winds)
Wind Directions from upslope (degrees)	90	165, 220
Wind adjustment factor	0.4	0.4
Slope (uphill)	21%	6-20%

Fire Modeling Scenarios

Based on slope and fuel conditions, three different fire scenarios were evaluated for the project site, including:

- **Scenario 1:** 97th percentile weather with off-shore wind and a fall fire burning in moderate to high dry chaparral and sage scrub shrub cover north and northeast of the project site. The terrain is slightly sloped (21% slope) with potential ignition sources with from a wildfire that originates northwest of the Project site. Fire in this area would be moving slightly downhill toward the Proposed Project.
- **Scenario 2:** 50th percentile weather with on-shore wind and a summer fire burning in moderate load chaparral and sage scrub shrub cover and a riparian forest across Woodward Street, west of the project site. This area is relatively flat (less than 10% slope) with potential ignition sources from a wildfire that originates in the Riparian Forest and chaparral vegetation to the west of the Proposed Project. Fire in this area would be moving slightly uphill toward the Proposed Project.
- **Scenario 3:** 97th percentile weather with off-shore wind and a fall fire burning in a riparian forest with moderate to high dry chaparral and sage scrub shrub cover north and

northwest of the project site in gentle terrain (6% slope). Potential ignition sources could be from vehicle or people walking along Woodward Street. Fire in this area would be moving slightly downhill toward the Proposed Project.

Fire Behavior Modeling Effort

As mentioned, the BehavePlus fire behavior modeling software package was utilized in evaluating anticipated fire behavior adjacent to the Proposed Project site. Three focused analyses were completed, each assuming worst-case fire weather conditions for a fire approaching the project site from the north, northwest, northeast, and west. Three fire behavior variables were selected as outputs from the BehavePlus analysis conducted for the project site, and include flame length (feet), rate of spread (mph), fireline intensity (BTU/feet/second), and surface fire spotting distance (miles). The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews, Bevins, and Seli 2008). Fireline intensity is a measure of heat output from the flaming front, and also affects the potential for a surface fire to transition to a crown fire. Fire spread rate represents the speed at which the fire progresses through surface fuels and is another important variable in initial attack and fire suppression efforts (Rothermel and Rinehart 1983). Spotting distance is the distance a firebrand or ember can travel down wind and ignite receptive fuel beds. The information in Table 5 presents an interpretation of the outputs for two fire behavior variables as related to fire suppression efforts. The results of fire behavior modeling efforts are presented in Table 6. Identification of modeling run locations is presented graphically in Figure 5 of the FPP.

Table 5
Fire Suppression Interpretation

Flame Length (ft.)	Fireline Intensity (Btu/ft./s)	Interpretations
Under 4 feet	Under 100 BTU/ft./s	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 to 8 feet	100-500 BTU/ft./s	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8 to 11 feet	500-1000 BTU/ft./s	Fires may present serious control problems -- torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11 feet	Over 1000 BTU/ft./s	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

FIRE BEHAVIOR MODELING RESULTS

The results presented in Table 6 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

Based on the BehavePlus analysis, worst-case fire behavior is expected in non-maintained chaparral north and below the proposed Project site under Peak weather conditions (represented by Fall Weather, Scenario 3). The fire is anticipated to be a wind-driven fire from the north/northeast during the fall. Under such conditions, expected surface flame lengths reach 44 feet with wind speeds of 50+ mph. Under this scenario, fireline intensities reach 21,620 BTU/feet/second with fast spread rates of 6.74 mph and could have a spotting distance up to 2.3 miles away.

Based on the BehavePlus analysis, post development fire behavior is expected in irrigated and replanted with plants that are acceptable with SMFD (Zone-A - FM8) under peak weather conditions (represented by Fall Weather, Scenario 4). Under such conditions, expected surface flame length is expected to be significantly lower, with flames lengths reaching approximately 11 feet with wind speeds of 50+ mph. Under this scenario, fireline intensities reach 62 BTU/feet/second with relatively slow spread rates of 0.2 mph and could have a spotting distance up to 0.4 miles away.

Table 6
RAWS BehavePlus Fire Behavior Model Results

Fire Scenario	Flame Length (feet)	Spread Rate (mph)	Fireline Intensity (Btu/ft./s)	Spot Fire (Miles)
Scenario 1: 21% slope, Fall, Offshore, Extreme Winds (Pre-Development)				
Moderate load shrub/chaparral (Sh2)	8.3' (15.8')	0.24 (0.98)	558 (2,277)	0.4 (1.2)[5]
High load shrub/chaparral (Sh5)	25.3' (44.2')	1.98 (6.69)	6,355 (21,454)	0.8 (2.4)
Scenario 2: 5% slope, Summer, Onshore Winds				
Moderate load shrub/chaparral (Sh2)	2.3'	0.06	36	0.2
Riparian Vegetation (FM9)	5.3'	0.37	210	0.3
Scenario 3: 6% slope, Fall, Offshore, Extreme Winds				
Moderate load shrub/chaparral (Sh2)	8.4' (15.8')	0.25 (0.99)	575 (2,293)	0.3 (1.0)
High load shrub/chaparral (Sh5)	25.6' (44.4')	2.03 (6.74)	6,519 (21,620)	0.8 (2.3)
Riparian Vegetation (FM9)	5.9' (13.0')	0.34 (1.91)	269 (1,497)	0.2 (0.8)
Scenario 1: 21% slope, Fall, Offshore, Extreme Winds (Post Development)				
FMZ Zone A (FM8)	2.1' (3.0')	0.1 (0.2)	28 (62)	0.1 (0.3)

[5] It should be noted that the wind mph in parenthesis represent peak gusts of 50 mph.

Appendix D

Suggested Plant List for a Defensible Space

SUGGESTED PLANT LIST FOR A DEFENSIBLE SPACE

BOTANICAL NAME	COMMON NAME	Climate Zone
TREES		
Acer		
platanoides	Norway Maple	M
rubrum	Red Maple	M
saccharinum	Silver Maple	M
saccarum	Sugar Maple	M
macrophyllum	Big Leaf Maple	C/ (R)
Alnus rhombifolia	White Alder	C/I/M (R)
Arbutus		
unedo	Strawberry Tree	All zones
Archontophoenix		
cunninghamiana	King Palm	C
Arctostaphylos spp.**	Manzanita	C/I/D
Brahea		
armata	Blue Hesper Palm	C/D
edulis	Guadalupe Palm	C/D
Ceratonia siliqua	Carob	C/I/D
Cerdidium floridum	Blue Palo Verde	D
Cercis occidentalis**	Western Redbud	C/I/M
Cornus		
nuttallii	Mountain Dogwood	I/M
stolonifera	Redtwig Dogwood	I/M
Eriobotrya		C/I/D
japonica	Loquat	C
Erythrina caffra	Kaffirboom Coral Tree	I/M
Gingko biloba "Fairmount"	Fairmount Maidenhair Tree	I/D/M
Gleditisia triacanthos	Honey Locust	
Juglans		I
californica	California Walnut	C/I
hindsii	California Black Walnut	I/D/M
Lagerstroemia indica	Crape Myrtle	I
Ligustrum lucidum	Glossy Privet	C/I/M
Liquidambar styraciflua	Sweet Gum	I
Liriodendron tulipifera	Tulip Tree	
Lyonothamnus floribundus		C
ssp. Asplenifolius	Fernleaf Catalina Ironwood	C/I/D
Melaleuca spp.	Melaleuca	C/I
Parkinsonia aculeate	Mexican Palo Verde	
Pistacia	Chinese Pistache	
chinensis	Pistachio Nut	C/I/D

vera	Pistachio Nut	I
Pittosporum		
phillyraeoides	Willow Pittosporum	C/I/D
viridiflorum	Cape Pittosporum	C/I
Platanus		
acerifolia	London Plane Tree	All zones
racemosa**	California Sycamore	C/I/M
Populus		
alba	White Poplar	D/M
fremontii**	Western Cottonwood	I
trichocarpa	Black Cottonwood	I/M
Prunus		
xblireiana	Flowering Plum	M
caroliniana	Carolina Laurel Cherry	C
ilicifolia**	Hollyleaf Cherry	C
lyonii**	Catalina Cherry	C
serrulata ‘Kwanzan’	Flowering Cherry	M
yedoensis ‘Akebono’	Akebono Flowering Cherry	M
Quercus		
agrifolia**	Coast Live Oak	C/I
engelmannii	Engelmann Oak	I
** suber	Cork Oak	C/I/D
Rhus		
lancea**	African Sumac	C/I/D
Salix spp.**	Willow	All zones (R)
Tristania conferta	Brisbane Box	C/I
Ulmus		
parvifolia	Chinese Elm	I/D
pumila	Siberian Elm	C/M
Umbellularia californica**	California Bay Laurel	C/I

SHRUBS		
Agave	Century Plant	D
americana	Century Plant	D
deserti	Shawis Century Plant	D
shawi**		
Amorpha fruticosa**	False Indigobush	I
Arbutus		
menziesii**	Madrone	C/I
Arctostaphylos spp.**	Manzanita	C/I/D
Atriplex**		
canescens	Hoary Saltbush	I
lentiformis	Quail Saltbush	D
Baccharis**		
glutinosa	Mule Fat	C/I
pilularis	Coyote Bush	C/I/D
Carissa grandiflora	Natal Plum	C/I
Ceanothus spp.**	California Lilac	C/I/M
Cistus spp.	Rockrose	C/I/D
Cneoridium dumosum**	Bushrue	C
Comarostaphylis**		
diversifolia	Summer Holly	C
Convolvulus cneorum	Bush Morning Glory	C/I/M
Dalea		
orcuttii	Orcutt's Delea	D
spinosa**	Smoke Tree	I/D
Elaeagnus		
pungens	Silverberry	C/I/M
Encelia**		
californica	Coast Sunflower	C/I
farinose	White Brittlebush	D/I
Eriobotrya		
deflexa	Bronze Loquat	C/I
Eriophyllum		
confertiflorum**	Golden Yarrow	C/I
staechadifolium	Lizard Tail	C
Escallonia spp.	Escallonia	C/I
Feijoa sellowiana	Pineapple Guava	C/I/D
Fouqueria splendens	Ocotillo	D
Fremontodendron**		
californicum	Flannelbush	I/M
mexicanum	Southern Flannelbush	I
Galvezia		
juncea	Baja Bush-Snapdragon	C
speciosa	Island Bush-Snapdragon	C
Garrya		
elliptica	Coast Silktassel	C/I
flavescens**	Ashy Silktassel	I/M

Heteromeles arbutifolia**	Ashy Silktassel	I/M
Lantana spp.	Toyon	C/I/M
Lotus scoparius	Lantana	C/I/D
Mahonia spp.	Deerweed	C/I
	Barberry	C/I/M
Malacothamnus		
clementinus		
	San Clemente Island Bush Mallow	C
fasciculatus**		
	Mesa Bushmallow	C/I
Melaleuca spp.		
Mimulus spp.**	Melaleuca	C/I/D
Nolina	Monkeyflower	C/I (R)
parryi		
parryi ssp. wolfii	Parry's Nolina	I
Photinia spp.	Wolf's Bear Grass	D
Pittosporum	Photinia	All Zones
crassifolium		
rhombifolium		CI/I
tobira 'Wheeleri'	Queensland Pittosporum	C/I
undulatum	Wheeler's Dwarf	C/I/D
viridiflorum	Victorian Box	C/I
Plumbago auriculata	Cape Pittosporum	C/I
Prunus	Cape Plumbago	C/I/D
caroliniana		
ilicifolia**	Carolina Laurel Cherry	C
lyonii**	Hollyleaf Cherry	C
Puncia granatum	Catalina Cherry	C
Pyracantha spp.	Pomegranate	C/I/D
Quercus	Firethorn	All Zones
dumosa**		
Rhamus	Scrub Oak	C/I
alaternus		
californica**	Italian Blackthorn	C/I
Rhaphiolepis spp.	Coffeeberry	C/I/M
Rhus	Rhaphiolepis	C/I/D
integrifolia**		
laurina	Lemonade Berry	C/I
lentii	Laurel Sumac	C/I
ovata**	Pink-Flowering Sumac	C/D
trilobata**	Sugarbush	I/M
Ribes	squawbush	I
viburnifolium		
speciosum**	Evergreen Currant	C/I
Romneya coulteri	Fuschia-Flowering Gooseberry	C/I/D
Rosa	Matilija Poppy	I
californica**		
minutifolia		

	Salvia spp.**	California Wild Rose	C/I
	Sambucus spp.**	Baja California Wild Rose	C/I
	Symphoricarpos mollis**	Sage	All Zones
	Syringa vulgaris	Elderberry	C/I/M
	Tecomaria capensis	Creeping Snowberry	C/I
	Teucrium fruticans	Lilac	M
	Toxicodendron**	Cape Honeysuckle	C/I/D
	diversilobum	Bush Germander	C/I
	Verbena		
	lilacina	Poison Oak	I/M
	Xylosma congestum		
	Yucca**	Lilac Verbena	C
	schidigera	Shiny Xylosma	C/I
	whipplei		
		Mojave Yucca	D
		Foothill Yucca	I

GROUNDCOVERS		
Achillea**	Yarrow	All Zones
Aptenia cordifolia	Apteria	C
Arctostaphylos spp.**	Manzanita	C/I/D
Baccharis**		
pilularis	Coyote Bush	C/I/D
Ceanothus spp.**	California Lilac	C/I/M
Cerastium tomentosum	Snow-in-Summer	All Zones
Coprosma kirkii	Creeping Coprosma	C/I/D
Cotoneaster spp.	Redberry	All Zones
Drosanthemum hispidum	Rosea Ice Plant	C/I
Dudleya		
brittonii	Brittonis Chalk Dudleya	C
pulverulenta**	Chalk Dudleya	C/I
virens	Island Live Fore-ever	C
Eschscholzia californica**	California Poppy	All Zones
Euonymus fortunei		
‘Carrierei’	Glossy Winter Creeper	M
‘Coloratus’	Purple-Leaf Winter Creeper	M
Ferocactus viridescens**	Coast Barrel Cactus	C
Gaillardia grandiflora	Blanket Flower	All Zones
Gazania spp.	Gazania	C/I
Helianthemum spp.**	Sunrose	All Zones
Lantana spp.	Lantana	C/I/D
Lasthenia		
californica**	Common Goldfields	I
glabrata	Coastal Goldfields	C
Lupinus spp.**	Lupine	C/I/M
Myoporum spp.	Myoporum	C/I
Pyracantha spp.	Firethorn	All zones
Rosmarinus officinalis	Rosemary	C/I/D
Santolina		
chamaecyparissus	Lavender Cotton	All Zones
virens	Santolina	All Zones
Trifolium frageriferum	O’Connor’s Legume	C/I
Verbena		
rigida	Verbena	All Zones
Viguiera laciniata**	San Diego Sunflower	C/I
Vinca		
minor	Dwarf Periwinkle	M

VINES		
Antigonon leptopus	San Miguel Coral Vine	C/I
Distictis buccinatoria	Blood-Red Trumpet Vine	C/I/D
Keckiella cordifolia**	Heart-Leaved Penstemon	C/I
Lonicera		
japonica 'Halliana'	Hall's Honeysuckle	All Zones
subspicata**	Chaparral Honeysuckle	C/I
Solanum		
jasminoides	Potato Vine	C/I/D

PERENNIALS		
Coreopsis		
gigantean	Giant Coreopsis	C
grandiflora	Coreopsis	All Zones
maritime	Sea Dahlia	C
verticillata	Coreopsis	C/I
Heuchera maxima	Island Coral Bells	C/I
Iris douglasiana**	Douglas Iris	C/M
Iva hayesiana**	Poverty Weed	C/I
Kniphofia uvaria	Red-Hot Poker	C/M
Lavandula spp.	Lavender	All Zones
Limonium californicum		
var. mexicanum	Coastal Statice	C
perezii	Sea Lavender	C/I
Oenothera spp.	Primrose	C/I/M
Penstemon spp.**	Penstemon	C/I/D
Satureja douglasii	Yerba Buena	C/I
Sisyrinchium		
bellum	Blue-Eyed Grass	C/I
californicum	Golden-Eyed Grass	C
Solanum		
xantii	Purple Nightshade	C/I
Zauschneria**		
californica	California Fuschia	C/I
cana	Hoary California Fuschia	C/I
'Catalina'	Catalina Fuschia	C/I

ANNUALS		
Lupinus spp.**	Lupine	C/I/M

Appendix E

Prohibited Plant List

UNDESIRABLE PLANT LIST

The following species are highly flammable and should be avoided when planting within the first 50 feet adjacent to a structure. The plants listed below are more susceptible to burning, due to rough or peeling bark, production of large amounts of litter, vegetation that contains oils, resin, wax, or pitch, large amounts of dead material in the plant, or plantings with a high dead to live fuel ratio. Many of these species, if existing on the property and adequately maintained (pruning, thinning, irrigation, litter removal, and weeding), may remain as long as the potential for spreading a fire has been reduced or eliminated.

BOTANICAL NAME	COMMON NAME
Abies species	Fir Trees
Acacia species	Acacia (trees, shrubs, groundcovers)
*Adenostoma sparsifolium***	Red Shanks
*Adenostoma fasciculatum***	Chamise
Agonis juniperina	Juniper Myrtle
Araucaria species	Monkey Puzzle, Norfolk Island Pine
*Artemesia californica***	California Sagebrush
Bambusa species	Bamboo
Cedrus species	Cedar
Chamaecyparis species	False Cypress
Coprosma pumila	Prostrate Coprosma
Cryptomeria japonica	Japanese Cryptomeria
Cupressocyparis leylandii	Leylandii Cypress
*Cupressus forbesii***	Tecate Cypress
Cupressus glabra	Arizona Cypress
Cupressus sempervirens	Italian Cypress
Dodonea viscosa	Hopseed Bush
*Eriogonum fasciculatum***	Common Buckwheat
Eucalyptus species	Eucalyptus
*Heterotheca grandiflora***	Telegraph Plant
Juniperus species	Junipers
Larix species	Larch
Lonicera japonica	Japanese Honeysuckle
Miscanthus species	Eulalia Grass
*Muehlenbergia species***	Deer Grass
Palmae species	Palms
Picea species	Spruce Trees
*Pickeringia Montana***	Chaparral Pea
Pinus species	Pines
Podocarpus species	Fern Pine
Pseudotsuga menziesii	Douglas Fir
Rosmarinus species	Rosemary
*Salvia mellifera***	Black Sage
Taxodium species	Cypress
Taxus species	Yew
Thuja species	Arborvitae
Tsuga species	Hemlock
*Urtica urens***	Burning Nettle

** San Diego County native species

References: Gordon, H. White, T.C. 1994. Ecological Guide to Southern California Chaparral Plant Series. Cleveland National Forest.

Willis, E. 1997. San Diego County Fire Chief's Association. Wildland/Urban Interface Development Standards

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City of Vista, California 1997. Undesirable Plants. Section 18.56.999. Landscaping Design, Development and Maintenance Standards.

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www.ucfpl.ucop.edu. 2004. University of California, Berkeley, Forest Products Laboratory, College of Natural Resources. Defensible Space Landscaping in the Urban/Wildland Interface. A Compilation of Fire Performance Ratings of Residential Landscape Plants.

County of Los Angeles Fire Department. 1998. Fuel Modification Plan Guidelines. Appendix I, Undesirable Plant List, and Appendix II, Undesirable Plant List.

Appendix L

Water and Sewer Study

VALLECITOS WATER DISTRICT

MISSION 316 WEST SUBDIVISION WATER AND SEWER STUDY

WORK ORDER # 204569

FINAL TECHNICAL MEMORANDUM

November 14, 2018

Prepared By: Robert Scholl, P.E., Eileen Koonce and Lisa Whitesell

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INTRODUCTION

The proposed Mission 316 West Subdivision (Project) is a 67-lot multi-family residential development on a 3.63-acre parcel (APN 220-210-50) located north of E. Mission Road between Woodward Street and Falcon Place in the City of San Marcos.

The Project property is located within the Vallecitos Water District's (VWD) boundaries for both water and wastewater service. The Project proposes to receive water and sewer service from VWD.

All new projects undergo evaluation by VWD to determine if the current water and/or sewer infrastructure is sufficient to accommodate the proposed water demands and sewer generation.

This study considers water demand and sewage generation increases due to the proposed Project densification. It analyzes the following aspects of VWD's infrastructure and makes recommendations for capital improvements for impacts that are created due to the land use change:

- Water distribution system, including the need to upsize pipelines, install new pipelines, or install flow control facilities
- Water storage, including the need for additional storage and the adequacy of existing storage tanks and reservoirs to serve the proposed development
- Water pump stations, including the need to install new pump stations or upsize existing pump stations to serve the proposed development
- Wastewater collection system, including the need to upsize pipelines and manholes, or the need to install new pipelines and manholes
- Wastewater lift stations, including the need to install new lift stations or upsize existing lift stations to serve the proposed development
- Wastewater land outfall, including the need to construct a parallel land outfall to serve this and other proposed developments
- Wastewater treatment facilities, including the need for obtaining additional capacity at the Encina Water Pollution Control Facility (EWPCF) or for expanding the Meadowlark Water Reclamation Facility (MRF)

WATER SYSTEM ANALYSIS

The proposed 3.63-acre Project lies completely within VWD's 920 Pressure Zone. Figures 1 and 2 show the development's location in relation to pressure zone boundaries, identify pipelines within the vicinity of the development, and identify storage reservoirs that supply the development area. The Project is proposed to connect to VWD's existing water system in E. Mission Road.

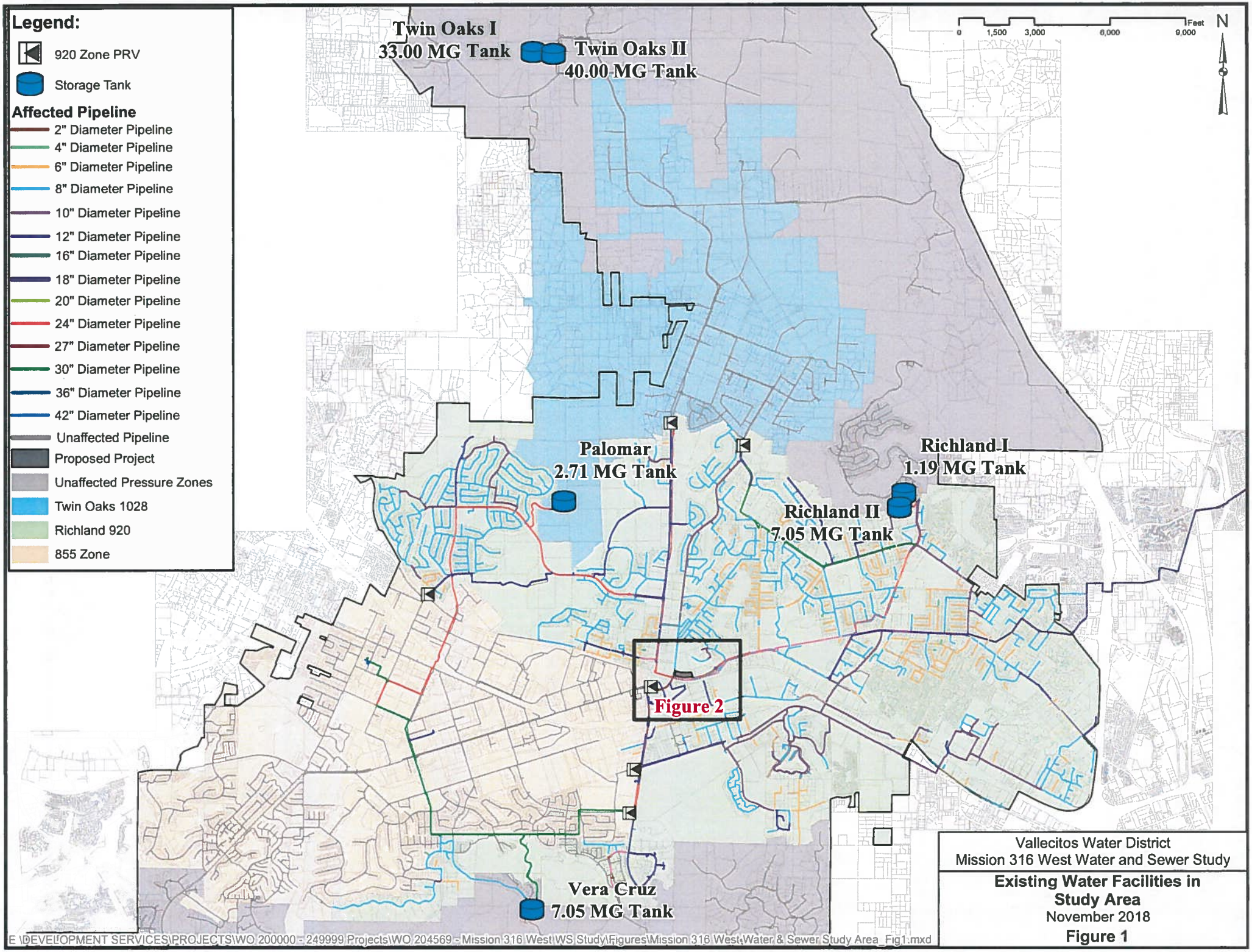
Water Demand Projections

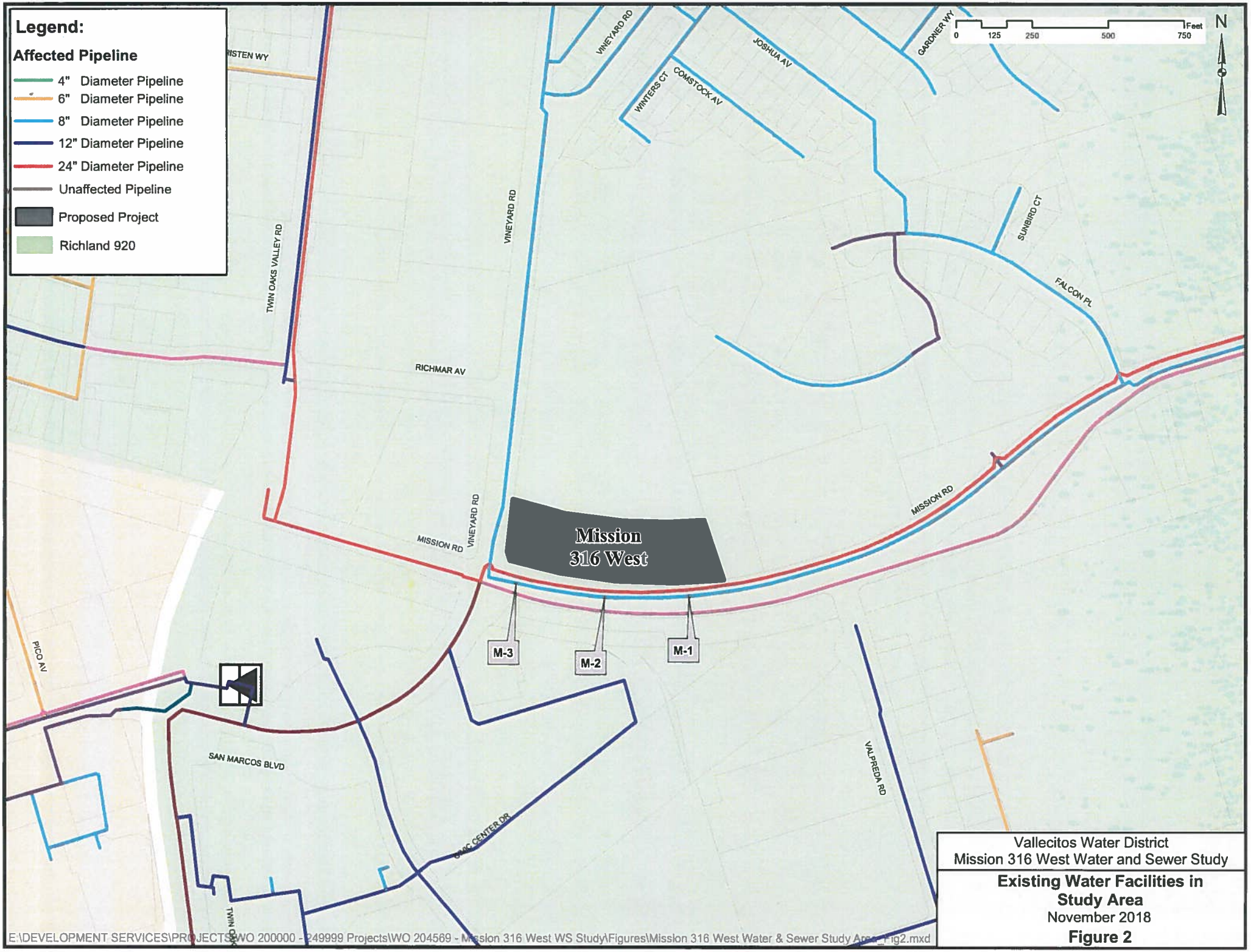
The Project property's General Plan designation by the City of San Marcos as of June 30, 2008 was Commercial. The 2008 Master Plan based its ultimate water demand planning on this approved land use. The Project proposes a density increase with 67 multi-family units on 3.63 acres (Residential 15-20 du/ac).

Table 1 provides the average water demand generated both under the density planned for in the 2008 Master Plan and under the proposed Project densification. The table shows that the densification will increase the projected average water demand from the 2008 Master Plan land use by 12,705 gallons per day.

Table 1 – Project Estimated Water Demands

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/acre)	Water Demand (gpd)
2008 Master Plan Land Use Demand				
Commercial (gpd/ac)	3.63		1,500	5,445
Total	**3.63**	**-**		**5,445**
Proposed Development Demand				
Residential (15-20 du/ac)	3.63	67	5,000	18,150
Total	**3.63**	**-**		**18,150**
Total Water Demand Increase				**12,705**


Legend:
920 Zone PRV
Storage Tank
Affected Pipeline
2" Diameter Pipeline
4" Diameter Pipeline
6" Diameter Pipeline
8" Diameter Pipeline
10" Diameter Pipeline
12" Diameter Pipeline
16" Diameter Pipeline
18" Diameter Pipeline
20" Diameter Pipeline
24" Diameter Pipeline
27" Diameter Pipeline
30" Diameter Pipeline
36" Diameter Pipeline
42" Diameter Pipeline
Unaffected Pipeline
Proposed Project
Unaffected Pressure Zones
Twin Oaks 1028
Richland 920
855 Zone
Twin Oaks I
33.00 MG Tank
Twin Oaks II
40.00 MG Tank
Palomar
2.71 MG Tank
Richland I
1.19 MG Tank
Richland II
7.05 MG Tank
Figure 2
Vera Cruz
7.05 MG Tank
0
1,500
3,000
6,000
9,000
Feet
N
Vallecitos Water District
Mission 316 West Water and Sewer Study
Existing Water Facilities in Study Area
November 2018
Figure 1
E:\DEVELOPMENT SERVICES\PROJECTS\WO 200000 - 249999 Projects\WO 204569 - Mission 316 West\WS Study\Figures\Mission 316 West Water & Sewer Study Area_Fig1.mxd


Legend:
Affected Pipeline
4" Diameter Pipeline
6" Diameter Pipeline
8" Diameter Pipeline
12" Diameter Pipeline
24" Diameter Pipeline
Unaffected Pipeline
Proposed Project
Richland 920
0 125 250 500 750 Feet
N
VINEYARD RD
JOSHUA AV
GARDNER WY
WINTERS CT
COMSTOCK AV
SUNBIRD CT
FALCON PL
TWIN OAKS VALLEY RD
RICHMAR AV
MISSION RD
Mission
316 West
M-3
M-2
M-1
PICO AV
SAN MARCOS BLVD
CRAIG CENTER DR
VALPREDA RD
Vallecitos Water District
Mission 316 West Water and Sewer Study
Existing Water Facilities in Study Area
November 2018
Figure 2
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Water Distribution System Analysis

The 2008 Master Plan water system distribution and pressure criteria are as follows:

Water Distribution Infrastructure Criteria

The water service pressure criteria to be met by this development are as follows:

- Minimum allowable pressure at peak hour demand: 40 psi
- Minimum allowable pressure at max day plus fire demand: 20 psi
- Maximum allowable pressure: 150 psi

The City of San Marcos Fire Marshall has set the required fire demand at 1,500 gpm for the Project.

To avoid excessive velocity and headloss within the distribution system, the following pipeline design criteria was also utilized:

- Maximum allowable velocity: 7 feet per second
- Maximum allowable headloss gradient: 15 feet per 1,000 feet
- Hazen-Williams C-factor: 130

Water Model Scenarios

The following scenarios were modeled to identify system impacts that may be created by the proposed water demands, and to recommend any improvements required to provide service to the Project:

- Average Day Demand with existing demands at the Project site
- Average Day Demand with the proposed Project
- Maximum Day Demand with existing demands at the Project site
- Maximum Day Demand with the proposed Project
- Peak Hour Demand with existing demands at the Project site
- Peak Hour Demand with the proposed Project
- Maximum Day Demand plus Fire Flow with existing demands at the Project site
- Maximum Day Demand plus Fire Flow with the proposed Project

Per the 2008 Master Plan, maximum day demands for this project are 300% those of average day demands, and peak hour demands are 620% those of average day demands.

Water Model Results

Modeling focused on the infrastructure in the direct vicinity of the Project. The model found that the Project did not create any distribution system deficiencies under average day demand or maximum day plus fire flow demand conditions. Table 2 presents a summary of the modeling results for this analysis.

Table 2 – Potable Water Pipeline Results under Maximum Day Demand plus Fire Flow Conditions

Pipe ID Number	Length (ft)	Existing Pipe Diameter (in)	Velocity under Average Day Demand (ft/s)	Velocity under Maximum Day + Fire Flow (ft/s)	Upsized Pipe Diameter (in)	Velocity under Maximum Day + Fire Flow w/ Upsized Pipe (ft/s)
M-1	612	8	0.17	4.64		
M-2	120	8	0.17	4.64		
M-3	900	8	0.17	4.64		

Water Storage Analysis

The 2008 Master Plan outlines VWD's potable water storage reservoirs for each pressure zone as follows:

> 1.5 times ADD (operational storage) + 3.0 times ADD (emergency storage) + fire flow demand = 4.5 times ADD + fire flow demand
>
> OR
>
> 5.0 times ADD, whichever is greater.

The project is located entirely within the VWD 920 pressure zone. Water storage for this zone is located within the 920 Richland and 1028 Twin Oaks pressure zones, as shown in Figure 1. Table 3 shows the required storage in the 855, 920 Richland, and 1028 Twin Oaks pressure zones for Year 2015 (current) and Year 2030 (Master Plan) relative to the existing storage provided within each zone.

Table 3 – Existing Reservoir Storage Capacity and Requirements

Pressure Zone	Year 2015 ADD (MGD)	Year 2015 Storage Requirement (MG)	Year 2030 ADD (MGD)	Year 2030 Storage Requirement (MG)	Existing Storage Available (MG)
855	6.33	31.7	6.33	31.7	0
920 Richland	9.66	48.3	9.66	48.3	18
1028 Twin Oaks	1.41	7.1	2.34	11.7	73
Totals	17.40	**87.1**	18.33	**91.7**	**91**

The Project will increase the projected average water demand by approximately 12,705 gallons per day as shown in Table 1.

Therefore, the amount of additional reservoir storage required is 500% of the development's average day demand, or:

12,705 gallons * 500% = **63,525 gallons**

The analysis finds that water storage capacity is currently available to serve the Project's increased storage requirements. Master Plan projects address and accommodate the Year 2030 storage deficiency and Water Capital Facility Fees paid by this Project will be used for the increase in storage necessitated by the Project's demand calculated above.

Water Pump Station Analysis

Pump stations are sized to supply maximum day flows while meeting all pressure criteria within their service areas. Since the proposed Project is located in a pressure zone that is not served by pumping, there are no pump station upgrade requirements for this project.

WASTEWATER SYSTEM ANALYSIS

The proposed 3.63-acre Mission 316 West Project will lie completely within VWD sewer shed 24C. Figures 3 – 6 show the development's location in relation to sewer shed boundaries, identify wastewater infrastructure within the vicinity of the development, and identify the downstream collection infrastructure that will be impacted by the development.

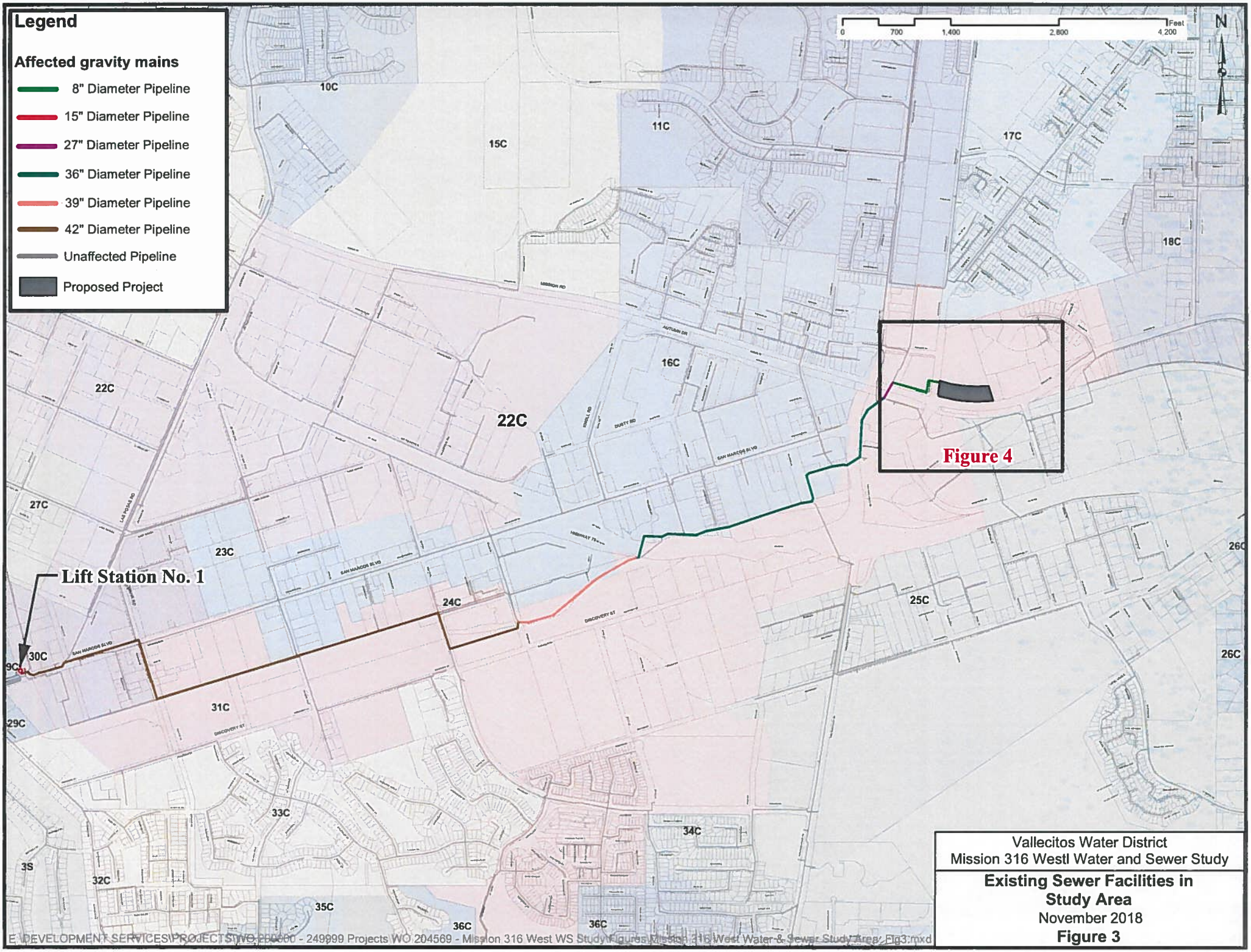
Wastewater Flow Projections

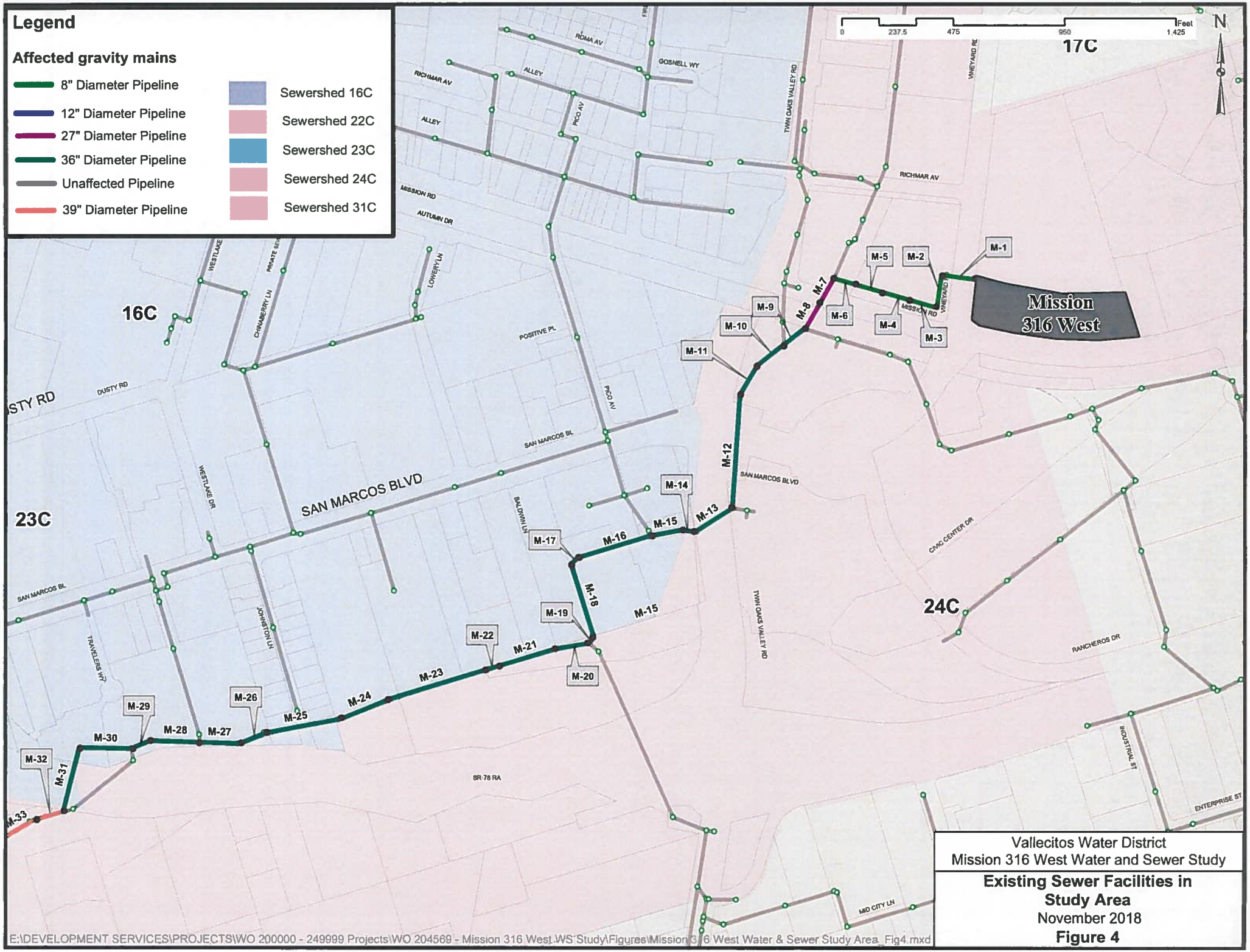
The Project property's General Plan designation by the City of San Marcos as of June 30, 2008 was Commercial. The 2008 Master Plan based its ultimate wastewater generation planning on this approved land use. The Project proposes a density increase with 67 multi-family units on 3.63 acres (Residential 15-20 du/ac).

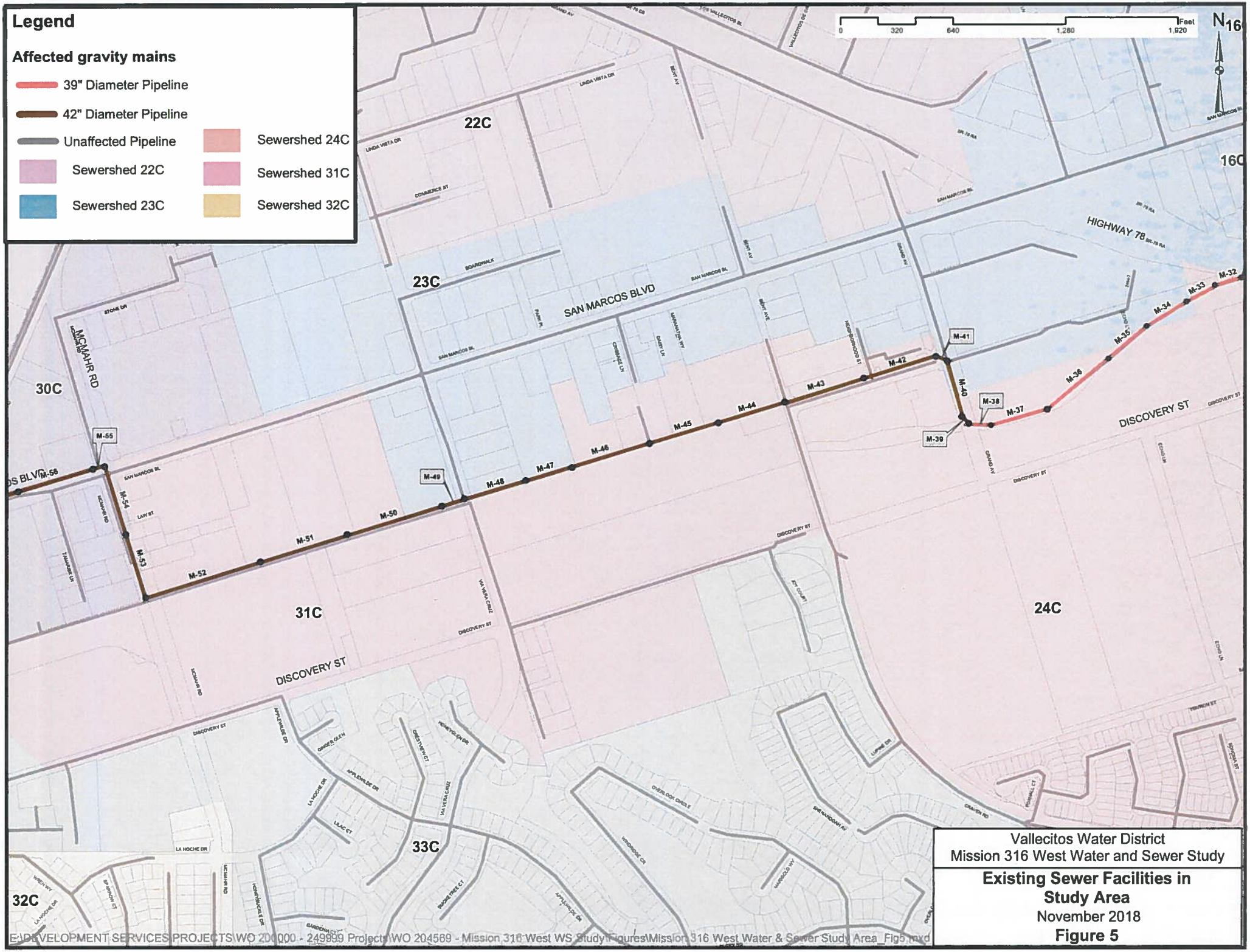
Table 4 provides the average wastewater generated both under the density planned for in the 2008 Master Plan and under the proposed Project densification. The table shows that the Project will increase the projected average wastewater generation from the 2008 Master Plan land use by 7,623 gpd.

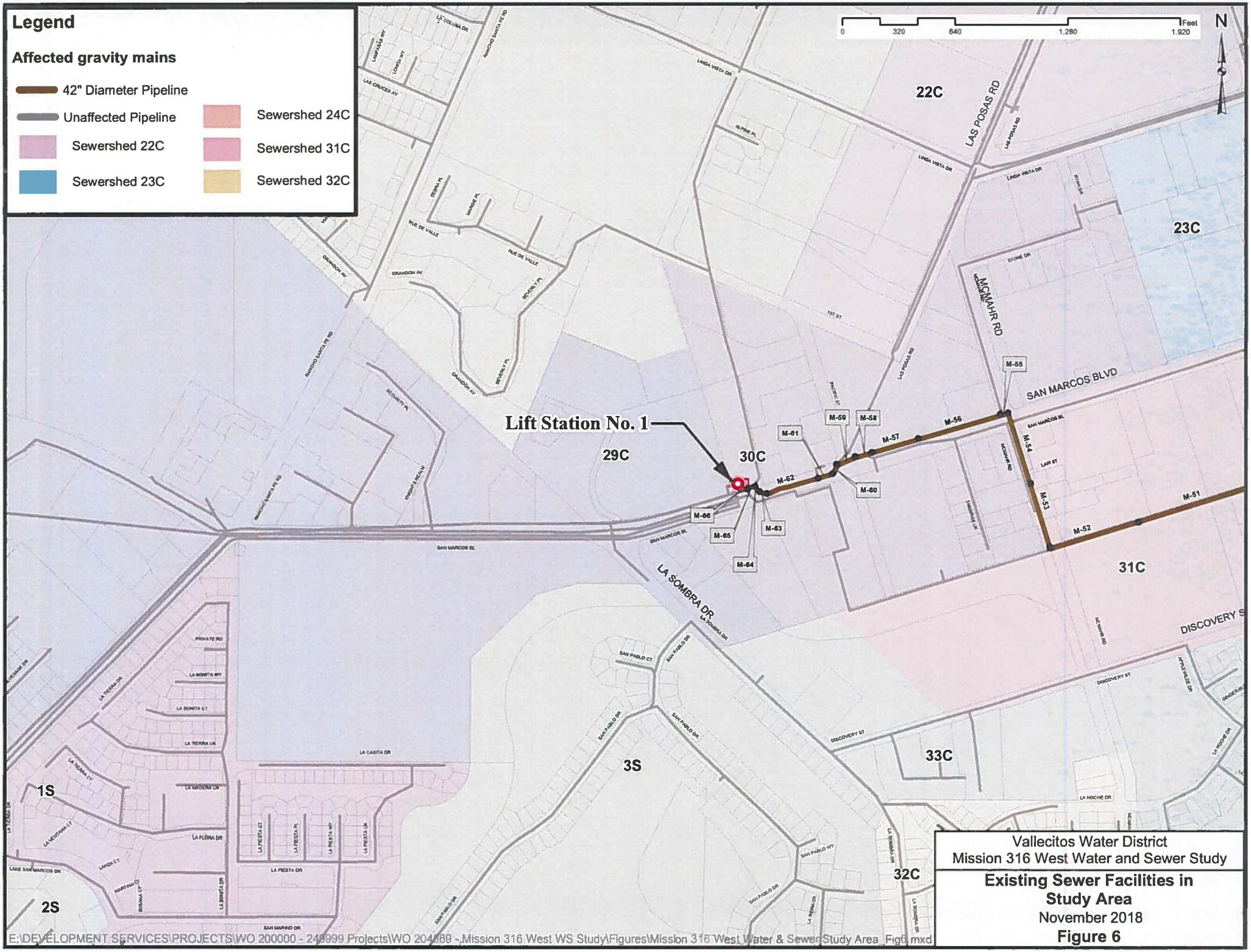
Table 4 – Project Estimated Wastewater Flows

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/acre)	Wastewater Flow (gpd)
2008 Master Plan Land Use Flows				
Commercial (gpd/ac)	3.63		1,200	4,356
Total	**3.63**			**4,356**
Proposed Development Flows				
Residential (15-20 du/ac)	3.63	67	3,300	11,979
Total	**3.63**			**11,979**
Total Increased Wastewater Flow				**7,623**


Legend
Affected gravity mains
8" Diameter Pipeline
15" Diameter Pipeline
27" Diameter Pipeline
36" Diameter Pipeline
39" Diameter Pipeline
42" Diameter Pipeline
Unaffected Pipeline
Proposed Project
0
700
1,400
2,800
4,200
Feet
N
Figure 4
Lift Station No. 1
10C
11C
15C
17C
18C
16C
22C
23C
24C
25C
26C
27C
30C
31C
33C
34C
35C
36C
3S
32C
29C
Vallecitos Water District
Mission 316 WestI Water and Sewer Study
Existing Sewer Facilities in Study Area
November 2018
Figure 3
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Legend
Affected gravity mains
8" Diameter Pipeline
12" Diameter Pipeline
27" Diameter Pipeline
36" Diameter Pipeline
Unaffected Pipeline
39" Diameter Pipeline
Sewershed 16C
Sewershed 22C
Sewershed 23C
Sewershed 24C
Sewershed 31C
0
237.5
475
950
1,425
Feet
N
17C
16C
23C
24C
Mission 316 West
M-1
M-2
M-3
M-4
M-5
M-6
M-7
M-8
M-9
M-10
M-11
M-12
M-13
M-14
M-15
M-16
M-17
M-18
M-19
M-20
M-21
M-22
M-23
M-24
M-25
M-26
M-27
M-28
M-29
M-30
M-31
M-32
M-33
SAN MARCOS BLVD
RICHMAR AV
MISSION RD
AUTUMN DR
POSITIVE PL
PICO AV
TWIN OAKS VALLEY RD
VINEYARD RD
CIVIC CENTER DR
RANCHEROS DR
INDUSTRIAL ST
ENTERPRISE ST
MID CITY LN
SR-78 RA
DUSTY RD
WESTLAKE DR
JOHNSTON LN
BALDWIN LN
TRAVELERS WY
Vallecitos Water District
Mission 316 West Water and Sewer Study
Existing Sewer Facilities in Study Area
November 2018
Figure 4
E:\DEVELOPMENT SERVICES\PROJECTS\WO 200000 - 249999 Projects\WO 204569 - Mission 316 West WS Study\Figures\Mission 316 West Water & Sewer Study Area_Fig4.mxd


Legend
Affected gravity mains
39" Diameter Pipeline
42" Diameter Pipeline
Unaffected Pipeline
Sewershed 22C
Sewershed 23C
Sewershed 24C
Sewershed 31C
Sewershed 32C
0
320
640
1,280
1,920
Feet
N
22C
23C
24C
30C
31C
32C
33C
160
SAN MARCOS BLVD
HIGHWAY 78
DISCOVERY ST
MCMAHR RD
M-32
M-33
M-34
M-35
M-36
M-37
M-38
M-39
M-40
M-41
M-42
M-43
M-44
M-45
M-46
M-47
M-48
M-49
M-50
M-51
M-52
M-53
M-54
M-55
M-56
Vallecitos Water District
Mission 316 West Water and Sewer Study
Existing Sewer Facilities in Study Area
November 2018
Figure 5
E:\DEVELOPMENT SERVICES\PROJECTS\WO 200000 - 249999 Projects\WO 204569 - Mission 316 West WS Study\Figures\Mission 316 West Water & Sewer Study Area_Fig5.mxd


Legend
Affected gravity mains
42" Diameter Pipeline
Unaffected Pipeline
Sewershed 22C
Sewershed 23C
Sewershed 24C
Sewershed 31C
Sewershed 32C
0
320
640
1,280
1,920
Feet
N
Lift Station No. 1
M-51
M-52
M-53
M-54
M-55
M-56
M-57
M-58
M-59
M-60
M-61
M-62
M-63
M-64
M-65
M-66
22C
23C
29C
30C
31C
32C
1S
2S
3S
33C
LAS POSAS RD
SAN MARCOS BLVD
LA SOMBRA DR
MCMAHR RD
DISCOVERY S
Vallecitos Water District
Mission 316 West Water and Sewer Study
Existing Sewer Facilities in Study Area
November 2018
Figure 6
E:\DEVELOPMENT SERVICES\PROJECTS\WO 200000 - 249999 Projects\WO 204289 - Mission 316 West WS Study\Figures\Mission 316 West Water & Sewer Study Area_Fig6.mxd

Wastewater Collection System Analysis

The 2008 Master Plan outlines VWD's wastewater system design criteria which are as follows:

Wastewater Collection Infrastructure Criteria

The wastewater pipeline criteria to be met both within and downstream of the development are as follows:

- Pipes 12 inches in diameter and smaller: ½ full maximum at peak flow
- Pipes over 12 inches in diameter: ¾ full maximum at peak flow
- Minimum velocity: 2 feet per second
- Maximum velocity: 10 feet per second
- Manning's n for gravity pipes: .013
- Hazen-Williams C-factor for force mains/siphons: 120
- Slope for pipes 12 inches in diameter and smaller: 0.4% minimum
- Slope for pipes over 12 inches in diameter: to be determined by VWD

When flow depth in gravity pipes exceeds maximum levels as stated above, a pipe upsize will be specified.

Wastewater Model Scenarios

The following scenarios were modeled to identify system impacts that may be created by the proposed sewer generation, and to recommend any improvements required to provide service to the Project:

- Average Dry Weather Flow with existing flows at the Project site
- Average Dry Weather Flow with the proposed Project
- Peak Dry Weather Flow with existing flows at the Project site
- Peak Dry Weather Flow with the proposed Project
- Peak Wet Weather Flow with existing flows at the Project site
- Peak Wet Weather Flow with the proposed Project

The peak dry weather curve is:

$$\text{Peak Dry Weather Factor} = 2.16 \times (\text{Average Dry Weather Flow Rate})^{-0.1618}$$

The wet weather peak curve is:

$$\text{Peak Wet Weather Factor} = 2.78 \times (\text{Average Dry Weather Flow Rate})^{-0.087}$$

Wastewater Model Results

Modeling focused not only on the sewer collection infrastructure in the direct vicinity of the Project, but also on all downstream infrastructure from the development to Lift Station No. 1 on San Marcos Boulevard that would be impacted by the additional flows (see Figures 3 through 6).

The modeling results showed that the proposed project does not result in any system deficiencies under peak wet weather flows during ultimate build-out conditions. Table 5 presents a summary of the modeling results from this analysis.

Table 5 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Project Site				Wastewater Flows with Proposed Project Development			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio
M-1	74	8	0.020	0	0			20	0.12		
M-2	83	8	0.020	0	0			20	0.12		
M-3	269	8	0.020	0	0			20	0.12		
M-4	80	8	0.020	0	0			20	0.12		
M-5	92	8	0.086	0	0			20	0.08		
M-6	100	8	0.020	0	0			20	0.12		
M-7	85.6	27	0.022	1857	0.21			1877	0.21		
M-8	261	27	0.008	1862	0.27			1882	0.27		
M-9	135	36	0.003	4358	0.36			4378	0.36		
M-10	128	36	0.005	4358	0.31			4378	0.31		
M-11	140	36	0.007	4358	0.29			4378	0.29		
M-12	470	36	0.004	4358	0.33			4378	0.33		
M-13	184	36	0.003	4358	0.36			4378	0.36		
M-14	36	36	0.004	4358	0.33			4378	0.33		
M-15	146	36	0.010	4358	0.26			4378	0.26		
M-16	318	36	0.010	4530	0.27			4550	0.27		
M-17	39	36	0.004	4530	0.34			4550	0.34		
M-18	319	36	0.004	4530	0.34			4550	0.34		
M-19	38	36	0.004	4530	0.34			4550	0.34		
M-20	139	36	0.004	5872	0.39			5892	0.39		
M-21	249	36	0.002	5872	0.47			5892	0.47		
M-22	51	36	0.007	5872	0.33			5892	0.34		
M-23	400	36	0.006	5872	0.35			5892	0.35		
M-24	278	36	0.004	5872	0.39			5892	0.39		
M-25	321	36	0.005	5872	0.37			5892	0.37		

Table 5 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Project Site				Wastewater Flows with Proposed Project Development			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio
M-26	124	36	0.005	5872	0.37			5892	0.37		
M-27	162	36	0.005	5872	0.37			5892	0.37		
M-28	206	36	0.004	6279	0.40			6299	0.40		
M-29	91	36	0.005	6279	0.38			6299	0.38		
M-30	220	36	0.005	6279	0.38			6299	0.38		
M-31	286	36	0.005	6279	0.38			6299	0.38		
M-32	152	39	0.006	6292	0.32			6312	0.32		
M-33	176	39	0.003	6292	0.39			6312	0.39		
M-34	271	39	0.002	6292	0.43			6312	0.43		
M-35	297	39	0.002	6292	0.43			6312	0.43		
M-36	452	39	0.002	6292	0.43			6312	0.43		
M-37	337	39	0.002	6292	0.43			6312	0.43		
M-38	123	39	0.008	6292	0.30			6312	0.30		
M-39	58	42	0.006	6292	0.29			6312	0.29		
M-40	308	42	0.002	6292	0.39			6312	0.39		
M-41	69	42	0.001	6292	0.47			6312	0.47		
M-42	448	42	0.003	6292	0.35			6312	0.35		
M-43	448	42	0.003	6292	0.35			6312	0.35		
M-44	404	42	0.006	6799	0.30			6819	0.30		
M-45	404	42	0.006	6799	0.30			6819	0.30		
M-46	368	42	0.003	6785	0.36			6805	0.36		
M-47	368	42	0.003	6785	0.36			6805	0.36		
M-48	368	42	0.003	6785	0.36			6805	0.36		
M-49	120	42	0.002	6785	0.40			6805	0.41		
M-50	457	42	0.004	6785	0.34			6805	0.34		

Table 5 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Project Site				Wastewater Flows with Proposed Project Development			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio
M-51	650	42	0.004	6785	0.34			6805	0.34		
M-52	677	42	0.004	6785	0.34			6805	0.34		
M-53	373	42	0.004	6785	0.34			6805	0.34		
M-54	420	42	0.004	6785	0.34			6805	0.34		
M-55	20	42	0.005	6785	0.32			6805	0.32		
M-56	486	42	0.004	6785	0.34			6805	0.34		
M-57	500	42	0.004	6785	0.34			6805	0.34		
M-58	156	42	0.005	7131	0.33			7151	0.33		
M-59	20	42	0.007	7131	0.30			7151	0.30		
M-60	15	42	0.053	9662	0.21			9682	0.21		
M-61	138	42	0.003	9662	0.44			9682	0.44		
M-62	347	42	0.001	9662	0.61			9682	0.61		
M-63	18	42	0.006	9662	0.36			9682	0.36		
M-64	9	42	0.033	9662	0.24			9682	0.24		
M-65	9	42	0.011	9766	0.31			9786	0.31		
M-66	73	42	0.004	10830	0.43			10850	0.43		

Wastewater Lift Station Analysis

Lift stations are sized for peak wet weather flow with manufacturer's recommended cycling times for pumping equipment. Since the proposed Project is not located in a sewer shed that is served by a lift station, there are no lift station upgrade requirements for this project.

Parallel Land Outfall Analysis

VWD's existing land outfall is shown in Figure 7. The outfall is approximately 8 miles in length and consists of 4 gravity pipeline sections and 3 siphon sections varying in diameter from 20 inches to 54 inches. VWD maintains the entire pipeline from Lift Station No. 1 to the Encina Water Pollution Control Facility (EWPCF). From Lift Station No. 1 to El Camino Real, VWD is the sole user of this pipeline. From El Camino Real to the EWPCF, the ownership capacity is as shown in Table 6 below:

Table 6 – Land Outfall Capacity Ownership by Agency

Agency	Ownership Percentage	Capacity (MGD)
Carlsbad	23.98%	5.00
Vista	17.99%	3.75
VWD	58.03%	12.10
Totals	**100.00%**	**20.85**

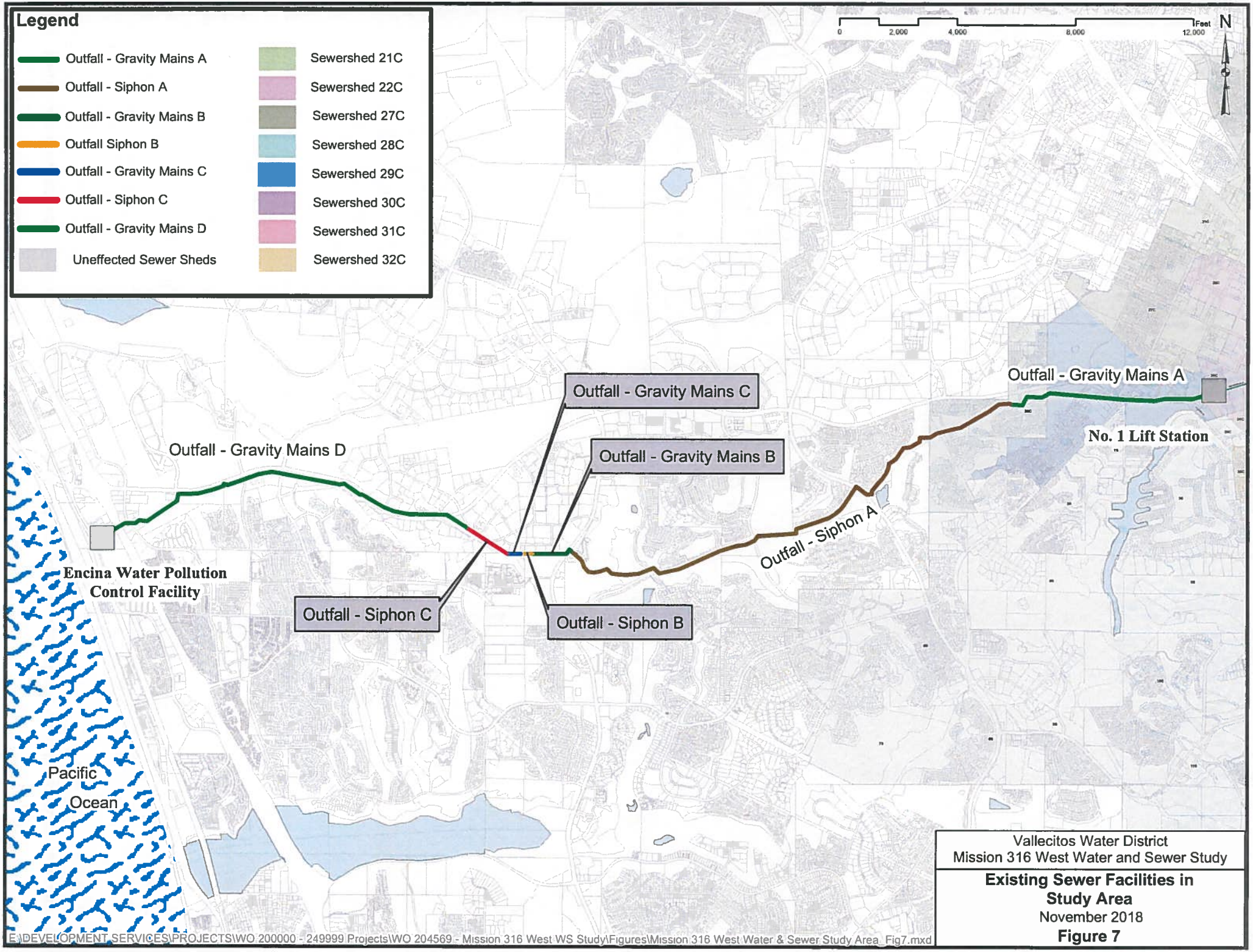
The Meadowlark Water Reclamation Facility (MRF) has a capacity of 5.0 MGD with a peak wet weather capacity of 8.0 MGD. Therefore, VWD has a combined peak wet weather wastewater collection capacity of 20.10 MGD (12.10 MGD + 8.0 MGD).

VWD's 2014 average daily wastewater flow was 7.2 MGD. This corresponds to a peak wet weather flow of 16.9 MGD, which falls within VWD's combined peak wet weather collection capacity.

The 2008 Master Plan estimated that, under approved land uses, VWD has an ultimate build-out average dry weather flow of 13.3 MGD. This corresponds to a peak wet weather flow of 29.5 MGD, which exceeds VWD's combined peak wet weather collection capacity. To accommodate additional wastewater flows from planned development, the 2008 Master Plan recommended conveyance of peak flows to the EWPCF through a parallel land outfall.

The Project proposes to generate 7,623 gpd of additional average wastewater flow that was not accounted for in the Land Outfall's capacity studied in the 2008 Master Plan.

The analysis finds that outfall capacity is currently available to serve the Project's proposed wastewater generation. Wastewater Capital Facility Fees paid by this Project will be used toward design and construction of a parallel land outfall to be sized to accommodate ultimate build-out wastewater flows.



Vallecitos Water District
Mission 316 West Water and Sewer Study

Existing Sewer Facilities in Study Area
November 2018
Figure 7

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Wastewater Treatment Facility Analysis

VWD utilizes two wastewater treatment facilities to treat wastewater collected within its sewer service area.

- The Meadowlark Reclamation Facility (MRF) has liquids treatment capacity of up to 5.0 MGD with a peak wet weather capacity of 8.0 MGD. MRF does not have solids treatment capacity, and therefore all solids are treated at the Encina Water Pollution Control Facility (EWPCF).
- The EWPCF is located in the City of Carlsbad. This is a regional facility with treatment capacity of up to 40.51 MGD. VWD's current ownership capacity is noted below.

Solids Treatment Capacity
VWD currently owns 10.47 MGD of solids treatment capacity at EWPCF. VWD's 2014 average daily wastewater flow was 7.2 MGD. Therefore, the analysis finds that adequate solids treatment capacity exists at this time to serve the Project.

The ultimate average wastewater flow identified in the 2008 Master Plan is 13.3 MGD, resulting in a projected solids treatment capacity deficiency of 2.83 MGD.

Liquids Treatment Capacity
VWD currently owns 7.67 MGD of liquids treatment capacity at the EWPCF in addition to the liquids treatment capacity of 5.0 MGD at MRF for a total of 12.67 MGD of liquids treatment capacity. VWD's 2014 average daily wastewater flow was 7.2 MGD. Therefore, the analysis finds that adequate liquids treatment capacity exists at this time to serve the Project.

The ultimate average wastewater flow identified in the 2008 Master Plan is 13.3 MGD, resulting in a projected liquids treatment capacity deficiency of 0.63 MGD.

Ocean Disposal Capacity
VWD currently owns 10.47 MGD of ocean disposal capacity at the EWPCF. VWD's 2014 average daily wastewater flow was 7.2 MGD. Therefore, the analysis finds that adequate ocean disposal capacity exists at this time to serve the Project.

The ultimate average wastewater flow identified in the 2008 Master Plan is 13.3 MGD, resulting in an ocean disposal deficiency of 2.83 MGD.

The District has determined that adequate wastewater treatment and disposal capacity exists for the proposed Project at this time subject to the qualifications referenced in the Conclusions and Conditions.

CONCLUSIONS AND CONDITIONS

The proposed Mission 316 West Subdivision is expected to increase average daily water demands by 12,705 gallons per day over the ultimate demands projected in the 2008 Master Plan. The Project is also expected to increase wastewater flow by 7,623 gallons per day over the ultimate flows projected in the 2008 Master Plan.

The Study concludes that the proposed development will result in the following impacts:

- An increase of 63,525 gallons of potable water storage requirement.
- An increase of 7,623 gpd in solids handling, liquids handling and ocean disposal capacity requirements at the Encina Water Pollution Control Facility.
- An increase of 7,623 gpd in the parallel land outfall's capacity requirement.

The following items are required as conditions of providing service to the proposed Project:

- Payment of all applicable Water and Wastewater Capital Facility fees in affect at the time service is committed in accordance with District rules and regulations.
- Construction and acceptance of all on-site water and sewer facilities prior to service being provided.

The District currently has water and sewer capacity available to serve the Project as proposed. However, the ability to provide water and sewer service in the future depends upon ultimate build-out of the Project and could change depending upon the timing of the build-out, as well as annexations and build-outs of other development projects, continued reliable water supplies from the San Diego County Water Authority, the District's treatment capacity at the EWPCF and other factors affecting growth in the District which may change over time.

This Study is based on the current adopted land use utilized in VWD's 2008 Master Plan. The study addresses the incremental facility impacts of this Project only and does not include or consider any additional projects within VWD's service area that have deviated from adopted Master Plan land uses. Any land use changes upstream and/or downstream of the Study area may necessitate a revision of any onsite and offsite studies. VWD shall determine if and when revisions to the Study are necessary. Costs for revising this Study shall be borne by the Developer.

Appendix M

Economic and Market Reports



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ECONOMIC IMPACT STUDY
MISSION 316 WEST

Prepared for:

City of San Marcos

1 Civic Center Drive

San Marcos, CA 92069

Attention: Joseph Farace, Principal Planner

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APPENDICES

APPENDIX A ECONOMIC IMPACT MODEL, APPROVED PLAN

APPENDIX B ECONOMIC IMPACT MODEL, PROPOSED PLAN

I EXECUTIVE SUMMARY

A Purpose of the Study

The objective of this Economic Impact Study (the "Study") is to analyze the economic impacts to the City of San Marcos (the "City") of proposed land use changes to the Mission 316 West project (the "Project").

The Project site is located on East Mission Road just east of Twin Oaks Valley Road on the northeast corner of Mission Road and Woodward Street, close to the 78 freeway and approximately 1.5 miles away from California State University, San Marcos. The 3.71-acre site is located in the Heart of the City/Richmar Specific Plan Areas and is currently designated for Commercial uses. Based on the market analysis prepared by Meyers Research ("Meyers Analysis"), the Study assumes that, under the existing designation, the Project site would likely be occupied by either (1) a two-story concrete tilt-up medical office building ("Medical Office Alternative"), or (2) two free standing retail/commercial pads and supporting in-line retail space ("Retail Alternative"). In order to establish an appropriate baseline to highlight the opportunity cost of the proposed land use change, DTA has evaluated the alternative that is expected to result in the largest fiscal benefit to the City - the Retail Alternative ("Approved Plan"). Notably, the application to the City includes a request for a General Plan Amendment for General Plan text changes, and a Specific Plan Amendment to the Heart of City Specific Plan to change the existing designation on the site from Commercial to High Density Residential (15-20 du/acre), on which approximately 67 attached condominium units would be developed (the "Proposed Plan").

Consequently, the Study estimates the economic impacts of the Approved Plan and the Proposed Plan (collectively, the "Scenarios"), and provides a side-by-side comparison of both Scenarios.

B Types of Economic Impacts Evaluated in the Study

The Study identifies the general economic impacts that would occur due to the Project and quantifies these impacts wherever possible. General economic impacts include additions to employment (number of average annual full- & part-time jobs) and economic output (e.g., gross receipts) in the City.

The Study also distinguishes between one-time impacts and permanent impacts. One-time impacts include benefits that occur on a non-recurring basis as a result of construction activity, while permanent impacts refer to benefits that occur on a continuing basis, year after year. Generally, first, there is a one-time impact from the construction of a facility. Then, after the construction phases are complete, firms have a recurring impact on the economy through their ongoing operations.

Economic impact studies also operate under the basic assumption that any increase in spending has three effects: direct, indirect, and induced. First, there is a direct effect caused by the additional output of goods or services. Second, there is a ripple of indirect effects on

all of the industries whose outputs are used by various industries and by a firm's supply chain. Third, there are induced effects that arise when employment increases in the region and stimulates greater household spending.

C Economic Impact Conclusions

The economic impact of the Approved Plan and the Proposed Plan are analyzed separately within the Study. In order to quantify the findings, the Study has evaluated the following elements as the major indicators of the economic impact: (i) Permanent Employment – direct-on-site and indirect/induced (which supplies or supports direct employment), (ii) Permanent Output (Gross Receipts) – total direct output plus output produced by suppliers and employee spending, and (iii) One-Time Construction Impacts.

C.1 Recurring Impacts

As illustrated in **Tables ES-1** and **ES-2** below, the Permanent Employees and Permanent Gross Receipts, are all substantially higher under the Approved Plan as compared to the Proposed Plan.

Table ES-1
Permanent (Recurring) Employment and Overall Economic Output
Approved Plan

Recurring Impacts	Direct	Indirect / Induced	Total
Employees			
City of San Marcos	77	27	104
Overall Output			
City of San Marcos	$7,537,452	$3,265,853	$10,803,305

Table ES-2
Permanent (Recurring) Employment and Overall Economic Output
Proposed Plan

Recurring Impacts	Direct	Indirect / Induced	Total
Employees			
City of San Marcos	0	0	0
Overall Output			
City of San Marcos	$1,017,645	$449,057	$1,466,702

C.2 One Time Impacts

On the other hand, as shown in **Tables ES-3** and **ES-4** below, One-Time Construction Employees and Gross Receipts are higher under the Proposed Plan. Although the Proposed Plan does not add any additional permanent full-time jobs, it significantly increases both One-time employment and One-Time Construction Overall Output. The tables presented in this section summarize the major conclusions related to the One-Time economic impacts of both the Approved Plan and the Proposed Plan.

Table ES-3
Construction (One Time) Employment and Overall Economic Output
Approved Plan

One-Time Impact	Direct	Indirect / Induced	Total
Employees			
City of San Marcos	72	30	102
Overall Output			
City of San Marcos	$10,876,988	$4,426,469	$15,303,458

Table ES-4
Construction (One Time) Employment and Overall Economic Output
Proposed Plan

One-Time Impacts	Direct	Indirect/Induced	Total
Employees			
City of San Marcos	79	41	119
Overall Output			
City of San Marcos	$13,400,000	$5,518,181	$18,918,181

D Market Considerations

The results summarized above assume buildout and full occupancy for each Scenario. However, prior to buildout and full occupancy, only a portion of the projected economic impacts would likely be realized.

Notably, according to the Meyers Analysis, this area may have difficulty generating full occupancy under the Approved Plan. Specifically, the Meyers Analysis notes that the Medical Office Alternative would not be viable given that there are other sites in the City that are better suited for such uses. Additionally, according to a number of real estate professionals familiar with the market, the Retail Alternative would likely struggle at that location as the average daily traffic (ADT) through the site would be too low to support such uses.

These metrics suggest that full buildout under the Approved Plan may not be achieved, or may, at best, take significantly longer than build-out under the Proposed Plan.

II INTRODUCTION

The objective of this Economic Impact Study (the "Study") is to analyze the economic impacts to the City of San Marcos (the "City") of proposed land use changes to the Mission 316 West project (the "Project").

The Project site is located on East Mission Road just east of Twin Oaks Valley Road on the northeast corner of Mission Road and Woodward Street, close to the 78 freeway and approximately 1.5 miles away from California State University, San Marcos. The 3.71-acre site is located in the Heart of the City/Richmar Specific Plan Areas and is currently designated for Commercial uses. Based on the market analysis prepared by Meyers Research ("Meyers Analysis"), the Study assumes that, under the existing designation, the Project site would likely be occupied by either (1) a two-story concrete tilt-up medical office building ("Medical Office Alternative"), or (2) two free standing retail/commercial pads and supporting in-line retail space ("Retail Alternative"). In order to establish an appropriate baseline to highlight the opportunity cost of the proposed land use change, DTA has evaluated the alternative that is expected to result in the largest fiscal benefit to the City - the Retail Alternative ("Approved Plan"). Notably, the application to the City includes a request for a General Plan Amendment for General Plan text changes, and a Specific Plan Amendment to the Heart of City Specific Plan to change the existing designation on the site from Commercial to High Density Residential (15-20 du/acre), on which approximately 67 attached condominium units would be developed (the "Proposed Plan").

Consequently, the Study estimates the economic impacts of the Approved Plan and the Proposed Plan (collectively, the "Scenarios"), and provides a side-by-side comparison of both Scenarios.

A Scope and Methodology

A.1 Approach

The Study identifies the general economic impacts that would occur with the development of the Approved Plan and the Proposed Plan individually, and quantifies these impacts wherever possible. General economic impacts include additions to employment (number of average annual full- & part-time jobs), and economic output (e.g., gross receipts). The Study also distinguishes between one-time economic impacts and permanent economic impacts. One-time impacts include benefits to the community that occur on a non-recurring basis as a result of construction and development activity, while permanent, recurring impacts refer to benefits that occur on a continuing basis, year after year. Additionally, for purposes of the Study, all economic impacts are stated in constant (un-inflated) 2019 dollars, based on the assumption that the relative impacts of inflation in future years may be difficult to gauge.

Furthermore, in evaluating economic impacts, the Study quantifies both direct

and indirect/induced economic impacts on the City. Direct economic impacts reflect the initial or first-round increases in jobs and output, all of which occur directly on-site. Indirect/induced economic impacts are the secondary and other additional rounds of economic activity that occur as a consequence of the direct impacts and can occur elsewhere within the City. The indirect impacts represent the economic activity – buying and selling of goods and services – of suppliers to the land use types analyzed. In this Study, suppliers to the Proposed Plan would likely include maintenance and repair professionals, utilities' providers, wholesale trade companies, and business support services; while suppliers to the Approved Plan may include real estate firms, computer and other technology firms, accounting and bookkeeping professionals, and utilities' providers. Additionally, the suppliers representing the indirect one-time impacts would likely include heavy industrial and construction suppliers for the actual development of buildings and facilities. Finally, the induced impacts represent the economic activity that results from household spending by employees of all companies directly and indirectly affected by the construction and operation of the land uses analyzed in the Study.

A.2 North American Industry Classification

Indirect and induced impacts can occur throughout all industries of the economy and have been categorized using the North American Industry Classification System ("NAICS"). Adopted by the Office of Management and Budget ("OMB") in 1997 to replace the Standard Industrial Classification System ("SIC"), NAICS is a widely-used system to classify business establishments for the collection, analysis, and publication of statistical data in Canada, Mexico, and the United States. NAICS industries are identified using a six-digit coding system to classify all economic activity into twenty broad sectors, five of which are mainly goods-producing sectors and fifteen of which are services-providing sectors. This six-digit hierarchical structure allows for the identification of nearly 1,170 industries. The broad NAICS sectors include the Retail/Commercial, Business Park, Industrial/Warehousing, and Construction, which are the focal NAICS categories analyzed within this Study to determine the indirect and induced economic impacts generated under both Scenarios.

A.3 IMPLAN Multiplier Method

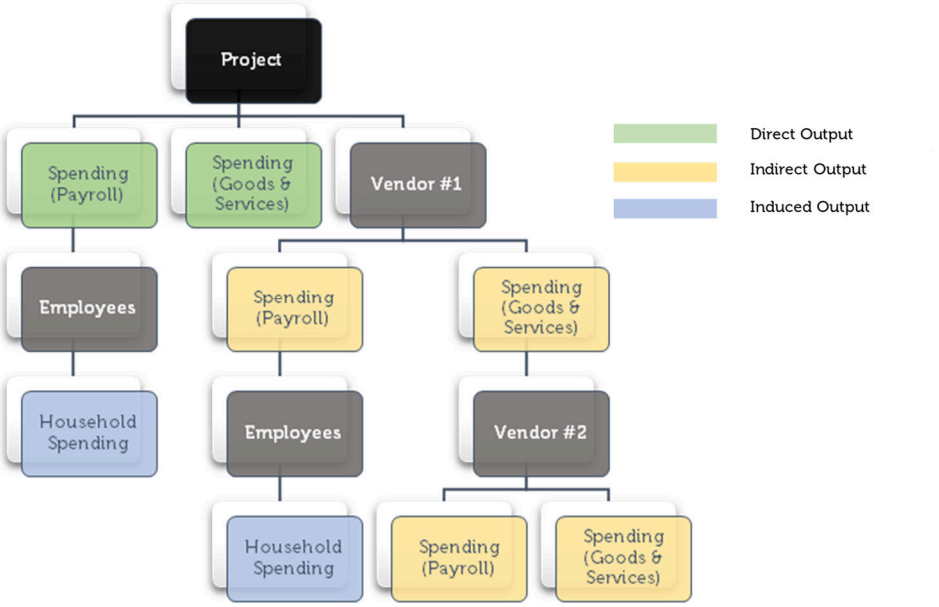
Although there is a consensus among economists that indirect and induced, or "multiplier" effects exist, most economists also agree that such effects are difficult to measure. Patterns on spending and employment among suppliers and employee households often vary over time and from one region to another. Nevertheless, there are certain input-output models that can be used to estimate indirect and induced effects.

In quantifying the indirect and induced economic impacts for the Study, DTA

utilized the Impact Analysis for Planning ("IMPLAN") Input/output Modeling System, a type of quantitative economic model that provides an approximate measure of the "multiplier effect" of a firm's spending on payroll and the purchasing of goods and services. In this study, DTA used Version 3 of the IMPLAN economic modeling system.

Like similar econometric models, IMPLAN helps to calculate the flow of payments for goods and services across different industry sectors, and between households and industries. The IMPLAN model can be envisioned simply as a large spreadsheet with hundreds of industries (plus the household sector) arrayed across the top as producers, and the same industries and households listed down the side as consumers. Each million dollars (output) in spending by any one consumer (i.e. within the Approved Plan or the Proposed Plan) is allocated across the producing industries from which that consumer buys goods and services. These producing industries, in turn, spend money buying goods and services from their own distinct sets of suppliers. Thus, the IMPLAN multiplier model allows one to gauge the effect on each dollar an industry spends as it diffuses through a regional economy. Furthermore, it allows one to translate the overall regional impact of spending into jobs and employee compensation. Please refer to the example presented in **Figure A** for a graphical representation of the multiplier effect in development.

FIGURE A
EXAMPLE OF THE MULTIPLIER EFFECT
(INDIRECT AND INDUCED OUTPUT)



Source: DTA, 2019

B Limitations – Accuracy of Information

The economic models presented in this Study contain analysis of revenues and impacts resulting from the Approved Plan and the Proposed Plan. These models are based on both (i) information provided to DTA by the City and its consultants, Applicant of the Proposed Plan, and (ii) certain DTA assumptions taken from DTA's proprietary databases, as compiled by DTA from previous studies prepared by the firm. The sources of information and basis of the estimates calculated in the Study are stated herein. While DTA is confident that the sources of information are reliable, DTA does not express an opinion or any other form of assurance on the accuracy of such information. The analysis of economic impacts contained in the Study is not considered to be a "financial forecast" or a "financial projection" as technically defined by the American Institute of Certified Public Accountants. The word "projection" used within the Study relates to broad expectations of future events or market conditions. Since the analyses contained herein are based on estimates and assumptions that are inherently subject to uncertainty and variation depending on evolving events, DTA cannot represent that such estimates will definitely be achieved. Some assumptions inevitably will not materialize, and unanticipated events and circumstances may occur; therefore, the actual results achieved may vary from these projections stated throughout the Study.

III ECONOMIC IMPACTS

The Study identifies the general economic impacts that would occur under the Approved Plan and compares them to the impacts under the Proposed Plan, quantifying the impacts of each Scenario wherever possible. General economic impacts include additions to employment (number of average annual full- & part-time jobs) and economic output (e.g., gross receipts). The Study also distinguishes between one-time economic impacts and permanent economic impacts. One-time impacts include benefits to the community that occur on a non-recurring time basis as a result of construction and development activity, while permanent, recurring impacts refer to benefits that occur on a continuing basis, year after year.

A Recurring Economic Impacts

A.1 Assumptions

Information provided to DTA indicates that the Approved Plan is expected to include approximately 48,000 square feet of commercial land uses. Based on the Meyers Analysis, the Study assumes that, under the Approved Plan, the Project site would likely be occupied by both sales tax generating and non-sales tax generating retail and office uses. In contrast, the Proposed Plan would involve a zoning change that would facilitate the development of 67 residential units (identified as high-density residential). Please see **Table 1**, presented below, for a general summary of the built-out projection on the Approved Plan and the Proposed Plan.

Table 1
Mission 316 West– Assumptions
Approved Plan vs. Proposed Plan

Assumptions	Approved Plan	Proposed Plan
Residential Land Uses	**Units**	**Units**
High Density Residential	0	67
Non-Residential Land Uses	**Sq. Ft.**	**Sq. Ft.**
Commercial	48,000	0
Permanent On-Site Jobs	**Employees**	**Employees**
High Density Residential	0	0
Commercial	77	0

A.2 Job Creation

As indicated in the Tables below, full development and buildout of the Approved Plan is expected to result in one hundred four (104) new jobs in the City. This total includes combined direct and indirect/induced employment. Moreover, due to the proposed residential land use of the Proposed Plan, development of the Proposed Plan is projected to generate no new jobs in the City

Although the specific location of the additional indirect jobs created cannot be identified in this Study, most of these jobs will likely be support service jobs in Retail, Office, Transportation, and similar areas. **Tables 2** and **3**, as well as **Exhibit 1** of **Appendices A** and **B**, summarize the direct and indirect/induced employment impacts of the Approved Plan and the Proposed Plan.

Table 2
Mission 316 West
Approved Plan – Recurring Employment

Recurring Impacts	Direct	Indirect / Induced	Total
Total Output			
City of San Marcos	77	27	104

Table 3
Mission 316 West
Proposed Plan – Recurring Employment

Recurring Impacts	Direct	Indirect / Induced	Total
Total Output			
City of San Marcos	0	0	0

Since the analyses contained herein are based on estimates and assumptions that are inherently subject to uncertainty and variation depending on evolving events, DTA cannot represent that such estimates will definitely be achieved. Some assumptions inevitably will not materialize, and unanticipated events and circumstances may occur; therefore, the actual results achieved may vary from these projections stated throughout the Study.

A.3 Overall Economic Output

In contrast to the Employment projections presented in the previous section, Total Output (i.e., total expenditures including sales or gross receipts, or other operating income) within the City will increase under both development Scenarios. **Tables 4** and **5**, summarize the Total Output projections under the Approved Plan and

Proposed Plan.

Table 4
Mission 316 West
Approved Plan – Recurring Total Output

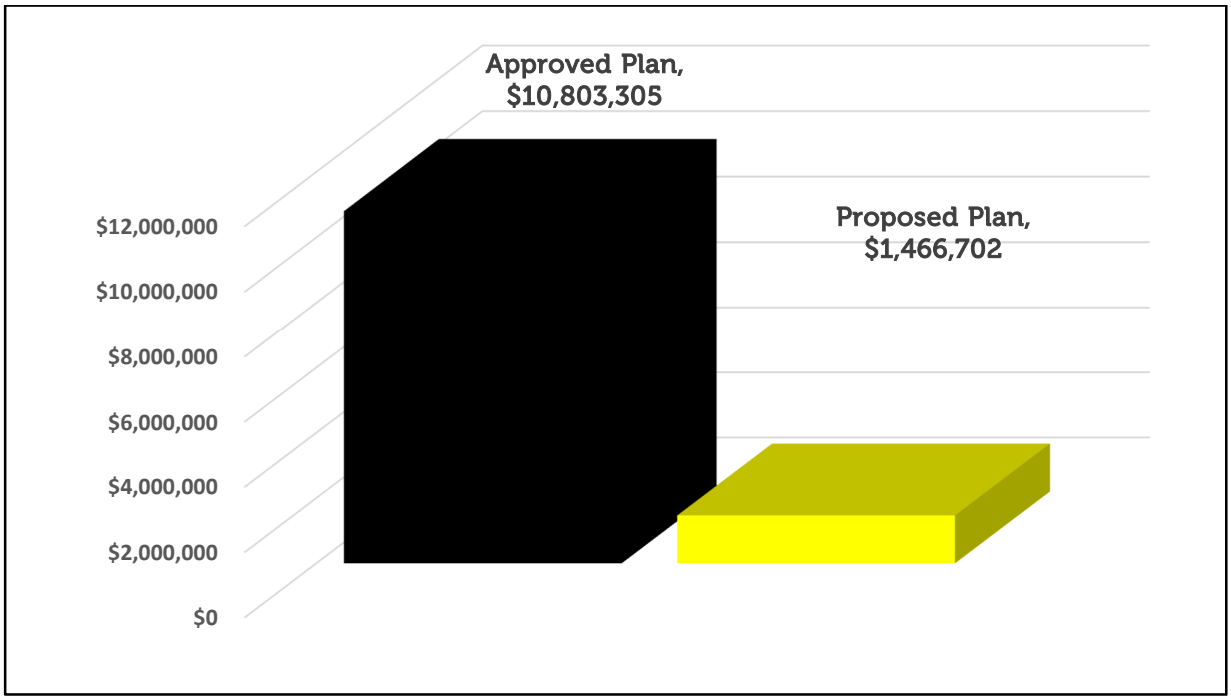
Recurring Impacts	Direct	Indirect / Induced	Total
Total Output			
City of San Marcos	$7,537,452	$3,265,853	$10,803,305

Table 5
Mission 316 West
Proposed Plan – Recurring Total Output

Recurring Impacts	Direct	Indirect / Induced	Total
Total Output			
City of San Marcos	$1,017,645	$449,057	$1,466,702

As shown in the tables above, DTA estimate that the direct and indirect/induced effects on the City would total over $10.8 Million for the Approved Plan and almost $1.5 million for the Proposed Plan. The side-by-side comparison of Total Output can be seen in the graphical representation presented in **Figure B** below.

FIGURE B
MISSION 316 WEST
APPROVED PLAN VS. PROPOSED PLAN – RECURRING TOTAL OUTPUT



B One-Time Employment and Output Impacts (Construction)

Under the Approved Plan, the area is projected to create approximately ninety-nine (97) one-time construction jobs in the City. For the Proposed Plan, one hundred nineteen (119) one-time construction jobs are expected to be created. **Tables 6** and **7** below summarize the projected increases in employment resulting from construction activities, under each Scenario.

Table 6
Mission 316 West
Approved Plan – One-Time Employment

One-Time Impacts	Direct	Indirect / Induced	Total
Employees			
City of San Marcos	72	30	102

Table 7
Mission 316 West
Proposed Plan – One-Time Employment

One-Time Impacts	Direct	Indirect / Induced	Total
Employees			
City of San Marcos	79	41	119

Notably, projected one-time Total Output is expected to increase considerably with the development of the Proposed Plan, as illustrated in the following tables. DTA estimates that the direct and indirect/induced effects on the City total almost $14.5 million in One-Time Total Output for the Approved Plan and over $18.9 million for the Proposed Plan. A side-by-side comparison of both Scenarios can be seen graphically in **Figure C** below.

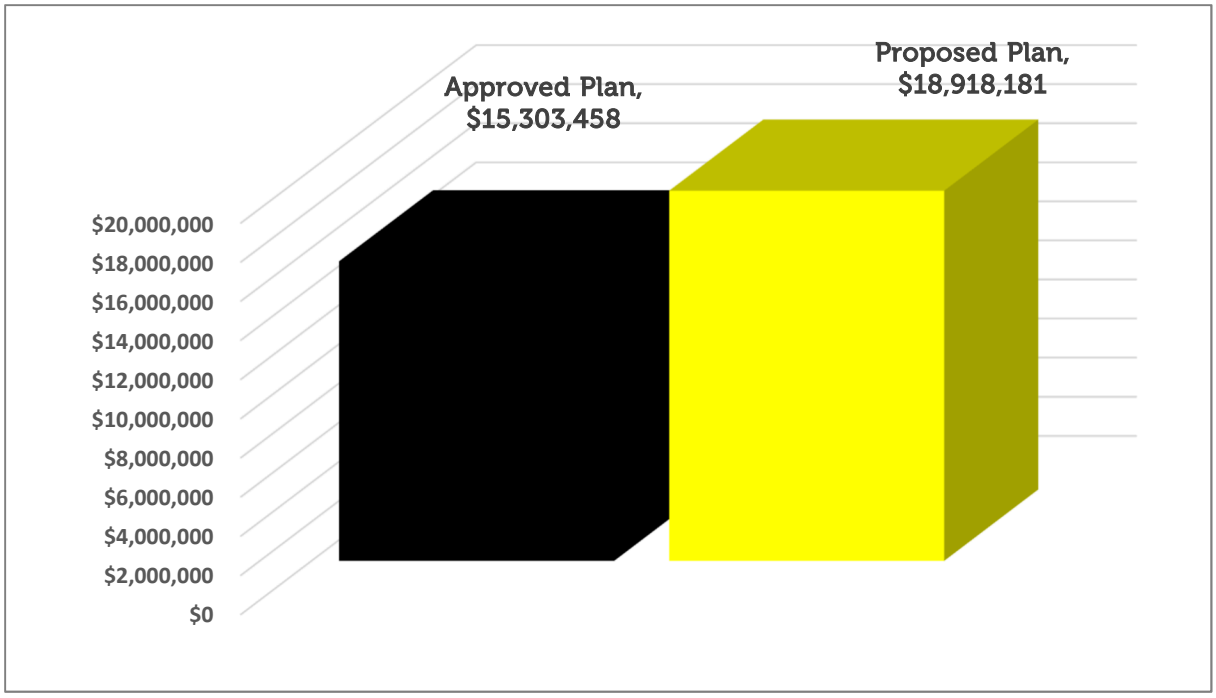
Table 8
Mission 316 West
Approved Plan – One-time Total Output

One-Time Impacts	Direct	Indirect / Induced	Total
Employees			
City of San Marcos	$10,876,988	$4,426,469	$15,303,458

Table 9
Mission 316 West
Proposed Plan – One-time Total Output

One-Time Impacts	Direct	Indirect / Induced	Total
Employees			
City of San Marcos	$13,400,000	$5,518,181	$18,918,181

Figure C
Mission 316 West
Approved Plan vs. Proposed Plan – One-Time Total Output



C Market Considerations

The results summarized above assume buildout and full occupancy for each Scenario. However, prior to buildout and full occupancy, only a portion of the projected economic impacts would likely be realized.

Notably, according to the Meyers Analysis, this area may have difficulty generating full occupancy under the Approved Plan. Specifically, the Meyers Analysis notes that the Medical Office Alternative would not be viable given that there are other sites in the City that are better suited for such uses. Additionally, according to a number of real estate professionals familiar with the market, the Retail Alternative would likely struggle at that location as the average daily traffic (ADT) through the site would be too low to support such uses.

These metrics suggest that full buildout under the Approved Plan may not be achieved, or may, at best, take significantly longer than build-out under the Proposed Plan.

APPENDIX A

City of San Marcos
Mission 316 West
Economic Impact Study

ECONOMIC IMPACT MODEL, APPROVED PLAN

CITY OF SAN MARCOS
MISSION 316 WEST
ECONOMIC IMPACT ANALYSIS - APPROVED PLAN

RECURRING JOBS

RECURRING IMPACTS

ONE-TIME JOBS

ONE TIME IMPACTS

JOB HOUSING BALANCE

SUMMARY

EXHIBIT 1
CITY OF SAN MARCOS - MISSION 316 WEST
RECURRING EMPLOYMENT - APPROVED PLAN

ASSUMPTIONS

I. RESIDENTIAL LAND USE ASSUMPTIONS

LAND USE CATEGORY	UNITS
NA	NA

II. NON-RESIDENTIAL LAND USE ASSUMPTIONS

LAND USE CATEGORY[1]	EMPLOYEES/1,000 SQ. FT.[2]	SQ. FT.[1]
NON-RETAIL	2.88	18,000
RETAIL	0.82	30,000

RECURRING EMPLOYMENT

III. CITY

	DIRECT EMPLOYEES[3]	INDIRECT EMPLOYEES[4]	INDUCED EMPLOYEES[4]	TOTAL EMPLOYEES
NON-RETAIL	52	10	11	73
RETAIL	25	2	4	31
TOTAL RECURRING EMPLOYMENT	**77**	**12**	**15**	**104**

NOTES:

[1] Source: City of San Marcos.

[2] Commercial Buildings Energy Consumption Survey (CBECS), 2012.

[3] Based on multiplying Category SF by Employees/1,000 SF metric.

[4] Source: San Marcos City IMPLAN multipliers.

* ***All figures subject to rounding***

EXHIBIT 2
CITY OF SAN MARCOS - MISSION 316 WEST
RECURRING ECONOMIC IMPACTS - APPROVED PLAN

ASSUMPTIONS

I. RESIDENTIAL SPENDING ASSUMPTIONS	HOUSEHOLD INCOME	% INCOME SPENT IN CITY	TOTAL RESIDENT SPENDING / YR.
NA	NA	NA	NA

II. NON-RESIDENTIAL OUTPUT ASSUMPTIONS	AVERAGE OUTPUT / EMPLOYEE[1]	OUTPUT / YR.[1]
NON-RETAIL	$104,934	$5,456,583
RETAIL	$83,235	$2,080,869

RECURRING OUTPUT

III. CITY

	DIRECT OUTPUT	INDIRECT OUTPUT [1]	INDUCED OUTPUT [1]	TOTAL OUTPUT
NON-RETAIL	$5,456,583	$981,001	$1,383,245	$7,820,830
RETAIL	$2,080,869	$374,105	$527,501	$2,982,475
TOTAL RECURRING OUTPUT	**$7,537,452**	**$1,355,107**	**$1,910,746**	**$10,803,305**

NOTES:

[1] Source: San Marcos City IMPLAN multipliers.

* *All figures subject to rounding*

EXHIBIT 3
CITY OF SAN MARCOS - MISSION 316 WEST
ONE-TIME EMPLOYMENT - APPROVED PLAN

ASSUMPTIONS

I. RESIDENTIAL LAND ASSUMPTIONS	UNITS
NA	NA

II. NON-RESIDENTIAL LAND USE ASSUMPTIONS	SQ. FT.
NON-RETAIL	18,000
RETAIL	30,000

III. PUBLIC FACILITIES	TOTAL COST
PROJECT INFRASTRUCTURE	NA

ONE-TIME EMPLOYMENT

IV. CITY

	DIRECT EMPLOYEES [1]	INDIRECT EMPLOYEES [1]	INDUCED EMPLOYEES [1]	TOTAL EMPLOYEES
NON-RETAIL	31	5	8	44
RETAIL	41	7	10	58
TOTAL ONE-TIME EMPLOYEES	**72**	**12**	**18**	**102**

NOTES:

[1] Source: San Marcos City IMPLAN multipliers (IMPLAN Sector 58: Construction of new non-residential structures).

* ***All figures subject to rounding***

EXHIBIT 4
CITY OF SAN MARCOS - MISSION 316 WEST
ONE-TIME IMPACTS - APPROVED PLAN

ASSUMPTIONS

I. RESIDENTIAL CONSTRUCTION COST ASSUMPTIONS	UNITS	ESTIMATED SQ. FT. PER DWELLING UNIT	COST PER UNIT
NA	NA	NA	NA

II. NON-RESIDENTIAL CONSTRUCTION COST ASSUMPTIONS	SQ. FT.	COST PER SQ. FT.[1]
NON-RETAIL	18,000	$260
RETAIL	30,000	$207

III. PUBLIC FACILITIES	TOTAL COST
PROJECT INFRASTRUCTURE	NA

ONE-TIME OUTPUT

IV. CITY

	DIRECT OUTPUT	INDIRECT OUTPUT[2]	INDUCED OUTPUT[2]	TOTAL OUTPUT
NON-RETAIL	$4,673,932	$876,528	$1,025,563	$6,576,022
RETAIL	$6,203,057	$1,163,293	$1,361,086	$8,727,436
TOTAL ONE-TIME OUTPUT	**$10,876,988**	**$2,039,820**	**$2,386,649**	**$15,303,458**

NOTES:

[1] Valuations provided by Meyers Research. Assumes that construction cost is approximately 85% of total valuation.

[2] Source: San Marcos City IMPLAN multipliers (IMPLAN Sector 58: Construction of new non-residential structures).

* *All figures subject to rounding*

EXHIBIT 5
CITY OF SAN MARCOS - MISSION 316 WEST
JOBS-HOUSING BALANCE - APPROVED PLAN

ASSUMPTIONS

I. EXISTING DEMOGRAPHICS

CITY OF SAN MARCOS	
HOUSING UNITS [1]	31,366
EMPLOYEES [2]	38,249

II. JOB IMPACTS [3]

CITY OF SAN MARCOS	
DIRECT IMPACT	77
ADDITIONAL INDIRECT	12
ADDITIONAL INDUCED	15
TOTAL	**104**

III. CUMULATIVE PROJECT DEMOGRAPHICS

EXISTING HOUSING UNITS PLUS PROJECT - CITY OF SAN MARCOS	**31,366**
PERCENTAGE INCREASE	*0.00%*
EXISTING EMPLOYEES PLUS PROJECT - CITY OF SAN MARCOS	**38,353**
PERCENTAGE INCREASE	*0.27%*

JOBS-HOUSING BALANCE

IV. JOBS-HOUSING BALANCE

CITY OF SAN MARCOS	
EXISTING	1.22
EXISTING WITH PROJECT	1.22
PERCENTAGE INCREASE	***0.27%***

NOTES:

[1] Source: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State (2018).

[2] Source: California Employment Development Department ("EDD") - Labor Market Information Division.

[3] Please see Exhibit B-1: Recurring Jobs.

* ***All figures subject to rounding***

EXHIBIT 6
CITY OF SAN MARCOS - MISSION 316 WEST
SUMMARY - APPROVED PLAN

ASSUMPTIONS

I.	RESIDENTIAL LAND USE ASSUMPTIONS	UNITS
	NA	NA

II.	NON-RESIDENTIAL LAND USE ASSUMPTIONS	EMPLOYEES/1,000 SQ. FT.	SQ. FT.
	NON-RETAIL	2.88	18,000
	RETAIL	0.82	30,000

ECONOMIC IMPACTS CONCLUSIONS

RECURRING IMPACTS

III.	JOB CREATION	DIRECT	INDIRECT/INDUCED	TOTAL
	CITYWIDE	77	27	104

IV.	TOTAL OUTPUT	DIRECT	INDIRECT/INDUCED	TOTAL
	CITYWIDE	$7,537,452	$3,265,853	$10,803,305

ONE-TIME IMPACTS

V.	CONSTRUCTION JOBS	DIRECT	INDIRECT/INDUCED	TOTAL
	CITYWIDE	72	30	102

VI.	CONSTRUCTION OUTPUT	DIRECT	INDIRECT/INDUCED	TOTAL
	CITYWIDE	$10,876,988	$4,426,469	$15,303,458

OTHER IMPACTS

VII.	JOBS-HOUSING BALANCE	BALANCE EXISTING	BALANCE WITH PROJECT	% INCREASE/ (DECREASE)
	CITYWIDE	1.22	1.22	0.27%

APPENDIX B

City of San Marcos
Mission 316 West
Economic Impact Study

ECONOMIC IMPACT MODEL, PROPOSED PLAN

CITY OF SAN MARCOS
MISSION 316 WEST
ECONOMIC IMPACT ANALYSIS - PROPOSED PLAN

RECURRING JOBS

RECURRING IMPACTS

ONE-TIME JOBS

ONE TIME IMPACTS

JOB HOUSING BALANCE

SUMMARY

EXHIBIT 1
CITY OF SAN MARCOS - MISSION 316 WEST
RECURRING EMPLOYMENT - PROPOSED PLAN

ASSUMPTIONS

I. RESIDENTIAL LAND USE ASSUMPTIONS[1]

LAND USE CATEGORY	CONFIGURATION	UNITS
RESIDENTIAL	CONDOMINIUM	67

II. NON-RESIDENTIAL LAND USE ASSUMPTIONS

LAND USE CATEGORY	EMPLOYEES/1,000 SQ. FT.	SQ. FT.
NA	NA	NA

RECURRING EMPLOYMENT

III. CITY

	DIRECT EMPLOYEES[2]	INDIRECT EMPLOYEES	INDUCED EMPLOYEES	TOTAL EMPLOYEES
RESIDENTIAL	0	0	0	0
TOTAL RECURRING EMPLOYMENT	**0**	**0**	**0**	**0**

NOTES:

[1] Source: Project Site Plan.

[2] Assume no permanent jobs are created on-site, given that the land use type is single family residential.

* ***All figures subject to rounding***

EXHIBIT 2
CITY OF SAN MARCOS - MISSION 316 WEST
RECURRING ECONOMIC IMPACTS - PROPOSED PLAN

ASSUMPTIONS

I. RESIDENTIAL SPENDING ASSUMPTIONS	HOUSEHOLD INCOME [1]	% INCOME SPENT IN CITY [2]	TOTAL RESIDENT SPENDING / YR.
RESIDENTIAL	$108,210	28%	$1,017,645

II. NON-RESIDENTIAL OUTPUT ASSUMPTIONS	AVERAGE OUTPUT / EMPLOYEE	OUTPUT / YR.
NA	NA	NA

RECURRING OUTPUT

III. CITY

	DIRECT OUTPUT	INDIRECT OUTPUT [3]	INDUCED OUTPUT [3]	TOTAL OUTPUT
RESIDENTIAL	$1,017,645	$179,443	$269,614	$1,466,702
TOTAL RECURRING OUTPUT	**$1,017,645**	**$179,443**	**$269,614**	**$1,466,702**

NOTES:

[1] Source: Fiscal Impact Analysis.

[2] Sources: Bureau of Labor Statistics (BLS) 2015 Consumer Expenditure Survey.

[3] Source: San Marcos City IMPLAN multipliers (IMPLAN Retail Sectors 396-406).

* *All figures subject to rounding*

EXHIBIT 3
CITY OF SAN MARCOS - MISSION 316 WEST
ONE-TIME EMPLOYMENT - PROPOSED PLAN

ASSUMPTIONS

I. RESIDENTIAL LAND ASSUMPTIONS	UNITS
RESIDENTIAL	67

II. NON-RESIDENTIAL LAND USE ASSUMPTIONS	SQ. FT.
NA	NA

III. PUBLIC FACILITIES	TOTAL COST
PROJECT INFRASTRUCTURE	NA

ONE-TIME EMPLOYMENT

IV. CITY

	DIRECT EMPLOYEES [1]	INDIRECT EMPLOYEES [1]	INDUCED EMPLOYEES [1]	TOTAL EMPLOYEES
RESIDENTIAL	79	21	20	119
TOTAL ONE-TIME EMPLOYEES	**79**	**21**	**20**	**119**

NOTES:

[1] Source: San Marcos City IMPLAN multipliers (IMPLAN Sector 59: Construction of new single-family residential structures).

* ***All figures subject to rounding***

EXHIBIT 4
CITY OF SAN MARCOS - MISSION 316 WEST
ONE-TIME IMPACTS - PROPOSED PLAN

ASSUMPTIONS

I. RESIDENTIAL CONSTRUCTION COST ASSUMPTIONS	UNITS	ESTIMATED SQ. FT. PER DWELLING UNIT	COST PER UNIT [1]
RESIDENTIAL	67	1,269	$200,000

II. NON-RESIDENTIAL CONSTRUCTION COST ASSUMPTIONS	SQ. FT.	COST PER SQ. FT. [1]
NA	NA	NA

III. PUBLIC FACILITIES	TOTAL COST
PROJECT INFRASTRUCTURE	NA

ONE-TIME OUTPUT

IV. CITY

	DIRECT OUTPUT	INDIRECT OUTPUT [2]	INDUCED OUTPUT [2]	TOTAL OUTPUT
RESIDENTIAL	$13,400,000	$2,852,407	$2,665,774	$18,918,181
TOTAL ONE-TIME OUTPUT	**$13,400,000**	**$2,852,407**	**$2,665,774**	**$18,918,181**

NOTES:

[1]Source: Reed Construction Data Inc.

[2]Source: San Marcos City IMPLAN multipliers (IMPLAN Sector 59: Construction of new single-family residential structures).

* ***All figures subject to rounding***

EXHIBIT 5
CITY OF SAN MARCOS - MISSION 316 WEST
JOBS-HOUSING BALANCE - PROPOSED PLAN

ASSUMPTIONS

I. EXISTING DEMOGRAPHICS

CITY OF SAN MARCOS	
HOUSING UNITS [1]	31,366
EMPLOYEES [2]	38,249

II. JOB IMPACTS [3]

CITY OF SAN MARCOS	
DIRECT IMPACT	0
ADDITIONAL INDIRECT	0
ADDITIONAL INDUCED	0
TOTAL	**0**

III. CUMULATIVE PROJECT DEMOGRAPHICS

EXISTING HOUSING UNITS PLUS PROJECT - CITY OF SAN MARCOS	**31,433**
PERCENTAGE INCREASE	*0.21%*
EXISTING EMPLOYEES PLUS PROJECT - CITY OF SAN MARCOS	**38,249**
PERCENTAGE INCREASE	*0.00%*

JOBS-HOUSING BALANCE

IV. JOBS-HOUSING BALANCE

CITY OF SAN MARCOS	
EXISTING	1.22
EXISTING WITH PROJECT	1.22
PERCENTAGE INCREASE	***-0.21%***

NOTES:

[1] Source: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State (2018).

[2] Source: California Employment Development Department ("EDD") - Labor Market Information Division.

[3] Please see Exhibit B-1: Recurring Jobs.

* ***All figures subject to rounding***

EXHIBIT 6
CITY OF SAN MARCOS - MISSION 316 WEST
SUMMARY - PROPOSED PLAN

ASSUMPTIONS

I. RESIDENTIAL LAND USE ASSUMPTIONS	UNITS
HIGH DENSITY RESIDENTIAL	67

II. NON-RESIDENTIAL LAND USE ASSUMPTIONS	EMPLOYEES/1,000 SQ. FT.	SQ. FT.
NA	NA	NA

ECONOMIC IMPACTS CONCLUSIONS

RECURRING IMPACTS

III. JOB CREATION	DIRECT	INDIRECT/INDUCED	TOTAL
CITYWIDE	0	0	0

IV. TOTAL OUTPUT	DIRECT	INDIRECT/INDUCED	TOTAL
CITYWIDE	$1,017,645	$449,057	$1,466,702

ONE-TIME IMPACTS

V. CONSTRUCTION JOBS	DIRECT	INDIRECT/INDUCED	TOTAL
CITYWIDE	79	41	119

VI. CONSTRUCTION OUTPUT	DIRECT	INDIRECT/INDUCED	TOTAL
CITYWIDE	$13,400,000	$5,518,181	$18,918,181

OTHER IMPACTS

VII. JOBS-HOUSING BALANCE	BALANCE EXISTING	BALANCE WITH PROJECT	% INCREASE/ (DECREASE)
CITYWIDE	1.22	1.22	-0.21%



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CITY OF SAN MARCOS

MISSION 316 WEST

CITY OF SAN MARCOS, CA

May 18, 2019

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FISCAL IMPACT REPORT
MISSION 316 WEST

Prepared for:

City of San Marcos

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I EXECUTIVE SUMMARY

A Purpose of the Report

The objective of this Fiscal Impact Study (the "Study") is to analyze the fiscal impacts to the City of San Marcos (the "City") of proposed land use changes to the Mission 316 West project (the "Project").

The Project site is located on East Mission Road just east of Twin Oaks Valley Road on the northeast corner of Mission Road and Woodward Street, close to the 78 freeway and approximately 1.5 miles away from California State University, San Marcos. The 3.71-acre site is located in the Heart of the City/Richmar Specific Plan Areas and is currently designated for Commercial uses. Based on the market analysis prepared by Meyers Research ("Meyers Analysis"), the Study assumes that, under the existing designation, the Project site would likely be occupied by either (1) a two-story concrete tilt-up medical office building ("Medical Office Alternative"), or (2) two free standing retail/commercial pads and supporting in-line retail space ("Retail Alternative"). In order to establish an appropriate baseline to highlight the opportunity cost of the proposed land use change, DTA has evaluated the alternative that is expected to result in the largest fiscal benefit to the City - the Retail Alternative ("Approved Plan"). Notably, the application to the City includes a request for a General Plan Amendment for General Plan text changes, and a Specific Plan Amendment to the Heart of City Specific Plan to change the existing designation on the site from Commercial to High Density Residential (15-20 du/acre), on which approximately 67 attached condominium units would be developed (the "Proposed Plan").

Consequently, the Study estimates the fiscal impacts of the Approved Plan and the Proposed Plan (collectively, the "Scenarios"), and provides a side-by-side comparison of both Scenarios.

B Types of Fiscal Impacts Evaluated in this Study

The fiscal impacts identified in this Study include recurring municipal revenues and costs to the City General Fund that result from the Project. The recurring revenues to the City identified in this Study are generated from a variety of sources, including property taxes, sales taxes, licenses and permits, franchise fees, fines, and other revenues. Although these revenues vary from year to year, they occur on a regular basis and are part of the City's budgeting plans on a yearly basis. The recurring General Fund expenditures for the City are equally important in this analysis. These recurring costs are associated with a variety of other services including public safety, public works, maintenance, and general government administrative services. Like the General Fund revenues, these are costs that the City must anticipate and plan for on a yearly basis.

Revenues that are considered non-recurring to the City, such as various permitting fees are excluded from this Study. The reason for excluding them is because new development is generally required to pay specific fees such as grading and building prior to the construction of a project. As these are considered one-time revenues, there is no expectation that new

development will need to pay these fees a second time. In addition, expenditures resulting from a project that are considered to be non-recurring are also excluded from the Study.

C Fiscal Impact on City General Fund (Approved Plan vs. Proposed Plan)

The following table summarizes the net fiscal impact to the City under the Approved Plan and the Proposed Plan.

Table ES-1: Net Fiscal Impact (City General Fund)

Fiscal Impact	Approved Plan	Proposed Plan
Total Recurring General Fund Revenues	$83,081	$114,651
Total Recurring General Fund Expenditures	($21,311)	($114,959)
Net Fiscal Impact	**$61,770**	**($308)**
Revenue to Expense Ratio	3.90	1.00

As indicated in **Table ES-1**, under the Approved Plan the overall fiscal impact to the City General Fund, resulting from revenues generated by development and the recurring costs associated with the Project, is a recurring fiscal surplus of $61,770. This total is based on $83,081 in recurring annual revenue and $21,311 in recurring annual costs. In this analysis, the total annual revenues generated are projected to equal 3.90 times the associated City General Fund costs.

Under the Proposed Plan, the overall fiscal impact to the City General Fund, resulting from revenues generated by the Project and the recurring costs associated with this area is a recurring fiscal deficit of $308 (effectively, fiscal neutrality). This amount is based on $114,651 in recurring annual revenues and $114,959 in annual expenditures. In this analysis, the total annual revenues generated are projected to equal 1.00 times the associated City General Fund costs.

Figure 1: Net Fiscal Impact (City General Fund) – Approved Plan (Commercial Uses)

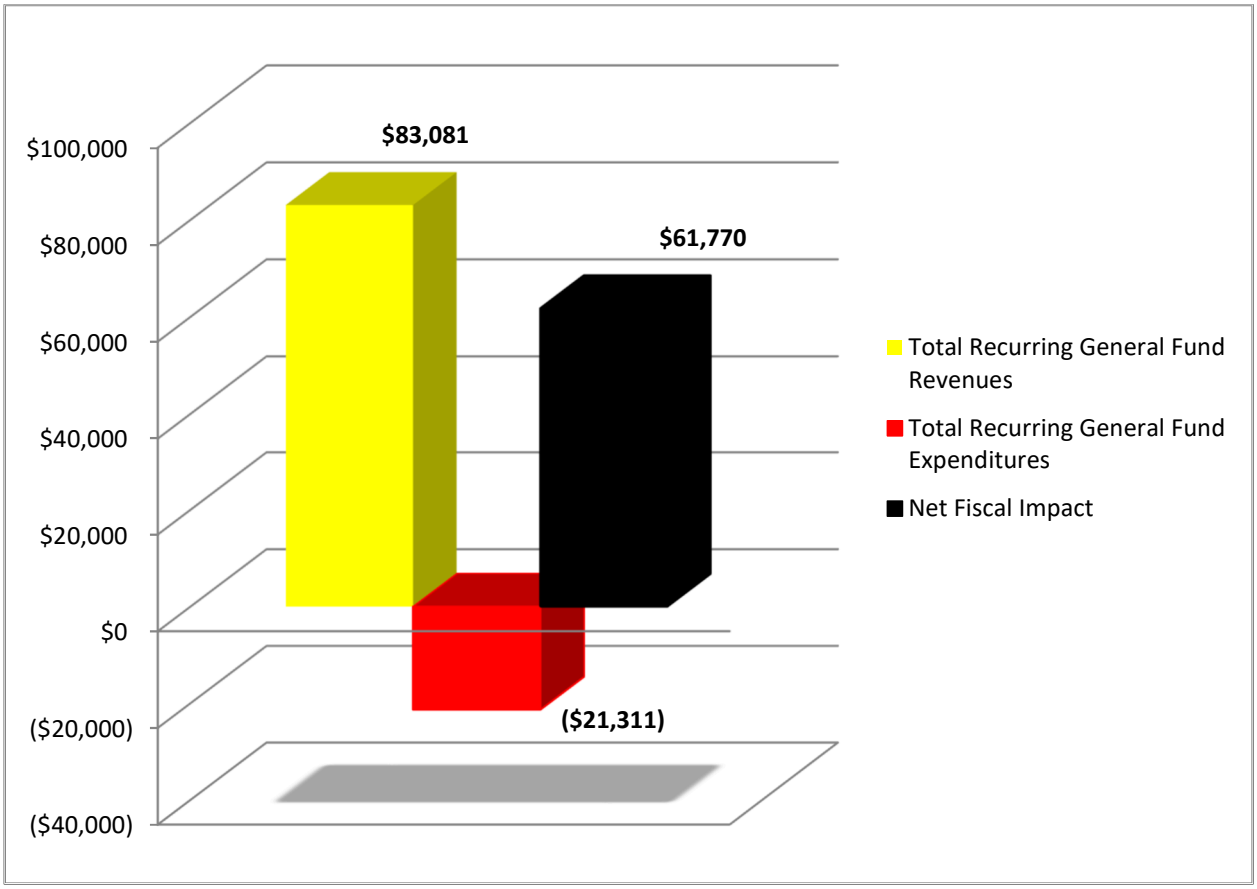
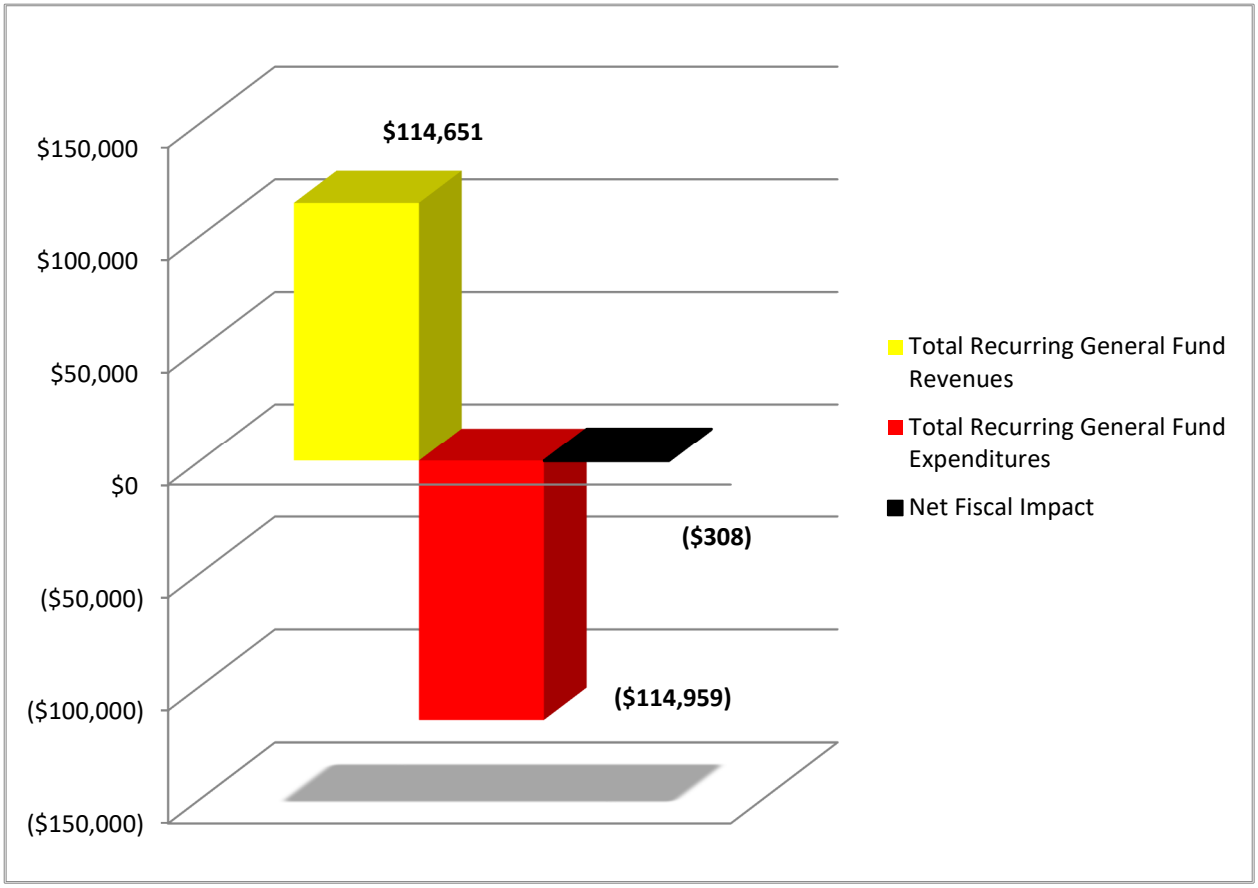


Figure 2: Net Fiscal Impact (City General Fund) – Proposed Plan



D Fiscal Impact Conclusions

The fiscal impact for the Approved Plan is significantly more positive than that for the Proposed Plan, primarily due to sales tax revenues from the retail uses anticipated on-site. In addition, the residential land uses under the Proposed Plan generate a larger demand for public services (i.e., recurring General Fund expenditures). However, these expenditures are offset by projected Community Facilities District ("CFD") revenues and Property Tax revenues resulting in fiscal neutrality under the Proposed Plan.

E Market Considerations

The results summarized above assume buildout and full occupancy for each Scenario. However, prior to buildout and full occupancy, only a portion of the projected fiscal impacts would likely be realized. Notably, according to the Meyers Analysis, this area may have difficulty generating full occupancy under the Approved Plan. Specifically, the Meyers Analysis notes that the Medical Office Alternative would not be viable given that there are other sites in the City that are better suited for such uses. Additionally, according to a

number of real estate professionals familiar with the market, the Retail Alternative would likely struggle at that location as the average daily traffic (ADT) through the site would be too low to support such uses.

These metrics suggest that full buildout under the Approved Plan may not be achieved, or may, at best, take significantly longer than build-out under the Proposed Plan.

II INTRODUCTION

DTA has been retained by the City of San Marcos (the "City") to analyze the fiscal impacts of proposed land use changes to the Mission 316 West project (the "Project").

The Project site is located on East Mission Road just east of Twin Oaks Valley Road on the northeast corner of Mission Road and Woodward Street, close to the 78 freeway and approximately 1.5 miles away from California State University, San Marcos. The 3.71-acre site is located in the Heart of the City/Richmar Specific Plan Areas and is currently designated for Commercial uses. Based on the market analysis prepared by Meyers Research ("Meyers Analysis"), the Study assumes that, under the existing designation, the Project site would likely be occupied by either (1) a two-story concrete tilt-up medical office building ("Medical Office Alternative"), or (2) two free standing retail/commercial pads and supporting in-line retail space ("Retail Alternative"). In order to establish an appropriate baseline to highlight the opportunity cost of the proposed land use change, DTA has evaluated the alternative that is expected to result in the largest fiscal benefit to the City - the Retail Alternative ("Approved Plan"). Notably, the application to the City includes a request for a General Plan Amendment for General Plan text changes, and a Specific Plan Amendment to the Heart of City Specific Plan to change the existing designation on the site from Commercial to High Density Residential (15-20 du/acre), on which approximately 67 attached condominium units would be developed (the "Proposed Plan").

Consequently, the Study estimates the fiscal impacts of the Approved Plan and the Proposed Plan (collectively, the "Scenarios"), and provides a side-by-side comparison of both Scenarios.

A Scope and Methodology – Recurring Fiscal Impacts

Fiscal impacts arising from a land development plan can be broadly categorized as one of two types: one-time impacts or recurring impacts. Each of these types may, in turn, be divided into a revenue component and a cost component. In this Study, it is assumed that one-time revenues would directly offset one-time costs; thus, the fiscal impacts considered focus on ongoing, or recurring, fiscal impacts of the Project on the City General Fund. Revenues that are generated outside of the City's General Fund (e.g., special district revenues) or costs are incurred by the City outside of the General Fund (e.g., costs financed through a special district) are not included in the fiscal impact analysis.

The fiscal impact analysis presented in this Study utilizes two specific methods of analysis: The Multiplier approach (consisting of three separate methodologies, specifically "Per Capita", "Per Employee", and "Per Capita/Employee") and the Case Study approach. Notably, the primary Multiplier approach used in this Study is the Per Capita/Employee methodology, which recognizes the fact that the exact relationship of service demands and revenue generating potential between residents and employees is

difficult to quantify. In order to address this challenge, several assumptions are employed.

DTA has determined that utilizing a service population, or Persons Served population, comprised of all residents and 50% of employees is common fiscal practice in quantifying the impact of a new development in a given service area. This number suggests that a resident generally has twice the fiscal impact of an employee. This methodology involves calculating the average City-wide revenues/costs per Persons Served, utilizing the City's Operating Budget for fiscal year ("FY") 2018-2019 (the "City Budget"), and applying these revenue/cost actors to the specific number of Persons Served projected for the Project.

If necessary, DTA will also use the Per Employee methodology to project recurring fiscal factors based on employment only, in areas such as business license revenues. Similarly, DTA will use the Per Capita methodology where appropriate to project recurring fiscal factors based on population only. Again, the Per Employee methodology or Per Capita methodology, involve calculating the average City-wide revenues/costs per employee or per capita, utilizing the City Budget, and applying these factors to the specific number of employees or residents, respectively, projected under each Scenario.

While most recurring revenues analyzed in this Study are projected using the Multiplier methodology, some major revenue sources, including Property Taxes and Sales Taxes, were calculated using a Case Study methodology that involves calculating marginal revenues to be specifically generated by a particular land use, instead of applying an average City-wide revenue factor. For purposes of this Study, all recurring revenues and costs are stated in current (un-inflated) 2019 dollars, based on the assumption that the relative impacts of inflation in future years will be the same for both of these fiscal impact categories.

Finally, certain revenues and expenditures for which the Multiplier methodology was utilized, were not expected to increase one-to-one with new development. Therefore, in order to accurately account for this, DTA applied a series of discount rates to specific revenues/costs. Generally, if needed, a discount rate would be applied to revenues or expenditures to exclude an administrative/overhead component of the revenue or expenditure that would likely not increase one-to-one with population or employment growth.

B Limitations – Accuracy of Information

The fiscal models in this Study contain an analysis of revenues, service costs (expenditures), and impacts to the City resulting from the Project. These models are based on both (i) information provided to DTA by City staff and other consultants, and (ii) certain DTA assumptions compiled by DTA from various sources including previous fiscal impact studies prepared by the firm. The sources of information and basis of the estimates calculated in the Study are stated herein. While DTA is confident that the sources of information are reliable, DTA does not express an opinion or any other form of assurance on the accuracy of such information.

Furthermore, the analysis of fiscal impacts contained in this Study is not considered to be a "financial forecast" or a "financial projection;" as technically defined by the American Institute of Certified Public Accountants. The word "projection" used within this Study relates to broad expectations of future events and/or market conditions. Since the analysis contained herein is based on estimates and assumptions that are inherently subject to uncertainty and variation depending on evolving events, DTA cannot represent that such estimates will definitely be achieved. Some assumptions inevitably will not materialize, and unanticipated events and circumstances may occur. Therefore, the actual results achieved may vary over time from the projections stated throughout this Study.

III DESCRIPTION OF RECURRING FISCAL REVENUES/COSTS

This section presents recurring revenue and service cost (expenditure) impacts to the City General Fund for both the Approved Plan and the Proposed Plan, along with the methodology and assumptions utilized to project these impacts. Detailed numerical analyses of anticipated revenue and service cost impacts are contained in **Appendix A.**

A Analysis of Recurring Revenues - Case Study Method

A.1 Property Taxes – Secured and Unsecured

Secured property tax revenues are projected based on the City's estimated share of the general 1% property tax levy. Total projected secured property tax revenues to the City from the Project are estimated at 15.243% of the basic 1% property tax levy, for Tax Rate Area ("TRA") 13113. Please refer to **Table 1** below and **Exhibit 5** of **Appendix A** for details regarding the secured and unsecured property tax assumptions utilized in the fiscal impact analysis.

Unsecured property taxes collected in the City are levied on tangible personal property that is not secured by real estate. Examples of unsecured property include trade fixtures (e.g., manufacturing equipment and computers), as well as airplanes, boats, and mobile homes on leased land. In generating the fiscal impact models for this Study, DTA has assumed that unsecured property values average 2.75% of the secured value for residential land uses and 10.00% of the secured value for non-residential land uses. Unsecured property tax revenue generated for both the Approved Plan and Proposed Plan are also presented in **Exhibit 5** of **Appendix A.**

A.2 Property Transfer Tax

Per California Revenue and Taxation Code §11901 et seq. and the San Marcos Municipal Code §3.12.030, sales of real property are taxed by the County of San Diego (the "County") at a rate of $1.10 per $1,000 of property value. For property located in the City, the property transfer tax is divided equally between the City and the County, with the City receiving $0.55 per $1,000 of transferred property sale or resale value, excluding assumed liens or encumbrances. Per typical baseline assumptions, DTA assumes that residential development changes ownership at an average rate of 10% per year. DTA also assumes that non-residential development changes ownership at an average rate of 5% per year, and that continuing liens and encumbrances are insignificant.

A.3 Property Taxes in-Lieu of Vehicle License Fees ("VLF")

The passage of Proposition 1A in California in 2004 enacted a constitutional amendment that introduced a new methodology to calculate property taxes in-lieu of VLF. Per California Revenue and Taxation Code §97.70, the property tax in-lieu of VLF amount now grows in proportion to the growth rate of gross assessed valuation

in a city or county. Property taxes in-lieu of VLF revenues are projected to grow with the change in the City-wide gross assessed valuation of taxable property from the prior fiscal year.

Property tax in-lieu of VLF revenues constitute an addition to other property tax apportionments and were calculated for purposes of this Study at $0.67 per $1,000 increase in assessed valuation on a City-wide basis. **Table 1** below presents details regarding the property tax assumptions utilized in the fiscal impact analysis.

Table 1: Property Tax Assumptions

Property Tax Assumptions	Approved Plan	Proposed Plan
Assessed Valuation		
Residential	$0	$31,086,200
Non-Residential	$12,796,457	$0
Secured Property Tax Allocation		
(As a Portion of the 1% General Property Tax Levy)		
City of San Marcos	8.879%	8.879%
Fire District	6.364%	6.364%
Unsecured Property Tax		
Residential	2.75%	2.75%
Non-Residential	10.0%	10.0%
Property Transfer Tax		
Residential Property Turnover Rate	10.0%	10.0%
Non-Residential Property Turnover Rate	5.0%	5.0%
Transfer Tax as a % of Assessed Value	0.11%	0.11%
Property Transfer Tax Passed through to the City	50.0%	50.0%
Property Tax in-Lieu of Vehicle License Fee (VLF)		
Total City Gross Assessed Value (VLF Base Year)	$7,756,621,947	$7,756,621,947
Total City Property Tax In-Lieu of VLF Revenues (in Base Year)	$5,191,930	$5,191,930
Property Tax In-Lieu of VLF Increase per $1,000 of AV	$0.67	$0.67

A.4 Sales Taxes

Direct sales tax revenues are generated by retail sales from businesses within City limits, with 1.00% of taxable sales receipts passed through to the City. **Exhibit 6** of **Appendix A** reflects (i) estimated taxable sales per square foot for on-site non-residential land uses, based on data from the Urban Land Institute's *Dollars & Cents of Shopping Projects* (2008) publication; and (ii) total estimated taxable sales for the Project, based on development assumptions provided by the City and the

Meyers Analysis.

Indirect sales tax revenues, also summarized in **Exhibit 6** of **Appendix A**, are projected based on estimated purchases made by residents and employees of the Project within the City. Based on information outlined in the International Council of Shopping Centers' Office-Worker Retail Spending in a Digital Age (2012), DTA assumed that each on-site employee spends nearly $5,652 annually within the City. Other Sales Tax assumptions are summarized in **Table 2** below.

Table 2: Sales Tax Assumptions

Sales Tax Assumptions	All Scenarios
Percentage of Sales Tax Passed through City of San Marcos	1.00%
Local Employee Spending	$5,652
Capture Rate of Retail Spending (within the City)	50%
Displacement Rate (existing taxable sales within the City)	20%
Taxable Sales per Square Foot – Retail	$200

A.5 CFD Special Tax Revenue

The Project is currently located in five (5) separate CFDs (collectively, the "CFDs") and will be subject to the applicable special tax for each CFD based on the land uses anticipated under each Scenario. Notably, revenues generated from CFD No. 98-02 and CFD No. 2011-01 will not be deposited in the City's General Fund and have therefore been excluded from this analysis. **Table 3** below and **Exhibit 7** of **Appendix A** summarize the CFD assumptions utilized for the Approved Plan and the Proposed Plan.

Table 3: CFD Assumptions

Community Facilities District	Approved Plan	Proposed Plan	Fund Designation
CFD 98-01 IA 1			
Commercial (Per Acre)	$1,235.60		**General Fund**
Residential (Per Unit)		$176.51	
CFD 98-02 (Zones A - E)			
Commercial (Per Acre)	$1,061.79		Non-General Fund
Residential (Per Unit)		$247.60	
CFD 98-02 (Zone F)			
Commercial (Per Acre)	N/A		Non-General Fund
Residential (Per Unit)		N/A	
CFD 2001-01			
Commercial (Per Acre)	$1,142.19		**General Fund**
Residential (Per Unit)		$163.17	
CFD 2011-01			
Commercial (Per Sq. Ft.)	$0.357		Non-General Fund
Residential (Per Unit)		$340.16	

B Analysis of Recurring Revenues – Multiplier Method

Utilizing the Multiplier methodology discussed in Section II(A) of this Study, the multipliers presented in this section and illustrated in **Table 4** below quantify the marginal increase in revenue for each specific revenue category as a result of the proposed development Scenario(s). Additional details on each revenue category are also provided below.

Table 4: General Fund Revenues (Multiplier Method)

Revenue Category	Amount	Methodology	Discount
Franchise Fees	$35.48	Persons Served	0%
Licenses and Permits	$13.73	Persons Served	0%
Fines and Forfeitures	$4.57	Persons Served	0%

B.1 Franchise Fees

The City receives franchise fee revenue from a variety of sources including utility companies (e.g., electricity, water, trash, etc.), pipelines that run under the City's streets, cable TV, taxi, and from companies that operate in the City's right-of-way to provide services for residents (e.g., tow trucks and solid waste haulers). Some

franchise fees are set dollar amounts that increase each year according to changes in some index, such as the Consumer Price Index. Other franchise fees are based on a percentage of utility revenues.

Using the *Per Capita/Employee Multiplier* approach, DTA has projected Franchise fees at $35.48 per persons served. This represents the marginal increase in revenue per additional persons served in this category.

B.2 Licenses and Permits

Licenses and Permits made up 7% of the City's revenue in FY 2018-2019 and is considered an important source of income to the City's General Fund. In addition to business licenses, the city imposes fees on a variety of permits, including building, electrical, plumbing, grading, construction, and many other areas.

DTA projects Licenses and Permits at $13.73 per persons served using the *Per Capita/Employee Multiplier* approach.

B.3 Fines and Forfeitures

To ensure the payment of various licenses and fees, the City's Municipal Code empowers the City to impose penalties and to collect fines in several areas. Among the significant categories in this section are parking fines, traffic fines, and forfeitures/ penalties for business licenses and franchises. After a careful review of this revenue source, Fines and Forfeiture have also been projected using the *Per Capita/Employee Multiplier* approach, at $4.57 per persons served.

C Analysis of Recurring Costs – Case Study Method

C.1 General Government

According to the City Budget, the percentage of recurring General Government overhead (percentage of total recurring General Fund expenditures) to the City General Fund non-government expenditures, is 20.1%. This is based on total general government expenditures of $11,061.897 and non-general government expenditure of $66,188,429. General Government costs are generated from several areas including City Council, Administration, Economic Development, City Attorney, City Clerk, Human Resources/Risk Management, Finance/Information Systems, and Real Property Services. Non-general government costs include Public Works, Development Services, Public Safety, Culture and Recreation, and other Financing Sources.

D Analysis of Recurring Costs – Multiplier Method

Table 5 below quantifies the marginal increase in expenditures for specific expenditure category as a result of the proposed development Scenario(s). A detailed description of each category is also provided below.

Table 5: General Fund Costs (Multiplier Method)

Expenditure Category	Amount	Methodology	Discount
Public Works	$106.81	Persons Served	0%
Development Services	$40.47	Persons Served	0%
Public Safety	$289.82	Persons Served	0%
Culture and Recreation	$15.49	Persons Served	0%
Other Financing Sources	$2.52	Persons Served	90%

D.1 Public Works

The Public Works Department is responsible for the design, construction, maintenance, and management of the City's vital municipal infrastructure system. It is composed of two divisions, Operations and Engineering. The Operations divisions includes administration, right-of-way maintenance, facilities maintenance, fleet maintenance, and parks and landscape maintenance, and is responsible for the maintenance and repair of City streets, buildings, flood control, storm drains, street lights, traffic signals, public places, parks, special districts, vehicles, and equipment. The Engineering division administers and coordinates the capital improvement program, traffic engineering, storm water maintenance, and construction inspection and management.

The Department also oversees the drafting and execution of related contracts and agreements, coordination with outside agencies, preparation and administration of capital grant funding, and management of City-owned asset data; and provides inspection and acceptance services for development and public infrastructure improvements in the City.

DTA projects the combined Public Works Department multiplier at $106.81 per persons served using the *Per Capita/Employee Multiplier* approach. Again, this represents the marginal increase in expenditures per additional persons served in this category.

D.2 Development Services

The duties of the Development Services Department range from project entitlement approvals to approvals of construction permits and City ordinances related to land use and development. The department is made up of four divisions: (1) the Building Division that enforces laws, codes, and ordinances for all building and parking activities in the City; (2) the Planning Division that administers the City's General Plan and various zoning and environmental regulation by analyzing and recommending measures to protect existing resources; (3) the Land Development Engineering Division that ensures compliance with City codes and ordinances, as well as the Subdivision Map Act, National Pollutant Discharge Elimination System ("NPDES")

permit, and Federal Emergency Management System ("FEMA") floodplain requirements; and (4) the Housing Division that provides programs that include the development of new affordable housing units, the Down Payment Assistance Program and the Homeowner Rehabilitation Program.

Notably, DTA projects the combined Development Services multiplier at $40.47 per persons served using the *Per Capita/Employee Multiplier* approach.

D.3 Public Safety

The Public Safety division discussed in this section is made up of both Law Enforcement and Fire services. According to the City Budget, this division accounts for the City's largest General Fund expenditure (over 50.0% of the City's annual General Fund expenditure). The City currently has a contract for police services with the San Diego County Sherriff's Department. The City contract for law enforcement services includes patrol, traffic, community-oriented policing, gang and narcotics details, detectives, and clerical and supervisory personnel. In contrast, the City operates its own Fire Department, which provides services to over 100,000 residents in the 33 square mile San Marcos Fire Protection District ("SMFPD"). The City itself, comprises 24 square miles of the SMFPD.

Based on the City Budget, DTA projects the combined Public Safety multiplier at $289.82 per persons served using the *Per Capita/Employee Multiplier* approach.

D.4 Culture and Recreation

The Culture and Recreation department is responsible for providing programs and services at the City's parks and recreation facilities. Among the specific elements of the department's work, are pre-school and youth programming, holiday celebrations, special events, cultural and performing arts activities, parks and trails planning, as well as aquatics and other programs. Additionally, the department oversees 17 neighborhood/community parks, 12 mini parks, and more than 60 miles of trails.

Based on the City Budget, DTA projects the Culture and Recreation multiplier at $15.49 per persons served using the *Per Capita/Employee Multiplier* approach.

D.5 Other Financing Services

The Other Financial Services category is comprised of Transfers Out, Annual Replacement, and Rehab Transfers, and is projected to have a combined multiplier of $2.52 per persons served using the *Per Capita/Employee Multiplier* approach. However, as explained in the earlier Scope and Methodology section, a discount rate of 90% was applied to this expenditure to exclude an administrative/overhead component of the expenditure that would not increase one-to-one with population or employment growth.

IV FISCAL IMPACTS TO THE CITY'S GENERAL FUND

A Total Recurring Revenues

Under the Approved Plan, the total annual incremental recurring revenues are projected to be $83,081. Notably, Direct and Indirect Sales Tax makes up the largest percentage total (59.1%). As shown in the table below, Secured Property Taxes (23.5%) and Property Tax in-lieu of VLF (9.3%), also make up significant portions of the revenue to the City.

Under the Proposed Plan, total annual incremental recurring revenues $114,651. As illustrated below in the **Table 6**, the largest percentage of revenue generated under the Proposed Plan is attributed to Secured Property Tax (41.3%). Additional categories contributing significant revenue to the City include CFD Revenue (19.9%) from CFD 98-01 IA 1 (Police) and CFD 2001-01 (Fire), and Property Tax in-lieu of VLF (17.6%). Other revenues, including Direct and Indirect Sales Tax at (8.7%), Franchise Fees (6.5%), and Licenses and Permits (2.5%), also make up significant portions of the revenue to the City. **Exhibits 1 and 11** of **Appendix A** provide additional details regarding all recurring revenues and the assumptions used in their derivation.

Table 6: Recurring Fiscal Revenues (City General Fund)

Revenue Category	Approved Plan		Proposed Plan	
	Amount	Percent	Amount	Percent
Secured Property Tax	$19,506	23.5%	$47,386	41.3%
Unsecured Property Tax	$1,951	2.3%	$1,303	1.1%
Property Transfer Tax	$352	0.4%	$1,733	1.5%
Property In-Lieu of Vehicle License Fee	$7,695	9.3%	$20,220	17.6%
Direct and Indirect Sales tax	$49,102	59.1%	$9,937	8.7%
Franchise Fees	$1,384	1.7%	$7,464	6.5%
Licenses and Permits	$535	0.6%	$2,889	2.5%
Fines and Forfeitures	$178	0.2%	$961	0.8%
CFD Revenue	$2,378	2.9%	$22,759	19.9%
Total Revenues	**$83,081**	**100.0%**	**$114,651**	**100.0%**

B Total Recurring Costs

As illustrated in **Table 7** below, under the Proposed Plan, the total annual incremental recurring costs are projected to be $114,959 per year. In contrast, under the Approved Plan, total annual costs are expected to total $21,311 per year. In both cases, Public Safety (53.0%) makes up the largest cost percentage, followed by Public Works (19.5%), and General Government (16.7%). **Exhibits 1 and 12** of **Appendix A** provide additional details on all recurring costs and the assumptions used in their derivation.

Table 7: Recurring Fiscal Costs (City General Fund)

Expenditure Category	Approved Plan		Proposed Plan	
	Amount	Percent	Amount	Percent
Public Works	$4,166	19.5%	$22,471	19.5%
Development Services	$1,578	7.4%	$8,514	7.4%
Public Safety	$11,303	53.0%	$60,972	53.0%
Culture and Recreation	$604	2.8%	$3,259	2.8%
Other Financing Sources	$98	0.5%	$530	0.5%
General Government	$3,562	16.7%	$19,213	16.7%
Total Revenues	**$21,311**	**100.0%**	**$114,959**	**100.0%**

C Overall Net Fiscal Impact

Table 8 presented below, shows the overall incremental fiscal impact to the City under both development Scenarios. Specifically, under the Approved Plan, the overall fiscal impact to the City General Fund resulting from revenues generated by development and the recurring costs associated with the Project, is a recurring fiscal surplus of $61,770. This total is based on $83,081 in recurring annual revenue and $21,311 in recurring annual costs. In this analysis, the total annual revenues generated are projected to equal 3.90 times the associated City General Funds Costs.

Under the Proposed Plan, the overall fiscal impact to the City General Fund, resulting from revenues generated by the Project and the recurring costs associated with this area is a recurring fiscal deficit of $308 (effectively, fiscally neutral). This amount is based on $114,651 in recurring annual revenues and $114,959 in remaining current annual costs (expenditures). In this analysis, the total annual revenues generated are projected to equal 1.00 times the associated City General Funds Costs.

Table 8: Net Fiscal Impact (City General Fund)

Fiscal Impact	Approved Plan	Proposed Plan
Total Recurring General Fund Revenues	$83,081	$114,651
Total Recurring General Fund Expenditures	($21,311)	($114,959)
Net Fiscal Impact	**$61,770**	**($308)**
Revenue to Expense Ratio	3.90	1.00

Notably, the fiscal impact for the Approved Plan is significantly more positive than that for the Proposed Plan, primarily due to sales tax revenues from the retail uses anticipated on-site. In addition, the residential land uses under the Proposed Plan generate a larger demand for public services (i.e., recurring General Fund expenditures). However, these expenditures are offset by projected CFD revenues and Property Tax revenues, resulting in fiscal neutrality for the Proposed Plan.

D Market Considerations

The results summarized above assume buildout and full occupancy for each Scenario. However, prior to buildout and full occupancy, only a portion of the projected fiscal impacts would likely be realized.

Notably, according to the Meyers Analysis, this area may have difficulty generating full occupancy under the Approved Plan. Specifically, the Meyers Analysis notes that the Medical Office Alternative would not be viable given that there are other sites in the City that are better suited for such uses. Additionally, according to a number of real estate professionals familiar with the market, the Retail Alternative would likely struggle at that location as the average daily traffic (ADT) through the site would be too low to support such uses.

These metrics suggest that full buildout under the Approved Plan may not be achieved, or may, at best, take significantly longer than build-out under the Proposed Plan.

APPENDIX A

City of San Marcos
Mission 316 West
Fiscal Impact Report

FISCAL IMPACT REPORT

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
FISCAL IMPACT ANALYSIS

FISCAL IMPACT SUMMARY

PROJECT SUMMARY

DEMOGRAPHICS

CASE STUDY REVENUES

CASE STUDY EXPENDITURES

MULTIPLIER REVENUES

MULTIPLIER EXPENDITURES

CITY BUDGET SUMMARY

EXHIBIT 1

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
FISCAL IMPACT SUMMARY

RECURRING GENERAL FUND REVENUES[1]	APPROVED PLAN AMOUNT	APPROVED PLAN % OF TOTAL	PROPOSED PLAN AMOUNT	PROPOSED PLAN % OF TOTAL
SECURED PROPERTY TAX	$19,506	23.5%	$47,386	41.3%
UNSECURED PROPERTY TAX	$1,951	2.3%	$1,303	1.1%
PROPERTY TRANSFER TAX	$352	0.4%	$1,733	1.5%
PROPERTY TAX IN-LIEU OF VEHICLE LICENSE FEE	$7,695	9.3%	$20,220	17.6%
DIRECT AND INDIRECT SALES TAX	$49,102	59.1%	$9,937	8.7%
FRANCHISE FEES	$1,384	1.7%	$7,464	6.5%
LICENSES AND PERMITS	$535	0.6%	$2,889	2.5%
FINES AND FORFEITURES	$178	0.2%	$961	0.8%
CFD REVENUE	$2,378	2.9%	$22,759	19.9%
TOTAL RECURRING GENERAL FUND REVENUES	**$83,081**	**100.0%**	**$114,651**	**100.0%**

RECURRING GENERAL FUND EXPENDITURES[2]	APPROVED PLAN AMOUNT	APPROVED PLAN % OF TOTAL	PROPOSED PLAN AMOUNT	PROPOSED PLAN % OF TOTAL
PUBLIC WORKS	$4,166	19.5%	$22,471	19.5%
DEVELOPMENT SERVICES	$1,578	7.4%	$8,514	7.4%
PUBLIC SAFETY	$11,303	53.0%	$60,972	53.0%
CULTURE AND RECREATION	$604	2.8%	$3,259	2.8%
OTHER FINANCING USES	$98	0.5%	$530	0.5%
GENERAL GOVERNMENT	$3,562	16.7%	$19,213	16.7%
TOTAL RECURRING GENERAL FUND EXPENDITURES	**$21,311**	**100.0%**	**$114,959**	**100.0%**

NET FISCAL IMPACT	APPROVED PLAN	PROPOSED PLAN
TOTAL ANNUAL RECURRING GENERAL FUND SURPLUS/(DEFICIT)	$61,770	$308
TOTAL ANNUAL REVENUE/EXPENDITURE RATIO	3.90	1.00

NOTES:

[1] Please see Exhibits 5-7 and 9 for the derivation of these calculations.

[2] Please see Exhibits 8 and 10 for the derivation of these calculations.

All figures subject to rounding

EXHIBIT 2

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
PROJECT SUMMARY

		APPROVED PLAN				PROPOSED PLAN					
LAND USE TYPE	TOTAL GROSS ACRES	BUILDING SPACE ACRES[1]	BUILDING SPACE SF[1]	ESTIMATED VALUE/BSF[2]	TOTAL ESTIMATED VALUE[2]	BUILDING SPACE ACRES[1]	BUILDING SPACE SF[1]	UNITS[1]	ESTIMATED VALUE/BSF	ESTIMATED AVERAGE SALE PRICE[2,3]	TOTAL ESTIMATED VALUE[2]
GRAND TOTAL	**3.71**	**1.00**	**48,000**	**$267**	**$12,796,457**	**1.95**	**85,009**	**67**	**$371**	**$450,273**	**$31,508,300**
NON-RESIDENTIAL											
NON-RETAIL		0.38	18,000	$305	$5,498,743						
RETAIL		0.63	30,000	$243	$7,297,714						
NON-RESIDENTIAL SUBTOTAL		**1.00**	**48,000**		**$12,796,457**						
RESIDENTIAL											
TOTAL						1.95	85,009	67		$450,273	$31,508,300
RESIDENTIAL SUBTOTAL						**1.95**	**85,009**	**67**			**$31,508,300**

NOTES

[1] Source: City of San Marcos.

[2] Source: Meyers Research, "Pricing and Absorption Study: Mission 316 West, San Marcos, CA".

[3] "Estimated average sale price" refers to the weighted average of the base price, as calculated using Meyers Research assumptions.

All figures subject to rounding

EXHIBIT 3

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
CITY DEMOGRAPHICS

POPULATION, HOUSEHOLDS, AND EMPLOYMENT (2018)

POPULATION[1]	95,768
EMPLOYMENT[2]	39,200
TOTAL PERSONS SERVED[3]	115,368
HOUSEHOLDS	29,941
AVERAGE HOUSEHOLD SIZE[1]	3.14

NOTES

[1] California Department of Finance, Housing and Population Information, January 1, 2018.

[2] Source: State of California Employment Development Department (EDD) (December 2018).

[3] Assumes City population plus 50% of employees.

EXHIBIT 4

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
PROJECT DEMOGRAPHICS

	APPROVED PLAN				PROPOSED PLAN						
LAND USE TYPE	BSF	SF PER EMPLOYEE	DIRECT EMPLOYEES	PERSONS SERVED	BSF	UNITS	SF PER EMPLOYEE	PERSONS PER HOUSEHOLD[1]	RESIDENTS	DIRECT EMPLOYEES	PERSONS SERVED
GRAND TOTAL	**48,000**		**77**	**39**	**85,009**	**67**	**0**	3.14	**210**	**0**	**210**
NON-RESIDENTIAL											
NON-RETAIL	18,000	347	52	26							
RETAIL	30,000	1,221	25	13							
NON-RESIDENTIAL SUBTOTAL	**48,000**		**77**	**39**					**0**	**0**	**0**
RESIDENTIAL											
TOTAL					85,009	67	NA	3.14	210	NA	210
RESIDENTIAL SUBTOTAL					**85,009**	**67**			**210**		**210**

NOTES

[1] California Department of Finance, Housing and Population Information, January 1, 2018.

[2] Source: Commercial Buildings Energy Consumption Survey (CBECS), 2012.

All figures subject to rounding

EXHIBIT 5

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED PROPERTY TAX REVENUES (CASE STUDY)

PROPERTY TAX SUMMARY		
LAND USE TYPE	APPROVED PLAN	PROPOSED PLAN
ALL PROPERTY TAXES		
SECURED PROPERTY TAXES	$19,506	$47,386
UNSECURED PROPERTY TAXES	$1,951	$1,303
PROPERTY TRANSFER TAXES	$352	$1,733
PROPERTY TAX IN-LIEU OF VLF	$7,695	$20,220
GRAND TOTAL ALL PROPERTY TAXES	**$29,504**	**$70,642**
RESIDENTIAL PROPERTY TAXES		
SECURED PROPERTY TAXES		$47,386
UNSECURED PROPERTY TAXES		$1,303
PROPERTY TRANSFER TAXES		$1,733
PROPERTY TAX IN-LIEU OF VLF		$20,220
TOTAL RESIDENTIAL PROPERTY TAXES		**$70,642**
NON-RESIDENTIAL PROPERTY TAXES		
SECURED PROPERTY TAXES	$19,506	$0
UNSECURED PROPERTY TAXES	$1,951	$0
PROPERTY TRANSFER TAXES	$352	$0
PROPERTY TAX IN-LIEU OF VLF	$7,695	$0
TOTAL NON-RESIDENTIAL PROPERTY TAXES	**$29,504**	**$0**

EXHIBIT 5

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED PROPERTY TAX REVENUES (CASE STUDY)

SECURED PROPERTY TAX CALCULATION			
LAND USE TYPE		APPROVED PLAN	PROPOSED PLAN
GRAND TOTAL			
ESTIMATED BUILDOUT VALUE		$12,796,457	$31,508,300
ESTIMATED EXEMPTIONS		$0	($422,100)
ESTIMATED ASSESSED VALUE		$12,796,457	$31,086,200
ESTIMATED SECURED PROPERTY TAXES		$19,506	$47,386
RESIDENTIAL			
ESTIMATED BUILDOUT VALUE		$0	$31,508,300
ESTIMATED EXEMPTIONS		$0	($422,100)
HOMEOWNER'S EXEMPTION (ANNUALLY)	$7,000		
PERCENT OF SALE UNITS TAKING HOMEOWNER'S EXEMPTION[1]	90%		
ESTIMATED ASSESSED VALUE		$0	$31,086,200
ESTIMATED SECURED PROPERTY TAXES		$0	$47,386
NON-RESIDENTIAL			
ESTIMATED BUILDOUT VALUE		$12,796,457	$0
ESTIMATED EXEMPTIONS		$0	$0
ESTIMATED ASSESSED VALUE		$12,796,457	$0
ESTIMATED SECURED PROPERTY TAXES		$19,506	$0

UNSECURED PROPERTY TAX CALCULATION			
LAND USE TYPE		APPROVED PLAN	PROPOSED PLAN
GRAND TOTAL		$1,951	$1,303
RESIDENTIAL			
ESTIMATED UNSECURED PROPERTY TAXES		$0	$1,303
UNSECURED TAXES AS A % OF SECURED[2]	2.75%		
NON-RESIDENTIAL			
ESTIMATED UNSECURED PROPERTY TAXES		$1,951	$0
UNSECURED TAXES AS A % OF SECURED[2]	10.00%		

EXHIBIT 5 - CONTINUED

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED PROPERTY TAX REVENUES (CASE STUDY)

PROPERTY TRANSFER TAX CALCULATION			
LAND USE TYPE		APPROVED PLAN	PROPOSED PLAN
GRAND TOTAL		$352	$1,733
RESIDENTIAL			
ESTIMATED PROPERTY TRANSFER TAXES		$0	$1,733
ESTIMATED BUILDOUT VALUE		$0	$31,508,300
TRANSFER TAX AS A % OF ASSESSED VALUE	0.11%		
PROPERTY TRANSFER TAX PASSED THROUGH TO CITY OF SAN MARCOS	50.00%		
RESIDENTIAL PROPERTY TURNOVER RATE	10.00%		
NON-RESIDENTIAL			
ESTIMATED PROPERTY TRANSFER TAXES		$352	$0
ESTIMATED BUILDOUT VALUE		$12,796,457	$0
TRANSFER TAX AS A % OF ASSESSED VALUE	0.11%		
PROPERTY TRANSFER TAX PASSED THROUGH TO CITY OF SAN MARCOS	50.00%		
NON-RESIDENTIAL PROPERTY TURNOVER RATE	5.00%		

PROPERTY TAX IN-LIEU OF VEHICLE LICENSE FEE CALCULATION			
LAND USE TYPE		APPROVED PLAN	PROPOSED PLAN
GRAND TOTAL		$7,695	$20,220
RESIDENTIAL			
ESTIMATED PROPERTY TAX IN-LIEU OF VLF		$0	$20,220
ESTIMATED BUILDOUT VALUE		$0	$31,508,300
ESTIMATED EXISTING ASSESSED VALUE		$0	$1,300,000
PROPERTY TAX IN-LIEU OF VLF INCREASE PER $1,000 OF AV	$0.67		
NON-RESIDENTIAL			
ESTIMATED PROPERTY TAX IN-LIEU OF VLF		$7,695	$0
ESTIMATED BUILDOUT VALUE		$12,796,457	$0
ESTIMATED EXISTING ASSESSED VALUE		$1,300,000	$0
PROPERTY TAX IN-LIEU OF VLF INCREASE PER $1,000 OF AV	$0.67		

EXHIBIT 5 - CONTINUED

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED PROPERTY TAX REVENUES (CASE STUDY)

PROPERTY TAX AND PROPERTY TRANSFER TAX RATES AND ASSUMPTIONS

PROPERTY TAX ALLOCATION (AS A PORTION OF THE 1% GENERAL PROPERTY TAX LEVY)	
CITY OF SAN MARCOS[3,4]	8.879%
FIRE DISTRICT[3,4]	6.364%
TOTAL	**15.243%**
PROPERTY TRANSFER TAX RATE AND ALLOCATION[5]	
TRANSFER TAX AS A % OF ASSESSED VALUE	0.11%
PROPERTY TRANSFER TAX PASSED THROUGH TO CITY OF SAN MARCOS	50.00%
PROPERTY TAX IN-LIEU OF VLF ASSUMPTIONS	
TOTAL CITY OF SAN MARCOS GROSS ASSESSED VALUE[6]	$7,756,621,947
TOTAL CITY PROPERTY TAX IN-LIEU VLF REVENUES[6]	$5,191,930
PROPERTY TAX IN-LIEU OF VLF INCREASE PER $1,000 OF AV	$0.67

NOTES

[1] Estimate, subject to change.

[2] Based on typical DTA baseline assumptions.

[3] Based on "General Fund" levy for Tax Rate Area (TRA) 13113.
Data provided by the County of San Diego Auditor-Controller's Office.

[4] Based on the average of the rates for TRA 13113.

[5] Source: California Revenue & Taxation Code §11901, et seq.; San Marcos Municipal Code §3.12.030.

[6] Source: State Controller's Office Division of Accounting and Reporting, Revenue and Taxation Code Section 97.70 (c)(1)(B)(i) - Vehicle License Fee Adjustment Amounts.

All figures subject to rounding

EXHIBIT 6

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED SALES TAX REVENUES (CASE STUDY)

SALES TAX SUMMARY		
LAND USE TYPE	APPROVED PLAN	PROPOSED PLAN
GRAND TOTAL	**$49,102**	**$9,937**
RESIDENTIAL SALES TAXES		
DIRECT SALES TAX		NA
INDIRECT SALES TAX - TAXABLE RESIDENT PURCHASES		
PRODUCT A		$9,937
PRODUCT B		$0
TOTAL RESIDENTIAL SALES TAXES		**$9,937**
NON-RESIDENTIAL SALES TAXES		
DIRECT SALES TAX[1]		
NON-RETAIL	$0	$0
RETAIL	$48,000	$0
INDIRECT SALES TAX - TAXABLE EMPLOYEE PURCHASES	$1,102	$0
TOTAL NON-RESIDENTIAL SALES TAXES	**$49,102**	**$0**

DIRECT SALES TAX ASSUMPTIONS		
TAXABLE SALES PER SF[1]		
NON-RETAIL	$0	$0
RETAIL	$200	$0
DISPLACED TAXABLE SALES[2]	20%	NA

EXHIBIT 6 - CONTINUED

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT

RESIDENTIAL INDIRECT SALES TAX ASSUMPTIONS

DISPOSABLE INCOME PER HOUSEHOLD

ESTIMATED AVERAGE HOUSEHOLD INCOME (ASSUMES 3:1 INCOME TO HOUSEHOLD PAYMENT RATIO) [3]	
HIGH DENSITY RESIDENTIAL	$94,906

MORTGAGE ASSUMPTIONS

HIGH DENSITY RESIDENTIAL	
AVERAGE PROJECTED SALES PRICE PER UNIT	$450,273
AVERAGE MORTGAGE (20% DOWN PAYMENT)[3]	$360,219
ANNUAL MORTGAGE PAYMENT (4.5% FOR 30 YEARS)[4]	$21,902
ADDITIONAL ANNUAL PROPERTY TAXES & HOA[5]	$9,733

RETAIL TAXABLE EXPENDITURES (AS A % OF DISPOSABLE INCOME)[6]

HIGH DENSITY RESIDENTIAL	31.25%

NON-RESIDENTIAL INDIRECT SALES TAX ASSUMPTIONS

EMPLOYEES (ANNUAL SPENDING PER EMPLOYEE)[7] $5,652

EXHIBIT 6 - CONTINUED

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED SALES TAX REVENUES (CASE STUDY)

CITY INDIRECT SALES TAX ASSUMPTIONS

SALES TAX % TO CITY[8]	1.00%
CITY RETAIL TAXABLE PURCHASE CAPTURE RATE[2]	50%

SAMPLE PROPERTY TAX BILL

FY 2018-19 AD VALOREM PROPERTY TAX RATE (13113)	1.11185%
CITY CFD SPECIAL TAXES	$927.44
OTHER DIRECT ASSESSMENTS	
VECTOR CONTROL	$7.92
CWA WATER AVAILABILITY	$10.00
MOSQUITO SURVEILLANCE	$2.28
MWD WATER STANDBY CHARGE	$11.50
SEWER SERVICE CHARGE	$467.88
TOTAL ETR	1.428773%

NOTES

[1] Estimate, subject to change.

[2] Estimate, subject to change.

[3] DTA estimates. Subject to change.

[4] DTA estimate. Annual payment includes principal, interest, property taxes, and homeowner's insurance.

[5] Assumption of $275 monthly HOA. Source: Meyers Research, "Pricing and Absorption Study: Mission 316 West, San Marcos, CA.

[6] Source: Bureau of Labor Statistics (BLS) *Consumer Expenditure Survey (2015).*

[7] Source: "Office-Worker Retail Spending in a Digital Age," ICSC (2012). Adjusted for inflation using the change in CPI for San Diego.

[8] Source: San Marcos Municipal Code §3.20.090.

**** All figures subject to rounding***

EXHIBIT 7

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED CFD SPECIAL TAX REVENUES (CASE STUDY)

CFD SPECIAL TAX SUMMARY - GENERAL FUND IMPACTS

LAND USE TYPE	ACRES RETAIL	ACRES NON-RETAIL	SF	UNITS	APPROVED PLAN	PROPOSED PLAN
TOTAL CFD SPECIAL TAXES					**$2,378**	**$22,759**
RESIDENTIAL CFD SPECIAL TAXES[1]						
CFD 98-01 IA 1				67		$11,826
CFD 2001-01 (FIRE)				67		$10,932
TOTAL RESIDENTIAL CFD SPECIAL TAXES						**$22,759**
NON-RESIDENTIAL CFD SPECIAL TAXES[1]						
CFD 98-01 IA 1	0.63	0.38			$1,236	
CFD 2001-01 (FIRE)	0.63	0.38			$1,142	
TOTAL NON-RESIDENTIAL CFD SPECIAL TAXES					**$2,378**	

CFD SPECIAL TAX SUMMARY - NON-GENERAL FUND IMPACTS (EXCLUDED FROM ANALYSIS)

LAND USE TYPE	ACRES RETAIL	ACRES NON-RETAIL	SF	UNITS	APPROVED PLAN	PROPOSED PLAN
TOTAL CFD SPECIAL TAXES					**$18,198**	**$39,380**
RESIDENTIAL CFD SPECIAL TAXES[1]						
CFD 98-02 (ZONES A - E)[2]				67		$16,589
CFD 98-02 (ZONE F)[2, 3]				67		NA
CFD 2011-01[2, 4]				67		$22,791
TOTAL RESIDENTIAL CFD SPECIAL TAXES						**$39,380**
NON-RESIDENTIAL CFD SPECIAL TAXES[1]						
CFD 98-02 (ZONES A - E)[2]	0.63	0.38			$1,062	
CFD 98-02 (ZONE F)[2, 3]	0.63	0.38			NA	
CFD 2011-01[2, 5]			48,000		$17,136	
TOTAL NON-RESIDENTIAL CFD SPECIAL TAXES					**$18,198**	

CFD SPECIAL TAX RATE ASSUMPTIONS

LAND USE	FY 2018-19 SPECIAL TAX RATE PER ACRE	PER SF	PER UNIT
RESIDENTIAL[1]			
CFD 98-01 IA 1			$176.51
CFD 2001-01 (FIRE)			$163.17
CFD 98-02 (ZONES A - E)[2]			$247.60
CFD 98-02 (ZONE F)[2, 3]			NA
CFD 2011-01[2, 4]			$340.16
NON-RESIDENTIAL[1]			
RETAIL			
CFD 98-01 IA 1	$1,235.60		
CFD 2001-01 (FIRE)	$1,142.19		
CFD 98-02 (ZONES A - E)[2]	$1,061.79		
CFD 98-02 (ZONE F)[2, 3]	NA		
CFD 2011-01[2, 5]		$0.3570	
NON-RETAIL			
CFD 98-01 IA 1	$1,235.60		
CFD 2001-01 (FIRE)	$1,142.19		
CFD 98-02 (ZONES A - E)[2]	$1,061.79		
CFD 98-02 (ZONE F)[2, 3]	NA		
CFD 2011-01[2, 5]		$0.3570	

NOTES

[1] Source: City of San Marcos.

[2] Special assessments collected from the CFD are deposited into Special Funds, not the General Fund. Therefore, these CFD revenues are excluded from this analysis.

[3] No special tax rate for Zone F has been established for the project.

[4] "Condominium" Rate, per dwelling unit

[5] "Retail" Rate, per building square foot

All figures subject to rounding

EXHIBIT 8

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED GENERAL GOVERNMENT EXPENDITURES (CASE STUDY)

GENERAL GOVERNMENT EXPENDITURES CALCULATION	APPROVED PLAN	PROPOSED PLAN
ESTIMATED RECURRING GENERAL GOVERNMENT OVERHEAD EXPENDITURES[1]	$3,562	$19,213

GENERAL GOVERNMENT ASSUMPTIONS	
TOTAL RECURRING CITY GENERAL FUND EXPENDITURES (EXCLUDING GENERAL GOVERNMENT OVERHEAD)[2]	$55,126,532
TOTAL RECURRING CITY GENERAL GOVERNMENT OVERHEAD[3]	$11,061,897
TOTAL RECURRING GENERAL FUND EXPENDITURES	$66,188,429
RECURRING CITY GENERAL GOVERNMENT OVERHEAD (% OF TOTAL RECURRING GENERAL FUND EXPENDITURES)[3]	20.1%
MARGINAL INCREASE IN GENERAL GOVERNMENT COSTS	100%

NOTES

[1] Based on total recurring project general fund expenditures (excluding general government overhead) from Exhibit 12.

[2] Based on City of San Marcos Operating Budget, Fiscal Year 2018-19.

[3] General Government Overhead Expenditures defined as costs for City Council, Administration, Housing and Neighborhood Services, City Attorney, City Clerk, Human Resources/Risk Management, Finance/Information Systems, and Real Property Services.

All figures subject to rounding

EXHIBIT 9

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED MULTIPLIER BASED GENERAL FUND REVENUES

MULTIPLIER BASED GENERAL FUND REVENUE SUMMARY		
REVENUE CATEGORY	APPROVED PLAN	PROPOSED PLAN
FRANCHISE FEES	$1,384	$7,464
LICENSES AND PERMITS	$535	$2,889
FINES AND FORFEITURES	$178	$961
TOTAL ESTIMATED MULTIPLIER REVENUES	**$2,097**	**$11,314**

MULTIPLIER BASED REVENUE ASSUMPTIONS		
REVENUE CATEGORY	MULTIPLIER[1]	BASIS
SALES TAX	NA	CASE STUDY
PROPERTY TAX	NA	CASE STUDY
FRANCHISE FEES	$35.48	PERSONS SERVED
LICENSES AND PERMITS	$13.73	PERSONS SERVED
FINES AND FORFEITURES	$4.57	PERSONS SERVED

NOTES

[1] Based on City of San Marcos Operating Budget, Fiscal Year 2018-19.

All figures subject to rounding

EXHIBIT 10

CITY OF SAN MARCOS
MISSION 316 WEST PROJECT
ESTIMATED MULTIPLIER BASED GENERAL FUND EXPENDITURES

MULTIPLIER BASED GENERAL FUND EXPENDITURE SUMMARY		
EXPENDITURE CATEGORY	APPROVED PLAN	PROPOSED PLAN
PUBLIC WORKS	$4,166	$22,471
DEVELOPMENT SERVICES	$1,578	$8,514
PUBLIC SAFETY	$11,303	$60,972
CULTURE AND RECREATION	$604	$3,259
OTHER FINANCING USES	$98	$530
TOTAL MULTIPLIER EXPENDITURES	$17,749	$95,746

MULTIPLIER BASED EXPENDITURE ASSUMPTIONS		
EXPENDITURE CATEGORY	MULTIPLIER[1]	BASIS
PUBLIC WORKS	$106.81	PERSONS SERVED
DEVELOPMENT SERVICES	$40.47	PERSONS SERVED
PUBLIC SAFETY	$289.82	PERSONS SERVED
CULTURE AND RECREATION	$15.49	PERSONS SERVED
OTHER FINANCING USES	$2.52	PERSONS SERVED

NOTES

[1] Based on City of San Marcos Operating Budget, Fiscal Year 2018-19.

All figures subject to rounding

EXHIBIT 11
Mission 316 West Project
CITY OF SAN MARCOS
FY 2018-19 GENERAL FUND REVENUE SUMMARY

REVENUE CATEGORY	TOTAL REVENUES	REVENUE TYPE	PROJECTION METHOD	DISCOUNT [1]	MULTIPLIER
REVENUES INCLUDED IN FISCAL IMPACT ANALYSIS					
SALES TAX	$17,663,248	RECURRING	CASE STUDY	NA	NA
PROPERTY TAX	$23,247,977	RECURRING	CASE STUDY	NA	NA
SPECIAL TAXES/ASSESSMENTS	$6,093,313	RECURRING	CASE STUDY	NA	NA
TRANSIENT OCCUPANCY TAX	$1,319,500	RECURRING	CASE STUDY	0%	NA
FRANCHISE FEES	$4,092,841	RECURRING	PERSONS SERVED	0%	$35.48
LICENSES AND PERMITS	$1,584,547	RECURRING	PERSONS SERVED	0%	$13.73
FINES AND FORFEITURES	$527,500	RECURRING	PERSONS SERVED	0%	$4.57
TOTAL INCLUDED GENERAL FUND REVENUES	**$54,528,926**				**$53.78**
CHARGES FOR SERVICES [3]					
DEDUCTED FROM GENERAL GOV'T CHARGES	$1,290,559	NA	NA	NA	NA
DEDUCTED FROM PUBLIC WORKS	$921,590	NA	NA	NA	NA
DEDUCTED FROM DEVELOPMENT SERVICES	$622,270	NA	NA	NA	NA
DEDUCTED FROM PUBLIC SAFETY: BUILDING REGULATION CHARGES	$4,760,033	NA	NA	NA	NA
DEDUCTED FROM CULTURE AND RECREATION	$2,203,250	NA	NA	NA	NA
TOTAL CHARGES FOR SERVICES	**$9,797,702**				
REVENUES EXCLUDED FROM FISCAL IMPACT ANALYSIS					
USE OF MONEY AND PROPERTY [4]	$6,137,949	NA	NA	NA	NA
MISCELLANEOUS REVENUES	$236,770	NA	NA	NA	NA
OTHER FINANCING SOURCES	$5,393,500	NA	NA	NA	NA
INTERGOVERNMENTAL REVENUES	$904,780	NA	NA	NA	NA
DEVELOPER FEES	$15,500	NA	NA	NA	NA
TOTAL EXCLUDED GENERAL FUND REVENUES	**$12,688,499**				
TOTAL GENERAL FUND REVENUES + CHARGES FOR SERVICES	**$77,015,127**				
TOTAL RECURRING GENERAL FUND REVENUES	**$54,528,926**				

NOTES

[1] Certain revenues may not be be expected to increase one-to-one with the new development.

[2] Source: FY 2018-19 Budget.

[3] All Charges for Services are deducted from expenditures on Exhibit 13.

[4] Interest income is modeled on a case study basis on Exhibit 8.

All figures subject to rounding

EXHIBIT 12
MISSION 316 WEST PROJECT
CITY OF SAN MARCOS
FY 2018-19 GENERAL FUND EXPENDITURE SUMMARY

EXPENDITURE CATEGORY	TOTAL EXPENDITURES	CHARGES FOR SERVICES ADJUSTMENT	EXPENDITURE TYPE	PROJECTION METHOD[1]	DISCOUNT[2]	MULTIPLIER
EXPENDITURES INCLUDED IN FISCAL IMPACT ANALYSIS						
GENERAL GOVERNMENT EXPENDITURES						
CITY COUNCIL	$299,672		RECURRING	CASE STUDY	NA	NA
ADMINISTRATION	$1,772,797		RECURRING	CASE STUDY	NA	NA
ECONOMIC DEVELOPMENT	$270,123		RECURRING	CASE STUDY	NA	NA
CITY ATTORNEY	$833,000		RECURRING	CASE STUDY	NA	NA
CITY CLERK	$674,437		RECURRING	CASE STUDY	NA	NA
HUMAN RESOURCES/ RISK MANAGEMENT	$3,602,854		RECURRING	CASE STUDY	NA	NA
FINANCE/ INFORMATION SYSTEMS	$3,810,697		RECURRING	CASE STUDY	NA	NA
REAL PROPERTY SERVICES	$1,088,876		RECURRING	CASE STUDY	NA	NA
TOTAL GENERAL GOVERNMENT EXPENDITURES	**$12,352,456**	**($1,290,559)**				
		$11,061,897				**$0.00**
PUBLIC WORKS						
OPERATIONS	$11,100,893	($772,469)	RECURRING	PERSONS SERVED	0%	$89.53
ENGINEERING	$2,142,974	($149,121)	RECURRING	PERSONS SERVED	0%	$17.28
TOTAL PUBLIC WORKS	**$13,243,867**	**($921,590)**				
		$12,322,277		**PERSONS SERVED**	**0%**	**$106.81**
DEVELOPMENT SERVICES						
ADMINISTRATION	$668,903	($78,667)	RECURRING	PERSONS SERVED	0%	$5.12
PLANNING	$1,352,161	($159,023)	RECURRING	PERSONS SERVED	0%	$10.34
BUILDING	$1,571,822	($184,857)	RECURRING	PERSONS SERVED	0%	$12.02
ENGINEERING	$852,381	($100,246)	RECURRING	PERSONS SERVED	0%	$6.52
STORMWATER PROGRAM MANAGEMENT	$845,849	($99,477)	RECURRING	PERSONS SERVED	0%	$6.47
TOTAL DEVELOPMENT SERVICES	**$5,291,116**	**($622,270)**				
		$4,668,846		**PERSONS SERVED**	**0%**	**$40.47**
PUBLIC SAFETY						
FIRE DEPARTMENT	$18,615,070	($2,319,845)	RECURRING	PERSONS SERVED	0%	$141.25
LAW ENFORCEMENT	$19,580,742	($2,440,188)	RECURRING	PERSONS SERVED	0%	$148.57
TOTAL PUBLIC SAFETY	**$38,195,812**	**($4,760,033)**				
		$33,435,779		**PERSONS SERVED**	**0%**	**$289.82**
CULTURE AND RECREATION						
COMMUNITY SERVICES	$3,990,275	($2,203,250)	RECURRING	PERSONS SERVED	0%	$15.49
TOTAL CULTURE AND RECREATION	**$3,990,275**	**($2,203,250)**				
		$1,787,025		**PERSONS SERVED**	**0%**	**$15.49**
OTHER FINANCING USES						
ANNUAL REPLACEMENT/REHAB TRANSFERS	$2,912,605		RECURRING	PERSONS SERVED	90%	$2.52
TOTAL OTHER FINANCING SOURCES	**$2,912,605**	**$0**				
		$2,912,605		**PERSONS SERVED**	90%	**$2.52**
TOTAL INCLUDED EXPENDITURES	**$75,986,131**	**$66,188,429**				
EXPENDITURES EXCLUDED FROM FISCAL IMPACT ANALYSIS						
TRANSFERS OUT	$995,000		NA	NA	NA	NA
TOTAL EXCLUDED GENERAL FUND EXPENDITURES	**$995,000**					
TOTAL GENERAL FUND EXPENDITURES	**$76,981,131**	**$66,188,429**				

NOTES

[1] Persons Served method assumes City population plus 50% of employees.

[2] Certain expenditures may not be expected to increase one-to-one with the new development.

All figures subject to rounding



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Mission 316 West

Pricing and Absorption
David Taussig & Associates
San Marcos, California
March 2019

Meyers RESEARCH
a Kennedy Wilson Company

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Objective & Key Findings

Mission 316 West, San Marcos, California

Contact Information

This market analysis was prepared by Meyers Research, a market research and consulting firm specializing in the real estate industry. It has been commissioned by David Taussig & Associates.

Alexis Wilmot served as Project Director and oversaw all aspects of this assignment. Tim Sullivan, Managing Principal, reviewed all recommendations and conclusions. Follow-up questions should be directed to Tim Sullivan at (858) 381- 4381 or tsullivan@meyersllc.com.

Objective

The City of San Marcos is processing a General Amendment and Zone Change of a vacant, undeveloped 3.71-acre site currently zoned Specific Plan Area and is designated within the Heart of the City Specific Plan within the "Commercial" business district (the "Subject"). The Subject is slated for redevelopment as a 67-unit residential attached condominium development at 260 East Mission Road San Marcos (the northeast corner of Woodward Street and Mission Road). This analysis will address the viability of the request for General Plan Amendment, and Specific Plan Amendment to the Heart of the City Specific Plan to change the existing land use designation on the site from Commercial to High Density Residential 15-20 du/acre. The objective of this analysis is to provide an independent analysis of the residential and retail market in the San Diego County and the San Marcos area to determine relevant market trends and to provide conclusions relevant to the future site use and the absorption potential for the planned residential units. Recommendations are based on March 2019 data.

Limiting Conditions

David Taussig & Associates, is responsible for representations about its development plans, marketing expectations and for disclosure of any significant information that might affect the ultimate realization of the projected results.

There will usually be differences between projected and actual results because events and circumstances frequently do not occur as expected, and the differences may be material.

We have no responsibility to update our report for events and circumstances occurring after the date of our report.

Payment of any and all of our fees and expenses is not in any way contingent upon any factor other than our providing services related to this report.

Meyers surveyed roughly 1,328 for-sale attached residential units in the competitive market area (CMA), and approximately 560 detached small detached homes and condominiums to ascertain the current state of the market, and to provide input on the development of the Subject as a townhome community:

1. Demand: Demand remains strong for attached housing options in both the City of San Marcos and the CMA.
2. Sales Traffic: There has been some recovery in sales traffic in the North County market since Fall of 2018 when traffic dropped off significantly. Residential for-sale developers and prospective home buyers alike proceeding with caution.
3. Recommended pricing as a 67-unit townhome development:
    - The average recommended total price is $470,000 ($371 per square foot).
    - Unit Sizes range from 1,104 to 1,646 square feet, with an average unit size of 1,269 square feet.
    - Roughly 55 of the 67 townhomes are back-to-back configuration which is not featured in any of the actively selling attached communities in the CMA. An adjustment price adjustment down was applied to the Subject to account for the less desirable townhome configuration (back-to-back vs rowtown). The recently built Mission Villas product located adjacent to the Subject features the same townhome configuration and was analyzed in depth to provide a benchmark for total home price in North San Marcos.
    - We have based our pricing on a monthly HOA fee of $240 per unit and a total tax rate of 1.31%.
    - Based on current market activity, the recommended total price at Mission 316 West could achieve a sales rate of 3.0 units per month.
    - Positioning:
    – Plan 1: The smallest floor plan is positioned at a discount to the market based off of the poor market response to the small attached home sizes offered at Anden by ColRich right off the CA-78 just south of the Subject. The community was converted into apartment rentals after only 1 sale in nearly 4 months due owing to high prices for small homes sizes (1,235 to 1,486 square feet) and limited product differentiation.
    – Plan 2: Priced in line with The Collection at St. Cloud and Palomar at Mission Lane to account for a better address and schools offset by masterplan amenities and coastal proximity.
    – Plan 3: Priced in line with The Collection at St. Cloud and Vela at Mission Lane (duplex) and just under Verano at Skyline.

Methodology:

As part of our due diligence for Mission 316 West, we performed the following research steps: 1) Researched the commercial market trends, 2) Identified sales comparables and commercial buildings for lease, 3) Spoke to local San Marcos commercial space broker representatives and interviewed local commercial office developers, 4) Analyzed the development activity and related values of other CA-78 corridor retail and medical office spaces along the SR-78 corridor (San Marcos, Escondido, and Vista).

Our research indicates that there are two traditional proposed uses that are most appropriate for the Subject: 1) Two-story concrete tilt-up medical office building, 2) Two free standing retail/commercial pads and supporting in-line retail space.

Retail

- Using the net operating income/cap rate appraisal method, the Subject property with two commercial free standings pads and in-line retail space for a total of 48,000 square feet could value the property at approximately $12.80* million ($266.59 per square foot). Based on recent sales and listing comparables, our recommended sale price for two commercial pads and in-line retail space is $290 per square foot.
- Retail Trends
  - Retail vacancy in the North County Submarket is at a four-year low, at roughly 4.6%. However, the submarket represents 54% (270,910 square feet) of the under construction retail in the San Diego MSA and it is likely that as the new retail space is delivered the lease rates will decrease as vacancy trends upward.
  - The San Marcos retail Submarket has the lowest lease rates in San Diego County, at $0.95 per square foot versus $1.42 per square foot for the MSA overall. Additionally, the San Marcos retail submarket has the second highest vacancy rate of any submarket in San Diego, at 10.5% vacancy versus 3.7% vacancy for the MSA overall.
- Feedback from brokers specializing in retail leases and investments in the North County area argue the retail market is soft in San Marcos and that the site average daily traffic (ADT) is too low to support a large strip center.

This analysis excludes building cost assumptions.

Medical Office

- Using the net operating income/cap rate appraisal method, the Subject property with a 48,000 square foot medical office building could be valued today at approximately $18.16* million ($378.29 per square foot). Based on recent sales and listing comparables, our recommended pricing for a two-story concrete tilt-up medical office building is $440 per square foot with a 7.0% cap rate.
- Office Trends
  - The SR-78 office market has below average lease rates and high vacancies, with an average lease rate of $2.00 and a vacancy rate of 6.5%, which is notably lower than the San Diego MSA vacancy rate average of 9.7%. San Marcos has the highest lease rates in the SR-78 submarket at $2.31 per square foot.
  - Vacancy is improving in the submarket, currently at 10.2%, down from the four year average of 11.5%. Lease rates are below the MSA average at $2.31 per square foot versus $2.73 per square foot for the MSA overall. Class B space comprises 48% of the total office space in the San Diego MSA. Lease rates are highest for Class A space ($3.27 per square foot), and the vacancy rate is lowest for Class C space (5.0%).
- Feedback from Newport National Corporation argued that the site could not support a medical office building due to a soft market and an inferior location. Additionally, in the absence of building cost assumptions we cannot determine if medical office is viable.

As part of our due diligence for Mission 316 West, a SWOT analysis was performed on the three land use considerations.

Internal Factors			
Strengths (+)	**For-Sale Townhomes**	**Medical Office**	**Retail**
Overall Advantages	• <1.0 mile from the CA-78 freeway • Adjacent to the Sprinter Rail System • Good daylight and views facing south and west • Safe area • Large retail centers located <1.5 miles away offering good access to retail, banking, professional service facilities, San Marcos Library, and the local post offices	• <1.0 mile from the CA-78 freeway • Adjacent to the Sprinter Rail System • Large retail centers located <1.5 miles away offering good access to retail, banking, professional service facilities, etc	• Medium density townhomes just east of the site and the City of San Marcos office buildings are located across the street • Safe area
Weaknesses (–)	**For-Sale Townhomes**	**Medical Office**	**Retail**
Areas of Improvement	• Recommended price point is high for the average incomes of residents in the North San Marcos ZIP code • Poor walkability to local restaurants	• No freeway visibility • Parking requirement would be difficult to comply with given the site shape	• No freeway visibility • Not large emough for a department store • No supporting retail/uses in the immediate area • Poor pedestrian walkability • 180º site visibility, not accessible from the north (backing to a knoll)

External Factors			
Opportunities (+)	**For-Sale Townhomes**	**Medical Office**	**Retail**
Market Voids & Favorable Trends	• Small and attainably priced townhomes are in demand in North San Marcos	• Aging U.S. population will fuel demand for medical office space 2020+	• Area gap for a department store & clothing store
Threats (–)	**For-Sale Townhomes**	**Medical Office**	**Retail**
Obstacles & Market Shifts	• Sprinter Rail System noise • Site Plan provides limited buffer to filter noise coming off of E. Mission Road • Homebuyers are proceeding with caution and sales rates are closer to three home per month on average down from three per month over the past year • The North City development south of the CA-78 will add 2,600 mixed use residential units	• Medical office space is a soft market in the SR-78 corridor • North City recently finished the build out of a 60,000 sf medical office building and another building of similar or larger size is planned just east of the North City development • The North City development south of the CA-78 will add 652,000 square feet of general office, 300,000 square feet of medical office, 700,000 square feet of mixed use retail/commercial, and 30,000 square feet of civic/community use	• No freeway visibility • Low ADT counts to support a strip center • Commerce Square, Creekside Village, and San Marcos Auto Center are located <1.5 miles away along San Marcos Blvd. • Second highest vacancy rate in the MSA at 10.5% • 40,000 square feet of retail space was delivered over 2018 while San Marcos net (171,000) square feet of space • An increasing number of storefront retail space is vacating owing to large ecommerce companies like Amazon

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Site & Location Analysis

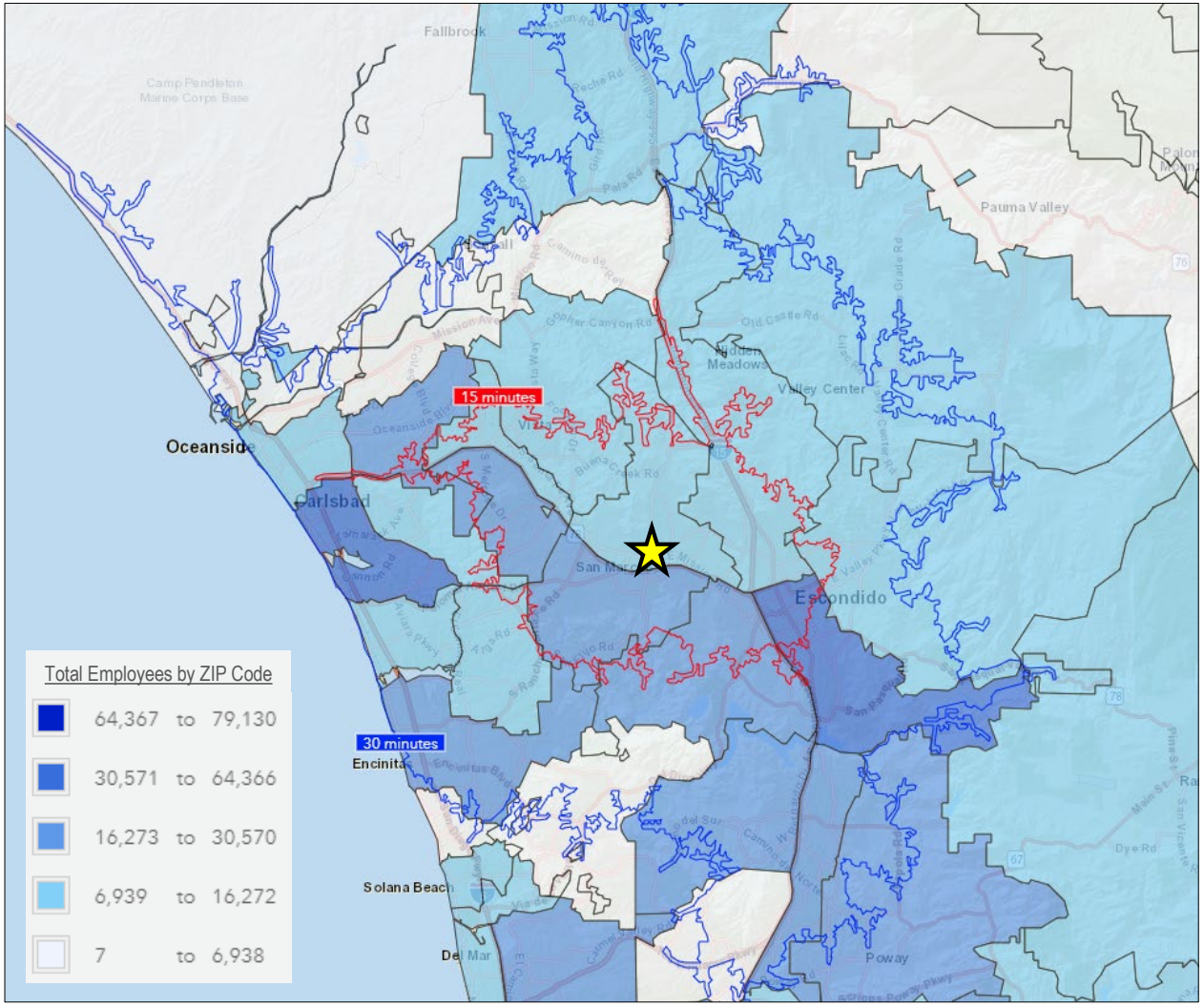
Mission 316 West, San Marcos, California

The site is located approximately 0.7 miles North of State Route 78 (SR 78) and approximately 3.5 miles West of Interstate 15 (I -15), which serve as major thoroughfares for commuters to employment hubs shown on the following page. The map below displays the typical drive time boundaries assuming typical morning and evening commuter conditions.

San Diego County Top Employers
University of California, San Diego
County of San Diego
United States Navy, San Diego
City of San Diego
San Diego Unified School District
Sharp Health Care
Scripps Health
Qualcomm Inc.
Kaiser Foundation Hospital
San Diego State University
Sony Electronics Inc
Seaworld San Diego

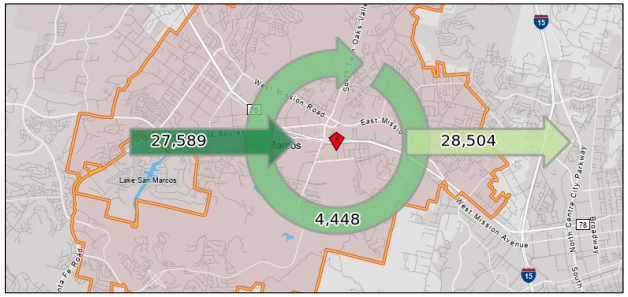
City of San Marcos Top Employers
Hunter Industries
United Parcel Service
So. CA Permanente Med Group
Wal-Mart
Costco Wholesale
24 Hour Fitness
Lusardi Construction Co.
RB III Associates Inc.
Fluid Components International
University Aux. & Research Services

City of Carlsbad Top Employers
ViaSat, Inc.
Thermo Fisher Scientific
LEGOLAND California
Carlsbad Unified School District
Omni La Costa Resort & Spa
TaylorMade-Adidas
SGN Nutrition
Gemological Institute of America
City of Carlsbad
OptumRx



Source: Meyers Research, Zonda, ESRI, City of San Marcos, City of Carlsbad

The color-concentrated areas indicate the highest proportion of commuter destinations from the Subject ZIP code 92069. Roughly 14% of local residents live and work in the City of San Marcos, while 33% of residents commute 10 miles or less to employment clusters primarily along the CA-78 in Carlsbad, Escondido, Vista, and Encinitas along the I-5. A further 25% commute between 10 and 24 miles to employment in Oceanside, Poway, and further south along the coast.



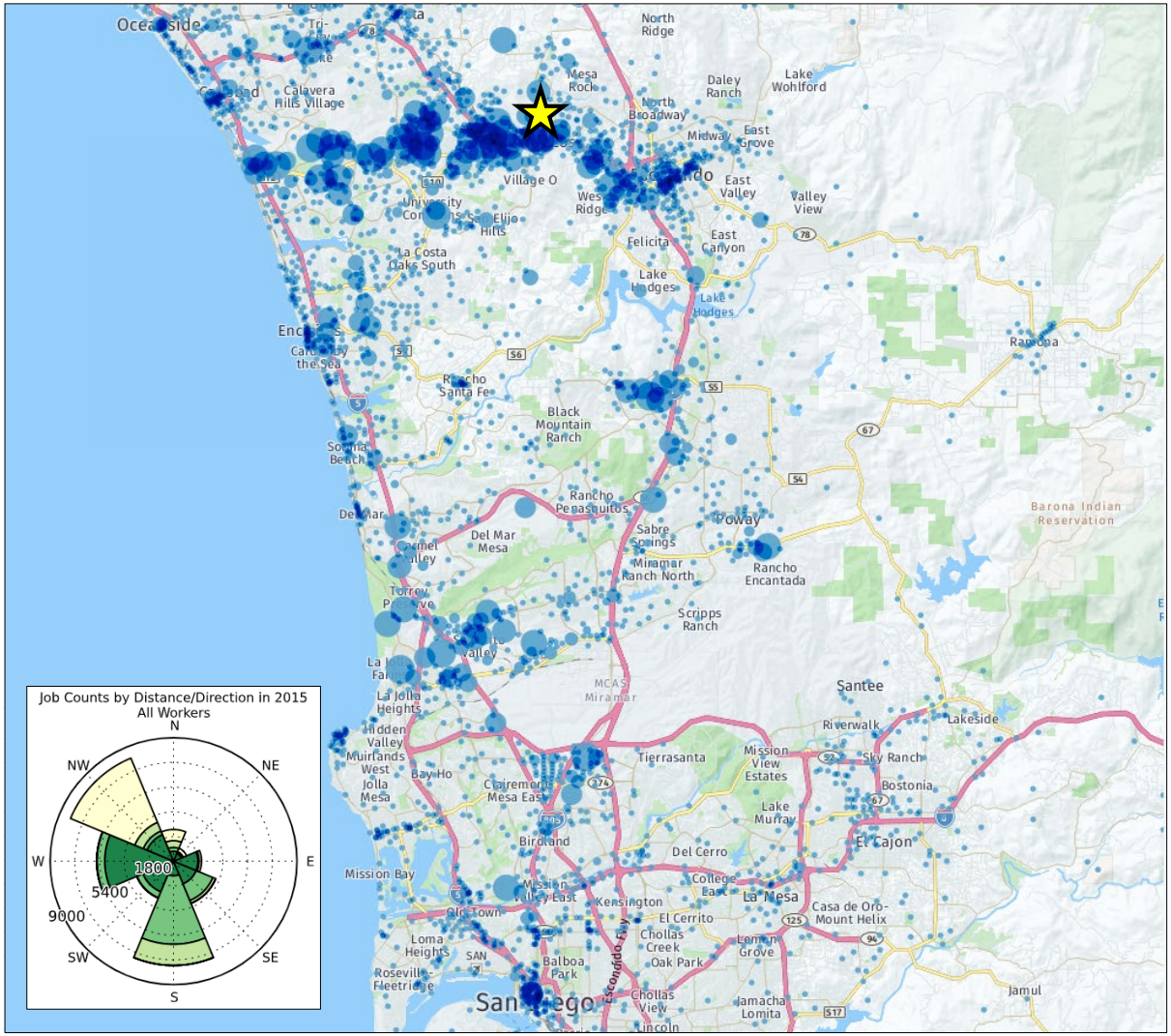
27,589 - Employed in Selection Area, Live Outside
28,504 - Live in Selection Area, Employed Outside
4,448 - Employed and Live in Selection Area

Jobs by Distance - Home Census Block to Work Census Block

	2015 Count	2015 Share
Total Primary Jobs	32,952	100.0%
Less than 10 miles	15,518	47.1%
10 to 24 miles	8,137	24.7%
25 to 50 miles	2,962	9.0%
Greater than 50 miles	6,335	19.2%

Jobs Counts by Places - Primary Jobs (2015)

County Subdivision	Count	Share
San Diego city, CA	6,764	20.50%
San Marcos city, CA	4,448	13.50%
Carlsbad city, CA	3,723	11.30%
Escondido city, CA	2,295	7.00%
Vista city, CA	2,289	6.90%
Oceanside city, CA	1,369	4.20%
Encinitas city, CA	1,048	3.20%
Los Angeles city, CA	771	2.30%
Poway city, CA	751	2.30%
Irvine city, CA	416	1.30%
All Other Locations	9,078	27.50%



Source: On The Map Census, Cartodb Maps

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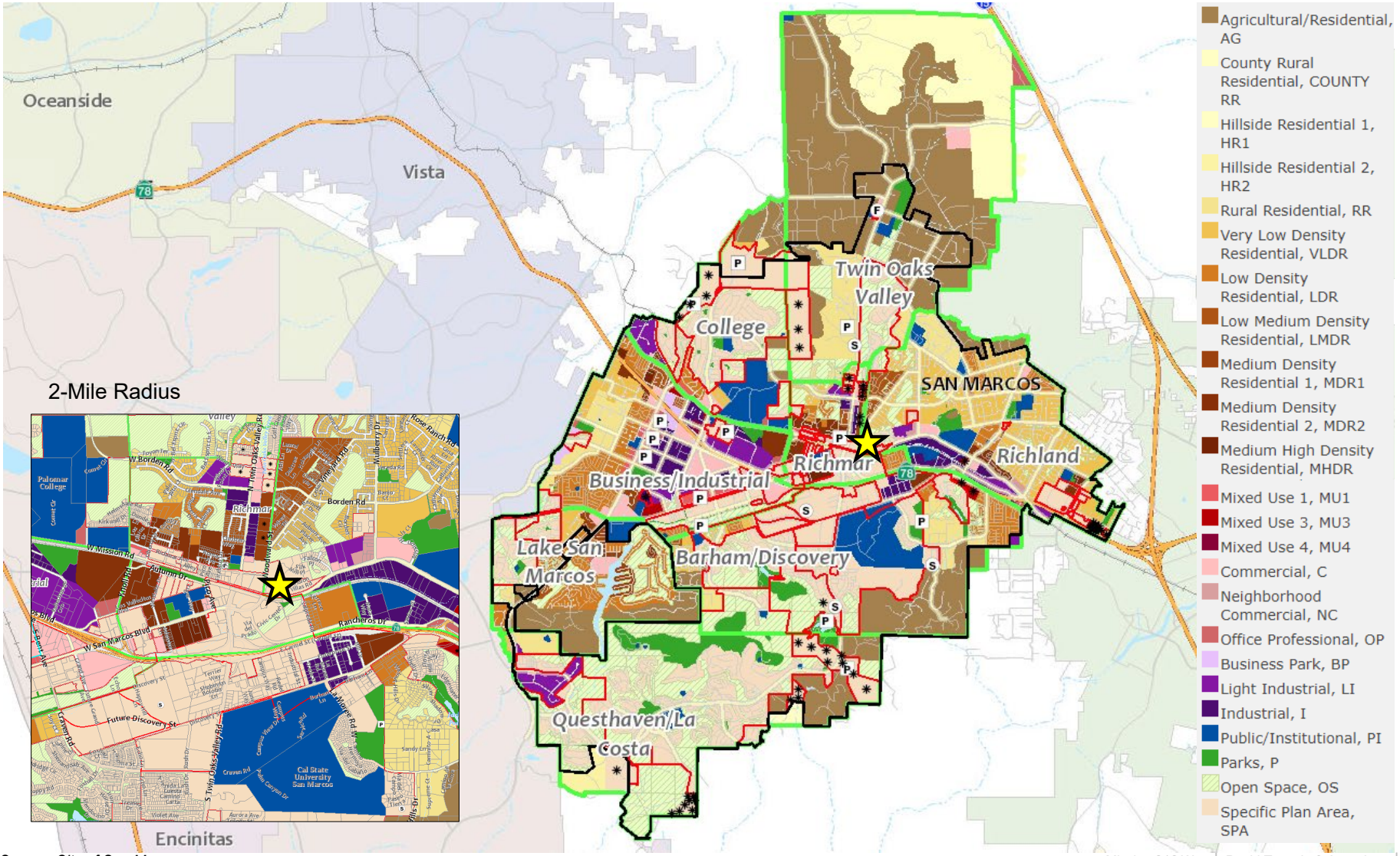


The Subject is located in close proximity to several public transportation options including the Breeze Bus line and the Inland Rail Trail and Rail Sprinter line. The nearest Breeze bus stop is the Mission Road and Val Preda San Marcos Health Center Stop and is located directly across the street on the south side of E Mission Road. The Inland Rail Trail and Rail Sprinter line is located to the south and runs along East Mission Road.

BREEZE Bus Route Finder

- 101 Oceanside to VA/UCSD/UTC via Hwy. 101
- 302 Oceanside to Vista via Vista Way
- 303 Oceanside to Vista via Town Center North
- 304 Encinitas to San Marcos via Rancho Santa Fe Rd.
- 305 Escondido to Vista via Mission Rd. & S. Santa Fe Ave.
- 306 Fallbrook to Vista via Mission Rd.
- 308 Solana Beach to Escondido via Del Dios Hwy.
- 309 Oceanside to Encinitas via El Camino Real
- 311 San Luis Rey Transit Center to Rancho Del Oro SPRINTER Station via Douglas Dr.
- 313 Oceanside Transit Center to San Luis Rey Transit Center via Mesa Dr.
- 315 Carlsbad Village Station to 14 Area
- 318 Oceanside to Vista via Oceanside Blvd. & Bobier Dr.
- 323 College Blvd. SPRINTER Station to Quarry Creek
- 325 Carlsbad Village to College Blvd. SPRINTER Station
- 332 Vista to Buena Creek SPRINTER Station via Vista Business Park
- 334 Vista Circulator
- 347 Cal State San Marcos to Palomar College
- 350 Escondido to Del Lago Transit Station via Westfield North County Mall
- 351/352 Escondido Circulator
- 353 Escondido Transit Center to Nordahl Marketplace via Citracado Pkwy.
- 354 Orange Glen High School via Mission, Lincoln & Citrus
- 355/357 El Norte Pkwy. & Valley Pkwy.
- 356 Morning View Dr., El Norte Pkwy. & Escondido Blvd.
- 358/359 N. Broadway, Country Club & El Norte Pkwy.
- 388 Escondido to Pala
- 444 Carlsbad Poinsettia COASTER Connection via Faraday Ave. & Rutherford Rd.
- 445 Carlsbad Poinsettia COASTER Connection to Palomar College

The site is located in the City of San Marcos. The San Marcos General Plan is shown below with the Subject displayed as a (yellow) star. The site is currently zoned Specific Plan Area and is designated within the Heart of the City Specific Plan within the "Commercial" business district and the proposed land used change for the Subject is to Medium Density Residential.



Source: City of San Marcos

The Mission 316 Specific Plan is to be amended which would include the Subject into the plan boundary with a zoning for Medium Density Multi-Family residential (18 du/acre). The amendment to the Mission 316 Specific Plan would also amend the Heart of the City Specific Plan. The site is part of the Heart of the City Specific Plan of San Marcos shown below on the left. The Mission 316 Specific Plan is located adjacent (east) of the Subject and features the attached residential communities Mission Terrace and Mission Villas, zoned for Low Medium Multi-Family residential (10.3 du/acre).



Source: City of San Marcos, Google Earth Pro

The Subject is located at the northeast corner of Woodward Street and Mission Road. The proposed location affords nice views of the hills to the south, and good access to several neighborhood amenities, including:

- CA-78 Highway just 0.5 mile away
- Sprinter Rail System stop located across the street, providing public transit running east to west
- Double Peak Park located 10 minutes away
- Cal State San Marcos and Palomar College both 1.5 miles away
- Walking distance from the assigned Elementary, Middle, and High schools









Source: Meyers Research

A preliminary plotting analysis for the proposed residential project on the Subject site yields a total of 67 back-to-back townhome units (APN: 220-210-50-00). Assuming a site size of roughly 3.71-acres, this translates to a density of approximately 18.0 units per acre.



Source: City of San Marcos

General Location:

- The Subject is ideally located for a medium high-density residential development and is slated to be incorporated into the Mission 316 Specific Plan. The existing Mission 316 Specific Plan addresses the need for a transition between existing industrial, commercial, and mobile home units to the south and existing low and medium-density residential to the north. The inclusion of the Subject into Mission 316 Specific Plan will provide much needed for-sale townhomes. The high-density residential units will provide a transition from the urban development south of the site to the Low Medium density at Mission 316 and the low-density residential character of development that stretches north.
- The proximity to transit and places of employment (shown on the following pages) make the Specific Plan Area an ideal location for the type of units the Mission 316 West proposes. Transit oriented housing are increasingly becoming attractive housing types to both young professionals and older citizens looking for convenient housing.

Existing Site Conditions and Zoning:

The Subject is currently a combination vacant land and disturbed vegetation with Commercial land use designation. The site is located approximately 0.7 miles North of State Route 78 (SR 78), near the San Marcos Civic Center Sprinter, and approximately 3.5 miles West of Interstate 15 (I -15), both of which will provide regional access to employment and services.

- Easements:
  - Two SDGE easements for public utilities and incidental purposes (location of easement cannot be determined from record information) is to be quitclaimed.
  - An easement for drainage, slope, public street, utility and drainage and incidental purposes (City of San Marcos) shall remain in place.
- Existing Improvements:
  - Concrete foundations and pads from previous residential use
  - Storm drain manholes (two at the southwest corner on Woodward St and E Mission Road; one at the southeastern corner on E Mission Road).
  - A concrete browditch runs from the southeastern boundary west toward the southwestern corner.
  - Traffic signal on the southwest corner of the site at Woodward St and E mission Road.
  - Travelways run across the property.
  - Paved sidewalk runs along the E Mission Road and along Woodward St.
  - Catchment fence along Woodward St.

Source: City of San Marcos, First American Title

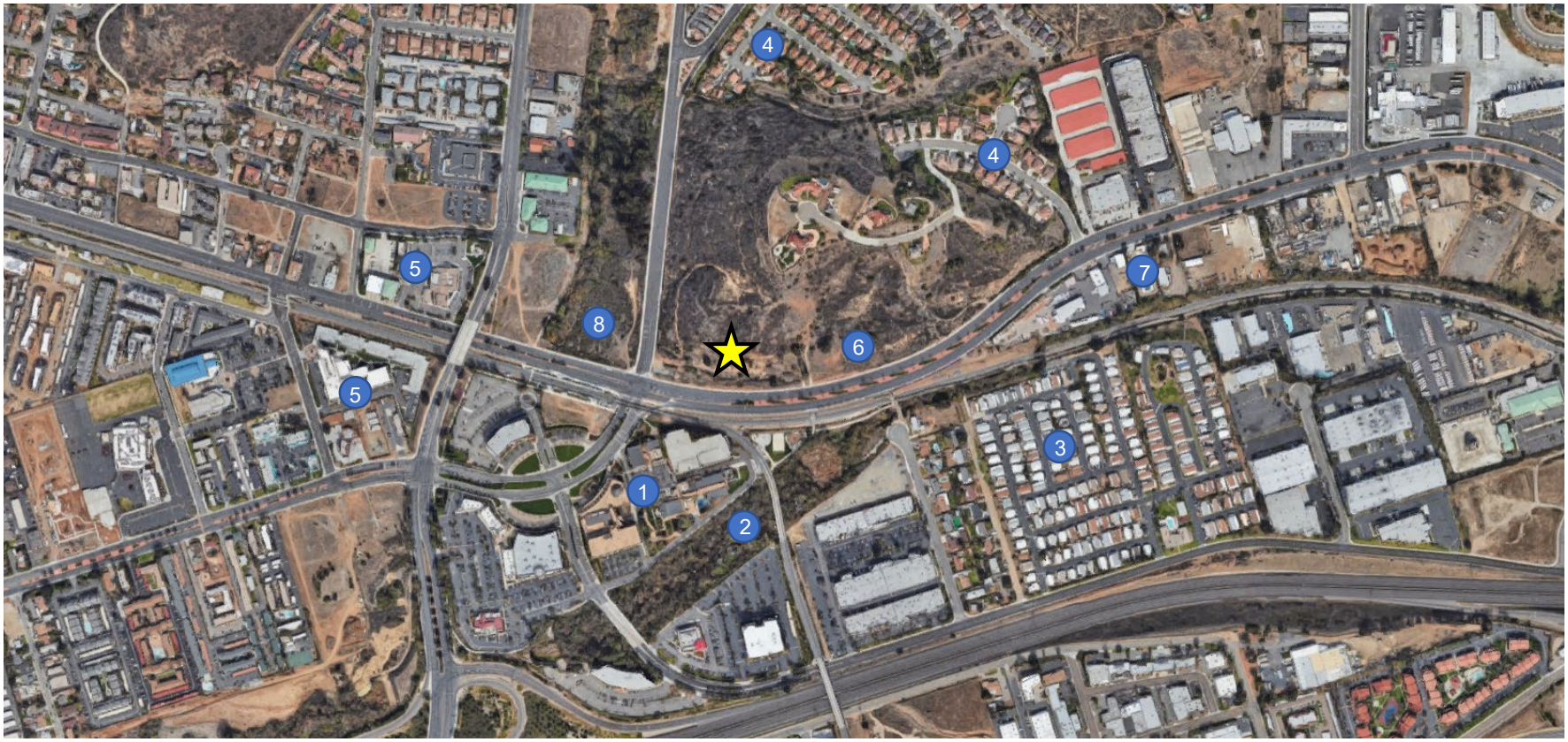
Topography: The site slopes steeply from the north edge downward to the south toward E. Mission Road. The sloping topography rises slightly on the northern portion of the site as well as the southern portion of the site creating a bench in the center. Elevation changes ± 40 feet.



Source: GoogleMaps, Meyers Research

Local Surrounding Uses:

1. The City of San Marcos Civic Center is located to the southwest of the Subject, on the opposite side of E Mission Road.
2. Southeast of the site on the opposite side of the road is an open space area, situated next to the NCHS San Marcos Health Center.
3. The Twin Oaks Valley Mobile Home Park is located southeast on the opposite side of E Mission Road.
4. Directly north of the Subject are existing low density residential neighborhoods and a disturbed open space area.
5. Commercial uses are located to the west and southwest of the Subject.
6. Immediately adjacent (east) to the Subject is the Mission 316 Specific Plan (Mission Villas and Mission Terrace).
7. Just east of the Mission 316 Specific Plan are two commercially zoned parcels and the adjacent industrial parcels are in transition to neighborhood commercial zoning, with the parcels adjacent to Mission Road slated to become Office Professional.
8. A 115-unit senior living residential care facility for memory care is planned just west across Woodward St.



Source: City of San Marcos, GoogleMaps

The Subject is located along the CA-78 corridor, with excellent access to employment nodes, local retail, services, and schools.



Source: GoogleMaps, Meyers Research

The east-west Sprinter light rail is a 22-mile rail system that connects Oceanside, Vista, San Marcos, and Escondido, serving 15 stations along the Highway 78 corridor. The nearest Sprinter line stop is the San Marcos Civic Center stop, located southwest of the Specific Plan area at the corner of Woodward Street and E Mission Road. The Sprinter runs every 30 minutes in each direction Monday through Friday, from approximately 4 am to 9 pm. Friday and Saturday trains run later.



SPRINTER STATIONS	
Oceanside Transit Center	313 S. Cleveland St., Oceanside, CA 92054
Coast Highway Station	1304 ½ S. Tremont St., Oceanside, CA 92054
Crouch Street Station	609 Crouch St., Oceanside, CA 92054
El Camino Real Station	1505 El Camino Real, Oceanside, CA 92054
Rancho Del Oro Station	3513 Oceanside Blvd, Oceanside, CA 92056
College Boulevard Station	4103 ½ Oceanside Blvd., Oceanside, CA 92056 *No overnight parking.*
Melrose Drive Station	1495 ½ N. Melrose Dr., Oceanside, CA 92056
Vista Transit Center	240 N. Santa Fe Rd., Vista, CA 92083
Civic Center-Vista Station	810 Phillips St., Vista, CA 92083
Buena Creek Station	1923 Buena Creek Rd., San Diego, CA 92084
Palomar College Station	1142 W. Armorlite Dr., San Marcos, CA 92069 *Free parking behind the station, accessible from Armorlite Drive, just west of the Bingham Drive intersection.*
San Marcos Civic Center Station	40 W. San Marcos Blvd., San Marcos, CA 92069 *No parking available.*
Cal State San Marcos Station	410 La Moree Rd., San Marcos, CA 92069 *No parking available.*
Nordahl Road Station	2121 Barham Dr., Escondido, CA 92025
Escondido Transit Center	796 W. Valley Pkwy., Escondido, CA 92025



Source: North County Transit District

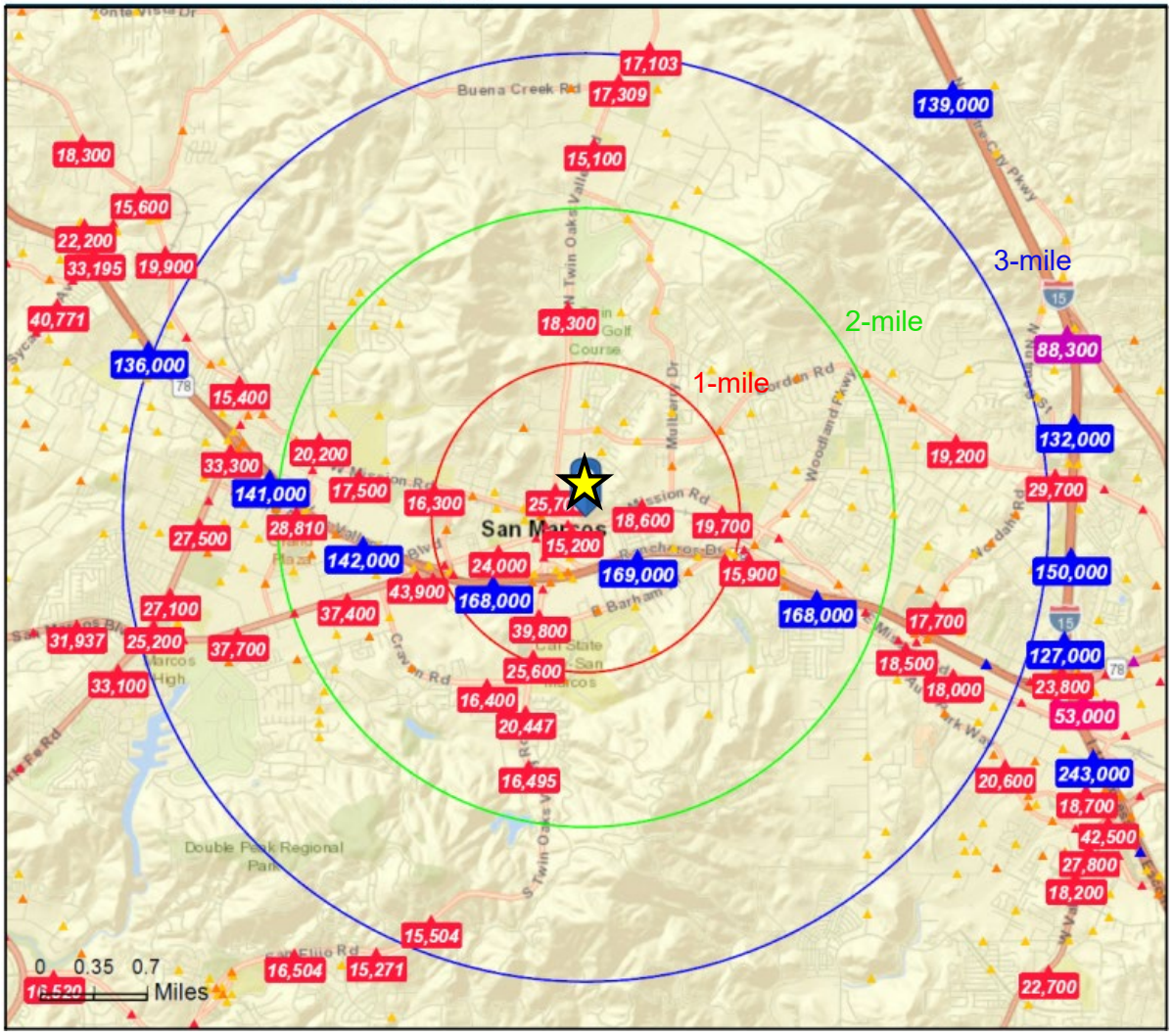
Meyers RESEARCH
a Kennedy Wilson Company

esri

Traffic Count Map

260 E Mission Rd
260 E Mission Rd, San Marcos, California, 92069
Rings: 1, 2, 3 mile radii

Prepared by Esri
Latitude: 33.14281
Longitude: -117.15897



Source: ESRI

E. Mission Road provides a high visibility marketing window and should positively impact the absorption of the proposed townhomes into the market. The average daily traffic count along E Mission Road ranges from 18,600 to 25,000. Woodward St feeds traffic into low-density residential housing and therefore has low daily traffic counts of roughly 3,500.

Subject Close-Up



Average Daily Traffic Volume
- Up to 6,000 vehicles per day
- 6,001 - 15,000
- 15,001 - 30,000
- 30,001 - 50,000
- 50,001 - 100,000
- More than 100,000 per day



Meyers RESEARCH
a Kennedy Wilson Company

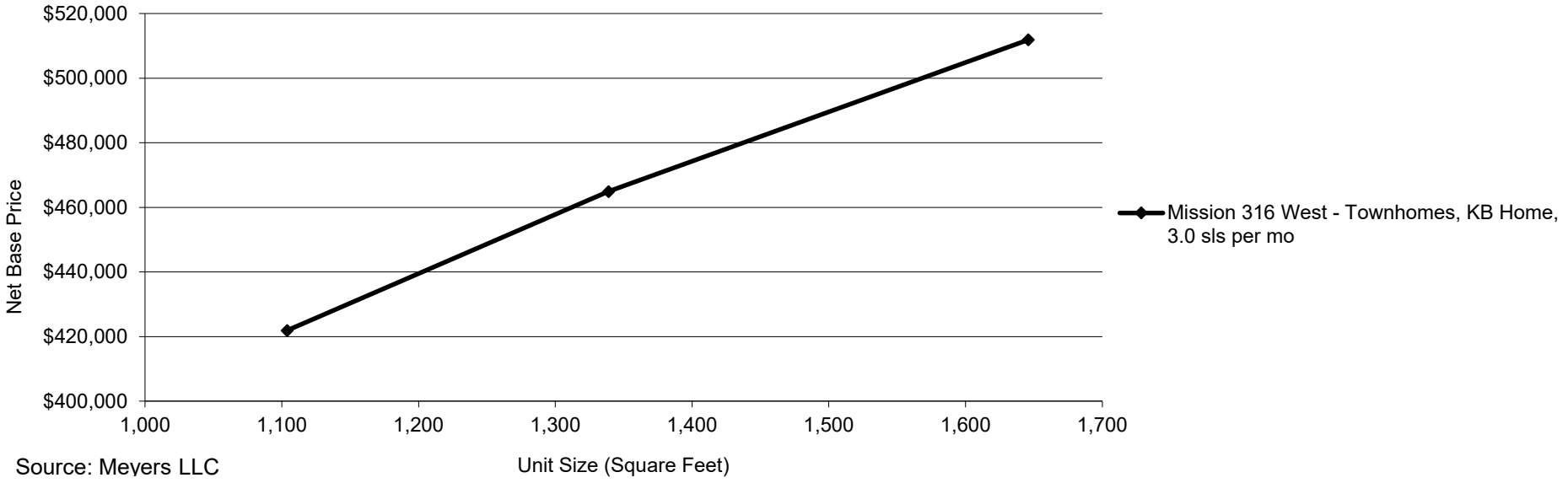
Product, Pricing and Absorption

Mission 316 West, San Marcos, California

The recommended base pricing for the townhomes at Mission 316 West ranges from $422,000 up to $512,000, with an average total price of $470,000 or $371 per square foot. Meyers' recommendations assume:

- A monthly HOA fee of $240 and a property base tax rate of 1.11185% plus a CFD of $900.55 per year (these recommended benchmarks are in line with other townhomes communities in the CMA).
- All units will have a 2-car side by side garage.
- Estimated options/upgrades spending at 3% of base price (+/-$15,000 per door on average).
- Premiums are estimated at $5,000 per unit to account for specific locations within the site that afford view corridors of the surrounding hills.
- An incentive towards closing costs of $5,000, not to be taken as a credit to the purchase price, but rather as a discount to preferred lender closing costs.

COMMUNITY SPECIFICS				FLOORPLANS						RECOMMENDATIONS													
Subject Property Name										Mo		Base	Incentives		Net Base	Net Base	Assumptions			Total	Payment Assumptions			90.0%
Location					Size					Sales	Base	Price/	Options /	Price	Price ($	Price/	Options /	Estimated	Total	Price/	Monthly	Base	Addl Tax	4.5%
Product Details		Sales Summary		Mix	SF	Bed	Bath	Level	Pkg	Pace	Price	SF	Upgrades	Reduction	Impacting)	SF	Upgrades	Premiums	Price	SF	HOA	Tax Rate	Assess.	Mo. Pmt.
Mission 316 West		**KB Home**		37	1,104	2	2.5	1	2	3.0	$421,900	$382	($5,000)	$0	$421,900	$382	$15,000	$5,000	$441,900	$400	$240	1.11%	0.20%	$2,905
San Marcos		-		17	1,339	3	2.5	1	2		$464,900	$347	($5,000)	$0	$464,900	$347	$15,000	$5,000	$484,900	$362	$240	1.11%	0.20%	$3,164
Product:	Townhomes	Total Units:	67	13	1,646	3	3.5	1	2		$511,900	$311	($5,000)	$0	$511,900	$311	$15,000	$5,000	$531,900	$323	$240	1.11%	0.20%	$3,447
Configuration:	3-story	Units Sold:	0																				
Lot Dimensions:	ATT	3 Months Sold:	0																				
		Units Remaining:	67																				
		% Remaining:	100%																				
		Summary Statistics:			1,269					3.0	$450,273	$355	($5,000)	$0	$450,273	$355	$15,000	$5,000	$470,273	$371	$240	1.11%	0.20%	$3,076



Source: Meyers LLC

Meyers focused on actively selling attached and small lot detached communities in and around San Marcos in the following ZIP codes:

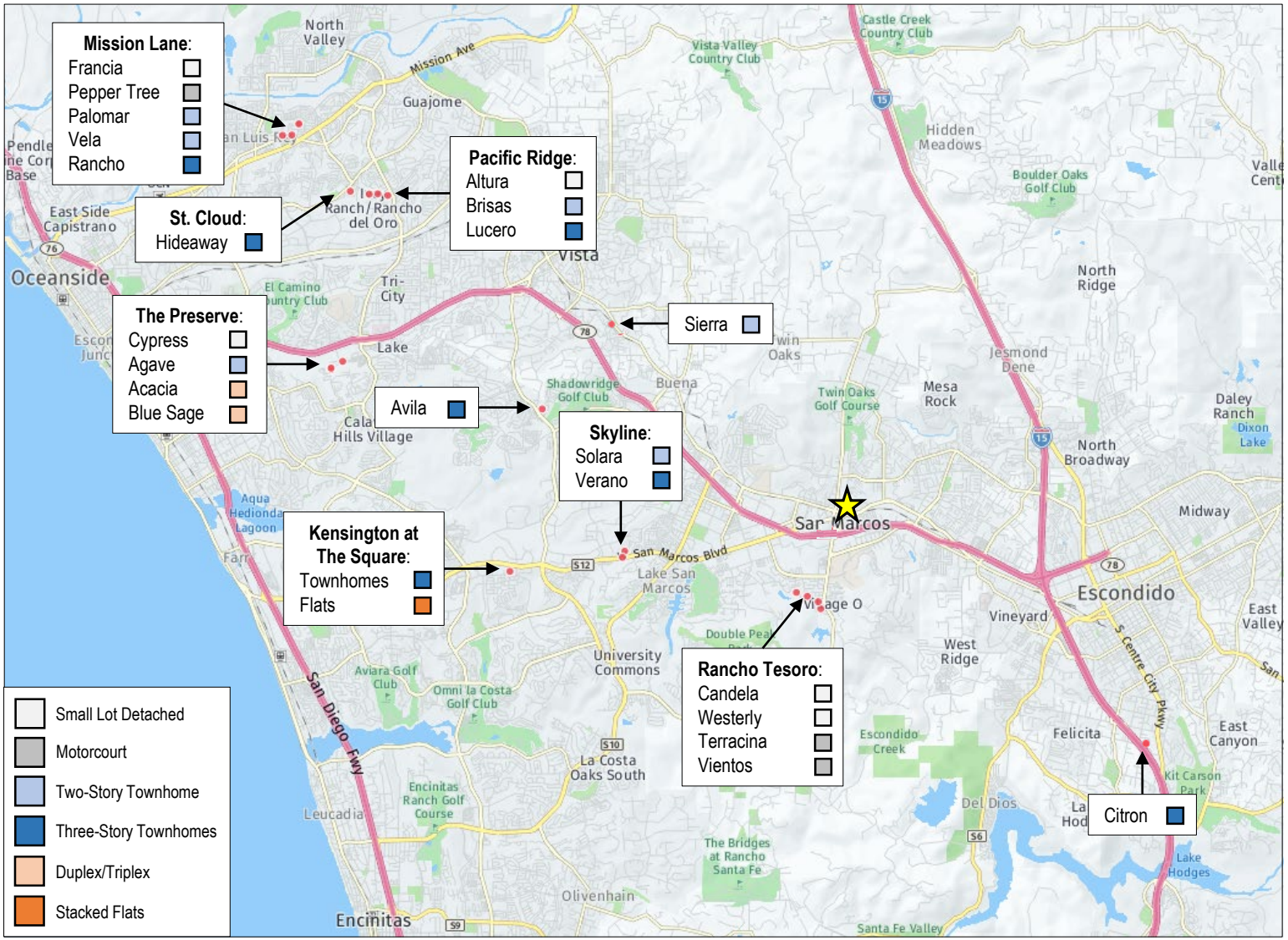
Carlsbad (92009/10)

Escondido (98025/6)

Oceanside (98056/7)

San Marcos (98069/78)

Vista (92081/3/4)



Source: Meyers Research, Carto, Geocodio

Below is a summary of the actively selling new townhome and stacked flat developments in the Inland North County CMA defined on the previous page, where attached prices range from $459,240 (Citron) to $711,333 (Kensington Square at Bressi Ranch). It should be noted that almost all communities which have been selling for 6 months or more have standing inventory with between $15,000 and $25,000 already included in the published 'base' prices. Buyers are spending an average of 4% of the base price ($12,000 to $27,000) on options/upgrades, while unit premiums average $5,500.

COMMUNITY	BUILDER / DEVELOPER	CITY	LOT SIZE	UNIT COUNT SUMMARY					SALES PACE		AVERAGE			MONTHLY		
				TOTAL	RLSD	SOLD	AVAIL.	REMAIN	ALL	3 MO.	SF	NET PRICE	$/SF	HOA	TAX	PAYMENT
Mission 316 West	KB Home	San Marcos	3-story	67		0		67	3.0	--	1,269	$470,273	$371	$240	1.31%	$3,076
Lucero Pacific Ridge 3-St TH	Cornerstone Communities	Oceanside	ATT	125	0	34	N/Av	91	1.5	1.7	1,652	$540,990	$327	$365	1.11%	$3,545
Verano at Skyline 3-St TH	D.R. Horton	Vista	ATT	120	0	14	N/Av	106	3.6	2.7	1,570	$531,240	$338	$335	1.28%	$3,525
Avila 3-St TH	Lennar	Vista	ATT	47	0	14	N/Av	33	2.7	1.7	1,840	$566,983	$308	$342	1.08%	$3,662
The Collection at St Cloud 3-St TH	Lennar	Oceanside	ATT	80	0	1	N/Av	79	6.1	6.1	1,656	$525,100	$317	$290	1.11%	$3,377
Hideaway at St. Cloud 3-St TH	William Lyon Homes	Oceanside	ATT	122	0	21	N/Av	101	2.7	1.3	1,708	$543,490	$318	$295	1.30%	$3,567
Rancho at Mission Lane 3-St TH	Beazer Homes	Oceanside	ATT	50	0	49	N/Av	1	3.4	0.7	1,485	$488,990	$329	$380	1.10%	$3,251
Citron 3-St TH	William Lyon Homes	Escondido	ATT	63	0	42	N/Av	21	5.3	3.3	1,314	$459,240	$349	$260	1.14%	$2,970
Sierra 2-St TH	KB Home	Vista	ATT	60	0	7	N/Av	53	2.1	2.3	1,833	$502,657	$274	$250	1.10%	$3,201
Brisas Pacific Ridge 2-St TH	Cornerstone Communities	Oceanside	ATT	117	0	40	N/Av	77	1.6	0.3	1,635	$583,323	$357	$349	1.11%	$3,778
Agave The Preserve 2-St TH	Cornerstone Communities	Carlsbad	ATT	88	0	68	N/Av	20	2.5	1.7	1,518	$597,657	$394	$363	1.30%	$3,962
Solara at Skyline 2-St TH	D.R. Horton	Vista	ATT	79	0	2	N/Av	77	0.6	0.3	1,513	$581,990	$385	$335	1.29%	$3,834
Blue Sage The Preserve Triplex	Cornerstone Communities	Carlsbad	ATT	102	0	18	N/Av	84	1.4	1.3	1,662	$664,990	$400	$413	1.30%	$4,417
Kensington at the Square 3-St TH	Shea	Carlsbad	ATT	103	0	20	N/Av	83	4.6	2.0	1,827	$711,333	$389	$370	1.30%	$4,653
Kensington at The Square Flats	Shea Homes	Carlsbad	ATT	22	0	20	N/Av	2	3.0	1.7	1,089	$545,000	$501	$573	1.30%	$3,855
Palomar 2-St TH	Beazer	Oceanside	ATT	86	0	7	N/Av	79	1.6	1.0	1,444	$501,823	$347	$294	1.10%	$3,240
Vela at Mission Lane Duplex	Beazer Homes	Oceanside	ATT	64	0	7	N/Av	57	1.5	0.7	1,671	$536,823	$321	$292	1.10%	$3,444
NEW HOME AVERAGE:									2.8	1.8	1,589	$555,102	$353	$344	1.19%	$3,643
NEW HOME MEDIAN:									2.6	1.7	1,644	$542,240	$343	$339	1.13%	$3,556

Meyers also tracked the sales trends for motor-court and small lot detached product actively selling in the CMA, with average total prices ranging from $625,000 (Peppertree at Mission Lane) to $817,000 (Rancho Tesoro Masterplan). Sales prices at Brookfield's attached product in Rancho Tesoro were adjusted in January and the sales agent believe they have successfully found the market. Buyers are spending an average of 5% of the base price ($12,500 to $70,000) on options/upgrades, while unit premiums average $12,500.

COMMUNITY	BUILDER / DEVELOPER	CITY	LOT SIZE	UNIT COUNT SUMMARY					SALES PACE		AVERAGE			MONTHLY		
				TOTAL	RLSD	SOLD	AVAIL.	REMAIN	ALL	3 MO.	SF	NET PRICE	$/SF	HOA	TAX	PAYMENT
Mission 316 West	KB Home	San Marcos	3-story	67		0		67	3.0	--	1,269	$470,273	$371	$240	1.31%	$3,076
Pepper Tree at Mission Lane	Beazer Homes	Oceanside	2,400	83	0	53	N/Av	30	2.8	2.7	1,970	$624,657	$317	$177	1.30%	$3,938
Altura Pacific Ridge	Cornerstone Communities	Oceanside	4,000	72	0	13	N/Av	59	1.2	1.7	1,885	$683,490	$363	$136	1.11%	$4,154
Francia at Mission Lane	Beazer Homes	Oceanside	4,900	59	0	48	N/Av	11	2.5	3.0	2,469	$703,823	$285	$375	1.11%	$4,513
Rancho Tesoro Masterplan	Brookfield Residential	San Marcos	-	346	0	240	N/Av	106	11.4	7.0	2,861	$816,819	$285	$195	1.60%	$5,297
		NEW HOME AVERAGE:							**4.5**	**3.6**	**2,296**	**$707,197**	**$313**	**$221**	**1.28%**	**$4,475**
		NEW HOME MEDIAN:							**2.6**	**2.8**	**2,220**	**$693,657**	**$301**	**$186**	**1.21%**	**$4,333**

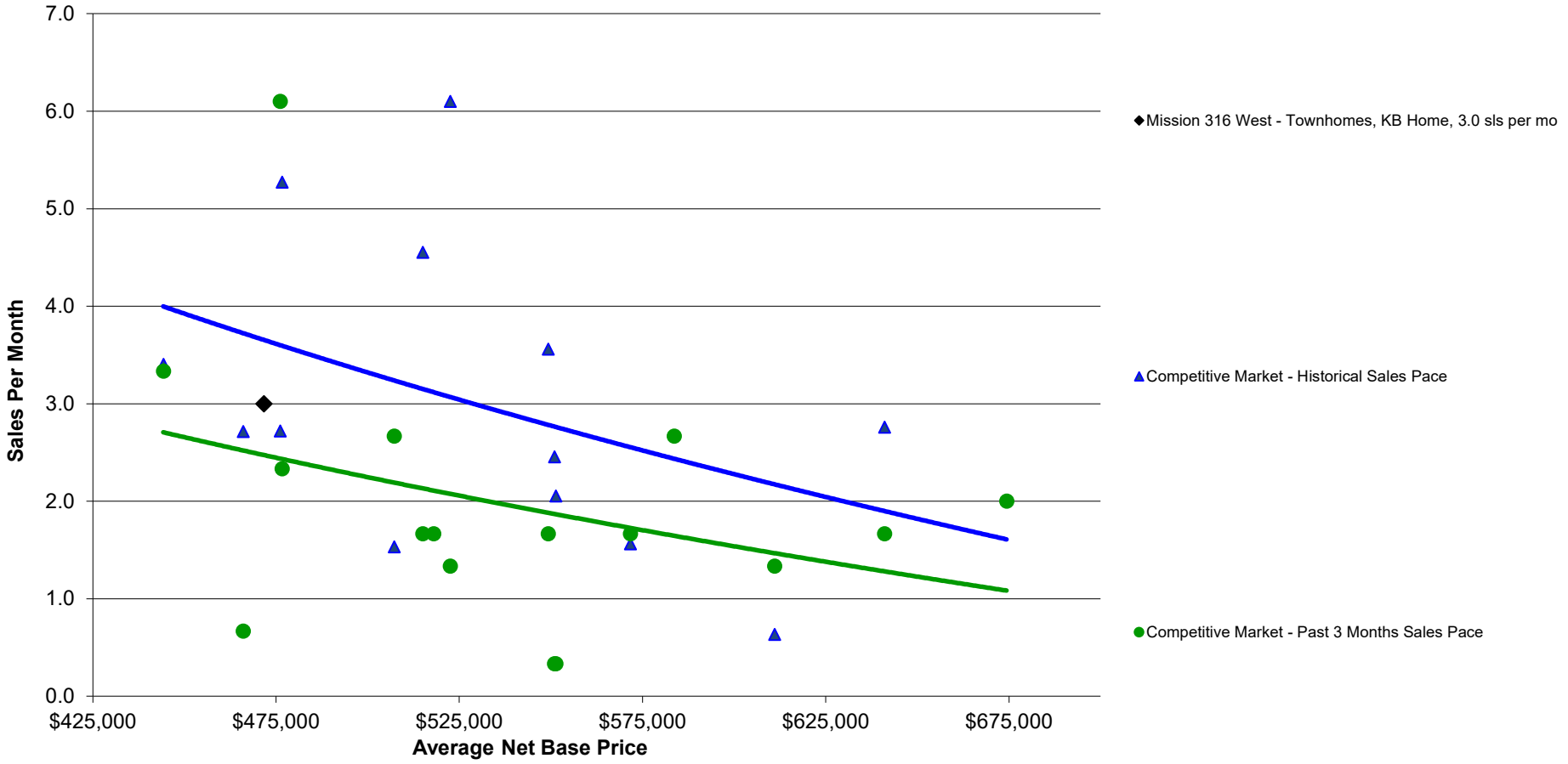
Recommended sales pace is based on recent market activity at Verano at Skyline in South Vista which is currently selling at 3.6 homes per month with comparable unit sizes and pricing. Comparable townhome communities actively selling in the CMA (shown on pages 21-22), average roughly 2.6 homes per month on a historical basis and 1.7 home per month over the past 3 months. Sales rates have improved since the beginning of the year and local sales agents have reported increased traffic over the past two months. At a recommended sales pace of 3.0 homes per month, Mission 316 West could sell through its inventory in a little less than two years, assuming a full-scale marketing and sales program, and regular operating hours.

HYPOTHETICAL COMMUNITY SELL OUT												
Project/Subdivision	Type	Configuration	# of Units	Avg Yr/Pace	Q1 Year 1	Q2 Year 1	Q3 Year 1	Q4 Year 1	Q1 Year 2	Q2 Year 2	Q3 Year 2	Q4 Year 2
Mission 316 West	Townhomes	3-story	67	34	9	9	9	9	9	9	9	4
COMMUNITY SUMMARY			67	34	9	9	9	9	9	9	9	4

Note: The current market activity in conjunction with slowing sales pace does not support price appreciation at this time.

The recommended sales pace of 3.0 homes per month at the Subject is above the historical sales rate for townhomes in the CMA at this price point (currently at roughly 2.7 units per month).

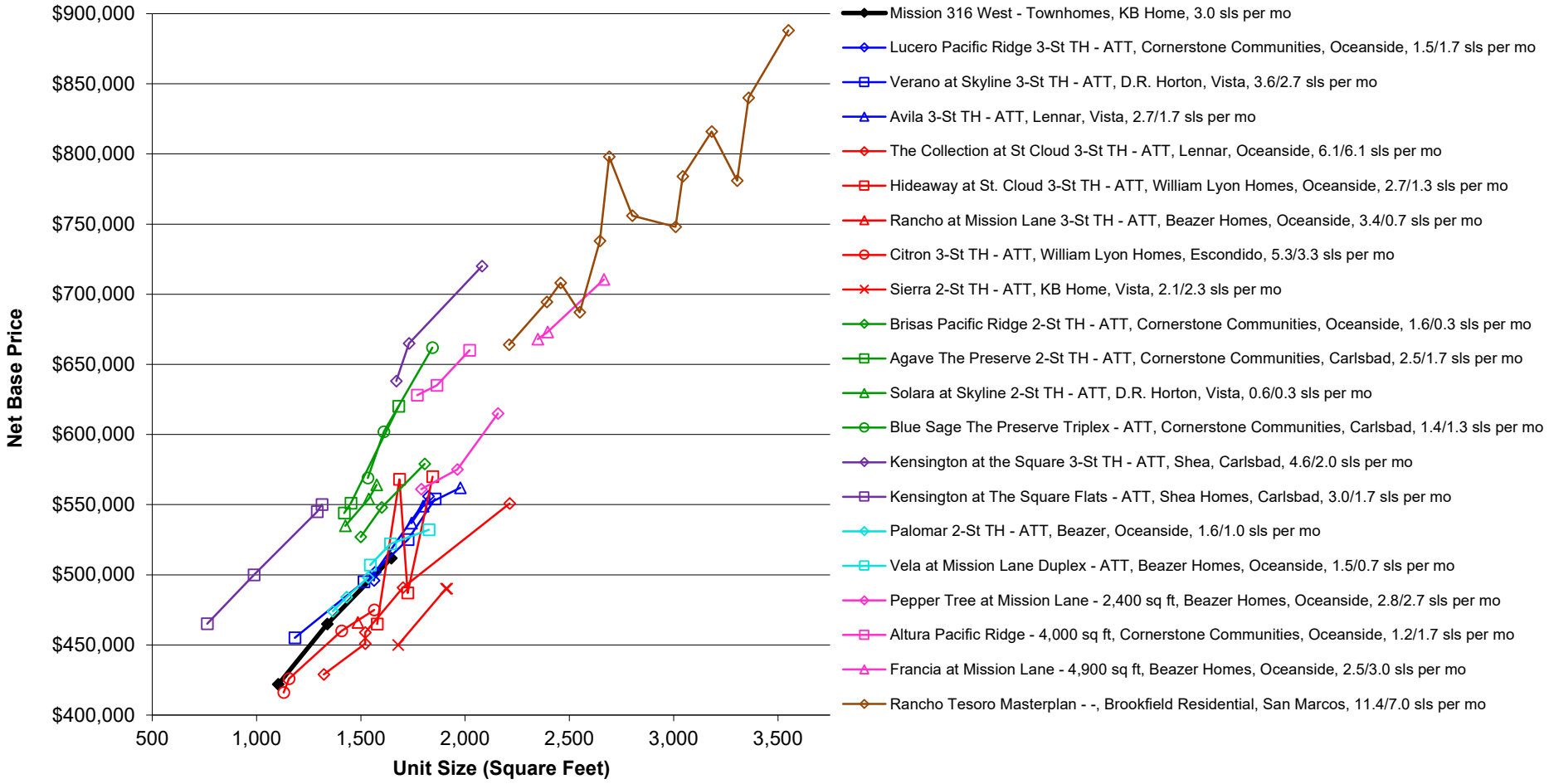
- The recommended absorption is slightly lower than the sales pace currently being achieved at Verano at Skyline in South Vista (3.6 home per month), which is achievable given the comparable unit sizes and home prices offset by a slightly inferior location at the Subject with better schools.
- Across the market sales pace has slowed by roughly 1 home per month by community. Kensington Square in Bressi Ranch is still selling very well and the motor court product at Terracina in Rancho Tesoro is selling at 2.7 homes per month. Additionally, resale volume in South San Marcos (92078) is high with 10.4 homes sold per month.



Source: Meyers Research; Individual Community Sales Offices

The base prices at the Subject are positioned as follows:

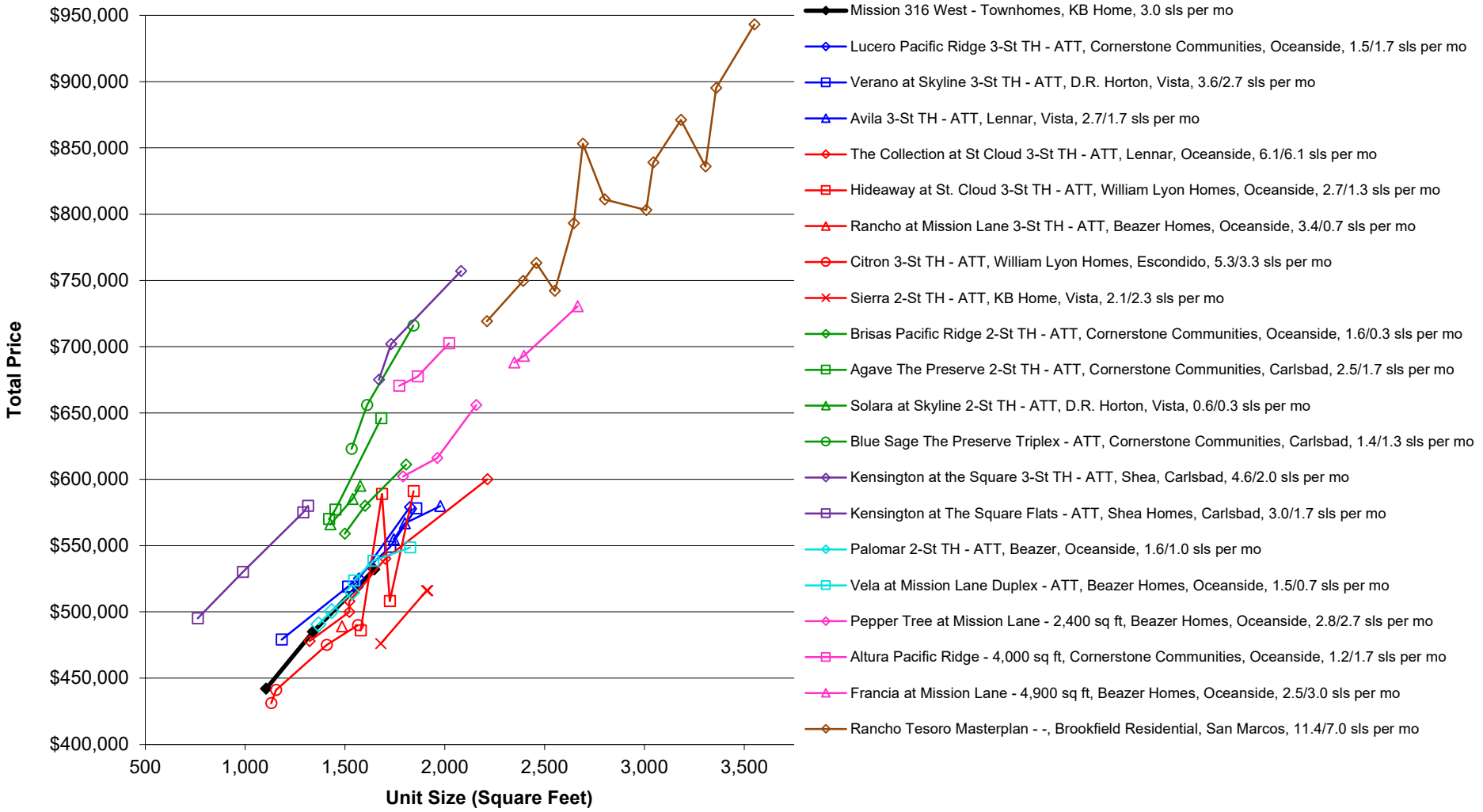
- **In line with the two-story townhomes at Palomar at Mission Lane**
- **Slightly below the two smallest duplex plans at Vela at Mission Lane and Verano at Skyline which has been selling well at 3.6 sales per month despite having some of the lowest schools scores in the CMA**
- **Priced above like product in North Oceanside to account for a more desirable address and better schools**



Source: Meyers Research; Individual Community Sales Offices

Absorption = Historical/3 Month

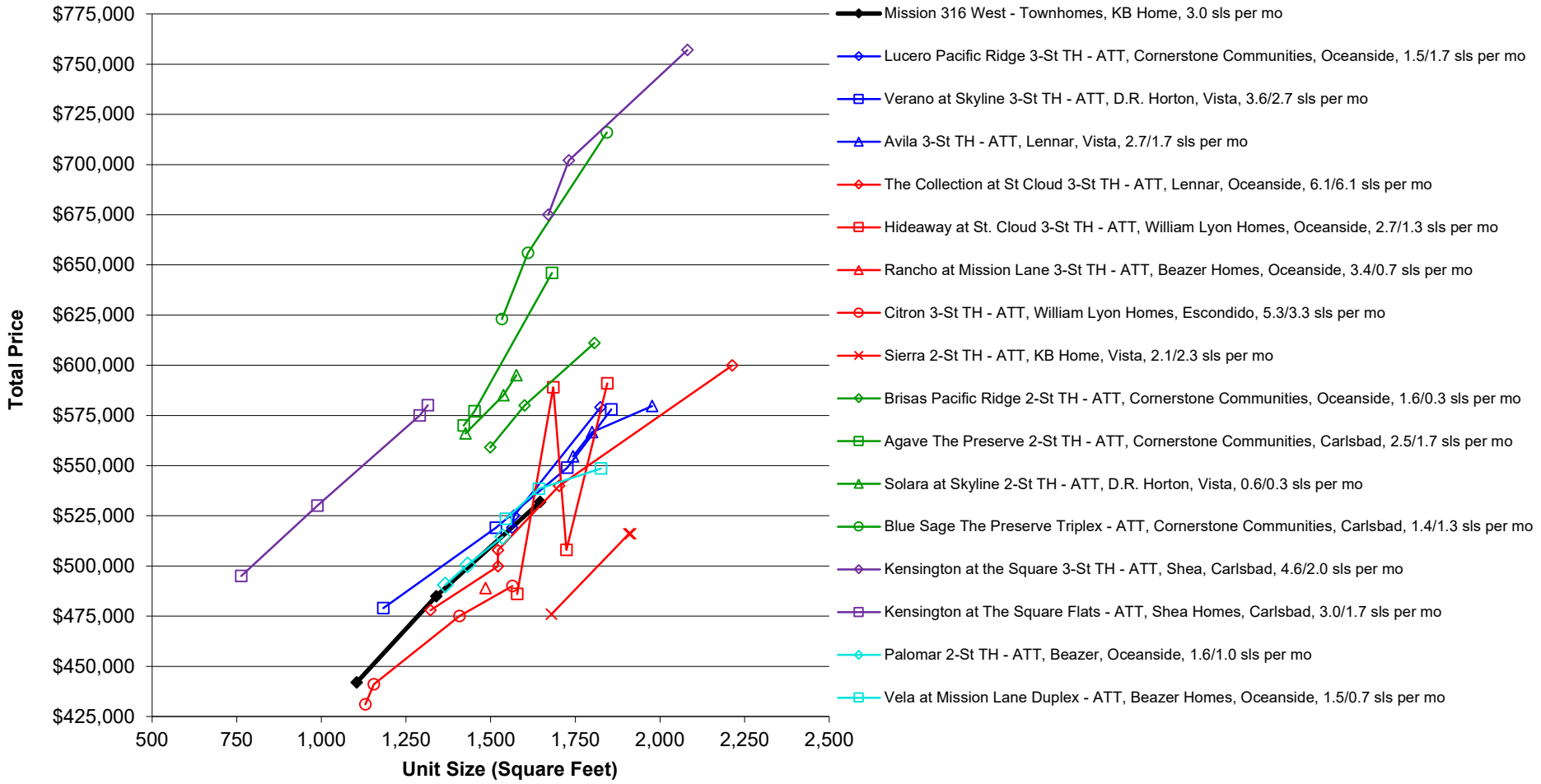
The recommended total pricing (base price + average options/upgrades estimates + average lot premium) remains in a similar position relative to total average sales prices for the attached competitive projects, and falls below the detached products which have a greater increase owing to higher spending on options and upgrades, and better premium opportunities.



Source: Meyers Research; Individual Community Sales Offices

Absorption = Historical/3 Month

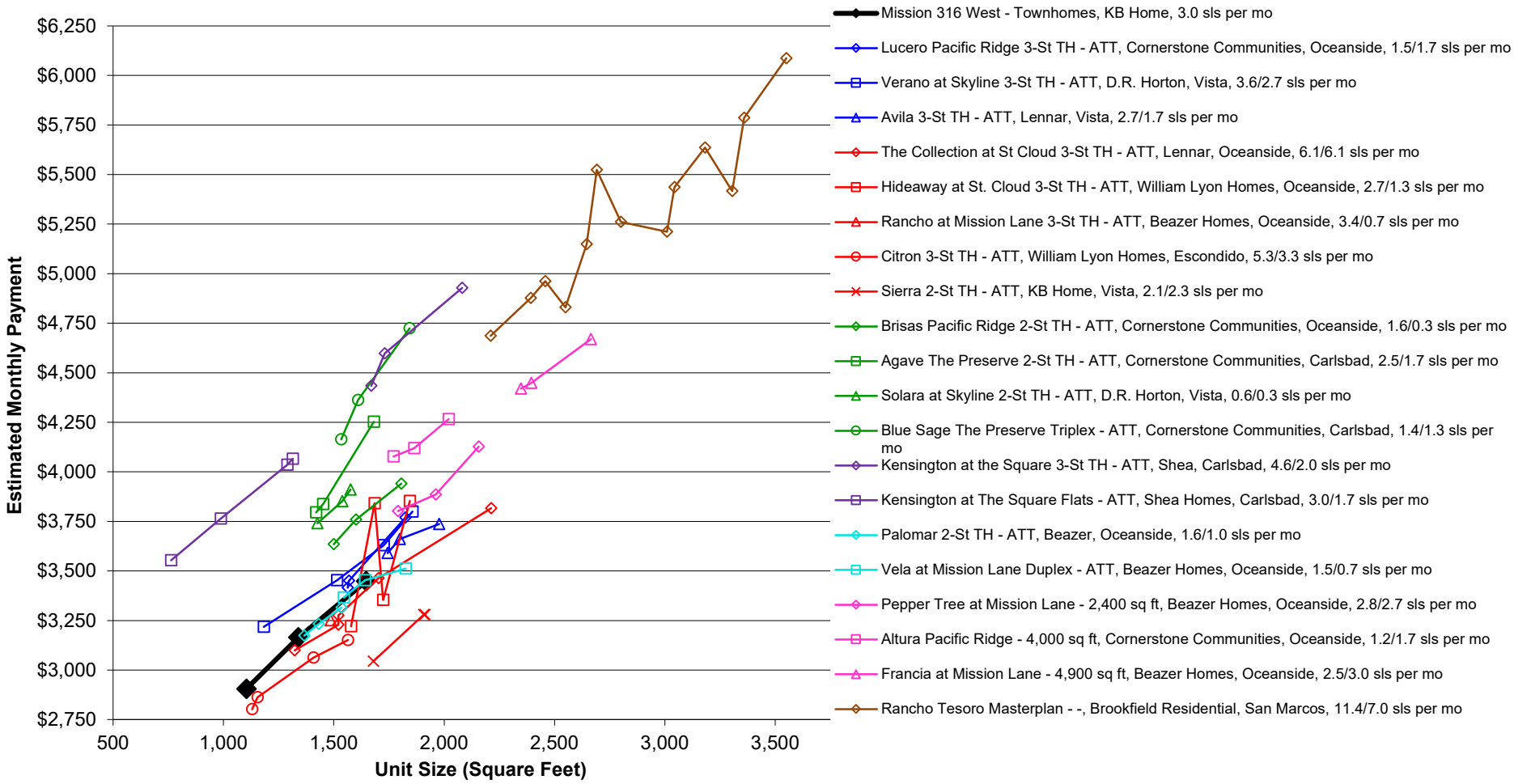
The recommended total pricing for the Subject is roughly $15,000 below the three-story townhomes at Verano at Skyline to account for the back-to-back townhome configuration proposed at Mission 316 West. The recommended total pricing for the Subject is in line with the two-story townhomes at Palomar at Mission Lane and the largest unit offered at the Subject is priced in line with the duplex product at Vela at Mission lane.
Both of these communities offer a more coastal proximate living experience however the schools are not as highly ranked and they are located further from main transportation corridors.



Source: Meyers Research; Individual Community Sales Offices

Absorption = Historical/3 Month

The monthly payments at the Subject assume a conventional 30-year loan with a mortgage interest rate of 4.5%, a monthly HOA fee of $240 per unit, and a total tax rate of 1.31%. The three-story Verano at Skyline product is has a total tax rate of roughly 1.18%, and is positioned $150 above the expected payments at the Subject. A comparison of product at Verano versus the Subject reflects a trade off between denser product with a back-to-back townhome configuration at the Subject and a more desirable location in the 92069 North San Marcos ZIP code with better schools and amenities close by. The Subject is positioned at a significant value to the Kensington Square townhomes in Carlsbad,

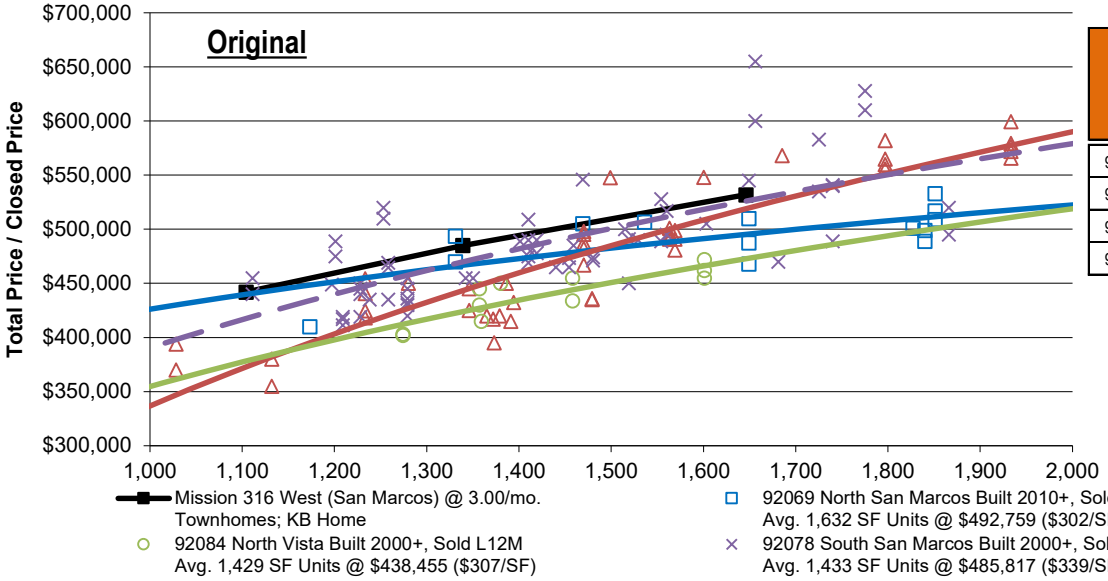


Source: Meyers Research; Individual Community Sales Offices

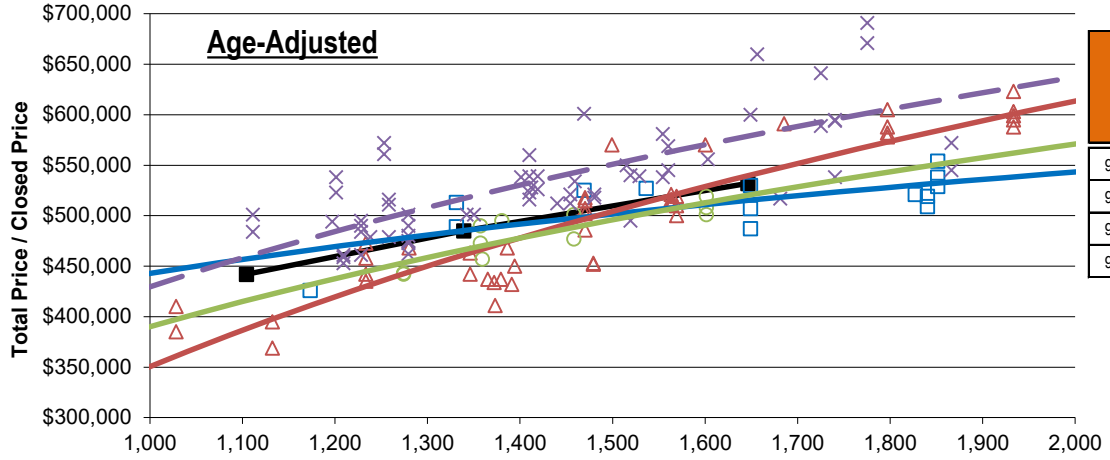
Absorption = Historical/3 Month

After applying an age adjustment factor to the resales in the area's found in the tables below, the Subject is appropriately positioned below the South San Marcos trendline, and in line with North San Marcos. The largest floor plan offered at Mission 316 West is just above the resales in North San Marcos and is in line with the Inland Oceanside trendline to account for better schools offset against a less coastal proximate location.

Attached resales in the 92069 ZIP code (North San Marcos) are priced at discount of roughly $20,000 compared to attached resales in South San Marcos (92078).



REFERENCE AREA	YEAR BUILT	AVERAGE SF	AVERAGE NET PRICE	AVERAGE $/SF
92069 North San Marcos Built 2010+, Sold L12M	2013	1,632	$492,759	$302
92078 South San Marcos Built 2000+, Sold L6M	2006	1,433	$485,817	$339
92069 North San Marcos Built 2000+, Sold L12M	2013	1,497	$479,367	$320
92084 North Vista Built 2000+, Sold L12M	2006	1,429	$438,455	$307
AVERAGE:		1,498	$474,100	$317
MEDIAN:		1,465	$482,592	$314

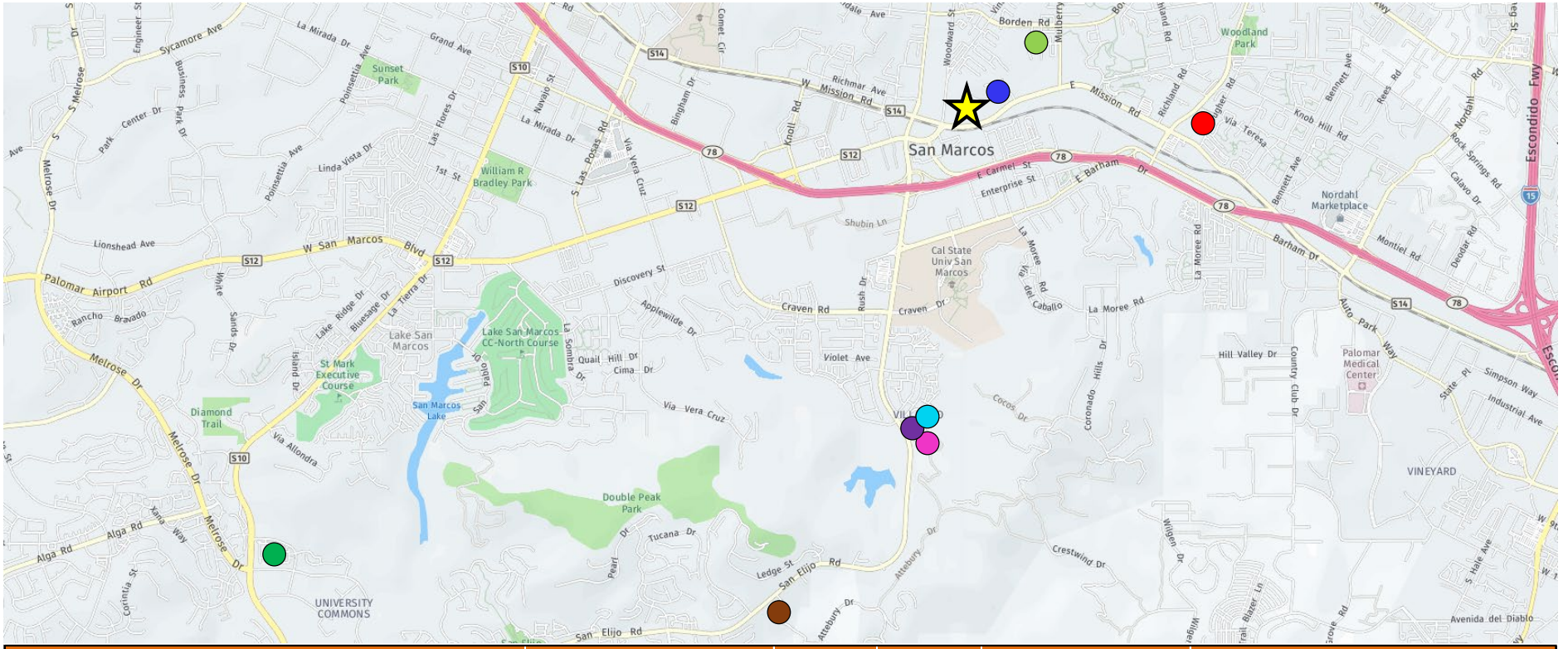


REFERENCE AREA	YEAR BUILT	AVERAGE SF	AVERAGE NET PRICE	AVERAGE $/SF
92069 North San Marcos Built 2000+, Sold L12M	2013	1,632	$512,429	$314
92078 South San Marcos Built 2000+, Sold L6M	2006	1,433	$534,587	$373
92056/7 Inland Oceanside Built 2000+, Sold L6M	2013	1,497	$498,600	$333
92084 North Vista Built 2000+, Sold L6M	2006	1,429	$482,364	$338
AVERAGE:		1,498	$506,995	$339
MEDIAN:		1,465	$505,514	$335

Source: Meyers Research

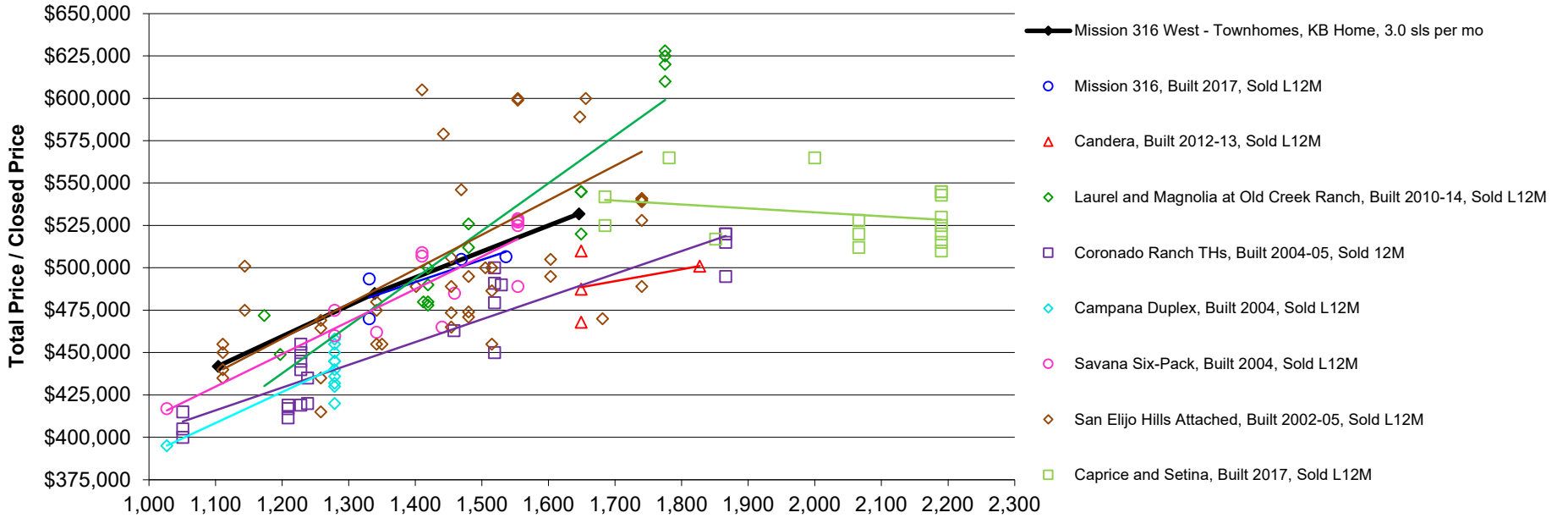
MAP OF SELECT CASE STUDIES

Product, Pricing and Absorption



REFERENCE AREA	DATE RANGE	YEAR BUILT	SALES	SALES PACE		AVERAGE		
				ALL	3 MO.	SF	NET PRICE	$/SF
Mission 316, Built 2017, Sold L12M	Mar. '18 to Mar. '19	2017	4	0.3	0.3	1,417	$493,781	$349
Caprice and Setina, Built 2017, Sold L12M	Apr. '18 to Mar. '19	2016	16	1.5	2.3	2,045	$531,675	$260
Candera, Built 2012-13, Sold L12M	Mar. '18 to Mar. '19	2013	4	0.6	0.0	1,694	$491,625	$290
Coronado Ranch THs, Built 2004-05, Sold 12M	May. '18 to Mar. '19	2004	23	2.4	2.3	1,388	$454,565	$328
Campana Duplex, Built 2004, Sold L12M	Apr. '18 to Mar. '19	2004	11	1.1	1.3	1,256	$436,909	$348
San Elijo Hills Attached, Built 2002-05, Sold L12M	Mar. '18 to Mar. '19	2004	44	4.1	3.3	1,458	$510,870	$350
Savana Six-Pack, Built 2004, Sold L12M	May. '18 to Mar. '19	2004	13	1.4	0.7	1,417	$490,615	$346
Laurel and Magnolia at Old Creek Ranch, Built 2010-14, Sold L12M	Apr. '18 to Mar. '19	2013	16	1.5	1.0	1,529	$530,000	$347
AVERAGE:			16	1.6	1.4	1,525	$492,505	$327
MEDIAN:			15	1.5	1.2	1,437	$492,703	$346

The recommended prices at Mission 316 West are at the top of the resale market for competitive attached communities in San Marcos. The Misison Terraces and Mission Villas (Mission 316) resales are the closest competition, adjacent to the site and newest inventory in North San Marcos. The Savanna (six-pack) product and Old Creek Ranch homes are the most comparable resales in the South San Marcos. See the following page for further price analysis on the Mission 316 resale community.



Source: Meyers LLC

REFERENCE AREA	DATE RANGE	YEAR BUILT	SALES	SALES PACE		AVERAGE		
				ALL	3 MO.	SF	NET PRICE	$/SF
Mission 316, Built 2017, Sold L12M	Mar. '18 to Mar. '19	2017	4	0.3	0.3	1,417	$493,781	$349
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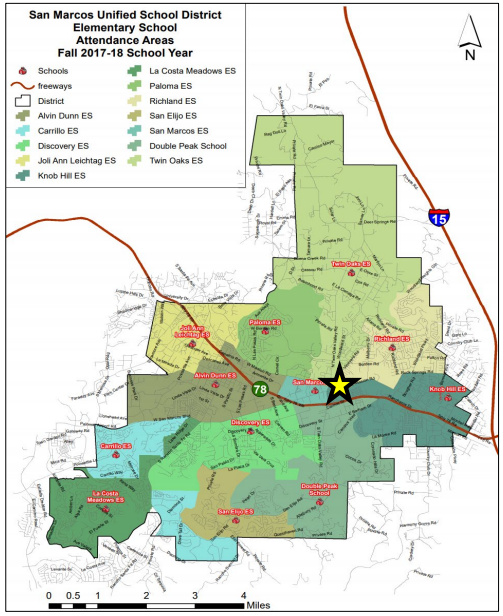
The Subject proposes back-to-back townhome configurations for 54 of the homes with home sizes ranging from 1104 to 1,646. The neighboring resale community, Mission Villas (built in 2017), also features back-to-back townhome configurations with very comparable home sizes. Assuming a market entry in 2020, and after applying a 2.75% age adjustment to the Mission Villas resales, the recommended prices for Mission 316 West are just above the age adjusted prices for like product located next door. Mission Terraces features rowtown configurations which command on average $14,000 more per plan compared to the back-to-back configuration. The 12 rowtown units offered at the Subject will command a similar mark up over the base prices shown below.

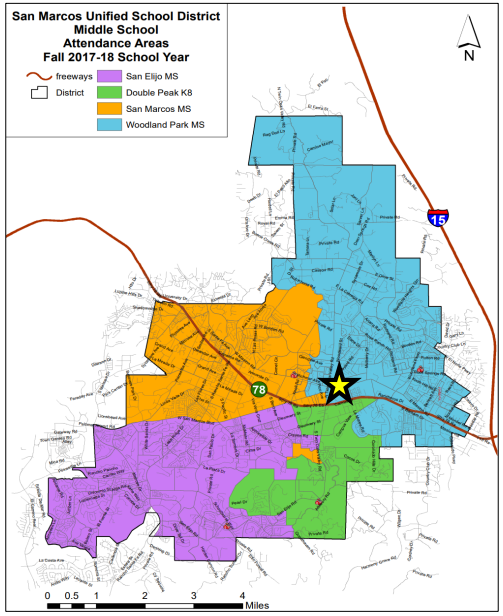
COMMUNITY SPECIFICS				FLOORPLANS						RECOMMENDATIONS												
Subject Property Name										Mo		Base	Incentives		Net Base	Net Base	Assumptions			Total	Payment Assumptions			90.0%
Location					Size					Sales	Base	Price/	Options /	Price	Price ($	Price/	Options /	Estimated	Total	Price/	Monthly	Base	Addl Tax	4.5%
Product Details		Sales Summary		Mix	SF	Bed	Bath	Level	Pkg	Pace	Price	SF	Upgrades	Reduction	Impacting)	SF	Upgrades	Premiums	Price	SF	HOA	Tax Rate	Assess.	Mo. Pmt.
Mission 316 West		**KB Home**		37	1,104	2	2.5	1	2	3.0	$421,900	$382	($5,000)	$0	$421,900	$382	$15,000	$5,000	$441,900	$400	$240	1.11%	0.20%	$2,905
San Marcos		-		17	1,339	3	2.5	1	2		$464,900	$347	($5,000)	$0	$464,900	$347	$15,000	$5,000	$484,900	$362	$240	1.11%	0.20%	$3,164
Product:	Townhomes	Total Units:	67	13	1,646	3	3.5	1	2		$511,900	$311	($5,000)	$0	$511,900	$311	$15,000	$5,000	$531,900	$323	$240	1.11%	0.20%	$3,447
Configuration:	3-story	Units Sold:	0																					
Lot Dimensions:	ATT	3 Months Sold:	0																					
		Units Remaining:	67																					
		% Remaining:	100%																					
		Summary Statistics:			1,269					3.0	$450,273	$355	($5,000)	$0	$450,273	$355	$15,000	$5,000	$470,273	$371	$240	1.11%	0.20%	$3,076

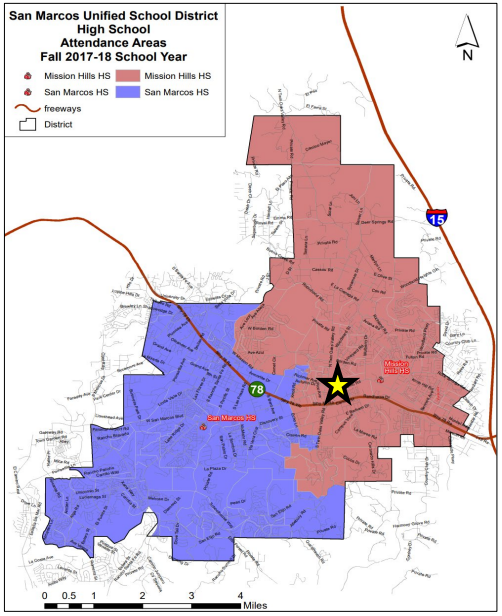
Full Address	Square Feet	Year Built	Sold Price	Age Adjustment	Age Adjusted Sold Price	Sold Date
389 Mission Villas Rd	1,105	2017	$433,380	2.75%	$445,298	1/12/2018
397 Mission Villas Rd	1,105	2018	$426,184	2.75%	$437,904	2/27/2018
Average:	**1,105**	**2018**	**$429,782**	--	**$441,601**	--
309 Mission Villas Rd	1,331	2017	$464,203	2.75%	$476,969	7/17/2017
405 Mission Villas Rd	1,331	2017	$493,500	2.75%	$507,071	8/24/2018
343 Mission Villas Rd	1,331	2017	$470,000	2.75%	$482,925	9/25/2018
329 Mission Villas Rd	1,351	2017	$457,800	2.75%	$470,390	6/1/2017
387 Mission Villas Rd	1,351	2016	$483,710	2.75%	$497,012	11/21/2017
429 Mission Villas Rd	1,351	2017	$474,386	2.75%	$487,432	11/29/2017
409 Mission Villas Rd	1,351	2017	$459,325	2.75%	$471,956	12/5/2017
Average:	**1,342**	**2017**	**$471,846**	--	**$484,822**	--
421 Mission Villas Rd	1,647	2017	$518,183	2.75%	$532,433	11/27/2017
425 Mission Villas Rd	1,647	2017	$517,132	2.75%	$531,353	12/1/2017
Average:	**1,647**	**2017**	**$517,658**	--	**$531,893**	--

The following table shows the assigned public schools for the Subject, ranked using the GreatSchools scoring system, with future Mission 316 West West residents assigned to Richland Elementary, Woodland Park Middle and Mission Hills High School. In comparison to actively selling communities, the schools assigned of the Subject rank in the middle of the competitive set. The new Kensington at The Square townhomes in Bressi Ranch have the highest ranked school scores in a highly amenitized community/area, and as such they are priced at a premium to other communities offering like product in the CMA.

Community	City/Area	District	Elementary	Great Schools	Middle	Great Schools	High	Great Schools	Average Great Schools
Kensington at The Square	Carlsbad	Carlsbad Unified School District	Poinsettia Elementary	7	Aviara Oaks Middle	9	Carlsbad High	9	8.3
Rancho Tesoro Masterplan	San Marcos	San Marcos Unified	Discovery Elementary	8	San Elijo Middle	8	Mission Hills High	8	8.0
The Preserve Masterplan	Carlsbad	Carlsbad Unified School District	Hope Elementary	8	Calavera Hills Middle	7	Carlsbad High	9	8.0
Pacific Ridge Masterplan	Oceanside	Oceanside Unfied School District	Ivey Ranch Elementary	8	Martin Luther King Jr. Middle	6	El Camino High	8	7.3
Mission 316 West	San Marcos	San Marcos Unified	Richland Elementary	7	Woodland Park Middle	6	Mission Hills High	8	7.0
St. Cloud Masterplan	Oceanside	Oceanside Unified School District	Ivey Ranch Elementary	8	Martin Luther King Jr. Middle	6	El Camino High	7	7.0
Avila	Vista	Vista Unified School District	Breeze Hill Elementary	7	Madison Middle School	5	Rancho Buena Vista High	8	6.7
Citron	Escondido	Escondido Union Elementary / High	L.R. Green Elementary	7	Bear Valley Middle	4	San Pasqual High	7	6.0
Skyline Masterplan	Vista	San Marcos Unified	Alvin M. Dunn Elementary	4	San Marcos Middle	5	San Marcos High	9	6.0
Mission Lane Masterplan	Oceanside	Oceanside Unified School District	Nichols Elementary	4	Cesar Chavez Middle	5	El Camino High	7	5.3
Sierra	Vista	Vista Unified School District	Hannalei Elementary	4	Rancho Minerva Middle	2	Rancho Buena Vista High	8	4.7







Source: GreatSchools, San Marcos Unified School District.org, Zonda

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Future Supply

Mission 316 West, San Marcos, California

ATTACHED FOR-SALE FUTURE SUPPLY IN CMA

Future Supply

There are 896 new for-sale attached homes in planning or under construction in the competitive market. Viewpointe by KB Home is located roughly 0.5 miles to the west of the Subject site and an interest list has begun forming. It is expected that Viewpointe will sell through its inventory before Mission 316 West enters the market and will not negatively impact the absorption rate at the Subject.

Project	Builder	City	ZIP Code	Total Units
Park Villas at El Corazon	Unknown	Oceanside	92056	80
The Peak at Delpy's Corner	Lennar	Vista	92084	124
Viewpointe	KB Home	San Marcos	92069	78
Meadowood/Attached	Pardee Homes	Fallbrook	92028	489
Square at Bressi Ranch	Shea Homes	Carlsbad	92009	125
			Total:	**896**

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There are ± 6,606 new for-sale homes in planning or under construction in the City of San Marcos. Roughly 81% of the planned projects are attached homes (not including the planned homes at the Subject). While San Elijo and Rancho Tesoro conclude their build out (primarily single family detached product), the focus of for-sale development has shifted toward attached living with smaller home sizes. This is owed to a combination of limited land and home price affordability concerns in the area (namely the Subject's 92078 zip code).

Major Planned Residential Projects: San Marcos

Project	Applicant/Builder	Detail	Status	Single Family Detached	High Density Detached	Attached	Total For-Sale	Apartments	Affordable Apartments	55+ Age Restricted APTs	Total Units
Mission 316 West	KB Home	Residential: Multi-Family	Application being processed			67	67				67
North City (University District Specific Plan)	Urban Villages San Marcos, LLC	Mixed Use	Under Construction	400		2,200 *	2,600		800		3,400
MU-4	Brookfield Residential	Residential: Multi-Family	Approved			220	220				220
Copper Hills	The Stephen A. Bieri Co.	Mixed Use	Application being processed		42	120	162	189			351
Corner @2 Oaks (Phase 2)	CR TOVR Associates, LLC	Residential: Multi-Family	Approved			118	118				118
H.G. Fenton South	H.G. Fenton Co.	Residential: Single Family	Approved	230			230				230
Borden Road 22	Hallmark Communities	Residential: Single Family	Under Construction	22			22				22
Lanikai Senior Residential Facility	Lanikai Partners	Residential: Multi-Family	Application being processed				0			115	115
Main Square	Blue Band Enterprises	Mixed Use	Application being processed				0	519			519
MARC San Marcos	Milano Holdings, Inc.	Mixed Use	Under Construction				0	416			416
Mariposa	Mariposa	Residential: Multi-Family	Application being processed				0		100		100
Mission 24	Hall Land Company, LLC	Residential: Multi-Family	Application being processed			24	24				24
Montiel Road 9, LLC	Montiel Partners	Residential: Single Family	Approved	9			9				9
Murai-Sab, LLC	ColRich	Residential: Single Family	Approved	89			89				89
Villa Serena	National Community Renaissance	Residential: Multi-Family	Approved				0		148		148
Pacifica San Marcos	North County Land Partners, LP	Mixed Use	Approved				0	31			31
Richard Woolsey	Richard Woolsey	Residential: Single Family	Approved	3			3				3
San Elijo Hills	San Elijo Hills Retail Center, LLC	Residential: Single Family	Application being processed	150		12	162				162
San Marcos 13, LLC	San Marcos 13, LLC	Residential: Single Family	Under Construction	14			14				14
San Marcos Creek	City of San Marcos	Mixed Use	Under Construction			2,300	2,300				2,300
San Marcos Highlands	Farouk Kubba	Residential: Single Family	Approved	189			189				189
Sandy Lane Estates	Lina Hsieh	Residential: Single Family	Application being processed	8			8				8
The McDonald Group	The McDonald Group	Mixed Use	Application being processed			85	85				85
Mission Villas - Mission Terrace	The Norman Project Owner, LLC	Residential: Multi-Family	Under Construction			92	92				92
Vidler Estates	The Orlando Company	Residential: Single Family	Under Construction	19			19				19
The Sunrise Gardens	The Sunrise Gardens Project Owner, LLC	Residential: Multi-Family	Application being processed			193	193				193
			CITY OF SAN MARCOS TOTALS:	**1,133**	**42**	**5,431**	**6,606**	**1,155**	**1,048**	**115**	**8,924**

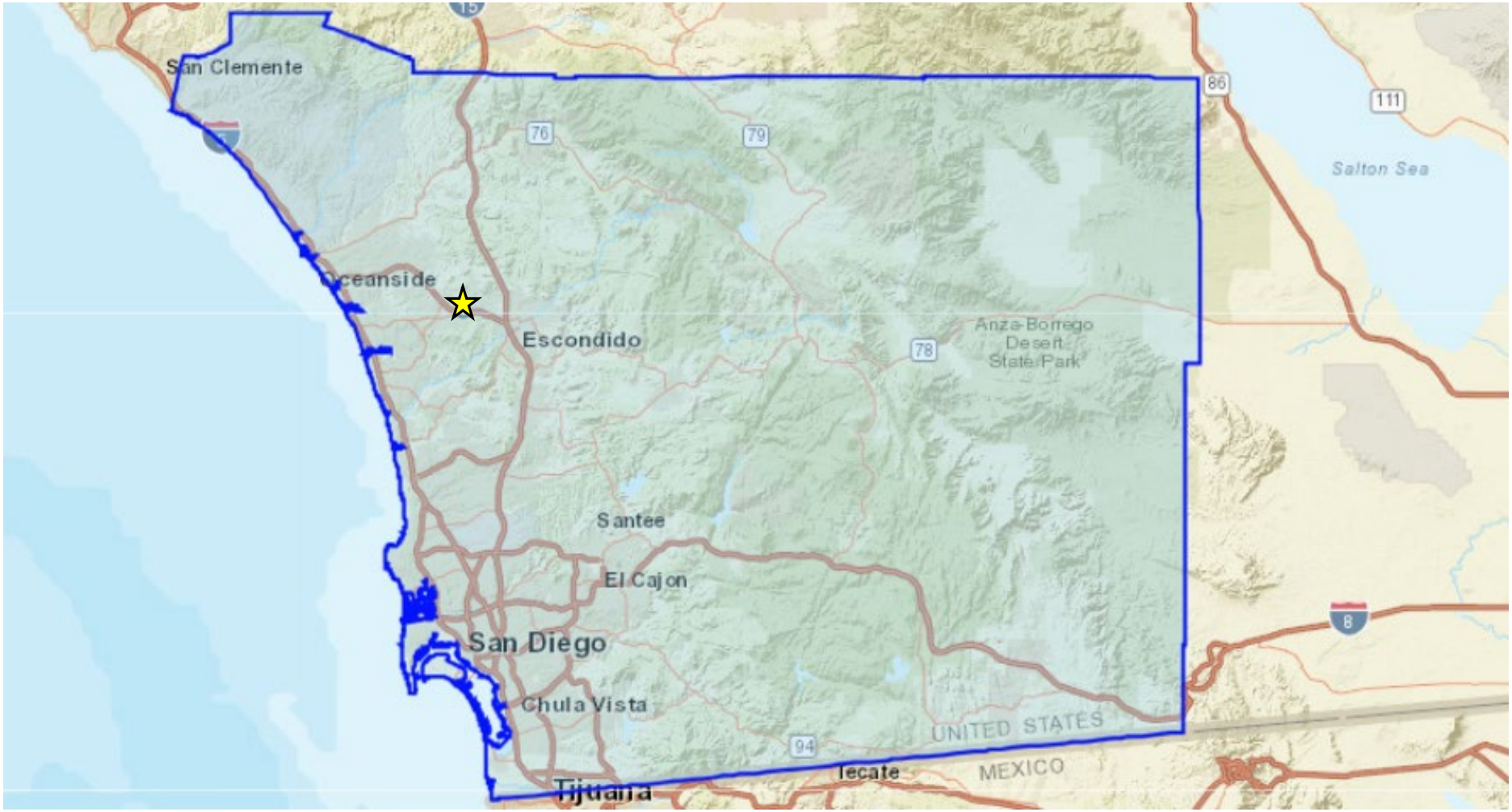
* Preliminary count

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Economic Overview

Mission 316 West, San Marcos, California

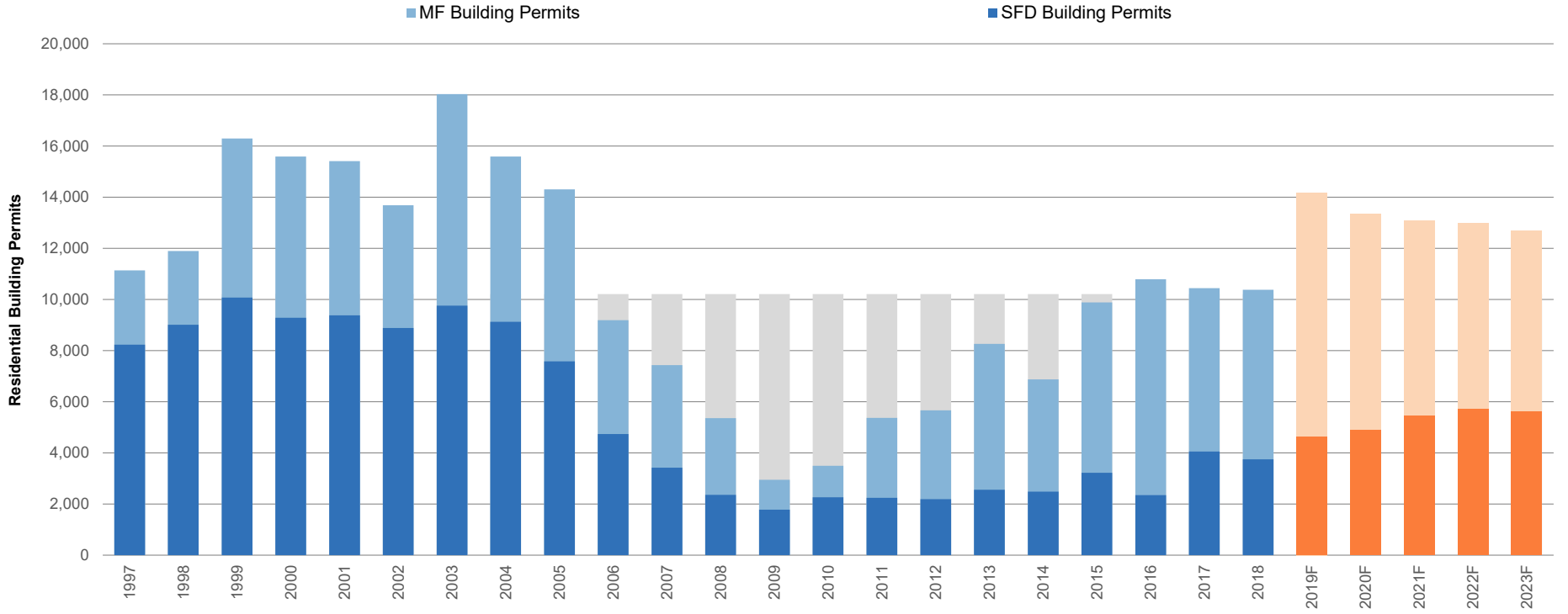
The Subject Property is located in the City of San Marcos which is within the San Diego-Carlsbad Metropolitan Statistical Area and San Diego County (the MSA and County are synonymous). San Marcos has gone through a comprehensive transition over the past two decades to a desirable location in Inland North County. With diverse housing choices, several restaurants, a strong retail base, job centers and highly ranked schools. The following slides highlight current, historical and projected economic and demographic indicators that support the proposed Mission 316 West project.



Source: ESRI

Since 2011 multi-family building permits have constituted roughly 66% of the total building permits in the San Diego MSA, and Economy.com forecasts that total permit issuance will spike 36.5% in 2019 and moderate thereafter to an average of 12,900 total permits per year for the next five years. Total building permits issued reached a 10-year high in 2016 at 10,791 permits and since that time total permit issuance has dropped roughly 3.8%.

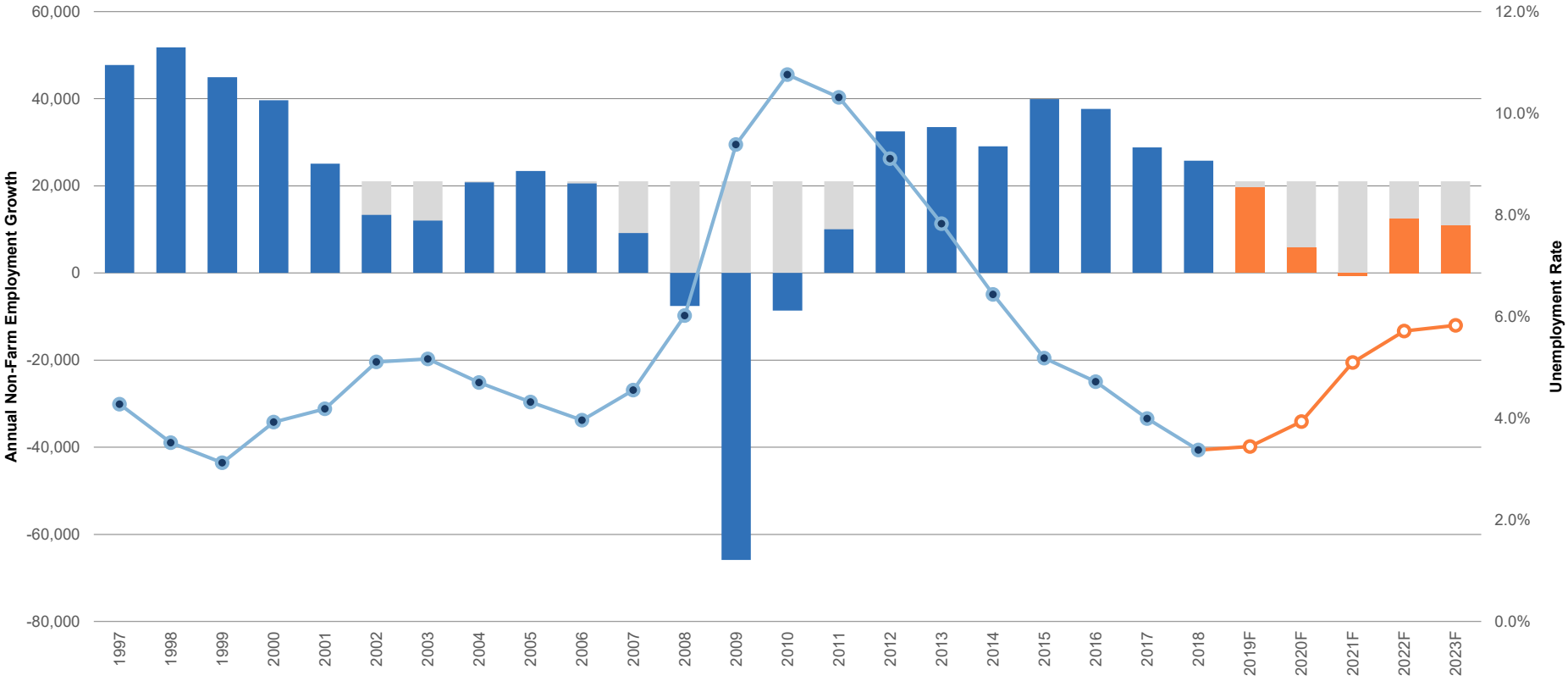
Residential Building Permit History & Forecasts	San Diego-Carlsbad, CA Metropolitan Statistical Area - Ten Year History										Economy.com Five-Year Forecast				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019F	2020F	2021F	2022F	2023F
Total Building Permits	2,946	3,494	5,370	5,666	8,264	6,875	9,883	10,791	10,441	10,379	14,174	13,327	13,083	12,974	12,690
Annual % Change	-45.0%	18.6%	53.7%	5.5%	45.9%	-16.8%	43.8%	9.2%	-3.2%	-0.6%	36.6%	-6.0%	-1.8%	-0.8%	-2.2%
SFD Building Permits	1,778	2,270	2,245	2,197	2,565	2,487	3,222	2,351	4,056	3,751	4,622	4,901	5,455	5,704	5,610
Annual % Change	-24.7%	27.7%	-1.1%	-2.1%	16.8%	-3.0%	29.6%	-27.0%	72.5%	-7.5%	23.2%	6.1%	11.3%	4.6%	-1.6%
MF Building Permits	1,168	1,224	3,125	3,469	5,699	4,388	6,661	8,440	6,385	6,628	9,552	8,426	7,628	7,270	7,080
Annual % Change	-61.0%	4.8%	155.3%	11.0%	64.3%	-23.0%	51.8%	26.7%	-24.3%	3.8%	44.1%	-11.8%	-9.5%	-4.7%	-2.6%



Source: Economy.com

The San Diego MSA non-farm employment has grown 2.4% per year over the past four years, with job growth moderating 31.5% over the past two years, at an unemployment rate of 3.4% (the second lowest rate recorded since 1999). Economy.com forecasts job growth slowing through 2020 and minor job losses in 2021. From 2015 to 2016, employment in San Marcos grew at a rate of 3.8%, from 39,116 to 40,613 employees.

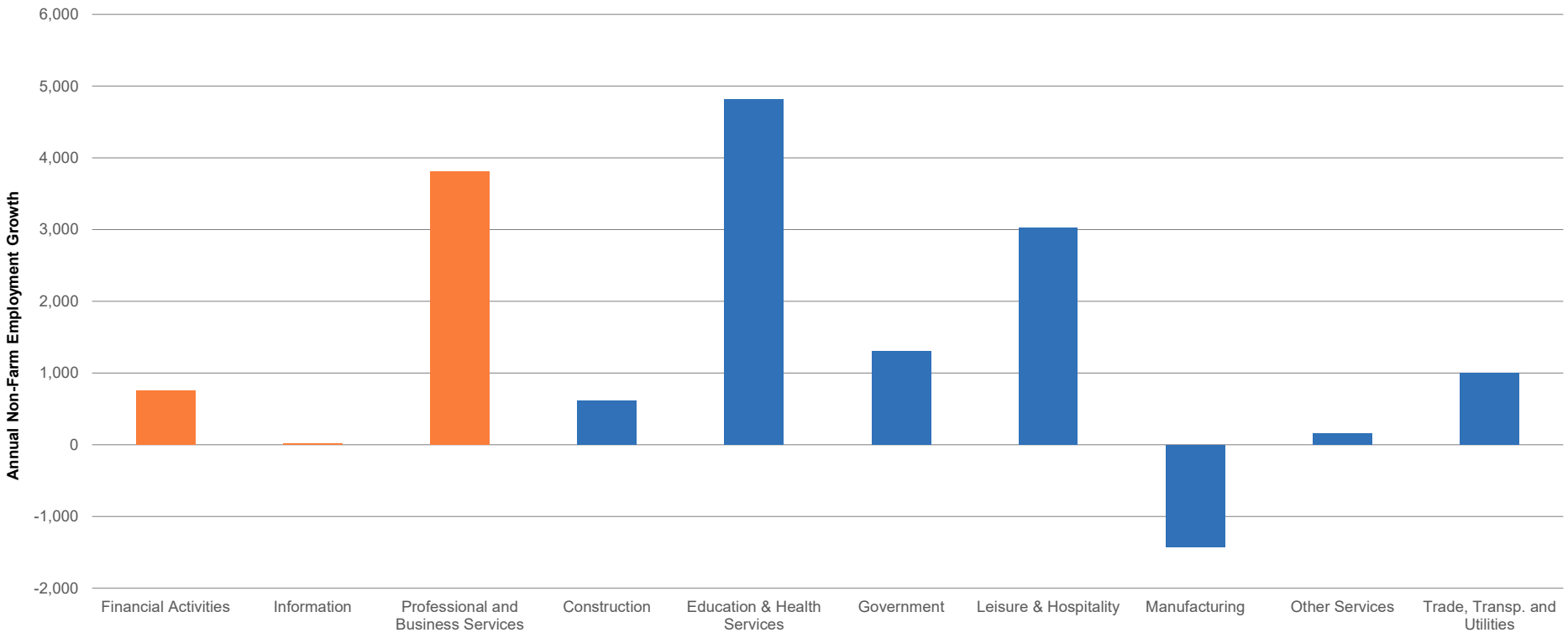
Employment History & Forecasts	San Diego-Carlsbad, CA Metropolitan Statistical Area - Ten Year History										Five-Year Forecast*				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019F	2020F	2021F	2022F	2023F
Non-Farm Employment	1,250,525	1,241,883	1,251,925	1,284,425	1,317,892	1,346,975	1,386,842	1,424,492	1,453,283	1,479,062	1,498,580	1,504,348	1,503,632	1,516,163	1,527,134
Prior Year Change	(65,858)	(8,642)	10,042	32,500	33,467	29,083	39,867	37,650	28,792	25,779	19,518	5,768	(716)	12,531	10,971
Annual % Change	-5.0%	-0.7%	0.8%	2.6%	2.6%	2.2%	3.0%	2.7%	2.0%	1.8%	1.3%	0.4%	0.0%	0.8%	0.7%
Unemployment Rate	9.4%	10.8%	10.3%	9.1%	7.8%	6.4%	5.2%	4.7%	4.0%	3.4%	3.4%	3.9%	5.1%	5.7%	5.8%



Source: Economy.com, DataUSA

Employment gains in recent years have been largely driven by expanding employment in Education & Health Services, Professional and Business Services, followed by Leisure & Hospitality. Manufacturing is the only sector that has experienced job losses over the past year. The most common job groups, by number of people living in San Marcos are Management, Business, Science, & Arts, Sales & Office, and Service.

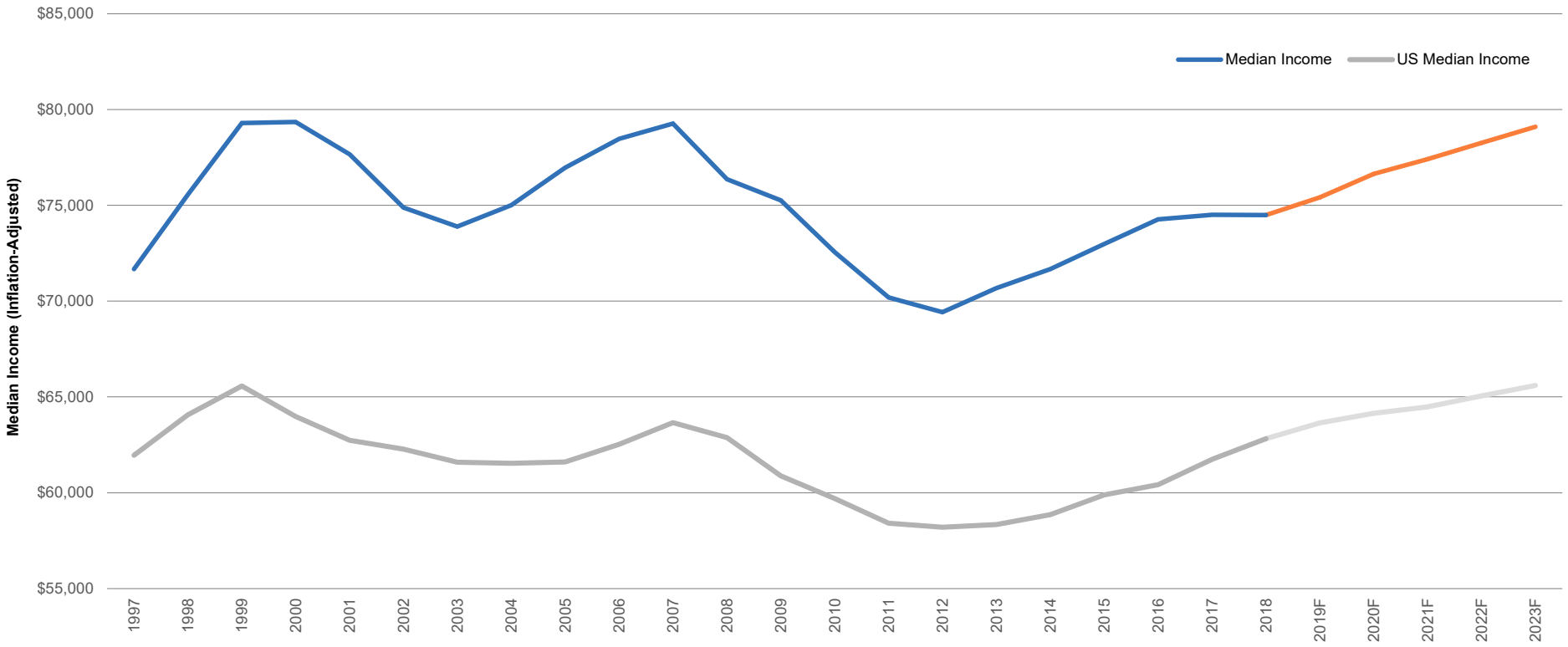
Employment by Sector	High Income Sectors			Other Sectors						
	Financial Activities	Information	Professional and Business Services	Construction	Education & Health Services	Government	Leisure & Hospitality	Manufacturing	Other Services	Trade, Transp. and Utilities
Current Month	74,571	24,473	254,169	83,483	217,161	253,051	196,431	112,477	57,874	229,704
Same Month Previous Year	73,822	24,452	250,361	82,869	212,345	251,751	193,406	113,902	57,720	228,704
12-Month Growth	749	21	3,808	614	4,816	1,300	3,025	-1,425	154	1,000



Source: Economy.com, Los Angeles Times

Median income levels in San Diego County are roughly $12,000 higher than the national level however, median income growth in San Diego County remained unchanged while the national median income level increased 1.7% over the past year. Economy.com forecasts that median income levels in San Diego County will appreciate between 1% to 1.6% over the next five years.

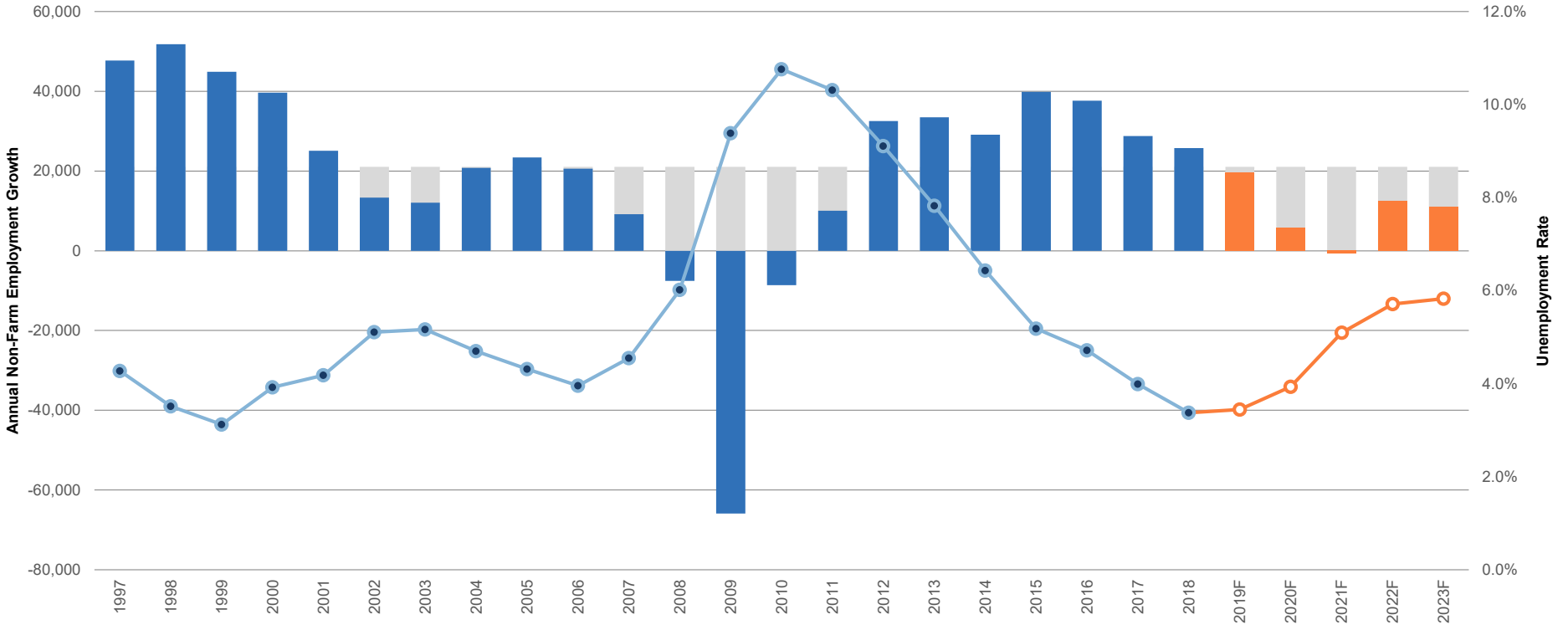
Median Income & Forecasts	San Diego-Carlsbad, CA Metropolitan Statistical Area - Ten Year History										Economy.com Five-Year Forecast				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019F	2020F	2021F	2022F	2023F
Median Income	$75,261	$72,557	$70,191	$69,423	$70,676	$71,667	$72,992	$74,270	$74,509	$74,497	$75,414	$76,649	$77,404	$78,259	$79,105
Annual % Change	-1.4%	-3.6%	-3.3%	-1.1%	1.8%	1.4%	1.8%	1.8%	0.3%	0.0%	1.2%	1.6%	1.0%	1.1%	1.1%
Median Income - United States	$60,885	$59,694	$58,404	$58,200	$58,333	$58,853	$59,896	$60,420	$61,746	$62,815	$63,644	$64,143	$64,480	$65,059	$65,597
Annual % Change	-3.2%	-2.0%	-2.2%	-0.3%	0.2%	0.9%	1.8%	0.9%	2.2%	1.7%	1.3%	0.8%	0.5%	0.9%	0.8%



Source: Economy.com

The E/P ratio has maintained levels above 2.0 from 2012 through 2018 indicating that for every 1.0 housing permit filed, an average of 2+ jobs were added in the San Diego MSA. Moody's forecasts that the E/P ratio will begin to decline as housing starts rise against moderating employment gains. The E/P Ratio is based on employment growth versus building permits. An E/P Ratio over 1.0 means more jobs are being added than homes are being built. Ratios above 1.0 - 1.5 indicate an opportunity to introduce new homes to a market.

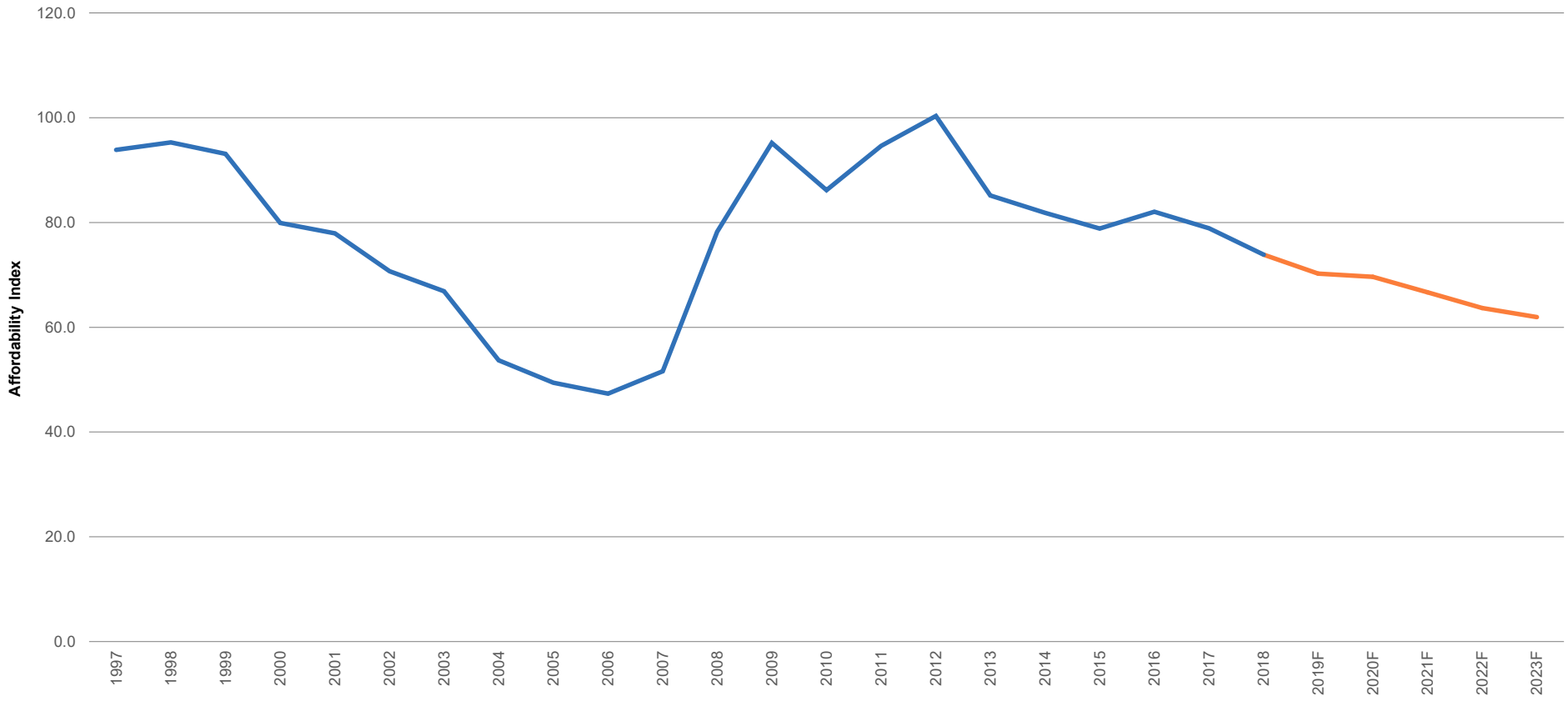
Employment/Housing History & Forecasts	San Diego-Carlsbad, CA Metropolitan Statistical Area - Ten Year History										Economy.com Five-Year Forecast				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019F	2020F	2021F	2022F	2023F
Non-Farm Employment	1,250,525	1,241,883	1,251,925	1,284,425	1,317,892	1,346,975	1,386,842	1,424,492	1,453,283	1,479,062	1,498,580	1,504,348	1,503,632	1,516,163	1,527,134
Prior Year Change	(65,858)	(8,642)	10,042	32,500	33,467	29,083	39,867	37,650	28,792	25,779	19,518	5,768	(716)	12,531	10,971
Building Permits	2,946	3,494	5,370	5,666	8,264	6,875	9,883	10,791	10,441	10,379	14,174	13,327	13,083	12,974	12,690
Employment/Housing	-22.36	-2.47	1.87	5.74	4.05	4.23	4.03	3.49	2.76	2.48	1.38	0.43	-0.05	0.97	0.86



Source: Economy.com

In recent years affordability peaked at 82.1 in 2016 due to a combination of price softening in the area and low interest rates. The index declined from 78.9 to 73.8 in 2018 and is forecast to decline over the next five years to levels into the 60's. The affordability index measures the ability of a family earning the median income amount to purchase a median-priced home. An index above 100 implies that the median income earning family has more than enough income to purchase a median-priced home.

Affordability Index w/ Forecasts	San Diego-Carlsbad, CA Metropolitan Statistical Area - Ten Year History										Economy.com Five-Year Forecast				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019F	2020F	2021F	2022F	2023F
Affordability Index	95.2	86.2	94.7	100.3	85.2	81.9	78.9	82.1	78.9	73.8	70.2	69.7	66.7	63.7	61.9



Source: Economy.com

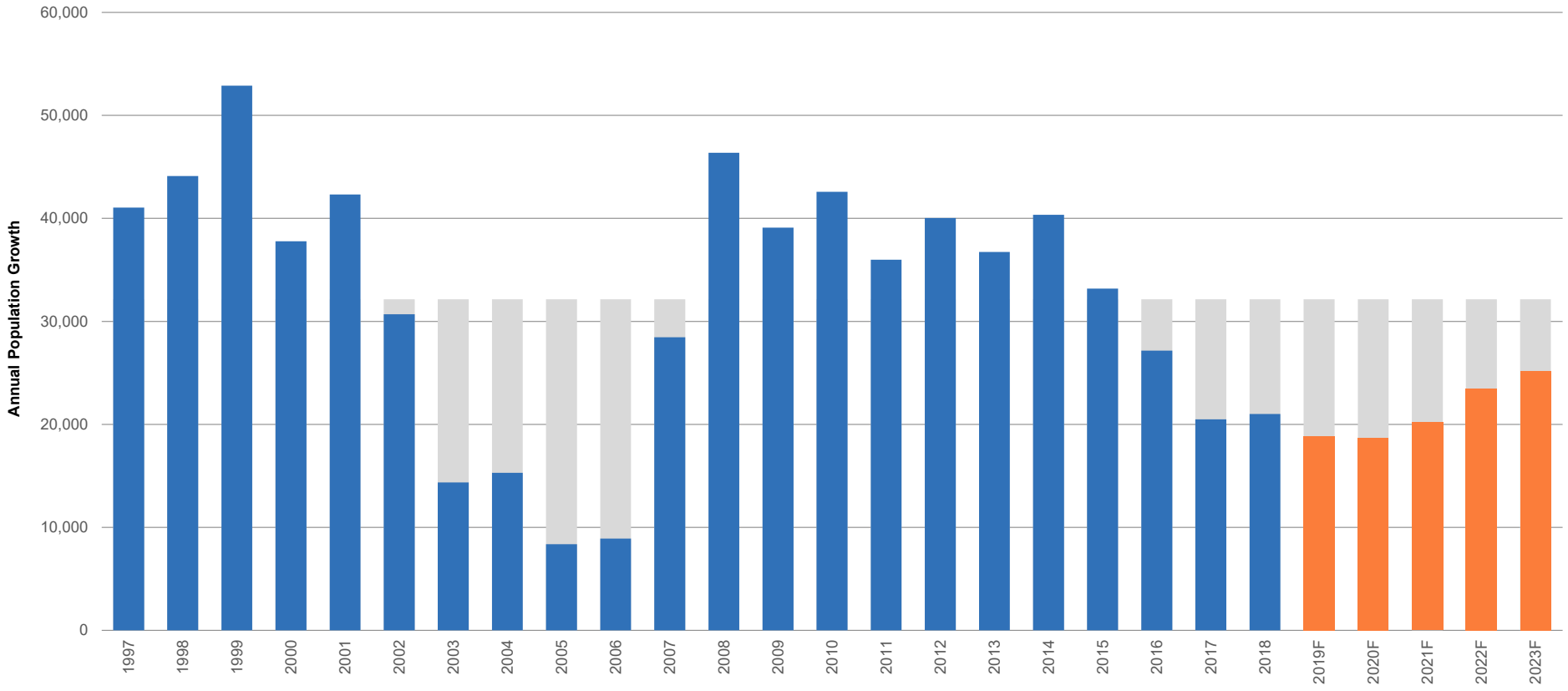
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Demographic Overview

Mission 316 West, San Marcos, California

Population growth in San Diego County slowed in 2015 from a historical trend of 1.3% average annual growth to 1%. That down trend has continued through 2018 to 0.6% growth per year. Economy.com forecasts that population growth will continue at this rate through 2021 and then increase to 0.7% annual growth through 2023.

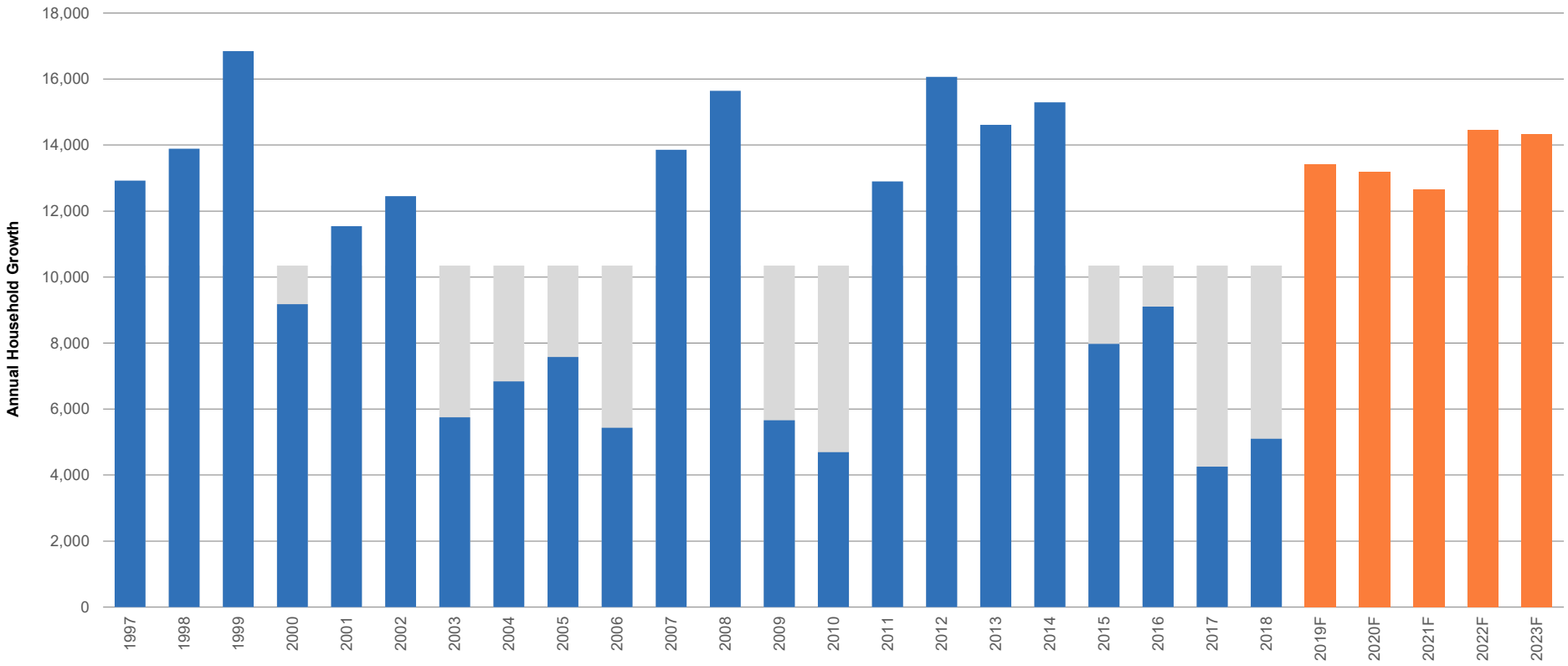
Population History & Forecasts	San Diego-Carlsbad, CA Metropolitan Statistical Area - Ten Year History										Economy.com Five-Year Forecast				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019F	2020F	2021F	2022F	2023F
Total Population	3,061,203	3,103,793	3,139,767	3,179,798	3,216,522	3,256,875	3,290,044	3,317,200	3,337,685	3,358,685	3,377,538	3,396,196	3,416,395	3,439,897	3,465,051
Prior Year Change	39,087	42,590	35,974	40,031	36,724	40,353	33,169	27,156	20,485	21,000	18,853	18,658	20,199	23,502	25,154
Annual % Change	1.3%	1.4%	1.2%	1.3%	1.2%	1.3%	1.0%	0.8%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%	0.7%



Source: Economy.com

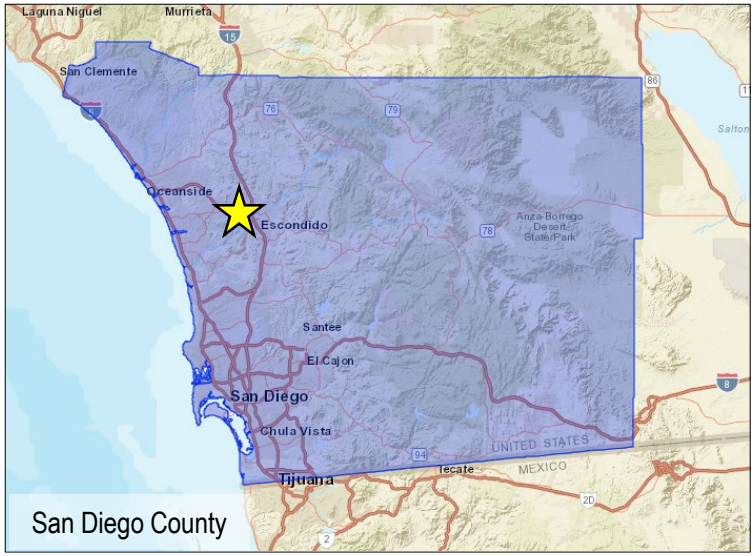
The San Diego MSA household growth has averaged between 4,250 to nearly 9,100 new households per year since 2015. The five year forecast suggests that strong household growth will begin in 2019 and will continue through 2023 for a total of 13,000 to 14,500 new households per year over the foreseeable future, generating demand for all types of new housing. The forecast growth rates mirror the level of growth seen between 2011 through 2014.

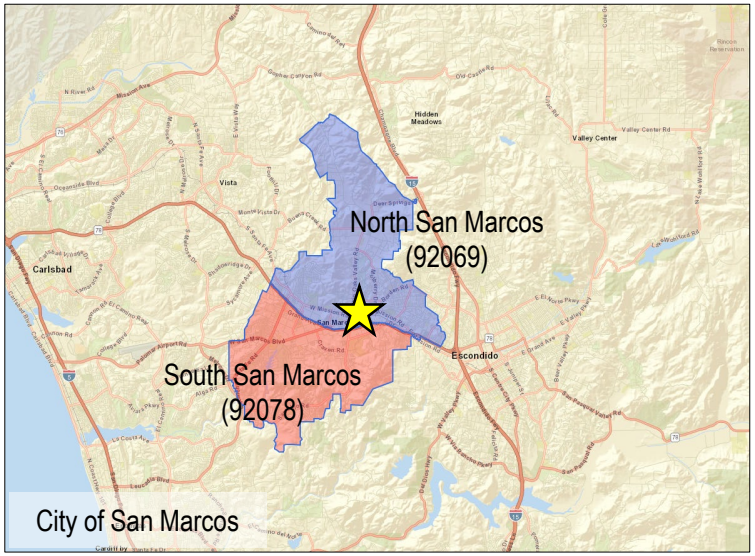
Household History & Forecasts	San Diego-Carlsbad, CA Metropolitan Statistical Area - Ten Year History										Economy.com Five-Year Forecast				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019F	2020F	2021F	2022F	2023F
Total Households	1,086,316	1,091,008	1,103,905	1,119,972	1,134,581	1,149,874	1,157,847	1,166,949	1,171,205	1,176,308	1,189,719	1,202,908	1,215,573	1,230,024	1,244,357
Prior Year Change	5,658	4,692	12,897	16,067	14,609	15,293	7,973	9,102	4,256	5,103	13,411	13,189	12,665	14,451	14,333
Annual % Change	0.5%	0.4%	1.2%	1.5%	1.3%	1.3%	0.7%	0.8%	0.4%	0.4%	1.1%	1.1%	1.1%	1.2%	1.2%



Source: Economy.com

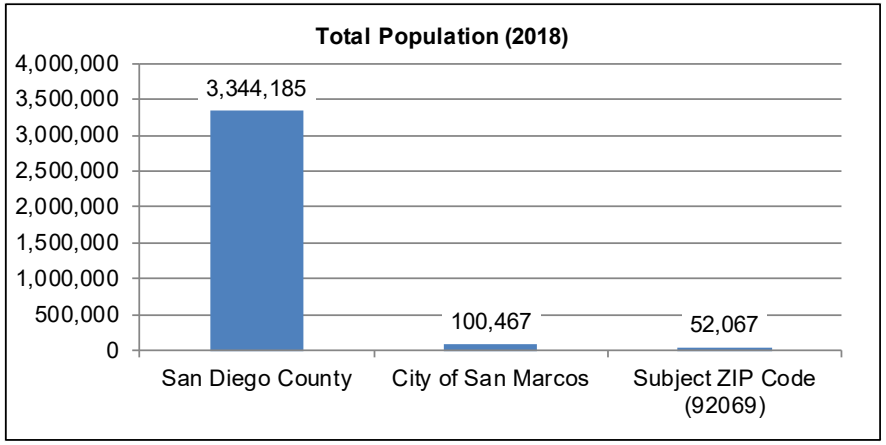
The three geographic areas considered in the demographic analysis are: San Diego County, the City of San Marcos, and the Subject ZIP code (92069). The Subject Property is located within the North San Marcos 92069 (blue), and South San Marcos (92078) is shown in (red).

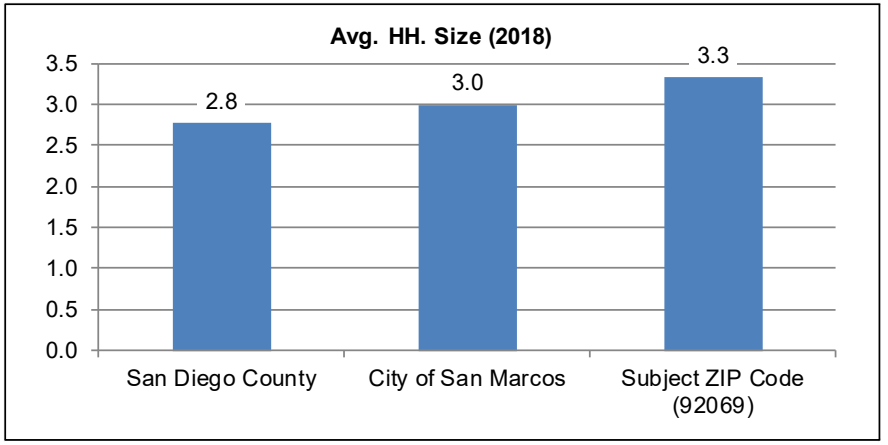


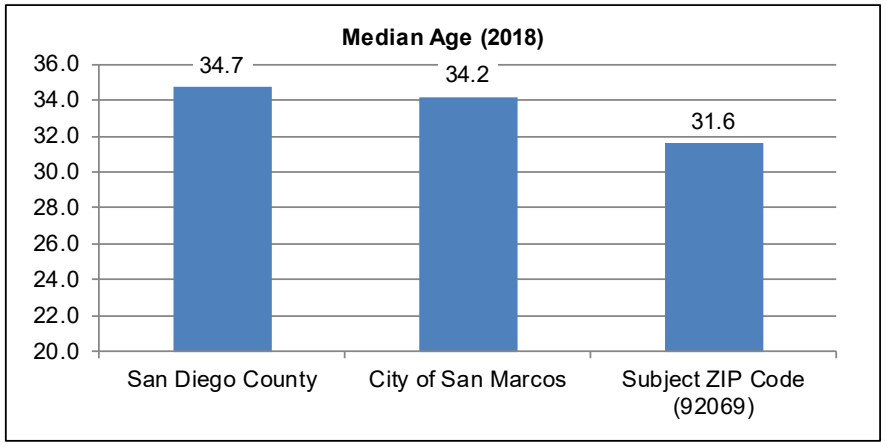


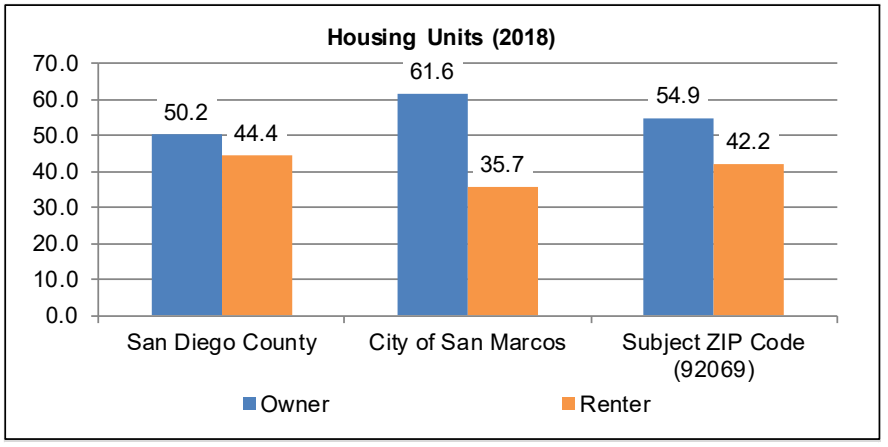
Source: ESRI

North San Marcos (92069) has a total population of ± 52,000 people and accounts for roughly 52% of the total population in the City of San Marcos. The average household size in North San Marcos is 3.3 people and is larger and younger than the rest of the City of San Marcos. Home ownership in North San Marcos follows a similar trend to San Diego County as a whole, with 42% of the population renting and 55% owning a home. Conversely, the City of San Marcos overall has more homeowners than renters.



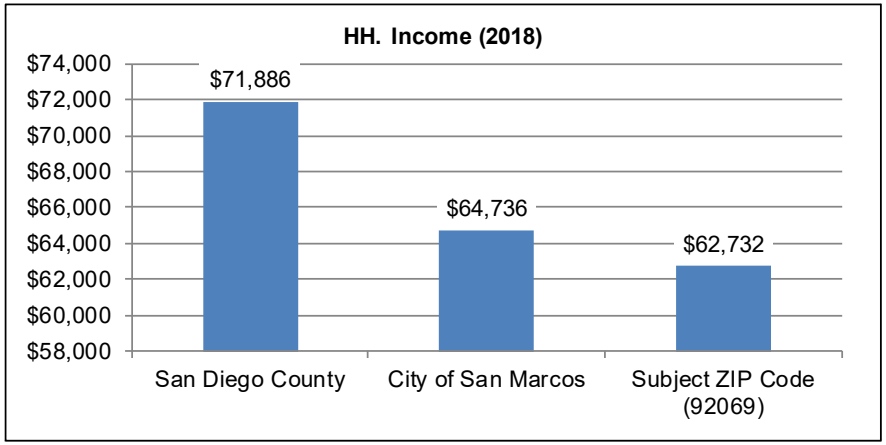


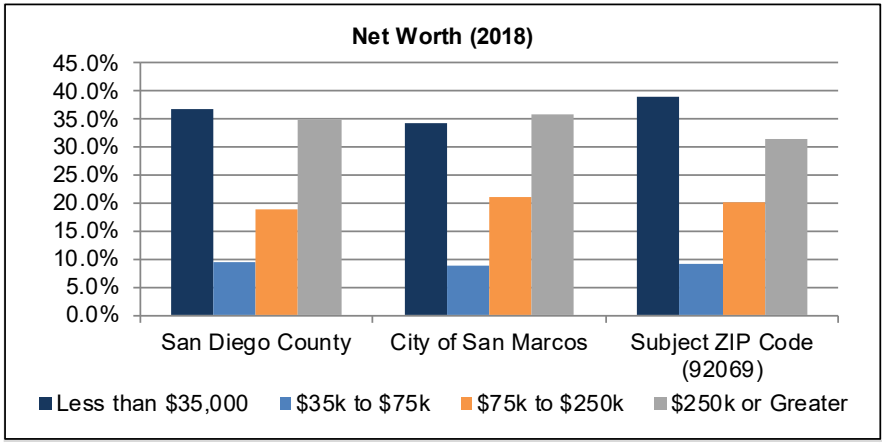


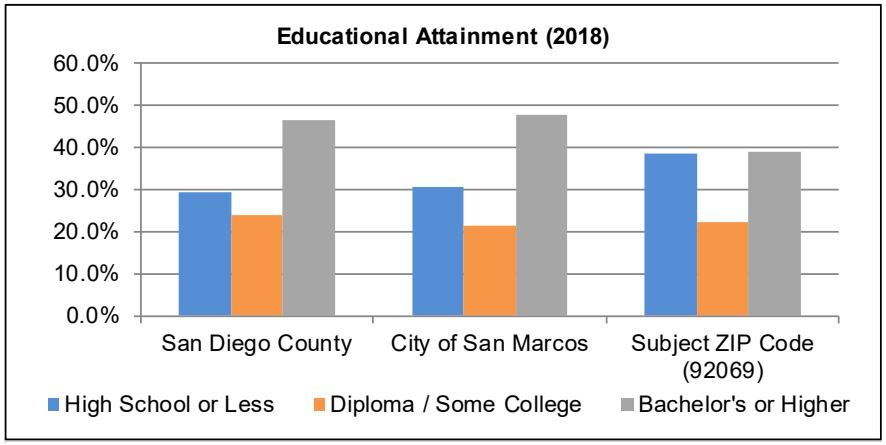


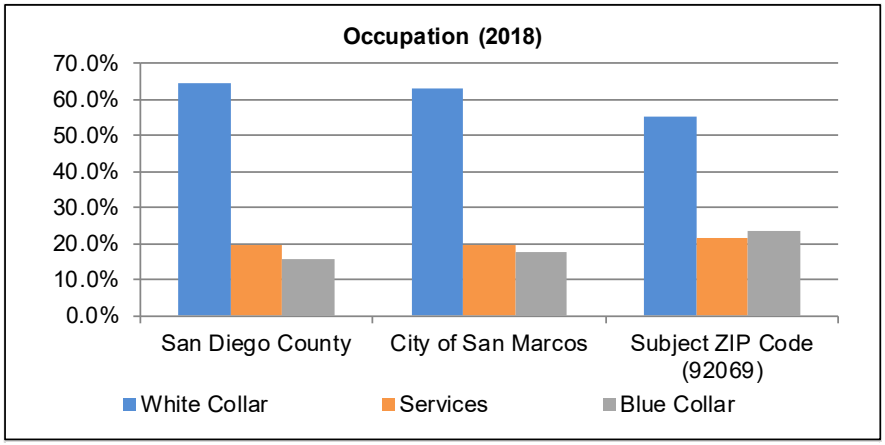
Source: ESRI

The Subject ZIP code (92069) has a slightly lower household income than the City of San Marcos as a whole. Additionally, the 92069 ZIP code has a lower average net worth than the City of San Marcos and San Diego County, with a higher concentration of service and blue collar workers. The financial buyer profile of the residents in this area suggest that the proposed product and price points will be well suited to the local population in the City of San Marcos and the CMA overall in terms affordability.









Source: ESRI

Meyers RESEARCH
a Kennedy Wilson Company

The buyer profile is a young professional with a small household size looking to transition from renting to first time home ownership in an urban location close to employment. The target populations of younger millennials, couples and singles with an income of $70,000+ could afford the proposed product at the recommended prices.





WHO ARE WE?

Bright Young Professionals is a large market, primarily located in urban outskirts of large metropolitan areas. These communities are home to young, educated, working professionals. More than one out of three householders is under the age of 35. Slightly more diverse couples dominate this market, with more renters than homeowners. More than two-fifths of the households live in single-family homes; over a third live in 5+ unit buildings. Labor force participation is high, generally white-collar work, with a mix of food service and part-time jobs (among the college students). Median household income, median home value, and average rent are close to the US values. Residents of this segment are physically active and up on the latest technology.

OUR NEIGHBORHOOD

- Approximately 57% of the households rent; 43% own their homes.
- Household type is primarily couples, married (or unmarried), with above average concentrations of both single-parent (Index 125) and single-person (Index 115) households.
- Multiunit buildings or row housing make up 56% of the housing stock (row housing (Index 178), buildings with 5–19 units (Index 275)); 43% built 1980–99.
- Average rent mirrors the US (Index 100).
- Lower vacancy rate is at 8.2%.

SOCIOECONOMIC TRAITS

- Education completed: 35% with some college or an associate's degree, 33% with a bachelor's degree or higher.
- Unemployment rate is lower at 4.7%, and labor force participation rate of 72% is higher than the US rate.
- These consumers are up on the latest technology.
- They get most of their information from the Internet.
- Concern about the environment, impacts their purchasing decisions.

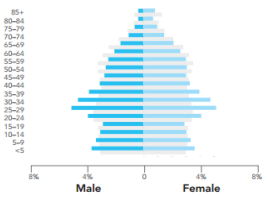
TAPESTRY SEGMENTATION
esri.com/tapestry

Note: The Index represents the ratio of the segment rate to the US rate multiplied by 100. Consumer preferences are estimated from data by GfK MRI.

AGE BY SEX (Esri data)

Median Age: 33.0 US: 38.2

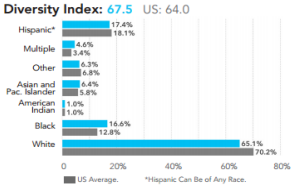
Indicates US



RACE AND ETHNICITY (Esri data)

The Diversity Index summarizes racial and ethnic diversity. The index shows the likelihood that two persons, chosen at random from the same area, belong to different race or ethnic groups. The index ranges from 0 (no diversity) to 100 (complete diversity).

Diversity Index: 67.5 US: 64.0



INCOME AND NET WORTH

Net worth measures total household assets (homes, vehicles, investments, etc.) less any debts, secured (e.g., mortgages) or unsecured (credit cards). Household income and net worth are estimated by Esri.

Median Household Income



Median Net Worth



MARKET PROFILE (Consumer preferences are estimated from data by GfK MRI)

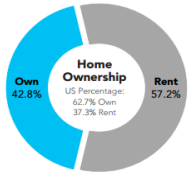
- Own retirement savings and student loans.
- Own newer computers (desktop, laptop, or both), iPods, and 2+ TVs.
- Go online and use mobile devices for banking, access YouTube or Facebook, visit blogs, download movies, and play games.
- Use cell phones to text, redeem mobile coupons, listen to music, and check for news and financial information.
- Find leisure going to bars/clubs, attending concerts, going to the beach, and renting DVDs from Redbox or Netflix.
- Enjoy a variety of sports, including backpacking, rock climbing, football, Pilates, running, and yoga.
- Eat out often at fast-food and family restaurants.

HOUSING

Median home value is displayed for markets that are primarily owner occupied; average rent is shown for renter-occupied markets. Tenure and home value are estimated by Esri. Housing type and average rent are from the Census Bureau's American Community Survey.

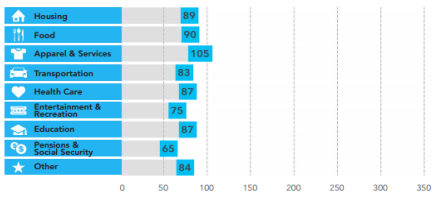
Typical Housing:
Single Family;
Multi-Units

Average Rent:
$1,042
US Average: $1,038



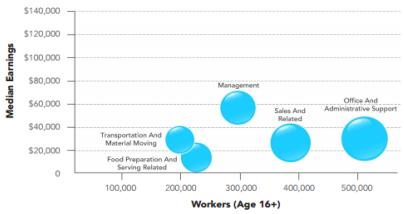
AVERAGE HOUSEHOLD BUDGET INDEX

The index compares the average amount spent in this market's household budgets for housing, food, apparel, etc., to the average amount spent by all US households. An index of 100 is average. An index of 120 shows that average spending by consumers in this market is 20 percent above the national average. Consumer expenditures are estimated by Esri.



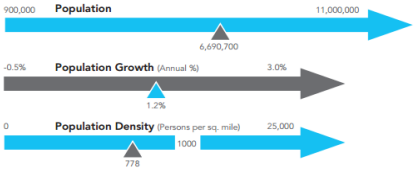
OCCUPATION BY EARNINGS

The five occupations with the highest number of workers in the market are displayed by median earnings. Data from the Census Bureau's American Community Survey.



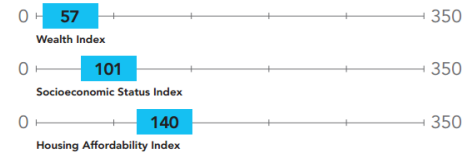
POPULATION CHARACTERISTICS

Total population, average annual population change since Census 2010, and average density (population per square mile) are displayed for the market relative to the size and change among all Tapestry markets. Data estimated by Esri.



ESRI INDEXES

Esri developed three indexes to display average household wealth, socioeconomic status, and housing affordability for the market relative to US standards.



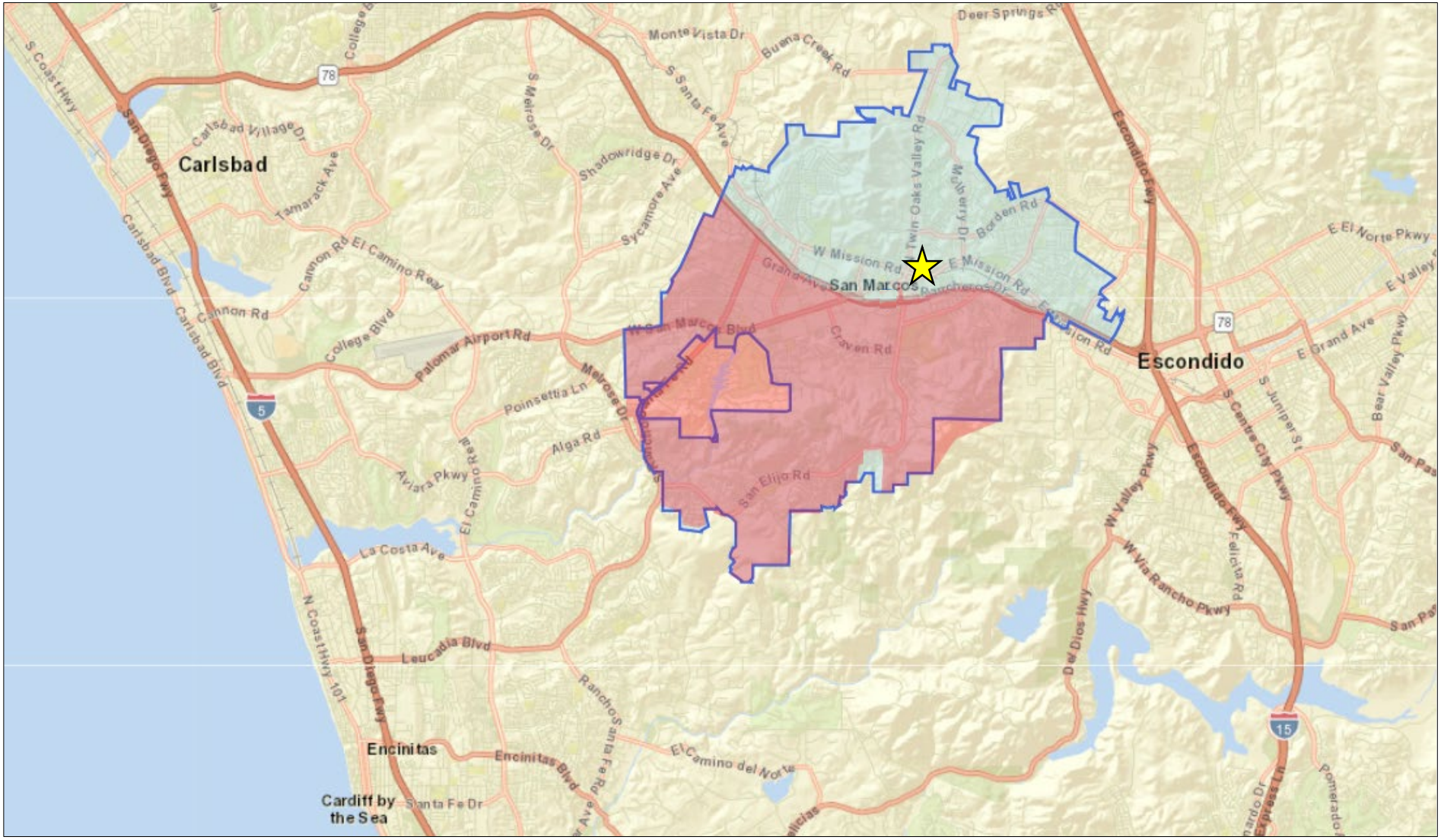
Source: ESRI

Meyers RESEARCH
a Kennedy Wilson Company

Housing Market Overview

Mission 316 West, San Marcos, California

The following map reflects the location of the Subject Property within the 92069 ZIP Code (light blue), South San Marcos 92078 (red) and the City of San Marcos overall (blue border). The following housing market overview slides compare market trends in the Subject ZIP code versus the South San Marcos 92078 ZIP code to gain perspective on the San Marcos' overall residential market position and the opportunity for the Subject to offer new homes at already established values.



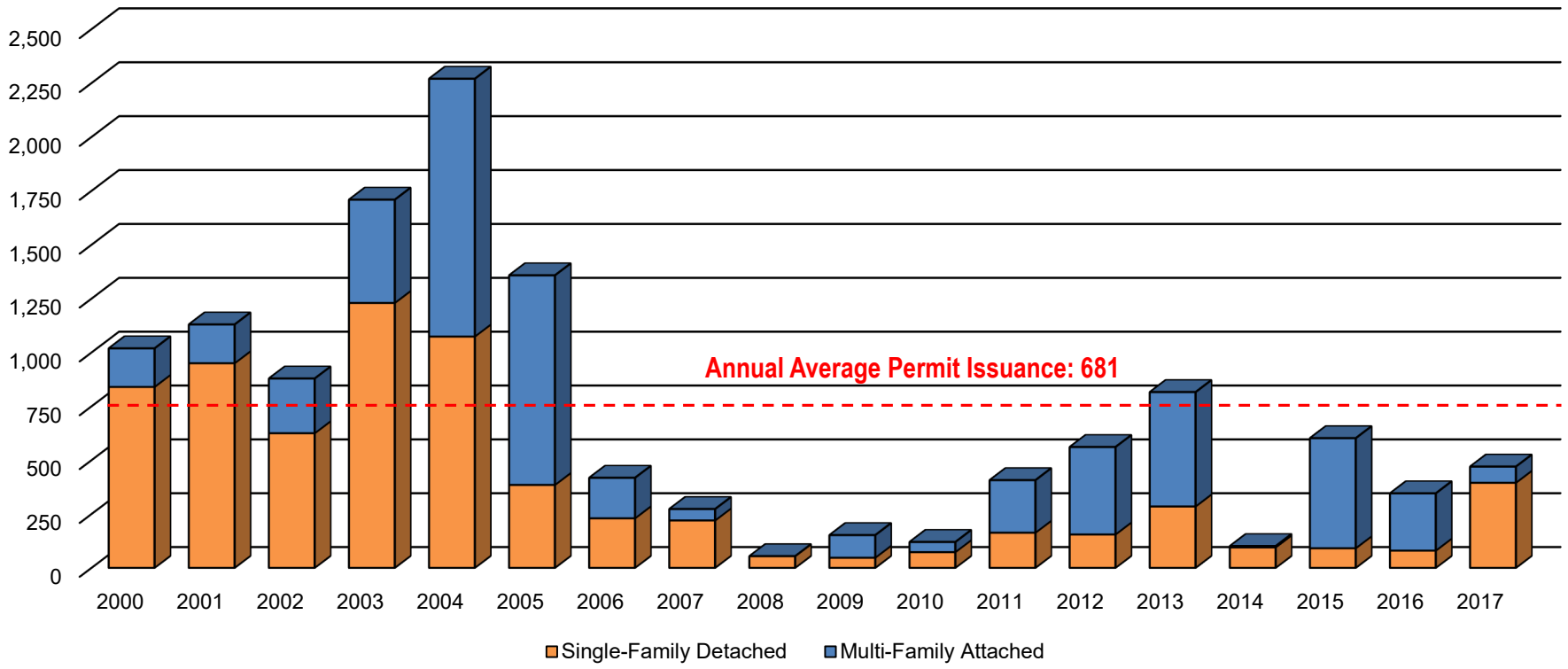
Source: ESRI

Total permit issuance in the City of San Marcos has averaged 357 permits/year over the past three years. Over that time period roughly 47% of the total permits pulled are for multi-family attached products which is up from a historical average of 43% since 2000. This indicates a shift in the area toward building attached homes likely owing to affordability concerns and scarce developable land.

City of San Marcos	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018*
Single-Family Detached	840	950	625	1,230	1,074	385	230	220	54	47	73	163	155	285	95	91	80	395	134
Multi-Family Attached	179	180	254	479	1,196	973	188	53	0	105	47	244	406	531	6	511	266	75	122
Total	1,019	1,130	879	1,709	2,270	1,358	418	273	54	152	120	407	561	816	101	602	346	470	256
% Capture SFD	82.4%	84.1%	71.1%	72.0%	47.3%	28.4%	55.0%	80.6%	100.0%	30.9%	60.8%	40.0%	27.6%	34.9%	94.1%	15.1%	23.1%	84.0%	52.3%
% Capture MFA	17.6%	15.9%	28.9%	28.0%	52.7%	71.6%	45.0%	19.4%	0.0%	69.1%	39.2%	60.0%	72.4%	65.1%	5.9%	84.9%	76.9%	16.0%	47.7%

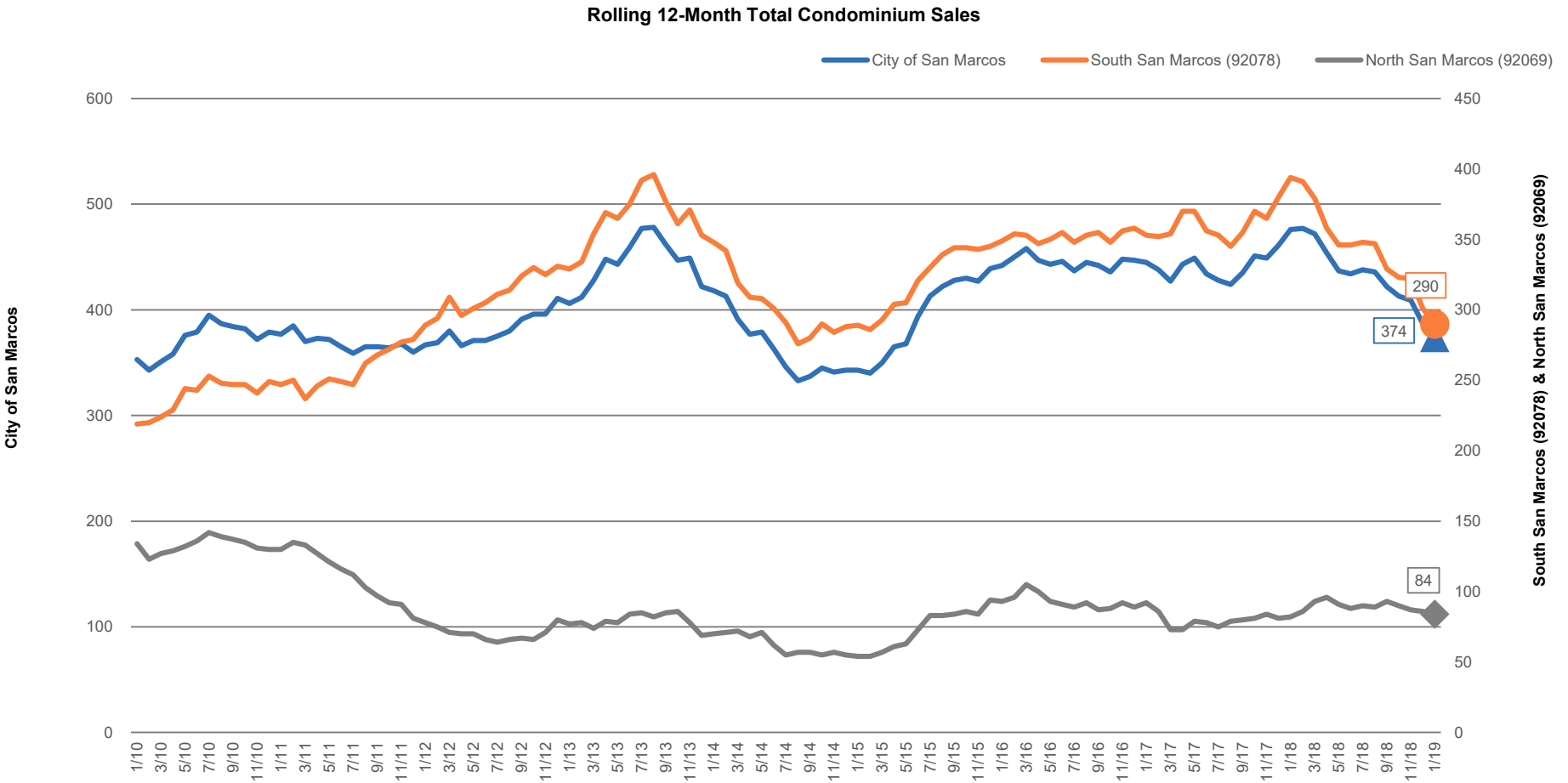
* Preliminary Values.

Historical Residential Building Permits City of San Marcos, San Diego County, CA



Source: HUD User, Meyers Research

Attached home sales volume in the City of San Marcos began trending down beginning in February of 2018, owing to a combination of limited supply and downward pressure from higher prices. South San Marcos (92078) accounts for 78% of the sales volume in the City overall and is attributed to the down trend in the city. Attached sales volume in North San Marcos has decreased by 2.5% over the past year while South San Marcos has decreased 26%.

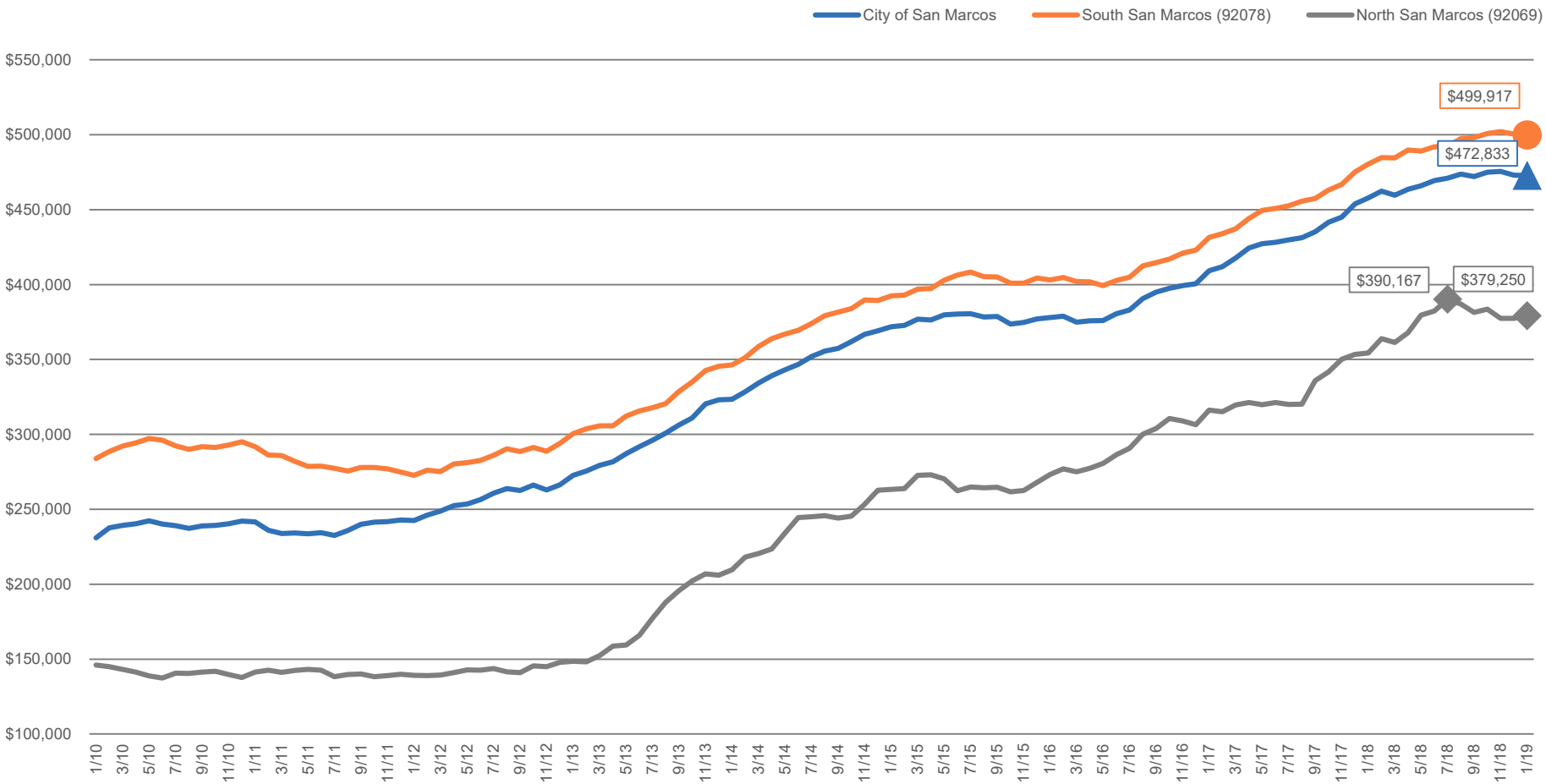


Source: Collateral Analytics

The average attached home price in the City of San Marcos has consistently trended upward over the past six years with minor slowing in 2016.

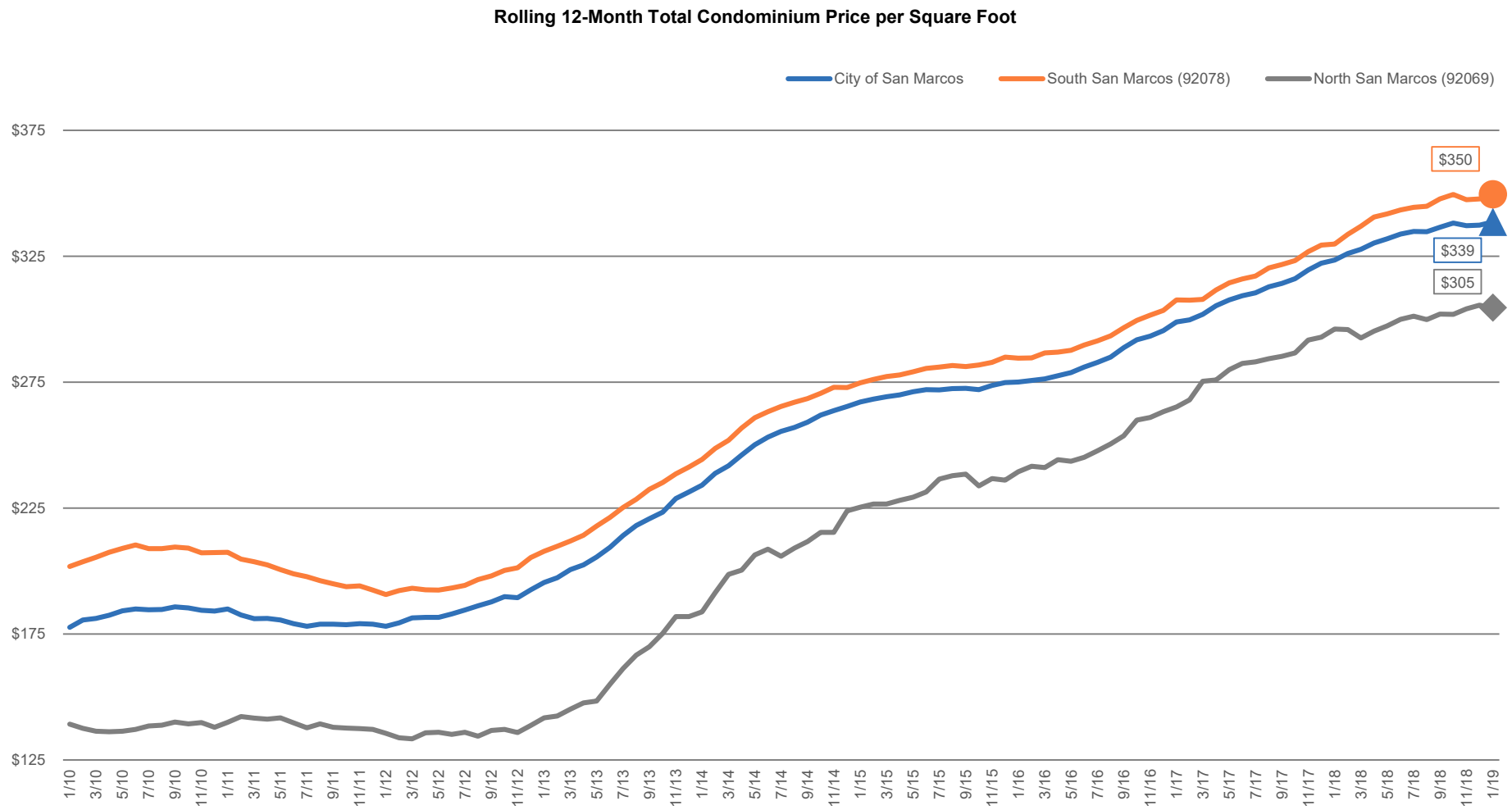
Over the past 12 months the average attached home price in North San Marcos has increased $15,000 (4%). Attached home prices in North San Marcos (92069) hit a market peak at $390,167 in July and steadily declined 3% through year end to $377,000. Sales and traffic counts jumped up in December and market confidence has improved; however, prices have remained stagnant with increased options and upgrades spec'd into new homes and standing inventory.

Rolling 12-Month Total Condominium Price



Source: Collateral Analytics

The North San Marcos average price per square foot has increased from $296 to $305 (nearly 3%) over the past year with 1% percent of the growth occurring over the past six months.



Source: Collateral Analytics

City of San Marcos: The average attached home prices in the City of San Marcos have steadily appreciated since 2010, which is clearly shown with the color concentrations spiking to the upper price ranges in 2017 and in 2018. Roughly 38% of the attached sales over the past two years were priced between $450,000 to $550,000.

Home Sales by Price Range: City of San Marcos

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019YTD
< $150k	48	100	100	71	57	20	5	4	5	1	2	0
$150 - $249k	73	89	92	114	121	71	47	67	33	16	12	0
$250 - $349k	111	128	141	138	187	192	82	89	84	73	56	4
$350 - $449k	90	23	35	27	28	117	147	174	201	115	86	5
$450 - $549k	9	4	5	3	4	9	49	82	87	180	146	10
$550 - $649k	2	1	2	2	2	0	5	13	20	52	44	2
$650 - $749k	3	2	2	3	2	3	2	3	6	15	32	0
$750 or Greater	3	3	2	2	10	10	6	7	11	9	9	1
Total	339	350	379	360	411	422	343	439	447	461	387	22
% Change		3.2%	8.3%	-5.0%	14.2%	2.7%	-18.7%	28.0%	1.8%	3.1%	-16.1%	

South San Marcos (92078): The majority of the total attached sales in South San Marcos over the past two years have been priced between $450,000 to $550,000, accounting for 41% of sales. The majority of the higher priced attached homes in South San Marcos are in the Rancho Tesoro master plan.

Home Sales by Price Range: South San Marcos (92078)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019YTD
< $150k	27	19	19	18	16	6	0	1	4	0	0	0
$150 - $249k	38	45	48	92	86	46	29	26	14	0	2	0
$250 - $349k	103	119	136	132	183	171	59	61	46	45	28	2
$350 - $449k	61	23	35	27	28	108	139	162	177	103	68	5
$450 - $549k	8	4	5	3	4	9	48	72	80	158	120	8
$550 - $649k	2	1	2	2	2	0	5	13	20	50	42	2
$650 - $749k	3	2	2	3	2	3	2	3	6	15	32	0
$750 or Greater	3	3	2	2	10	10	6	7	11	9	9	1
Total	245	216	249	279	331	353	288	345	358	380	301	18
% Change		-11.8%	15.3%	12.0%	18.6%	6.6%	-18.4%	19.8%	3.8%	6.1%	-20.8%	

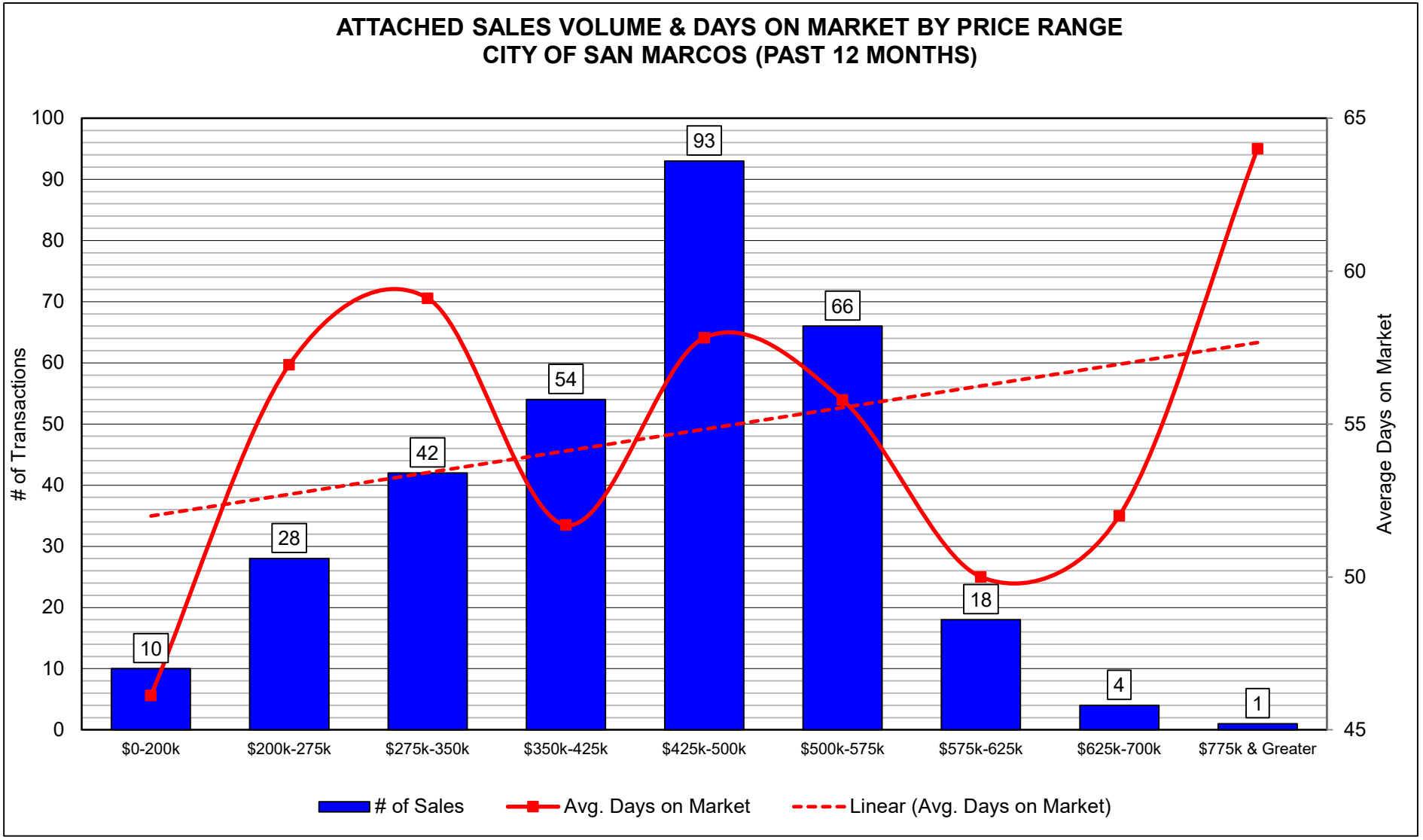
North San Marcos (92069): Roughly 38% of attached home sales in North San Marcos are priced in excess of $400,000. Limited attached housing development occurred in North San Marcos in the 2000's which kept average prices below $200,000 through 2013.

Home Sales by Price Range: North San Marcos (92069)

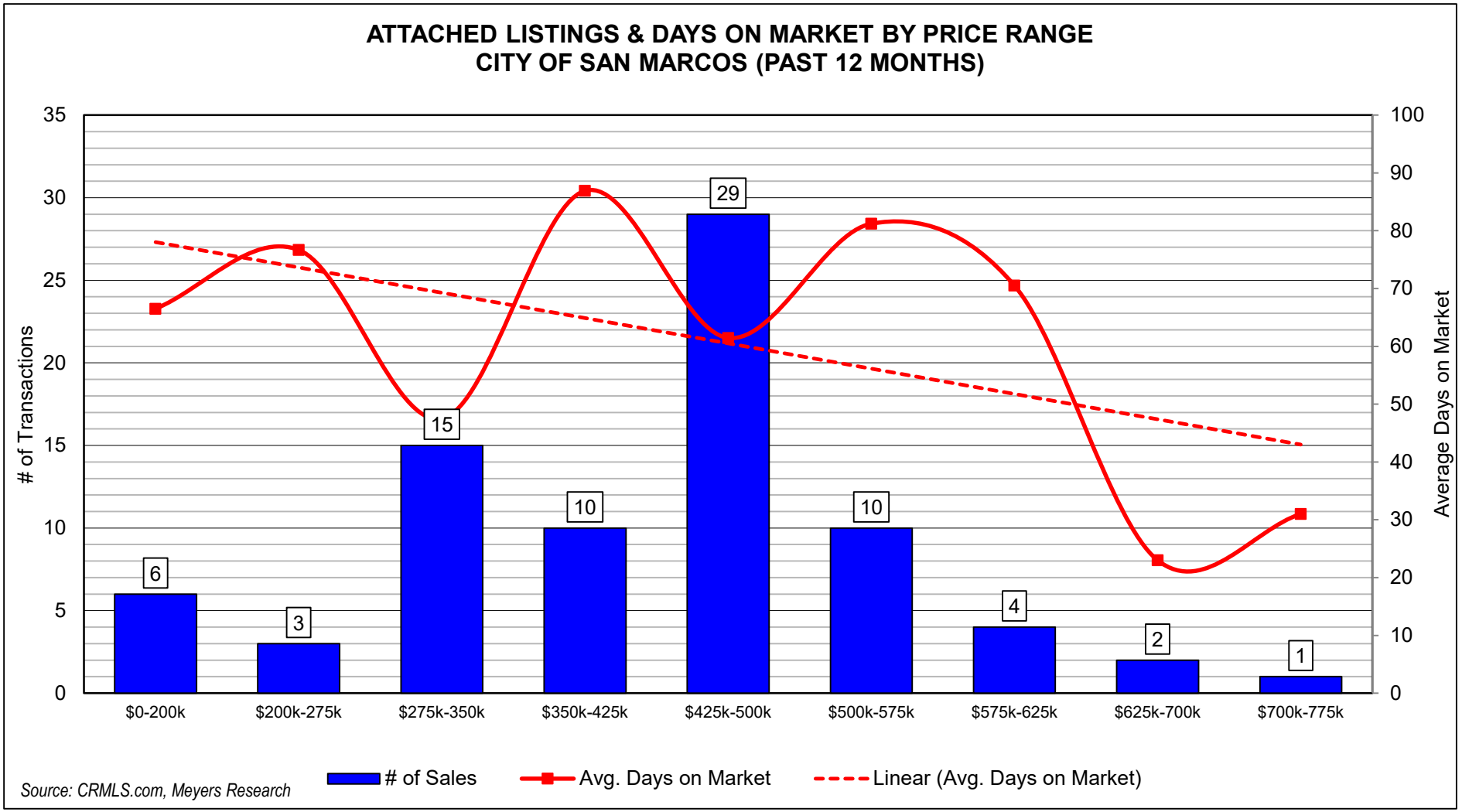
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019YTD
< $150k	18	64	73	52	39	14	3	3	1	0	2	0
$150 - $199k	25	47	36	19	25	14	6	17	14	4	2	0
$200 - $249k	11	14	16	4	11	7	9	18	4	13	4	0
$250 - $299k	6	7	0	5	2	12	20	18	21	10	11	0
$300 - $349k	4	2	5	1	3	11	6	14	15	15	19	2
$350 - $399k	28	0	0	0	0	11	6	8	19	11	12	0
$400 or Greater	2	0	0	0	0	0	5	16	15	28	36	2
Total	94	134	130	81	80	69	55	94	89	81	86	4
% Change		42.6%	-3.0%	-37.7%	-1.2%	-13.8%	-20.3%	70.9%	-5.3%	-9.0%	6.2%	

Source: Collateral Analytics

Roughly 64% (202 transactions) of the 316 attached sales over the past 12 months within the City of San Marcos were priced over between $400k to $625k, with an average market time of between 52 to 58 days. It's important to note that the average age of resale product analyzed was built in 1997.



Roughly 65% of the attached listings in the City of San Marcos are priced between the recommended prices at the Subject ($395k - $625k). There are currently 80 active listings on the market, and with 316 sold transactions over the same period, which translates to 26.3 sales per month. At this sales rate, there is currently 3 months of supply in the City of San Marcos attached market, which indicates a high demand for attached home product with limited market inventory. The average days on market time for active listings is 64 days.



Source: CRMLS.com, Meyers Research

TOTAL DETACHED HOME SALES VOLUME BY PRICE RANGE

Housing Market Overview

Meyers RESEARCH
a Kennedy Wilson Company

City of San Marcos: Roughly 86% of the detached sales over the past two years were priced in excess of $500,000+. Detached sales volume has increased slightly over the past three years with 958 sales in 2018 and a three year average of 953 sales per year.

Home Sales by Price Range: City of San Marcos

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019YTD
< $200k	31	62	31	47	37	9	15	7	13	6	5	1
$200 - $299k	124	144	139	148	138	51	30	18	10	8	3	0
$300 - $399k	195	233	233	264	300	189	116	79	52	48	21	2
$400 - $499k	190	188	200	214	207	251	187	195	179	103	72	1
$500 - $599k	138	164	154	126	191	233	216	236	217	199	154	8
$600 - $699k	110	113	89	62	98	164	170	178	173	198	203	11
$700 - $799k	46	25	22	21	41	98	92	145	127	159	192	2
$800 or Greater	21	10	5	9	22	84	129	133	177	233	308	15
Total	855	939	873	891	1,034	1,079	955	991	948	954	958	40
% Change		9.8%	-7.0%	2.1%	16.0%	4.4%	-11.5%	3.8%	-4.3%	0.6%	0.4%	

South San Marcos (92078): Roughly 61% of the detached sales volume in the City of San Marcos occurs in South San Marcos. The majority of the detached sales over the past two years in South San Marcos have been priced in excess of $800,000, accounting for 42% of sales.

Home Sales by Price Range: South San Marcos (92078)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019YTD
< $200k	7	14	7	10	12	1	3	2	8	1	2	0
$200 - $299k	28	23	37	45	41	12	6	6	4	2	0	0
$300 - $399k	37	85	68	115	108	55	30	32	14	16	3	2
$400 - $499k	84	101	97	127	114	103	69	60	56	25	22	0
$500 - $599k	103	148	125	115	161	114	83	129	94	66	37	2
$600 - $699k	102	102	82	50	88	124	127	120	112	107	102	5
$700 - $799k	39	20	16	17	36	84	87	123	110	133	146	1
$800 or Greater	18	6	3	7	16	75	123	126	155	213	272	15
Total	418	499	435	486	576	568	528	598	553	563	584	25
% Change		19.4%	-12.8%	11.7%	18.5%	-1.4%	-7.0%	13.3%	-7.5%	1.8%	3.7%	

North San Marcos (92069): Roughly 39% of the detached sales volume in the City of San Marcos occurs in North San Marcos. North San Marcos has had significantly less single family detached housing over the past decade and as a result the majority of the sales activity takes place between $500,000 to $700,000, accounting for 58% of sales in the ZIP code.

Home Sales by Price Range: North San Marcos (92069)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019YTD
< $200k	24	48	24	37	25	8	12	5	5	5	3	1
$200 - $299k	96	121	102	103	97	39	24	12	6	6	3	0
$300 - $399k	158	148	165	149	192	134	86	47	38	32	18	0
$400 - $499k	106	87	103	87	93	148	118	135	123	78	50	1
$500 - $599k	35	16	29	11	30	119	133	107	123	133	117	6
$600 - $699k	8	11	7	12	10	40	43	58	61	91	101	6
$700 - $799k	7	5	6	4	5	14	5	22	17	26	46	1
$800 or Greater	3	4	2	2	6	9	6	7	22	20	36	0
Total	437	440	438	405	458	511	427	393	395	391	374	15
% Change		0.7%	-0.5%	-7.5%	13.1%	11.6%	-16.4%	-8.0%	0.5%	-1.0%	-4.3%	

Source: Collateral Analytics

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Commercial Evaluation

Mission 316 West, San Marcos, California

As part of our due diligence for Mission 316 West, we researched the commercial market trends (both retail and office space), sales comparables, commercial space for lease, spoke to local San Marcos commercial space broker representatives (Colliers International), and spoke with local commercial developers (Newport National Corporation). Further, we analyzed the development activity and related values of other CA-78 corridor retail spaces in San Marcos, Escondido, and Vista, where the retail space provide some benchmarks of possible land values and lease rates at the project. We considered two methods to value the Subject property in its existing condition as a stand alone commercial building: a net operating income / cap rate approach and a sales comparable approach.

Our research indicates that there are two traditional proposed uses that are most appropriate for the Subject: a concrete tilt-up medical office building, and two commercial free standing pads with supporting in-line retail space. Using the net operating income/cap rate appraisal method, **the Subject property with a 48,000 square foot concrete tilt-up medical office building could be valued today at approximately $18.16 million ($378.29 per square foot); two commercial free standings pads and in-line retail space for a total of 48,000 square feet could value the property at approximately $12.80 million ($266.59 per square foot). It's important to note that this analysis excludes building costs and the time required to lease-up the buildings.** This assumes 30% lot coverage on a 3.71-acre site, while maintaining the parking requirement for the proposed uses. These values are based on market lease rates, broker feedback, property listings and recent sale transactions (with cap rates) and are supported by a sales transaction (comps) approach. The current lease rates and sales pricing for retail & medical office space in the competitive area is discussed in more detail on the following pages.

Net Operating Income / Cap Rate Valuation Approach												
Type	Square Feet	Estimated Monthly Lease Rate Per SF (Gross)	Estimated Annual Lease Rate Per SF (Gross)	Gross Receipts	Operating Expenses	Net Operating Income	Vacancy Rate	Vacancy	Total Estimated Annual Revenues	Cap Rate (%)	Total Value	$/SF
Medical Office	**48,000**	**$3.10**	**$37.20**	**$1,785,600**	**($336,000)**	**$1,449,600**	**10.0%**	**($178,560)**	**$1,271,040**	**7.00%**	**$18,157,714**	**$378.29**

Net Operating Income / Cap Rate Valuation Approach									
Type	Square Feet	Estimated Monthly Lease Rate Per SF (NNN)*	Estimated Annual Lease Rate Per SF (NNN)*	Net Operating Income	Vacancy Rate	Vacancy	Total Estimated Annual Revenues	Cap Rate (%)	Total Value	$/SF
Commercial Pads (Retail/Flex)	**18,000**	**$1.98**	**$23.76**	**$427,680**	**-10%**	**($42,768)**	**$384,912**	**7.00%**	**$5,498,743**	**$305.49**
In-Line Retail	**30,000**	**$1.65**	**$19.80**	**$594,000**	**-14%**	**($83,160)**	**$510,840**	**7.00%**	**$7,297,714**	**$243.26**
Total	**48,000**	**$1.77**	**$21.29**	**$1,021,680**	**-13%**	**($125,928)**	**$895,752**	**7.00%**	**$12,796,457**	**$266.59**

*Assumes all real estate property taxes, insurance, management fees (on or off-site), repairs and maintenance, and utilities are paid by tenant under a Triple Net lease.

Sales Transaction Valuation Approach			
Type	Square Feet	Price Per Square Foot	Total Value
Medical Office	**48,000**	**$440**	**$21,120,000**

Sales Transaction Valuation Approach			
Type	Square Feet	Price Per Square Foot	Total Value
Commercial Pads (Retail/Office)	18,000	$324	$5,832,000
In-Line Retail	30,000	$270	$8,100,000
TOTAL	**48,000**	**$290**	**$13,932,000**

Source: Meyers Research, REIS, Loopnet, Newport National Corporation

Using a land residual analysis appraisal method**, the Subject property built out as a retail center could be valued today at approximately $12.1 million ($252.02 per square foot. It's important to note that this analysis excludes building costs.** A parcel report from SanGIS reports an assessed land value of $1,300,000 for the Subject. Based off a sale of a comparable 3.87-acre site located just 0.2 miles north on Woodward Street that sold for $270,000, we found a land value of $297,000 for the Subject after adjusting the comparable sale price with a 10% premium for the increased ADT. We can only assume that the additional assessed $1 million of the Subject parcel are the entitlements on the site. To gain perspective on improvements value add to a retail property we analyzed the 1.07-acre Campus Pointe II retail center south of Cal State San Marcos which was recently built and is nearly fully occupied. Using a parcel report from SanGIS we adjusted the improvement values of the 1.07-acre site to a size of 3.71-acres which equated to ~$10,800,000. The improvements translate to a value of $225 per square foot.

Land Residual Analysis		
Factor	Total Value ($)	
Raw Land	$	297,000
Entitlements	$	1,000,000
Improvements	$	10,800,000
Land Value:	**$**	**12,097,000**

Source: Meyers Research, Loopnet, SanGIS

If the Subject were to be a retail use the recommended lease rates per square foot per month range from $1.65 to $1.98 NNN. These rates are predicated off the values that local brokers and Newport National Corporation provided. It should be noted that broker feedback has suggested that retail would struggle at the site and that the highest and best use is multi-family townhomes. The average asking lease rate for retail space in the competitive market is $1.49 per square foot. Mulberry Plaza is an older strip retail center (built in 1977) in a comparable location just west from the project (also on E. Mission Road), with asking lease rates between $1.10 to $1.15 per square foot. Shane Park Plaza (built 2017) is also located in a comparable location with current listings ranging from $1.65 to $1.85 per square foot NNN. It's worth noting that Shane Park Plaza is currently 67% vacant despite being on the market for over 1.5 years.

Building Name Address	Built	Total Building Leasable SF	Available Space	Occupancy Rate (%)	Vacancy Rate (%)	Asking Lease Rate (Per SF Per Mo.)	Terms	Description
Mulberry Plaza 574-576 E. Mission Rd San Marcos, 92069	1977/2012	15,299	1,233 1,139 807			$1.10 $1.10 $1.15	Triple Net	Strip Retail
		Total	**3,179**	**79.2%**	**20.8%**	**$1.11**		
Twin Oaks Town Center 403-407 N. Twin Oaks Valley Rd San Marcos, 92069	2007	21,390	2,481 1,384 1,583			$1.62 $1.62 $1.62	Full Service Gross	Strip Center
		Total	**5,448**	**74.5%**	**25.5%**	**$1.62**		
San Marcos Plaza 330-340 Rancheros Dr San Marcos, 92069	1979	70,000	1,817			$1.35	Gross + Utilities	Flex
		Total	**1,817**	**57.9%**	**42.1%**	**$1.35**		
Vallecitos Village 1226-1344 E Mission Rd San Marcos, 92069	1978	78,821	1,500 5,615 3,800			$1.50 $1.50 $1.50	Triple Net	Neighborhood Center
		Total	**10,915**	**86.2%**	**13.8%**	**$1.50**		
Coleman Center 1284 W. San Marcos Blvd San Marcos, 92078	1985	13,150	5,000			$1.40	Triple Net	Strip Retail
		Total	**5,000**	**62.0%**	**38.0%**	**$1.40**		
San Marcos Square 156-190 S. Rancho Santa Fe Rd San Marcos, 92078	1970	19,274	1,550 3,400 1,100 1,600			$1.45 $1.45 $1.45 $1.45	Triple Net	Strip Center
		Total	**7,650**	**60.3%**	**39.7%**	**$1.45**		
The Shops at Lake San Marcos 1030 La Bonita Dr. San Marcos, 92078	2008	25,116	1,551 1,104 1,473			$1.50 $1.50 $1.50	Triple Net	Neighborhood Center
		Total	**4,128**	**83.6%**	**16.4%**	**$1.50**		
Shane Park Plaza 240-260 S. Rancho Santa Fe Rd San Marcos, 92078	2017	6,028	1,119 895 1,000 1,000			$1.85 $1.65 $1.75 $1.75	Triple Net	Strip Center
		Total	**4,014**	**33.4%**	**66.6%**	**$1.76**		
	Min	6,028	807	33.4%	13.8%	$1.10		
	Max	78,821	5,615	86.2%	66.6%	$1.85		
	Total	249,078	42,151	--	--	--		
	Average	**31,135**	**1,916**	67.1%	32.9%	**$1.49**		

Source: Meyers Research, REIS, Loopnet

If the Subject were to be a Medical Office building the recommended lease rate per square foot per month is $3.10 triple net. This rate was predicated off of the information Newport National Corporation provided. It should be noted that broker feedback as well as input from Newport National Corporation has suggested that medical office space would not be viable given that there are other sites in the City that are better suited for medical office space and that it would take ~4-10 years to lease-up the building. Medical office space built between 1978 to 2005 fetches asking lease rates ranging between $1.30 to $2.55.

Building Name Address	Class	Built	Total Building Leasable SF	Available Space	Occupancy Rate (%)	Vacancy Rate (%)	Asking Lease Rate (Per SF Per Mo.)	Terms
1595 Grand Ave San Marcos, 92078	B	1987	11,426	2,412			$1.49	Gross + Utilities
				Total **2,412**	**78.9%**	**21.1%**	**$1.49**	
334 Via Vera Cruz San Marcos, 92078	B	1982	28,911	2,787 913 767 802			$1.95	Gross + Utilities
				Total **5,269**	**81.8%**	**18.2%**	**$1.95**	
700 W El Norte Pkwy Escondido, 92026	B	1991	15,038	2,640 1,627			$2.38 $2.38	Triple Net
				Total **4,267**	**71.6%**	**28.4%**	**$2.38**	
Hidden Valley Medical Bldg 255 N Elm St Escondido, 92025	B	1983	19,151	2,291 2,870			$2.15 $2.15	Triple Net
				Total **5,161**	**73.1%**	**26.9%**	**$2.15**	
910 E Ohio Ave Escondido, 92025	C	1978	13,990	1,700 2,500 1,420 1,250 700			$1.50 $1.50 $1.50 $1.50 $1.50	Modified Gross
				Total **7,570**	**45.9%**	**54.1%**	**$1.50**	
950 E Pennsylvania Ave Escondido, 92025	B	1993	10,030	1,282 1,707			$1.45 $1.30	Gross + Utilities
				Total **2,989**	**70.2%**	**29.8%**	**$1.45**	
Sycamore Health Center 910 Sycamore Ave Vista, 92081	B	1990	20,282	3,256			$2.20	Triple Net
				Total **3,256**	**83.9%**	**16.1%**	**$2.20**	
Vista Medical Plaza 2067 W Vista Way Vista, 92083	B	1986	54,978	1,560 6,770			$2.55 $2.55	Triple Net
				Total **8,330**	**84.8%**	**15.2%**	**$2.55**	
Tri-City Medical Arts Building 161 Thunder Dr Vista, 92083	C	1980	34,900	2,390 2,841 4,746 811 700			$2.25	Modified Gross
				Total **11,488**	**67.1%**	**32.9%**	**$2.25**	
CreekView Medical Park 1968 Via Ctr Vista, 92081	B	2009	8,000	5,000			$1.85	Triple Net
				Total **5,000**	**37.5%**	**62.5%**	**$1.85**	
		Min	8,000	700	37.5%	15.2%	$1.30	
		Max	54,978	6,770	84.8%	62.5%	$2.55	
		Total	216,706	55,742	--	--	--	
		Average	**21,671**	**2,230**	**69.5%**	**30.5%**	**$1.90**	

Source: Meyers Research, REIS, Loopnet

Based on recent sales and listing comparables, our recommended sale price for two commercial pads and in-line retail space is $290 per square foot on average. Recent retail property transactions range from $148 per square foot to $356 per square foot, and the average price is $246 per square foot among these comparables with an average year built of 1992. After applying an age adjustment factor (Marshall & Swift Index) for listings and transactions of retail centers in the competitive market, the average price per square foot is $321. The age adjusted average supports the recommended pricing for a new retail center right across the street from the City offices and the Sprinter Rail stop however, the age adjustment factor is based on a national scale and often overstates the adjusted value.

Property Name Address	Retail Center/Area	Type	Sale Date	Year Built	Cap Rate	Square Feet	Sale Price	Price/ SF	Age Adjustment	Adjusted Sale Price	Adjusted Price/ SF
San Marcos Village 156-190 S. Rancho Santa Fe Rd San Marcos, 92078	S. San Marcos	Neighborhood Center	11/28/2017	1975	7.0%	19,274	$4,250,000	$221	74%	**$7,395,000**	**$384**
Woodland Crossings 975-979 Woodland Pkwy San Marcos, 92069	N. San Marcos	Neighborhood Center	10/30/2018	2007	7.6%	10,822	$3,850,000	$356	8%	**$4,158,000**	**$384**
Twin Oaks Valley Rd 403-407 N. Twin Oaks Valley Rd San Marcos, 92069	S. San Marcos	Neighborhood Center	Listing	2007	5.4%	21,390	$5,980,000	$280	8%	**$6,458,400**	**$302**
864-866 W. San Marcos Blvd San Marcos, 92078	S. San Marcos	Gas Station / Repair Garage	2/22/2018	1991	7.1%	9,709	$2,225,000	$229	32%	**$2,937,000**	**$303**
Escondido Design Center 2750 Auto Park Way Escondido, 92029	W. Escondido	Neighborhood Center	11/2/2018	1980	7.7%	40,000	$5,900,000	$148	59%	**$9,381,000**	**$235**
Campus Pointe II 801-803 S.Twin Oaks Valley Rd San Marcos, 92069	S. San Marcos	Neighborhood Center	Sale	2014	5.4%	12,104	$4,600,000	$380	8%	**$4,968,000**	**$410**
			Min:	1975	5.40%	9,709	$2,225,000	$148	8%	**$2,937,000**	**$235**
			Max:	2007	7.70%	40,000	$5,980,000	$380	74%	**$7,395,000**	**$410**
			Total:	--	--	113,299	$26,805,000	--	--	**$35,297,400**	**--**
			Average:	**1992**	6.70%	20,239	**$4,467,500**	**$269**	32%	**$5,882,900**	**$336**

Source: Meyers Research, REIS, Loopnet

Based on current medical office listings along the SR-78 corridor, our recommended pricing for a medical office building is $400 per square foot with a cap rate of 7.0%. Current listings range from $140 per square foot to $598 per square foot, and the average price is $320 per square foot among these comparables with an average year built of 1991. The three listings built 2007+ are asking for $437+ per square foot which supports the recommended sale price of $440 per square foot for a new building. The average cap rate for the recently sold and currently listed comparables is 6.37%. It is believed that the listings with cap rates <7% are currently occupied with asking rates well below the market which would support the high cap rate (a buyer can purchase the building and bring rents up to market).

Property Name Address	Class	Sale Date	Year Built	Lot Size (acres)	Cap Rate	Square Feet	Sale Price	Price/ SF
Grand Avenue Medical 1595 Grand Ave San Marcos, 92078	B	Listing	1987	0.88	5.4%	11,426	$2,800,000	$245
West Pace Health Care Facility 1706 Descanso Ave San Marcos, 92078	B	Listing	1982	0.89	5.5%	19,592	$5,557,000	$284
Nordahl Medical Center 838 Nordahl Rd San Marcos, 92069	A	Listing	2010	--	6.8%	20,230	$12,100,000	$598
910 E Ohio Ave Escondido, 92025	C	Listing	1978	0.80	--	13,990	$2,999,000	$214
704 E Grand Ave Escondido, 92025	B	Listing	1973	0.56	8.7%	15,320	$2,145,000	$140
Hickory Professional Building 240 S. Hickory Escondido, 92025	B	Listing	1978	0.69	--	19,277	$2,900,000	$150
Sycamore Medical Center 902 Sycamore Ave Vista, 92081	B	Listing	2007	0.80	7.1%	13,727	$6,000,000	$437
Fresenius Medical Care 950 Hacienda Dr Vista, 92081	B	Listing	2007	1.54	6.0%	8,662	$4,251,000	$491
620 S Melrose Dr Vista, 92081	B	Listing	1999	0.42	5.1%	4,974	$1,600,000	$322

Min	1973	0.42	5.10%	4,974	$1,600,000	$140
Max	2010	1.54	8.70%	20,230	$12,100,000	$598
Total	--		--	127,198	$40,352,000	--
Average	**1991**	**0.82**	**6.37%**	**14,133**	**$4,483,556**	**$320**

Source: Meyers Research, REIS, Loopnet

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San Diego Retail Market Overview

Mission 316 West, San Marcos, California

The following bullets summarize our findings for retail market conditions in the San Diego MSA, North County market and the San Marcos submarket.

- **Retail inventory** in San Diego has been increasing since 2009, with roughly 189,000 to 739,000 square feet added each year over the past four years. New retail deliveries have averaged 1.5 million square feet annually over the past 30 years, which is largely reflective of the building boom in the late 1980s, while new deliveries have been well below the historical average since 2008, which is partially a function of limited land supply. Retail inventory grew by 189,000 square feet in 2018, the smallest growth since 2014.

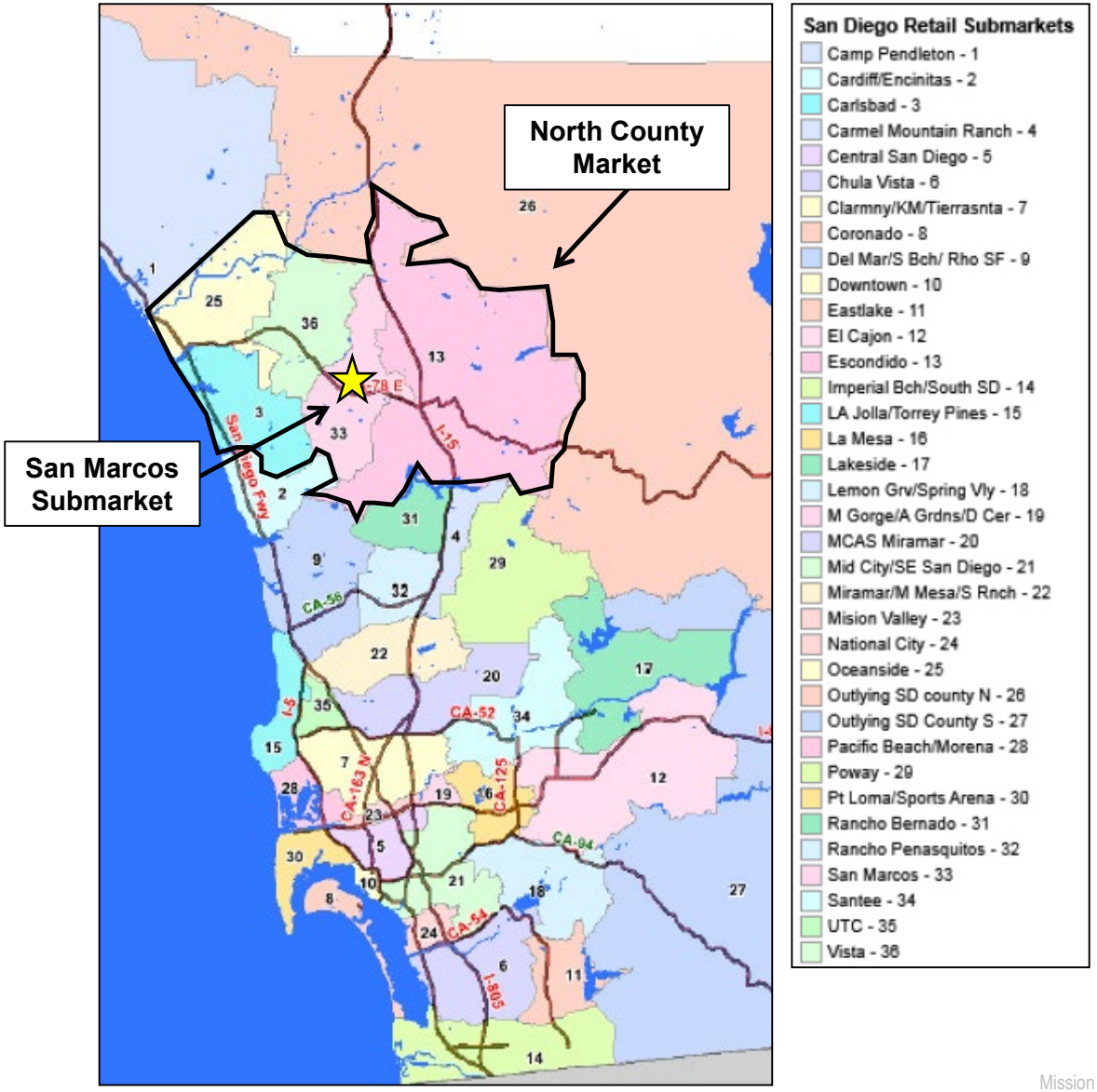
- **San Diego MSA** retail lease rates have been on the increase, and were up over $2.00 per square foot in Q2 & Q3 2018. Lease rates have fallen back slightly to $1.93 in the fourth quarter of 2018, while vacancy rates have trended downward since 2010 to 3.8% at year-end 2018. San Diego's retail market experienced negative absorption of 366,000 square feet with deliveries at roughly 268,000 square feet over the past year. Based on current construction activity, an additional 390,000+ square feet of retail space is projected for delivery through 2019-20.

- **In the North County Submarket**, roughly 342,000 square feet of retail has been added since 2015, with between 30,000 and 142,000 square feet being delivered each year since 2015. The largest inventory deliveries have been in the North County Retail Submarket (primarily Escondido) as well as the Central San Diego Submarket (primarily Little Italy). Rents in the North County retail market increased in to $1.75 in Q2 2018 and fell in the third and fourth quarter to $1.45 per square foot at year end (the lowest asking lease rate since Q3 2015) as more inventory has been added. Vacancy rates are currently at a four-year low at 4.6%. Nearly 643,000 square feet of retail space has been absorbed since 2015 compared to 342,000 square feet of completed space. Over the past four quarters, absorption came at negative (81,000) square feet while the market delivered 142,000 square feet of new retail space. The North County submarket represents 54% (270,910 square feet) of the under construction retail in the San Diego MSA, once the space has been delivered to market, it is likely that lease rates will decrease as vacancy trends upwards.

- **The San Marcos retail Submarket** has the lowest lease rates in San Diego County, at $0.95 per square foot versus $1.42 per square foot for the MSA overall. The San Marcos retail submarket has the second highest vacancy rate of any submarket in San Diego, at 10.5% vacancy versus 3.7% vacancy for the MSA overall.

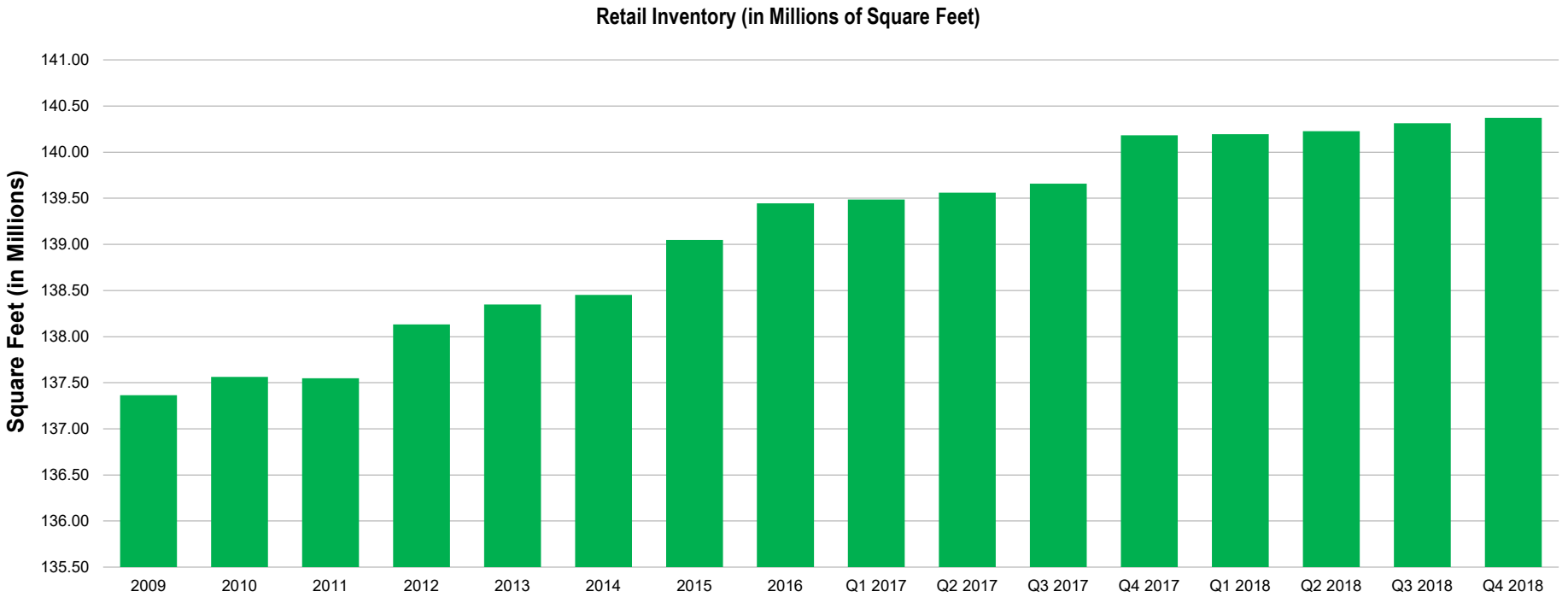
- Brokers that we interviewed report market conditions are soft in San Marcos, and the anchored centers fare better than the numerous un-anchored retail strips. Generally, rents are decreasing and vacancy is increasing.

The San Diego MSA is comprised of 36 retail submarkets. The Mission 316 West site is located in the San Marcos submarket, which is part of the greater North County market that includes the Escondido, Oceanside, Carlsbad and Vista submarkets.



Source: CoStar

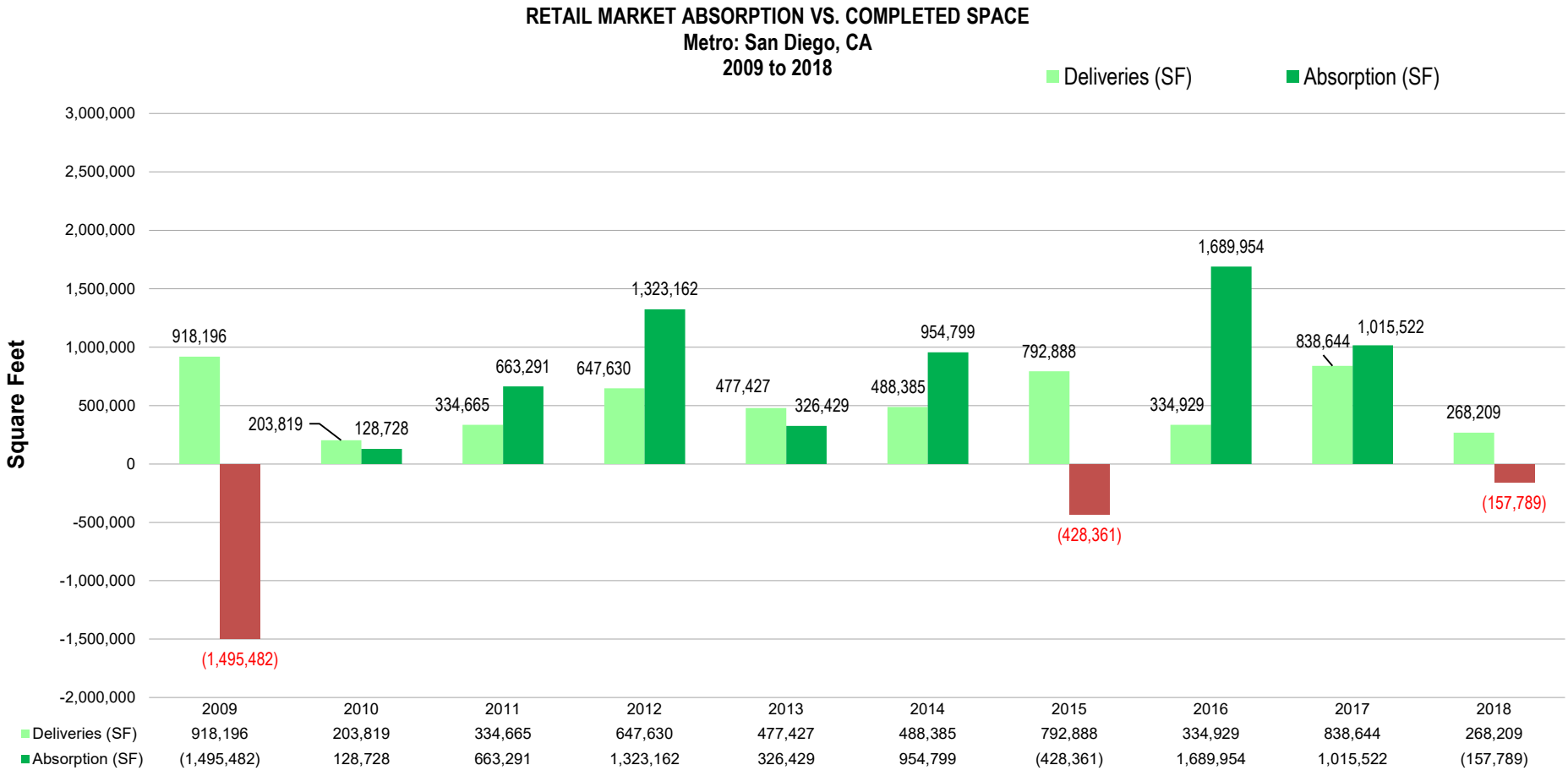
New annual retail deliveries in San Diego have averaged 460,000 square feet over the past 10 years. Over the past year, a total of 268,209 square feet of retail space was delivered in the San Diego retail market. Additionally there were 390,692 square feet of retail space under construction at the end of the fourth quarter 2018.



Inventory	2009	2010	2011	2012	2013	2014	2015	2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Total Inventory (SF)	137,363,426	137,562,647	137,547,155	138,131,892	138,348,786	138,453,040	139,047,204	139,443,356	139,486,151	139,558,949	139,658,357	140,182,420	140,195,309	140,227,314	140,313,860	140,371,737
Inventory Change		199,221	-15,492	584,737	216,894	104,254	594,164	396,152	42,795	72,798	99,408	524,063	12,889	32,005	86,546	57,877
% Change		0.1%	0.0%	0.4%	0.2%	0.1%	0.4%	0.3%	0.0%	0.1%	0.1%	0.4%	0.0%	0.0%	0.1%	0.0%

Source: CoStar

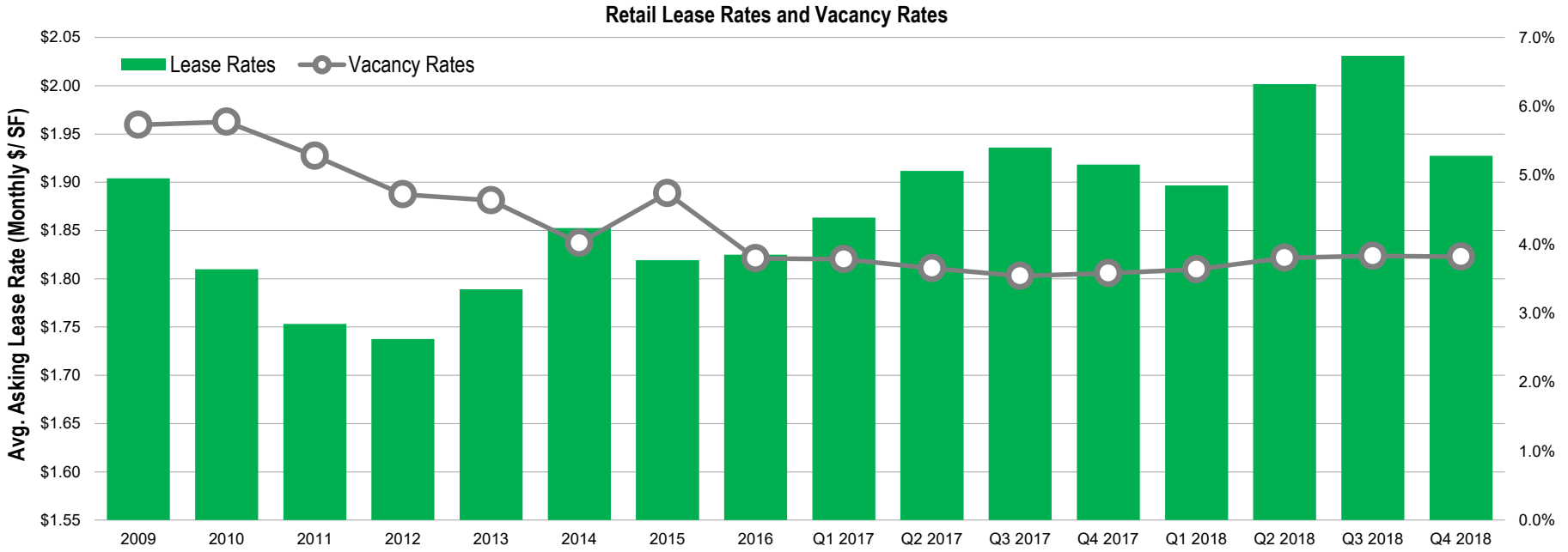
San Diego's retail market experienced negative absorption during the recession in 2008 and 2009 and again in 2015. Retail net absorption was slightly positive in San Diego fourth quarter 2018, with positive 76,614 square feet absorbed in the quarter. In third quarter 2018, net absorption was positive 28,031 square feet, while in second quarter 2018, absorption came at negative (205,432) square feet. In first quarter 2018, negative (57,002) square feet was absorbed in the market. The biggest retail delivery activity over the past year includes the redevelopment of the long-vacant Toyota Dealership in Escondido with a new El Super supermarket. Other large retail deliveries of 2018 include, the ongoing redevelopment of Little Italy, a Ford dealership in La Mesa, and the development of the Village at Pacific Highlands.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Deliveries (SF)	918,196	203,819	334,665	647,630	477,427	488,385	792,888	334,929	838,644	268,209
Absorption (SF)	(1,495,482)	128,728	663,291	1,323,162	326,429	954,799	(428,361)	1,689,954	1,015,522	(157,789)

Source: CoStar

Average quoted asking rental rates in the San Diego retail market are down over previous quarter levels, and up from their levels four quarters ago. San Diego's retail vacancy rate ended the year at 3.8% which is a strong benchmark for the market, however, the amount of vacant sublease space in the market has trended up over the past four quarters. At the end of Q1 2018, there were 225,140 square feet of vacant sublease space. Currently, there are 246,587 square feet vacant in the market.



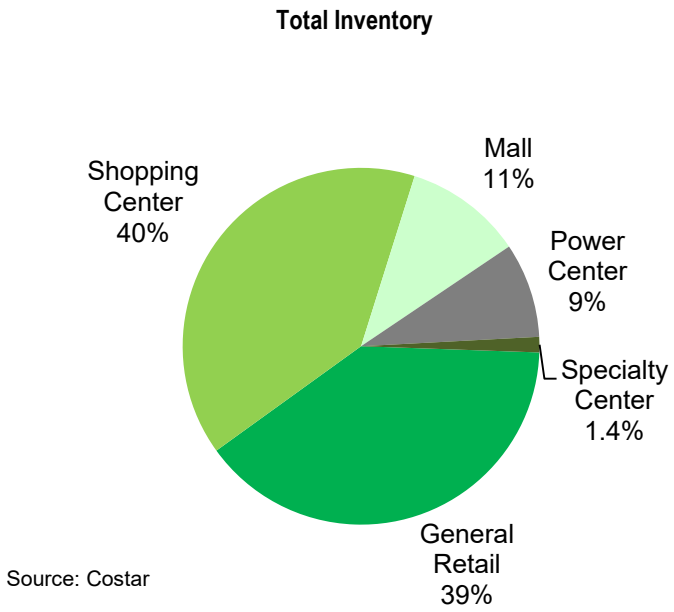
Source: Costar

Lease Rates	2009	2010	2011	2012	2013	2014	2015	2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Lease Rate ($/ SF/ Mo.)	$1.90	$1.81	$1.75	$1.74	$1.79	$1.85	$1.82	$1.83	$1.86	$1.91	$1.94	$1.92	$1.90	$2.00	$2.03	$1.93
Lease Rate Change		($0.09)	($0.06)	($0.02)	$0.05	$0.06	($0.03)	$0.01	$0.04	$0.05	$0.02	($0.02)	($0.02)	$0.11	$0.03	($0.10)
% Change		-4.9%	-3.1%	-0.9%	3.0%	3.5%	-1.8%	0.3%	2.1%	2.6%	1.3%	-0.9%	-1.1%	5.5%	1.5%	-5.1%

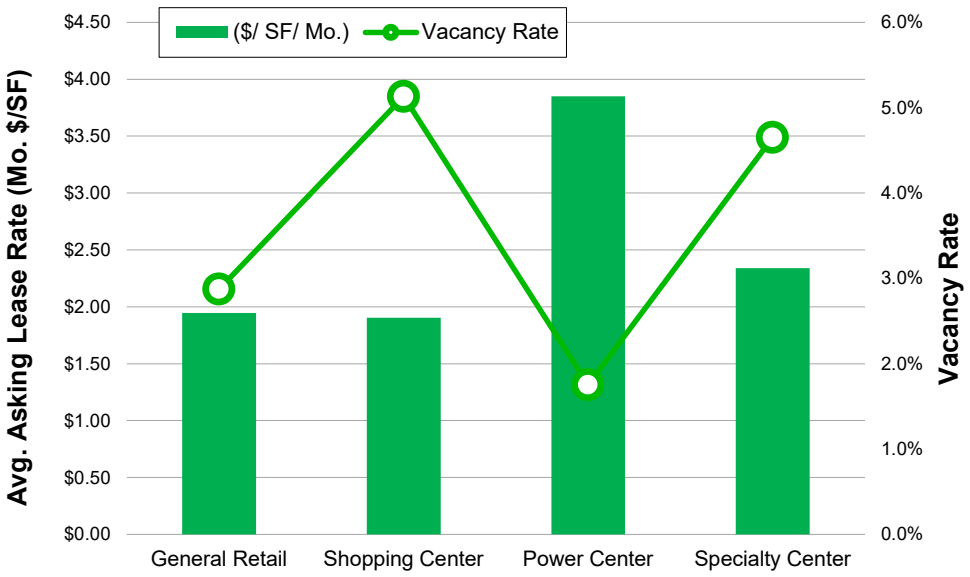
Vacancy Rates	2009	2010	2011	2012	2013	2014	2015	2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Vacancy Rate	5.7%	5.8%	5.3%	4.7%	4.6%	4.0%	4.7%	3.8%	3.8%	3.7%	3.5%	3.6%	3.6%	3.8%	3.8%	3.8%
Vac. Rate Change		0.0%	-0.5%	-0.6%	-0.1%	-0.6%	0.7%	-0.9%	0.0%	-0.1%	-0.1%	0.0%	0.1%	0.2%	0.0%	0.0%
% Change		0.7%	-8.5%	-10.5%	-1.8%	-13.3%	17.9%	-19.9%	-0.4%	-3.5%	-3.0%	1.1%	1.6%	4.6%	0.8%	-0.4%

General Retail space and Shopping Centers dominate the San Diego retail market, accounting for 80% of the total retail space. Lease rates are highest for Power Center space ($3.85 per square foot), and the vacancy rate is lowest for Power Centers (1.0%) followed by General Retail space (2.9%).

Type	Total SF	Vacant SF	Vacancy Rate	Absorption (SF) 2018	Deliveries (SF) 2018	Under Construction (SF)	Asking Rent ($/ SF/ Mo.)
General Retail	55,440,672	1,593,059	2.9%	246,140	185,710	105,122	$1.95
Shopping Center	55,873,545	2,865,893	5.1%	(58,629)	20,905	264,270	$1.90
Mall	15,036,047	597,843	4.0%	187,313	405,000	0	$0.00
Power Center	12,059,961	211,431	1.8%	133,535	0	21,300	$3.85
Specialty Center	1,961,512	91,230	4.7%	11,057	0	0	$2.34
TOTAL:	**140,371,737**	**5,359,456**	**3.8%**	**519,416**	**611,615**	**390,692**	**$1.93**



Source: Costar

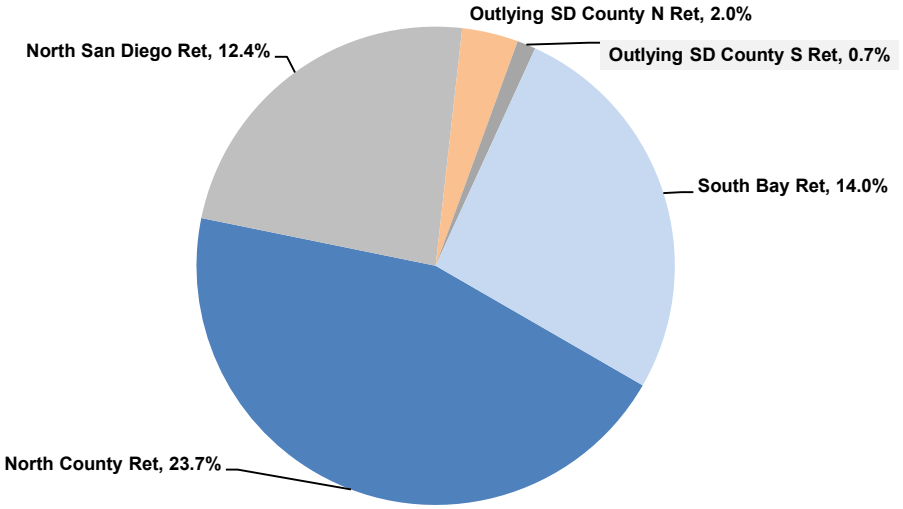


The North County retail submarket comprises of nearly a quarter of the San Diego MSA overall. Additionally, the North County retail market is more affordable than any of the other submarkets, with average lease rates of ±1.45 per square foot per month. The vacancy rate is the second lowest rate in the MSA overall, at 4.8%, indicating there likely isn't support for additional retail space at market rate.

RETAIL SNAPSHOT BY MARKET
Metro: San Diego
Year-End 2018

Submarket	Total SF	Vacant SF	Vacancy Rate	2018 YTD Net Absorption (SF)	2018 YTD Deliveries (SF)	Under Construction (SF)	Avg. Asking Rent ($/ SF/ Mo.)
Camp Pendleton Ret	74,846	0	0.0%	0	0	0	$0.00
Central San Diego Re.	39,592,929	1,149,102	2.9%	91,526	59,622	2,640	$2.35
East County Ret	20,220,272	729,737	3.6%	(166,664)	23,594	15,834	$1.63
I-15 Corridor Ret	6,455,804	201,593	3.1%	30,968	0	0	$2.95
MCAS Miramar Ret	23,702	0	0.0%	0	0	0	$0.00
North County Ret	33,204,037	1,592,952	4.8%	(81,299)	141,794	210,790	$1.45
North San Diego Ret	17,445,962	925,143	5.3%	(165,028)	23,167	44,558	$2.80
Outlying SD County N Ret	2,813,285	69,217	2.5%	16,923	6,632	0	$1.83
Outlying SD County S Ret	930,043	24,360	2.6%	(1,096)	0	0	$1.60
South Bay Ret	19,610,857	667,352	3.4%	116,881	13,400	116,870	$1.99
TOTAL:	**140,371,737**	**5,359,456**	**3.8%**	**(157,789)**	**268,209**	**390,692**	**$1.93**

Total Inventory

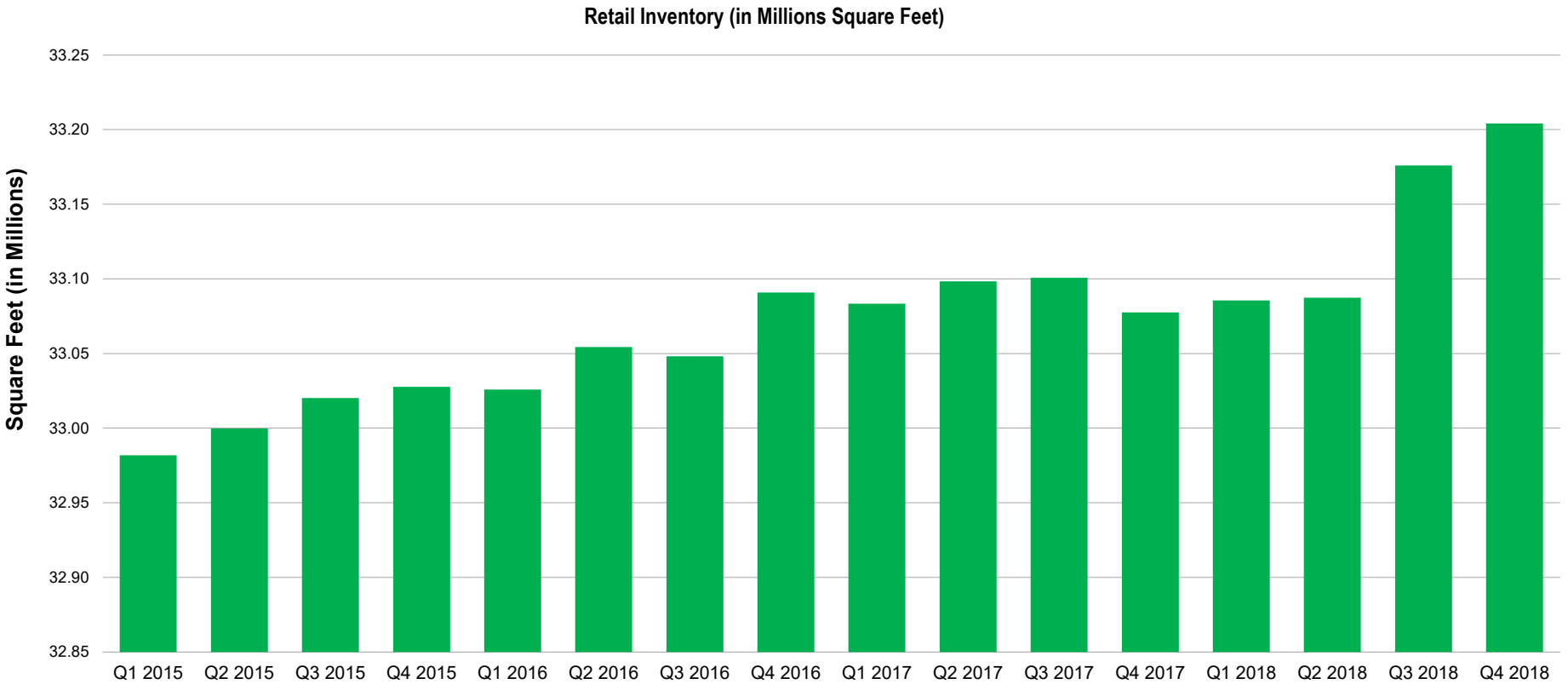


Source: Costar

North County Retail Trends

Mission 316 West, San Marcos, California

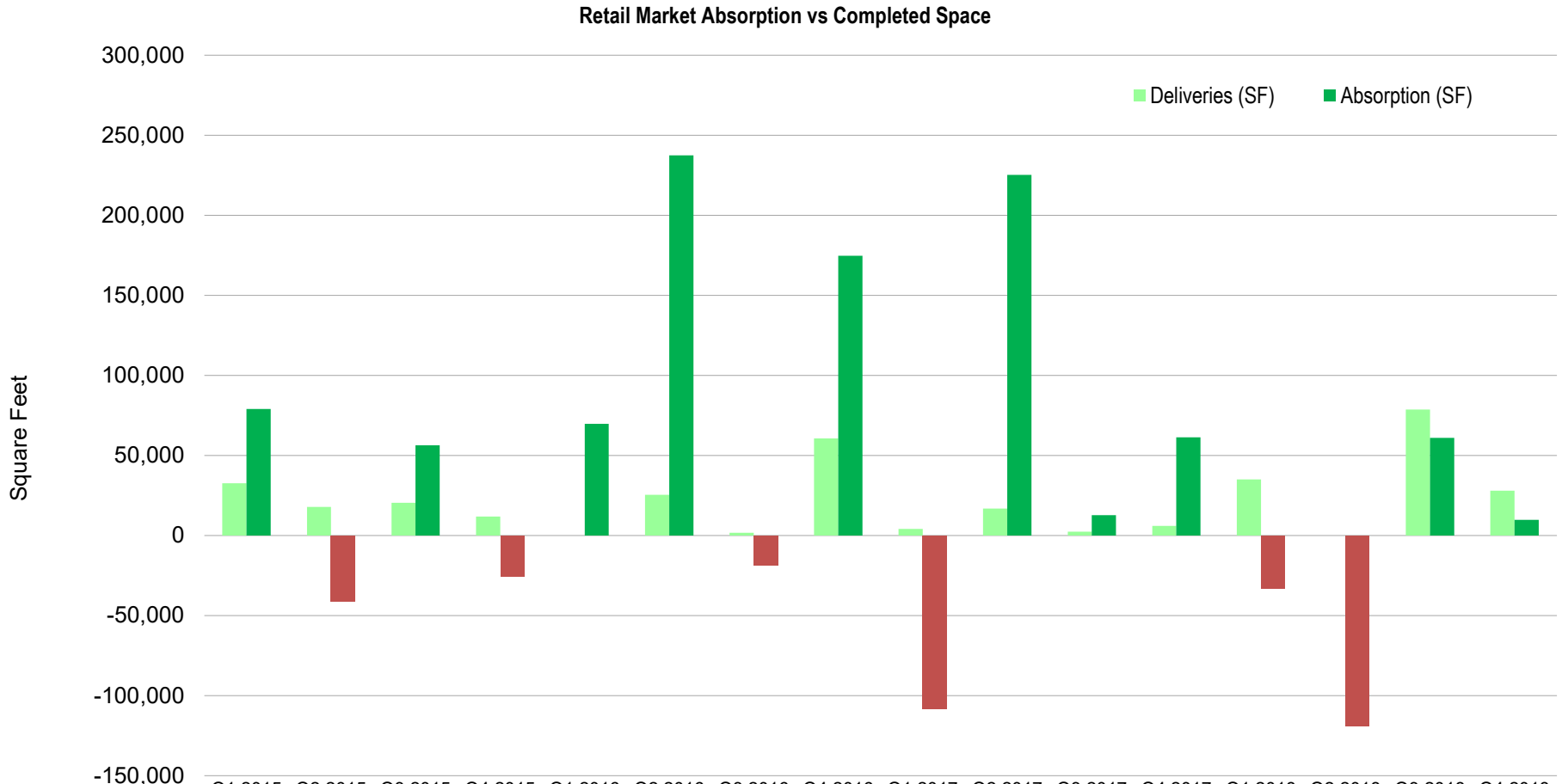
Over the past four years, the North County retail submarket cluster has net 222,000 square feet of new retail space, of which 106,500 square feet have been added since the third quarter 2018. The new retail deliveries are likely a major contributing factor to the North County vacancy rate of 4.8.



Inventory	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Total Inventory (SF)	32,981,791	32,999,703	33,020,183	33,027,702	33,025,852	33,054,331	33,048,081	33,090,790	33,083,328	33,098,268	33,100,768	33,077,583	33,085,568	33,087,462	33,176,034	33,204,037
Inventory Change	--	17,912	20,480	7,519	-1,850	28,479	-6,250	42,709	-7,462	14,940	2,500	-23,185	7,985	1,894	88,572	28,003
% Change	--	0.1%	0.1%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.3%	0.1%

Source: CoStar

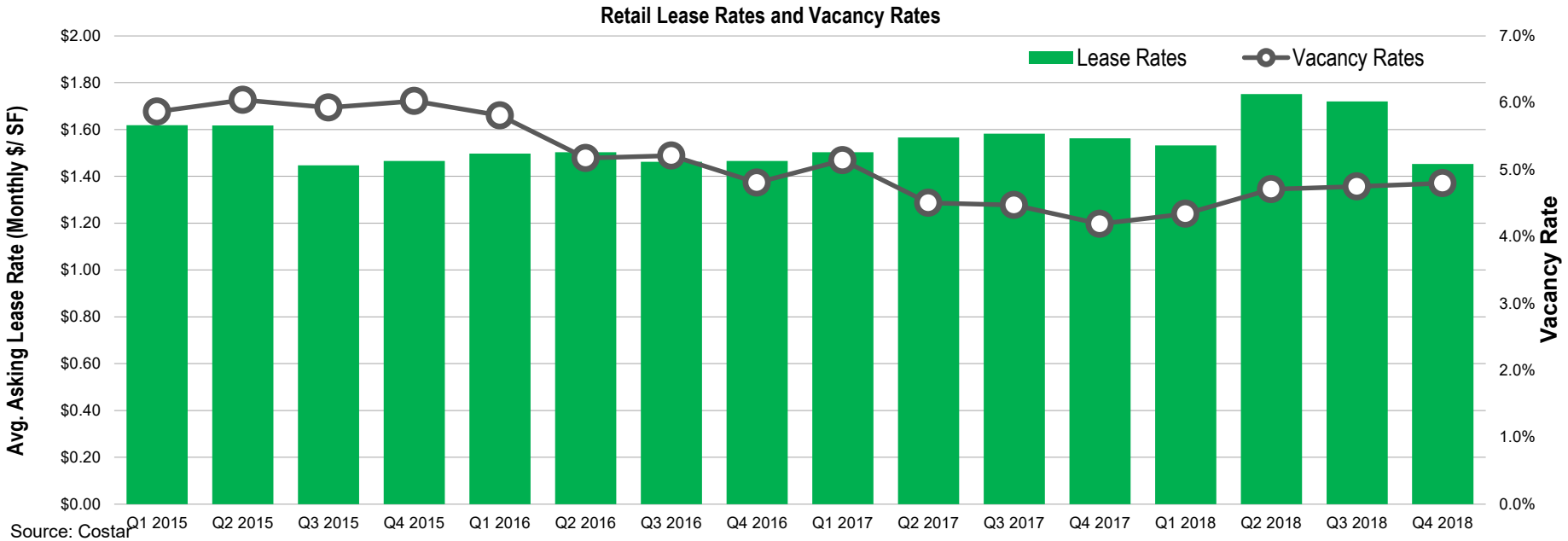
Absorption in the North County retail market was strong through 2017, with 724,000 square feet leased compared to deliveries of just 200,000 square feet, pushing up the lease asking rates in the area. Over the past four quarters, absorption came at negative (81,000) square feet while the market delivered 142,000 square feet of new retail space. Additionally, there are 210,790 square feet of retail under construction in the North County submarket.



	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Deliveries (SF)	32,747	17,912	20,480	11,847	0	25,469	1,750	60,709	4,200	16,886	2,500	6,028	35,081	0	78,710	28,003
Absorption (SF)	79,139	-41,148	56,420	-25,396	69,853	237,525	-18,364	174,815	-108,265	225,337	12,719	61,453	-33,125	-119,037	61,049	9,814

Source: CoStar

The average lease rate ($/ SF/ Mo.) in Q4 2018 is $1.45, down from the two year average lease rate of $1.58. Vacancy is improving in the submarket, currently at 4.8%, down from the four year average of 5.1%. However, it is important to note that the vacancy rate reached a low of 4.2% in Q4 2017 and has since increased steadily to 4.8% year-end 2018.



Source: Costar

Lease Rates	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Lease Rate ($/ SF/ Mo.)	$1.62	$1.62	$1.45	$1.47	$1.50	$1.50	$1.46	$1.47	$1.50	$1.57	$1.58	$1.56	$1.53	$1.75	$1.72	$1.45
Lease Rate Change		($0.00)	($0.17)	$0.02	$0.03	$0.01	($0.04)	$0.00	$0.04	$0.06	$0.02	($0.02)	($0.03)	$0.22	($0.03)	($0.27)
% Change		-0.1%	-10.5%	1.3%	2.2%	0.4%	-2.7%	0.2%	2.6%	4.2%	1.1%	-1.3%	-2.0%	14.3%	-1.8%	-15.5%

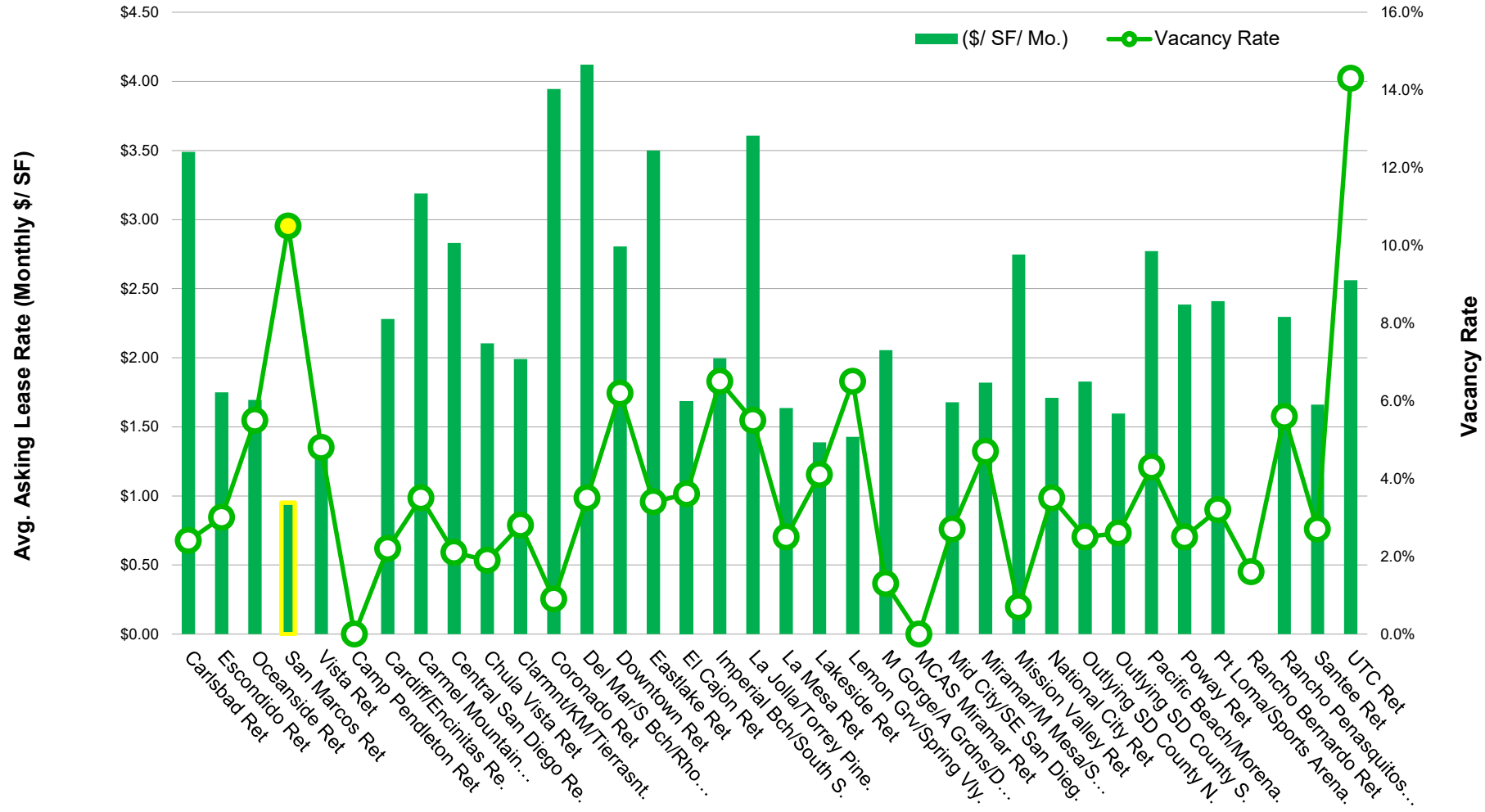
Vacancy Rates	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Vacancy Rate	5.9%	6.0%	5.9%	6.0%	5.8%	5.2%	5.2%	4.8%	5.1%	4.5%	4.5%	4.2%	4.3%	4.7%	4.7%	4.8%
Vac. Rate Change		0.2%	-0.1%	0.1%	-0.2%	-0.6%	0.0%	-0.4%	0.3%	-0.6%	0.0%	-0.3%	0.2%	0.4%	0.0%	0.1%
% Change		3.0%	-1.9%	1.7%	-3.6%	-11.0%	0.7%	-7.8%	7.0%	-12.4%	-0.7%	-6.3%	3.7%	8.4%	0.9%	1.1%

Meyers RESEARCH
a Kennedy Wilson Company

San Marcos Retail Trends

Mission 316 West, San Marcos, California

Despite having the lowest asking lease rate, at $0.95, the San Marcos retail submarket has the second highest vacancy rate, at 10.5%. The average asking lease rate in North County is $1.45 and the average vacancy rate is 3.7%. The City of San Marcos is a relatively new city compared to the greater San Diego area and the number of households has not grown proportionately with the amount of retail space that has been delivered along the CA-78 corridor and San Marcos Blvd. This directly translates to the low asking rates and high vacancy rates that we see today.



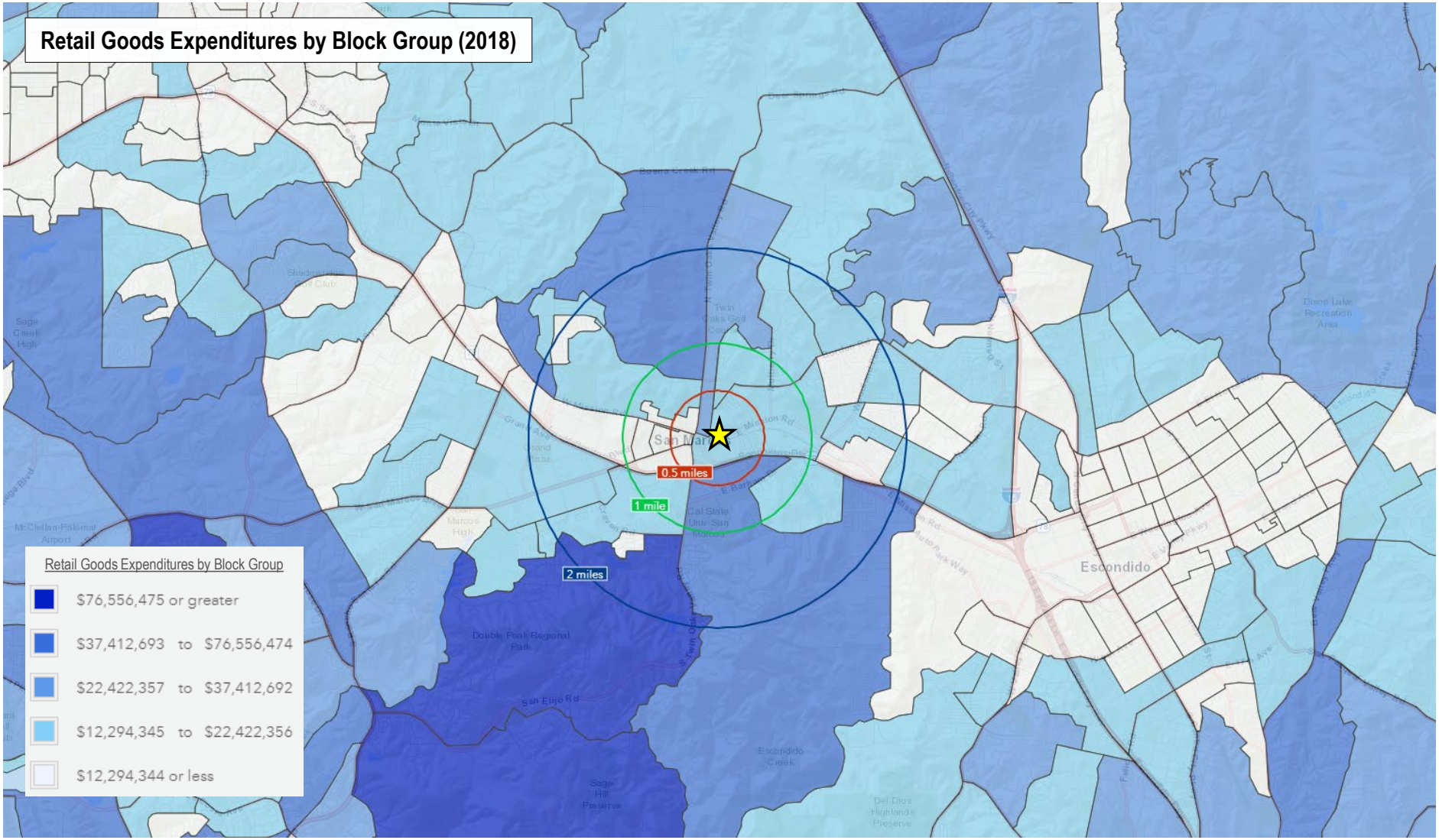
Source: CoStar

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Submarket	Total SF	Vacant SF	Vacancy Rate	2018 YTD Net Absorption (SF)	2018 YTD Deliveries (SF)	Under Construction (SF)	Avg. Asking Rent ($/ SF/ Mo.)
Carlsbad Ret	5,597,537	136,678	2.4%	(16,042)	0	161,708	$3.49
Escondido Ret	10,191,273	303,981	3.0%	73,114	64,900	7,082	$1.75
Oceanside Ret	7,516,121	414,699	5.5%	(29,453)	32,881	0	$1.70
San Marcos Ret	**4,628,309**	**485,563**	**10.5%**	**(170,985)**	**40,078**	**0**	**$0.95**
Vista Ret	5,270,797	252,031	4.8%	62,067	3,935	42,000	$1.42
Camp Pendleton Ret	74,846	0	0.0%	0	0	0	$0.00
Cardiff/Encinitas Re.	5,388,120	115,888	2.2%	(37,989)	3,697	4,409	$2.28
Carmel Mountain Ranc.	2,209,371	78,245	3.5%	6,285	0	0	$3.19
Central San Diego Re.	5,046,188	105,783	2.1%	97,298	10,600	0	$2.83
Chula Vista Ret	9,255,029	179,991	1.9%	68,839	0	0	$2.11
Clarmnt/KM/Tierrasnt.	7,117,604	200,862	2.8%	(35,100)	4,000	2,640	$1.99
Coronado Ret	630,430	5,937	0.9%	7,220	0	0	$3.95
Del Mar/S Bch/Rho SF.	3,185,762	109,959	3.5%	23,977	19,470	11,849	$4.12
Downtown Ret	4,800,390	297,894	6.2%	11,373	16,057	0	$2.81
Eastlake Ret	2,429,181	82,252	3.4%	67,383	0	111,198	$3.50
El Cajon Ret	9,206,746	334,202	3.6%	(38,651)	4,299	15,834	$1.69
Imperial Bch/South S.	4,257,080	276,393	6.5%	(10,610)	0	0	$2.00
La Jolla/Torrey Pine.	1,786,329	97,870	5.5%	(5,740)	0	0	$3.61
La Mesa Ret	5,122,207	126,850	2.5%	(26,321)	15,463	0	$1.64
Lakeside Ret	618,779	25,643	4.1%	(7,122)	0	0	$1.39
Lemon Grv/Spring Vly.	2,619,575	171,271	6.5%	(109,485)	0	0	$1.43
M Gorge/A Grdns/D Ce.	1,015,353	13,186	1.3%	7,590	0	0	$2.06
MCAS Miramar Ret	23,702	0	0.0%	0	0	0	$0.00
Mid City/SE San Dieg.	7,407,700	203,235	2.7%	25,215	2,465	0	$1.68
Miramar/M Mesa/S Rnc.	4,269,740	199,314	4.7%	2,945	0	28,300	$1.82
Mission Valley Ret	5,863,785	41,666	0.7%	106	0	0	$2.75
National City Ret	3,669,567	128,716	3.5%	(8,731)	13,400	5,672	$1.71
Outlying SD County N.	2,813,285	69,217	2.5%	16,923	6,632	0	$1.83
Outlying SD County S.	930,043	24,360	2.6%	(1,096)	0	0	$1.60
Pacific Beach/Morena.	3,136,055	135,828	4.3%	(29,390)	6,000	0	$2.77
Poway Ret	2,843,826	72,470	2.5%	26,913	0	0	$2.38
Pt Loma/Sports Arena.	4,575,424	144,711	3.2%	7,214	20,500	0	$2.41
Rancho Bernardo Ret	683,836	10,753	1.6%	(3,091)	0	0	$0.00
Rancho Penasquitos R.	718,771	40,125	5.6%	861	0	0	$2.30
Santee Ret	2,652,965	71,771	2.7%	14,915	3,832	0	$1.66
UTC Ret	2,816,011	402,112	14.3%	(148,221)	0	0	$2.56
TOTAL:	**140,371,737**	**5,359,456**	**3.7%**	**(157,789)**	**268,209**	**390,692**	**$1.42**

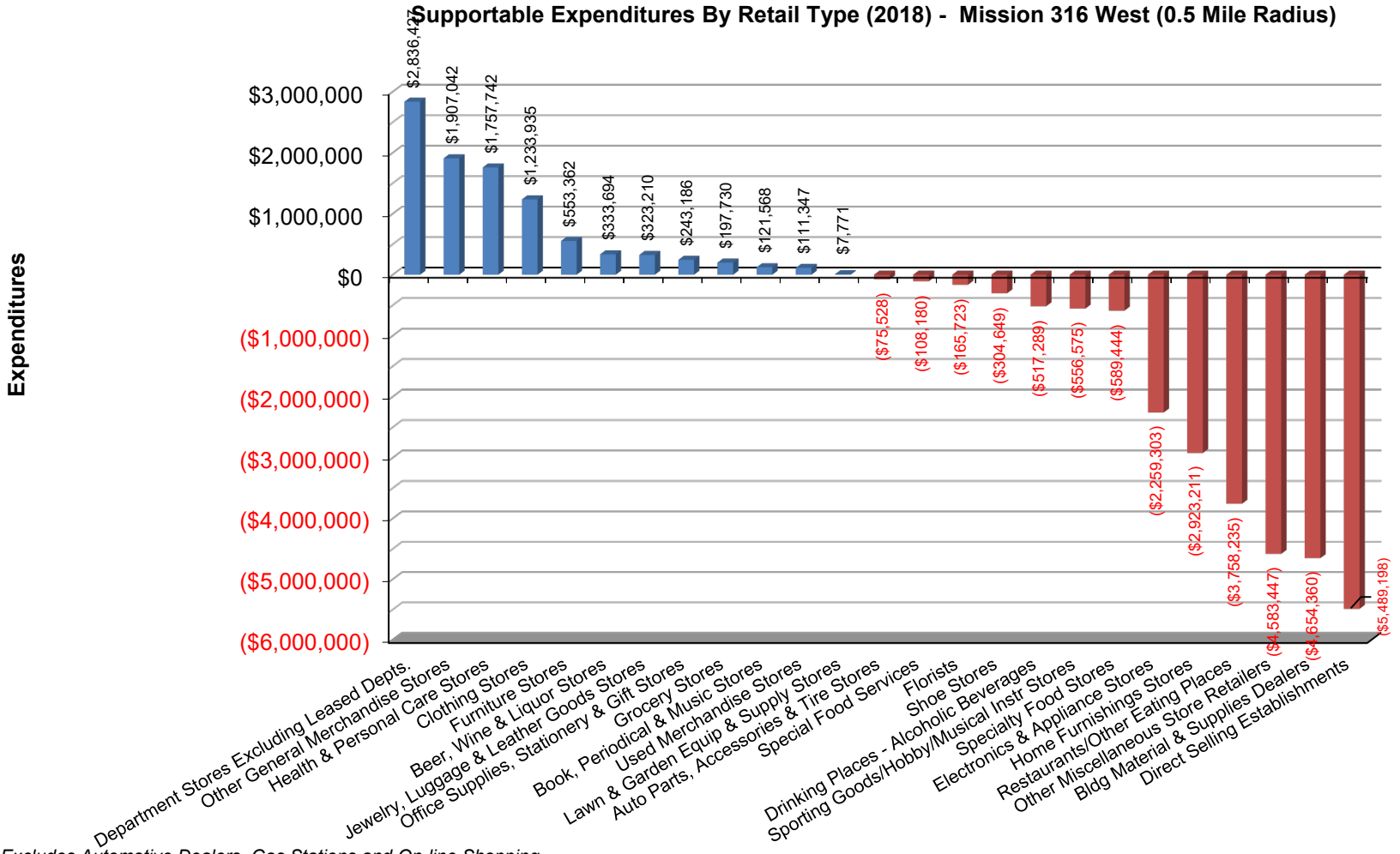
Source: CoStar

The map below displays total retail goods expenditures by block group in the San Marcos area. The following slides will provide detail of retail expenditures by area to give understanding of what type is retail is over or undersupplied.



Source: ESRI

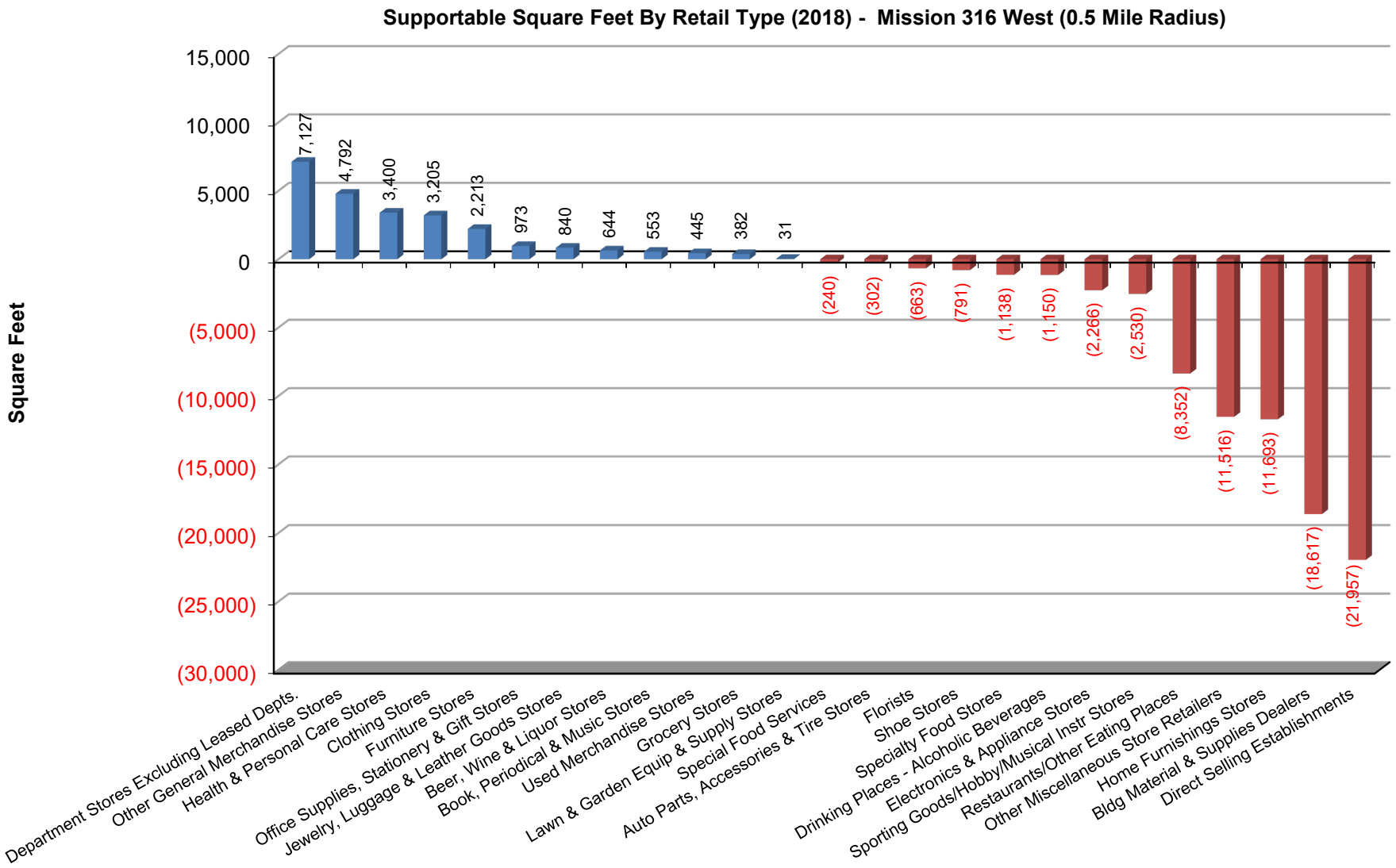
The chart below shows the opportunity gap of sales expenditures by retail type in the 0.5-mile radius around Mission 316 West. The retail types in demand are: Department Stores, General Merchandise Stores, Health & Personal Care Stores, Clothing Stores, and Furniture Stores. The retail types are in oversupply are: Direct Selling Establishments, Bldg. Material & Supplies Dealers, Other Misc. Store Retailers, Restaurants, and Home Furnishing Stores.



Note: Excludes Automotive Dealers, Gas Stations and On-line Shopping

Source: ESRI

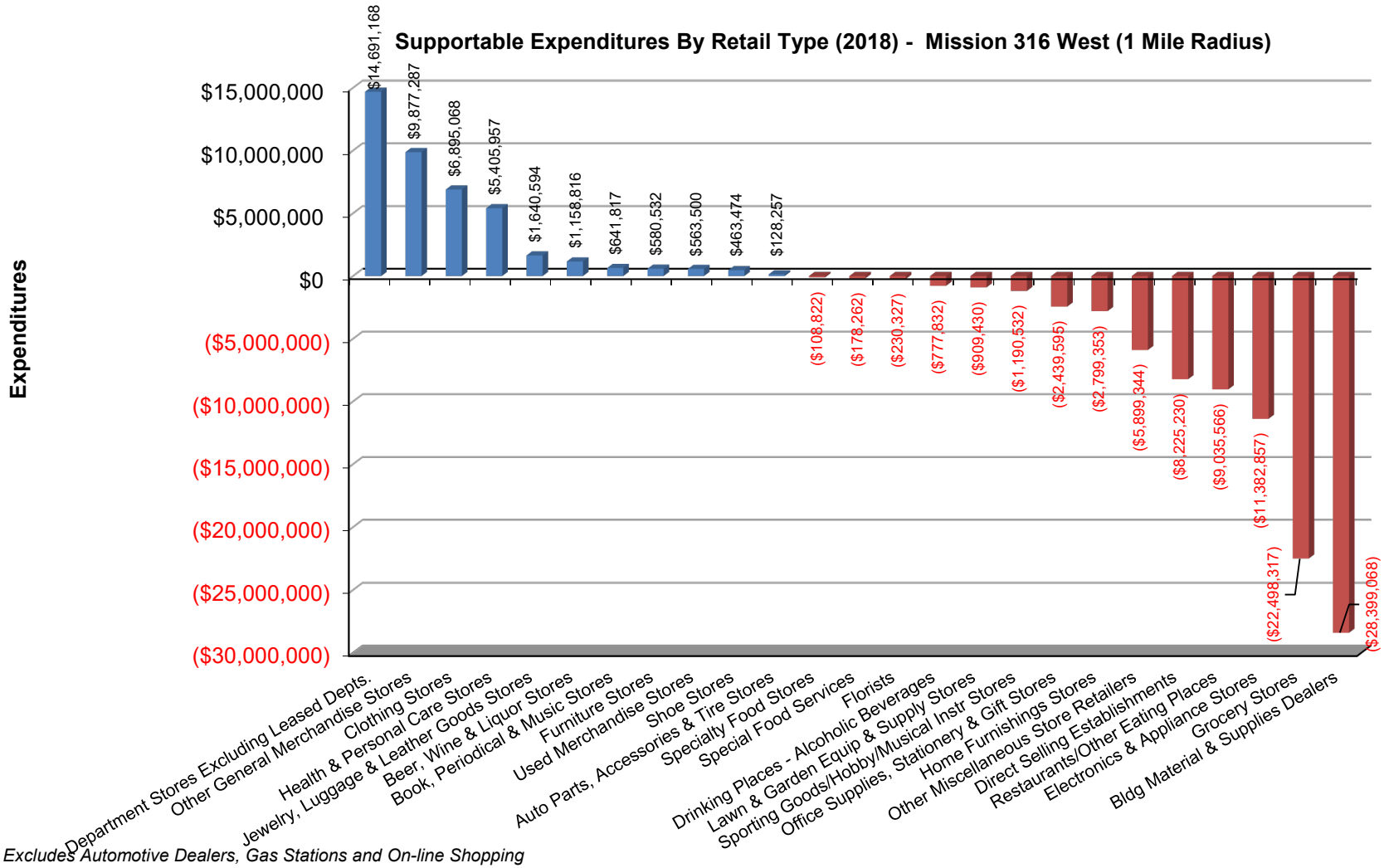
The chart below shows the supportable square feet by retail type in the 0.5-mile radius around Mission 316 West.



Note: Excludes Automotive Dealers, Gas Stations and On-line Shopping

Source: ESRI

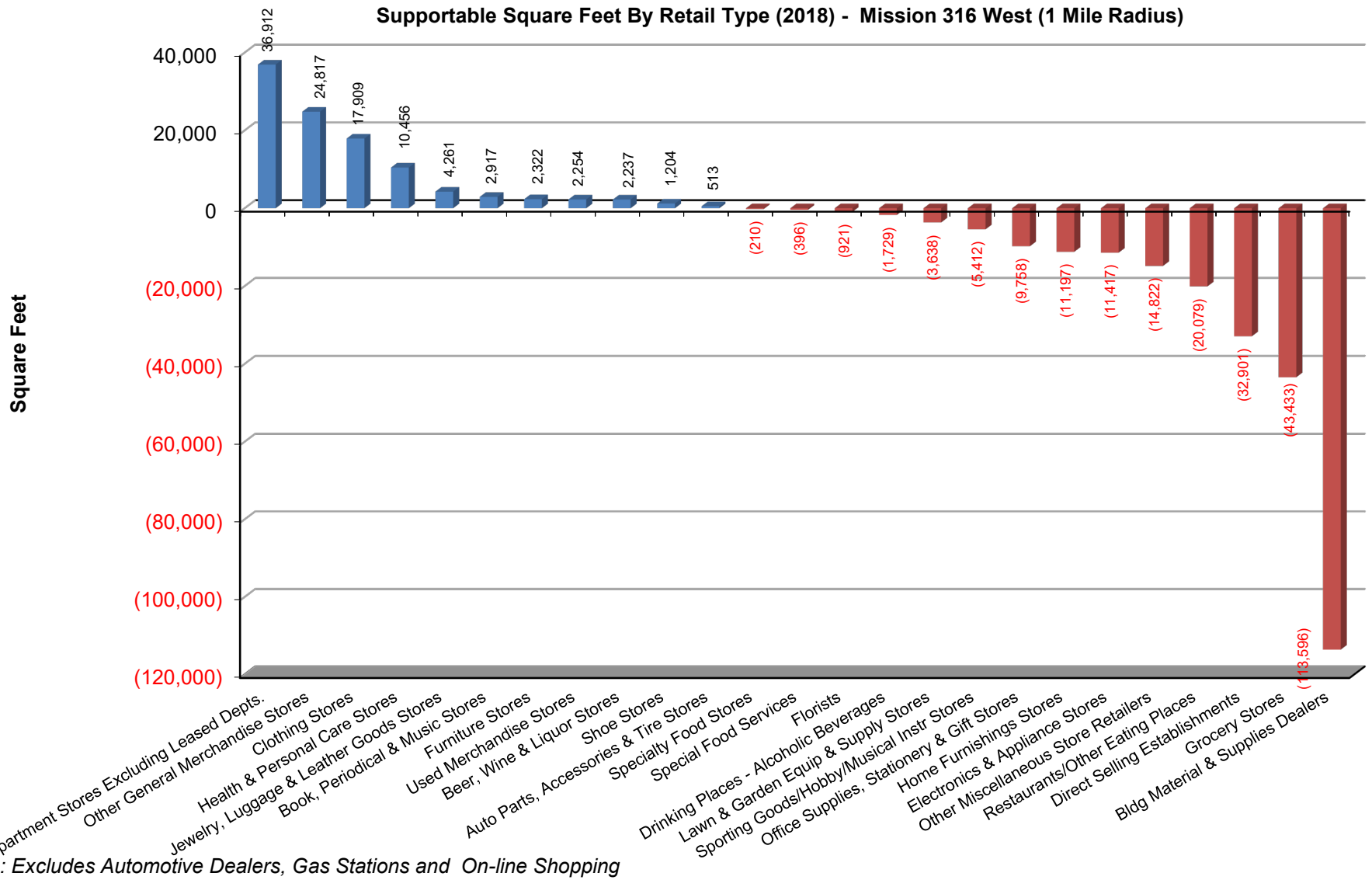
The chart below shows the opportunity gap of sales expenditures by retail type in the 1-mile radius around Mission 316 West. The retail types in demand are: Department Stores, General Merchandise Stores, Clothing Stores, Health & Personal Care Stores, and Jewelry, Luggage and Leather Stores. The retail types that are in oversupply are: Bldg. Material & Supplies Dealers, Grocery Stores, Electronics & Appliance Stores, Restaurants, and Direct Selling Establishments.



Note: Excludes Automotive Dealers, Gas Stations and On-line Shopping

Source: ESRI

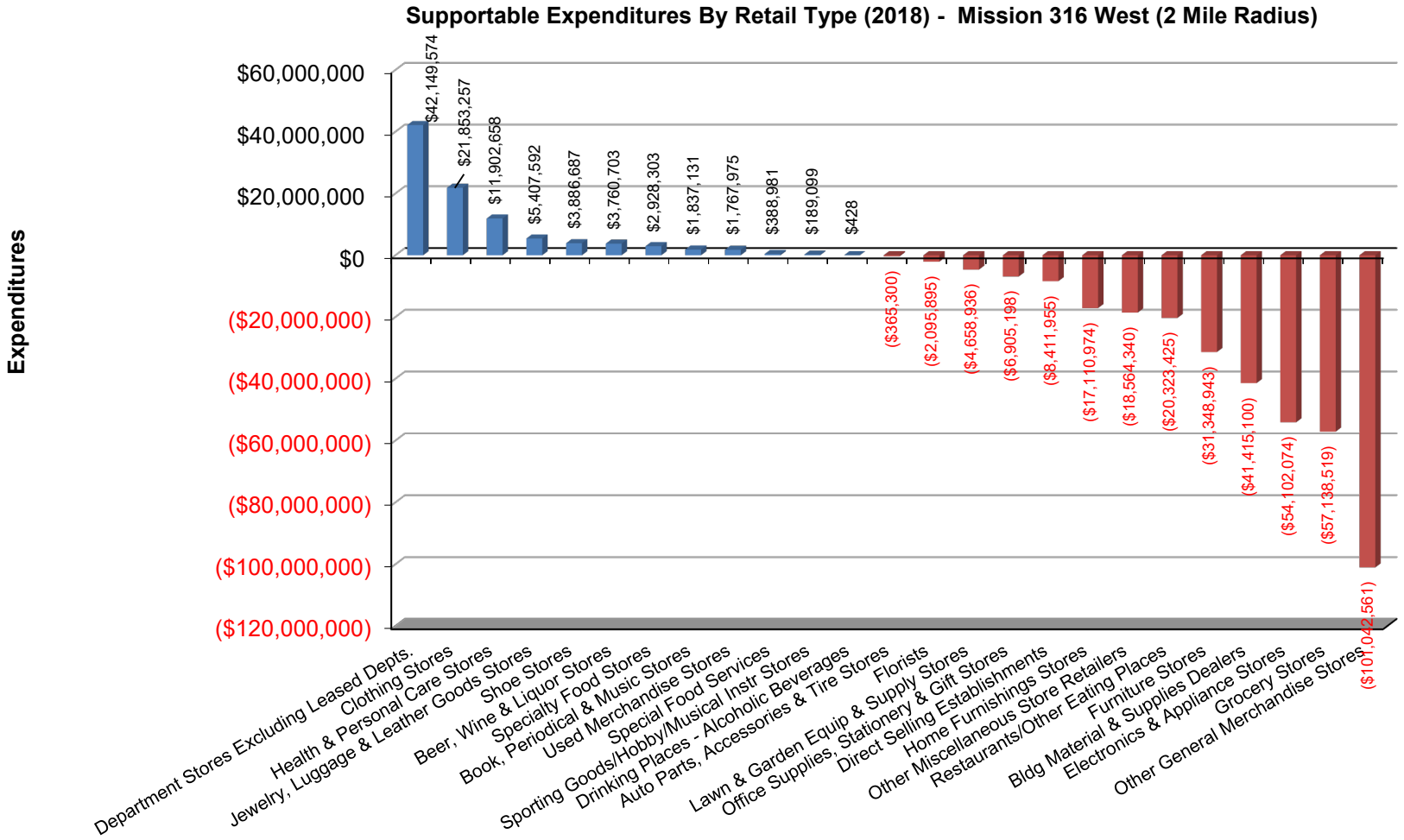
The chart below shows the supportable square feet by retail type in the 1-mile radius around Mission 316 West.



Note: Excludes Automotive Dealers, Gas Stations and On-line Shopping

Source: ESRI

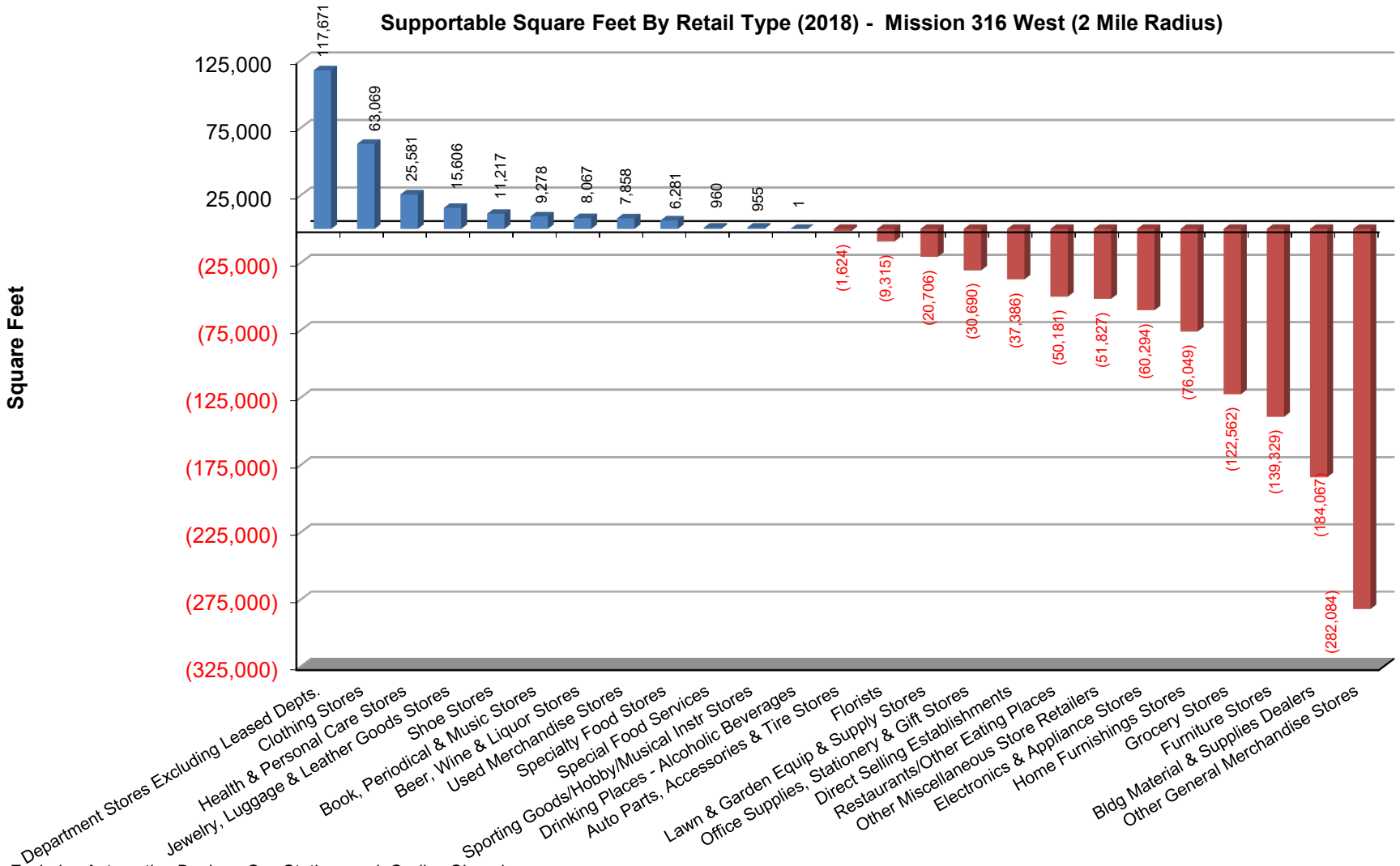
The chart below shows the opportunity gap of sales expenditures by retail type in the 2-mile radius around Mission 316 West. The retail types in demand are: Department Stores, Clothing Stores, Health & Personal Care Stores, Jewelry, Luggage and Leather Stores, and Shoe Stores. The retail types that are in oversupply are: Other General Merchandise Stores, Grocery Stores, Electronics & Appliance Stores, Bldg. Material & Supplies Dealers, and Furniture Stores. Roughly $42 million of expenditures could be supported in the Department Stores retail type.



Note: Excludes Automotive Dealers, Gas Stations and On-line Shopping

Source: ESRI

The chart below shows the supportable square feet by retail type in the 2-mile radius around Mission 316 West. Roughly 118,000 square feet of Department Store retail space could be supported in the 2-mile radius.



Note: Excludes Automotive Dealers, Gas Stations and On-line Shopping

Source: ESRI

Meyers RESEARCH
a Kennedy Wilson Company

San Diego Office Market Overview

Mission 316 West, San Marcos, California

OFFICE MARKET SUMMARY

San Diego Office Market Overview

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The following bullets summarize our findings for office market conditions in the San Diego MSA, SR-78 Corridor market and the San Marcos submarket.

- Office inventory in the San Diego MSA grew by an average of 481,000 square feet annually between 2016 and 2018, with 682,000 square feet of delivered office space in 2018. Total office inventory in the San Diego market area amounted to 116,559,174 square feet in 5,540 buildings as of the end of Q4 2018. The Class-A office sector consisted of 36,338,123 square feet in 287 projects. There were 2,035 Class-B buildings totaling 56,435,495 square feet, and the Class-C sector consisted of 23,785,556 square feet in 3,218 buildings.

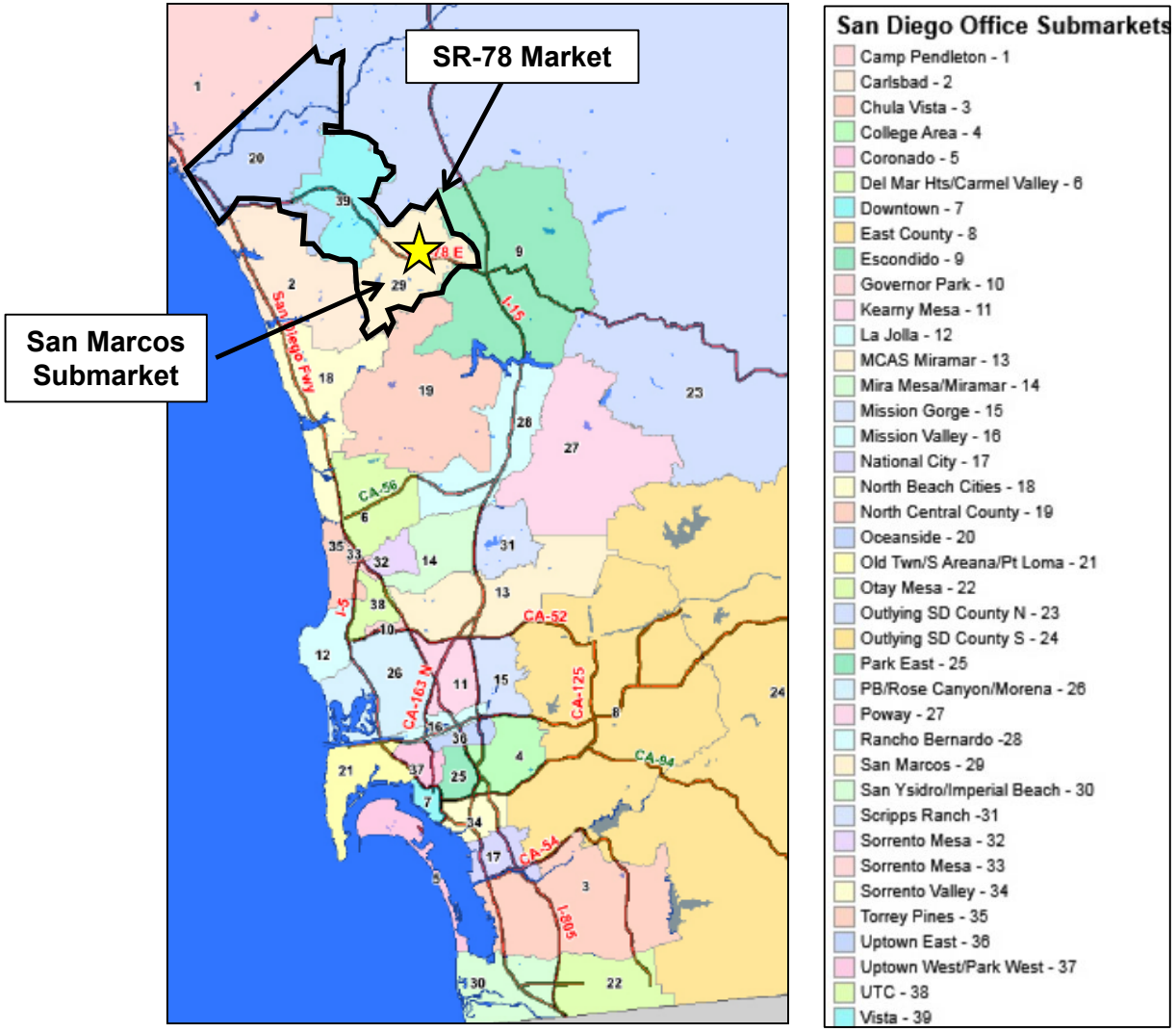
- **San Diego MSA** average lease rates are $2.73 per square foot with and rates are expected to continue to increase as vacancy continues to trend down. Following a spike in 2008 and 2009, office vacancy rates have trended downward to 9.7% on average across the MSA. Meanwhile the lease rates have risen 25% since 2013 to $2.73 per square foot. Class B space comprises 48% of the total office space in the San Diego MSA. Lease rates are highest for Class A space ($3.27 per square foot), and the vacancy rate is lowest for Class C space (5.0%). The San Diego Office market net 241,000 square feet of office space in 2018 after starting Q1 2018 with 389,000 square feet of vacancies. In both 2017 and 2018 office deliveries outpaced absorption in the MSA.

- **The SR-78 office market** has below average lease rates and high vacancies, with an average lease rate of $2.00 (San Marcos has the highest lease rates in the Submarket at $2.31 per square foot), and a vacancy rate of 6.5%, which is notably lower than the San Diego MSA vacancy rate average of 9.7%. Escondido is not included in the SR-78 Submarket, but it is a competitor given its adjacent location, with the second lowest vacancy rate in the area at 8.6%, and lease rates of $2.16 per square foot.

- **The San Marcos office Submarket:** Vacancy is improving in the submarket, currently at 10.2%, down from the four year average of 11.5%. Lease rates are below the MSA average at $2.31 per square foot versus $2.73 per square foot for the MSA overall. The San Marcos office submarket vacancy rate is higher than the MSA overall at 10.2% compared to the 9.7% vacancy rate for the MSA overall. Class B space comprises 48% of the total office space in the San Diego MSA. Lease rates are highest for Class A space ($3.27 per square foot), and the vacancy rate is lowest for Class C space (5.0%).

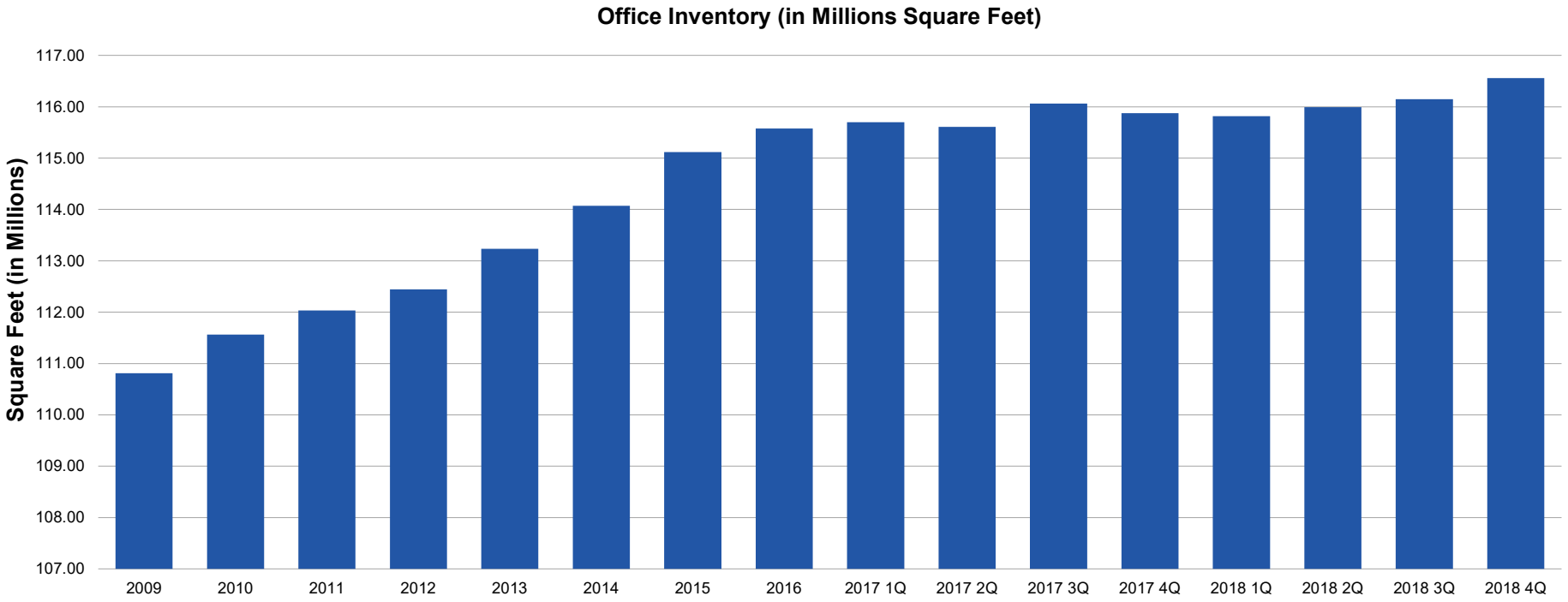
- Brokers that we interviewed report office market conditions are improving, and that there is an increase in activity. North County in general has stabilized performance, and San Marcos has been improving, where rents are stiffening, there is some increased leasing activity, and owners are withholding rent concessions. Vacancy rates are improving.

The San Diego MSA is comprised of 39 office submarkets. The Mission 316 West site is located in the San Marcos submarket, which is part of the greater SR-78 market that includes the Oceanside and Vista submarkets.



Source: CoStar

Office inventory in the San Diego MSA increased on average 481,000 square feet annually between 2016 and 2018. Roughly 682,000 square feet of office space was delivered over the course of 2018.

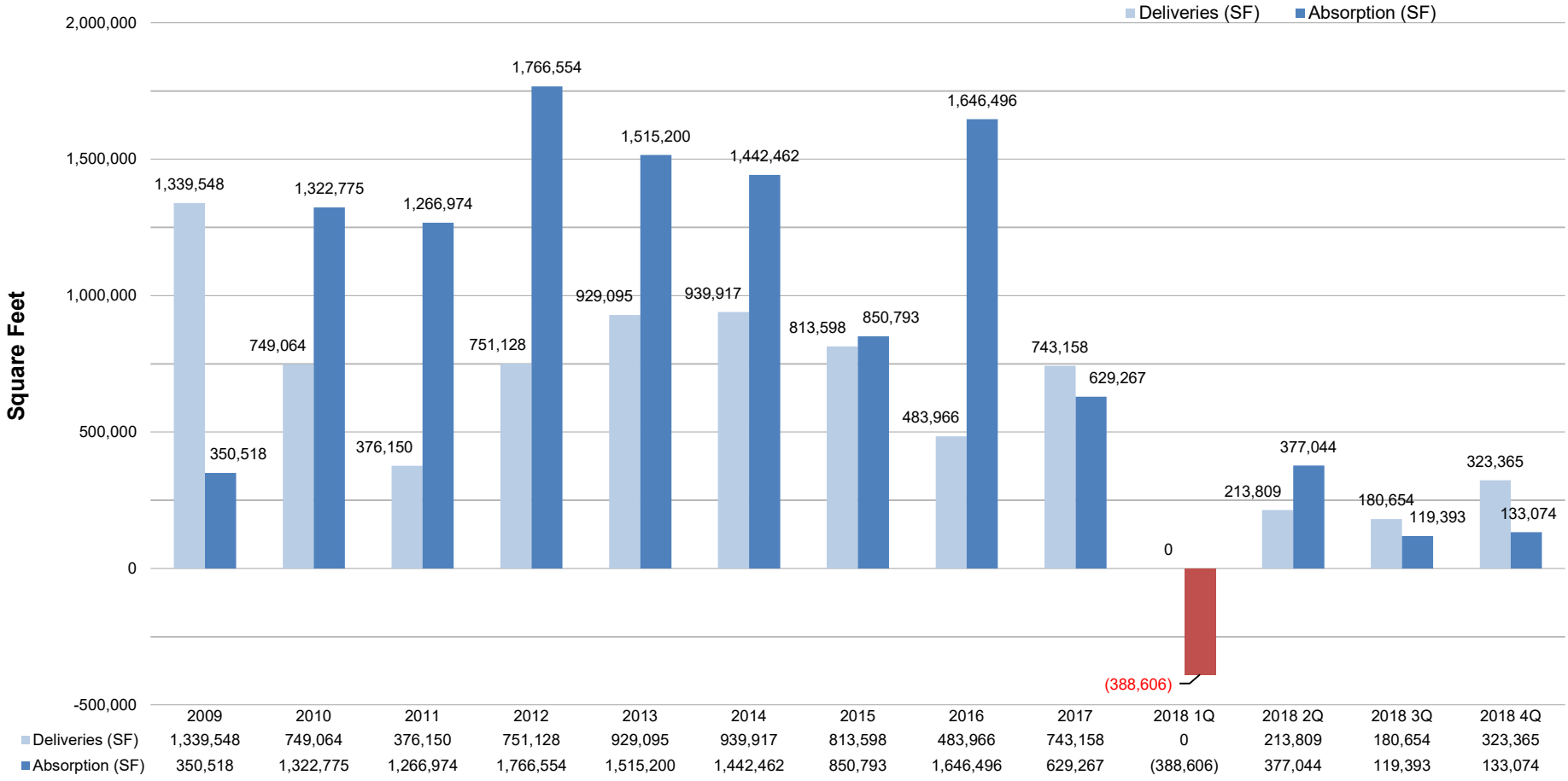


Inventory	2009	2010	2011	2012	2013	2014	2015	2016	2017 1Q	2017 2Q	2017 3Q	2017 4Q	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Total Inventory (SF)	110,812,771	111,564,125	112,031,062	112,444,231	113,231,538	114,073,650	115,115,908	115,575,128	115,698,226	115,609,174	116,062,269	115,877,280	115,813,866	115,992,307	116,147,391	116,559,174
Inventory Change		751,354	466,937	413,169	787,307	842,112	1,042,258	459,220	123,098	-89,052	453,095	-184,989	-63,414	178,441	155,084	411,783
% Change		0.7%	0.4%	0.4%	0.7%	0.7%	0.9%	0.4%	0.1%	-0.1%	0.4%	-0.2%	-0.1%	0.2%	0.1%	0.4%

Source: CoStar

The San Diego Office market net 241,000 square feet of office space in 2018 after starting Q1 2018 with 389,000 square feet of vacancies. Absorption between 2010 through 2016 outpaced deliveries (with an annual average delivery of 720,000 square feet of office space). In both 2017 and 2018 office deliveries outpaced absorption in the MSA.

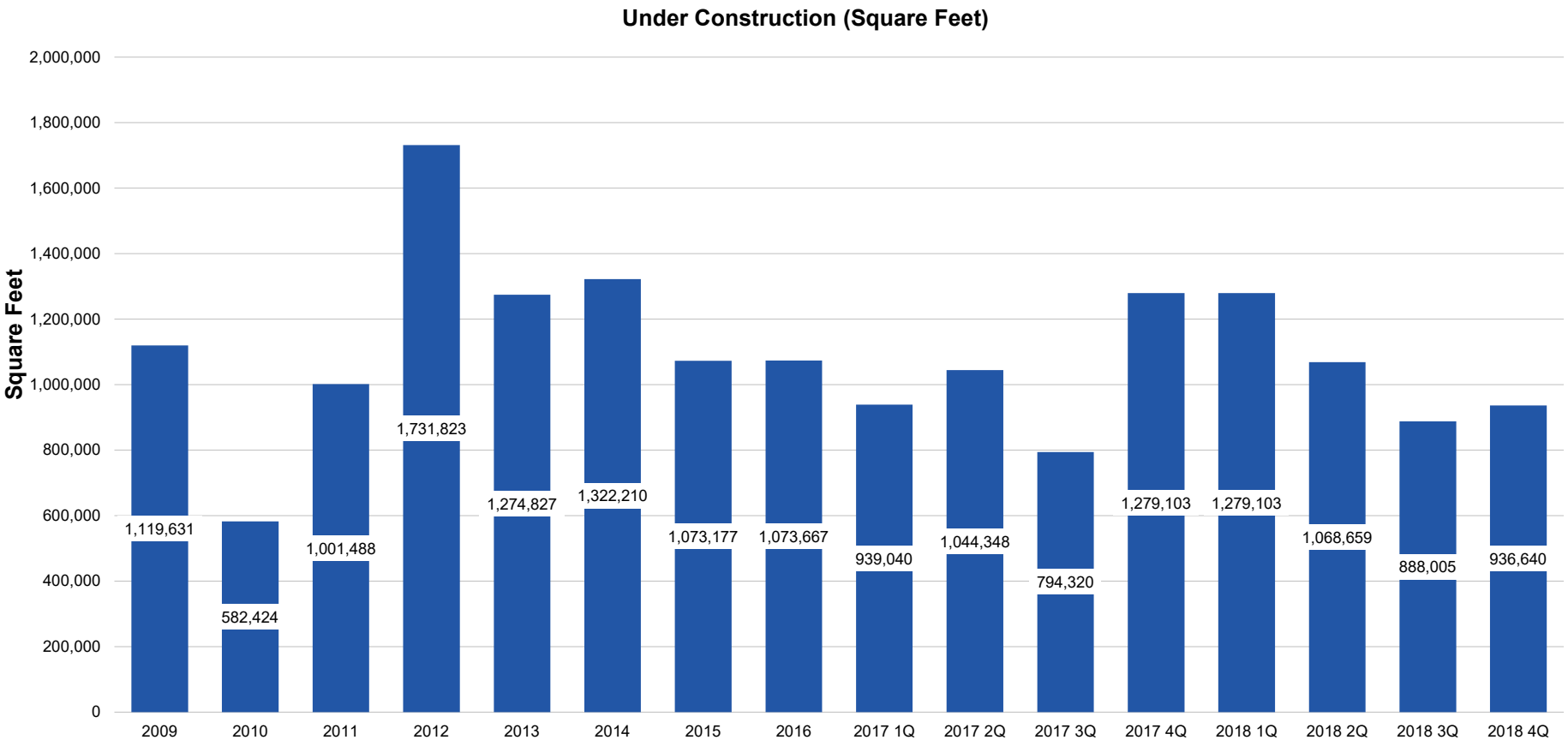
OFFICE MARKET ABSORPTION VS. COMPLETED SPACE
San Diego MSA, CA
2009 to 2018



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Deliveries (SF)	1,339,548	749,064	376,150	751,128	929,095	939,917	813,598	483,966	743,158	0	213,809	180,654	323,365
Absorption (SF)	350,518	1,322,775	1,266,974	1,766,554	1,515,200	1,442,462	850,793	1,646,496	629,267	(388,606)	377,044	119,393	133,074

Source: Costar

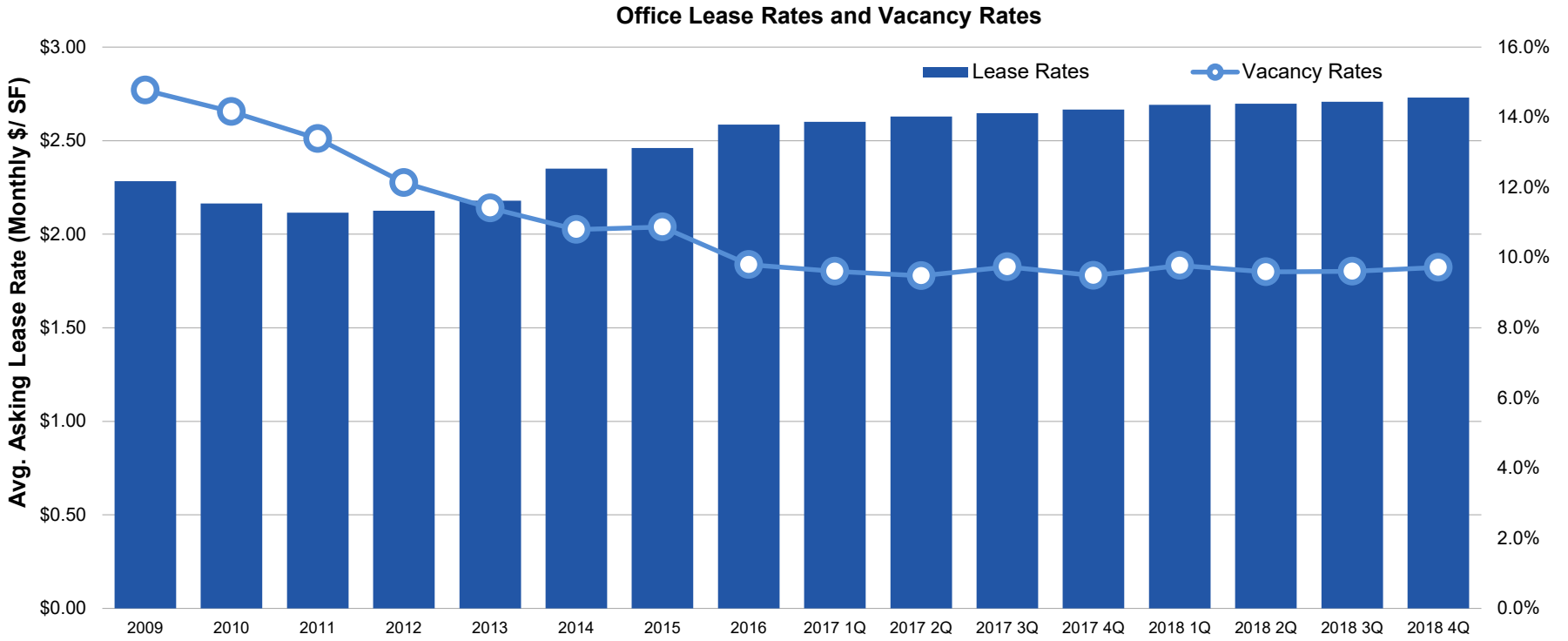
Roughly 1.28 million square feet of office space was under construction at the beginning of 2018 and 391,000 square feet of space was delivered in Q2 and Q3 2018. The San Diego MSA has averaged 1.12 million square feet of office space under development annually since 2009.



Under Construction	2009	2010	2011	2012	2013	2014	2015	2016	2017 1Q	2017 2Q	2017 3Q	2017 4Q	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Under Construction (SF)	1,119,631	582,424	1,001,488	1,731,823	1,274,827	1,322,210	1,073,177	1,073,667	939,040	1,044,348	794,320	1,279,103	1,279,103	1,068,659	888,005	936,640
Under Const. Change		-537,207	419,064	730,335	-456,996	47,383	-249,033	490	-134,627	105,308	-250,028	484,783	0	-210,444	-180,654	48,635
% Change		-48.0%	72.0%	72.9%	-26.4%	3.7%	-18.8%	0.0%	-12.5%	11.2%	-23.9%	61.0%	0.0%	-16.5%	-16.9%	5.5%

Source: CoStar

Office vacancy rates have steadily trended down since 2009 to 9.7% on average across the MSA. Since 2013 the average office lease rate has increased 25% to $2.73 per square foot. The average lease rate increased $0.07 (2.2%) per square foot over 2018.



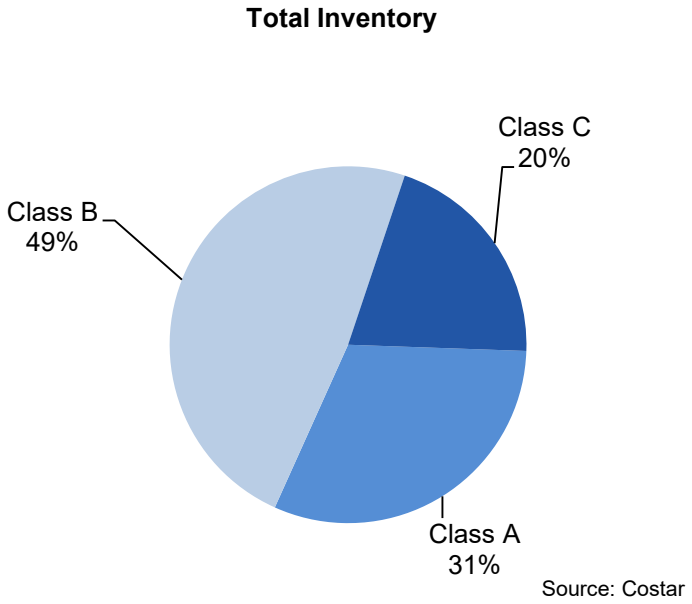
Lease Rates	2009	2010	2011	2012	2013	2014	2015	2016	2017 1Q	2017 2Q	2017 3Q	2017 4Q	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Lease Rate ($/ SF/ Mo.)	$2.28	$2.16	$2.12	$2.13	$2.18	$2.35	$2.46	$2.59	$2.60	$2.63	$2.65	$2.67	$2.69	$2.70	$2.71	$2.73
Lease Rate Change		($0.12)	($0.05)	$0.01	$0.05	$0.17	$0.11	$0.13	$0.01	$0.03	$0.02	$0.02	$0.03	$0.00	$0.01	$0.02
% Change		-5.2%	-2.3%	0.5%	2.5%	7.9%	4.7%	5.1%	0.5%	1.1%	0.7%	0.7%	1.0%	0.2%	0.4%	0.8%

Vacancy Rates	2009	2010	2011	2012	2013	2014	2015	2016	2017 1Q	2017 2Q	2017 3Q	2017 4Q	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Vacancy Rate	14.8%	14.2%	13.4%	12.1%	11.4%	10.8%	10.9%	9.8%	9.6%	9.5%	9.7%	9.5%	9.8%	9.6%	9.6%	9.7%
Vac. Rate Change		-0.6%	-0.8%	-1.3%	-0.7%	-0.6%	0.1%	-1.1%	-0.2%	-0.1%	0.3%	-0.2%	0.3%	-0.2%	0.0%	0.1%
% Change		-4.1%	-5.5%	-9.4%	-6.0%	-5.3%	0.6%	-9.8%	-2.0%	-1.3%	2.7%	-2.5%	3.0%	-1.9%	0.2%	1.1%

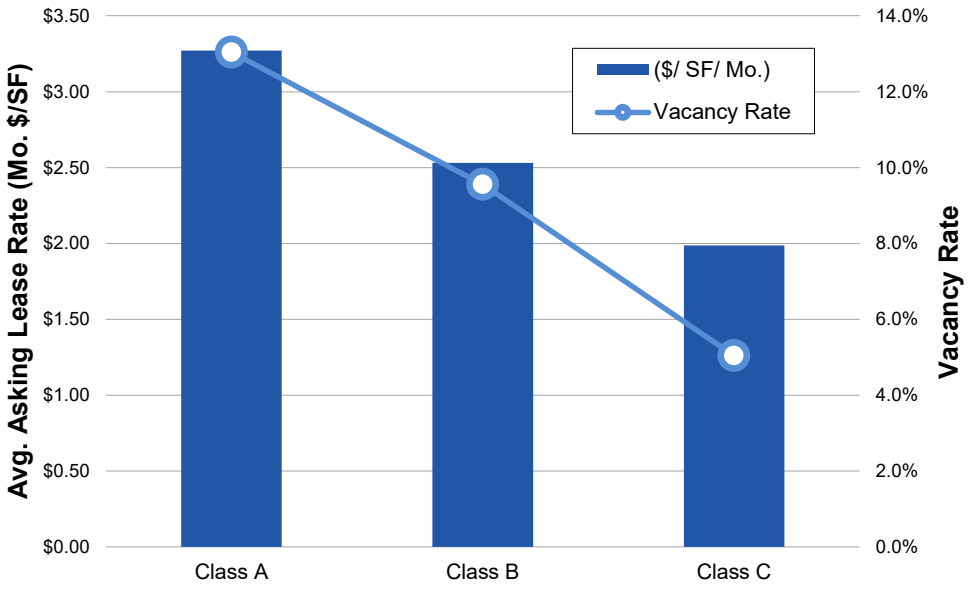
Source: CoStar

Class B space comprises 48% of the total office space in the San Diego MSA. Lease rates are highest for Class A space ($3.27 per square foot), and the vacancy rate is lowest for Class C space (5.0%).

Type	Total SF	Vacant SF	Vacancy Rate	Absorption (SF) Year to Date	Deliveries (SF) Year to Date	Under Construction (SF)	Asking Rent ($/ SF/ Mo.)
Class A	36,338,123	4,736,359	13.0%	179,857	682,954	857,994	$3.27
Class B	56,435,495	5,390,258	9.6%	199,177	34,874	78,646	$2.53
Class C	23,785,556	1,198,652	5.0%	(138,129)	0	0	$1.99
TOTAL:	**116,559,174**	**11,325,269**	**9.7%**	**240,905**	**717,828**	**936,640**	**$2.73**



Source: Costar



Source: CoStar

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SR-78 Corridor Office Trends

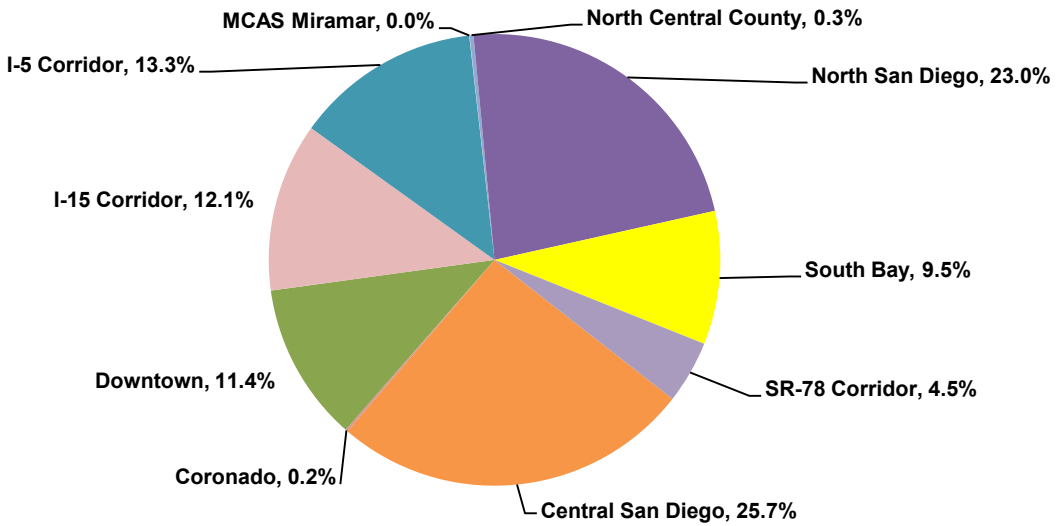
Mission 316 West, San Marcos, California

The SR-78 corridor office submarket comprises of 4.5% of the San Diego MSA overall. Additionally, the North County retail market is more affordable than any of the other submarkets, with average lease rates of ± 2.00 per square foot per month. The vacancy rate is comparable to the I-15 corridor, with vacancies between 10.2% and 10.8% indicating there is likely isn't support for additional office space in the SR-78 submarket.

OFFICE SNAPSHOT BY SUBMARKET
San Diego, CA MSA
Year-End 2018

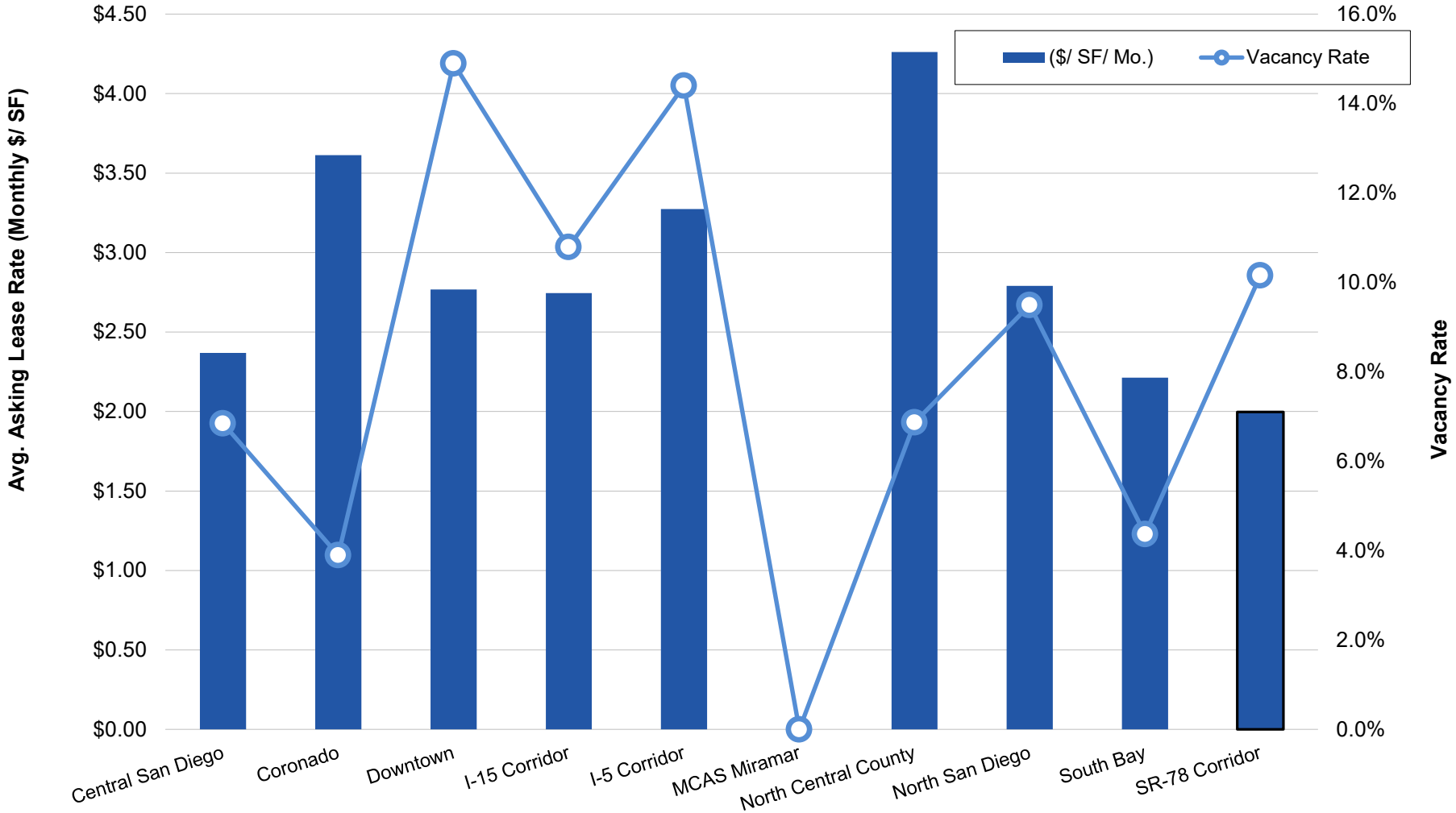
Submarket	Total SF	Vacant SF	Vacancy Rate	YTD Net Absorption (SF)	YTD Deliveries (SF)	Avg. Asking Rent ($/ SF/ Mo.)
Central San Diego	29,757,442	2,037,438	6.8%	(159,809)	171,365	$2.37
Coronado	184,076	7,176	3.9%	9,035	0	$3.61
Downtown	13,151,549	1,959,331	14.9%	(419,595)	60,000	$2.77
I-15 Corridor	13,979,836	1,508,063	10.8%	53,334	75,000	$2.75
I-5 Corridor	15,370,088	2,213,295	14.4%	252,096	237,809	$3.27
MCAS Miramar	31,618	0	0.0%	0	0	$0.00
North Central County	318,677	21,893	6.9%	(2,730)	0	$4.26
North San Diego	26,591,964	2,523,642	9.5%	418,925	156,000	$2.79
South Bay	11,040,090	482,252	4.4%	83,341	17,654	$2.21
SR-78 Corridor	5,196,729	527,792	10.2%	10,362	0	$2.00
TOTAL:	**115,622,069**	**11,280,882**	**9.8%**	**244,959**	**717,828**	**$2.65**

Total Inventory

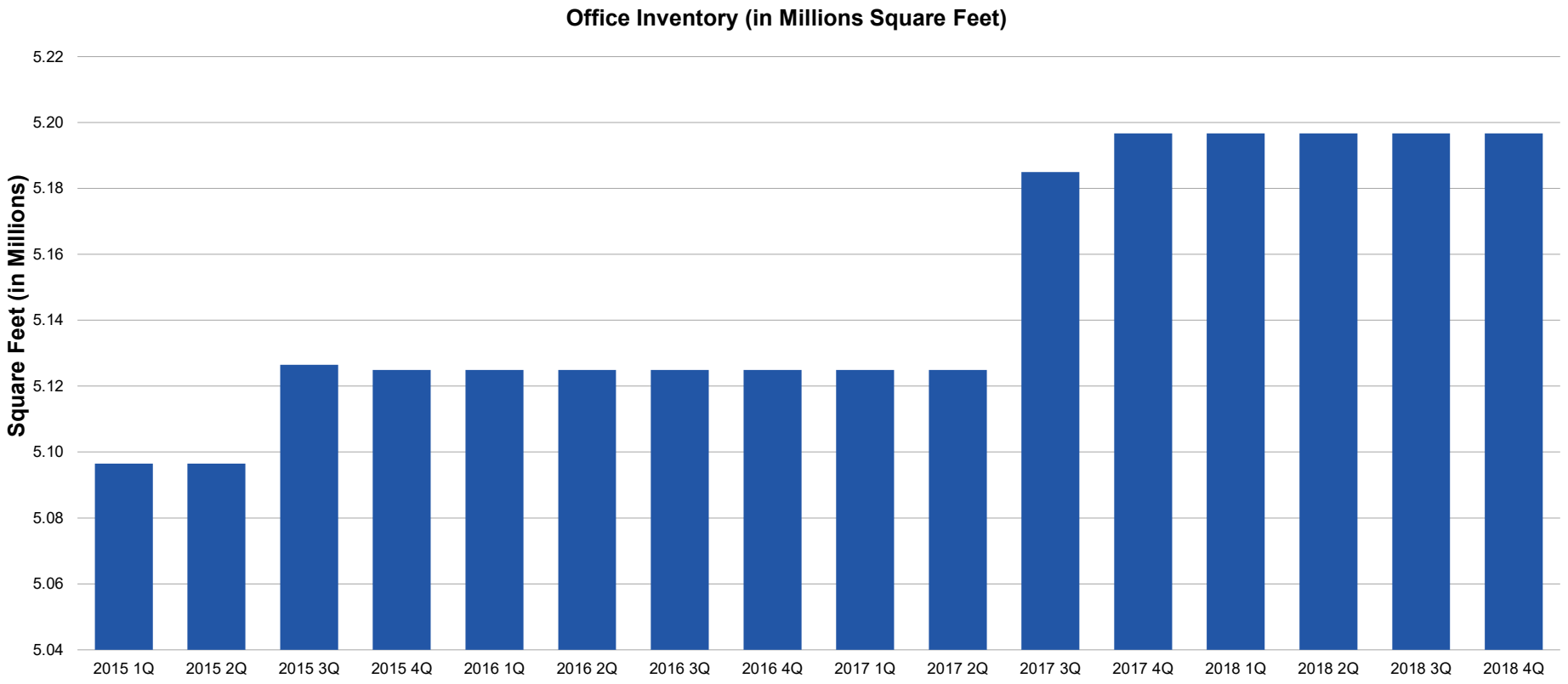


Source: CoStar

The North Central County office submarket commands the highest asking lease rates, at $4.26 per square foot, while the SR-78 Corridor which includes San Marcos, Vista and Oceanside, is the lowest at $2.00.



Over the past four years, the SR-78 corridor office submarket cluster has net 100,000 square feet of new office space over the past four years, of which 72,000 square feet have been added since the third quarter 2017. The new office deliveries are likely a major contributing factor to the SR-78 corridor vacancy rate of 10.2%.



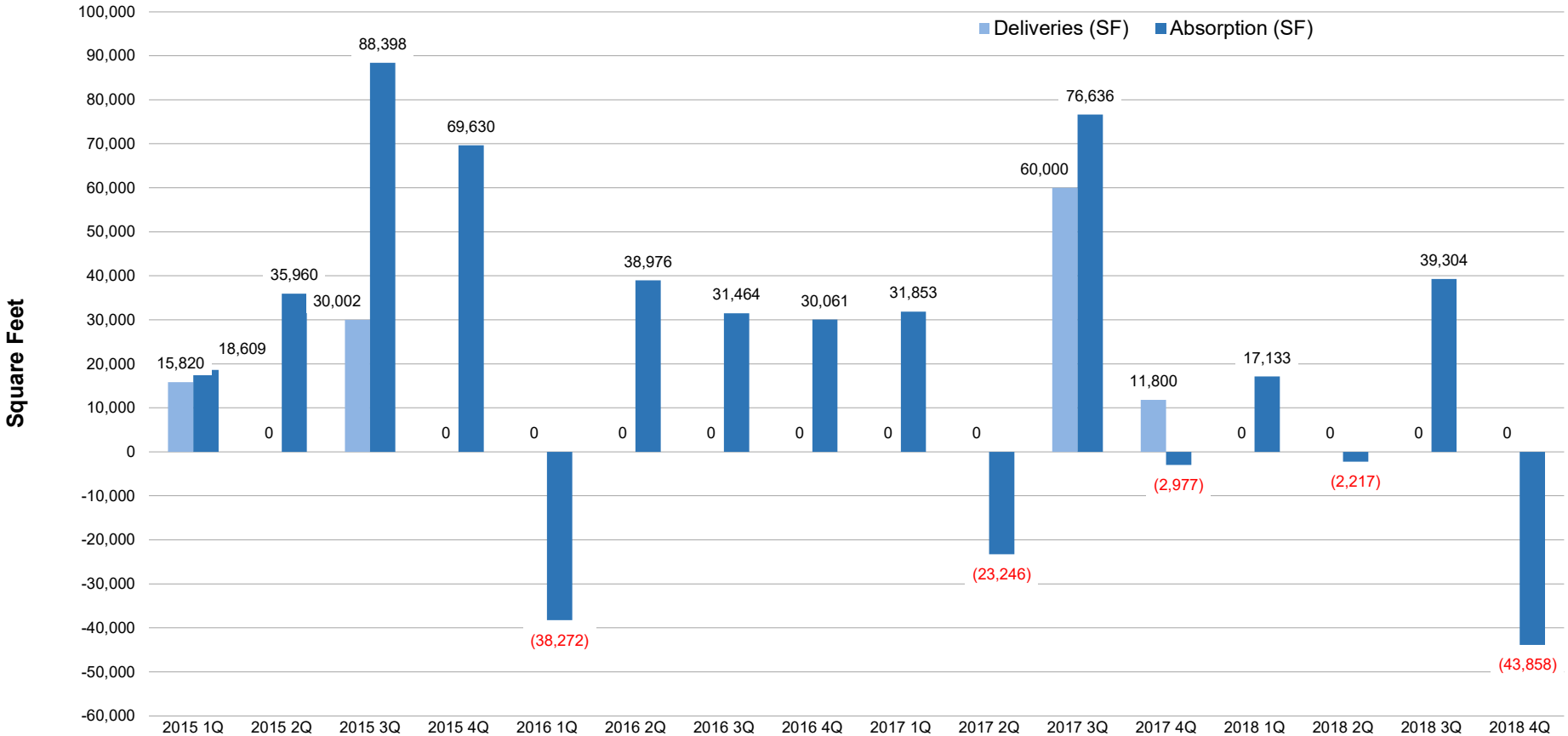
Source: Costar

Inventory	2015 1Q	2015 2Q	2015 3Q	2015 4Q	2016 1Q	2016 2Q	2016 3Q	2016 4Q	2017 1Q	2017 2Q	2017 3Q	2017 4Q	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Total Inventory (SF)	5,096,448	5,096,448	5,126,450	5,124,929	5,124,929	5,124,929	5,124,929	5,124,929	5,124,929	5,124,929	5,184,929	5,196,729	5,196,729	5,196,729	5,196,729	5,196,729
Inventory Change	--	0	30,002	-1,521	0	0	0	0	0	0	60,000	11,800	0	0	0	0
% Change	--	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.2%	0.0%	0.0%	0.0%	0.0%

Source: CoStar

Absorption in the SR-78 corridor office market has been strong over the past four years, with 367,000 square feet leased compared to deliveries of just 118,000 square feet, pushing up the lease asking rates in the area. Over the past four quarters, net absorption was 10,000 square feet while the market delivered no new retail space.

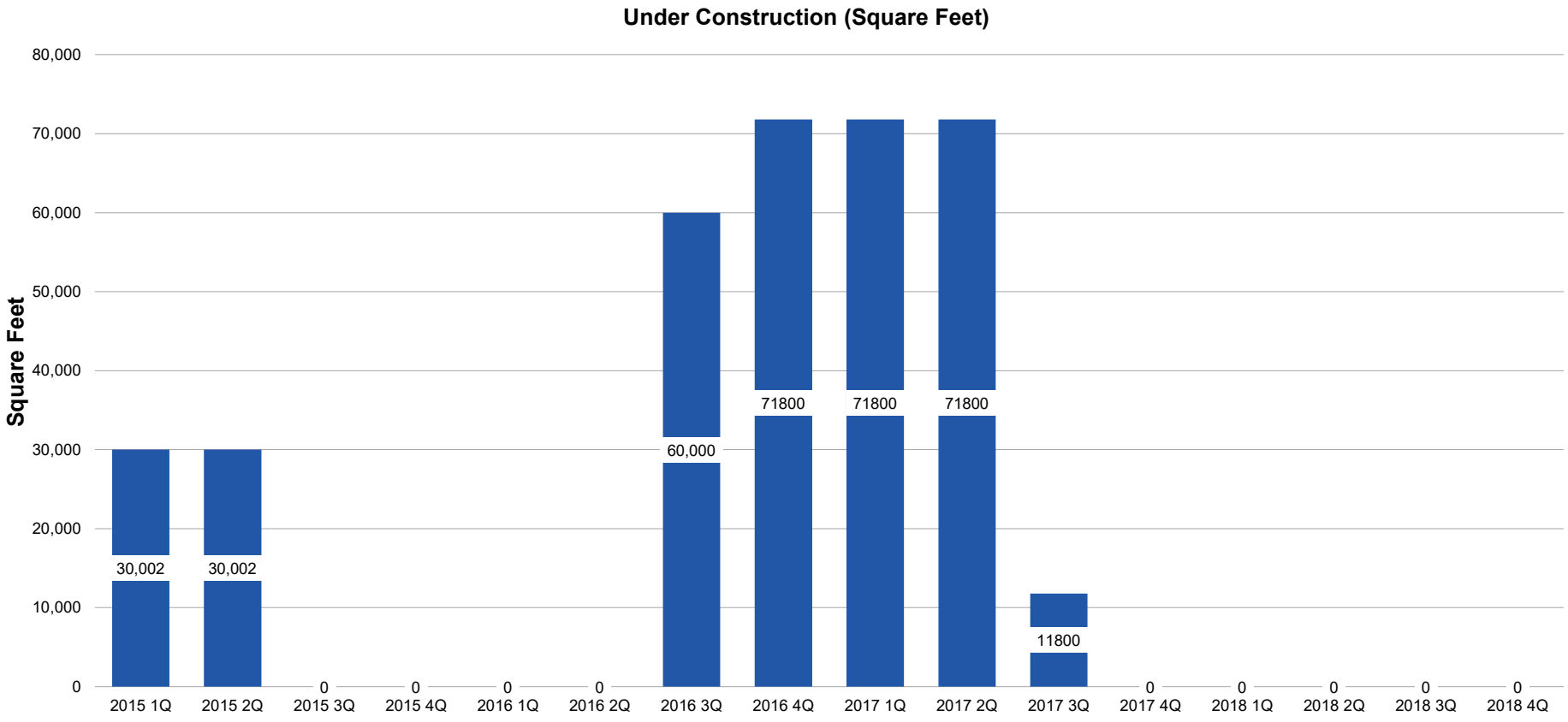
OFFICE MARKET ABSORPTION VS. COMPLETED SPACE



	2015 1Q	2015 2Q	2015 3Q	2015 4Q	2016 1Q	2016 2Q	2016 3Q	2016 4Q	2017 1Q	2017 2Q	2017 3Q	2017 4Q	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Deliveries (SF)	15,820	0	30,002	0	0	0	0	0	0	0	60,000	11,800	0	0	0	0
Absorption (SF)	18,609	35,960	88,398	69,630	(38,272)	38,976	31,464	30,061	31,853	(23,246)	76,636	(2,977)	17,133	(2,217)	39,304	(43,858)

Source: Costar

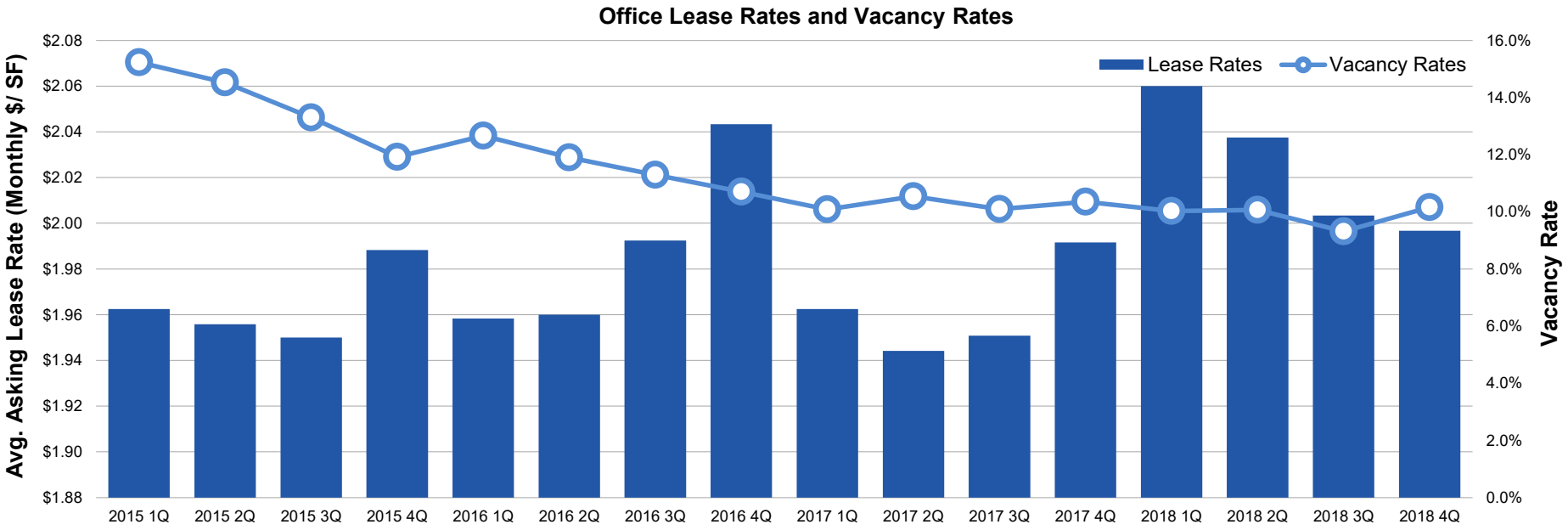
Roughly 72,000 square feet of office space was under construction in Q1 2017 and was delivered in Q4 2017. No office space is currently under construction along the SR-78 corridor.



Under Construction	2015 1Q	2015 2Q	2015 3Q	2015 4Q	2016 1Q	2016 2Q	2016 3Q	2016 4Q	2017 1Q	2017 2Q	2017 3Q	2017 4Q	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Under Construction (SF)	30,002	30,002	0	0	0	0	60,000	71,800	71,800	71,800	11,800	0	0	0	0	0
Under Const. Change		0	-30,002	0	0	0	60,000	11,800	0	0	-60,000	-11,800	0	0	0	0
% Change		0.0%	-100.0%	0.0%	0.0%	0.0%	0.0%	19.7%	0.0%	0.0%	-83.6%	-100.0%	0.0%	0.0%	0.0%	0.0%

Source: CoStar

The average lease rate ($/ SF/ Mo.) in Q4 2018 is $2.00, which is consistent with the two year average lease rate. Vacancy is improving in the submarket, currently at 10.2%, down from the four year average of 11.5%. The vacancy rate reached a low of 9.3% in Q3 2018 before spiking back to 10.2% after the vacancy of 44,000 square feet in Q4 2018.



Source: Costar

Lease Rates	2015 1Q	2015 2Q	2015 3Q	2015 4Q	2016 1Q	2016 2Q	2016 3Q	2016 4Q	2017 1Q	2017 2Q	2017 3Q	2017 4Q	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Lease Rate ($/ SF/ Mo.)	$1.96	$1.96	$1.95	$1.99	$1.96	$1.96	$1.99	$2.04	$1.96	$1.94	$1.95	$1.99	$2.06	$2.04	$2.00	$2.00
Lease Rate Change		($0.01)	($0.01)	$0.04	($0.03)	$0.00	$0.03	$0.05	($0.08)	($0.02)	$0.01	$0.04	$0.07	($0.02)	($0.03)	($0.01)
% Change		-0.3%	-0.3%	2.0%	-1.5%	0.1%	1.7%	2.6%	-4.0%	-0.9%	0.3%	2.1%	3.4%	-1.1%	-1.7%	-0.3%

Vacancy Rates	2015 1Q	2015 2Q	2015 3Q	2015 4Q	2016 1Q	2016 2Q	2016 3Q	2016 4Q	2017 1Q	2017 2Q	2017 3Q	2017 4Q	2018 1Q	2018 2Q	2018 3Q	2018 4Q
Vacancy Rate	15.2%	14.5%	13.3%	11.9%	12.7%	11.9%	11.3%	10.7%	10.1%	10.5%	10.1%	10.4%	10.0%	10.1%	9.3%	10.2%
Vac. Rate Change		-0.7%	-1.2%	-1.4%	0.7%	-0.8%	-0.6%	-0.6%	-0.6%	0.5%	-0.4%	0.3%	-0.3%	0.0%	-0.8%	0.8%
% Change		-4.6%	-8.4%	-10.4%	6.3%	-6.0%	-5.2%	-5.2%	-5.8%	4.5%	-4.2%	2.6%	-3.2%	0.4%	-7.5%	9.1%

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San Marcos Office Trends

Mission 316 West, San Marcos, California

Meyers RESEARCH
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The San Marcos commercial office submarket comprises of 1.66 million SF, or 1.5% of San Diego MSA overall.

Submarket	Total SF	Vacant SF	Vacancy Rate	2018 YTD Net Absorption (SF)	2018 YTD Deliveries (SF)	Under Construction (SF)	Avg. Asking Rent ($/ SF/ Mo.)
Oceanside	1,782,174	166,758	9.4%	(6,074)	-	-	$2.04
San Marcos	**1,656,233**	**107,831**	**6.5%**	**30,352**	**-**	**-**	**$2.31**
Vista	1,758,322	253,203	14.4%	(13,916)	-	-	$1.81
Carlsbad	7,328,578	1,220,138	16.6%	314,926	228,954	231,646	$2.50
Chula Vista	3,512,814	228,556	6.5%	37,051	-	-	$2.43
College Area	1,600,740	41,741	2.6%	13,614	-	-	$2.23
Coronado	184,076	7,176	3.9%	9,035	-	-	$3.61
Del Mar Hts/Carmel V.	4,788,701	808,149	16.9%	(54,899)	-	-	$4.27
Downtown	13,151,549	1,959,331	14.9%	(419,595)	60,000	372,000	$2.77
East County	5,588,400	168,525	3.0%	6,820	17,654	-	$1.91
Escondido	2,577,491	222,315	8.6%	23,574	75,000	-	$2.16
Governor Park	889,275	82,335	9.3%	(11,775)	-	-	$2.74
Kearny Mesa	11,188,068	847,212	7.6%	(239,649)	-	-	$2.28
La Jolla	1,718,454	110,091	6.4%	6,519	-	-	$3.17
MCAS Miramar	31,618	0	0.0%	-	-	-	-
Mira Mesa/Miramar	1,658,590	138,667	8.4%	29,375	-	-	$1.78
Mission Gorge	724,561	11,792	1.6%	2,255	-	-	$1.71
Mission Valley	7,349,849	767,177	10.4%	65,879	168,000	-	$2.49
National City	791,199	6,433	0.8%	23,033	-	-	$2.11
North Beach Cities	3,252,809	185,008	5.7%	(7,931)	8,855	24,000	$3.51
North Central County	318,677	21,893	6.9%	(2,730)	-	-	$4.26
Old Town/S Arena/Pt L.	3,020,320	154,872	5.1%	(3,940)	-	-	$2.56
Otay Mesa	220,288	6,041	2.7%	(64)	-	-	$2.24
Outlying SD County N	750,919	33,824	4.5%	3,509	-	-	$1.51
Outlying SD County S	189,186	10,563	5.6%	(7,563)	-	-	$2.28
Park East	382,158	9,172	2.4%	3,819	-	-	$2.01
PB/Rose Canyon/More.	1,790,877	94,837	5.3%	(39,026)	3,365	-	$2.05
Poway	1,608,985	45,558	2.8%	34,299	-	-	$2.33
Rancho Bernardo	7,013,591	748,089	10.7%	104,878	-	-	$2.98
San Ysidro/Imperial	248,878	1,927	0.8%	8,227	-	-	$1.81
Scripps Ranch	2,776,769	492,101	17.7%	(109,417)	-	158,994	$2.45
Sorrento Mesa	9,767,087	1,068,661	10.9%	179,702	-	-	$2.71
Sorrento Valley	832,793	75,205	9.0%	(8,610)	-	-	$2.47
Southeast San Diego	678,511	70,770	10.4%	8,274	-	-	$2.16
Torrey Pines	3,086,304	88,330	2.9%	187,426	156,000	-	$3.69
Uptown East	303,382	2,000	0.7%	(638)	-	-	$2.55
Uptown West/Park west	3,397,487	108,635	3.2%	37,877	-	-	$2.47
UTC	8,639,461	960,353	11.1%	36,288	-	150,000	$3.25
Totals	**111,362,445**	**10,797,477**	**9.7%**	**230,543**	**717,828**	**936,640**	**$2.66**

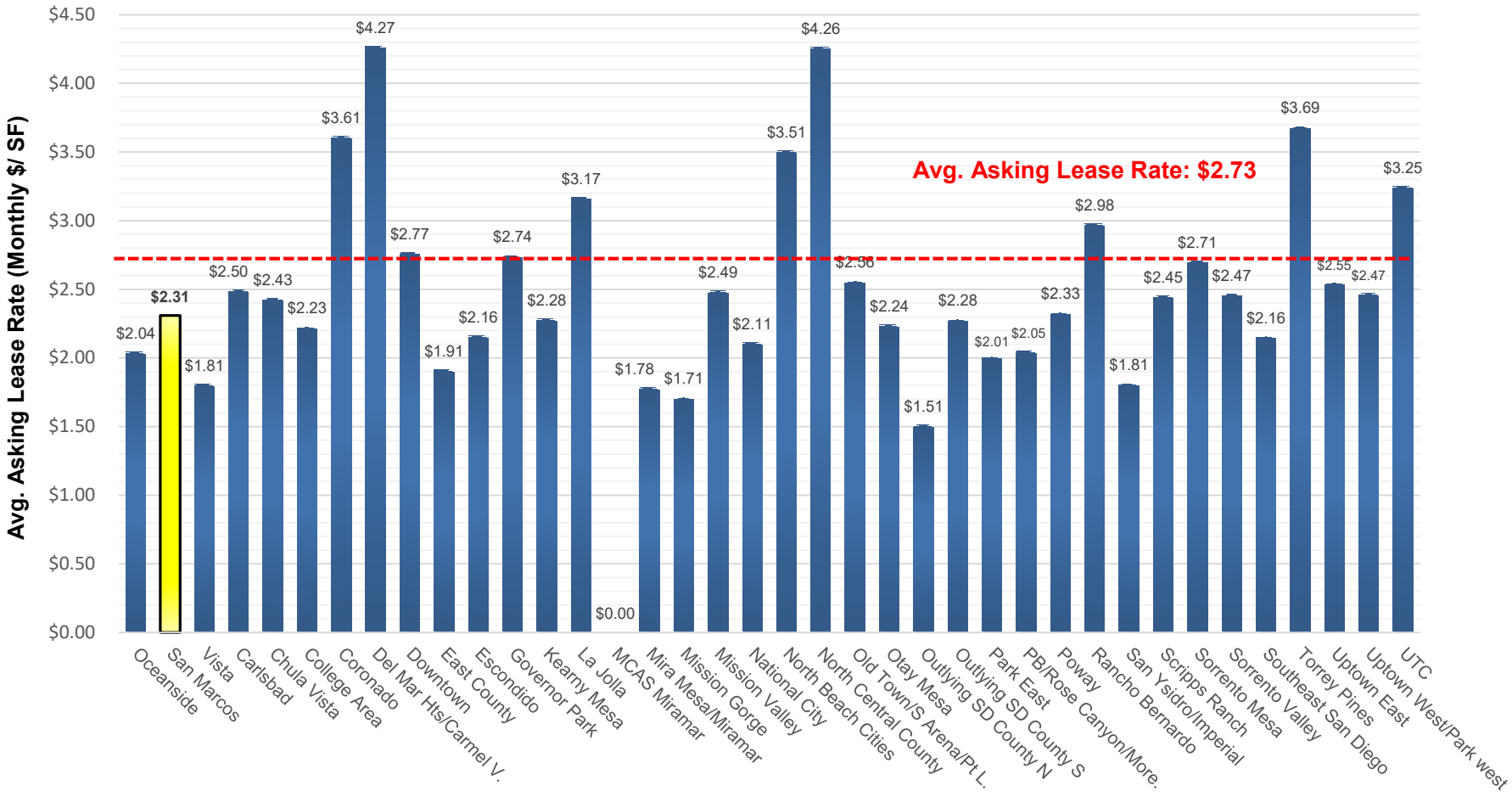
Source: CoStar, Meyers Research

AVERAGE ASKING LEASE RATES IN THE SAN DIEGO MSA

San Marcos Office Trends

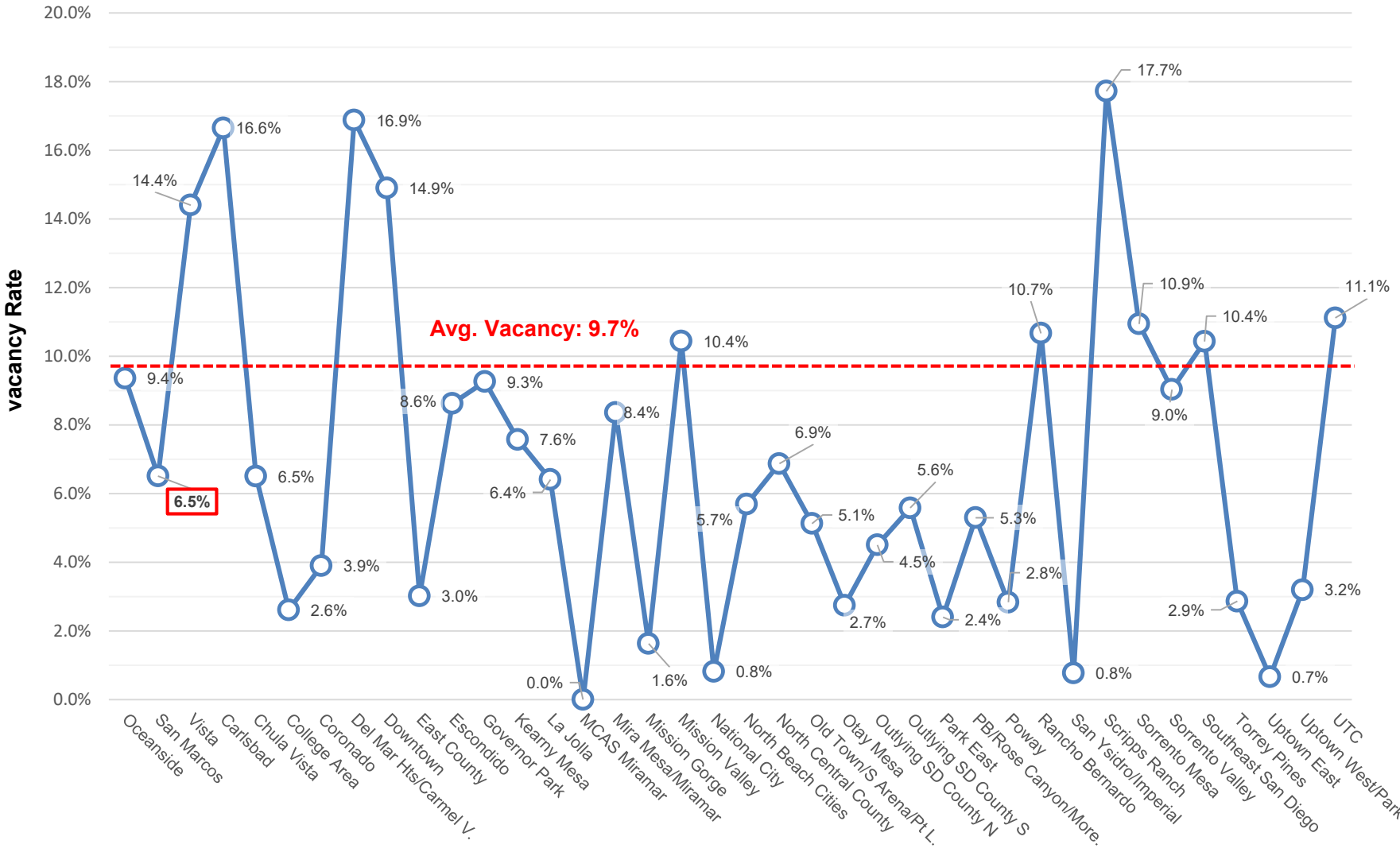
Meyers RESEARCH
a Kennedy Wilson Company

San Marcos Office submarket average asking lease rate is $2.31 which is slightly below MSA average ($2.73). The average asking lease rate is very comparable to Poway at an average asking lease rate of $2.33.



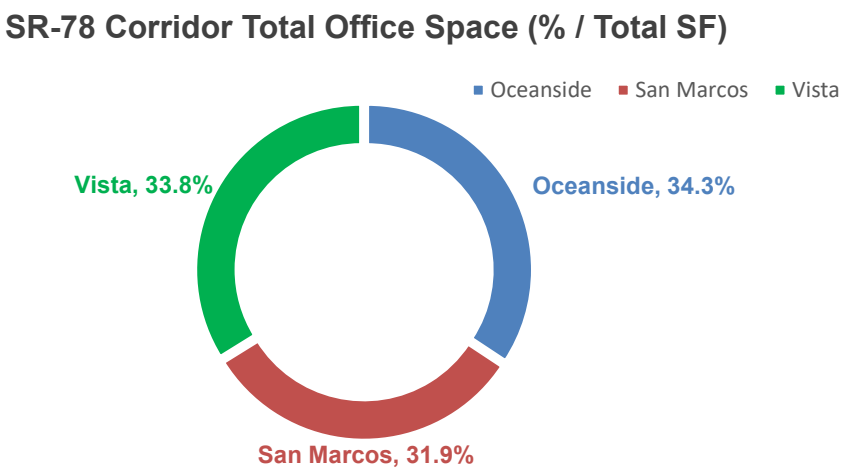
SAN MARCOS OFFICE SUBMARKET HAS VACANCY RATE BELOW MSA AVERAGE

San Marcos Office Trends



The SR-78 Corridor has a 10.2% blended average vacancy rate, and San Marcos commands the highest lease rates at $2.31 per square foot, with the lowest vacancy rate at 6.5%, indicating the desirability of San Marcos commercial office market. When compared to other North County Submarkets, San Marcos is priced on average at lease rates just below Carlsbad, and above Escondido.

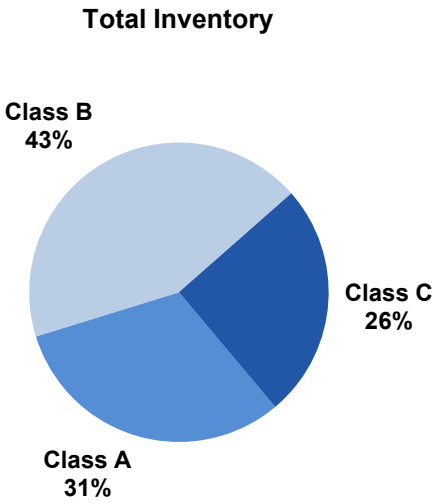
Submarket	Total SF	2018 YTD Net Absorption (SF)	Vacant SF	Vacancy Rate	Avg. Asking Rent ($/ SF/ Mo.)
Oceanside	1,782,174	(6,074)	166,758	9.4%	$2.04
San Marcos	**1,656,233**	**30,352**	**107,831**	**6.5%**	**$2.31**
Vista	1,758,322	(13,916)	253,203	14.4%	$1.81
Subtotal:	**5,196,729**	**10,362**	**527,792**	**10.2%**	**$2.05**
Carlsbad	7,328,578	37,051	1,220,138	16.6%	$2.50
Escondido	2,577,491	13,614	222,315	8.6%	$2.16
Total:	**9,906,069**	**50,665**	**1,442,453**	**14.6%**	**$2.41**



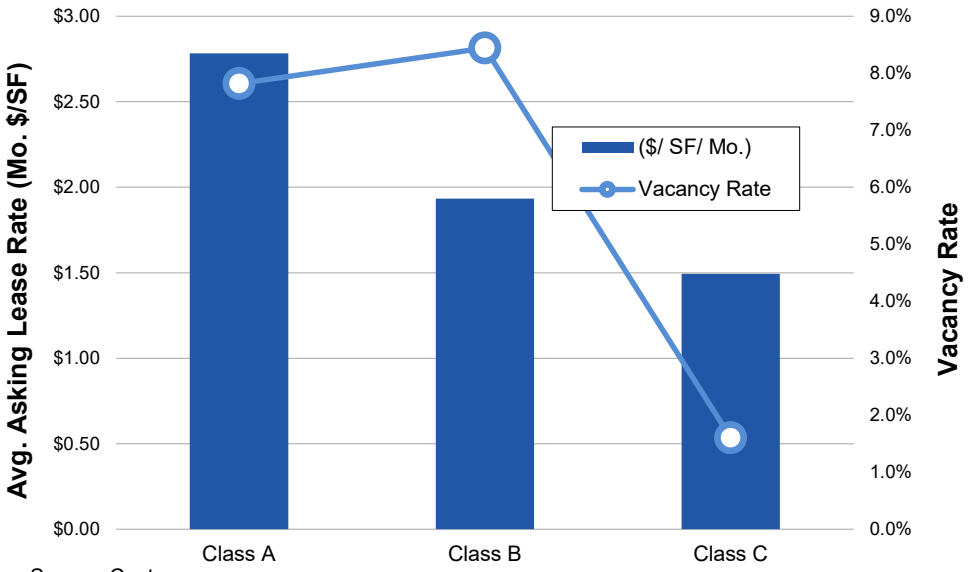
Source: CoStar, Meyers Research

Class B would be building classification of a commercial office building on the Mission 316 West site and currently the San Marcos office market is saturated with 60,516 (8.4%) square feet of vacant space and only absorbed 11,454 square feet over the past year. However, the Subject site could offer the most desirable Class B commercial office building in the market, across the street from the best Class A office space in the SR-78 corridor (City of San Marcos buildings). Class C Commercial office space has a vacancy of only 6,753 (1.6%) square feet after absorbing 11,204 square feet over 2018. Class A Office space commands a high asking monthly rent of $2.78 which is very competitive in the market.

Type	Total SF	Vacant SF	Vacancy Rate	Absorption (SF) Year to Date	Deliveries (SF) Year to Date	Under Construction (SF)	Asking Rent ($/ SF/ Mo.)
Class A	519,003	40,562	7.8%	7,694	0	0	$2.78
Class B	716,921	60,516	8.4%	11,454	0	0	$1.93
Class C	420,309	6,753	1.6%	11,204	0	0	$1.49
TOTAL:	**1,656,233**	**107,831**	**6.5%**	**30,352**	**0**	**0**	**$2.09**



Source: Costar, Meyers Research



Source: Costar

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Appendix

Mission 316 West, San Marcos, California

COMPETITIVE FLOORPLAN DETAIL

Appendix

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COMMUNITY SPECIFICS AND SALES PACE				FLOORPLAN SUMMARY					COMPETITIVE MARKET PRICING SUMMARY												
Project Name		**Builder Name**								Base	Current Incentives			Net Base	Net Base	Typical		Total	Monthly Payment Inputs			90.0%
Location		**Master Plan**		Size					Base	Price/	Price	Options /	Closing $ /	Price ($	Price/	Options /		Price/	Monthly	Base	Addl	4.5%
Product Details		Sales Summary		SF	Bed	Bath	Level	Pkg	Price	Sq. Ft.	Reduction	Upgrades	Other	Reduction)	Sq. Ft.	Upgrades	Premiums	SF	HOA	Tax	Taxes	Mo.Pmt.
Lucero Pacific Ridge 3-St TH		**Cornerstone Communities**		1,563	4	4.0	3	2	$495,990	$317	$0	$0	($5,000)	$495,990	$317	$20,000	$3,000	$332	$365	1.11%	0.00%	$3,416
Oceanside		**Pacific Ridge**		1,569	3	2.5	3	2	$501,990	$320	$0	$0	($5,000)	$501,990	$320	$20,000	$3,000	$335	$365	1.11%	0.00%	$3,451
Product:	Townhomes	Total Units:	125	1,824	4	3.5	3	2	$555,990	$305	$0	$0	($5,000)	$555,990	$305	$20,000	$3,000	$317	$365	1.11%	0.00%	$3,769
Configuration:	ATT	Units Sold:	34																		
		3 Months Sold:	5																		
Sales Open Date:	Apr-17	Units Remaining:	91																		
Overall Sales Rate:	1.5	% Remaining:	73%																		
3 Mon. Sales Rate:	1.7																				
		Totals/Averages:		1,652					$517,990	$314	$0	$0	($5,000)	$517,990	$314	$20,000	$3,000	$327	$365	1.11%	0.00%	$3,545
Verano at Skyline 3-St TH		**D.R. Horton**		1,183	2	2.5	3	2	$454,990	$385	$0	$0	($5,000)	$454,990	$385	$20,000	$4,000	$405	$335	1.10%	0.20%	$3,218
Vista		**Skyline**		1,515	3	3.0	3	2	$494,990	$327	$0	$0	($5,000)	$494,990	$327	$20,000	$4,000	$343	$335	1.10%	0.18%	$3,453
Product:	Townhomes	Total Units:	120	1,726	3	3.5	3	2	$524,990	$304	$0	$0	($5,000)	$524,990	$304	$20,000	$4,000	$318	$335	1.10%	0.17%	$3,629
Configuration:	ATT	Units Sold:	14	1,856	4	3.5	3	2	$553,990	$298	$0	$0	($5,000)	$553,990	$298	$20,000	$4,000	$311	$335	1.10%	0.16%	$3,800
		3 Months Sold:	8																		
Sales Open Date:	Nov-18	Units Remaining:	106																		
Overall Sales Rate:	3.6	% Remaining:	88%																		
3 Mon. Sales Rate:	2.7																				
		Totals/Averages:		1,570					$507,240	$323	$0	$0	($5,000)	$507,240	$323	$20,000	$4,000	$338	$335	1.10%	0.18%	$3,525
Avila 3-St TH		**Lennar**		1,743	3	3.5	3	2	$536,900	$308	$0	($2,500)	($2,500)	$536,900	$308	$13,000	$7,250	$318	$342	1.08%	0.00%	$3,590
Vista		-		1,799	3	3.5	3	2	$548,900	$305	$0	($2,500)	($2,500)	$548,900	$305	$13,000	$7,250	$315	$342	1.08%	0.00%	$3,660
Product:	Townhomes	Total Units:	47	1,977	4	3.5	3	2	$561,900	$284	$0	($2,500)	($2,500)	$561,900	$284	$13,000	$7,250	$293	$342	1.08%	0.00%	$3,737
Configuration:	ATT	Units Sold:	14																		
		3 Months Sold:	5																		
Sales Open Date:	Oct-18	Units Remaining:	33																		
Overall Sales Rate:	2.7	% Remaining:	70%																		
3 Mon. Sales Rate:	1.7																				
		Totals/Averages:		1,840					$549,233	$299	$0	($2,500)	($2,500)	$549,233	$299	$13,000	$7,250	$308	$342	1.08%	0.00%	$3,662

COMMUNITY SPECIFICS AND SALES PACE				FLOORPLAN SUMMARY					COMPETITIVE MARKET PRICING SUMMARY														
Project Name		**Builder Name**									Current Incentives			Net Base	Net Base	Typical				Monthly Payment Inputs			90.0%
Location		**Master Plan**		Size					Base	Base Price/	Price	Options /	Closing $ /	Price ($	Price/	Options /		Total	Total Price/	Monthly	Base	Addl	4.5%
Product Details		Sales Summary		SF	Bed	Bath	Level	Pkg	Price	Sq. Ft.	Reduction	Upgrades	Other	Reduction)	Sq. Ft.	Upgrades	Premiums	Price	SF	HOA	Tax	Taxes	Mo.Pmt.
The Collection at St Cloud 3-St TH		**Lennar**		1,322	2	2.0	3	2	$428,900	$324	$0	$0	($5,000)	$428,900	$324	$45,000	$4,000	$477,900	$361	$290	1.11%	0.00%	$3,099
Oceanside		**St Cloud**		1,521	3	3.0	3	2	$450,900	$296	$0	$0	($5,000)	$450,900	$296	$45,000	$4,000	$499,900	$329	$290	1.11%	0.00%	$3,229
Product:	Townhomes	Total Units:	80	1,521	3	3.0	3	2	$458,900	$302	$0	$0	($5,000)	$458,900	$302	$45,000	$4,000	$507,900	$334	$290	1.11%	0.00%	$3,276
Configuration:	ATT	Units Sold:	1	1,702	3	3.5	3	2	$490,900	$288	$0	$0	($5,000)	$490,900	$288	$45,000	$4,000	$539,900	$317	$290	1.11%	0.00%	$3,464
		3 Months Sold:	1	2,213	4	3.5	3	2	$550,900	$249	$0	$0	($5,000)	$550,900	$249	$45,000	$4,000	$599,900	$271	$290	1.11%	0.00%	$3,817
Sales Open Date:	Mar-19	Units Remaining:	79																				
Overall Sales Rate:	6.1	% Remaining:	99%																				
3 Mon. Sales Rate:	6.1																						
		Totals/Averages:		1,656					$476,100	$288	$0	$0	($5,000)	$476,100	$288	$45,000	$4,000	$525,100	$317	$290	1.11%	0.00%	$3,377
Hideaway at St. Cloud 3-St TH		**William Lyon Homes**		1,578	2	2.5	3	2	$464,990	$295	$0	$0	($5,000)	$464,990	$295	$18,000	$3,000	$485,990	$308	$295	1.30%	0.00%	$3,221
Oceanside		**St. Cloud**		1,685	4+L	3.0	2	2	$567,990	$337	$0	$0	($5,000)	$567,990	$337	$18,000	$3,000	$588,990	$350	$295	1.30%	0.00%	$3,841
Product:	Townhomes	Total Units:	122	1,724	3	3.5	3	2	$486,990	$282	$0	$0	($5,000)	$486,990	$282	$18,000	$3,000	$507,990	$295	$295	1.30%	0.00%	$3,354
Configuration:	ATT	Units Sold:	21	1,844	4	4.0	3	2	$569,990	$309	$0	$0	($5,000)	$569,990	$309	$18,000	$3,000	$590,990	$320	$295	1.30%	0.00%	$3,853
		3 Months Sold:	4																				
Sales Open Date:	Jul-18	Units Remaining:	101																				
Overall Sales Rate:	2.7	% Remaining:	83%																				
3 Mon. Sales Rate:	1.3																						
		Totals/Averages:		1,708					$522,490	$306	$0	$0	($5,000)	$522,490	$306	$18,000	$3,000	$543,490	$318	$295	1.30%	0.00%	$3,567
Rancho at Mission Lane 3-St TH		**Beazer Homes**		1,485	3	2.5	2	2	$465,990	$314	$0	$0	($5,000)	$465,990	$314	$15,000	$8,000	$488,990	$329	$380	1.10%	0.00%	$3,251
Oceanside		**Mission Lane**																					
Product:	Townhomes	Total Units:	50																				
Configuration:	ATT	Units Sold:	49																				
		3 Months Sold:	2																				
Sales Open Date:	Dec-17	Units Remaining:	1																				
Overall Sales Rate:	3.4	% Remaining:	2%																				
3 Mon. Sales Rate:	0.7																						
		Totals/Averages:		1,485					$465,990	$314	$0	$0	($5,000)	$465,990	$314	$15,000	$8,000	$488,990	$329	$380	1.10%	0.00%	$3,251
Citron 3-St TH		**William Lyon Homes**		1,130	2	2.5	0	2	$415,990	$368	$0	$0	($3,000)	$415,990	$368	$12,000	$3,000	$430,990	$381	$260	1.14%	0.00%	$2,803
Escondido		**-**		1,155	2	2.5	0	2	$425,990	$369	$0	$0	($3,000)	$425,990	$369	$12,000	$3,000	$440,990	$382	$260	1.14%	0.00%	$2,862
Product:	Townhomes	Total Units:	63	1,408	3	3.5	0	2	$459,990	$327	$0	$0	($3,000)	$459,990	$327	$12,000	$3,000	$474,990	$337	$260	1.14%	0.00%	$3,063
Configuration:	ATT	Units Sold:	42	1,564	3	3.0	0	2	$474,990	$304	$0	$0	($3,000)	$474,990	$304	$12,000	$3,000	$489,990	$313	$260	1.14%	0.00%	$3,152
		3 Months Sold:	10																				
Sales Open Date:	Jul-18	Units Remaining:	21																				
Overall Sales Rate:	5.3	% Remaining:	33%																				
3 Mon. Sales Rate:	3.3																						
		Totals/Averages:		1,314					$444,240	$338	$0	$0	($3,000)	$444,240	$338	$12,000	$3,000	$459,240	$349	$260	1.14%	0.00%	$2,970
Sierra 2-St TH		**KB Home**		1,679	3	2.5	2	2	$449,990	$268	$0	$0	($5,000)	$449,990	$268	$21,000	$5,000	$475,990	$283	$250	1.10%	0.00%	$3,045
Vista		**-**		1,908	3	2.5	2	2	$489,990	$257	$0	$0	($5,000)	$489,990	$257	$21,000	$5,000	$515,990	$270	$250	1.10%	0.00%	$3,279
Product:	Townhomes	Total Units:	60	1,913	3	2.5	2	2	$489,990	$256	$0	$0	($5,000)	$489,990	$256	$21,000	$5,000	$515,990	$270	$250	1.10%	0.00%	$3,279
Configuration:	ATT	Units Sold:	7																				
		3 Months Sold:	7																				
Sales Open Date:	Nov-18	Units Remaining:	53																				
Overall Sales Rate:	2.1	% Remaining:	88%																				
3 Mon. Sales Rate:	2.3																						
		Totals/Averages:		1,833					$476,657	$260	$0	$0	($5,000)	$476,657	$260	$21,000	$5,000	$502,657	$274	$250	1.10%	0.00%	$3,201

COMMUNITY SPECIFICS AND SALES PACE				FLOORPLAN SUMMARY					COMPETITIVE MARKET PRICING SUMMARY														
Project Name		**Builder Name**									Current Incentives			Net Base	Net Base	Typical				Monthly Payment Inputs			90.0%
Location		**Master Plan**		Size					Base	Base Price/	Price	Options /	Closing $ /	Price ($	Price/	Options /		Total	Total Price/	Monthly	Base	Addl	4.5%
Product Details		Sales Summary		SF	Bed	Bath	Level	Pkg	Price	Sq. Ft.	Reduction	Upgrades	Other	Reduction)	Sq. Ft.	Upgrades	Premiums	Price	SF	HOA	Tax	Taxes	Mo.Pmt.
Brisas Pacific Ridge 2-St TH		**Cornerstone Communities**		1,499	3	2.5	2	2	$526,990	$352	$0	$0	($5,000)	$526,990	$352	$22,000	$10,000	$558,990	$373	$349	1.11%	0.00%	$3,635
Oceanside		**Pacific Ridge**		1,600	3	2.5	2	2	$547,990	$342	$0	$0	($5,000)	$547,990	$342	$22,000	$10,000	$579,990	$362	$349	1.11%	0.00%	$3,759
Product:	Townhomes	Total Units:	117	1,806	3	2.5	2	2	$578,990	$321	$0	$0	($5,000)	$578,990	$321	$22,000	$10,000	$610,990	$338	$349	1.11%	0.00%	$3,941
Configuration:	ATT	Units Sold:	40																				
		3 Months Sold:	1																				
Sales Open Date:	Jan-17	Units Remaining:	77																				
Overall Sales Rate:	1.6	% Remaining:	66%																				
3 Mon. Sales Rate:	0.3																						
		Totals/Averages:		1,635					$551,323	$337	$0	$0	($5,000)	$551,323	$337	$22,000	$10,000	$583,323	$357	$349	1.11%	0.00%	$3,778
Agave The Preserve 2-St TH		**Cornerstone Communities**		1,420	3	2.5	2	2	$543,990	$383	$0	$0	($5,000)	$543,990	$383	$22,000	$4,000	$569,990	$401	$363	1.30%	0.00%	$3,795
Carlsbad		**The Preserve**		1,452	3	2.5	2	2	$550,990	$379	$0	$0	($5,000)	$550,990	$379	$22,000	$4,000	$576,990	$397	$363	1.30%	0.00%	$3,837
Product:	Townhomes	Total Units:	88	1,681	3	2.5	2	2	$619,990	$369	$0	$0	($5,000)	$619,990	$369	$22,000	$4,000	$645,990	$384	$363	1.30%	0.00%	$4,253
Configuration:	ATT	Units Sold:	68																				
		3 Months Sold:	5																				
Sales Open Date:	Nov-16	Units Remaining:	20																				
Overall Sales Rate:	2.5	% Remaining:	23%																				
3 Mon. Sales Rate:	1.7																						
		Totals/Averages:		1,518					$571,657	$377	$0	$0	($5,000)	$571,657	$377	$22,000	$4,000	$597,657	$394	$363	1.30%	0.00%	$3,962
Solara at Skyline 2-St TH		**D.R. Horton**		1,426	3	2.5	2	2	$534,990	$375	$0	$0	($5,000)	$534,990	$375	$25,000	$6,000	$565,990	$397	$335	1.10%	0.19%	$3,741
Vista		**Skyline**		1,538	3	2.5	2	2	$553,990	$360	$0	$0	($5,000)	$553,990	$360	$25,000	$6,000	$584,990	$380	$335	1.10%	0.19%	$3,852
Product:	Townhomes	Total Units:	79	1,576	3	2.5	2	2	$563,990	$358	$0	$0	($5,000)	$563,990	$358	$25,000	$6,000	$594,990	$378	$335	1.10%	0.18%	$3,911
Configuration:	ATT	Units Sold:	2																				
		3 Months Sold:	1																				
Sales Open Date:	Dec-18	Units Remaining:	77																				
Overall Sales Rate:	0.6	% Remaining:	97%																				
3 Mon. Sales Rate:	0.3																						
		Totals/Averages:		1,513					$550,990	$364	$0	$0	($5,000)	$550,990	$364	$25,000	$6,000	$581,990	$385	$335	1.10%	0.19%	$3,834
Blue Sage The Preserve Triplex		**Cornerstone Communities**		1,533	3	2.5	2	2	$568,990	$371	$0	$0	($5,000)	$568,990	$371	$34,000	$20,000	$622,990	$406	$413	1.08%	0.22%	$4,164
Carlsbad		**The Preserve**		1,610	3	2.5	2	2	$601,990	$374	$0	$0	($5,000)	$601,990	$374	$34,000	$20,000	$655,990	$407	$413	1.08%	0.22%	$4,363
Product:	Townhomes	Total Units:	102	1,843	3	2.5	2	2	$661,990	$359	$0	$0	($5,000)	$661,990	$359	$34,000	$20,000	$715,990	$388	$413	1.08%	0.22%	$4,724
Configuration:	ATT	Units Sold:	18																				
		3 Months Sold:	4																				
Sales Open Date:	Feb-18	Units Remaining:	84																				
Overall Sales Rate:	1.4	% Remaining:	82%																				
3 Mon. Sales Rate:	1.3																						
		Totals/Averages:		1,662					$610,990	$368	$0	$0	($5,000)	$610,990	$368	$34,000	$20,000	$664,990	$400	$413	1.08%	0.22%	$4,417

COMMUNITY SPECIFICS AND SALES PACE				FLOORPLAN SUMMARY					COMPETITIVE MARKET PRICING SUMMARY														
Project Name		**Builder Name**									Current Incentives			Net Base	Net Base	Typical				Monthly Payment Inputs			90.0%
Location		**Master Plan**		Size					Base	Base Price/	Price	Options /	Closing $ /	Price ($	Price/	Options /		Total	Total Price/	Monthly	Base	Addl	4.5%
Product Details		Sales Summary		SF	Bed	Bath	Level	Pkg	Price	Sq. Ft.	Reduction	Upgrades	Other	Reduction)	Sq. Ft.	Upgrades	Premiums	Price	SF	HOA	Tax	Taxes	Mo.Pmt.
Kensington at the Square 3-St TH		**Shea**		1,670	3	3.5	3	2	$638,000	$382	$0	$0	($2,500)	$638,000	$382	$27,000	$10,000	$675,000	$404	$370	1.30%	0.00%	$4,434
Carlsbad		**Bressi Ranch**		1,731	3+L	3.0	3	2	$665,000	$384	$0	$0	($2,500)	$665,000	$384	$27,000	$10,000	$702,000	$406	$370	1.30%	0.00%	$4,597
Product:	Townhomes	Total Units:	103	2,081	3	3.5	3	2	$720,000	$346	$0	$0	($2,500)	$720,000	$346	$27,000	$10,000	$757,000	$364	$370	1.30%	0.00%	$4,928
Configuration:	ATT	Units Sold:	20																				
		3 Months Sold:	6																				
Sales Open Date:	Oct-18	Units Remaining:	83																				
Overall Sales Rate:	4.6	% Remaining:	81%																				
3 Mon. Sales Rate:	2.0																						
		Totals/Averages:		1,827					$674,333	$369	$0	$0	($2,500)	$674,333	$369	$27,000	$10,000	$711,333	$389	$370	1.30%	0.00%	$4,653
Kensington at The Square Flats		**Shea Homes**		763	1	1.0	0	1	$465,000	$609	$0	$0	($2,500)	$465,000	$609	$20,000	$10,000	$495,000	$649	$573	1.30%	0.00%	$3,553
Carlsbad		**Bressi Ranch**		988	2	2.0	0	2	$500,000	$506	$0	$0	($2,500)	$500,000	$506	$20,000	$10,000	$530,000	$536	$573	1.30%	0.00%	$3,764
Product:	Stacked Flats	Total Units:	22	1,290	3	2.0	0	2	$545,000	$422	$0	$0	($2,500)	$545,000	$422	$20,000	$10,000	$575,000	$446	$573	1.30%	0.00%	$4,035
Configuration:	ATT	Units Sold:	20	1,314	2	2.0	0	2	$550,000	$419	$0	$0	($2,500)	$550,000	$419	$20,000	$10,000	$580,000	$441	$573	1.30%	0.00%	$4,065
		3 Months Sold:	5																				
Sales Open Date:	Aug-18	Units Remaining:	2																				
Overall Sales Rate:	3.0	% Remaining:	9%																				
3 Mon. Sales Rate:	1.7																						
		Totals/Averages:		1,089					$515,000	$473	$0	$0	($2,500)	$515,000	$473	$20,000	$10,000	$545,000	$501	$573	1.30%	0.00%	$3,855
Palomar 2-St TH		**Beazer**		1,366	3	2.5	2	2	$473,990	$347	$0	$0	($8,000)	$473,990	$347	$15,000	$1,500	$490,490	$359	$294	1.10%	0.00%	$3,174
Oceanside		**Mission Lane**		1,432	3	2.5	2	2	$483,990	$338	$0	$0	($8,000)	$483,990	$338	$15,000	$1,500	$500,490	$349	$294	1.10%	0.00%	$3,232
Product:	Townhomes	Total Units:	86	1,535	4	2.5	2	2	$497,990	$324	$0	$0	($8,000)	$497,990	$324	$15,000	$1,500	$514,490	$335	$294	1.10%	0.00%	$3,315
Configuration:	ATT	Units Sold:	7																				
		3 Months Sold:	3																				
Sales Open Date:	Oct-18	Units Remaining:	79																				
Overall Sales Rate:	1.6	% Remaining:	92%																				
3 Mon. Sales Rate:	1.0																						
		Totals/Averages:		1,444					$485,323	$336	$0	$0	($8,000)	$485,323	$336	$15,000	$1,500	$501,823	$347	$294	1.10%	0.00%	$3,240
Vela at Mission Lane Duplex		**Beazer Homes**		1,545	3	2.5	2	2	$506,990	$328	$0	$0	($8,000)	$506,990	$328	$15,000	$1,500	$523,490	$339	$292	1.10%	0.00%	$3,365
Oceanside		**Mission Lane**		1,642	3	2.5	2	2	$521,990	$318	$0	$0	($8,000)	$521,990	$318	$15,000	$1,500	$538,490	$328	$292	1.10%	0.00%	$3,454
Product:	Attached	Total Units:	64	1,826	4	3.0	2	2	$531,990	$291	$0	$0	($8,000)	$531,990	$291	$15,000	$1,500	$548,490	$300	$292	1.10%	0.00%	$3,512
Configuration:	ATT	Units Sold:	7																				
		3 Months Sold:	2																				
Sales Open Date:	Oct-18	Units Remaining:	57																				
Overall Sales Rate:	1.5	% Remaining:	89%																				
3 Mon. Sales Rate:	0.7																						
		Totals/Averages:		1,671					$520,323	$311	$0	$0	($8,000)	$520,323	$311	$15,000	$1,500	$536,823	$321	$292	1.10%	0.00%	$3,444

Meyers RESEARCH
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COMMUNITY SPECIFICS AND SALES PACE				FLOORPLAN SUMMARY					COMPETITIVE MARKET PRICING SUMMARY													
Project Name		**Builder Name**									Current Incentives			Net Base	Net Base	Typical			Total	Monthly Payment Inputs			90.0%
Location		**Master Plan**		Size					Base	Base Price/	Price	Options /	Closing $ /	Price ($	Price/	Options /		Total	Price/	Monthly	Base	Addl	4.5%
Product Details		Sales Summary		SF	Bed	Bath	Level	Pkg	Price	Sq. Ft.	Reduction	Upgrades	Other	Reduction)	Sq. Ft.	Upgrades	Premiums	Price	SF	HOA	Tax	Taxes	Mo.Pmt.
Pepper Tree at Mission Lane		**Beazer Homes**		1,790	3	2.5	2	2	$560,990	$313	$0	$0	($5,000)	$560,990	$313	$30,000	$11,000	$601,990	$336	$177	1.10%	0.20%	$3,802
Oceanside		**Mission Lane**		1,962	4	2.5	2	2	$574,990	$293	$0	$0	($5,000)	$574,990	$293	$30,000	$11,000	$615,990	$314	$177	1.10%	0.20%	$3,886
Product:	Detached Cond	Total Units:	83	2,157	4	4.0	2	2	$614,990	$285	$0	$0	($5,000)	$614,990	$285	$30,000	$11,000	$655,990	$304	$177	1.10%	0.20%	$4,127
Configuration:	2,400	Units Sold:	53																			
Lot Dimensions:	40x60	3 Months Sold:	8																			
Sales Open Date:	Jul-17	Units Remaining:	30																			
Overall Sales Rate:	2.8	% Remaining:	36%																			
3 Mon. Sales Rate:	2.7																					
		Totals/Averages:		1,970					$583,657	$296	$0	$0	($5,000)	$583,657	$296	$30,000	$11,000	$624,657	$317	$177	1.10%	0.20%	$3,938
Altura Pacific Ridge		**Cornerstone Communities**		1,771	3	2.5	2	2	$627,990	$355	$0	$0	($6,000)	$627,990	$355	$25,000	$17,500	$670,490	$379	$136	1.11%	0.00%	$4,078
Oceanside		**Pacific Ridge**		1,864	3	2.5	2	2	$634,990	$341	$0	$0	($6,000)	$634,990	$341	$25,000	$17,500	$677,490	$363	$136	1.11%	0.00%	$4,119
Product:	Single Family	Total Units:	72	2,021	3	2.5	2	2	$659,990	$327	$0	$0	($6,000)	$659,990	$327	$25,000	$17,500	$702,490	$348	$136	1.11%	0.00%	$4,266
Configuration:	4,000	Units Sold:	13																			
		3 Months Sold:	5																			
Sales Open Date:	Mar-18	Units Remaining:	59																			
Overall Sales Rate:	1.2	% Remaining:	82%																			
3 Mon. Sales Rate:	1.7																					
		Totals/Averages:		1,885					$640,990	$340	$0	$0	($6,000)	$640,990	$340	$25,000	$17,500	$683,490	$363	$136	1.11%	0.00%	$4,154
Francia at Mission Lane		**Beazer Homes**		2,348	3	2.5	2	2	$667,990	$284	$0	$0	($5,000)	$667,990	$284	$12,500	$7,500	$687,990	$293	$375	1.11%	0.00%	$4,419
Oceanside		**Mission Lane**		2,395	4	2.5	2	2	$672,990	$281	$0	$0	($5,000)	$672,990	$281	$12,500	$7,500	$692,990	$289	$375	1.11%	0.00%	$4,449
Product:	Single Family	Total Units:	59	2,665	4	3.0	2	3	$710,490	$267	$0	$0	($5,000)	$710,490	$267	$12,500	$7,500	$730,490	$274	$375	1.11%	0.00%	$4,669
Configuration:	4,900	Units Sold:	48																			
Lot Dimensions:	50x80	3 Months Sold:	9																			
Sales Open Date:	Jul-17	Units Remaining:	11																			
Overall Sales Rate:	2.5	% Remaining:	19%																			
3 Mon. Sales Rate:	3.0																					
		Totals/Averages:		2,469					$683,823	$277	$0	$0	($5,000)	$683,823	$277	$12,500	$7,500	$703,823	$285	$375	1.11%	0.00%	$4,513
Rancho Tesoro Masterplan		**Brookfield Residential**		2,211	3	2.5	2	2	$664,000	$300	$0	$0	($5,000)	$664,000	$300	$45,119	$10,000	$719,119	$325	$195	1.60%	0.00%	$4,687
San Marcos		**Rancho Tesoro**		2,392	4	3.5	2	2	$694,500	$290	$0	$0	($5,000)	$694,500	$290	$45,119	$10,000	$749,619	$313	$195	1.60%	0.00%	$4,877
Product:	Single Family	Total Units:	346	2,458	4	3.0	2	2	$708,000	$288	$0	$0	($5,000)	$708,000	$288	$45,119	$10,000	$763,119	$310	$195	1.60%	0.00%	$4,962
Configuration:	-	Units Sold:	240	2,550	4	3.0	2	2	$687,000	$269	$0	$0	($5,000)	$687,000	$269	$45,119	$10,000	$742,119	$291	$195	1.60%	0.00%	$4,830
		3 Months Sold:	21	2,646	4	3.0	2	2	$738,000	$279	$0	$0	($5,000)	$738,000	$279	$45,119	$10,000	$793,119	$300	$195	1.60%	0.00%	$5,149
Sales Open Date:	Jun-17	Units Remaining:	106	2,691	4	3.0	2	2	$798,000	$297	$0	$0	($5,000)	$798,000	$297	$45,119	$10,000	$853,119	$317	$195	1.60%	0.00%	$5,524
Overall Sales Rate:	11.4	% Remaining:	31%	2,801	4	3.0	2	2	$755,900	$270	$0	$0	($5,000)	$755,900	$270	$45,119	$10,000	$811,019	$290	$195	1.60%	0.00%	$5,261
3 Mon. Sales Rate:	7.0			3,009	5	3.5	2	2	$748,000	$249	$0	$0	($5,000)	$748,000	$249	$45,119	$10,000	$803,119	$267	$195	1.60%	0.00%	$5,211
				3,044	5	4.0	2	2	$783,900	$258	$0	$0	($5,000)	$783,900	$258	$45,119	$10,000	$839,019	$276	$195	1.60%	0.00%	$5,436
				3,182	5	3.5	2	2	$815,900	$256	$0	$0	($5,000)	$815,900	$256	$45,119	$10,000	$871,019	$274	$195	1.60%	0.00%	$5,636
				3,305	5	4.0	2	2	$780,900	$236	$0	$0	($5,000)	$780,900	$236	$45,119	$10,000	$836,019	$253	$195	1.60%	0.00%	$5,417
				3,359	5	3.5	3	2	$840,000	$250	$0	$0	($5,000)	$840,000	$250	$45,119	$10,000	$895,119	$266	$195	1.60%	0.00%	$5,786
				3,550	5	3.5	2	2	$888,000	$250	$0	$0	($5,000)	$888,000	$250	$45,119	$10,000	$943,119	$266	$195	1.60%	0.00%	$6,086
		Totals/Averages:		2,861					$761,700	$266	$0	$0	($5,000)	$761,700	$266	$45,119	$10,000	$816,819	$285	$195	1.60%	0.00%	$5,297

The following key team members participated on this analysis:

Tim Sullivan, Managing Principal, oversees our Advisory practice. With over three decades of experience, Mr. Sullivan is an expert in residential and mixed use feasibility studies, strategic planning and product development, and regularly conducts market analyses around the United States and internationally.

Alexis Wilmot, Manager, has 16 years of experience in real estate development, and a strong background in financial analysis of residential home building markets. Her career has focused on master-planned communities, transit oriented development, infill and mixed-use projects, and affordable housing development, both new construction and acquisition rehabilitation.

Mason Brusseau, Analyst, conducts analysis on a variety of product types while aiding the advisory team.

Additional support was provided as needed.

COMPANY EXPERIENCE

Appendix

Meyers Research, a Kennedy Wilson Company, is a nation-wide research firm guiding real estate investors throughout the country. Our highly educated and experienced consulting staff believes in providing the highest quality service possible to our clients, which means completing the exact analysis they need. Based in Beverly Hills, we are home to over 140 experts in 10 offices across the country.

Our company offers a unique research tool known as Zonda that offers an edge to our research with easy access real-time data at a local level across the United States. Our local Zonda database provides our team with a history of new and resale housing information, maps, comprehensive data, and many other metrics we use in our analyses to begin the reporting process with greater accuracy -- quickly, accurately and cost-effectively -- with on the ground and in person research. Zonda provides access to over 275 metrics influencing the housing industry including monthly and annual historical trends, future projections and real-time narrative reported by seasoned analysts across the country.

Our senior executive team are thought leaders that individually have more than 30 years of experience in housing and real estate research. With our advisory services, we have navigated builders through different housing cycles and have a deep understanding of local markets. Our consulting team has a broad range of housing expertise and experience spanning the country including consumer research, feasibility studies, portfolio valuation, business planning, and custom research designed to make better decisions related to any real estate investment.

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Zonda and Our Research

- Competitive Analysis throughout the Country
- Exclusive Access to our Research & Consulting Executives
- Metro Analysis & Housing Trends
- Apartment Analysis & Forecast
- Exclusive Client Events
- Presentations & Webinars
- Proprietary Surveys

Advisory

- For-Sale, Apartment, Commercial & Mixed Use
- Resort & International Development
- Strategic Direction & Planning
- Home Builder Operations Assessment
- Demand Analysis
- Consumer Research & Focus Groups
- Custom Economic Analysis & Forecasting
- Litigation Support & Expert Witness
- Financial Modeling
- Project & Product Positioning

Consumer and Product Strategy

- Consumer and Product Insights
- Tactical and Marketing Strategies
- Product Design Advisory
- Custom Consumer Research
- Customer Shop Research

Thank you!

This analysis was prepared by Meyers Research, LLC, a Kennedy Wilson company.