

Appendix J. Traffic Impact Analysis

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TRANSPORTATION IMPACT ANALYSIS

MARJA ACRES

Carlsbad, California
March 26, 2019

LLG Ref. 3-16-2608

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EXECUTIVE SUMMARY

The Marja Acres Project (“Project”) proposes the development of 252 townhomes, and 46 age-restricted multi-family units, along with a maximum of 10,000 square feet (SF) of retail/commercial redevelopment on the site. The site is currently developed with about 12,370 SF of commercial space. The Project site is located in the city of Carlsbad, on the south side of El Camino Real between Kelly Drive and West Ranch Road/ Lisa Street.

The Project study area includes six (6) intersections and four (4) street segments along El Camino Real. The transportation analyses for the Project were conducted in accordance with the *City of Carlsbad Transportation Impact Analysis Guidelines*. The following scenarios are evaluated in this report:

- Existing
- Existing + Project
- Existing + Cumulative
- Existing + Cumulative + Project

The gross Project trip generation was calculated using SANDAG’s *Not So Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region* (April 2002) and ITE’s *Trip Generation Manual* (10th ed.). Net trip generation was calculated by deducting trips associated with the existing on-site uses. The net Project is calculated to generate 2,059 daily trips with 178 trips (43 inbound / 135 outbound) in the AM peak hour and 173 trips (129 inbound / 44 outbound) during the PM peak hour.

This report evaluated the effect of the Project on the Existing and Existing + Cumulative baselines using the two distinct analyses needed to meet requirements for both the City of Carlsbad Growth Management and the California Environmental Quality Act (CEQA). Two cumulative scenarios were evaluated. One cumulative scenario utilized the existing street network while the second assumed completion of the planned College Boulevard extension. A multi-modal level of service (MMLOS) was also conducted for El Camino Real based on City guidelines, as is a discussion of the requisite requirement for a Transportation Demand Management plan.

Based on City of Carlsbad and regional SANTEC/ITE significance criteria, ***no significant direct or cumulative Project impacts are calculated.***

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TRANSPORTATION IMPACT ANALYSIS

MARJA ACRES

Carlsbad, California

March 26, 2019

1.0 INTRODUCTION

1.1 Project Description

The Project proposes to construct 252 townhomes, and 46 age-restricted multi-family units (298 total units) along with 10,000 SF of retail/commercial and restaurant redevelopment (6,000 SF of Specialty Retail use and 4,000 SF of “sit-down, high-turnover” restaurant) on the site.

The Project site located on the south side of El Camino Real between Kelly Drive and West Ranch Road/ Lisa Street, directly across from Robertson Ranch. The major intersections to the east and west are Cannon Road and Tamarack Avenue, respectively. Project access is proposed via two unsignalized right-in/right-out driveways to El Camino Real, consistent with the existing development.

The site is currently developed with an existing 12,370 SF retail/commercial center that includes the following uses:

- Convenience Market (liquor store) – 2,700 SF
- Specialty Retail (bicycle shop and guitar shop) – 6,370 SF
- Sit-down, High Turnover Restaurant – 3,300 SF

Figure 1–1 shows the vicinity map. **Figure 1–2** shows a more detailed Project area map. **Figure 1–3** shows the Project site plan.

1.2 Project Impact Analyses

Two distinct analyses are needed to meet requirements for City of Carlsbad Growth Management and the California Environmental Quality Act (CEQA). Both analyses are included in this traffic impact analysis.

The Growth Management Plan analysis is based on the *City of Carlsbad Traffic Impact Analysis Guidelines*, which outlines evaluation of facilities based on their typologies, and it defines analysis methodologies, thresholds of significance, and other necessary considerations. Roadway segment analysis, signalized intersection analysis (queuing at turn lanes), and multimodal level of service (LOS) are included in this portion of the report.

The CEQA Analysis is based on the Carlsbad historic use of thresholds of significance in the *SANTEC/ITE Guidelines for Traffic Impact Studies in the San Diego Region*, March 2000. Facilities are evaluated based on Table 1 of the *SANTEC/ITE Guidelines*. For roadway segments analysis capacity is evaluated using the City of Carlsbad Roadway Capacity Tables (same analysis as is

required for Growth Management). Intersection LOS is evaluated based on the most recent version of the *Highway Capacity Manual* (HCM) methodology. No multi-modal analysis is required for this portion of the report.

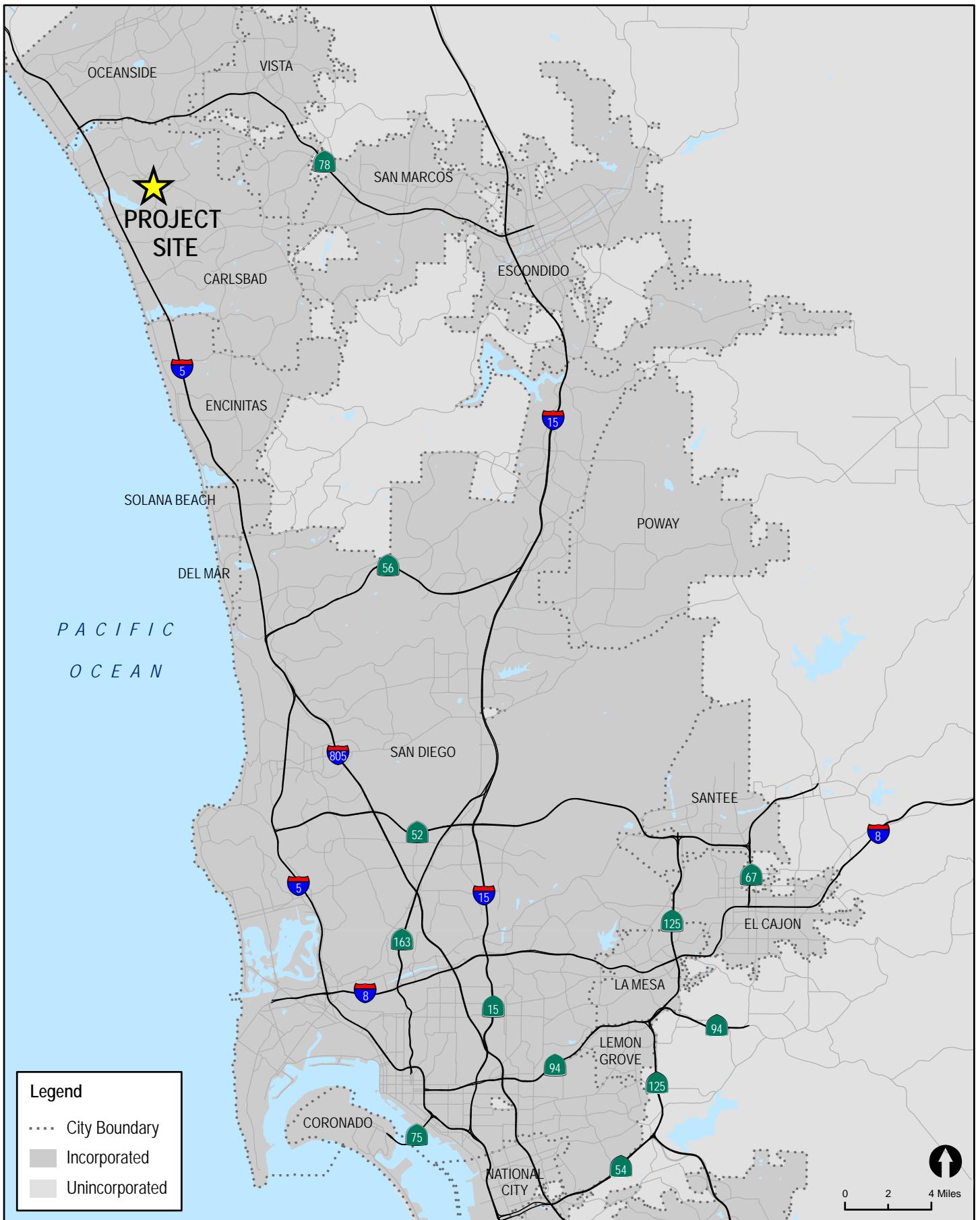
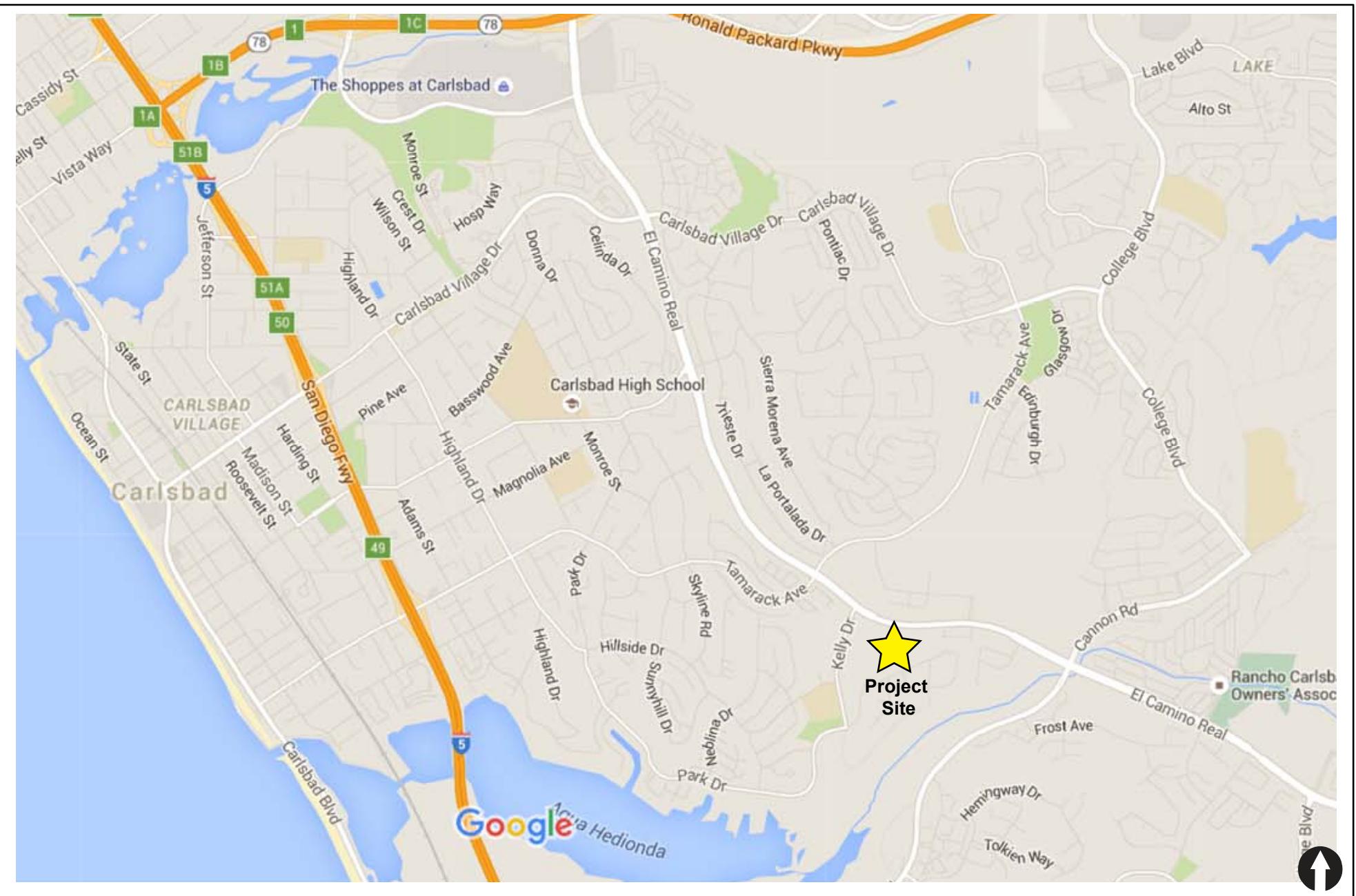
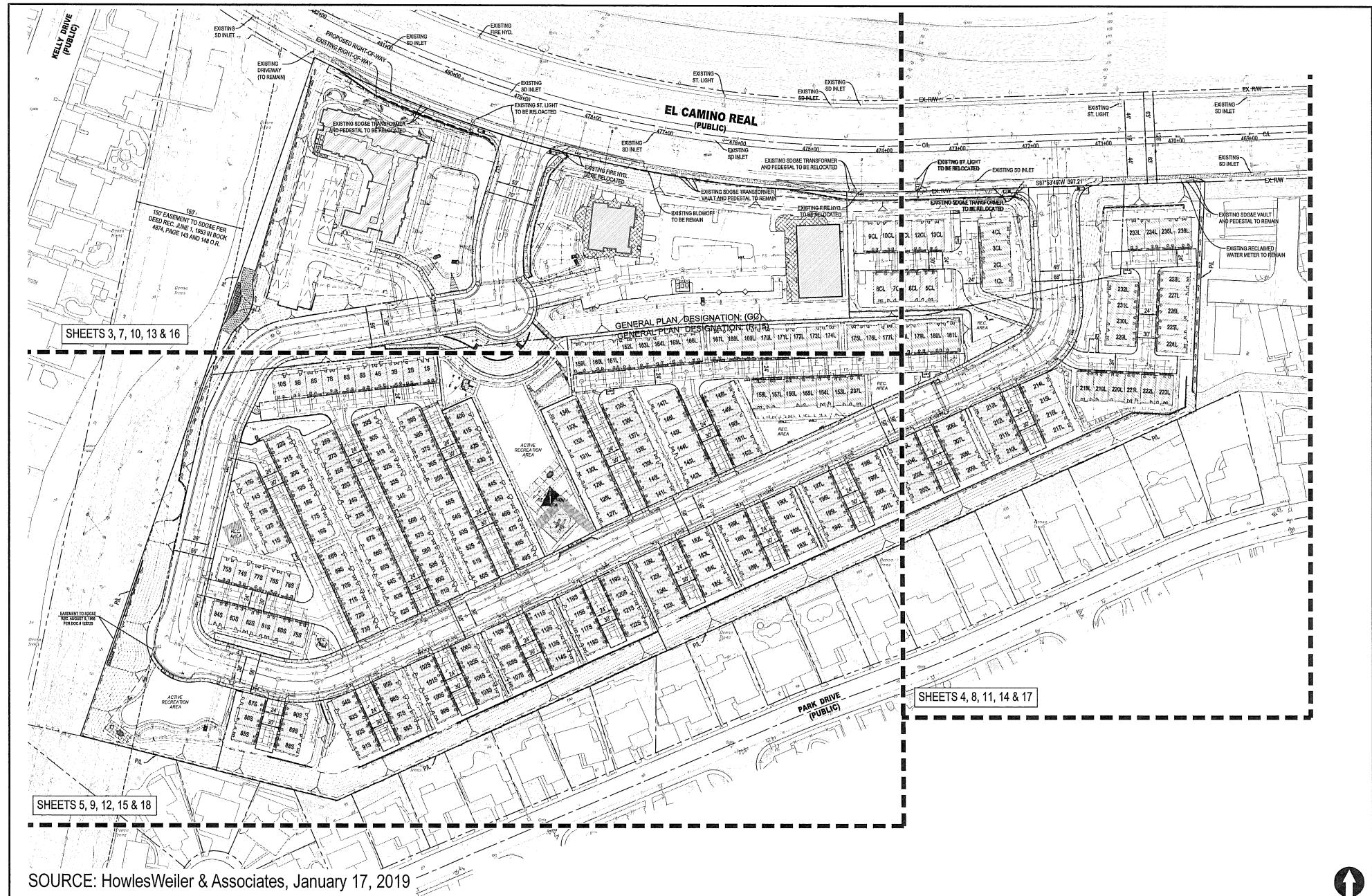


Figure 1-1

Vicinity Map

MARJA ACRES





SOURCE: HowlesWeiler & Associates, January 17, 2019



Figure 1-3

Site Plan

2.0 ANALYSIS APPROACH & METHODOLOGY

As discussed in *Section 1.2* above, two distinct analyses are provided to address both the City's Growth Management Plan and State of California CEQA requirements. Each of these approaches evaluates components of the street system, but using different methodologies. The following is a discussion of these methodologies.

2.1 Auto Analysis per City TIA Guidelines (Growth Management Plan)

The following summarizes the evaluation methodologies to be used per the *City of Carlsbad Transportation Impact Analysis Guidelines*, consistent with the City's adopted Growth Management Plan.

2.1.1 Study Area

Per the City of Carlsbad TIA Guidelines, the study area shall include the following:

Intersections

- All signalized intersections within 0.25 miles of a project access point serving vehicles will be included in the study area. Additional intersections within 0.25 to 0.5 miles from the project access points may also be added to the study area at the discretion of the City Engineer / City Traffic Engineer.
- Unsignalized intersections located along corridors subject to Auto MMLOS within the project study area may require a traffic signal warrant analysis. A warrant analysis is required if:
 - The unsignalized intersection provides direct access to the project site, or
 - The unsignalized intersection provides direct access to a cumulative project considered in the Transportation Impact Analysis
 - The unsignalized intersection has been identified by the City as a potential signalized intersection.

A warrant analysis is not required for right turn in/right turn out only intersections or driveways that are physically restricted by a raised center median.

Street Segments

- Non-freeway roadway segments that are subject to Auto MMLOS Criteria and expected to experience an increase in project traffic equal to 50 or more peak hour trips in either direction of travel.

Freeway Mainline Segments

- Freeway mainline segments where the project adds 50 or more peak hour trips in either direction of travel.

Freeway Ramps

- Freeway entrance and exit ramps where the proposed project will add 20 or more peak-hour trips and/or cause any traffic queues to exceed ramp storage capacities.

Based on these guidelines, the following auto facilities are included in the study area for Growth Management Plan analysis:

Intersections

- El Camino Real / Tamarack Avenue (signalized)
- El Camino Real / Kelly Drive (signalized)
- El Camino Real / West Ranch Road (signalized)
- El Camino Real / Cannon Road (signalized)

Street Segments (El Camino Real: 6-lane Arterial)

- Tamarack Avenue to Kelly Drive
- Kelly Drive to Project Driveways
- Project Driveways to West Ranch Road
- West Ranch Road to Cannon Road

The two (2) unsignalized project access driveways are right turn in//right turn out only and restricted by a raised center median. Thus, per the City guidelines, no warrant analysis of these intersections is required.

2.1.2 Signalized Intersection Methodology

The City of Carlsbad's published TIA Guidelines state that all signalized intersections within the study area are subject to the signalized intersection analysis. The analysis will address the adequacy of the signalized intersection geometry to serve the existing, forecast and project traffic through the intersection. As stated previously, all signalized intersection within 0.25 miles of the project auto access driveway or intersection shall be evaluated if the project adds trips to the left turn or right turning movements at the intersection. The signalized study area will be based on trip generation and trip assignment for the project. Analyses will be based on the following criteria:

- **Left turn queue assessment:** Compare the left turn volume with the length of the left turn pocket(s). A general rule of thumb of one foot per left turning vehicle per lane may be used for this analysis.
- **Left turn volume:** If the left turn volume exceeds 250 vehicles per hour, a second left turn lane is recommended.
- **Right turn volume:** If the right turn volume exceeds 150 vehicles per hour, a dedicated right turn lane is recommended.

2.1.3 Roadway Segment Level of Service Methodology

The City of Carlsbad's published TIA Guidelines state that roadways within the Project study area subject to Auto MMLOS standards shall be evaluated using the most current version of the Highway Capacity Manual, as outlined in the City's General Plan Mobility Element (2015). Roadway Capacity Tables derived from the Highway Capacity Manual were developed specifically for each roadway subject to MMLOS in the City of Carlsbad. The specific capacity calculated for each

roadway takes into account key geometric and operational factors including number of lanes, type of facility, intersection cycle length, distance between intersections, and other factors related to lane capacity and signal operations. The capacity for each roadway segment was calculated using the ARTPLAN software, which was developed using the capacity calculations outlined in the HCM. The ARTPLAN software package is used nationally as a planning tool, but alternative methods can be used to calculate roadway segment capacity.

The *City of Carlsbad Segment LOS Capacity Threshold* table provides the directional capacity for each roadway segment subject to MMLOS analysis in the General Plan Mobility Element. To evaluate the operating conditions along a study corridor, peak hour volumes are compared to the Roadway Capacity Tables to determine the segment operating conditions. The LOS for each segment is reported for all study scenarios in the TIA.

Appendix A contains the City of Carlsbad Segment LOS Capacity Threshold table.

2.2 Auto Analysis per SANTEC/ITE Guidelines (CEQA)

2.2.1 Study Area

Per the SANTEC/ITE Guidelines for Traffic Impact Studies in the San Diego Region, the study area must include:

- All local roadway segments (including all State surface routes), intersections, and mainline freeway locations where the proposed project will add 50 or more peak hour trips in either direction to the existing roadway traffic.
- All freeway entrance and exit ramps where the proposed project will add 20 or more peak hour trips.

Based on the Project's trip generation and distribution (*Section 4.0*), the following locations are included in the Project study area for CEQA Analysis:

Intersections

- El Camino Real / Tamarack Avenue
- El Camino Real / Kelly Drive
- El Camino Real / W. Project Driveway
- El Camino Real / E. Project Driveway
- El Camino Real / West Ranch Road
- El Camino Real / Cannon Road

Street Segments

El Camino Real

- Tamarack Avenue to Kelly Drive
- Kelly Drive to Project Driveways
- Project Driveways to West Ranch Road
- West Ranch Road to Cannon Road

2.2.2 Signalized Intersection Methodology

Signalized intersections were analyzed under AM and PM peak hour conditions. Average vehicle delay was determined utilizing the methodology found in Chapter 19 of the *Highway Capacity Manual 6th Edition (HCM 6)*, with the assistance of the *Synchro 10* computer software. The delay values (represented in seconds) are presented for the pre-and-post Project conditions. A more detailed explanation of the methodology is attached in *Appendix B*.

2.2.3 Unsignalized Intersection Methodology

Unsignalized intersections were analyzed under AM and PM peak hour conditions. Average vehicle delay was determined based upon the procedures found in Chapter 20 and Chapter 21 of the *HCM 6* with the assistance of the *Synchro 10* computer software. A more detailed explanation of the methodology is also attached in *Appendix B*.

2.2.4 Roadway Segment Methodology

The City of Carlsbad has historically evaluated street segment LOS by evaluating the volume-to-capacity ratio for peak hour traffic.

The City has updated the capacity table utilized for the “Volume/Capacity”, or “V’C” method with development of the recent *City of Carlsbad Segment LOS Capacity Threshold* table also utilized in the Growth Management Plan roadway LOS methodology described above in Section 2.1.3.

2.3 Multimodal Level of Service Analysis

The City of Carlsbad requires multimodal level of service (MMLOS) evaluation for pedestrian, bicycle and transit/rideshare users of the public roadway system. The City organizes the street network by a system of “typologies”, as defined by the *City of Carlsbad Mobility Element*. Depending on the typology, different streets may require different MMLOS evaluations. For each roadway user set (pedestrian, bicycle, transit), general criteria groups have been identified. **Table 2-1** shows a summary of the criteria for each roadway user set.

TABLE 2-1
MULTIMODAL LEVEL OF SERVICE CRITERIA

Roadway Users		
Pedestrian	Bicycle	Transit/Ridesharing
Accessibility & Functionality	Street Characteristics	Access
Street Characteristics	Facility (each side of street)	Connectivity
Crossing Characteristics	Bikeway Design	Transit Priority
Other Elements	Connectivity/Contiguity	Service
–	Adjacent Vehicle Parking	Amenities
–	Other Elements.	Bicycle Accommodations
–	–	Available Mobility Services

Source: *City of Carlsbad*.

Each roadway's typography is evaluated for the particular set of roadway users based on sub-criteria, which is assigned "typology points". The following represents examples of sub-criteria within the "Transit and Ridesharing" general criteria group with corresponding points assigned:

- *Access – "ADA compliant sidewalk or path to transit stops in both directions" (15 points assigned)*
- *Connectivity – "Multiple transit routes on segment" (10 points assigned)*
- *Transit Priority – "Dedicated right of way" (5 points assigned)*
- *Service – "Commute shuttle service provided during the morning and afternoon commute periods" (10 points assigned)*
- *Amenities – "Covered bus stops" (5 points assigned)*
- *Bicycle Accommodations – "Bike parking available at the bus stop" (5 points assigned)*
- *Available Mobility Services – "On demand rideshare services available" (10 points assigned)*

The MMLOS analysis evaluates each of the sub-criteria, totals the points for the subject street typology, and compares the points to the City's MMLOS Point System and LOS Rating, shown in **Table 2–2**. This table assigns a qualitative LOS to several ranges of points, similar to the application of LOS to ranges in delay for CEQA-analysis intersection operations.

TABLE 2–2
MMLOS POINT SYSTEM & LOS RATING

<i>Point Score</i>	<i>LOS</i>
90-100	A
80-90	B
70-80	C
60-70	D
50-60	E
0-50	F

Source: City of Carlsbad

The City's Mobility Element calls for each street typology to achieve LOS D or better operations for each general criteria group. It should be noted that scores in excess of 100 points can be achieved.

2.3.1 Study Area

The following roadway in the study area was identified for MMLOS evaluation:

- ***El Camino Real*** is identified in the Mobility Element as an "Arterial Street". Based on the City's criteria for MMLOS evaluation, it is subject to the following MMLOS "LOS D Standards" and corresponding analyses:
 - Transit/Ridesharing

Thus, El Camino Real is not evaluated based on City standards for the following MMLOS elements:

- Pedestrian MMLOS Criteria
- Bicycle MMLOS Criteria

Figure 2–1 shows the MMLOS study area.

2.4 Thresholds of Significance

2.4.1 TIA Guidelines (Growth Management Plan)

The City of Carlsbad Growth Management Program “Citywide Facilities and Improvements Plan (last amended August 22, 2017)” states that the performance standard for the circulation system is as follows:

Implement a comprehensive livable streets network that serves all users of the system – vehicles, pedestrians, bicycles and public transit. Maintain LOS D or better for all modes that are subject to this multi-modal level of service (MMLOS) standard, as identified in Table 3-1 of the General Plan Mobility Element, excluding LOS exempt intersections and streets approved by the City Council.

Thus, the Growth Management Plan’s standard for all non-exempt street system facilities is LOS D. To comply with the Growth Management Program, all roadway facilities identified as not meeting the performance standard (LOS D) in the existing conditions scenario must be fully mitigated regardless of the project impact to that facility, or the TIA must request an exemption from the LOS D standard according to the Mobility Element Implementing Policy 3-P.9.

The project causes a significant impact to the transportation facility in the study area if one or more of the following criteria is met:

- The roadway facility is projected to exceed the LOS D standard and the project’s traffic meets or exceeds the thresholds of significance listed in *Table 2-3*; or
- A ramp meter delay exceeds 15 minutes and the project’s traffic meets or exceeds the thresholds of significance listed in *Table 2-3*; or
- The addition of project results in a change in LOS from acceptable (LOS D or better) to deficient (LOS E or F) on a roadway segment, freeway segment or ramp; or
- The project results in a change in conditions on a roadway segment, freeway segment or ramp that exceeds the allowable thresholds (outlined in *Table 2-3*) for locations operating at a deficient LOS without the project (baseline conditions).

TABLE 2-3
MEASURE OF SIGNIFICANT PROJECT TRAFFIC IMPACTS – ROADWAYS SUBJECT TO THE VEHICLE MMLOS STANDARD

Auto Facility Subject to MMLOS Thresholds	Threshold of Significance
Roadway Segment	Any trip added to a segment forecast to operate at deficient LOS requires project mitigation; Project mitigation will be determined based on project contribution to the identified impact.
Freeway Segment	1% increase in V/C or 1 mph decrease in speed
Ramp Meter	2-minute increase

Source: Table 6 – Carlsbad TIA Guidelines (FINAL), April 2018.

The project can have either a direct or cumulative impact as follows:

- **Direct Impacts:** any significant impact identified under existing conditions. Direct impacts shall be fully mitigated by the project.
- **Cumulative Impacts:** any significant impact identified under Cumulative and Horizon Year conditions. Cumulative impacts may be mitigated through fair share contribution. Projects identified for fair share contribution should be included in the City's Capital Improvement Program (CIP) or Transportation Impact Fee (TIF) program.

Any roadway section that is identified as having a significant impact must either:

- Mitigate the traffic impact to pre-project conditions, or
- Request LOS exemption from City Council for the LOS standard and identify feasible TSM & TDM mitigation

Because of the qualitative nature of the MMLOS methodology, a project impact is significant if an existing pedestrian, bicycle or transit facility is determined to not meet the LOS D standard regardless of the forecasted number of project trips expected to use the facility. An impact occurs and is deemed significant if:

- An existing facility in the project study area does not meet the pedestrian, bicycle or transit LOS standard, or
- The project causes a standard facility to become substandard (e.g., removal of an existing bike lane or bus stop, or blocking pedestrian access), or
- A gap is identified in or directly adjacent to the study area related to pedestrian, bicycle or transit service to the project site.

2.4.2 SANTEC/ITE Guidelines (CEQA Method)

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 2–4** 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 2–4*, 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 2–4
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:

- 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.
- 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.
- The impact is only considered significant if the total delay exceeds 15 minutes.

General Notes:

- 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.
- LOS = Level of Service

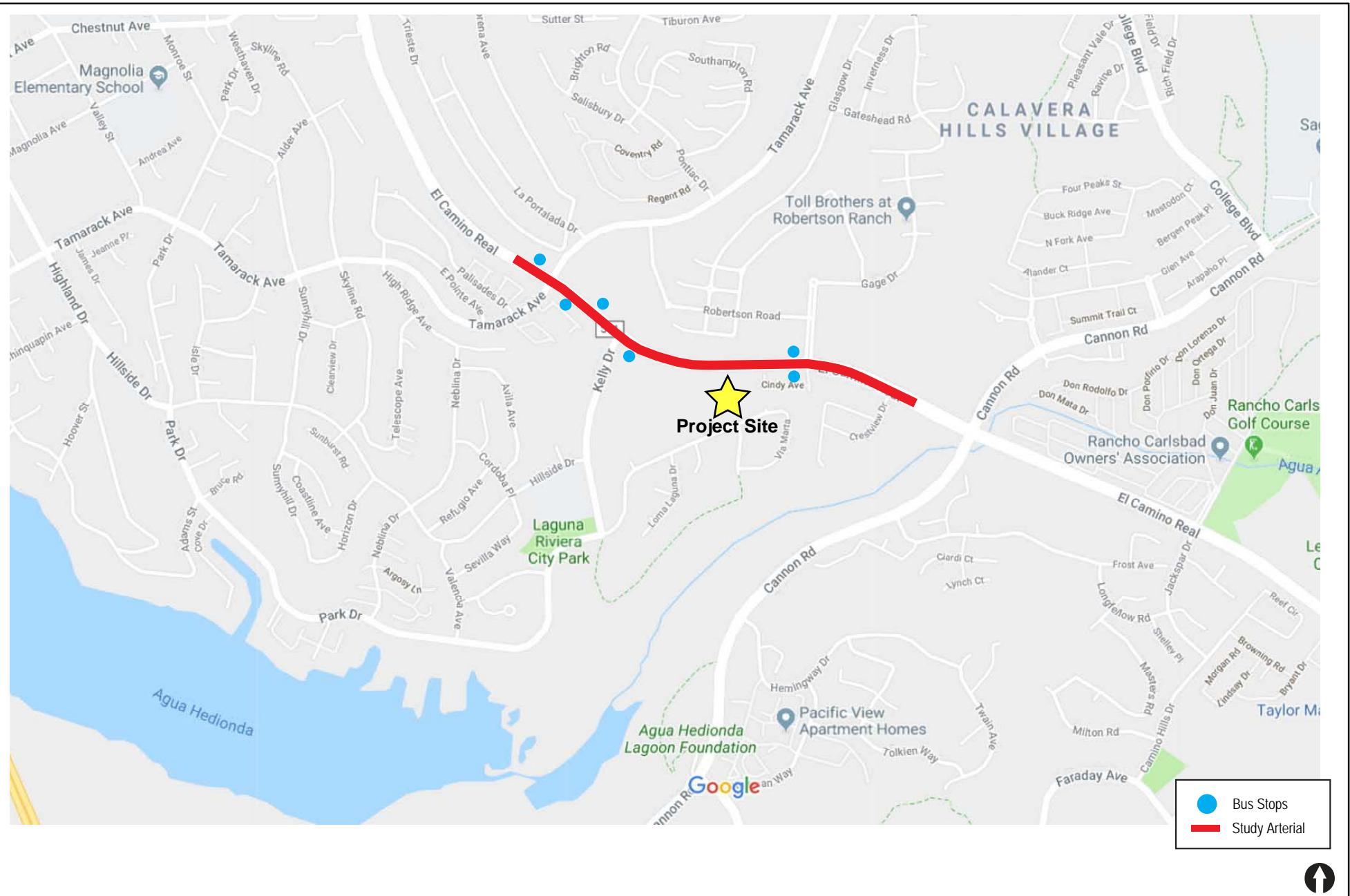


Figure 2-1

MMLOS Study Area

MARJA ACRES

3.0 EXISTING CONDITIONS

This section presents existing transportation conditions for street system components identified for either Growth Management, CEQA, or Multi-Modal analysis.

3.1 Existing Street Network

The following is a description of the major roadways within the study area. *Figure 3-1* illustrates existing conditions in the study area in terms of traffic lanes and intersection controls.

El Camino Real is classified as an Arterial Street on the *City of Carlsbad Mobility Element*. Within the study area, El Camino Real is currently constructed as a six-lane divided roadway with a raised center median. The posted speed limit is 55 mph. Bike lanes are provided in both directions of travel and on-street parking is not allowed on El Camino Real.

El Camino Real in the Project vicinity was recently improved to its buildout 6-lane Arterial Street standard as part of the Robertson Ranch development located across the street from the Proposed Project. As such, intersection configurations, lane widths, bike lane and bus stop configurations, pedestrian sidewalk and crosswalk facilities are considered built out to City standards throughout the study area.

It should be noted that a third westbound through lane on El Camino Real at its intersection with Cannon Road is planned and is anticipated to be completed prior to the Project's approval or construction. However, as it is not yet constructed, this lane is not assumed as an existing baseline condition for analysis in this report.

Tamarack Avenue is classified as a Neighborhood Connector Street on the *City of Carlsbad Mobility Element*. Within the study area, Tamarack Avenue is currently constructed as a four-lane roadway. The posted speed limit is 45 mph north of El Camino Real and 35 mph south of El Camino Real. Curbside parking is not permitted. Bike lanes and bus stops are provided.

Kelly Drive is classified as a School Street the *City of Carlsbad Mobility Element*. Within the study area, Kelly Drive is currently constructed as a two-lane roadway with center TWLTL median. The posted speed limit is 25 mph. Curbside parking and bike lanes are provided. The north leg of the intersection currently serves a limited amount of construction-related traffic associated with the Robertson Ranch project and will ultimately serve as a project driveway for that development.

West Ranch Road is an unclassified roadway in the *City of Carlsbad Mobility Element*. West Ranch Road is currently constructed as two-lane divided roadway and serves as an access point for the Robertson Ranch residential community. There is no posted speed limit. Curbside parking is not permitted. West Ranch Road is located opposite Lisa Street, a single access point for a gated community on the opposite (south) side of El Camino Real.

Cannon Road is classified as an Arterial Street in the *City of Carlsbad Mobility Element*. Within the study area, Cannon Road is currently constructed as a four-lane divided roadway. The posted speed limit is 50 mph. Curbside parking is not permitted. Bike lanes and bus stops are provided.

Cannon Road in the vicinity of El Camino Real currently serves as an interim detour route for north-south traffic using College Boulevard, located east of Cannon Road. College Boulevard is currently missing a segment between Cannon Road and El Camino Real, and until this extension is constructed by adjacent development, sub-standard operating conditions will occur in this area, particularly at the El Camino Real/ Cannon Road signalized intersection.

3.2 Existing Traffic Volumes

AM/PM peak hour intersection counts at all study area intersections were commissioned on Tuesday, November 13, 2018 while schools in the area were in session and the current phases of Robertson Ranch located directly to the north were developed. Daily traffic volumes (ADT) on El Camino Real in the study area were also conducted on the same date.

Figure 3-2 shows the Existing Traffic Volumes. **Appendix C** contains the intersection and segment count sheets.

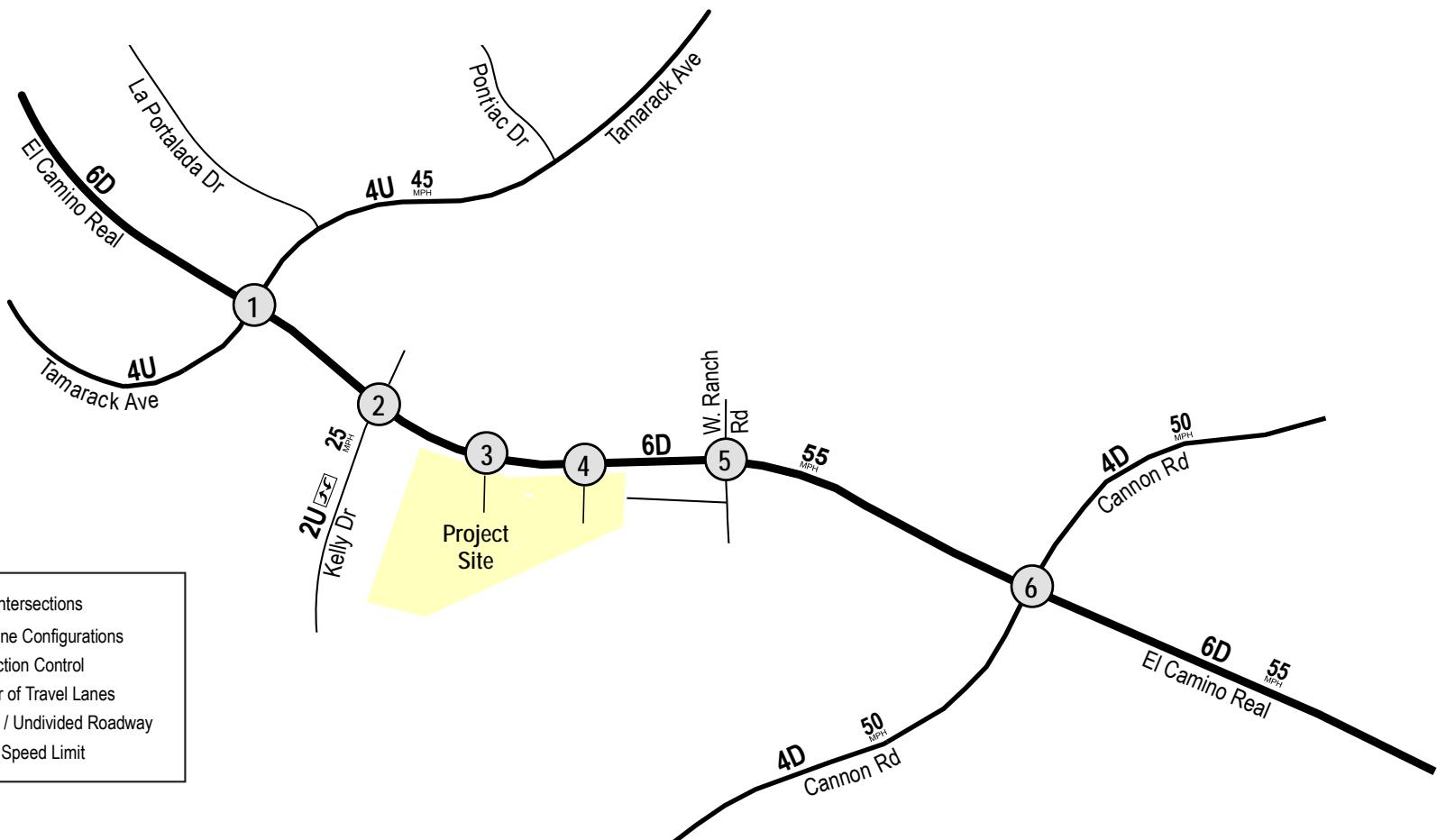
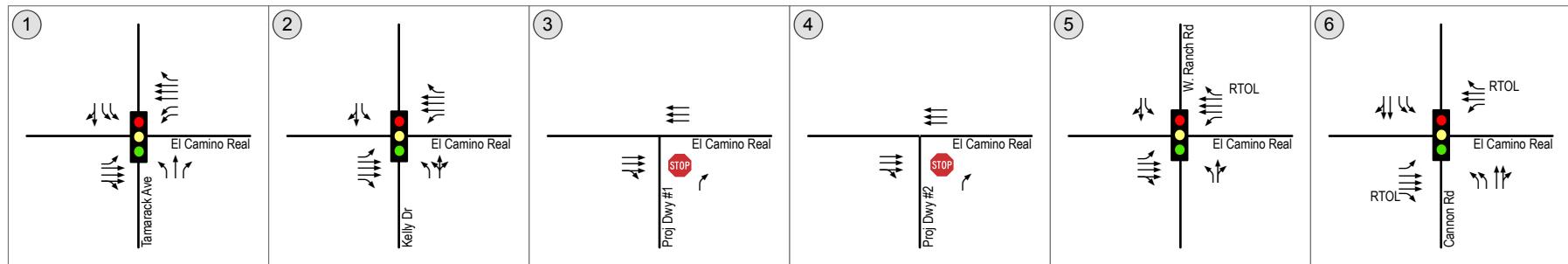
3.3 Existing Transit Conditions

Transit schedules for the local serving Route 309 and 323 Bus Services are included in **Appendix D**.

Route 309 provides service from Oceanside to Encinitas via El Camino Real, serving the El Camino Real SPRINTER Station. Service is provided seven days a week at approximately 30 minute headways throughout the day, with hourly headways in the late evenings.

Route 323 provides service from the College Boulevard SPRINTER Station to Quarry Creek. Additional stops including Carlsbad High School and Sage Creek High School are served on school days during the regular school year. Service is at approximately hourly headways Monday through Friday. Route 323 does not operate on Saturdays, Sundays, or holidays.

The nearest stops to the Project for both routes are located on El Camino Real at Kelly Drive and at West Ranch Road/Lisa Street. Improvements (shelters, trash cans) are present at 3 of the 4 stops located adjacent to the Project.



(1)	47 / 21 ↓ 189 / 130 ↑ 401 / 130 ↓ 47 / 34 ↑ 136 / 126 ↓ 280 / 176 ↑ 40 / 45 ↓ 2,074 / 607 ↑ 2,074 / 607 ↓ 40 / 45	El Camino Real
(2)	8 / 2 ↓ 2 / 0 ↑ 2,704 / 720 ↓ 107 / 72	El Camino Real
(3)	4 / 0 ↓ 619 / 1,885 ↑ 176 / 166 ↓ 89 / 47 ↑ 255 / 94 ↓ 2,892 / 773 ↑ 9 / 28 ↓ 7 / 19 ↑ Proj Drwy #1	El Camino Real
(4)	803 / 2,024 ↓ 2,894 / 785 ↑ 5 / 7 ↓ 5 / 17 ↑ Proj Drwy #2	El Camino Real
(5)	52 / 22 ↓ 1 / 0 ↑ 19 / 43 ↓ 36 / 47 ↑ 2,832 / 740 ↓ 0 / 1 ↑ 0 / 0 ↓ 1 / 1 ↑ W. Ranch Rd	El Camino Real
(6)	39 / 65 ↓ 754 / 2,002 ↑ 3 / 13 ↓ 108 / 52 ↑ 2,289 / 585 ↓ 453 / 154 ↑ 100 / 55 ↓ 170 / 342 ↑ 184 / 544 ↓ 82 / 86 ↑ Cannon Rd ↓ Cannon Rd	El Camino Real

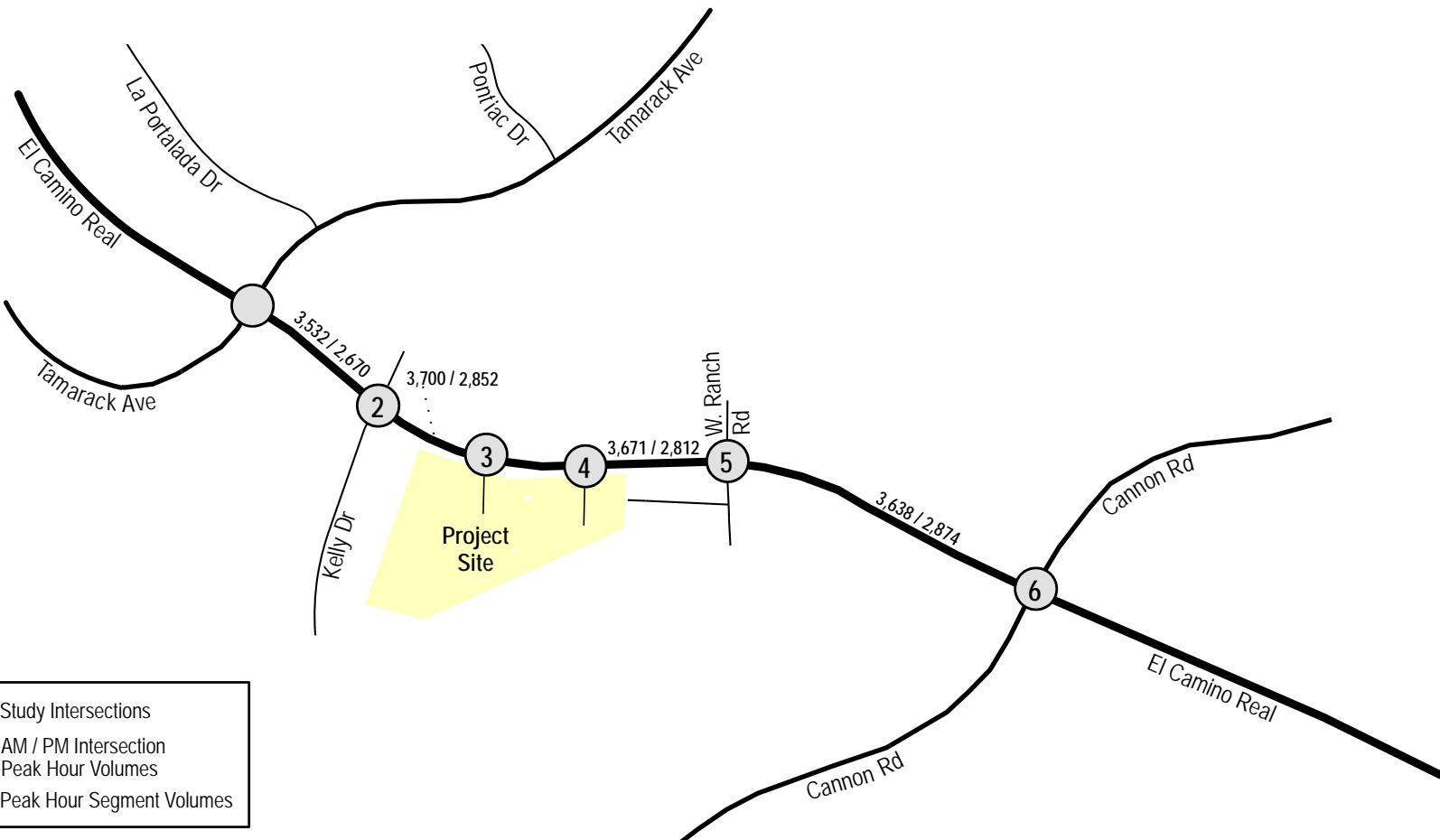


Figure 3-2

Existing Traffic Volumes

MARJA ACRES

4.0 PROPOSED PROJECT

4.1 Trip Generation

The Project proposes the construction of 298 residential dwelling units and 10,000 SF of commercial space. The residential units will be composed of 252 market rate townhomes, and 46 affordable age-restricted multi-family units. The townhomes are analyzed under the “Condominium” trip generation rate found in the SANDAG “Brief Guide”, based on an approximate residential density of 17 DU/acre for these units. The senior apartments are analyzed using the “Senior Adult Housing – Attached” rate from the national ITE Trip Generation Manual, as SANDAG does not provide a rate for that unique land use. Instead, SANDAG provides a rate for “retirement community” which is typically a larger, stand-alone age-restricted single-family home community as opposed to reduced-rate senior apartments as proposed. **Appendix E** contains the ITE trip generation rates. The commercial space is currently proposed as 6,000 SF of specialty retail uses, and 4,000 SF of sit-down/high-turnover restaurant use.

Trip generation estimates for the Project were based on the SANDAG’s *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region* (April 2002). The standard reduction of 10% was applied to the gross trip generation volumes based on SANDAG guidance for mixed-use developments where residential and commercial retail are combined. This is a relatively modest mixed-use reduction that reflects both the mixed-use economies of the Project site itself, and the larger mixed-use economies that could be expected given the unique location of the retail uses adjacent to existing and future residences such as those at Robertson Ranch.

The site is currently developed with approximately 12,370 sf of commercial space consisting of a restaurant, convenience/liquor store, bicycle shop, and guitar repair shop. The trip generation of the existing land uses was tabulated directly by using the peak hour counts conducted at the site driveways. Average daily trips (ADT) were calculated assuming the combined AM and PM total peak hour trips represent 16% of the daily trips (8% in each peak hour on average).

Table 4-1 tabulates the net Project traffic generation. Net of reductions for mixed-use and the existing on-site land uses, the Project is calculated to generate 2,063 ADT with 44 inbound / 136 outbound trips during the AM peak hour and 130 inbound / 43 outbound trips during the PM peak hour.

TABLE 4-1
PROJECT TRIP GENERATION SUMMARY

Land Use	Quantity	Daily Driveway Trips (ADT)		AM Peak Hour					PM Peak Hour				
		Rate	Volume	Rate	In:Out	Volume			Rate	In:Out	Volume		
					Split	In	Out	Total			Split	In	Out
Townhomes (Condominium) ^a	252 DU	8/DU	2,016	8%	2:8	32	129	161	10%	7:3	141	61	202
Apartment ^b	46 DU	3.7/DU	170			3	6	9			7	5	12
Specialty Retail ^c	6,000 SF	40/ksf	240	3%	6:4	4	3	7	9%	5:5	11	11	22
Restaurant (Sit-down, high turnover)	4,000 SF	160/ksf	640	8%	5:5	26	25	51	8%	6:4	31	20	51
<i>Subtotal:</i>	—	—	3,070	—	—	65	163	228	—	—	190	97	287
<i>Mixed-Use Reduction (10%)^d</i>	—	—	(307)	—	—	(7)	(16)	(23)	—	—	(19)	(10)	(29)
<i>Existing Traffic to be Removed^e</i>	—	—	(700)	—	—	(15)	(12)	(27)	—	—	(42)	(43)	(85)
<i>Net New Traffic</i>	—	—	2,059	—	—	43	135	178	—	—	129	44	173

Source: SANDAG (Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region (April 2002).

Footnotes:

- a. Condominium rate applies to “any multi-family 6-20 DU/acre”.
- b. Senior Adult Housing – Attached (Land Use 252). ITE Trip Generation Manual, 10th Edition (See Appendix E).
- c. Specialty retail rate applies to proposed “bike shop” and unspecified retail
- d. SANDAG allows a mixed-use reduction of 10% “where residential and commercial retail are combined”. The Project proposes 10,000 SF of total commercial for 298 residential units.
- e. Existing traffic is calculated based on actual peak hour driveway counts (November 2017). Existing daily traffic estimated from peak hour counts.

General Notes:

- ksf = Thousand Square Feet
- ADT = Average Daily Trips

4.2 Trip Distribution

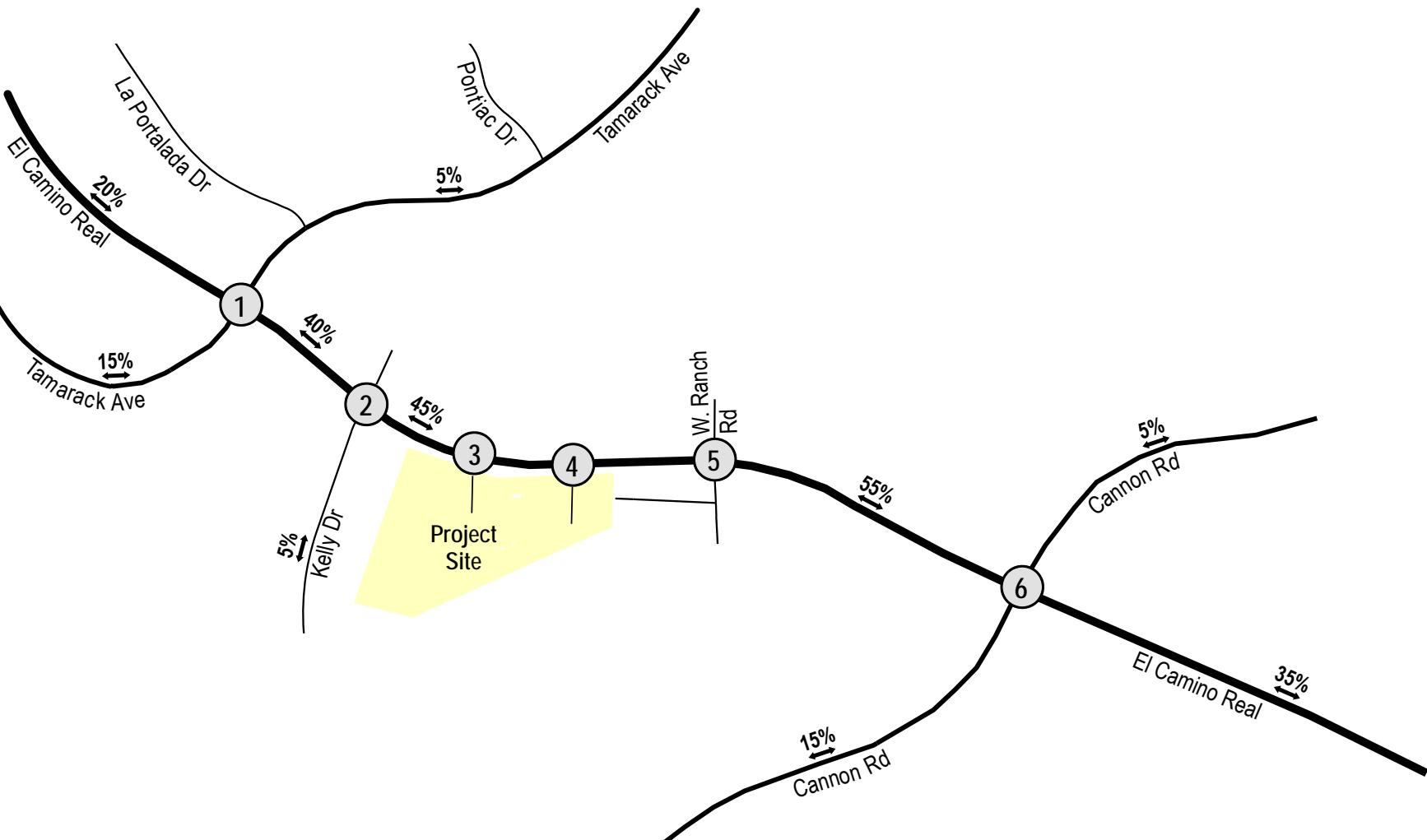
The Project's distribution was developed using engineering judgment informed by the Project land uses (residential, age-restricted residential, retail and restaurant), as well as existing traffic patterns at the study area intersections. The Project's residential components are intended to provide both infill (apartments) and senior housing, both of which are anticipated to generate both regional trips to the Interstate 5 corridor and locally-oriented trips along the El Camino Real corridor.

Some Project traffic has been distributed to/from the Kelly Elementary school located south of El Camino Real on Kelly Drive through the El Camino Real/ Kelly Drive signalized intersection to reflect potential school and/or cut through trips to Tamarack Drive. The intersection is evaluated, but Kelly Drive is classified as a School Street per the City of Carlsbad Mobility Element; therefore, it is not subject to level of service standards for vehicles.

It should also be noted that the raised median on El Camino Real restricts left turns to and from the Project site. The adjacent signalized intersections at West Ranch Road/Lisa Street to the east and Kelly Drive to the west will serve the resulting U-turn movements.

4.3 Trip Assignment

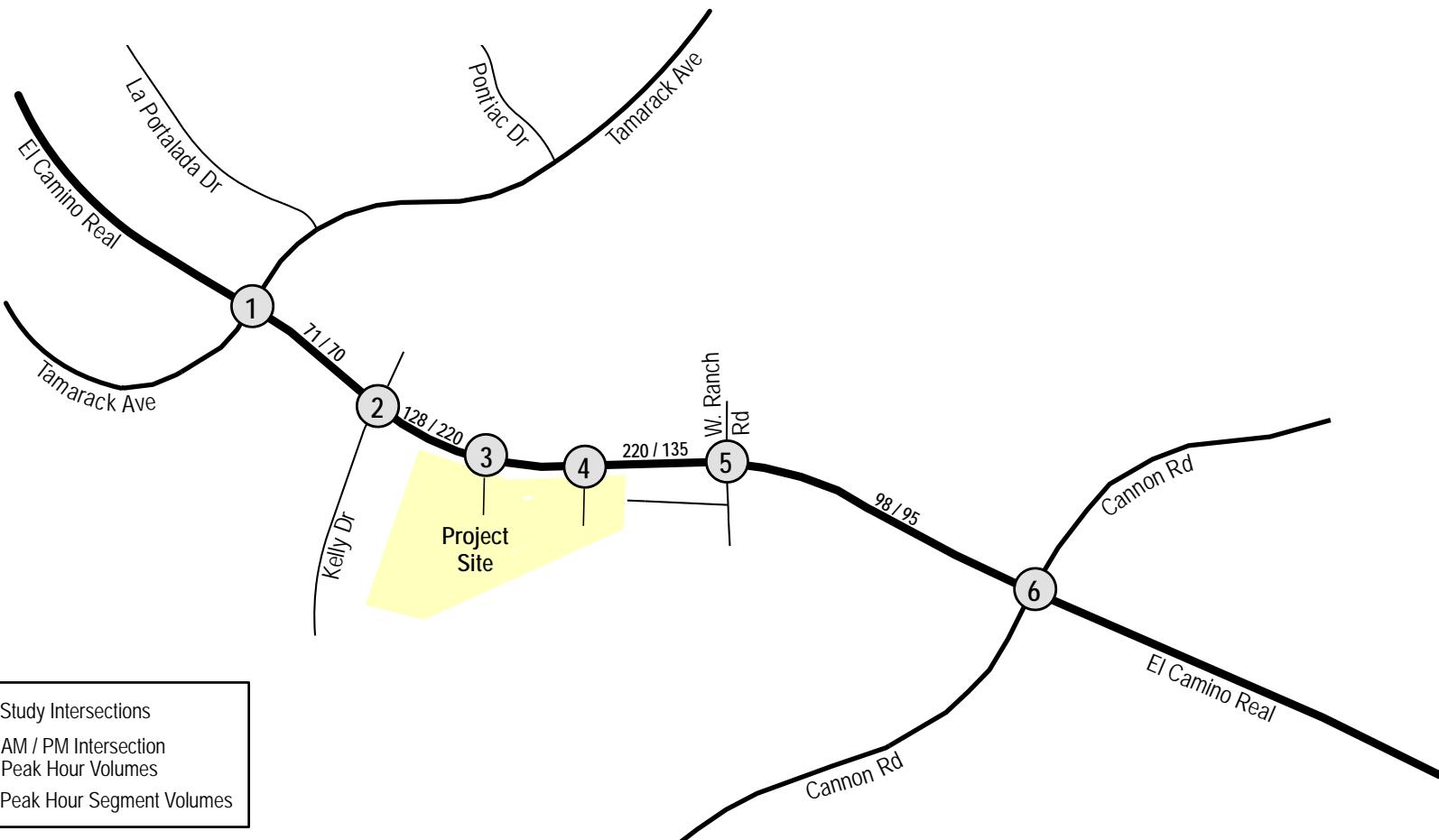
The Project traffic generation in *Table 4-1* was assigned to the street system based on the trip distribution presented in **Figure 4-1**. The resulting assignment of AM/PM peak hour Project volumes is shown on **Figure 4-2**. Existing + Project traffic volumes are presented on **Figure 4-3**.



Study Intersections
 XX% Local Project Distribution



(1)					
9 / 27 → Tamarack Ave 6 / 19 ↘	2 / 6 7 / 2 27 / 9 20 / 7	El Camino Real			
	17 / 52 → Kelly Dr 2 / 6 ↘	El Camino Real	54 / 18 31 / 73		
			22 / 65 → 21 / 64	85 / 91 Proj Dwy #1 68 / 22 ↘	El Camino Real
				68 / 22 → 22 / 65 ↘	El Camino Real
				67 / 22 Proj Dwy #2	
					W. Ranch Rd
				61 / 20 ↘ 74 / 24 →	El Camino Real
					24 / 71
					7 / 2 ↗ 47 / 15 → 20 / 7 ↘
					Cannon Rd 6 / 19 ↗
					16 / 46



Study Intersections
 AM / PM → AM / PM Intersection
 Peak Hour Volumes
 AM / PM Peak Hour Segment Volumes

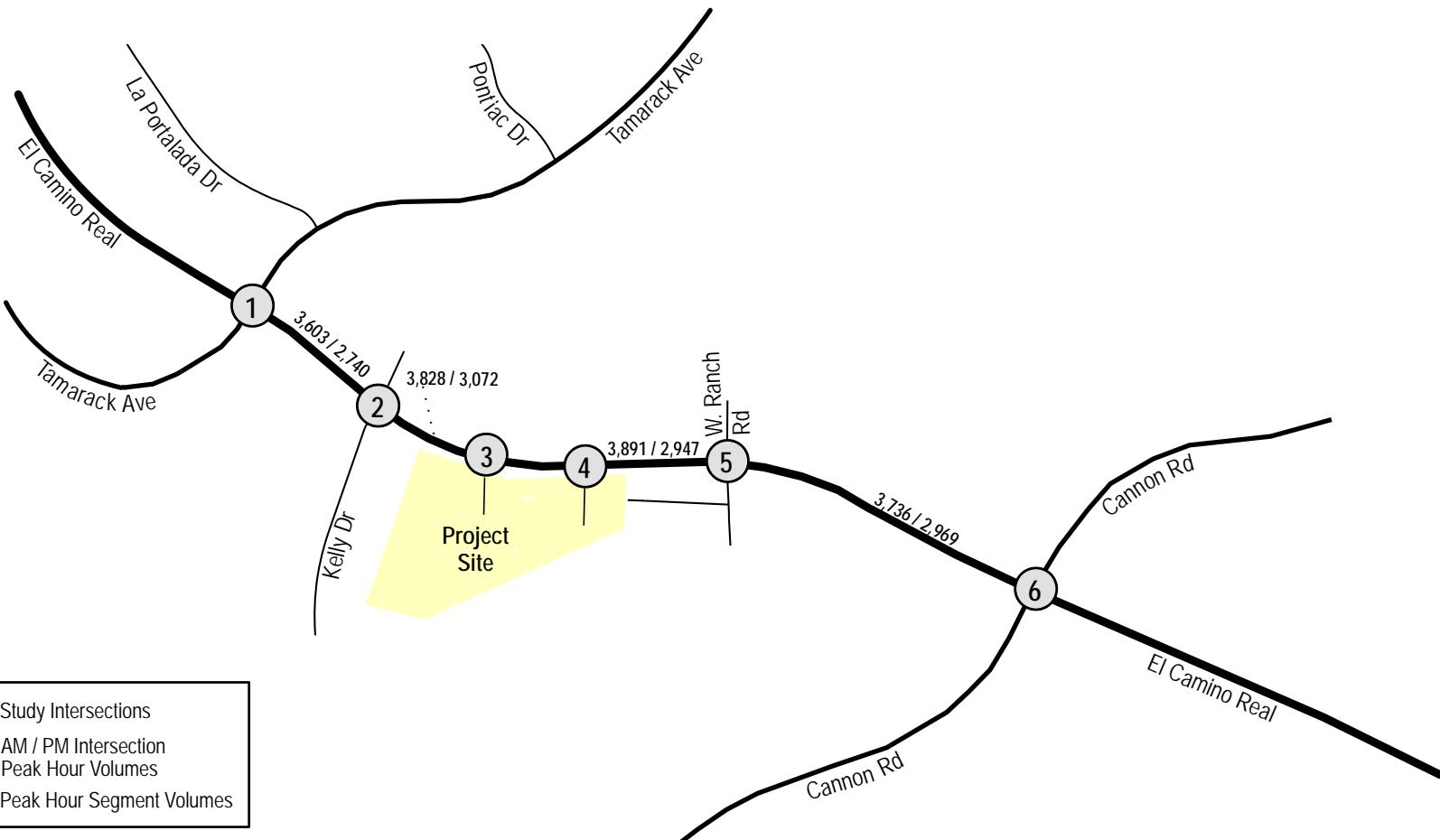


Figure 4-2

Project Traffic Volumes

MARJA ACRES

(1)	47 / 21 ↓ 189 / 130 ↑ 403 / 136	139 / 247 ↑ 468 / 1,493 ↓ 166 / 156
	40 / 40 ↗ 2,083 / 634 → 40 / 45 ↘	Tamarack Ave 47 / 34 ↗ 136 / 126 → 286 / 95 ↘
(2)	8 / 2 2 / 0 ↗ 2,721 / 772 → 107 / 72 ↘	4 / 0 673 / 1,903 207 / 239
(3)	2,914 / 838 → 30 / 92 ↘	888 / 2,115 Proj Driv #1 75 / 41 ↗
(4)	2,962 / 807 → 27 / 72 ↘	888 / 2,115 El Camino Real Proj Driv #2 72 / 39 ↗
(5)	97 / 67 ↗ 2,906 / 764 → 0 / 1 ↘	52 / 22 1 / 0 ↗ 19 / 43 W. Ranch Rd 39 / 65 778 / 2,073 3 / 13
(6)	107 / 57 ↗ 2,336 / 600 → 473 / 161 ↘	110 / 58 709 / 216 982 / 334 Cannon Rd 176 / 301 ↗ 184 / 544 → 82 / 86 ↘



5.0 CUMULATIVE CONDITIONS

The analyses is conducted for potential cumulative development conditions; one with the existing street network, and one with the future College Boulevard extension (and associated development projects) is included. The following sections describe each.

5.1 Cumulative Projects – Existing Street Network

To determine Near-Term (Existing + Cumulative) conditions, LLG coordinated with the City of Carlsbad to identify approved or pending projects that will add traffic to the Project study area in the near-term (Project opening day) condition. For the purposes of this analysis, Near-Term for the Project is considered to be 2025 (approximately five years from the date of this study), when the following six (6) cumulative projects identified for inclusion in Near-Term conditions would be considered built and occupied. **Table 5–1** lists and describes each cumulative project.

For *Existing Street Network* conditions, **Figure 5–1** shows the total cumulative projects peak hour traffic volumes. **Figure 5–2** shows the peak hour traffic volumes for the “Existing + Cumulative Projects” scenario. **Figure 5–3** shows the peak hour traffic volumes for the “Existing + Cumulative Projects + Project” scenario.

The total cumulative traffic volumes for the Robertson Ranch development, located opposite the Project, are depicted in a figure in **Appendix F**.

5.2 Cumulative Projects – With College Boulevard Extension

An additional four (4) cumulative projects are located on the planned future extension of College Boulevard.

- Cantarini Ranch
- Holly Springs
- Dos Colinas
- Encinas Creek Apartment Homes

These projects will require the construction of the College Boulevard extension between Cannon Road and El Camino Real. The College Boulevard extension will serve to relieve the existing traffic volumes on El Camino Real between College Boulevard and Cannon Road, thereby improving operations at the El Camino Real / Cannon Road intersection in the study area. Thus, it is considered a worst-case analysis to evaluate the cumulative conditions scenario using the existing street network without the extension of College Boulevard.

However, as these four cumulative projects are approved and could move forward at any time, a cumulative conditions scenario with the extension of College Boulevard and the associated development projects that would construct it was evaluated. **Table 5–2** lists and describes the projects included in the cumulative analysis with the College Boulevard extension.

For *With College Boulevard Extension* conditions, **Figure 5–4** shows the total cumulative projects peak hour traffic volumes. **Figure 5–5** shows the peak hour traffic volumes for the “Existing + Cumulative Projects” scenario. **Figure 5–6** shows the peak hour traffic volumes for the “Existing + Cumulative Projects + Project” scenario.

TABLE 5–1
CUMULATIVE PROJECTS LIST – EXISTING STREET NETWORK

Permit Number	Project Name	Description
CT 03-10	Aura Circle	9 single family dwelling units located north of Aura Circle, west of Kelly Drive.
MP 02-03	Robertson Ranch PA-1 & PA-2	Includes 27 multi-family dwelling units and 2.3 acres of RV storage area with access to El Camino Real and Tamarack Avenue.
SDP14-08	Robertson Ranch PA-7 & PA-8	Includes a total of 396 multi-family dwelling units with access to El Camino Real and Tamarack Avenue. Approximately 30% of these units were constructed and occupied at the time of existing baseline counts. The balance of forecasted traffic was added to Near-Term conditions.
CT 13-03	Robertson Ranch PA-9 & 10	Includes a total of 100 single family dwelling units with access to El Camino Real and Tamarack Avenue. Approximately 50% of these units were constructed and occupied at the time of existing baseline counts. The balance of forecasted traffic was added to Near-Term conditions.
CT 2018-0007	Robertson Ranch PA-11	Includes a total of 8.0 acres of community commercial development and 5.0 acres of community facilities with access to El Camino Real and Tamarack Avenue.
SDP15-13	Robertson Ranch PA-22	98 senior apartments located south/east of Cannon Road between El Camino Real and College Boulevard.

Source: City of Carlsbad

TABLE 5-2
CUMULATIVE PROJECTS LIST – WITH COLLEGE BLVD EXTENSION

Permit Number	Project Name	Description
CT 03-10	Aura Circle	9 single family dwelling units located north of Aura Circle, west of Kelly Drive.
MP 02-03	Robertson Ranch PA-1 & PA-2	Includes 27 multi-family dwelling units and 2.3 acres of RV storage area with access to El Camino Real and Tamarack Avenue.
SDP 14-08	Robertson Ranch PA-7 & PA-8	Includes a total of 396 multi-family dwelling units with access to El Camino Real and Tamarack Avenue. Approximately 30% of these units were constructed and occupied at the time of existing baseline counts. The balance of forecasted traffic was added to Near-Term conditions.
CT 13-03	Robertson Ranch PA-9 & 10	Includes a total of 100 single family dwelling units with access to El Camino Real and Tamarack Avenue. Approximately 50% of these units were constructed and occupied at the time of existing baseline counts. The balance of forecasted traffic was added to Near-Term conditions.
CT 2018-0007	Robertson Ranch PA-11	Includes a total of 8.0 acres of community commercial development and 5.0 acres of community facilities with access to El Camino Real and Tamarack Avenue.
SDP 15-13	Robertson Ranch PA-22	98 senior apartments located south/east of Cannon Road between El Camino Real and College Boulevard.
CT 00-18	Cantarini Ranch	105 single family dwelling units and 80 multi-family dwelling units located on the easterly side of the future College Boulevard extension between El Camino Real and Cannon Road.
CT 00-21	Holly Springs	43 single family dwelling units located southerly of Cannon Road and easterly of the future College Boulevard extension between El Camino Real and Cannon Road.
CUP 09-02	Dos Colinas	305 Senior/Assisted Living units on two non-contiguous sites along the future College Boulevard extension between Cannon Road and El Camino Real.
SDP 01-10(A)	Encinas Creek Apartment Homes	127 apartment located south/east of Cannon Road between El Camino Real and College Boulevard.

Source: City of Carlsbad

5.3 Network Conditions

As described in the prior sections, two cumulative conditions scenarios are evaluated. The first assumes the existing street network with no notable improvements within the study area.

The second scenario assumes the construction of the College Boulevard extension between Cannon Road and El Camino Real in conjunction with the associated development projects that would construct it. Cannon Road currently experiences high volumes to/from El Camino Real as a result of the missing segment of College Boulevard that will be constructed with the development of the approved projects on the College Boulevard extension. When those projects are constructed, they will be conditioned to complete the missing segment of College Boulevard which will alleviate the majority of Cannon Road-bound volumes currently using the El Camino Real/ Cannon Road intersection.

While approved and designed (including the College Boulevard extension), these cumulative project are not currently moving forward. Subsequently the College Boulevard extension is not assured. As such, it is conservative to exclude these four cumulative projects from the Near-Term analysis since it results in a continued evaluation of higher volumes at the El Camino Real/ Cannon Road intersection. As discussed in *Section 3.1*, a third westbound through lane on El Camino Real at its intersection with Cannon Road is planned and is anticipated to be completed prior to the Project's approval or construction. However, as it is not yet constructed, this lane is not assumed as a baseline condition for either cumulative scenario in this report.

(1)					
3 / 2 → 2 / 1 ← 19 / 27	14 / 28 ← 51 / 72 → 27 / 37	90 / 135 ← 8 / 13	99 / 149 ← 99 / 149	99 / 149 ← 99 / 149	92 / 134 → 149 / 217
1 / 4 → 39 / 90 →	75 / 161 → 1 / 3 →	Kelly Dr 2 / 2 9 / 15	El Camino Real	El Camino Real	W. Ranch Rd 117 / 268 → 7 / 15
Tamarack Ave 19 / 47	El Camino Real 19 / 47		Proj Drwy #1	Proj Drwy #2	El Camino Real

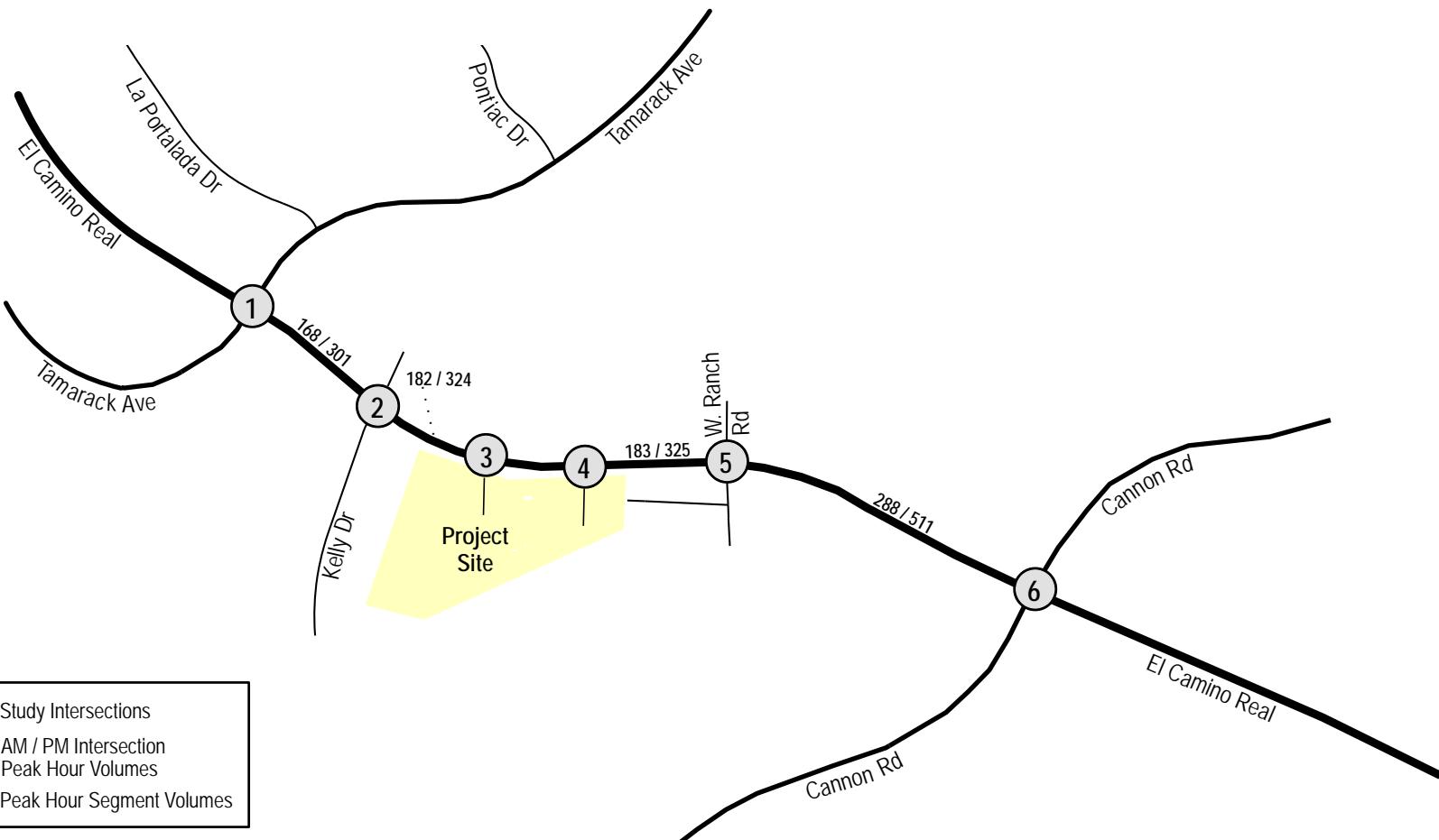


Figure 5-1
Cumulative Projects Traffic Volumes
Existing Street Network

MARJA ACRES

(1)	50 / 23 191 / 131 420 / 157	146 / 273 492 / 1,556 173 / 186
	41 / 44 2,113 / 697 40 / 45	El Camino Real 137 / 128 299 / 123
	Tamarack Ave	
(2)	8 / 2 2 / 0 2,779 / 881 108 / 75	146 / 273 492 / 1,556 173 / 186 El Camino Real 91 / 49 264 / 99
	Kelly Dr	
(3)	4 / 0 709 / 2,020 184 / 179	2,976 / 949 9 / 28 El Camino Real 7 / 19 Proj Driv #1
(4)	902 / 2,173	902 / 2,173 El Camino Real 2,978 / 961 5 / 7 Proj Driv #2
(5)	144 / 156 110 228 / 260 3 / 13	156 / 333 761 / 2,017 0 / 1 El Camino Real 0 / 2 0 / 1 W. Ranch Rd
(6)	128 / 92 711 / 217 986 / 336 64 / 62	411 / 1,019 574 / 1,802 82 / 186 El Camino Real 124 / 90 2,371 / 698 511 / 234 Cannon Rd

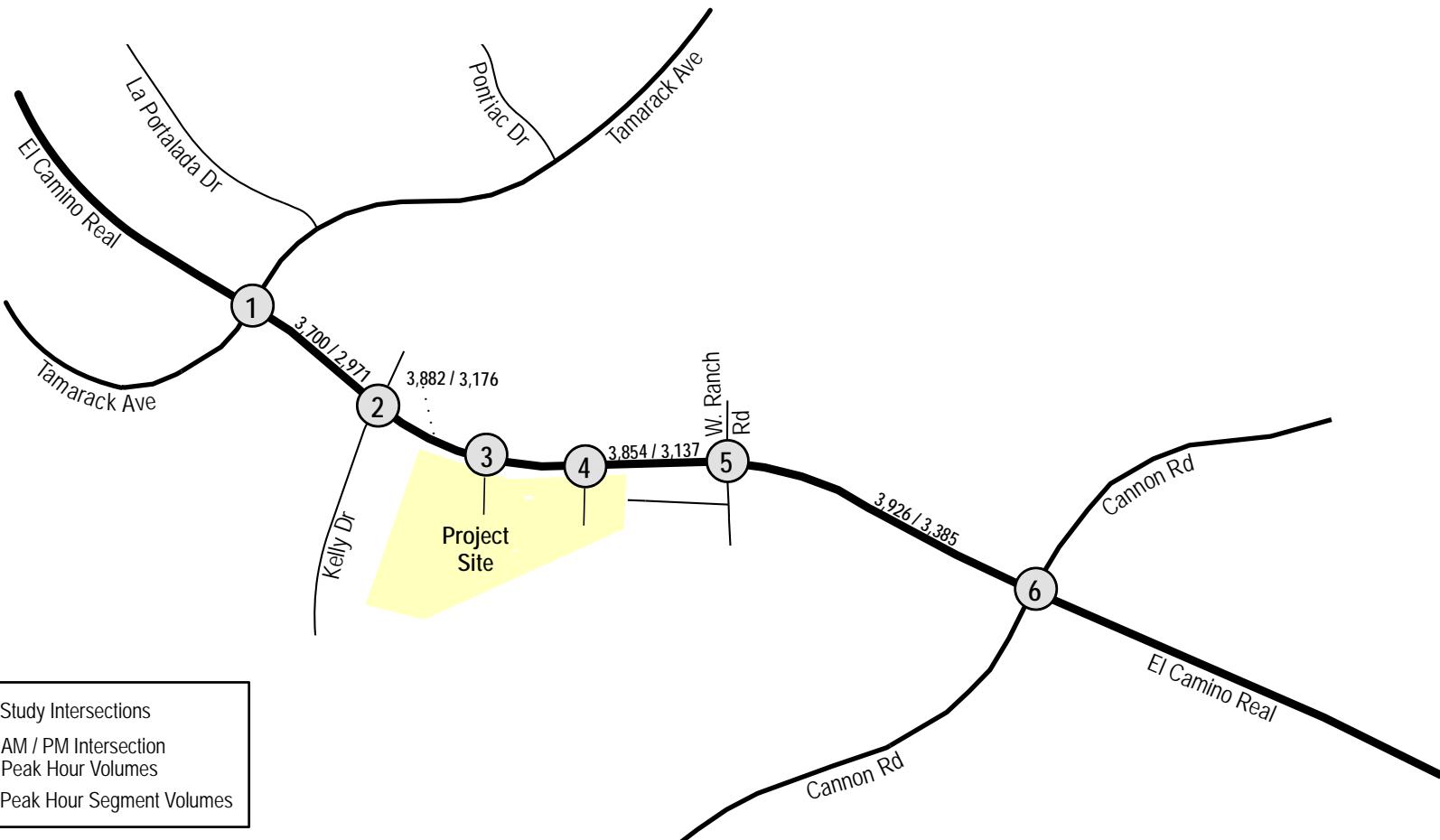


Figure 5-2

Existing + Cumulative Projects Traffic Volumes Existing Street Network

MARJA ACRES

(1)	50 / 23 ↓ 191 / 131 ↑ 422 / 163	153 / 275 ↑ 519 / 1,565 ↓ 193 / 193
(2)	41 / 44 2,122 / 724 40 / 45	El Camino Real 47 / 34 13 / 128 305 / 142
(3)	8 / 2 2 / 0 2,796 / 933 108 / 75	El Camino Real 4 / 0 763 / 2,038 215 / 252
(4)	2,998 / 1,014 30 / 92	El Camino Real 987 / 2,264 Proj Driv #1 75 / 41
(5)	3,046 / 983 27 / 72	El Camino Real 987 / 2,264 Proj Driv #2 72 / 39
(6)	169 / 232 2,918 / 775 0 / 1	El Camino Real 156 / 333 785 / 2,088 3 / 13
	W. Ranch Rd	0 / 2 1 / 1
	Cannon Rd	131 / 92 2,418 / 713 531 / 241
	219 / 461 185 / 546 82 / 186	El Camino Real 130 / 98 711 / 217 986 / 336
		411 / 1,019 590 / 1,848 64 / 62

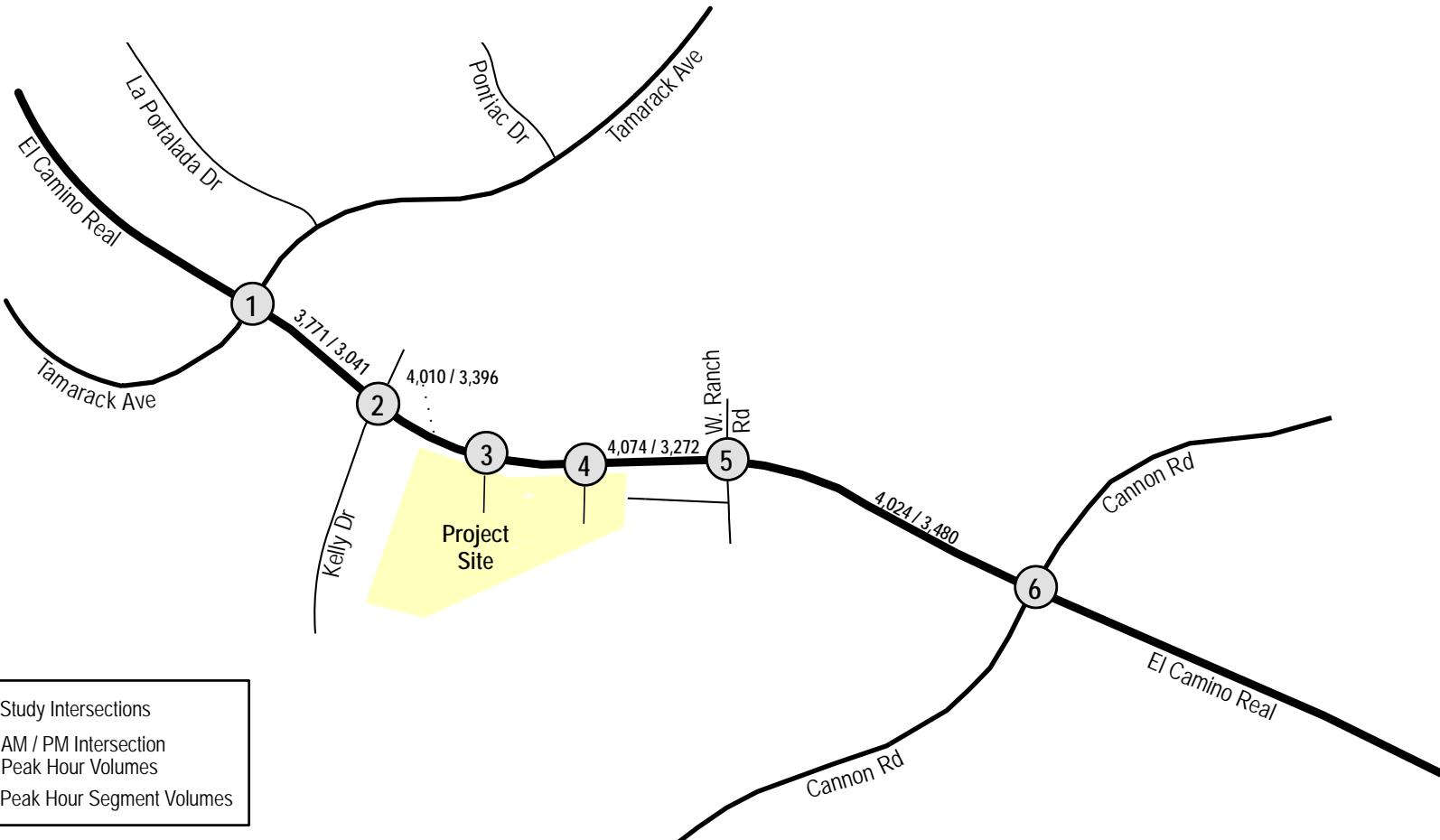


Figure 5-3

Existing + Cumulative Projects + Project Traffic Volumes Existing Street Network

MARJA ACRES

(1)					
3 / 2 → 2 / 1 ← 19 / 29	15 / 29 ↑ 87 / 93 ← 39 / 44	141 / 164 ← 10 / 14	152 / 179	152 / 179	92 / 134 ← 149 / 217
1 / 4 → 52 / 134 →	El Camino Real 23 / 60	Kelly Dr 2 / 2 10 / 18	El Camino Real	El Camino Real	W. Ranch Rd 117 / 268 ← 60 / 45
Tamarack Ave			Proj Dwy #1	Proj Dwy #2	
(2)	(3)	(4)	(5)	(6)	

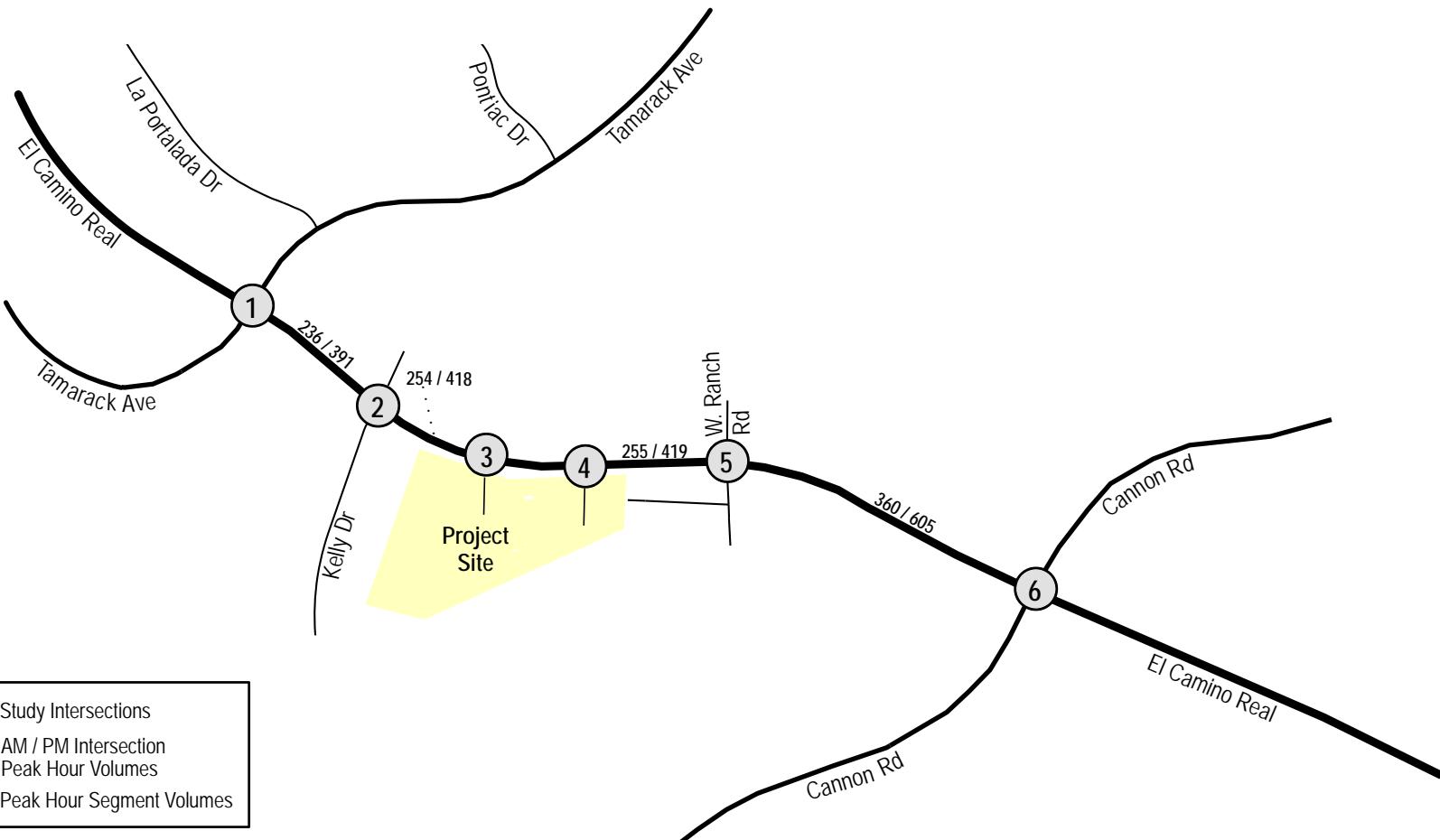


Figure 5-4

Cumulative Projects Traffic Volumes With College Boulevard Extension

MARJA ACRES

(1)						
50 / 23 ↓ 191 / 131 ↓ 420 / 159	147 / 274 ↑ 528 / 1,577 ↓ 185 / 193	4 / 0 ↑ 760 / 2,049 ↓ 186 / 180	955 / 2,203 ↑ 2,995 / 1,013 ↓ 9 / 28 Proj Day #1 7 / 19	955 / 2,203 ↑ 2,997 / 1,025 ↓ 5 / 7 Proj Day #2 5 / 17	144 / 156 ↓ 110 228 / 260 ↓ 3 / 13	156 / 333 ↓ 814 / 2,047 ↓ 3 / 13
41 / 44 ↓ 2,126 / 741 ↓ 40 / 45	47 / 34 ↓ 137 / 128 ↓ 303 / 136	2 / 0 ↓ 2,798 / 942 ↓ 108 / 75	Kelly Dr 91 / 49 ↓ 265 / 102	El Camino Real	El Camino Real	El Camino Real
Tamarack Ave	El Camino Real	El Camino Real	El Camino Real	El Camino Real	W. Ranch Rd	El Camino Real
(2)	(3)	(4)	(5)	(6)		
8 / 2						
2 / 0	2,995 / 1,013 ↓ 9 / 28 Proj Day #1 7 / 19	2,997 / 1,025 ↓ 5 / 7 Proj Day #2 5 / 17	108 / 212 ↓ 2,863 / 815 ↓ 0 / 1	124 / 90 ↓ 2,390 / 762 ↓ 511 / 234	128 / 92 ↓ 711 / 217 ↓ 397 / 136	165 / 410 ↓ 627 / 1,832 ↓ 91 / 78
Tamarack Ave	El Camino Real	El Camino Real	El Camino Real	Cannon Rd	El Camino Real	El Camino Real

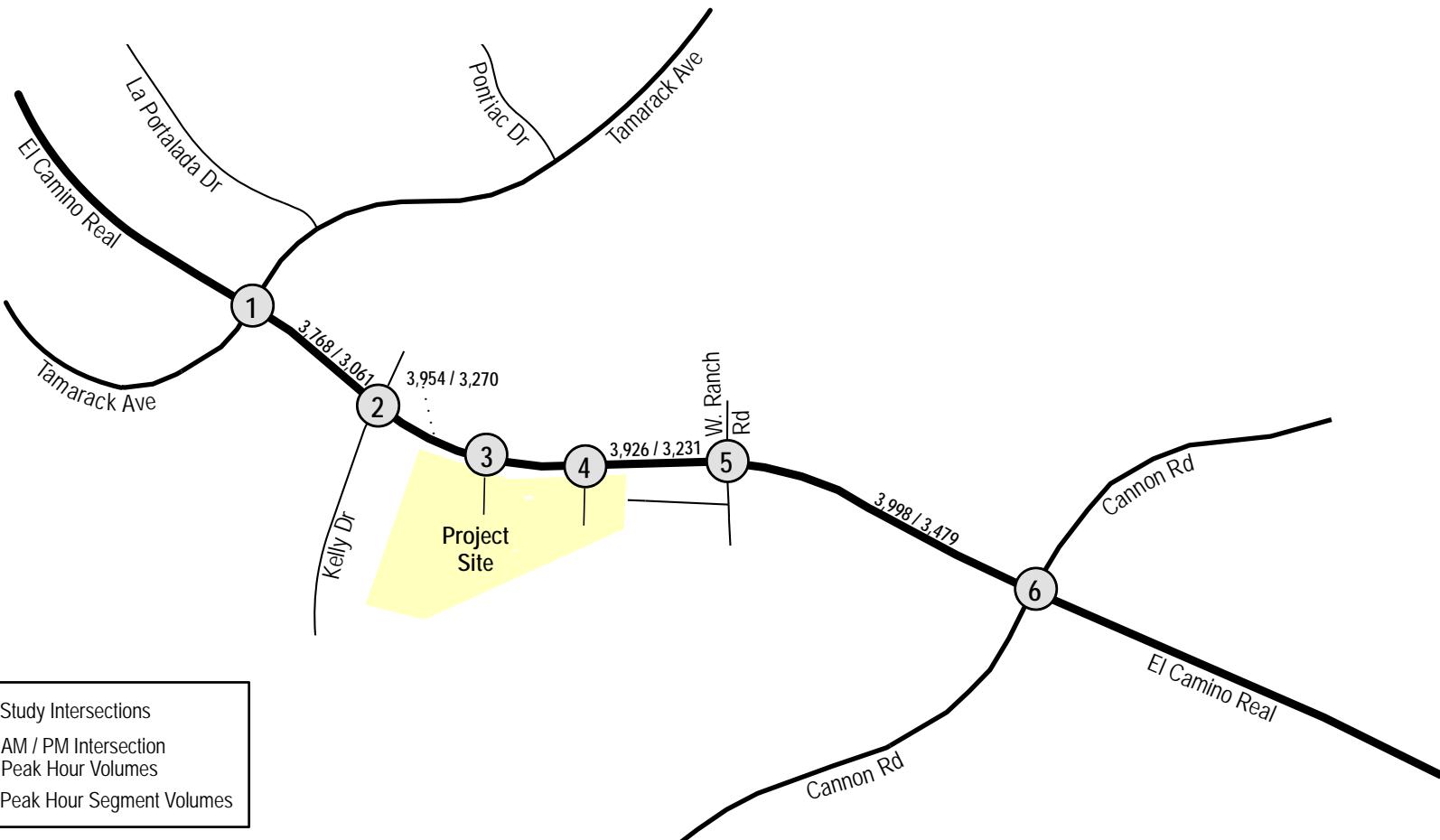


Figure 5-5

Existing + Cumulative Projects Traffic Volumes With College Boulevard Extension

MARJA ACRES

(1)	50 / 23 ↓ 191 / 131 ↑ 422 / 165	154 / 276 ↑ 555 / 1,586 ↓ 205 / 200
41 / 44 → 2,135 / 768 → 40 / 45 →	Tamarack Ave 47 / 34 13 / 128 309 / 155	El Camino Real El Camino Real
(2)	8 / 2 2 / 0 → 2,815 / 994 → 108 / 75 ↓	4 / 0 814 / 2,067 217 / 253
Kelly Dr	91 / 49 267 / 108	El Camino Real
(3)	3,017 / 1,078 → 30 / 92 →	1,040 / 2,294 Proj Drwy #1 75 / 41 ↘
El Camino Real	El Camino Real	El Camino Real
(4)	3,065 / 1,047 → 27 / 72 →	1,040 / 2,294 Proj Drwy #2 72 / 39 ↘
El Camino Real	El Camino Real	El Camino Real
(5)	144 / 156 169 / 232 → 2,937 / 839 → 0 / 1 ↓	156 / 333 838 / 2,118 3 / 13
W. Ranch Rd	El Camino Real 0 / 0 0 / 1	El Camino Real
(6)	130 / 98 2,437 / 777 → 531 / 241 ↓	165 / 410 643 / 1,878 91 / 78
Cannon Rd 219 / 461 185 / 546 92 / 120	El Camino Real El Camino Real	El Camino Real

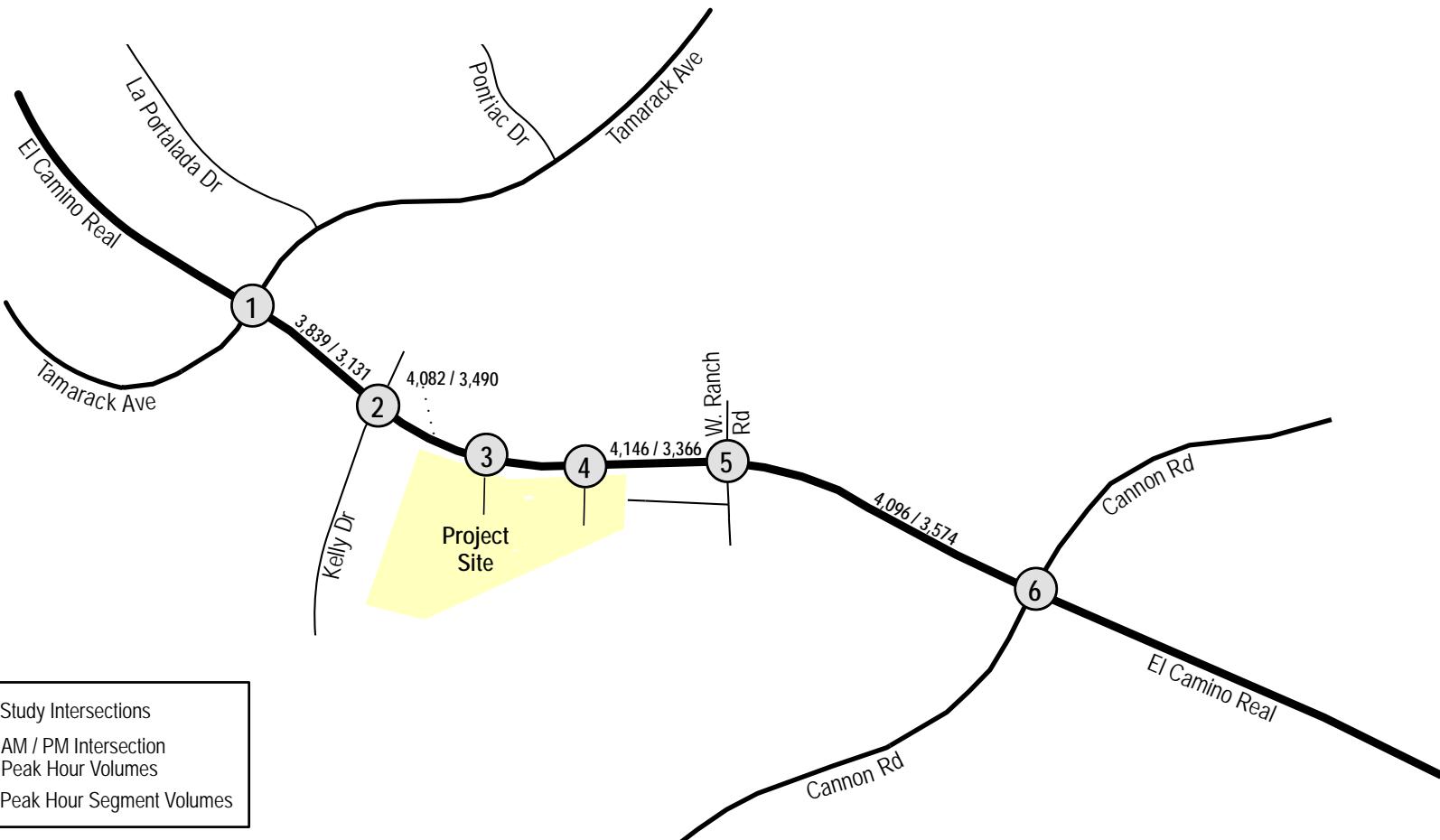


Figure 5-6

Existing + Cumulative Projects + Project Traffic Volumes With College Boulevard Extension

MARJA ACRES

6.0 ANALYSIS PER CITY TIA GUIDELINES (GROWTH MANAGEMENT PLAN)

6.1 Background

Based on the approach and methodologies described in *Section 2.1* for the Growth Management Plan analysis, the following is an evaluation of the four (4) signalized intersections and the four (4) street segments. Significance of impacts is based on the City's TIA Guidelines, as discussed in *Section 2.4.1*.

6.2 Analysis of Existing Conditions

6.2.1 Signalized Intersection Analysis

Table 6-1 shows the queue lengths under Existing conditions at study area signalized intersections, for the applicable left-and-right turning movements to which the Project would contribute traffic.

As shown in *Table 6-1*, the calculated queues do not exceed the existing pocket lengths. Also, the maximum southbound right-turn volumes at intersection No. 6, El Camino Real/Cannon Road are 108 peak hour trips in the AM peak hour. These do not exceed the 150 peak hour trips identified as the threshold for consideration of a dedicated right-turn lane (see *Section 2.1.2*).

TABLE 6-1
EXISTING SIGNALIZED INTERSECTION ANALYSIS

Signalized Intersection	Movement	Turn Lanes	Pocket Length (feet)	Peak Hour	Turn Volume	Queue Length (feet)
1. El Camino Real / Tamarack Avenue	SBL	2	320	AM PM	401 130	201 65
	WBR	1	330	AM	132	132
				PM	245	245
	WBL	2	270	AM	146	73
				PM	149	75
2. El Camino Real / Kelly Drive	WBL	1	280	AM PM	176 166	176 166
5. El Camino Real / West Ranch Road	EBL	1	320	AM PM	36 47	36 47
6. El Camino Real / Cannon Road	EBL	1	270	AM PM	100 55	100 55
	EBR ^a	1	410	AM	453	317
				PM	154	—
	NBL	2	350	AM PM	170 342	85 171
	SBR	N/A	N/A	AM PM	108 52	— —

Footnotes:

- a. Right turn peak hour volumes are reduced by 80% of complementary left turn volume due to presence of right turn overlap phasing for this movement.

6.2.2 Roadway Segment Analysis

Table 6–2 shows the street segment operations under Existing conditions in the study area to which the Project would contribute traffic.

As shown in *Table 6–2*, all of the study area street segments are calculated to operate at LOS C.

TABLE 6–2
EXISTING STREET SEGMENT ANALYSIS

El Camino Real	Functional Classification ^a	Capacity ^b (LOS D)	Peak Hour	Volume	LOS ^c
1. Tamarack Avenue to Kelly Drive	6-Ln Divided	5,320	AM PM	3,532 2,670	C C
2. Kelly Drive to Project Driveway	6-Ln Divided	5,320	AM PM	3,700 2,852	C C
3. Project Driveway to West Ranch Road	6-Ln Divided	5,320	AM PM	3,671 2,812	C C
4. West Ranch Road to Cannon Road	6-Ln Divided	5,320	AM PM	3,638 2,874	C C

Footnotes:

- a. The classification at which the road currently functions.
- b. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- c. Level of Service.

LOS	Peak Hour Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

6.3 Analysis of Existing + Project Conditions

6.3.1 Signalized Intersection Analysis

Table 6-3 shows the queue lengths under Existing + Project conditions at study area intersections, for the applicable left-and-right turning movements with the Project's traffic contribution

As shown in *Table 6-3*, the calculated queues do not exceed the existing pocket lengths with the addition of Project traffic. **No direct Project impacts are calculated.**

It should be noted that the maximum southbound right-turn volumes at intersection No. 6, El Camino Real/ Cannon Road are 110 peak hour trips in the AM peak hour. These do not exceed the 150 peak hour trips identified as the threshold for consideration of a dedicated right-turn lane (see *Section 2.1.2*).

TABLE 6-3
EXISTING + PROJECT
SIGNALIZED INTERSECTION ANALYSIS

Signalized Intersection	Movement	Turn Lanes	Pocket Length (feet)	Peak Hour	Existing		Existing + Project	
					Turn Volume	Queue Length (feet)	Turn Volume	Queue Length (feet)
1. El Camino Real / Tamarack Avenue	SBL	2	320	AM PM	401 130	201 65	403 136	202 68
	WBR	1	330	AM	132	132	139	139
				PM	245	245	247	247
	WBL	2	270	AM PM	146 149	73 75	166 156	83 78
2. El Camino Real / Kelly Drive	WBL	1	280	AM PM	176 166	176 166	207 239	207 239
5. El Camino Real / West Ranch Road	EBL	1	320	AM PM	36 47	36 47	97 67	97 67
6. El Camino Real / Cannon Road	EBL	1	270	AM PM	100 55	100 55	107 57	107 57
	EBR ^a	1	410	AM	453	317	473	332
				PM	154	—	161	—
	NBL	2	350	AM PM	170 342	85 171	176 361	88 181
	SBR	N/A	N/A	AM PM	108 52	— —	110 58	— —

Footnotes:

- a. Right turn peak hour volumes are reduced by 80% of complementary left turn volume due to presence of right turn overlap phasing for this movement.

6.3.2 Roadway Segment Analysis

Table 6–4 shows the street segment operations under Existing + Project conditions in the study area with the Project's traffic contribution.

As shown in *Table 6–4*, all of the study area street segments are calculated to continue to operate at acceptable LOS C with the addition of Project traffic. **No direct Project impacts are calculated.**

TABLE 6–4
EXISTING + PROJECT
SEGMENT ANALYSIS

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing		Existing + Project	
			Volume	LOS ^b	Volume	LOS
1. Tamarack Avenue to Kelly Drive	5,320	AM PM	3,532 2,670	C C	3,603 2,740	C C
2. Kelly Drive to Project Driveway	5,320	AM PM	3,700 2,852	C C	3,828 3,072	C C
3. Project Driveway to West Ranch Road	5,320	AM PM	3,671 2,812	C C	3,891 2,947	C C
4. West Ranch Road to Cannon Road	5,320	AM PM	3,638 2,874	C C	3,736 2,969	C C

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service

LOS	Peak Hour Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

6.4 Analysis of Existing + Cumulative Conditions – Existing Street Network

6.4.1 Signalized Intersection Analysis

Table 6–5 shows the queue lengths under Existing + Cumulative Projects conditions at study area intersections, for the applicable left-and-right turning movements to which the Project would contribute traffic.

As shown in *Table 6–5*, the calculated queues do not exceed the existing pocket lengths with the addition of cumulative project traffic.

It should be noted that the maximum southbound right-turn volumes at intersection No. 6, El Camino Real/ Cannon Road are 128 peak hour trips in the AM peak hour. These do not exceed the 150 peak hour trips identified as the threshold for consideration of a dedicated right-turn lane (see *Section 2.1.2*).

TABLE 6–5
EXISTING + CUMULATIVE CONDITIONS
SIGNALIZED INTERSECTION ANALYSIS – EXISTING STREET NETWORK

Signalized Intersection	Movement	Turn Lanes	Pocket Length (feet)	Peak Hour	Turn Volume	Queue Length (feet)
1. El Camino Real / Tamarack Avenue	SBL	2	320	AM PM	420 157	210 79
	WBR	1	330	AM	146	146
				PM	273	273
	WBL	2	270	AM	173	87
				PM	186	93
2. El Camino Real / Kelly Drive	WBL	1	280	AM PM	184 179	184 179
5. El Camino Real / West Ranch Road	EBL	1	320	AM PM	108 212	108 212
6. El Camino Real / Cannon Road	EBL	1	270	AM PM	124 90	124 90
	EBR ^a	1	410	AM	511	341
				PM	234	—
	NBL	2	350	AM PM	213 442	107 221
	SBR	N/A	N/A	AM PM	128 92	— —

Footnotes:

- a. Right turn peak hour volumes are reduced by 80% of complementary left turn volume due to presence of right turn overlap phasing for this movement.

6.4.2 Roadway Segment Analysis

Table 6–6 shows the street segment operations under Existing + Cumulative Projects conditions.

As shown in *Table 6–6*, street segments continue to operate at acceptable LOS C with the addition of cumulative project traffic.

TABLE 6–6
EXISTING + CUMULATIVE CONDITIONS
SEGMENT OPERATIONS – EXISTING STREET NETWORK

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing + Cumulative	
			Volume	LOS ^b
1. Tamarack Avenue to Kelly Drive	5,320	AM	3,700	C
		PM	2,971	C
2. Kelly Drive to Project Driveway	5,320	AM	3,882	C
		PM	3,176	C
3. Project Driveway to West Ranch Road	5,320	AM	3,854	C
		PM	3,137	C
4. West Ranch Road to Cannon Road	5,320	AM	3,926	C
		PM	3,385	C

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service
- c.

LOS	Peak Hour Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

6.5 Analysis of Existing + Cumulative + Project Conditions – Existing Street Network

6.5.1 Signalized Intersection Analysis

Table 6–7 shows the queue lengths under Existing + Cumulative Projects + Project conditions at study area signalized intersections for the applicable left-and-right turning movements with the addition of Project traffic.

As shown in *Table 6–7*, the calculated queues are accommodated in the existing pocket lengths. **No cumulative Project impacts are calculated.**

It should be noted that the maximum southbound right-turn volumes at intersection No. 6, El Camino Real/ Cannon Road are 130 peak hour trips in the AM peak hour. These do not exceed the 150 peak hour trips identified as the threshold for consideration of a dedicated right-turn lane (see *Section 2.1.2*).

TABLE 6–7
EXISTING + CUMULATIVE + PROJECT
SIGNALIZED INTERSECTION ANALYSIS – EXISTING STREET NETWORK

Signalized Intersection	Movement	Turn Lanes	Pocket Length (ft)	Peak Hour	Existing + Cumulative Projects		Existing + Cumulative Projects + Project	
					Turn Volume	Queue Length	Turn Volume	Queue Length
1. El Camino Real / Tamarack Avenue	SBL	2	320	AM	420	210	422	211
	WBR	1	330	PM	157	79	163	82
				AM	146	146	153	153
	WBL	2	270	PM	273	273	275	275
	WBL	1	280	AM	173	87	193	97
				PM	186	93	193	97
2. El Camino Real / Kelly Drive	WBL	1	280	AM	184	184	215	215
5. El Camino Real / West Ranch Road	EBL	1	320	PM	179	179	252	252
6. El Camino Real / Cannon Road	EBL	1	270	AM	108	108	169	169
	EBR ^a	1	410	PM	212	212	232	232
				AM	124	124	131	131
	NBL	2	350	PM	90	90	92	92
				AM	511	341	531	356
				PM	234	—	241	—
	SBR	N/A	N/A	AM	213	107	219	110
				PM	442	221	461	231
				AM	128	—	130	—
				PM	92	—	98	—

Footnotes:

- a. Right turn peak hour volumes are reduced by 80% of complementary left turn volume due to presence of right turn overlap phasing for this movement.

6.5.2 Roadway Segment Analysis

Table 6–8 shows the street segment operations under Existing + Cumulative Projects + Project condition.

As shown in *Table 6–8*, all of the study area street segments are calculated to continue to operate at acceptable LOS C. **No cumulative Project impacts are calculated.**

TABLE 6–8
EXISTING + CUMULATIVE + PROJECT
SEGMENT ANALYSIS – EXISTING STREET NETWORK

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing + Cumulative Projects		Existing + Cumulative Projects + Project	
			Volume	LOS ^b	Volume	LOS
1. Tamarack Avenue to Kelly Drive	5,320	AM	3,700	C	3,771	C
		PM	2,971	C	3,041	C
2. Kelly Drive to Project Driveway	5,320	AM	3,882	C	4,010	C
		PM	3,176	C	3,396	C
3. Project Driveway to West Ranch Road	5,320	AM	3,854	C	4,074	C
		PM	3,137	C	3,272	C
4. West Ranch Road to Cannon Road	5,320	AM	3,926	C	4,024	C
		PM	3,385	C	3,480	C

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service
- c.

LOS	Peak Hour Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

6.6 Analysis of Existing + Cumulative Conditions – With College Boulevard Extension

6.6.1 Signalized Intersection Analysis

Table 6–9 shows the queue lengths under Existing + Cumulative Projects conditions at study area intersections, for the applicable left-and-right turning movements to which the Project would contribute traffic.

As shown in *Table 6–9*, the calculated queues do not exceed the existing pocket lengths with the addition of cumulative project traffic.

It should be noted that the maximum southbound right-turn volumes at intersection No. 6, El Camino Real/ Cannon Road are 128 peak hour trips in the AM peak hour. These do not exceed the 150 peak hour trips identified as the threshold for consideration of a dedicated right-turn lane (see *Section 2.1.2*).

TABLE 6–9
EXISTING + CUMULATIVE CONDITIONS
SIGNALIZED INTERSECTION ANALYSIS – WITH COLLEGE BLVD EXTENSION

Signalized Intersection	Movement	Turn Lanes	Pocket Length (feet)	Peak Hour	Turn Volume	Queue Length (feet)
1. El Camino Real / Tamarack Avenue	SBL	2	320	AM PM	420 159	210 80
	WBR	1	330	AM	147	147
				PM	274	274
	WBL	2	270	AM PM	185 193	93 97
2. El Camino Real / Kelly Drive	WBL	1	280	AM PM	186 180	186 180
5. El Camino Real / West Ranch Road	EBL	1	320	AM PM	108 212	108 212
6. El Camino Real / Cannon Road	EBL	1	270	AM PM	124 90	124 90
	EBR ^a	1	410	AM	511	363
				PM	234	—
	NBL	2	350	AM PM	213 442	107 221
	SBR	N/A	N/A	AM PM	128 92	— —

Footnotes:

- a. Right turn peak hour volumes are reduced by 80% of complementary left turn volume due to presence of right turn overlap phasing for this movement.

6.6.2 Roadway Segment Analysis

Table 6–10 shows the street segment operations under Existing + Cumulative Projects conditions.

As shown in *Table 6–10*, street segments continue to operate at acceptable LOS C with the addition of cumulative project traffic.

TABLE 6–10
EXISTING + CUMULATIVE CONDITIONS
SEGMENT OPERATIONS – WITH COLLEGE BLVD EXTENSION

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing + Cumulative	
			Volume	LOS ^b
1. Tamarack Avenue to Kelly Drive	5,320	AM	3,768	C
		PM	3,061	C
2. Kelly Drive to Project Driveway	5,320	AM	3,954	C
		PM	3,270	C
3. Project Driveway to West Ranch Road	5,320	AM	3,926	C
		PM	3,231	C
4. West Ranch Road to Cannon Road	5,320	AM	3,998	C
		PM	3,479	C

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service

LOS	Peak Hour Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

6.7 Analysis of Existing + Cumulative + Project Conditions – With College Boulevard Extension

6.7.1 Signalized Intersection Analysis

Table 6–11 shows the queue lengths under Existing + Cumulative Projects + Project conditions at study area signalized intersections for the applicable left-and-right turning movements with the addition of Project traffic.

As shown in *Table 6–11*, the calculated queues are accommodated in the existing pocket lengths. **No cumulative Project impacts are calculated.**

It should be noted that the maximum southbound right-turn volumes at intersection No. 6, El Camino Real/ Cannon Road are 130 peak hour trips in the AM peak hour. These do not exceed the 150 peak hour trips identified as the threshold for consideration of a dedicated right-turn lane (see *Section 2.1.2*).

TABLE 6–11
EXISTING + CUMULATIVE + PROJECT
SIGNALIZED INTERSECTION ANALYSIS – WITH COLLEGE BLVD EXTENSION

Signalized Intersection	Movement	Turn Lanes	Pocket Length (ft)	Peak Hour	Existing + Cumulative Projects		Existing + Cumulative Projects + Project	
					Turn Volume	Queue Length	Turn Volume	Queue Length
1. El Camino Real / Tamarack Avenue	SBL	2	320	AM	420	210	422	211
				PM	159	80	165	83
	WBR	1	330	AM	147	147	154	154
				PM	274	274	276	276
	WBL	2	270	AM	185	93	205	103
				PM	193	97	200	100
2. El Camino Real / Kelly Drive	WBL	1	280	AM	186	186	217	217
5. El Camino Real / West Ranch Road	EBL	1	320	PM	180	180	253	253
6. El Camino Real / Cannon Road	EBL	1	270	AM	108	108	169	169
				PM	212	212	232	232
	EBR ^a	1	410	AM	124	124	131	131
				PM	90	90	92	92
	NBL	2	350	AM	511	363	531	383
				PM	234	—	241	—
	SBR	N/A	N/A	AM	128	—	130	—
				PM	92	—	98	—

Footnotes:

- a. Right turn peak hour volumes are reduced by 80% of complementary left turn volume due to presence of right turn overlap phasing for this movement.

6.7.2 Roadway Segment Analysis

Table 6-12 shows the street segment operations under Existing + Cumulative Projects + Project conditions.

As shown in *Table 6-12*, all of the study area street segments are calculated to continue to operate at acceptable LOS C. **No cumulative Project impacts are calculated.**

TABLE 6-12
EXISTING + CUMULATIVE + PROJECT
SEGMENT ANALYSIS – WITH COLLEGE BLVD EXTENSION

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing + Cumulative Projects		Existing + Cumulative Projects + Project	
			Volume	LOS ^b	Volume	LOS
1. Tamarack Avenue to Kelly Drive	5,320	AM	3,768	C	3,839	C
		PM	3,061	C	3,131	C
2. Kelly Drive to Project Driveway	5,320	AM	3,954	C	4,082	C
		PM	3,270	C	3,490	C
3. Project Driveway to West Ranch Road	5,320	AM	3,926	C	4,146	C
		PM	3,231	C	3,366	C
4. West Ranch Road to Cannon Road	5,320	AM	3,998	C	4,096	C
		PM	3,479	C	3,574	C

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service
- c.

LOS	Peak Hour
	Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

6.8 MMLOS Analysis

The existing transit amenities proximate to the site on El Camino Real were evaluated using the City of Carlsbad's interactive MMLOS Tool (September 2018). Based on the existing transit operations (routes, headways, etc.) and associated stations and amenities on the corridor in the Project vicinity, the analysis shows a score of 92 points is achieved resulting in LOS A. The City's TIA Guidelines state that the City strives to maintain LOS D or better on each roadway for each mode of travel that is subject to the MMLOS analysis. As LOS A is calculated for El Camino Real for the applicable "Transit and Ridesharing" MMLOS criteria, **no significant Project impacts are calculated.**

Appendix G contains the MMLOS results.

6.9 TIA Guidelines – Findings and Conclusions

Based on the City's TIA Guidelines thresholds of significance presented in *Section 2.4.1, no significant direct or cumulative Project impacts are calculated* at any of the study area intersections or street segments under either cumulative condition.

The nonresidential portion of the project shall comply with the requirements of the City of Carlsbad Transportation Demand Management (TDM) ordinance prior to approval of a final map, building or grading permit, whichever occurs first

7.0 ANALYSIS PER SANTEC/ITE GUIDELINES (CEQA)

7.1 Background

Based on the approach and methodologies described in *Section 2.2* for the CEQA analysis, the following is an evaluation of the four (4) signalized intersections, two (2) unsignalized intersections and the four (4) street segments. Significance of impacts is based on the *SANTEC/ITE Guidelines*, as discussed in *Section 2.4.2*.

7.2 Analysis of Existing Conditions

7.2.1 Signalized and Unsignalized Intersection Analysis

Table 7-1 shows the AM/PM peak hour operations of study area intersections under existing conditions.

As discussed in *Section 5.2*, El Camino Real and Cannon Road currently experience higher near-term volumes than would be expected due to the absence of the planned and approved College Boulevard extension between El Camino Real and Cannon Road. *Figure 3-2* shows very high southbound left-turns (AM) and westbound right-turns (PM) at the El Camino Real / Cannon Road intersection which include “cut-thru” traffic that should otherwise be using College Boulevard. As such, the level of existing peak hour delay reflects a temporary condition. **Appendix H** contains the intersection analysis worksheets for the Existing scenario.

7.2.2 Roadway Segment Analysis

Analysis of the study area street segments was performed using the methodology outlined in *Section 2.2.4* of this report. **Table 7-2** shows that all of the study area street segments are calculated to operate at acceptable LOS C.

TABLE 7-1
EXISTING INTERSECTION ANALYSIS

Intersection	Control Type	Peak Hour	Delay
1. El Camino Real / Tamarack Avenue	Signal	AM	54.2
		PM	42.1
	Signal	AM	21.8
		PM	13.8
	MSSC ^b	AM	20.1
		PM	10.0
4. El Camino Real / Project Driveway B	MSSC	AM	20.0
		PM	10.0
5. El Camino Real / West Ranch Road	Signal	AM	14.1
		PM	8.3
6. El Camino Real/ Cannon Road	Signal	AM	43.5
		PM	65.8

Footnotes:

- a. Average vehicular delay in seconds.
- b. Minor Street Stop Control. Minor street delay is reported.

SIGNALIZED		UN SIGNALIZED	
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 7-2
EXISTING STREET SEGMENT ANALYSIS

El Camino Real	Functional Classification ^a	Capacity ^b (LOS D)	Peak Hour	Volume	LOS ^c	V/C ^d
1. Tamarack Avenue to Kelly Drive	6-Ln Divided	5,320	AM PM	3,532 2,670	C C	0.664 0.502
2. Kelly Drive to Project Driveway	6-Ln Divided	5,320	AM PM	3,700 2,852	C C	0.695 0.536
3. Project Driveway to West Ranch Road	6-Ln Divided	5,320	AM PM	3,671 2,812	C C	0.690 0.529
4. West Ranch Road to Cannon Road	6-Ln Divided	5,320	AM PM	3,638 2,874	C C	0.684 0.540

Footnotes:

- a. The classification at which the road currently functions.
- b. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- c. Level of Service.
- d. Volume to Capacity.

LOS	Peak Hour Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

7.3 Analysis of Existing + Project Conditions

7.3.1 Signalized and Unsignalized Intersection Analysis

Table 7-3 shows the results of the intersection capacity analyses conducted for the study intersections under Existing + Project conditions during the AM and PM peak hours.

All intersections where the Project adds more than 2.0 seconds of delay are calculated to operate at LOS D or better with the Project. Therefore, ***no significant direct Project impacts are calculated.***

Appendix I contains the intersection analysis worksheets for the Existing + Project scenario.

TABLE 7-3
EXISTING + PROJECT
INTERSECTION ANALYSIS

Intersection	Control Type	Peak Hour	Existing	Existing + Project		Significant Impact
			Delay ^a	Delay	Δ ^b	
1. El Camino Real / Tamarack Avenue	Signal	AM	54.2	54.8	0.6	None
		PM	42.1	42.2	0.1	None
	Signal	AM	21.8	26.6	4.8	None ^d
		PM	13.8	17.3	3.5	None ^d
	MSSC ^c	AM	20.1	26.6	6.5	None ^d
		PM	10.0	10.3	0.3	None
	MSSC	AM	20.0	28.8	8.8	None ^d
		PM	10.0	10.1	0.1	None
	Signal	AM	14.1	17.0	2.9	None ^d
		PM	8.3	9.0	0.7	None
	Signal	AM	43.5	45.1	1.6	None
		PM	65.8	66.9	1.1	None

Footnotes:

- a. Average delay expressed in seconds per vehicle.
- b. Δ denotes Project induced delay increase.
- c. Minor Street Stop Control. Minor street delay is reported.
- d. While the Project increases delay by greater than 2.0 seconds, the calculated LOS with the Project is "D" or better. Therefore, no significant impact is determined.

SIGNALIZED		UN SIGNALIZED	
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

7.3.2 Roadway Segment Analysis

Existing + Project street segment analyses were conducted for the study roadways. **Table 7-4** summarizes the street segment operations under Existing + Project conditions.

As shown in *Table 7-4*, the study area segments are calculated to continue to operate at acceptable LOS C. Therefore, ***no significant direct Project impacts are calculated.***

TABLE 7-4
EXISTING + PROJECT
SEGMENT ANALYSIS

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing			Existing + Project				Significant Impact
			Volume	LOS ^b	V/C ^c	Volume	LOS	V/C	Δ ^d	
1. Tamarack Avenue to Kelly Drive	5,320	AM PM	3,532 2,670	C C	0.664 0.502	3,603 2,740	C C	0.677 0.515	0.013 0.013	No No
2. Kelly Drive to Project Driveway	5,320	AM PM	3,700 2,852	C C	0.695 0.536	3,828 3,072	C C	0.720 0.577	0.025 0.041	No No
3. Project Driveway to West Ranch Road	5,320	AM PM	3,671 2,812	C C	0.690 0.529	3,891 2,947	C C	0.731 0.554	0.041 0.025	No No
4. West Ranch Road to Cannon Road	5,320	AM PM	3,638 2,874	C C	0.684 0.540	3,736 2,969	C C	0.702 0.558	0.018 0.018	No No

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service
- c. Volume to Capacity.
- d. Δ denotes project induced V/C increase.

Peak Hour	Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

7.4 Analysis of Existing + Cumulative Conditions – Existing Street Network

7.4.1 Signalized and Unsignalized Intersection Analysis

Table 7-5 reports the Existing + Cumulative Project intersection operations during the AM and PM peak hours.

Appendix J contains the intersection analysis worksheets for the Existing + Cumulative Projects scenario.

TABLE 7-5
EXISTING + CUMULATIVE CONDITIONS
INTERSECTION ANALYSIS – EXISTING STREET NETWORK

Intersection	Control Type	Peak Hour	Delay ^a
1. El Camino Real / Tamarack Avenue	Signal	AM PM	57.2 42.3
2. El Camino Real / Kelly Drive	Signal	AM PM	28.3 15.0
3. El Camino Real / Project Driveway A	MSSC ^b	AM PM	21.3 10.2
4. El Camino Real / Project Driveway B	MSSC	AM PM	21.1 10.2
5. El Camino Real / West Ranch Road	Signal	AM PM	40.4 32.7
6. El Camino Real / Cannon Road	Signal	AM PM	48.6 77.4

Footnotes:

a. Average delay expressed in seconds per vehicle.

b. Minor Street Stop Control. Minor street delay is reported.

SIGNALIZED		UN SIGNALIZED	
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

7.4.2 Roadway Segment Analysis

Table 7-6 summarizes the street segment operations under Existing + Cumulative Projects conditions. As shown in *Table 7-6*, the study area segments are calculated to continue to operate at LOS C with the addition of cumulative project traffic.

TABLE 7-6
EXISTING + CUMULATIVE CONDITIONS
SEGMENT OPERATIONS – EXISTING STREET NETWORK

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing + Cumulative		
			Volume	LOS ^b	V/C ^c
1. Tamarack Avenue to Kelly Drive	5,320	AM	3,700	C	0.695
		PM	2,971	C	0.558
2. Kelly Drive to Project Driveway	5,320	AM	3,882	C	0.730
		PM	3,176	C	0.597
3. Project Driveway to West Ranch Road	5,320	AM	3,854	C	0.724
		PM	3,137	C	0.590
4. West Ranch Road to Cannon Road	5,320	AM	3,926	C	0.738
		PM	3,385	C	0.636

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service
- c. Volume to Capacity.

LOS	Peak Hour Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

7.5 Analysis of Existing + Cumulative + Project Conditions – Existing Street Network

7.5.1 Signalized and Unsignalized Intersection Analysis

Table 7-7 reports the Existing + Cumulative Projects + Project intersection operations during the AM and PM peak hours. All intersections where the Project is calculated to add more than 2.0 seconds of delay are calculated to operate at LOS D or better with the Project. Therefore, **no significant cumulative Project impacts are calculated.**

Appendix K contains the intersection analysis worksheets for the Existing + Cumulative Projects + Project scenario.

TABLE 7-7
EXISTING + CUMULATIVE + PROJECT
INTERSECTION ANALYSIS – EXISTING STREET NETWORK

Intersection	Control Type	Peak Hour	Existing + Cumulative Projects	Existing + Cumulative Projects + Project		Significant Impact
			Delay ^a	Delay	Δ ^b	
1. El Camino Real / Tamarack Avenue	Signal	AM	57.2	57.9	0.7	None
		PM	42.3	42.4	0.1	None
2. El Camino Real / Kelly Drive	Signal	AM	28.3	34.2	5.9	None ^d
		PM	15.0	18.2	3.2	None ^d
3. El Camino Real / Project Driveway A	MSSC ^c	AM	21.3	30.6	9.3	None ^d
		PM	10.2	10.7	0.5	None
4. El Camino Real / Project Driveway B	MSSC	AM	21.1	30.2	9.1	None ^d
		PM	10.2	10.5	0.3	None
5. El Camino Real / West Ranch Road	Signal	AM	40.4	41.6	1.2	None
		PM	32.7	37.5	4.8	None ^d
6. El Camino Real / Cannon Road	Signal	AM	48.6	51.1	2.5	None ^d
		PM	77.4	78.6	1.2	None

Footnotes:

- a. Average delay expressed in seconds per vehicle.
- b. Δ denotes Project induced delay increase.
- c. Minor Street Stop Control. Minor street delay is reported.
- d. While the Project increases delay by greater than 2.0 seconds, the calculated LOS with the Project is “D” or better. Therefore, no significant impact is determined.

SIGNALIZED		UN SIGNALIZED	
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

7.5.2 Roadway Segment Analysis

Table 7-8 summarizes the street segment operations under Existing + Cumulative conditions with the addition of Project traffic volumes.

As shown in *Table 7-8*, the study area segments are calculated to continue to operate at acceptable LOS C. Therefore, ***no significant cumulative Project impacts are calculated.***

TABLE 7-8
EXISTING + CUMULATIVE + PROJECT
SEGMENT ANALYSIS – EXISTING STREET NETWORK

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing + Cumulative Projects			Existing + Cumulative Projects + Project				Significant Impact
			Volume	LOS ^b	V/C ^c	Volume	LOS	V/C	Δ ^d	
1. Tamarack Avenue to Kelly Drive	5,320	AM	3,700	C	0.695	3,771	C	0.709	0.014	No
		PM	2,971	C	0.558	3,041	C	0.572	0.014	No
2. Kelly Drive to Project Driveway	5,320	AM	3,882	C	0.730	4,010	C	0.754	0.024	No
		PM	3,176	C	0.597	3,396	C	0.638	0.041	No
3. Project Driveway to West Ranch Road	5,320	AM	3,854	C	0.724	4,074	C	0.766	0.042	No
		PM	3,137	C	0.590	3,272	C	0.615	0.025	No
4. West Ranch Road to Cannon Road	5,320	AM	3,926	C	0.738	4,024	C	0.756	0.018	No
		PM	3,385	C	0.636	3,480	C	0.654	0.018	No

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service
- c. Volume to Capacity.
- d. Δ denotes project-induced V/C increase.

Peak Hour	Volume
LOS	
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

7.6 Analysis of Existing + Cumulative Conditions – With College Boulevard Extension

7.6.1 Signalized and Unsignalized Intersection Analysis

Table 7-9 reports the Existing + Cumulative Project intersection operations during the AM and PM peak hours.

Appendix L contains the intersection analysis worksheets for the Existing + Cumulative Projects scenario.

TABLE 7-9
EXISTING + CUMULATIVE CONDITIONS
INTERSECTION ANALYSIS – WITH COLLEGE BLVD EXTENSION

Intersection	Control Type	Peak Hour	Delay ^a
1. El Camino Real / Tamarack Avenue	Signal	AM	57.4
		PM	42.2
2. El Camino Real / Kelly Drive	Signal	AM	30.4
		PM	15.4
3. El Camino Real / Project Driveway A	MSSC ^b	AM	22.6
		PM	10.4
4. El Camino Real / Project Driveway B	MSSC	AM	22.4
		PM	10.3
5. El Camino Real / West Ranch Road	Signal	AM	40.1
		PM	32.5
6. El Camino Real / Cannon Road	Signal	AM	36.9
		PM	60.0

Footnotes:

- a. Average delay expressed in seconds per vehicle.
- b. Minor Street Stop Control. Minor street delay is reported.

SIGNALIZED		UN SIGNALIZED	
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

7.6.2 Roadway Segment Analysis

Table 7-10 summarizes the street segment operations under Existing + Cumulative Projects conditions. As shown in *Table 7-10*, the study area segments are calculated to continue to operate at LOS C with the addition of cumulative project traffic.

TABLE 7-10
EXISTING + CUMULATIVE CONDITIONS
SEGMENT OPERATIONS – WITH COLLEGE BLVD EXTENSION

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing + Cumulative		
			Volume	LOS ^b	V/C ^c
1. Tamarack Avenue to Kelly Drive	5,320	AM	3,768	C	0.708
		PM	3,061	C	0.575
2. Kelly Drive to Project Driveway	5,320	AM	3,954	C	0.743
		PM	3,270	C	0.615
3. Project Driveway to West Ranch Road	5,320	AM	3,926	C	0.738
		PM	3,231	C	0.607
4. West Ranch Road to Cannon Road	5,320	AM	3,998	C	0.752
		PM	3,479	C	0.654

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service
- c. Volume to Capacity.

LOS	Peak Hour Volume
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

7.7 Analysis of Existing + Cumulative + Project Conditions – With College Boulevard Extension

7.7.1 Signalized and Unsignalized Intersection Analysis

Table 7-11 reports the Existing + Cumulative Projects + Project intersection operations during the AM and PM peak hours. All intersections where the Project is calculated to add more than 2.0 seconds of delay are calculated to operate at LOS D or better with the Project. Therefore, **no significant cumulative Project impacts are calculated.**

Appendix M contains the intersection analysis worksheets for the Existing + Cumulative Projects + Project scenario.

TABLE 7-11
EXISTING + CUMULATIVE + PROJECT
INTERSECTION ANALYSIS – WITH COLLEGE BLVD EXTENSION

Intersection	Control Type	Peak Hour	Existing + Cumulative Projects	Existing + Cumulative Projects + Project		Significant Impact
			Delay ^a	Delay	Δ ^b	
1. El Camino Real / Tamarack Avenue	Signal	AM	57.4	58.2	0.8	None
		PM	42.2	42.3	0.1	None
2. El Camino Real / Kelly Drive	Signal	AM	30.4	36.3	5.9	None ^d
		PM	15.4	18.7	3.3	None ^d
3. El Camino Real / Project Driveway A	MSSC ^c	AM	22.6	32.0	9.4	None ^d
		PM	10.4	10.7	0.3	None
4. El Camino Real / Project Driveway B	MSSC	AM	22.4	34.1	11.7	None ^d
		PM	10.3	10.7	0.4	None
5. El Camino Real / West Ranch Road	Signal	AM	40.1	41.8	1.7	None
		PM	32.5	35.4	2.9	None ^d
6. El Camino Real / Cannon Road	Signal	AM	36.9	38.4	1.5	None
		PM	60.0	60.8	0.8	None

Footnotes:

- a. Average delay expressed in seconds per vehicle.
- b. Δ denotes Project induced delay increase.
- c. Minor Street Stop Control. Minor street delay is reported.
- d. While the Project increases delay by greater than 2.0 seconds, the calculated LOS with the Project is “D” or better. Therefore, no significant impact is determined.

SIGNALIZED		UN SIGNALIZED	
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

7.7.2 Roadway Segment Analysis

Table 7-12 summarizes the street segment operations under Existing + Cumulative conditions with the addition of Project traffic volumes.

As shown in *Table 7-12*, the study area segments are calculated to continue to operate at acceptable LOS C. Therefore, ***no significant cumulative Project impacts are calculated.***

TABLE 7-12
EXISTING + CUMULATIVE + PROJECT
SEGMENT ANALYSIS – WITH COLLEGE BLVD EXTENSION

El Camino Real	Capacity ^a (LOS D)	Peak Hour	Existing + Cumulative Projects			Existing + Cumulative Projects + Project				Significant Impact
			Volume	LOS ^b	V/C ^c	Volume	LOS	V/C	Δ ^d	
1. Tamarack Avenue to Kelly Drive	5,320	AM	3,768	C	0.708	3,839	C	0.722	0.014	No
		PM	3,061	C	0.575	3,131	C	0.589	0.014	No
2. Kelly Drive to Project Driveway	5,320	AM	3,954	C	0.743	4,082	C	0.767	0.024	No
		PM	3,270	C	0.615	3,490	C	0.656	0.041	No
3. Project Driveway to West Ranch Road	5,320	AM	3,926	C	0.738	4,146	C	0.779	0.041	No
		PM	3,231	C	0.607	3,366	C	0.633	0.026	No
4. West Ranch Road to Cannon Road	5,320	AM	3,998	C	0.752	4,096	C	0.770	0.018	No
		PM	3,479	C	0.654	3,574	C	0.672	0.018	No

Footnotes:

- a. Hourly two-way capacities based on City of Carlsbad Segment LOS Capacity Thresholds.
- b. Level of Service
- c. Volume to Capacity.
- d. Δ denotes project-induced V/C increase.

Peak Hour	Volume
LOS	
A	N/A
B	N/A
C	<4,820
D	<5,320
E	<5,360
F	>5,360

7.8 CEQA Method – Findings and Conclusions

Based on the SANTEC/ITE Guidelines thresholds of significance presented in *Section 2.4.2, no significant direct or cumulative Project impacts are calculated* at any of the study area intersections or street segments based on the addition of Project traffic under either cumulative condition.

8.0 TRANSPORTATION DEMAND MANAGEMENT

The City of Carlsbad passed a Transportation Demand Management (TDM) ordinance to establish policies and guidelines for transportation demand management in the city. The ordinance supports the Climate Action Plan and seeks to reduce the number of Carlsbad employees driving alone to and from work and increase alternative commuting options like transit, biking, carpool, and vanpool to meet 2035 greenhouse gas reduction targets. The TDM ordinance requires new nonresidential development where the employees generate a minimum of 110 average daily trips to develop a Transportation Demand Management Plan. The project proposes to add 10,000 square feet of commercial development, which will exceed the 110 ADT threshold.

Typical TDM plans consist of programs and policies to reduce the demand for the single occupant automobile. Common techniques include carpool programs, car-sharing and bike-sharing programs, flexible work hours, telecommute provisions, shuttle services to nearby transit stations, employee transit subsidies (e.g. employers will subsidize bus or rail tickets), installation of bicycle facilities (lockers, racks, lanes, showers at employment areas, etc.), or other measures that would reduce the demand to drive, particularly during the peak commute hours.

As the Project proposes a mix of uses (residential, specialty retail and restaurant, not all of the aforementioned general techniques will necessarily apply to all proposed uses. However, Project-specific measures can be developed that will reflect its ability to effectively incentivize employees to reduce single occupant vehicle demand, increase use of multi-modal transportation options, and reduce peak commute trips. The applicant shall comply with the City of Carlsbad Transportation Demand Management ordinance prior to issuance of building permits.

End of Report



TECHNICAL APPENDICES

MARJA ACRES

Carlsbad, California

March 26, 2019

LLG Ref. 3-16-2608

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APPENDIX A

CITY OF CARLSBAD SEGMENT LOS CAPACITY THRESHOLD TABLE

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City of Carlsbad Segment LOS Capacity Threshold

Segment Capacity Threshold for Arterial Streets

Hourly Volume in Peak Direction

Lanes	Speed Limit	Median	B	C	D	E
1	35	Undivided	**	180	590	740
	35	Divided	**	190	630	780
2	35	Divided	**	520	1390	1540
	45	Divided	**	600	1560	1760
	50	Divided	**	850	1690	1820
	55	Divided	**	1050	1800	1890
3	35	Divided	**	680	2230	2540
	45	Divided	**	2040	2660	2700
	50	Divided	**	2360	2760	2800
	55	Divided	390	2600	2870	2900
4	45	Divided	**	2780	3560	3620

Hourly Volume in Both Direction

Lanes	Speed Limit	Median	B	C	D	E
2	35	Undivided	**	340	1100	1380
	35	Divided	**	360	1170	1450
4	35	Divided	**	970	2580	2860
	45	Divided	**	1120	2890	3260
	50	Divided	**	1580	3130	3380
	55	Divided	**	1950	3340	3500
5	55	Divided	**	3395	4343	4455
6	35	Divided	**	1260	4130	4720
	50	Divided	**	4380	5120	5180
	55	Divided	730	4820	5320	5360
7	45	Divided	**	4483	5785	5878

Annual Average Daily Traffic

Lanes	Speed Limit	Median	B	C	D	E
2	35	Undivided	**	4200	13700	17200
	35	Divided	**	4400	14600	18100
4	35	Divided	**	12100	32200	35800
	45	Divided	**	13900	36200	40800
	50	Divided	**	19700	39200	42200
	55	Divided	**	24400	41700	43800
6	35	Divided	**	15800	51700	59000
	50	Divided	**	54700	63900	64800
	55	Divided	9100	60200	66500	67000

Segment Capacity Threshold for Industrial Streets

Hourly Volume in Peak Direction

Lanes	Speed Limit	Median	B	C	D	E
1	25	Undivided	**	110	450	560
	25	Divided	**	140	610	720
	35	Undivided	**	180	590	740
	35	Divided	**	190	630	780
	40	Undivided	**	216	708	888
	40	Divided	**	228	756	936

Hourly Volume in Both Direction

Lanes	Speed Limit	Median	B	C	D	E
2	25	Undivided	**	200	800	990
	25	Divided	**	250	1080	1270
	35	Undivided	**	340	1100	1380
	35	Divided	**	360	1170	1450
	40	Undivided	**	408	1320	1656
	40	Divided	**	432	1404	1740

Annual Average Daily Traffic

Lanes	Speed Limit	Median	B	C	D	E
2	25	Undivided	**	2200	8900	11000
	25	Divided	**	2800	12000	14100
	35	Undivided	**	4200	13700	17200
	35	Divided	**	4400	14600	18100
	40	Undivided	**	5040	16440	20640
	40	Divided	**	5280	17520	21720

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APPENDIX B

HCM INTERSECTION METHODOLOGY

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HIGHWAY CAPACITY 6th EDITION MANUAL LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

In the Highway Capacity Manual 6th Edition (HCM 6), Level of Service for signalized intersections is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, Level of Service criteria are 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.

Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group or approach in question.

LEVEL OF SERVICE	CONTROLLED DELAY PER VEHICLE (SEC)		
A		≤	10.0
B	10.1	to	20.0
C	20.1	to	35.0
D	35.1	to	55.0
E	55.1	to	80.0
F		>	80.0

Level of Service 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.

Level of Service B describes operations with delay in the range of 10.1 to 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.

Level of Service C describes operations with delay in the range of 20.1 to 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 in the level. The number of vehicles stopping is significant at this level, although many still pass through the intersections without stopping.

Level of Service D describes operations with delay in the range of 35.1 to 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 high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of Service E describes operations with delay in the range of 55.1 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.

Level of Service F describes operations with delay in excess of 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.

HIGHWAY CAPACITY 6th EDITION MANUAL LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

In the Highway Capacity Manual 6th Edition (HCM 6), Level of Service for unsignalized intersections is determined by the computed or measured control delay and is defined for each minor movement. Level of Service is not defined for the intersection as a whole. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. The criteria are given in the following table, and are based on the average control delay for any particular minor movement.

LEVEL OF SERVICE	AVERAGE CONTROL DELAY SEC/VEH			EXPECTED DELAY TO MINOR STREET TRAFFIC
A	0.0	\leq	10.0	Little or no delay
B	10.1	to	15.0	Short traffic delays
C	15.1	to	25.0	Average traffic delays
D	25.1	to	35.0	Long traffic delays
E	35.1	to	50.0	Very long traffic delays
F		$>$	50.0	Severe congestion

Level of Service 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 Level of Service 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 on 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.

In most cases at Two-Way Stop Controlled (TWSC) intersections, the critical movement is the minor-street left-turn movement. As such, the minor-street left-turn movement can generally be considered the primary factor affecting overall intersection performance. The lower threshold for LOS F is set at 50 seconds of delay per vehicle. There are many instances, particularly in urban areas, in which the delay equations will predict delays of 50 seconds (LOS F) or more for minor-street movements under very low volume conditions on the minor street (less than 25 vehicle/hour). Since the first term of the equation is a function only of the capacity, the LOS F threshold of 50 sec/vehicle is reached with a movement capacity of approximately 85 vehicle/hour or less.

This procedure assumes random arrivals on the major street. For a typical four-lane arterial with average daily traffic volumes in the range of 15,000 to 20,000 vehicles per day (peak hour, 1,500 to 2,000 vehicle/hour), the delay equation used in the TWSC capacity analysis procedure will predict 50 seconds of delay or more (LOS F) for many urban TWSC intersections that allow minor-street left-turn movements. **The LOS F threshold will be reached regardless of the volume of minor-street left-turn traffic.** Notwithstanding this fact, most low-volume minor-street approaches would not meet any of the volume or delay warrants for signalization of the *Manual on Uniform Traffic Control Devices* (MUTCD) since the warrants define an asymptote at 100 vehicle/hour on the minor approach. As a result, many public agencies that use the HCM 6 Level of Service thresholds to determine the design adequacy of TWSC intersections may be forced to eliminate the minor-street left-turn movement, even when the movement may not present any operational problem, such as the formation of long queues on the minor street or driveway approach.

APPENDIX C

EXISTING TRAFFIC COUNT SHEETS

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National Data & Surveying Services

Intersection Turning Movement Count

Location: Tamarack Ave & El Camino Real
 City: Carlsbad
 Control: Signalized

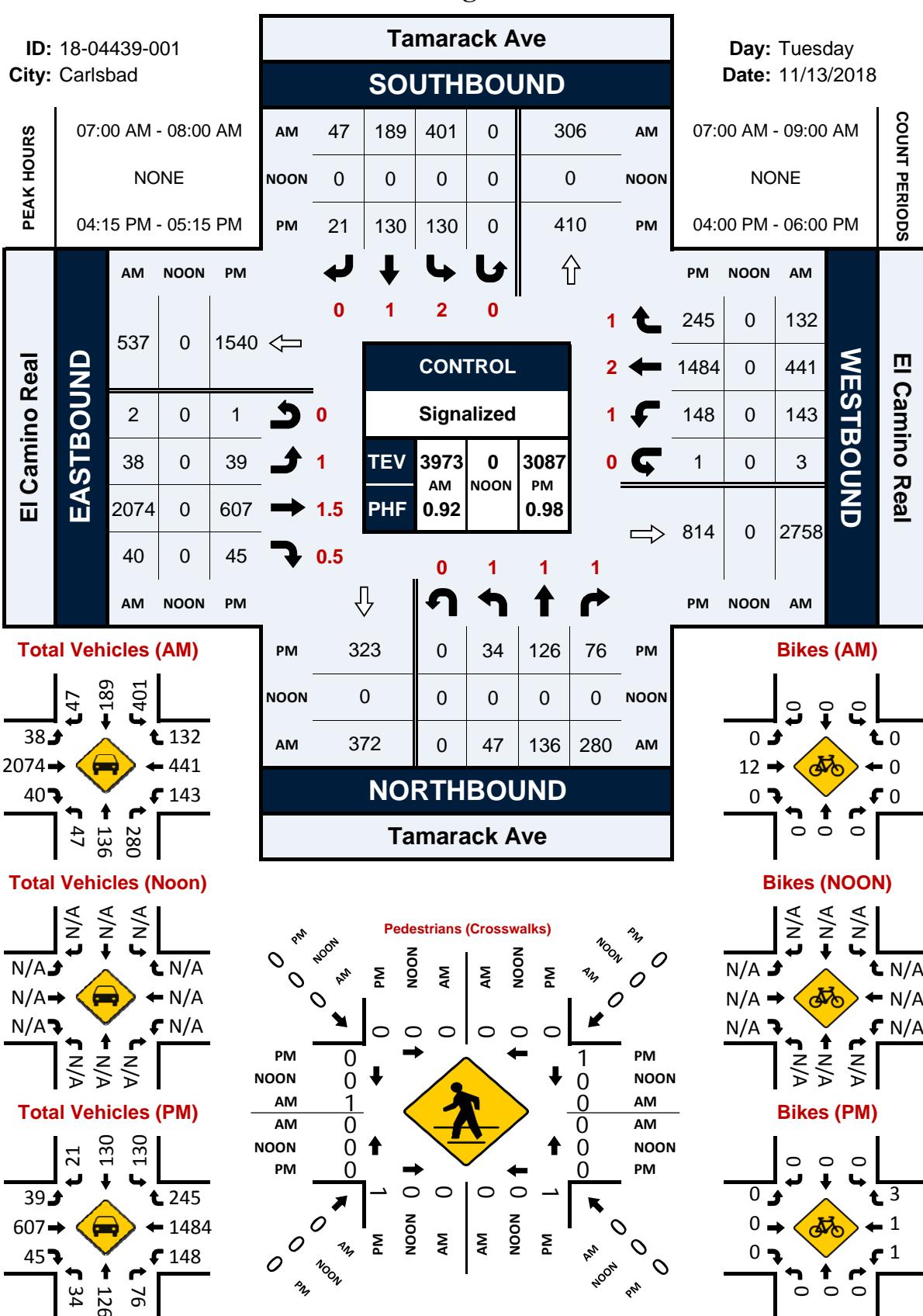
Project ID: 18-04439-001
 Date: 11/13/2018

Total

NS/EW Streets:	Tamarack Ave				Tamarack Ave				El Camino Real				El Camino Real				
	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
AM	1 NL	1 NT	1 NR	0 NU	2 SL	1 ST	0 SR	0 SU	1 EL	1.5 ET	0.5 ER	0 EU	1 WL	2 WT	1 WR	0 WU	TOTAL
7:00 AM	12	25	43	0	71	43	21	0	9	420	3	0	38	163	24	1	873
7:15 AM	13	29	70	0	110	70	15	0	9	552	13	1	54	113	33	0	1082
7:30 AM	7	41	82	0	105	47	7	0	12	601	10	0	36	86	35	0	1069
7:45 AM	15	41	85	0	115	29	4	0	8	501	14	1	15	79	40	2	949
8:00 AM	17	27	44	0	99	36	10	0	6	411	13	0	9	109	23	1	805
8:15 AM	10	22	42	0	83	48	15	0	3	366	10	0	9	117	16	0	741
8:30 AM	3	22	48	0	65	26	6	0	8	305	9	0	19	101	19	0	631
8:45 AM	18	19	29	0	57	19	6	0	6	207	9	0	21	138	18	1	548
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	95	226	443	0	705	318	84	0	61	3363	81	2	201	906	208	5	6698
PEAK HR :	07:00 AM - 08:00 AM				63.69% 28.73% 7.59% 0.00%				1.74% 95.89% 2.31% 0.06%				15.23% 68.64% 15.76% 0.38%				TOTAL
PEAK HR VOL :	47	136	280	0	401	189	47	0	38	2074	40	2	143	441	132	3	3973
PEAK HR FACTOR :	0.783	0.829	0.824	0.000	0.872	0.675	0.560	0.000	0.792	0.863	0.714	0.500	0.662	0.676	0.825	0.375	0.918
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1 NL	1 NT	1 NR	0 NU	2 SL	1 ST	0 SR	0 SU	1 EL	1.5 ET	0.5 ER	0 EU	1 WL	2 WT	1 WR	0 WU	TOTAL
4:00 PM	11	32	27	0	21	40	11	0	9	157	9	0	38	345	70	1	771
4:15 PM	9	26	18	0	28	38	3	0	6	170	9	0	38	368	63	1	777
4:30 PM	11	33	18	0	37	33	6	0	18	141	7	0	32	374	49	0	759
4:45 PM	6	31	17	0	38	31	7	0	5	153	13	1	36	371	51	0	760
5:00 PM	8	36	23	0	27	28	5	0	10	143	16	0	42	371	82	0	791
5:15 PM	11	29	25	0	24	27	8	0	12	131	5	1	48	366	82	0	769
5:30 PM	11	36	20	0	28	25	4	0	10	130	10	0	31	350	81	1	737
5:45 PM	9	25	18	0	32	17	8	0	11	113	9	0	53	244	80	0	619
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	76	248	166	0	235	239	52	0	81	1138	78	2	318	2789	558	3	5983
PEAK HR :	04:15 PM - 05:15 PM				44.68% 45.44% 9.89% 0.00%				6.24% 87.61% 6.00% 0.15%				8.67% 76.04% 15.21% 0.08%				TOTAL
PEAK HR VOL :	34	126	76	0	130	130	21	0	39	607	45	1	148	1484	245	1	3087
PEAK HR FACTOR :	0.773	0.875	0.826	0.000	0.855	0.855	0.750	0.000	0.542	0.893	0.703	0.250	0.881	0.992	0.747	0.250	0.976

Tamarack Ave & El Camino Real

Peak Hour Turning Movement Count



National Data & Surveying Services
Intersection Turning Movement Count

Location: Kelly Dr & El Camino Real
City: Carlsbad
Control: Signalized

Project ID: 18-04439-002
Date: 11/13/2018

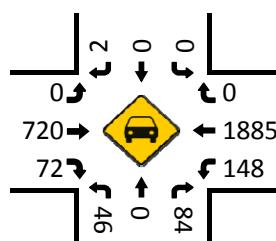
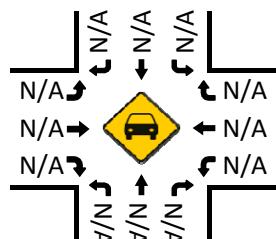
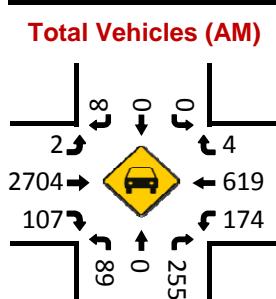
Total															Date: 11/18/2018			
NS/EW Streets:		Kelly Dr				Kelly Dr				El Camino Real				El Camino Real				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL	
	1.5	0	0.5	0	0	1	0	0	1	2	1	0	1	3	0	0		
7:00 AM	14	0	44	0	0	0	0	0	0	563	8	0	13	248	1	1	892	
7:15 AM	10	0	41	0	0	0	0	5	0	1	731	24	0	25	154	2	0	993
7:30 AM	24	0	62	0	0	0	0	0	1	718	41	0	79	128	1	0	1054	
7:45 AM	41	0	108	0	0	0	3	0	0	692	34	0	57	89	0	1	1025	
8:00 AM	33	0	52	0	0	0	0	0	0	521	18	0	13	98	1	2	738	
8:15 AM	14	0	49	0	0	0	0	1	0	1	443	11	0	3	132	2	0	656
8:30 AM	14	0	35	0	0	0	0	2	0	0	417	13	0	20	149	3	3	656
8:45 AM	9	0	25	0	0	0	1	0	1	286	6	0	12	145	1	1	487	
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL	
APPROACH %'s :	159	0	416	0	0	0	0	12	0	4	4371	155	0	222	1143	11	8	6501
	27.65%	0.00%	72.35%	0.00%	0.00%	0.00%	100.00%	0.00%	0.09%	96.49%	3.42%	0.00%	16.04%	82.59%	0.79%	0.58%		
PEAK HR :	07:00 AM - 08:00 AM																TOTAL	
PEAK HR VOL :	89	0	255	0	0	0	0	8	0	2	2704	107	0	174	619	4	2	3964
PEAK HR FACTOR :	0.543	0.000	0.590	0.000	0.000	0.000	0.400	0.400	0.500	0.925	0.652	0.000	0.551	0.624	0.500	0.500	0.940	
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL	
	1.5	0	0.5	0	0	1	0	0	1	2	1	0	1	3	0	0		
NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU			
4:00 PM	16	0	21	0	0	0	1	0	0	207	14	0	38	449	2	5	753	
4:15 PM	13	0	22	0	0	0	3	0	0	181	20	0	29	438	0	1	707	
4:30 PM	10	0	29	1	0	0	1	0	0	195	19	0	36	442	0	2	735	
4:45 PM	11	0	16	0	0	0	0	0	0	173	14	0	34	467	0	3	718	
5:00 PM	12	0	25	0	0	0	1	0	0	193	20	0	36	497	0	3	787	
5:15 PM	13	0	14	0	0	0	0	0	0	159	19	0	42	479	0	10	736	
5:30 PM	11	0	14	0	0	0	0	0	0	172	15	0	43	437	0	4	696	
5:45 PM	12	0	17	0	0	0	0	0	0	151	9	0	32	348	0	5	574	
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL	
APPROACH %'s :	98	0	158	1	0	0	6	0	0	1431	130	0	290	3557	2	33	5706	
	38.13%	0.00%	61.48%	0.39%	0.00%	0.00%	100.00%	0.00%	0.00%	91.67%	8.33%	0.00%	7.47%	91.63%	0.05%	0.85%		
PEAK HR :	04:30 PM - 05:30 PM																TOTAL	
PEAK HR VOL :	46	0	84	1	0	0	2	0	0	720	72	0	148	1885	0	18	2976	
PEAK HR FACTOR :	0.885	0.000	0.724	0.250	0.000	0.000	0.500	0.000	0.000	0.923	0.900	0.000	0.881	0.948	0.000	0.450	0.945	
	0.819				0.500				0.925			0.957						

Kelly Dr & El Camino Real

Peak Hour Turning Movement Count

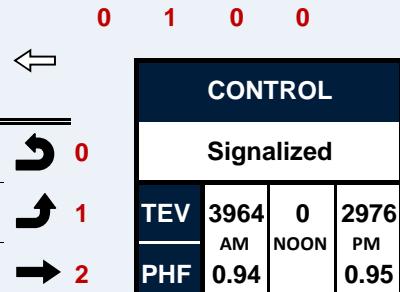
ID: 18-04439-002
City: Carlsbad

PEAK HOURS	07:00 AM - 08:00 AM		
	NONE		
04:30 PM - 05:30 PM			
EASTBOUND	AM	NOON	PM
El Camino Real	716	0	1933
	0	0	0
	2	0	0
	2704	0	720
	107	0	72
	AM	NOON	PM

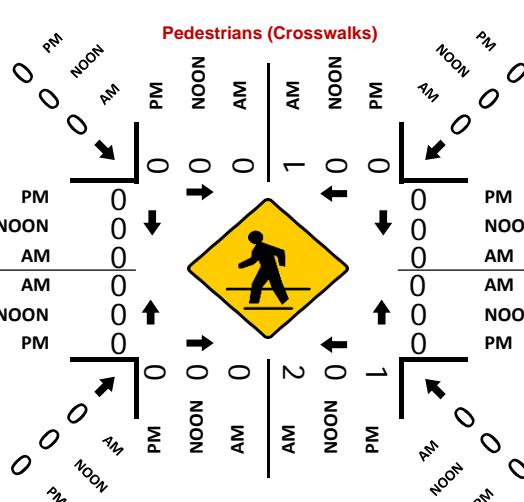


Kelly Dr					
SOUTHBOUND					
AM	8	0	0	0	6 AM
NOON	0	0	0	0	0 NOON
PM	2	0	0	0	0 PM



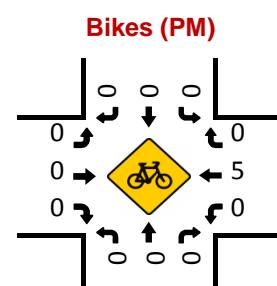
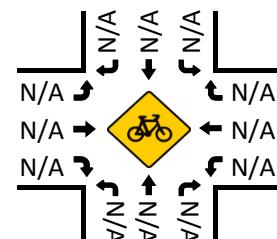
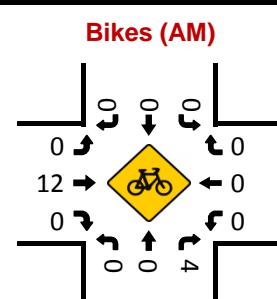


PM	221	1	46	0	84	PM
NOON	0	0	0	0	0	NOON
AM	281	0	89	0	255	AM



Day: Tuesday
Date: 11/13/2018

07:00 AM - 09:00 AM			
NONE			
04:00 PM - 06:00 PM			
PM	NOON	AM	
0	0	4	
885	0	619	
148	0	174	
18	0	2	
822	0	2961	
			WESTBOUND



National Data & Surveying Services

Intersection Turning Movement Count

Location: Project Dwy 1 & El Camino Real
 City: Carlsbad
 Control: 1-Way Stop (NB)

Project ID: 18-04439-003
 Date: 11/13/2018

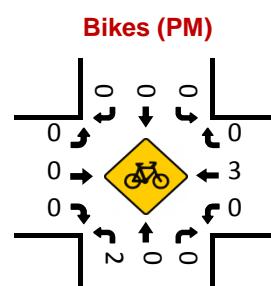
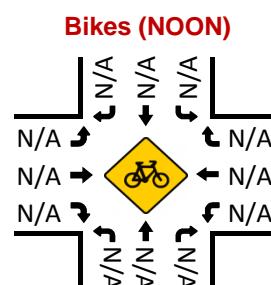
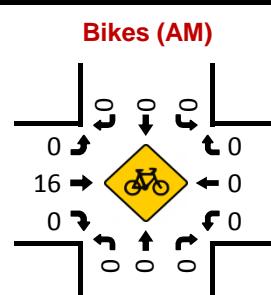
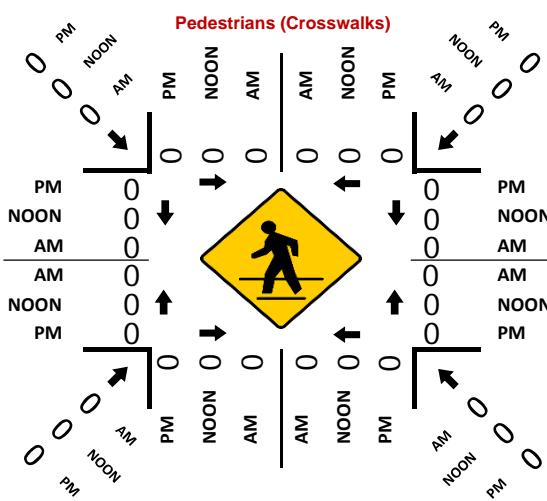
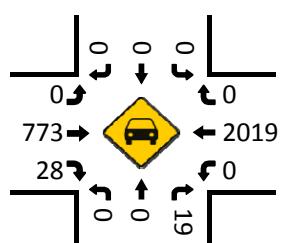
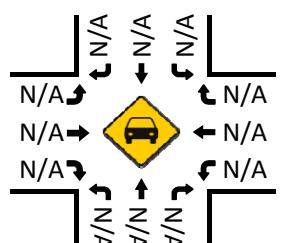
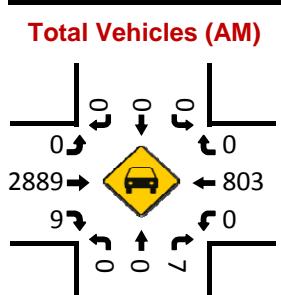
Total

NS/EW Streets:	Project Dwy 1				Project Dwy 1				El Camino Real				El Camino Real				
	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
AM	0 NL	0 NT	1 NR	0 NU	0 SL	0 ST	0 SR	0 SU	0 EL	3 ET	0 ER	0 EU	0 WL	3 WT	0 WR	0 WU	TOTAL
7:00 AM	0	0	1	0	0	0	0	0	0	575	2	0	0	235	0	0	813
7:15 AM	0	0	3	0	0	0	0	0	0	733	3	0	0	208	0	0	947
7:30 AM	0	0	2	0	0	0	0	0	0	802	2	0	0	195	0	0	1001
7:45 AM	0	0	1	0	0	0	0	0	0	779	2	0	0	165	0	0	947
8:00 AM	0	0	1	0	0	0	0	0	0	609	3	0	0	122	0	0	735
8:15 AM	0	0	1	0	0	0	0	0	0	487	2	0	0	131	0	0	621
8:30 AM	0	0	2	0	0	0	0	0	0	464	4	0	0	141	0	0	611
8:45 AM	0	0	6	0	0	0	0	0	0	323	5	0	0	179	0	0	513
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	0 0.00%	0 0.00%	17 100.00%	0 0.00%	0 0	0 0	0 0	0 0	0 0.00%	4772	23	0	0	1376	0	0	6188
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	7	0	0	0	0	0	0	2889	9	0	0	803	0	0	3708
PEAK HR FACTOR :	0.000	0.000	0.583	0.000	0.000	0.000	0.000	0.000	0.901	0.750	0.000	0.000	0.000	0.854	0.000	0.926	
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	0 NT	1 NR	0 NU	0 SL	0 ST	0 SR	0 SU	0 EL	3 ET	0 ER	0 EU	0 WL	3 WT	0 WR	0 WU	TOTAL
4:00 PM	0	0	8	0	0	0	0	0	0	205	11	0	0	483	0	0	707
4:15 PM	0	0	6	0	0	0	0	0	0	208	5	0	0	479	0	0	698
4:30 PM	0	0	5	0	0	0	0	0	0	190	6	0	0	469	0	0	670
4:45 PM	0	0	4	0	0	0	0	0	0	210	5	0	0	482	0	0	701
5:00 PM	0	0	3	0	0	0	0	0	0	194	7	0	0	527	0	0	731
5:15 PM	0	0	5	0	0	0	0	0	0	184	9	0	0	501	0	0	699
5:30 PM	0	0	7	0	0	0	0	0	0	185	7	0	0	509	0	0	708
5:45 PM	0	0	1	0	0	0	0	0	0	163	4	0	0	408	0	0	576
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	0 0.00%	0 0.00%	39 100.00%	0 0.00%	0 0	0 0	0 0	0 0	0 0.00%	1539	54	0	0	3858	0	0	5490
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	19	0	0	0	0	0	0	773	28	0	0	2019	0	0	2839
PEAK HR FACTOR :	0.000	0.000	0.679	0.000	0.000	0.000	0.000	0.000	0.920	0.778	0.000	0.000	0.000	0.958	0.000	0.971	

Project Dwy 1 & El Camino Real

Peak Hour Turning Movement Count

ID: 18-04439-003
City: Carlsbad



National Data & Surveying Services

Intersection Turning Movement Count

Location: Project Dwy 2 & El Camino Real
 City: Carlsbad
 Control: 1-Way Stop (NB)

Project ID: 18-04439-004
 Date: 11/13/2018

Total

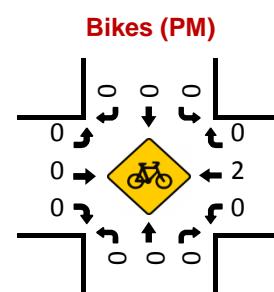
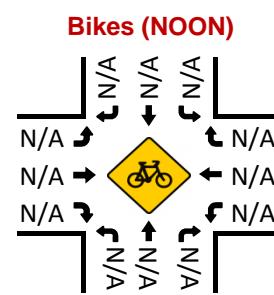
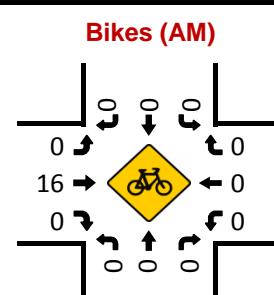
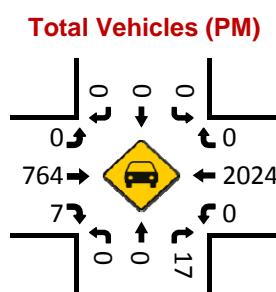
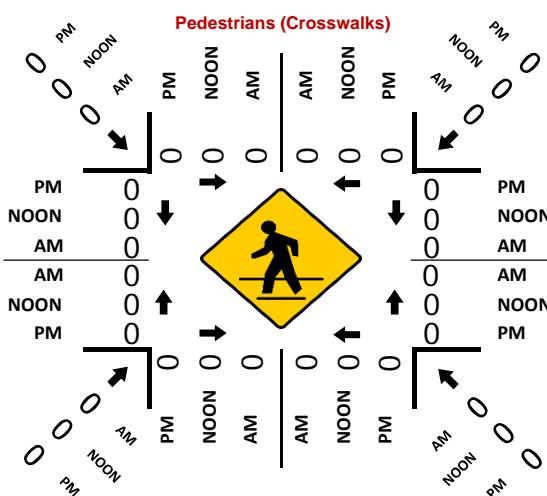
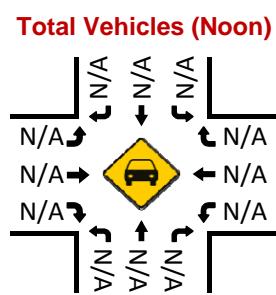
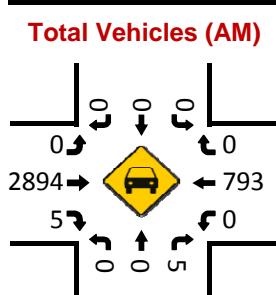
NS/EW Streets:	Project Dwy 2				Project Dwy 2				El Camino Real				El Camino Real				
	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
AM	0 NL	0 NT	1 NR	0 NU	0 SL	0 ST	0 SR	0 SU	0 EL	3 ET	0 ER	0 EU	0 WL	3 WT	0 WR	0 WU	TOTAL
7:00 AM	0	0	1	0	0	0	0	0	0	550	1	0	0	256	0	0	808
7:15 AM	0	0	0	0	0	0	0	0	0	757	2	0	0	186	0	0	945
7:30 AM	0	0	1	0	0	0	0	0	0	813	1	0	0	197	0	0	1012
7:45 AM	0	0	3	0	0	0	0	0	0	774	1	0	0	154	0	0	932
8:00 AM	0	0	3	0	0	0	0	0	0	608	1	0	0	114	0	0	726
8:15 AM	0	0	3	0	0	0	0	0	0	514	0	0	0	128	0	0	645
8:30 AM	0	0	2	0	0	0	0	0	0	431	1	0	0	158	0	0	592
8:45 AM	0	0	2	0	0	0	0	0	0	338	1	0	0	176	0	0	517
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	0 0.00%	0 0.00%	15 100.00%	0 0.00%	0 0	0 0	0 0	0 0	0 0.00%	4785 99.83%	8 0.17%	0 0.00%	0 0.00%	1369 100.00%	0 0.00%	0 0.00%	6177 0.00%
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	5	0	0	0	0	0	0	2894	5	0	0	793	0	0	3697
PEAK HR FACTOR :	0.000	0.000	0.417	0.000	0.000	0.000	0.000	0.000	0.000	0.890	0.625	0.000	0.000	0.774	0.000	0.000	0.913

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	0 NT	1 NR	0 NU	0 SL	0 ST	0 SR	0 SU	0 EL	3 ET	0 ER	0 EU	0 WL	3 WT	0 WR	0 WU	TOTAL
4:00 PM	0	0	5	0	0	0	0	0	0	219	1	0	0	489	0	0	714
4:15 PM	0	0	3	0	0	0	0	0	0	209	2	0	0	469	0	0	683
4:30 PM	0	0	4	0	0	0	0	0	0	201	2	0	0	473	0	0	680
4:45 PM	0	0	4	0	0	0	0	0	0	202	2	0	0	487	0	0	695
5:00 PM	0	0	4	0	0	0	0	0	0	198	0	0	0	507	0	0	709
5:15 PM	0	0	5	0	0	0	0	0	0	183	0	0	0	505	0	0	693
5:30 PM	0	0	4	0	0	0	0	0	0	181	5	0	0	525	0	0	715
5:45 PM	0	0	1	0	0	0	0	0	0	169	0	0	0	390	0	0	560
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	0 0.00%	0 0.00%	30 100.00%	0 0.00%	0 0	0 0	0 0	0 0	0 0.00%	1562 99.24%	12 0.76%	0 0.00%	0 0.00%	3845 100.00%	0 0.00%	0 0.00%	5449 0.00%
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	17	0	0	0	0	0	0	764	7	0	0	2024	0	0	2812
PEAK HR FACTOR :	0.000	0.000	0.850	0.000	0.000	0.000	0.000	0.000	0.000	0.946	0.350	0.000	0.000	0.964	0.000	0.000	0.983

Project Dwy 2 & El Camino Real

Peak Hour Turning Movement Count

ID: 18-04439-004
City: Carlsbad



National Data & Surveying Services
Intersection Turning Movement Count

Location: W Ranch St & El Camino Real
 City: Carlsbad
 Control: Signalized

Project ID: 18-04439-005
 Date: 11/13/2018

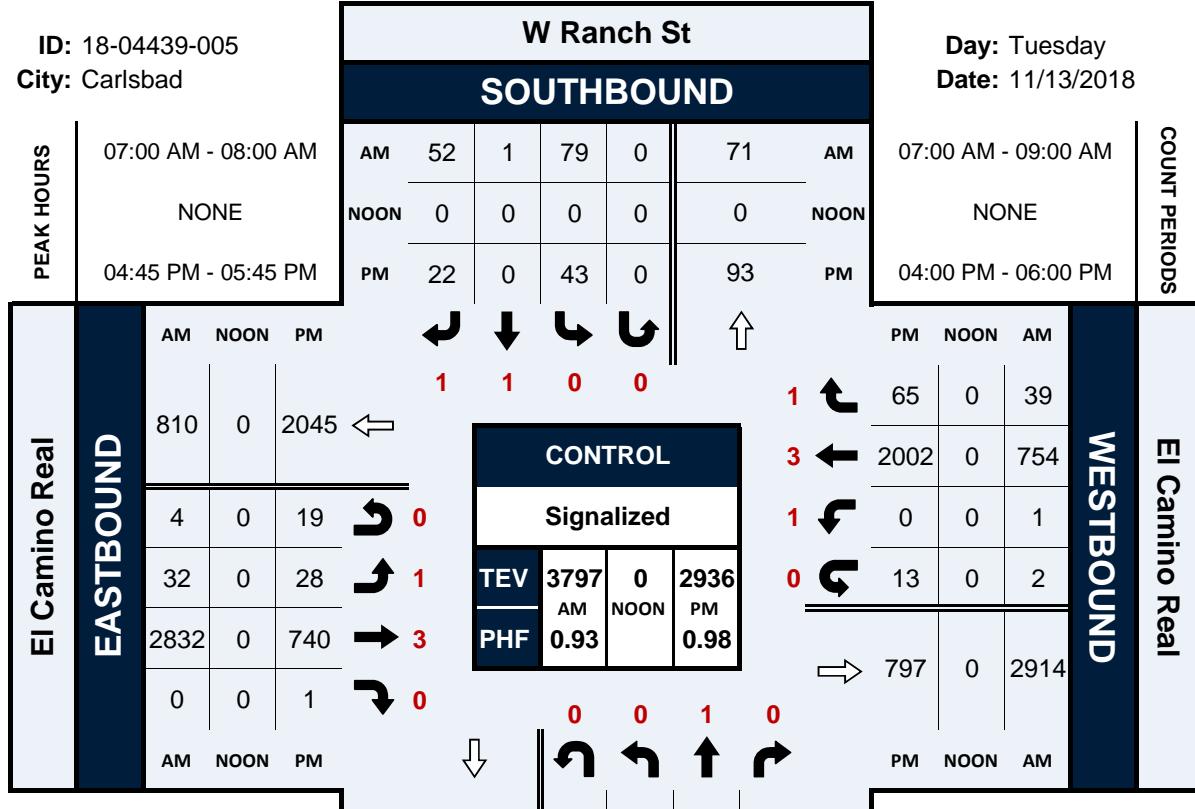
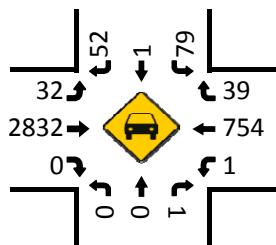
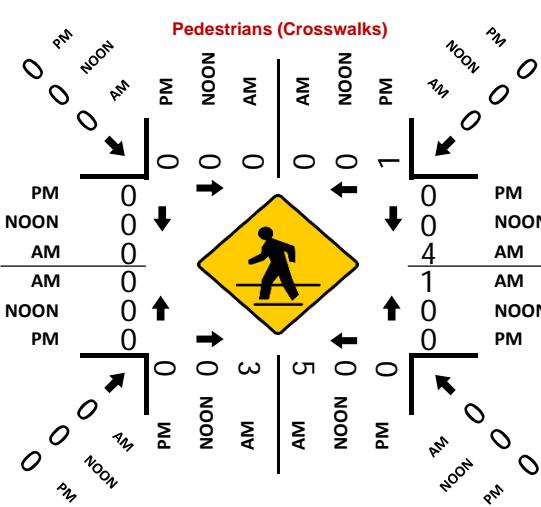
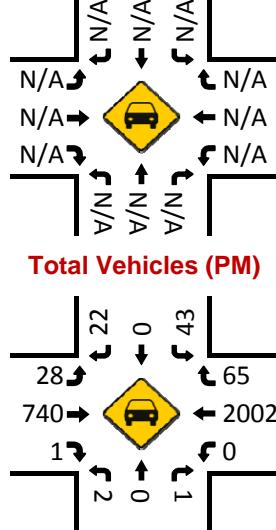
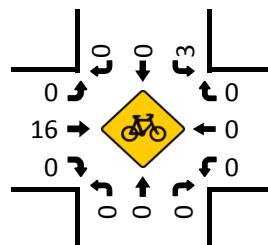
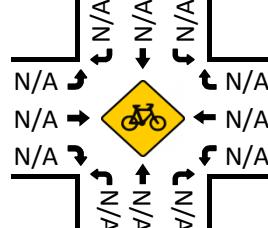
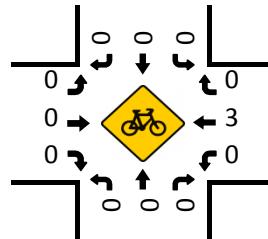
NS/EW Streets:	Total																
	W Ranch St				W Ranch St				El Camino Real								
	NORTHBOUND				SOUTHBOUND				EASTBOUND								
AM	0 NL	1 NT	0 NR	0 NU	0 SL	1 ST	1 SR	0 SU	1 EL	3 ET	0 ER	0 EU	1 WL	3 WT	1 WR	0 WU	TOTAL
7:00 AM	0	0	0	0	16	0	10	0	8	528	0	1	0	227	14	1	805
7:15 AM	0	0	0	0	28	0	10	0	6	727	0	3	1	197	9	0	981
7:30 AM	0	0	1	0	18	1	10	0	6	762	0	0	0	182	8	0	988
7:45 AM	0	0	0	0	17	0	22	0	12	815	0	0	0	148	8	1	1023
8:00 AM	2	0	1	0	17	0	9	0	7	628	0	1	0	110	9	2	786
8:15 AM	0	0	0	0	13	0	8	0	5	500	1	1	0	122	12	3	665
8:30 AM	1	0	1	0	20	0	15	0	7	418	2	2	0	125	5	3	599
8:45 AM	0	0	2	0	26	0	7	0	6	357	0	3	1	179	12	0	593
TOTAL VOLUMES :	NL 3 37.50%	NT 0 0.00%	NR 5 62.50%	NU 0 0.00%	SL 155 62.75%	ST 1 0.40%	SR 91 36.84%	SU 0 0.00%	EL 57 1.19%	ET 4735 98.52%	ER 3 0.06%	EU 11 0.23%	WL 2 0.15%	WT 1290 93.55%	WR 77 5.58%	WU 10 0.73%	TOTAL 6440
APPROACH %'s :																	TOTAL
PEAK HR :	07:00 AM - 08:00 AM																TOTAL 3797
PEAK HR VOL :	0	0	1	0	79	1	52	0	32	2832	0	4	1	754	39	2	
PEAK HR FACTOR :	0.000	0.000	0.250	0.000	0.705	0.250	0.591	0.000	0.667	0.869	0.000	0.333	0.250	0.830	0.696	0.500	0.928
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
PM	0 NL	1 NT	0 NR	0 NU	0 SL	1 ST	1 SR	0 SU	1 EL	3 ET	0 ER	0 EU	1 WL	3 WT	1 WR	0 WU	TOTAL
4:00 PM	0	0	0	0	14	0	8	0	8	215	0	7	1	469	18	3	743
4:15 PM	1	0	0	0	3	0	7	0	7	190	1	4	2	469	12	2	698
4:30 PM	1	0	0	0	10	0	5	1	8	188	1	6	0	460	12	4	696
4:45 PM	1	0	1	0	9	0	6	0	10	200	0	4	0	477	16	2	726
5:00 PM	1	0	0	0	13	0	3	0	3	193	1	4	0	515	15	4	752
5:15 PM	0	0	0	0	11	0	6	0	9	176	0	2	0	515	14	4	737
5:30 PM	0	0	0	0	10	0	7	0	6	171	0	9	0	495	20	3	721
5:45 PM	0	0	0	0	9	0	9	0	6	163	0	3	0	401	13	6	610
TOTAL VOLUMES :	NL 4 80.00%	NT 0 0.00%	NR 1 20.00%	NU 0 0.00%	SL 79 60.31%	ST 0 0.00%	SR 51 38.93%	SU 1 0.76%	EL 57 3.57%	ET 1496 93.79%	ER 3 0.19%	EU 39 2.45%	WL 3 0.08%	WT 3801 96.18%	WR 120 3.04%	WU 28 0.71%	TOTAL 5683
APPROACH %'s :																	TOTAL 2936
PEAK HR :	04:45 PM - 05:45 PM																TOTAL 0.974
PEAK HR VOL :	2	0	1	0	43	0	22	0	28	740	1	19	0	2002	65	13	
PEAK HR FACTOR :	0.500	0.000	0.250	0.000	0.827	0.000	0.786	0.000	0.700	0.925	0.250	0.528	0.000	0.972	0.813	0.813	0.976

W Ranch St & El Camino Real

Peak Hour Turning Movement Count

ID: 18-04439-005
City: Carlsbad

Day: Tuesday
Date: 11/13/2018

**Total Vehicles (AM)****Total Vehicles (Noon)****NORTHBOUND**
W Ranch St**Total Vehicles (PM)****Bikes (AM)****Bikes (Noon)****Bikes (PM)**

National Data & Surveying Services
Intersection Turning Movement Count

Location: Cannon Rd & El Camino Real
 City: Carlsbad
 Control: Signalized

Project ID: 18-04439-006
 Date: 11/13/2018

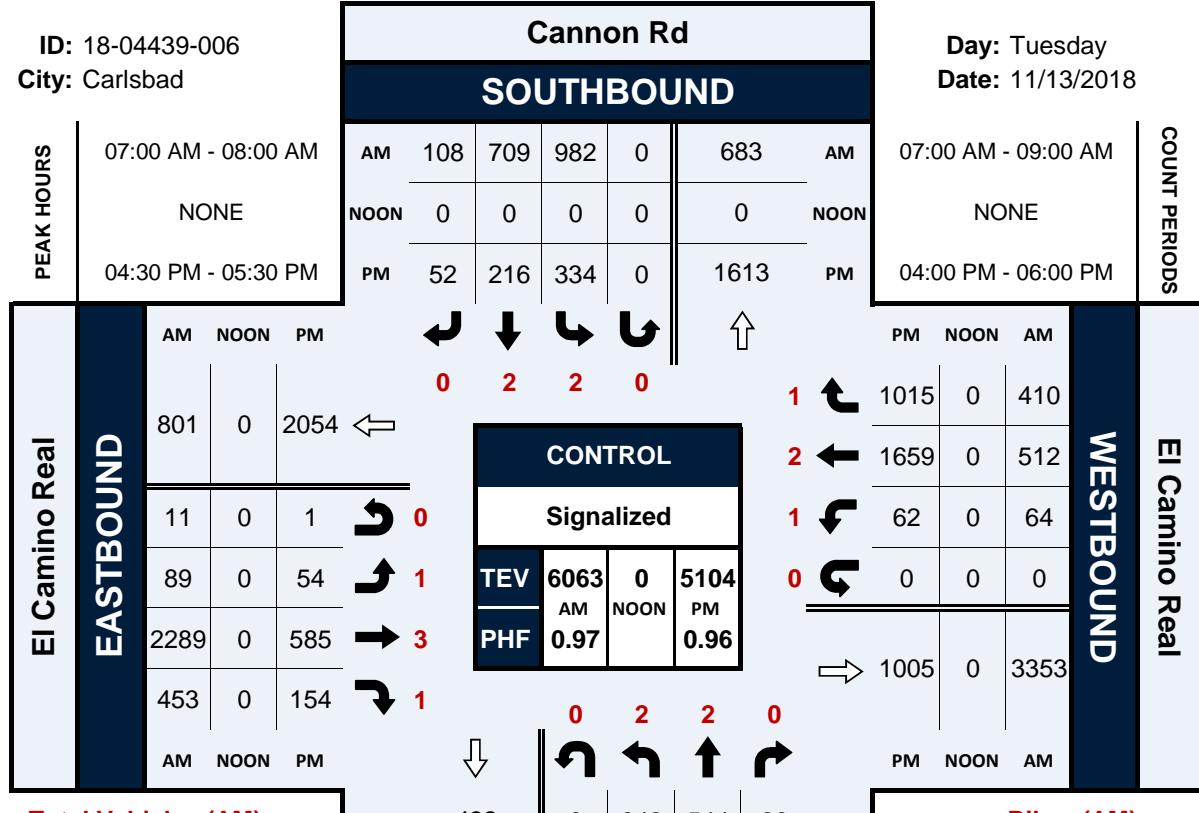
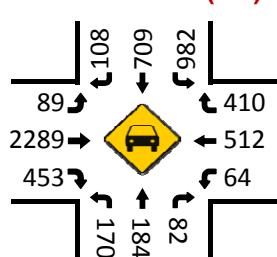
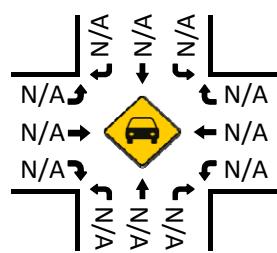
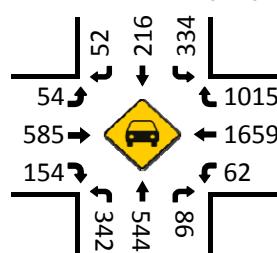
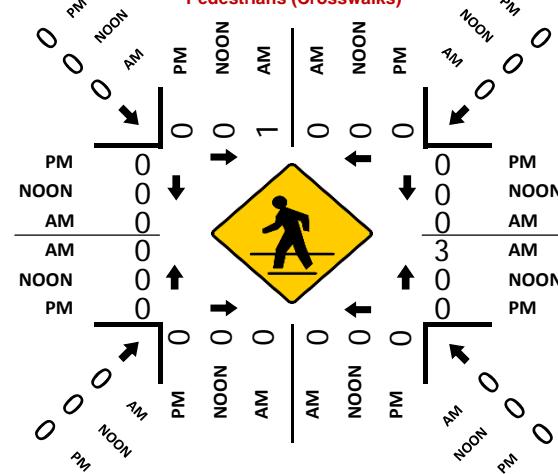
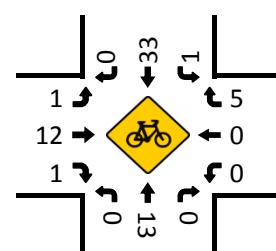
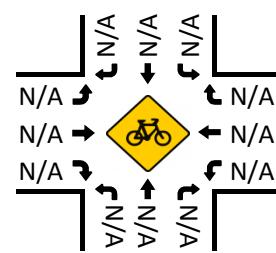
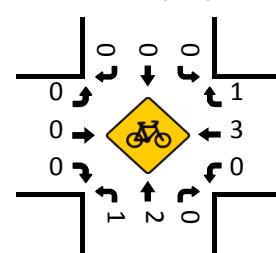
Total

NS/EW Streets:	Cannon Rd				Cannon Rd				El Camino Real				El Camino Real				
	2 NL	2 NT	0 NR	0 NU	2 SL	2 ST	0 SR	0 SU	1 EL	3 ET	1 ER	0 EU	1 WL	2 WT	1 WR	0 WU	
AM	NORTHBOUND		SOUTHBOUND		EASTBOUND		WESTBOUND										
	2 NL	2 NT	0 NR	0 NU	2 SL	2 ST	0 SR	0 SU	1 EL	3 ET	1 ER	0 EU	1 WL	2 WT	1 WR	0 WU	TOTAL
7:00 AM	55	106	14	0	192	166	29	0	47	393	86	6	10	147	214	0	1465
7:15 AM	28	36	23	0	237	191	37	0	15	604	115	1	15	150	67	0	1519
7:30 AM	47	10	28	0	283	183	21	0	11	666	119	1	15	122	59	0	1565
7:45 AM	40	32	17	0	270	169	21	0	16	626	133	3	24	93	70	0	1514
8:00 AM	15	32	12	0	210	110	4	0	15	627	96	1	16	98	56	1	1293
8:15 AM	20	28	23	0	217	113	5	0	6	485	76	1	21	105	67	0	1167
8:30 AM	11	27	18	0	192	85	9	0	4	363	63	1	18	125	66	0	982
8:45 AM	29	32	43	0	220	98	16	0	8	332	48	0	11	134	67	0	1038
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	245	303	178	0	1821	1115	142	0	122	4096	736	14	130	974	666	1	10543
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	170	184	82	0	982	709	108	0	89	2289	453	11	64	512	410	0	6063
PEAK HR FACTOR :	0.773	0.434	0.732	0.000	0.623	0.928	0.730	0.000	0.473	0.859	0.852	0.458	0.667	0.853	0.479	0.000	0.969
PM	NORTHBOUND		SOUTHBOUND		EASTBOUND		WESTBOUND										
	2 NL	2 NT	0 NR	0 NU	2 SL	2 ST	0 SR	0 SU	1 EL	3 ET	1 ER	0 EU	1 WL	2 WT	1 WR	0 WU	TOTAL
4:00 PM	83	133	15	0	88	58	15	0	19	173	33	2	8	398	219	0	1244
4:15 PM	61	123	20	0	106	43	14	0	17	150	34	1	17	409	259	0	1254
4:30 PM	79	127	17	0	87	53	8	0	16	144	35	0	14	388	230	0	1198
4:45 PM	77	144	22	0	79	61	18	0	12	159	35	0	13	417	249	0	1286
5:00 PM	94	121	18	0	78	53	17	0	13	147	50	0	17	419	268	0	1295
5:15 PM	92	152	29	0	90	49	9	0	13	135	34	1	18	435	268	0	1325
5:30 PM	94	135	17	0	54	41	15	0	11	115	47	0	10	399	259	0	1197
5:45 PM	62	96	22	0	69	53	8	0	10	133	27	0	11	333	200	0	1024
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	642	1031	160	0	651	411	104	0	111	1156	295	4	108	3198	1952	0	9823
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	342	544	86	0	334	216	52	0	54	585	154	1	62	1659	1015	0	5104
PEAK HR FACTOR :	0.910	0.895	0.741	0.000	0.890	0.928	0.885	0.722	0.000	0.844	0.920	0.770	0.250	0.861	0.953	0.947	0.000
																0.949	0.963

Cannon Rd & El Camino Real**Peak Hour Turning Movement Count**

ID: 18-04439-006
City: Carlsbad

Day: Tuesday
Date: 11/13/2018

**Total Vehicles (AM)****Total Vehicles (Noon)****Total Vehicles (PM)****Pedestrians (Crosswalks)****Bikes (AM)****Bikes (NOON)****Bikes (PM)**

Prepared by NDS/ATD

VOLUME

El Camino Real Bet. Tamarack Ave & Kelly Dr

Day: Tuesday
Date: 11/13/2018

City: Carlsbad
Project #: CA18 4440 001

DAILY TOTALS		NB		SB		EB		WB						Total	
AM Period		0	0		15,354		13,922							29,276	
00:00			14	26		40		12:00		172	240		412		
00:15			12	18		30		12:15		201	190		391		
00:30			1	10		11		12:30		185	190		375		
00:45		7	34	7	61	14	95	12:45		185	743	147	767	332 1510	
01:00			4	11		15		13:00		201	183		384		
01:15			6	7		13		13:15		151	189		340		
01:30			6	7		13		13:30		212	181		393		
01:45		3	19	4	29	7	48	13:45		198	762	180	733	378 1495	
02:00			5	2		7		14:00		164	269		433		
02:15			1	4		5		14:15		224	237		461		
02:30			4	9		13		14:30		268	328		596		
02:45		7	17	7	22	14	39	14:45		296	952	372	1206	668 2158	
03:00			7	0		7		15:00		207	290		497		
03:15			12	4		16		15:15		218	346		564		
03:30			18	1		19		15:30		235	317		552		
03:45		29	66	9	14	38	80	15:45		203	863	439	1392	642 2255	
04:00			11	3		14		16:00		212	418		630		
04:15			21	7		28		16:15		191	454		645		
04:30			45	13		58		16:30		204	443		647		
04:45		82	159	16	39	98	198	16:45		209	816	474	1789	683 2605	
05:00			45	12		57		17:00		200	480		680		
05:15			84	17		101		17:15		184	472		656		
05:30			155	26		181		17:30		213	443		656		
05:45		228	512	37	92	265	604	17:45		176	773	350	1745	526 2518	
06:00			119	38		157		18:00		145	336		481		
06:15			246	71		317		18:15		124	324		448		
06:30			361	70		431		18:30		124	299		423		
06:45		574	1300	110	289	684	1589	18:45		130	523	172	1131	302 1654	
07:00			528	219		747		19:00		101	189		290		
07:15			729	209		938		19:15		94	155		249		
07:30			805	134		939		19:30		90	90		180		
07:45			728	2790	107	669	835	3459	19:45		77	362	115	549	192 911
08:00			540	140		680		20:00		88	89		177		
08:15			436	134		570		20:15		63	88		151		
08:30			436	136		572		20:30		71	79		150		
08:45			314	1726	183	593	497	2319	20:45		80	302	77	333	157 635
09:00			259	125		384		21:00		75	72		147		
09:15			222	150		372		21:15		48	68		116		
09:30			199	127		326		21:30		62	62		124		
09:45			217	897	162	564	379	1461	21:45		52	237	50	252	102 489
10:00			161	154		315		22:00		32	43		75		
10:15			187	132		319		22:15		18	41		59		
10:30			165	140		305		22:30		20	54		74		
10:45			168	681	165	591	333	1272	22:45		22	92	39	177	61 269
11:00			175	173		348		23:00		11	34		45		
11:15			142	165		307		23:15		13	27		40		
11:30			171	223		394		23:30		8	25		33		
11:45			195	683	213	774	408	1457	23:45		13	45	25	111	38 156
TOTALS			8884	3737		12621		TOTALS			6470	10185		16655	
SPLIT %				70.4%	29.6%		43.1%	SPLIT %			38.8%	61.2%		56.9%	

DAILY TOTALS	NB	SB	EB	WB	Total 29,276						
	0	0	15,354	13,922							
AM Peak Hour	07:15	11:30	07:00	PM Peak Hour	14:15	16:30	16:45				
AM Pk Volume	2802	866	3459	PM Pk Volume	995	1869	2675				
Pk Hr Factor	0.870	0.902	0.921	Pk Hr Factor	0.840	0.973	0.979				
7 - 9 Volume	0	0	4516	1262	5778	4 - 6 Volume	0	0	1589	3534	5123
7 - 9 Peak Hour			07:15	07:00	07:00	4 - 6 Peak Hour			16:00	16:30	16:45
7 - 9 Pk Volume	0	0	2802	669	3459	4 - 6 Pk Volume	0	0	816	1869	2675
Pk Hr Factor	0.000	0.000	0.870	0.764	0.921	Pk Hr Factor	0.000	0.000	0.962	0.973	0.979

VOLUME

El Camino Real Bet. Kelly Dr & Project Dwy 1

Day: Tuesday

Date: 11/13/2018

City: Carlsbad

Project #: CA18_4440_002

DAILY TOTALS				NB 0	SB 0	EB 15,175	WB 14,565					Total 29,740
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL	
00:00			13	21	34	12:00			184	247	431	
00:15			13	19	32	12:15			200	229	429	
00:30			2	11	13	12:30			206	216	422	
00:45			6	34	7	12:45			176	766	866	
01:00			3	12	15	13:00			207	187	394	
01:15			5	8	13	13:15			172	206	378	
01:30			6	8	14	13:30			196	206	402	
01:45			6	20	8	13:45			201	776	810	
02:00			6	2	8	14:00			158	316	474	
02:15			3	2	5	14:15			220	293	513	
02:30			4	9	13	14:30			306	378	684	
02:45			7	20	3	14:45			328	1012	1342	
03:00			7	2	9	15:00			197	303	500	
03:15			12	4	16	15:15			223	336	559	
03:30			18	3	21	15:30			221	331	552	
03:45			30	67	7	15:45			198	839	1406	
04:00			14	3	17	16:00			215	447	662	
04:15			20	9	29	16:15			194	447	641	
04:30			51	15	66	16:30			196	451	647	
04:45			83	168	10	16:45			207	812	1816	
05:00			48	13	61	17:00			196	491	687	
05:15			84	15	99	17:15			183	486	669	
05:30			144	21	165	17:30			195	474	669	
05:45			208	484	36	17:45			166	740	1822	
06:00			112	35	147	18:00			139	360	499	
06:15			230	63	293	18:15			111	313	424	
06:30			323	68	391	18:30			110	303	413	
06:45			548	1213	113	18:45			129	489	1161	
07:00			498	223	721	19:00			91	190	281	
07:15			674	216	890	19:15			81	155	236	
07:30			729	184	913	19:30			91	97	188	
07:45			737	2638	177	19:45			68	331	108	
08:00			577	122	699	20:00			81	93	174	
08:15			448	126	574	20:15			52	94	146	
08:30			435	137	572	20:30			72	83	155	
08:45			327	1787	188	20:45			72	277	352	
09:00			265	120	385	21:00			68	60	128	
09:15			221	147	368	21:15			47	65	112	
09:30			222	139	361	21:30			51	57	108	
09:45			221	929	159	21:45			43	209	44	
10:00			171	158	329	22:00			29	48	77	
10:15			187	152	339	22:15			20	36	56	
10:30			161	152	313	22:30			18	57	75	
10:45			195	714	173	22:45			21	88	173	
11:00			174	185	359	23:00			11	33	44	
11:15			157	171	328	23:15			11	28	39	
11:30			200	230	430	23:30			8	22	30	
11:45			190	721	248	23:45			11	41	107	
TOTALS			8795	3934	12729	TOTALS			6380	10631	17011	
SPLIT %			69.1%	30.9%	42.8%	SPLIT %			37.5%	62.5%	57.2%	

DAILY TOTALS				NB 0	SB 0	EB 15,175	WB 14,565				Total 29,740
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AM Peak Hour	07:15	11:30	07:00	PM Peak Hour	14:30	16:45	16:45
AM Pk Volume	2717	954	3438	PM Pk Volume	1054	1922	2703
Pk Hr Factor	0.922	0.962	0.940	Pk Hr Factor	0.803	0.979	0.984
7 - 9 Volume	0	0	4425	4 - 6 Volume	0	0	5190
7 - 9 Peak Hour			07:15	07:00	07:00	1552	3638
7 - 9 Pk Volume	0	0	2717	800	3438	812	1922
Pk Hr Factor	0.000	0.000	0.922	0.897	0.940	0.944	0.979
				Pk Hr Factor	0.000	0.000	0.984

Prepared by NDS/ATD

VOLUME

El Camino Real Bet. Project Dwy 2 & W. Ranch Rd

Day: Tuesday
Date: 11/13/2018

City: Carlsbad
Project #: CA18 4440 003

DAILY TOTALS				NB 0	SB 0	EB 15,202	WB 14,611					Total 29,813
AM Period	NB	SB	EB	WB	TOTAL		PM Period	NB	SB	EB	WB	TOTAL
00:00			12	21	33		12:00		180	246	426	
00:15			13	19	32		12:15		185	232	417	
00:30			2	12	14		12:30		224	206	430	
00:45			6	33	7	59	12:45		188	777	179	863
01:00			3	11	14		13:00		200	187	387	
01:15			5	8	13		13:15		174	203	377	
01:30			6	8	14		13:30		200	209	409	
01:45			5	19	10	37	13:45		204	778	218	817
02:00			6	2	8		14:00		159	313	472	
02:15			2	2	4		14:15		218	292	510	
02:30			3	9	12		14:30		311	348	659	
02:45			8	19	4	17	14:45		329	1017	349	1302
03:00			7	2	9		15:00		207	297	504	
03:15			12	4	16		15:15		224	334	558	
03:30			19	5	24		15:30		228	335	563	
03:45			30	68	7	18	15:45		202	861	439	1405
04:00			14	4	18		16:00		222	457	679	
04:15			20	10	30		16:15		193	446	639	
04:30			51	14	65		16:30		194	454	648	
04:45			79	164	11	39	16:45		206	815	456	1813
05:00			48	12	60		17:00		198	500	698	
05:15			81	15	96		17:15		180	494	674	
05:30			143	20	163		17:30		181	485	666	
05:45			211	483	38	85	17:45		169	728	382	1861
06:00			113	35	148		18:00		135	351	486	
06:15			222	65	287		18:15		110	330	440	
06:30			325	70	395		18:30		114	306	420	
06:45			551	1211	110	280	18:45		126	485	184	1171
07:00			486	228	714		19:00		89	192	281	
07:15			675	210	885		19:15		77	162	239	
07:30			714	185	899		19:30		88	101	189	
07:45			741	2616	173	796	19:45		78	332	110	565
08:00			586	120	706		20:00		78	98	176	
08:15			475	128	603		20:15		58	94	152	
08:30			410	138	548		20:30		69	85	154	
08:45			354	1825	191	577	20:45		70	275	81	358
09:00			252	121	373		21:00		69	64	133	
09:15			223	150	373		21:15		49	65	114	
09:30			222	147	369		21:30		50	59	109	
09:45			219	916	154	572	21:45		42	210	46	234
10:00			168	157	325		22:00		29	50	79	
10:15			193	152	345		22:15		20	36	56	
10:30			160	151	311		22:30		19	60	79	
10:45			181	702	175	635	22:45		21	89	30	176
11:00			184	190	374		23:00		11	33	44	
11:15			159	167	326		23:15		11	28	39	
11:30			199	228	427		23:30		8	23	31	
11:45			196	738	237	822	23:45		11	41	25	109
TOTALS			8794	3937	12731		TOTALS		6408	10674		17082
SPLIT %			69.1%	30.9%	42.7%		SPLIT %		37.5%	62.5%		57.3%

DAILY TOTALS	NB	SB	EB	WB	Total 29,813			
	0	0	15,202	14,611				
AM Peak Hour	07:15	11:30	07:00	PM Peak Hour	14:30	16:45	16:45	
AM Pk Volume	2716	943	3412	PM Pk Volume	1071	1935	2700	
Pk Hr Factor	0.916	0.958	0.933	Pk Hr Factor	0.814	0.968	0.967	
7 - 9 Volume	0	0	4441	4 - 6 Volume	0	1543	3674	5217
7 - 9 Peak Hour	07:15	07:00	07:00	4 - 6 Peak Hour	0	16:00	16:45	16:45
7 - 9 Pk Volume	0	0	2716	4 - 6 Pk Volume	0	815	1935	2700
Pk Hr Factor	0.000	0.000	0.916	Pk Hr Factor	0.000	0.918	0.968	0.967

VOLUME

El Camino Real Bet. W. Ranch Rd & Cannon Rd

Day: Tuesday

Date: 11/13/2018

City: Carlsbad

Project #: CA18_4440_004

DAILY TOTALS				NB 0	SB 0	EB 15,534	WB 14,793					Total 30,327
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL	
00:00			13	23	36	12:00			181	247	428	
00:15			12	19	31	12:15			178	231	409	
00:30			2	11	13	12:30			220	197	417	
00:45			6	33	60	12:45			204	783	849	
					93				378		1632	
01:00			3	12	15	13:00			209	186	395	
01:15			5	8	13	13:15			182	215	397	
01:30			6	8	14	13:30			202	196	398	
01:45			4	18	37	13:45			220	813	211	
					55				808	431	1621	
02:00			7	2	9	14:00			177	313	490	
02:15			4	2	6	14:15			235	304	539	
02:30			3	9	12	14:30			313	363	676	
02:45			8	22	4	14:45			325	1050	1328	
					39				673		2378	
03:00			6	2	8	15:00			209	299	508	
03:15			12	5	17	15:15			235	336	571	
03:30			18	3	21	15:30			238	351	589	
03:45			32	68	7	15:45			207	889	1438	
					85				659		2327	
04:00			15	3	18	16:00			224	472	696	
04:15			19	12	31	16:15			189	471	660	
04:30			53	13	66	16:30			194	454	648	
04:45			84	171	11	16:45			199	806	1873	
					210				675		2679	
05:00			48	13	61	17:00			199	518	717	
05:15			81	12	93	17:15			182	499	681	
05:30			150	21	171	17:30			180	482	662	
05:45			210	489	39	17:45			168	729	1895	
					85				564		2624	
06:00			116	37	153	18:00			141	352	493	
06:15			215	63	278	18:15			115	350	465	
06:30			334	78	412	18:30			121	301	422	
06:45			531	1196	124	18:45			124	501	1206	
					302				327		1707	
07:00			487	227	714	19:00			87	199	286	
07:15			696	203	899	19:15			86	162	248	
07:30			735	187	922	19:30			83	106	189	
07:45			784	2702	149	19:45			79	335	114	
					766				581	193	916	
08:00			622	120	742	20:00			73	99	172	
08:15			481	131	612	20:15			59	102	161	
08:30			401	132	533	20:30			65	87	152	
08:45			383	1887	186	20:45			76	273	379	
					569				167		652	
09:00			264	131	395	21:00			62	66	128	
09:15			233	138	371	21:15			53	72	125	
09:30			237	141	378	21:30			51	57	108	
09:45			224	958	154	21:45			38	204	244	
					564				87		448	
10:00			167	154	321	22:00			30	50	80	
10:15			200	143	343	22:15			20	40	60	
10:30			148	152	300	22:30			17	57	74	
10:45			183	698	178	22:45			21	88	178	
					627				52		266	
11:00			200	186	386	23:00			11	36	47	
11:15			170	165	335	23:15			11	27	38	
11:30			210	243	453	23:30			7	21	28	
11:45			200	780	228	23:45			12	41	109	
					822				37		150	
TOTALS			9022	3905	12927	TOTALS			6512	10888	17400	
SPLIT %			69.8%	30.2%	42.6%	SPLIT %			37.4%	62.6%	57.4%	

DAILY TOTALS				NB 0	SB 0	EB 15,534	WB 14,793				Total 30,327
AM Peak Hour			07:15	11:30	07:15	PM Peak Hour			14:15	16:45	16:45
AM Pk Volume			2837	949	3496	PM Pk Volume			1082	1975	2735
Pk Hr Factor			0.905	0.961	0.937	Pk Hr Factor			0.832	0.953	0.954
7 - 9 Volume	0	0	4589	1335	5924	4 - 6 Volume	0	0	1535	3768	5303
7 - 9 Peak Hour			07:15	07:00	07:15	4 - 6 Peak Hour			16:00	16:45	16:45
7 - 9 Pk Volume	0	0	2837	766	3496	4 - 6 Pk Volume	0	0	806	1975	2735
Pk Hr Factor	0.000	0.000	0.905	0.844	0.937	Pk Hr Factor	0.000	0.000	0.900	0.953	0.954

APPENDIX D

TRANSIT SCHEDULES

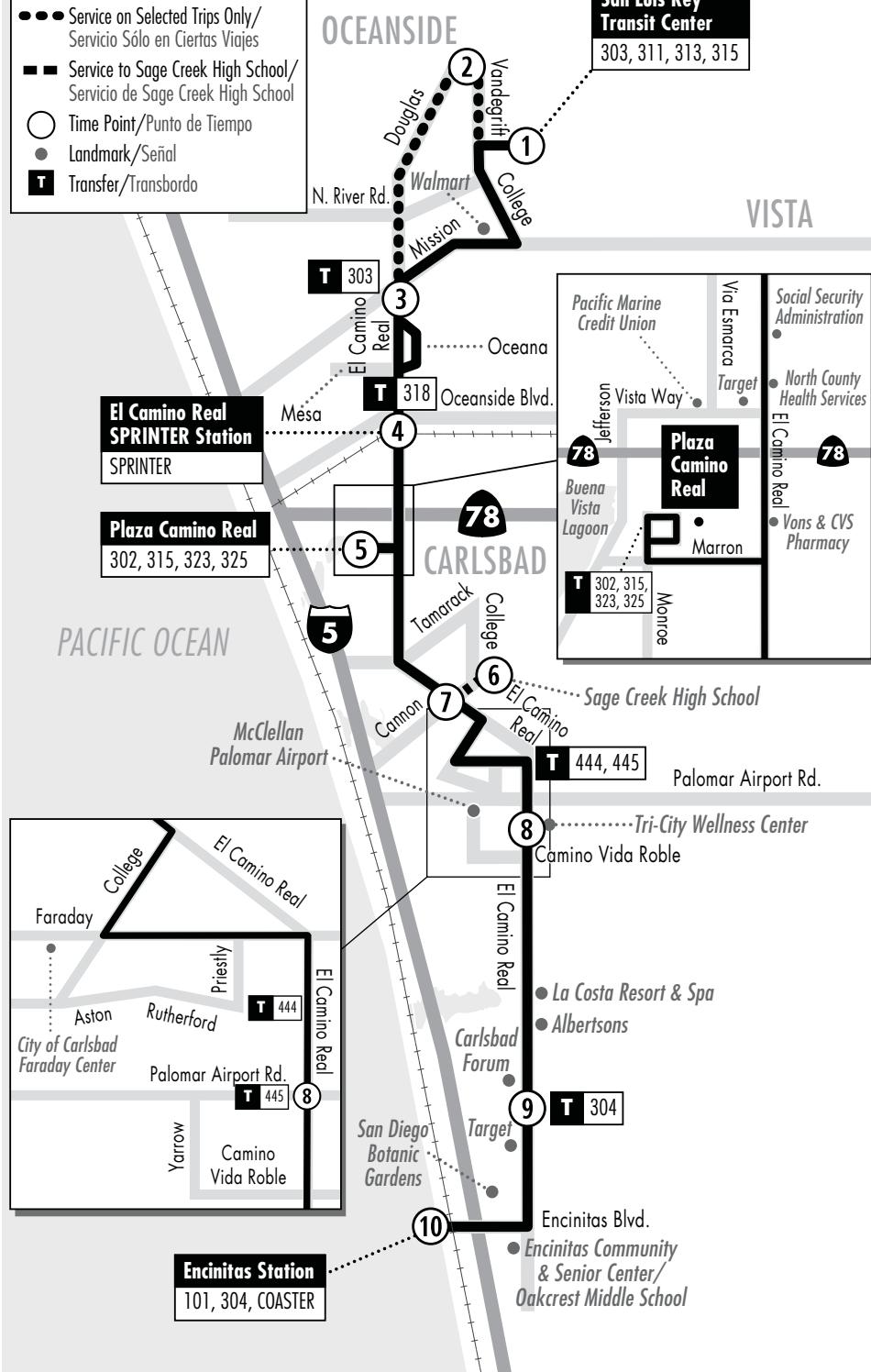
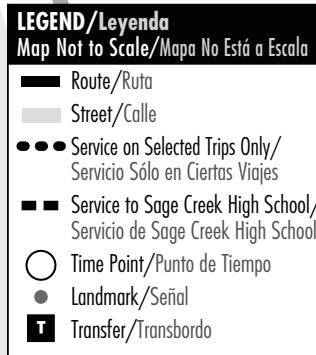
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309**Oceanside to Encinitas via El Camino Real**

M-F • SA • SU • H

Destinations/Destinos

- Encinitas City Hall
- Plaza Camino Real
- El Camino Real SPRINTER Station
- The Shoppes at Carlsbad
- Encinitas Ranch Town Center (Target)
- Sage Creek High School
- San Diego Botanic Gardens
- La Costa Resort & Spa
- Social Security Administration
- McClellan Palomar Airport



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Oceanside to Encinitas via El Camino Real

Bold denotes P.M. times/Horarios en negritas son en la tarde

Monday - Friday Southbound to Encinitas									
San Luis Rey Transit Center	Douglas Dr. & Vandegrift Bl.	Mission Ave. & El Camino Real	El Camino Real Station	Plaza Camino Real	College Bl. & Cannon Rd.	El Camino Real & Cannon Rd.	El Camino Real & Gateway Rd.	El Camino Real & Leucadia Bl.	Encinitas Station
1	2	3	4	5	6	7	8	9	10
3:57	-	4:14	4:23	4:37	-	4:45	4:54	5:04	5:14a
4:32	-	4:49	4:58	5:12	-	5:20	5:29	5:39	5:49
4:58	-	5:15	5:24	5:38	-	5:46	5:55	6:05	6:15
5:31	-	5:48	5:58	6:12	-	6:20	6:30	6:41	6:54
6:01	-	6:18	6:28	6:42	-	6:50	7:00	7:11	7:24
6:28	-	6:45	6:55	7:09	-	7:17	7:27	7:38	7:51
7:01	-	7:18	7:28	7:42	-	7:51	8:01	8:12	8:31
7:31	-	7:48	7:58	8:12	-	8:21	8:31	8:42	9:01
8:01	-	8:18	8:28	8:42	-	8:51	9:01	9:12	9:31
8:31	-	8:48	8:58	9:12	-	9:21	9:31	9:42	10:01
9:01	9:06	9:19	9:31	9:45	-	9:54	10:04	10:15	10:34
9:31	-	9:48	9:58	10:12	-	10:21	10:31	10:42	11:01
10:01	-	10:18	10:28	10:42	-	10:51	11:01	11:12	11:31
10:31	-	10:48	10:58	11:12	-	11:21	11:31	11:42	12:01p
10:59	11:04	11:17	11:28	11:42	-	11:51	12:01	12:12	12:31
11:31	-	11:48	11:58	12:12	-	12:21	12:31	12:42	1:01
12:01	-	12:18	12:28	12:42	-	12:51	1:01	1:12	1:31
12:29	-	12:47	12:58	1:14	-	1:22	1:32	1:43	2:01
12:59	-	1:17	1:28	1:42	-	1:51	2:01	2:13	2:32
1:28	1:33	1:46	1:57	2:11	-	2:20	2:30	2:42	3:01
1:59	-	2:17	2:28	2:42	-	2:51	3:01	3:13	3:32
-	-	-	-	-	2:51	2:54	3:02	3:14	3:33
2:29	-	2:47	2:58	3:12	-	3:21	3:31	3:43	4:02
2:59	-	3:17	3:28	3:42	-	3:51	4:01	4:13	4:32
3:29	-	3:47	3:58	4:12	-	4:21	4:31	4:43	5:02
3:59	-	4:17	4:28	4:42	-	4:51	5:01	5:13	5:32
4:29	-	4:47	4:58	5:12	-	5:21	5:31	5:43	6:02
4:59	-	5:17	5:28	5:42	-	5:51	6:01	6:13	6:32
5:29	-	5:47	5:58	6:12	-	6:21	6:31	6:43	7:02
6:31	-	6:47	6:58	7:12	-	7:21	7:31	7:42	7:57
7:30	-	7:46	7:56	8:08	-	8:16	8:25	8:35	8:49
8:35	-	8:51	9:01	9:13	-	9:21	9:30	9:40	9:54

Trips operate when Sage Creek High School is open. Trip operates on school days in regular school year (not during summer school).

El autobús opera cuando está abierta la Preparatoria de Sage Creek. El servicio opera en días escolares durante el año escolar regular (no durante la sesión escolar de verano).

Bold denotes P.M. times/Horarios en negritas son en la tarde

Monday - Friday Northbound to Oceanside										
Encinitas Station	El Camino Real & Leucadia Bl.	El Camino Real & Gateway Rd.	El Camino Real & Cannon Rd.	College Bl. & Cannon Rd.	Plaza Camino Real	El Camino Real Station	Mission Ave. & El Camino Real	Douglas Dr. & Vandegrift Bl.	San Luis Rey Transit Center	
10	9	8	7	6	5	4	3	2	1	
5:37	5:49	5:58	6:07	-	6:17	6:28	6:39	-	6:55a	
6:00	6:19	6:28	6:37	-	6:47	6:58	7:09	-	7:25	
6:30	6:49	6:58	7:07	-	7:17	7:28	7:39	-	7:55	
-	*6:49	*6:58	*7:08	*7:10	-	-	-	-	-	
7:06	7:25	7:34	7:43	-	7:53	8:04	8:15	-	8:31	
7:30	7:49	7:58	8:07	-	8:17	8:28	8:39	-	8:55	
-	**7:50	**7:59	**8:08	**8:11	-	-	-	-	-	
7:57	8:15	8:24	8:34	-	8:45	8:58	9:09	-	9:25	
8:27	8:45	8:54	9:04	-	9:15	9:28	9:41	9:52	9:58	
9:00	9:17	9:26	9:35	-	9:45	9:58	10:09	-	10:25	
9:30	9:47	9:56	10:05	-	10:15	10:28	10:39	-	10:55	
10:00	10:17	10:26	10:35	-	10:45	10:58	11:09	-	11:25	
10:31	10:48	10:57	11:06	-	11:16	11:29	11:40	-	11:56	
11:00	11:17	11:26	11:35	-	11:45	11:58	12:11	12:22	12:28p	
11:30	11:47	11:56	12:05	-	12:15	12:28	12:39	-	12:55	
12:00	12:17	12:26	12:35	-	12:45	12:58	1:09	-	1:25	
12:30	12:47	12:56	1:05	-	1:15	1:28	1:39	-	1:55	
12:57	1:16	1:25	1:34	-	1:44	1:58	2:09	-	2:27	
1:27	1:46	1:55	2:04	-	2:14	2:28	2:39	-	2:57	
1:57	2:16	2:25	2:34	-	2:44	2:58	3:09	-	3:27	
2:27	2:46	2:55	3:04	-	3:14	3:28	3:39	-	3:57	
2:54	3:14	3:24	3:35	-	3:46	4:00	4:11	-	4:30	
3:22	3:42	3:52	4:03	-	4:14	4:28	4:39	-	4:58	
3:52	4:12	4:22	4:33	-	4:44	4:58	5:09	-	5:28	
4:26	4:46	4:56	5:07	-	5:18	5:32	5:43	-	6:02	
4:52	5:12	5:22	5:33	-	5:44	5:58	6:09	-	6:28	
5:22	5:42	5:52	6:03	-	6:14	6:28	6:39	-	6:58	

* **Operates Monday, Tuesday, Thursday, and Friday.**
Opera lunes, martes, jueves, y viernes.

** **Operates Wednesday only.**
Opera miércoles solamente.

Trips operate when Sage Creek High School is open. Trip operates on school days in regular school year (not during summer school).

El autobús opera cuando está abierta la Preparatoria de Sage Creek. El servicio opera en días escolares durante el año escolar regular (no durante la sesión escolar de verano).

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Oceanside to Encinitas via El Camino Real

Bold denotes P.M. times/Horarios en negritas son en la tarde

Monday - Friday Northbound to Oceanside									
Encinitas Station	El Camino Real & Leucadia Bl.	El Camino Real & Gateway Rd.	El Camino Real & Cannon Rd.	College Bl. & Cannon Rd.	Plaza Camino Real	El Camino Real Station	Mission Ave. & El Camino Real	Douglas Dr. & Vandegrift Bl.	San Luis Rey Transit Center
10	9	8	7	6	5	4	3	2	1
5:52	6:12	6:22	6:33	-	6:44	6:58	7:09	-	7:28
6:25	6:44	6:53	7:03	-	7:14	7:28	7:39	-	7:57
7:29	7:47	7:56	8:05	-	8:15	8:28	8:39	-	8:55
8:31	8:49	8:58	9:07	-	9:17	9:30	9:41	-	9:55
9:29	9:47	9:56	10:05	-	10:15	10:28	10:39	-	10:53

Bold denotes P.M. times/Horarios en negritas son en la tarde

Saturday							
Southbound to Encinitas							
San Luis Rey Transit Center	Mission Ave. & El Camino Real	El Camino Real Station	Plaza Camino Real	El Camino Real & Cannon Rd.	El Camino Real & Gateway Rd.	El Camino Real & Leucadia Bl.	Encinitas Station
1	3	4	5	7	8	9	10
5:29	5:45	5:58	6:16	6:24	6:33	6:43	6:56a
6:29	6:45	6:58	7:16	7:24	7:33	7:43	7:56
7:30	7:47	7:58	8:16	8:25	8:35	8:46	9:02
8:30	8:47	8:58	9:16	9:25	9:35	9:46	10:02
9:00	9:17	9:28	9:46	9:55	10:05	10:16	10:32
9:29	9:47	9:58	10:16	10:25	10:35	10:46	11:02
9:59	10:17	10:28	10:46	10:55	11:05	11:16	11:32
10:29	10:47	10:58	11:16	11:25	11:35	11:46	12:02p
10:59	11:17	11:28	11:46	11:55	12:05	12:16	12:32
11:29	11:47	11:58	12:16	12:25	12:35	12:46	1:02
11:59	12:17	12:28	12:46	12:55	1:05	1:16	1:32
12:28	12:46	12:58	1:16	1:24	1:34	1:45	2:01
12:58	1:16	1:28	1:46	1:54	2:04	2:15	2:31
1:28	1:46	1:58	2:15	2:24	2:34	2:46	3:02
1:58	2:16	2:28	2:45	2:54	3:04	3:16	3:32
2:29	2:46	2:58	3:15	3:24	3:34	3:46	4:02
2:59	3:16	3:28	3:45	3:54	4:04	4:16	4:32
3:29	3:46	3:58	4:15	4:24	4:34	4:46	5:02
3:59	4:16	4:28	4:45	4:54	5:04	5:16	5:32
4:28	4:46	4:58	5:15	5:24	5:34	5:46	6:02
4:58	5:16	5:28	5:45	5:54	6:04	6:16	6:32
5:28	5:46	5:58	6:15	6:24	6:34	6:46	7:02
5:59	6:16	6:28	6:46	6:55	7:05	7:16	7:31
6:29	6:46	6:58	7:16	7:25	7:35	7:46	8:01
7:29	7:46	7:58	8:16	8:25	8:35	8:46	9:01
8:29	8:46	8:58	9:15	9:23	9:31	9:41	9:55
9:33	9:46	9:58	10:15	10:23	10:31	10:41	10:55

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Oceanside to Encinitas via El Camino Real

Bold denotes P.M. times/Horarios en negritas son en la tarde

Saturday Northbound to Oceanside							
Encinitas Station	El Camino Real & Leucadia Bl.	El Camino Real & Gateway Rd.	El Camino Real & Cannon Rd.	Plaza Camino Real	El Camino Real Station	Mission Ave. & El Camino Real	San Luis Rey Transit Center
10	9	8	7	5	4	3	1
5:35	5:48	5:57	6:06	6:17	6:28	6:39	6:51a
6:35	6:48	6:57	7:06	7:17	7:28	7:39	7:51
7:30	7:44	7:53	8:03	8:15	8:28	8:41	8:56
8:30	8:44	8:53	9:03	9:15	9:28	9:41	9:56
9:00	9:14	9:23	9:33	9:45	9:58	10:11	10:26
9:30	9:46	9:55	10:04	10:15	10:28	10:41	10:56
10:00	10:16	10:25	10:34	10:45	10:58	11:11	11:26
10:30	10:46	10:55	11:04	11:15	11:28	11:41	11:56
11:00	11:16	11:25	11:34	11:45	11:58	12:12	12:28p
11:30	11:46	11:55	12:04	12:15	12:28	12:42	12:58
12:00	12:16	12:25	12:34	12:45	12:58	1:12	1:28
12:30	12:46	12:55	1:04	1:15	1:28	1:42	1:58
1:00	1:16	1:25	1:34	1:45	1:58	2:12	2:28
1:29	1:45	1:54	2:03	2:14	2:28	2:42	2:59
1:55	2:11	2:21	2:32	2:44	2:58	3:13	3:30
2:25	2:41	2:51	3:02	3:14	3:28	3:43	4:00
2:55	3:11	3:21	3:32	3:44	3:58	4:13	4:30
3:25	3:41	3:51	4:02	4:14	4:28	4:43	5:00
3:55	4:11	4:21	4:32	4:44	4:58	5:13	5:30
4:25	4:41	4:51	5:02	5:14	5:28	5:43	6:00
4:55	5:11	5:21	5:32	5:44	5:58	6:13	6:30
5:25	5:41	5:51	6:02	6:14	6:28	6:43	7:00
5:55	6:11	6:21	6:32	6:44	6:58	7:13	7:30
6:27	6:43	6:52	7:02	7:14	7:28	7:41	7:58
7:30	7:45	7:54	8:03	8:14	8:28	8:40	8:55
8:30	8:45	8:54	9:03	9:14	9:28	9:40	9:54
9:33	9:46	9:55	10:04	10:15	10:28	10:39	10:53

309 | Oceanside to Encinitas via El Camino Real

Bold denotes P.M. times/Horarios en negritas son en la tarde

Sunday & Holidays Southbound to Encinitas							
San Luis Rey Transit Center	Mission Ave. & El Camino Real	El Camino Real Station	Plaza Camino Real	El Camino Real & Cannon Rd.	El Camino Real & Gateway Rd.	El Camino Real & Leucadia Bl.	Encinitas Station
1	3	4	5	7	8	9	10
5:29	5:45	5:58	6:16	6:24	6:33	6:43	6:56a
6:29	6:45	6:58	7:16	7:24	7:33	7:43	7:56
7:30	7:47	7:58	8:16	8:25	8:35	8:46	9:02
8:30	8:47	8:58	9:16	9:25	9:35	9:46	10:02
9:29	9:47	9:58	10:16	10:25	10:35	10:46	11:02
10:29	10:47	10:58	11:16	11:25	11:35	11:46	12:02p
11:29	11:47	11:58	12:16	12:25	12:35	12:46	1:02
12:28	12:46	12:58	1:16	1:24	1:34	1:45	2:01
1:28	1:46	1:58	2:15	2:24	2:34	2:46	3:02
2:29	2:46	2:58	3:15	3:24	3:34	3:46	4:02
3:29	3:46	3:58	4:15	4:24	4:34	4:46	5:02
4:28	4:46	4:58	5:15	5:24	5:34	5:46	6:02
5:28	5:46	5:58	6:15	6:24	6:34	6:46	7:02
6:29	6:46	6:58	7:16	7:25	7:35	7:46	8:01
7:29	7:46	7:58	8:16	8:25	8:35	8:46	9:01
8:29	8:46	8:58	9:15	9:23	9:31	9:41	9:55
9:33	9:46	9:58	10:15	10:23	10:31	10:41	10:55

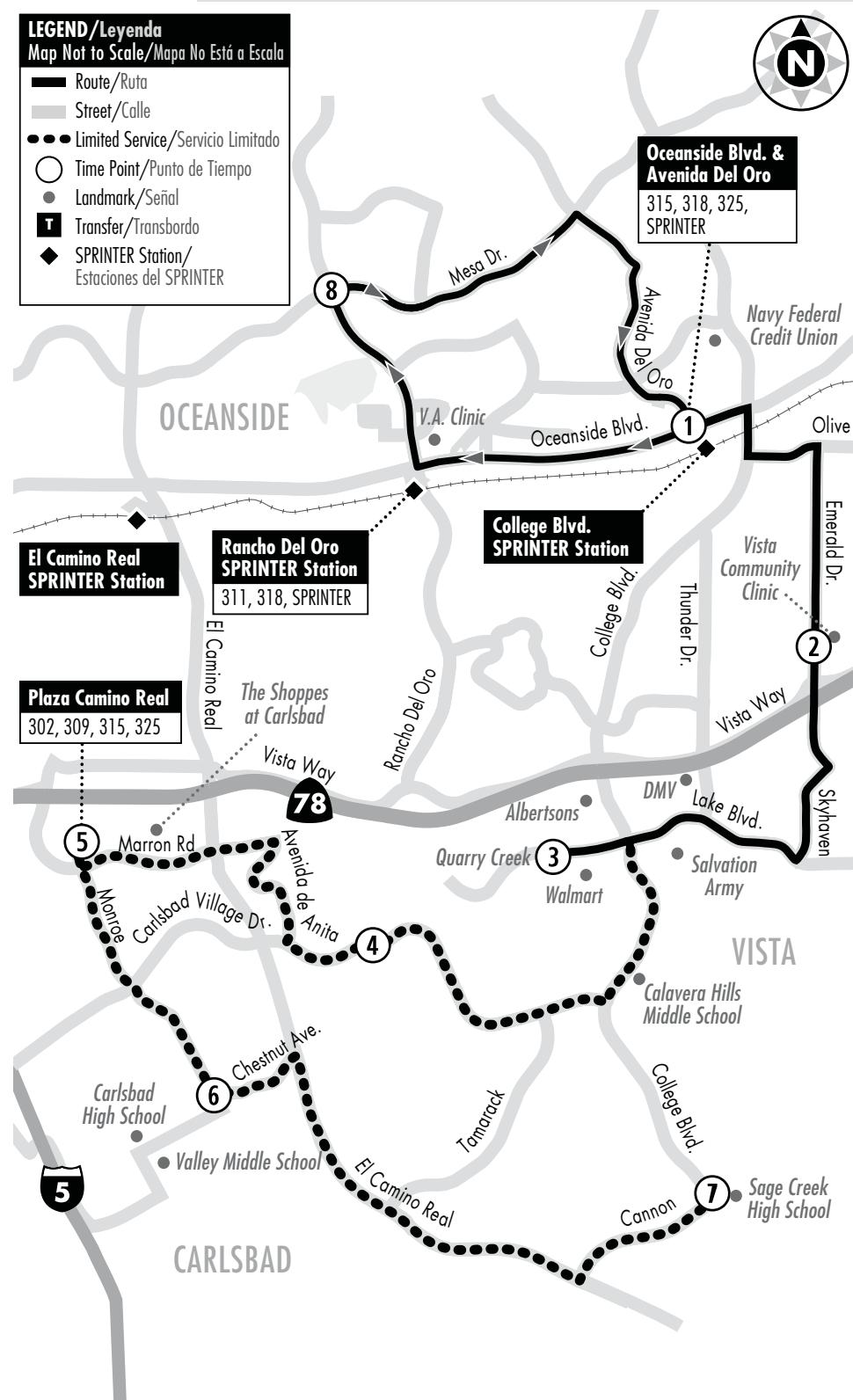
309 | Oceanside to Encinitas via El Camino Real

Bold denotes P.M. times/Horarios en negritas son en la tarde

Sunday & Holidays							
Northbound to Oceanside							
Encinitas Station	El Camino Real & Leucadia Bl.	El Camino Real & Gateway Rd.	El Camino Real & Cannon Rd.	Plaza Camino Real	El Camino Real Station	Mission Ave. & El Camino Real	San Luis Rey Transit Center
10	9	8	7	5	4	3	1
5:35	5:48	5:57	6:06	6:17	6:28	6:39	6:51a
6:35	6:48	6:57	7:06	7:17	7:28	7:39	7:51
7:30	7:44	7:53	8:03	8:15	8:28	8:41	8:56
8:30	8:44	8:53	9:03	9:15	9:28	9:41	9:56
9:30	9:46	9:55	10:04	10:15	10:28	10:41	10:56
10:30	10:46	10:55	11:04	11:15	11:28	11:41	11:56
11:30	11:46	11:55	12:04	12:15	12:28	12:42	12:58p
12:30	12:46	12:55	1:04	1:15	1:28	1:42	1:58
1:29	1:45	1:54	2:03	2:14	2:28	2:42	2:59
2:25	2:41	2:51	3:02	3:14	3:28	3:43	4:00
3:25	3:41	3:51	4:02	4:14	4:28	4:43	5:00
4:25	4:41	4:51	5:02	5:14	5:28	5:43	6:00
5:25	5:41	5:51	6:02	6:14	6:28	6:43	7:00
6:27	6:43	6:52	7:02	7:14	7:28	7:41	7:58
7:30	7:45	7:54	8:03	8:14	8:28	8:40	8:55
8:30	8:45	8:54	9:03	9:14	9:28	9:40	9:54
9:33	9:46	9:55	10:04	10:15	10:28	10:39	10:53

323**College Blvd. SPRINTER Station to Quarry Creek****M-F****Destinations/Destinos**

- Plaza Camino Real
- Quarry Creek (Walmart)
- The Shoppes at Carlsbad
- Carlsbad High School
- Sage Creek High School
- DMV
- Salvation Army
- Vista Community Clinic
- Valley Middle School
- VA Clinic



323**College Blvd. SPRINTER Station to Quarry Creek**

Bold denotes P.M. times/Horarios en negritas son en la tarde

Monday - Friday						
Southbound to Quarry Creek/Plaza Camino Real						
#Oceanside Bl & Avenida Del Oro	Emerald Dr. & West Dr.	Quarry Creek Plaza (Walmart)	Carlsbad Village Dr. & Santa Clara Way	Plaza Camino Real Transit Center	Chestnut Ave. & Monroe St. (Carlsbad HS)	Cannon Rd. & College Blvd. (Sage Creek HS)
1	2	3	4	5	6	7
5:56	6:02	6:10a	–	–	–	–
*6:08	*6:16	–	*6:33	*6:47	*6:59	*7:15a
**6:16	**6:24	–	**6:41	**6:55	**7:07	–
6:56	7:02	7:10	–	–	–	–
**7:09	**7:18	–	**7:34	**7:48	**8:00	**8:15
7:56	8:02	8:10	–	–	–	–
8:56	9:02	9:12	–	–	–	–
9:56	10:02	10:12	–	–	–	–
10:56	11:02	11:12	–	–	–	–
11:56	12:02	12:12p	–	–	–	–
12:56	1:03	1:13	–	–	–	–
1:56	2:03	2:13	–	–	–	–
2:56	3:03	3:13	–	–	–	–
3:56	4:03	4:13	–	–	–	–
4:56	5:03	5:13	–	–	–	–
5:56	6:03	6:12	–	–	–	–

- * Operates Monday, Tuesday, Thursday, and Friday arriving at Carlsbad High School at 6:59 a.m. and Sage Creek High School at 7:15 a.m.
Opera lunes, martes, jueves, viernes, y llegando a Carlsbad High School a las 6:59 a.m. y Sage Creek High School a las 7:15 a.m.
- ** Operates Wednesday only.
Solamente opera miércoles llegando.

Route 323 does not operate on Saturdays, Sundays, or holidays.

La Ruta 323 no ofrece servicio sábados, domingos, o días festivos.

Board southbound Route 323 buses on south side of Oceanside Blvd. by Panda Express.
Aborde autobuses de la ruta 323 hacia el sur en el lado sur de Oceanside Blvd. cerca de Panda Express.

Trips operate only when high schools are open. Trip operates on school days in regular school year (not during summer school).

Viajes operan sólo cuando las escuelas preparatorias están abiertas. El servicio opera en días escolares durante el año escolar regular (no durante la sesión escolar de verano).

323 | College Blvd. SPRINTER Station to Quarry Creek

Bold denotes P.M. times/Horarios en negritas son en la tarde

Monday - Friday Northbound to College Blvd. SPRINTER Station									
Cannon Rd. & College Blvd. (Sage Creek HS)	Chestnut Ave. & Monroe St. (Carlsbad HS)	Plaza Camino Real Transit Center	Carlsbad Village Dr. & Santa Clara Way	Quarry Creek Plaza (Walmart)	Emerald Dr. & West Dr.	Oceanside Bl. & Avenida Del Oro	Mesa Dr. & Rancho Del Oro Dr.	Oceanside Bl. & Avenida Del Oro	
7	6	5	4	3	2	1	8	1	
—	—	—	—	5:13	5:23	5:34	5:36	5:47a	
—	—	—	—	6:13	6:23	6:34	6:36	6:47	
—	—	—	—	7:13	7:23	7:34	7:36	7:47	
—	—	—	—	8:13	8:23	8:34	8:36	8:47	
—	—	—	—	9:13	9:23	9:34	9:36	9:47	
—	—	—	—	10:13	10:23	10:34	10:36	10:47	
—	—	—	—	11:13	11:23	11:34	11:36	11:47	
—	—	—	—	12:14	12:24	12:34	12:36	12:47p	
—	—	—	—	1:14	1:24	1:34	1:36	1:47	
—	—	—	—	2:14	2:24	2:35	2:37	2:48	
—	—	—	—	3:14	3:24	3:35	3:37	3:48	
2:45	2:56	3:06	3:15	—	3:34	3:45	3:47	3:58	
—	—	—	—	4:14	4:24	4:36	4:38	4:50	
—	—	—	—	5:14	5:24	5:36	5:38	5:49	

Route 323 does not operate on Saturdays, Sundays, or holidays.
La Ruta 323 no ofrece servicio sábados, domingos, o días festivos.

Trips operate only when high schools are open. Trip operates on school days in regular school year (not during summer school).

Viajes operan sólo cuando las escuelas preparatorias están abiertas. El servicio opera en días escolares durante el año escolar regular (no durante la sesión escolar de verano).

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APPENDIX E

ITE TRIP GENERATION RATES

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Senior Adult Housing - Attached (252)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 6

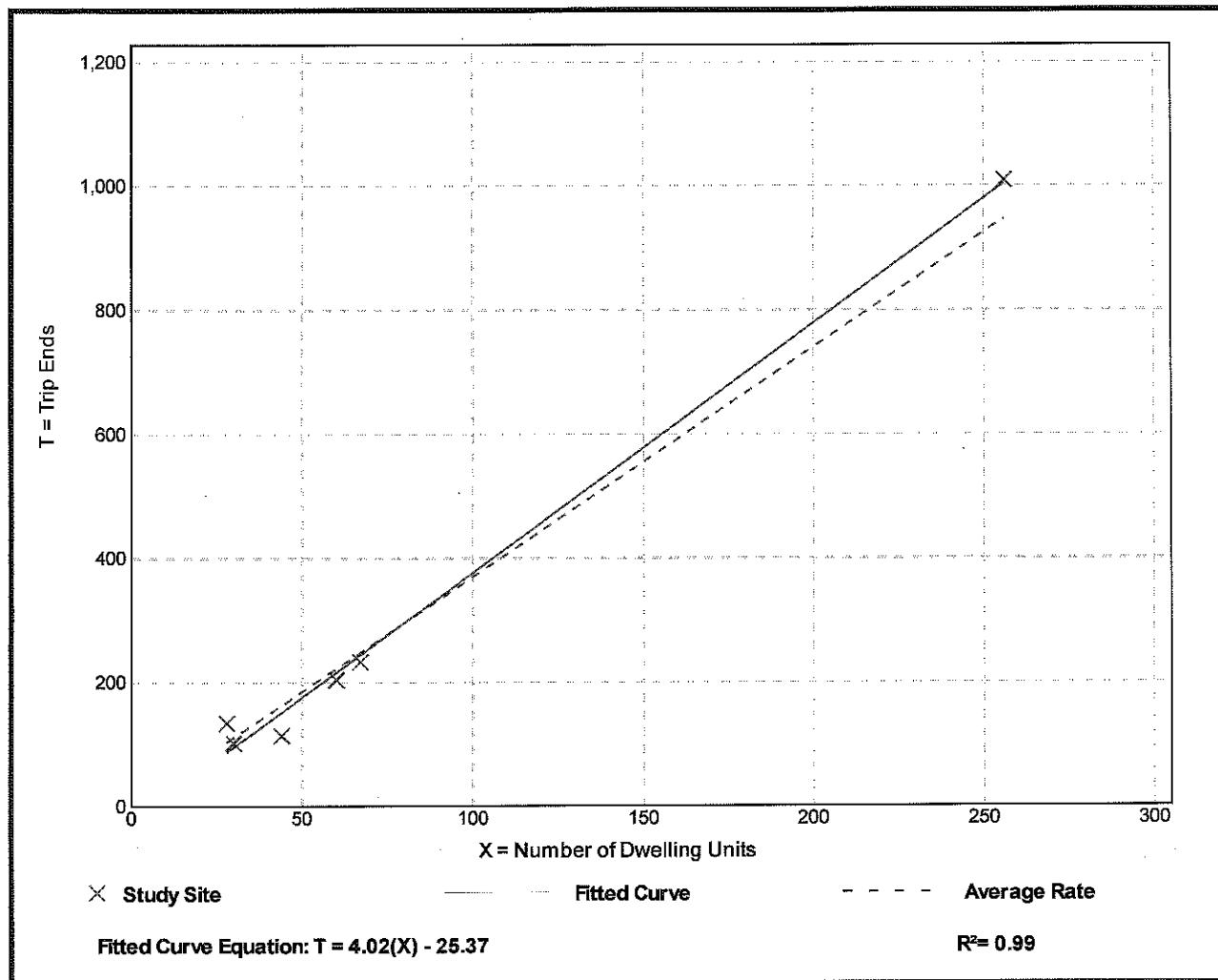
Avg. Num. of Dwelling Units: 81

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
3.70	2.59 - 4.79	0.53

Data Plot and Equation



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APPENDIX F

ROBERTSON RANCH CUMULATIVE PROJECT TRAFFIC VOLUMES

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(1)					
3 / 2 → 2 / 1 ← 19 / 27	14 / 28 ← 50 / 71 → 26 / 37	90 / 135 ← 7 / 10 → 6 / 13	98 / 146 ← 98 / 146	98 / 146 ← 98 / 146	92 / 134 ← 149 / 217
1 / 4 → 38 / 88	75 / 161 → 19 / 46	Kelly Dr 0 / 1 6 / 13	81 / 174 → Proj Dwy #1	81 / 174 → Proj Dwy #2	72 / 165 → 9 / 9 →
Tamarack Ave	El Camino Real	El Camino Real	El Camino Real	El Camino Real	W. Ranch Rd
					117 / 268 ← 6 / 12
					20 / 40 → 2 / 1 ← 4 / 2
					1 / 4 → 61 / 141
					Cannon Rd 43 / 99 → 1 / 2
					El Camino Real

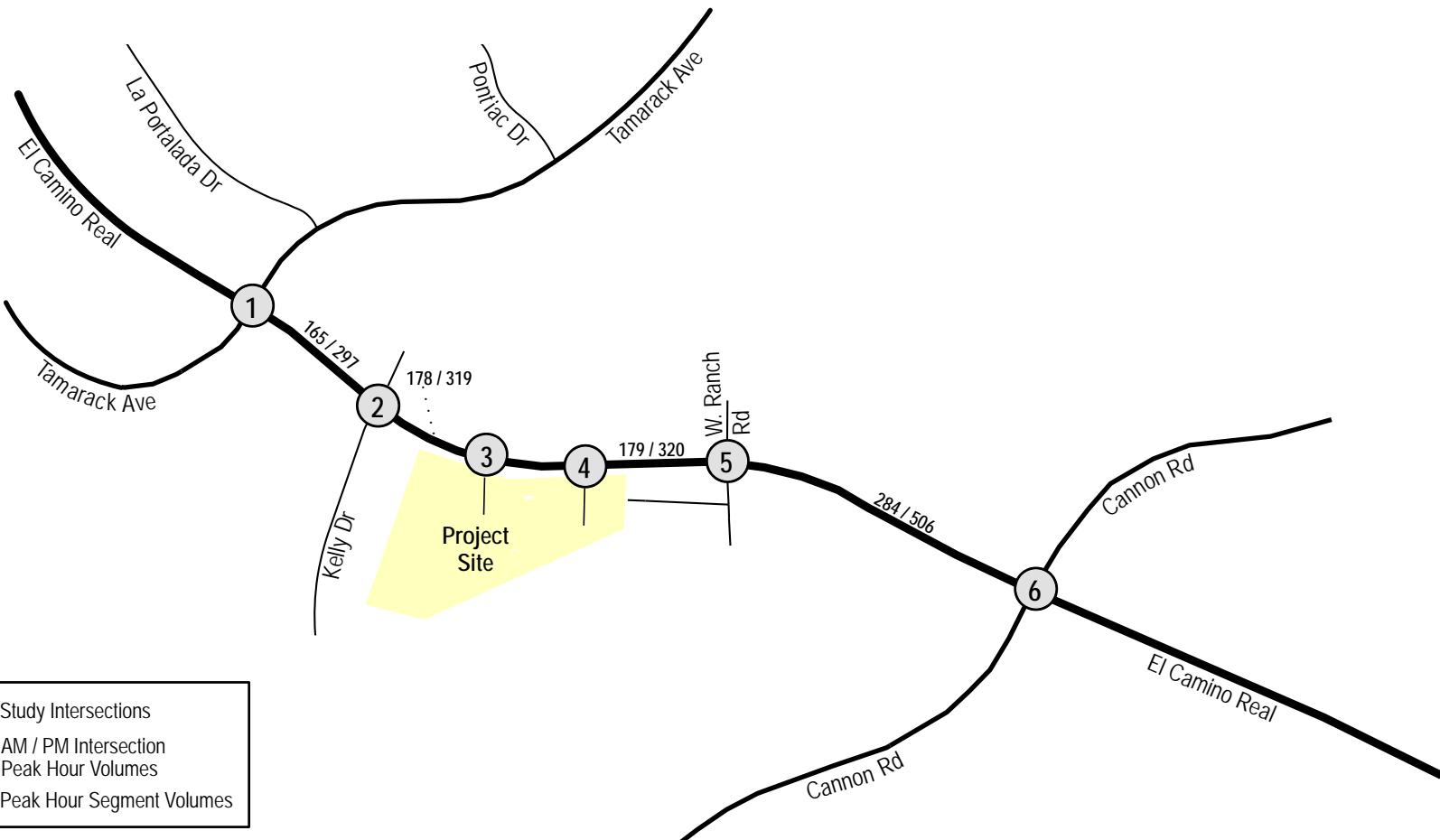


Figure A

Robertson Ranch Cumulative Project Traffic Volumes

MARJA ACRES

APPENDIX G

MMLOS RESULTS

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Project: Marja Acres
Segment: El Camino Real From Tamarack Avenue To West Ranch Road
Scenario: All Scenarios
By: LLG

Transit & Ridesharing MMLOS Criteria		NB	SB	
Criteria		Points	Points Assigned	Points Assigned
Transit Stop Located Within 1/2 Mile Walk from Subject Site or Roadway Segment				
Access	No greater than 1/4 mile walk to the nearest transit stop	50 (rail/bus) 30 (bus)	30	30
	No greater than 1/2 mile walk to the nearest transit stop	30 (rail/bus) 20 (bus)	0	0
	No greater than 1 mile bicycle ride to the nearest transit stop	5	0	0
	ADA compliant sidewalk or path to transit stops in both directions	15	15	15
Connectivity	Multiple transit routes stop on segment	10	0	0
	Route provides a direct link to a COASTER station or mobility hub	15	15	15
	Route provides for a single transfer to reach a COASTER station or mobility hub	5	5	5
Transit priority	Dedicated right of way	5	0	0
	Transit priority during peak hours	5	0	0
Service	Headways of 15 minutes between 6:30-8:30 am and 4-6 pm on weekdays	15	0	0
	Headways of 30 minutes between 6:30-8:30 am and 4-6 pm on weekdays	5	5	5
	Headways of 1 hour between 6:30-8:30 am and 4-6 pm on weekdays	2	0	0
	Commute shuttle service provided during the morning and afternoon commute periods	10	0	0
	No more than 1 hour headways between 9 am and 5 pm on weekends	5	5	5
Amenities	Covered bus stops	5	0	0
	Bench	10	10	10
	Well-lit stop that provides a sense of security	5	5	5
	Trash cans	2	2	2
Bicycle Accommodations	Bus stop located within a block of commercial services	5	0	0
	Bike parking available at the bus stop	5	0	0
No Transit Stop Located Within 1/2 Mile Walk from Subject Site or Roadway Segment				
Available Mobility Services	Area governed by an adopted TDM ordinance that will promote ridesharing and/or the use of non-auto modes	60	0	0
	On demand rideshare services available	60	0	0
	Segment within FLEX service area	60	0	0
		Total Score:	92	92
		Transit LOS:	A	A

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APPENDIX H

HCM ANALYSIS WORKSHEETS – EXISTING

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Existing AM
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (veh/h)	40	2074	40	146	441	132	47	136	280	401	189	47
Future Volume (veh/h)	40	2074	40	146	441	132	47	136	280	401	189	47
Initial Q (Q _b), 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		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	2254	43	159	479	129	51	148	239	436	205	51
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	55	2405	46	394	2865	889	209	260	220	482	225	56
Arrive On Green	0.03	0.47	0.47	0.23	1.00	1.00	0.12	0.14	0.14	0.14	0.16	0.16
Sat Flow, veh/h	1781	5159	98	3456	5106	1585	1781	1870	1585	3456	1446	360
Grp Volume(v), veh/h	43	1486	811	159	479	129	51	148	239	436	0	256
Grp Sat Flow(s), veh/h/ln	1781	1702	1853	1728	1702	1585	1781	1870	1585	1728	0	1806
Q Serve(g_s), s	3.6	62.0	62.4	5.9	0.0	0.0	3.9	11.1	16.3	18.6	0.0	20.9
Cycle Q Clear(g_c), s	3.6	62.0	62.4	5.9	0.0	0.0	3.9	11.1	16.3	18.6	0.0	20.9
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	55	1587	864	394	2865	889	209	260	220	482	0	281
V/C Ratio(X)	0.78	0.94	0.94	0.40	0.17	0.15	0.24	0.57	1.09	0.90	0.00	0.91
Avail Cap(c_a), veh/h	112	1641	893	394	2865	889	239	312	264	539	0	341
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.1	37.9	38.0	53.6	0.0	0.0	60.1	60.4	39.5	63.5	0.0	62.3
Incr Delay (d2), s/veh	8.3	11.8	19.0	0.2	0.1	0.3	0.2	0.7	79.6	16.5	0.0	22.6
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	1.7	26.6	30.9	2.4	0.0	0.1	1.8	5.4	11.3	9.3	0.0	11.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	80.5	49.8	57.0	53.8	0.1	0.3	60.4	61.1	119.2	80.0	0.0	84.9
LnGrp LOS	F	D	E	D	A	A	E	E	F	F	A	F
Approach Vol, veh/h		2340			767			438			692	
Approach Delay, s/veh		52.8			11.3			92.7			81.8	
Approach LOS		D			B			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	23.1	75.9	22.6	28.4	8.9	90.2	25.1	25.8				
Change Period (Y+R _c), s	6.0	* 6	* 5	* 5	* 4.2	6.0	* 4.2	* 5				
Max Green Setting (Gmax), s	9.9	* 72	* 20	* 28	* 9.4	72.8	* 23	* 25				
Max Q Clear Time (g _{c+l1}), s	7.9	64.4	5.9	22.9	5.6	2.0	20.6	18.3				
Green Ext Time (p _c), s	0.0	5.5	0.0	0.4	0.0	2.0	0.3	0.6				
Intersection Summary												
HCM 6th Ctrl Delay			54.2									
HCM 6th LOS			D									
Notes												

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

Existing AM
2: Kelly Dr & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙			↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙			↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙			↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙		
Traffic Volume (veh/h)	2	2704	107	176	619	4	89	0	255	0	0	8
Future Volume (veh/h)	2	2704	107	176	619	4	89	0	255	0	0	8
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	2	2877	114	187	659	4	95	0	271	0	0	8
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	5	2926	908	184	3440	1068	329	0	293	17	0	15
Arrive On Green	0.01	1.00	1.00	0.03	0.22	0.22	0.18	0.00	0.18	0.00	0.00	0.01
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	2	2877	114	187	659	4	95	0	271	0	0	8
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.2	0.0	0.0	15.5	15.7	0.3	6.9	0.0	25.2	0.0	0.0	0.8
Cycle Q Clear(g_c), s	0.2	0.0	0.0	15.5	15.7	0.3	6.9	0.0	25.2	0.0	0.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	5	2926	908	184	3440	1068	329	0	293	17	0	15
V/C Ratio(X)	0.42	0.98	0.13	1.02	0.19	0.00	0.29	0.00	0.93	0.00	0.00	0.53
Avail Cap(c_a), veh/h	59	2926	908	184	3440	1068	368	0	328	59	0	53
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.34	0.34	0.34	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	74.5	0.0	0.0	72.4	25.1	19.1	52.7	0.0	60.1	0.0	0.0	74.0
Incr Delay (d2), s/veh	7.3	6.5	0.1	70.5	0.1	0.0	0.2	0.0	28.2	0.0	0.0	10.5
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	0.1	1.8	0.0	11.0	7.2	0.1	3.1	0.0	12.5	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	81.8	6.5	0.1	143.0	25.3	19.1	52.8	0.0	88.4	0.0	0.0	84.5
LnGrp LOS	F	A	A	F	C	B	D	A	F	A	A	F
Approach Vol, veh/h	2993				850			366			8	
Approach Delay, s/veh	6.3				51.1			79.1			84.5	
Approach LOS	A				D			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.0	92.0		32.4	4.9	107.1		5.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	5.5	79.1		* 31	5.0	89.6		5.0				
Max Q Clear Time (g_c+mt), s	2.0			27.2	2.2	17.7		2.8				
Green Ext Time (p_c), s	0.0	32.6		0.5	0.0	2.6		0.0				

Intersection Summary

HCM 6th Ctrl Delay 21.8
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.

Existing AM
3: Project Access 1 & El Camino Real

Marja Acres
01/16/2019

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	2892	9	0	803	0	7
Future Vol, veh/h	2892	9	0	803	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3110	10	0	863	0	8

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 1560
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 *246
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - - *246
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	20.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	246	-	-	-
HCM Lane V/C Ratio	0.031	-	-	-
HCM Control Delay (s)	20.1	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing AM
4: Project Access 2 & El Camino Real

Marja Acres
01/16/2019

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	2894	5	0	803	0	5
Future Vol, veh/h	2894	5	0	803	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3180	5	0	882	0	5

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 1593
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 *246
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *246
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	20
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	246	-	-	-
HCM Lane V/C Ratio	0.022	-	-	-
HCM Control Delay (s)	20	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing AM
5: Lisa St/W Ranch St & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	36	2832	0	3	754	39	0	0	1	79	1	52
Future Volume (veh/h)	36	2832	0	3	754	39	0	0	1	79	1	52
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	39	3045	0	3	811	42	0	0	1	85	1	56
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	50	3982	0	6	3853	1264	1	0	58	76	3	171
Arrive On Green	0.03	0.78	0.00	0.01	1.00	1.00	0.00	0.00	0.04	0.04	0.11	0.11
Sat Flow, veh/h	1781	5274	0	1781	5106	1585	1781	0	1585	1781	28	1561
Grp Volume(v), veh/h	39	3045	0	3	811	42	0	0	1	85	0	57
Grp Sat Flow(s), veh/h/ln	1781	1702	0	1781	1702	1585	1781	0	1585	1781	0	1589
Q Serve(g_s), s	3.3	48.8	0.0	0.3	0.0	0.0	0.0	0.0	0.1	6.4	0.0	5.0
Cycle Q Clear(g_c), s	3.3	48.8	0.0	0.3	0.0	0.0	0.0	0.0	0.1	6.4	0.0	5.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		0.98
Lane Grp Cap(c), veh/h	50	3982	0	6	3853	1264	1	0	58	76	0	174
V/C Ratio(X)	0.78	0.76	0.00	0.54	0.21	0.03	0.00	0.00	0.02	1.12	0.00	0.33
Avail Cap(c_a), veh/h	106	3982	0	58	3853	1264	58	0	444	76	0	461
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	0.00	0.92	0.92	0.92	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.4	9.0	0.0	74.4	0.0	0.0	0.0	0.0	69.7	71.8	0.0	61.7
Incr Delay (d2), s/veh	21.9	1.4	0.0	58.2	0.1	0.0	0.0	0.0	0.1	139.0	0.0	1.1
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	1.8	13.6	0.0	0.2	0.0	0.0	0.0	0.0	0.0	5.9	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	94.3	10.5	0.0	132.6	0.1	0.0	0.0	0.0	69.8	210.8	0.0	62.7
LnGrp LOS	F	B	A	F	A	A	A	A	E	F	A	E
Approach Vol, veh/h		3084			856			1			142	
Approach Delay, s/veh		11.5			0.6			69.8			151.4	
Approach LOS		B			A			E			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.1	123.5	0.0	21.5	8.8	119.7	11.0	10.5				
Change Period (Y+Rc), s	4.6	6.5	4.6	5.0	4.6	6.5	4.6	5.0				
Max Green Setting (Gmax), s	4.9	76.0	4.9	43.5	8.9	72.0	6.4	42.0				
Max Q Clear Time (g_c+l1), s	2.3	50.8	0.0	7.0	5.3	2.0	8.4	2.1				
Green Ext Time (p_c), s	0.0	22.7	0.0	0.3	0.0	5.7	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				14.1								
HCM 6th LOS				B								
Notes												
User approved ignoring U-Turning movement.												

Existing AM
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↗	↑ ↗ ↗	↑ ↗	↗ ↗	↑ ↗	↗ ↗	↑ ↗	↑ ↗	↗ ↗	↑ ↗	↑ ↗	↗ ↗
Traffic Volume (veh/h)	100	2289	453	64	512	410	170	184	82	982	709	108
Future Volume (veh/h)	100	2289	453	64	512	410	170	184	82	982	709	108
Initial Q (Q _b), 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	103	2360	467	66	528	423	175	190	85	1012	731	111
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	2365	877	641	2723	1677	311	161	69	1009	794	121
Arrive On Green	0.14	0.93	0.93	0.36	0.77	0.77	0.09	0.07	0.07	0.29	0.26	0.26
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	2419	1041	3456	3093	469
Grp Volume(v), veh/h	103	2360	467	66	528	423	175	138	137	1012	420	422
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1683	1728	1777	1786
Q Serve(g_s), s	8.5	67.4	0.0	3.7	6.1	0.0	7.3	10.0	10.0	43.8	34.5	34.5
Cycle Q Clear(g_c), s	8.5	67.4	0.0	3.7	6.1	0.0	7.3	10.0	10.0	43.8	34.5	34.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.62	1.00		0.26
Lane Grp Cap(c), veh/h	123	2365	877	641	2723	1677	311	118	112	1009	456	459
V/C Ratio(X)	0.84	1.00	0.53	0.10	0.19	0.25	0.56	1.16	1.22	1.00	0.92	0.92
Avail Cap(c_a), veh/h	194	2366	877	641	2723	1677	311	118	112	1009	505	507
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.48	0.48	0.48	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.8	5.4	2.1	31.9	4.8	0.0	65.4	70.0	70.0	53.1	54.2	54.3
Incr Delay (d2), s/veh	4.7	12.3	1.1	0.0	0.2	0.4	1.5	132.6	157.3	29.0	20.1	20.1
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	8.7	4.8	1.3	1.6	1.8	0.2	3.3	8.9	9.2	23.0	18.0	18.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	68.6	17.7	3.3	31.9	5.0	0.4	66.9	202.6	227.3	82.1	74.3	74.4
LnGrp LOS	E	B	A	C	A	A	E	F	F	F	E	E
Approach Vol, veh/h	2930			1017			450			1854		
Approach Delay, s/veh	17.2			4.8			157.4			78.6		
Approach LOS	B			A			F			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	60.8	75.5	19.5	44.5	14.6	121.8	48.0	16.0				
Change Period (Y+Rc), s	6.0	* 6	* 6	* 6	* 4.2	6.0	* 4.2	* 6				
Max Green Setting (Gmax), s	* 3	* 70	* 11	* 43	* 16	59.5	* 44	* 10				
Max Q Clear Time (g_c+l), s	69.4	9.3	36.5	10.5	8.1	45.8	12.0					
Green Ext Time (p_c), s	0.0	0.1	0.1	2.0	0.0	2.6	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 43.5
HCM 6th LOS D

Notes

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

Existing PM
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑↓		↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↓	
Traffic Volume (veh/h)	40	607	45	149	1484	245	34	126	76	130	130	21
Future Volume (veh/h)	40	607	45	149	1484	245	34	126	76	130	130	21
Initial Q (Q _b), 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	41	619	46	152	1514	224	35	129	70	133	133	21
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	468	2657	196	197	1685	523	227	249	211	459	210	33
Arrive On Green	0.26	0.55	0.55	0.08	0.44	0.44	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1781	4852	358	3456	5106	1585	1781	1870	1585	3456	1577	249
Grp Volume(v), veh/h	41	433	232	152	1514	224	35	129	70	133	0	154
Grp Sat Flow(s), veh/h/ln	1781	1702	1806	1728	1702	1585	1781	1870	1585	1728	0	1826
Q Serve(g_s), s	2.6	9.9	10.0	6.5	41.2	10.3	2.6	9.6	6.0	5.2	0.0	12.0
Cycle Q Clear(g_c), s	2.6	9.9	10.0	6.5	41.2	10.3	2.6	9.6	6.0	5.2	0.0	12.0
Prop In Lane	1.00		0.20	1.00		1.00	1.00		1.00	1.00		0.14
Lane Grp Cap(c), veh/h	468	1864	989	197	1685	523	227	249	211	459	0	243
V/C Ratio(X)	0.09	0.23	0.23	0.77	0.90	0.43	0.15	0.52	0.33	0.29	0.00	0.63
Avail Cap(c_a), veh/h	468	1864	989	272	1998	620	241	524	444	479	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.87	0.87	0.87	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.7	17.6	17.6	68.4	39.8	15.8	58.2	60.5	58.9	58.7	0.0	61.5
Incr Delay (d2), s/veh	0.0	0.3	0.6	4.9	7.1	2.2	0.1	0.6	0.3	0.1	0.0	1.0
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	1.1	3.7	4.1	2.9	16.2	3.9	1.2	4.6	2.5	2.3	0.0	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	41.8	17.9	18.2	73.3	46.9	18.1	58.4	61.1	59.3	58.8	0.0	62.5
LnGrp LOS	D	B	B	E	D	B	E	E	E	E	A	E
Approach Vol, veh/h		706			1890			234			287	
Approach Delay, s/veh		19.4			45.6			60.2			60.8	
Approach LOS		B			D			E			E	

Intersection Summary

HCM 6th Ctrl Delay	42.1
HCM 6th LOS	D

Notes

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

Existing PM
2: Kelly Dr & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑	↑↑↑	↑	↑	↓		↑	↑	
Traffic Volume (veh/h)	0	720	72	166	1885	0	47	0	84	0	0	2
Future Volume (veh/h)	0	720	72	166	1885	0	47	0	84	0	0	2
Initial Q (Q _b), 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	758	76	175	1984	0	49	0	88	0	0	2
Peak Hour Factor	0.95	0.95	0.95	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	2	2	2	2
Cap, veh/h	1	3508	1089	197	4227	1312	125	0	111	5	0	4
Arrive On Green	0.00	0.23	0.23	0.15	1.00	0.00	0.07	0.00	0.07	0.00	0.00	0.00
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	0	758	76	175	1984	0	49	0	88	0	0	2
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.0	18.1	5.7	14.5	0.0	0.0	3.9	0.0	8.2	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.0	18.1	5.7	14.5	0.0	0.0	3.9	0.0	8.2	0.0	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1	3508	1089	197	4227	1312	125	0	111	5	0	4
V/C Ratio(X)	0.00	0.22	0.07	0.89	0.47	0.00	0.39	0.00	0.79	0.00	0.00	0.47
Avail Cap(c_a), veh/h	59	3508	1089	362	4227	1312	384	0	341	69	0	61
HCM Platoon Ratio	0.33	0.33	0.33	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	0.97	0.97	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	25.1	20.3	63.0	0.0	0.0	66.7	0.0	68.7	0.0	0.0	74.7
Incr Delay (d2), s/veh	0.0	0.1	0.1	5.2	0.4	0.0	0.7	0.0	4.7	0.0	0.0	27.5
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	0.0	8.3	2.0	6.4	0.1	0.0	1.8	0.0	3.5	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	25.3	20.5	68.3	0.4	0.0	67.4	0.0	73.3	0.0	0.0	102.2
LnGrp LOS	A	C	C	E	A	A	E	A	E	A	A	F
Approach Vol, veh/h		834			2159			137			2	
Approach Delay, s/veh		24.8			5.9			71.2			102.2	
Approach LOS		C			A			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	1.1	109.1		15.2	0.0	130.2		4.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	0.5	62.0		* 32	5.0	87.5		5.8				
Max Q Clear Time (g_c+I1), s	0.5	20.1		10.2	0.0	2.0		2.2				
Green Ext Time (p_c), s	0.2	3.1		0.4	0.0	12.8		0.0				

Intersection Summary

HCM 6th Ctrl Delay 13.8
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.

Existing PM
3: Project Access 1 & El Camino Real

Marja Acres
01/16/2019

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	773	28	0	2024	0	19
Future Vol, veh/h	773	28	0	2024	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
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	797	29	0	2087	0	20

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 413
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 *743
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *743
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
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HCM Control Delay, s 0 0 10

HCM LOS B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	743	-	-	-
HCM Lane V/C Ratio	0.026	-	-	-
HCM Control Delay (s)	10	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing PM
4: Project Access 2 & El Camino Real

Marja Acres
01/16/2019

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	785	7	0	2024	0	17
Future Vol, veh/h	785	7	0	2024	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	801	7	0	2065	0	17

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 404
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 *743
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *743
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	743	-	-	-
HCM Lane V/C Ratio	0.023	-	-	-
HCM Control Delay (s)	10	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing PM
5: Lisa St/West Village & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	47	740	1	13	2002	65	2	0	1	43	0	22
Future Volume (veh/h)	47	740	1	13	2002	65	2	0	1	43	0	22
Initial Q (Q _b), 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	48	755	1	13	2043	66	2	0	1	44	0	22
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	62	4177	6	20	3929	1270	4	0	41	57	0	88
Arrive On Green	0.01	0.26	0.26	0.02	1.00	1.00	0.00	0.00	0.03	0.03	0.00	0.06
Sat Flow, veh/h	1781	5266	7	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	48	488	268	13	2043	66	2	0	1	44	0	22
Grp Sat Flow(s), veh/h/ln	1781	1702	1869	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	4.0	16.7	16.7	1.1	0.0	0.0	0.2	0.0	0.1	3.7	0.0	2.0
Cycle Q Clear(g_c), s	4.0	16.7	16.7	1.1	0.0	0.0	0.2	0.0	0.1	3.7	0.0	2.0
Prop In Lane	1.00			1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	62	2700	1482	20	3929	1270	4	0	41	57	0	88
V/C Ratio(X)	0.77	0.18	0.18	0.65	0.52	0.05	0.53	0.00	0.02	0.77	0.00	0.25
Avail Cap(c_a), veh/h	100	2700	1482	63	3929	1270	58	0	444	100	0	481
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.09	0.09	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	73.5	17.6	17.6	73.0	0.0	0.0	74.8	0.0	71.2	72.1	0.0	67.8
Incr Delay (d2), s/veh	18.2	0.1	0.3	3.3	0.0	0.0	82.2	0.0	0.2	19.7	0.0	1.5
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	2.1	7.6	8.4	0.5	0.0	0.0	0.2	0.0	0.0	2.0	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	91.7	17.8	17.9	76.3	0.0	0.0	157.0	0.0	71.5	91.8	0.0	69.3
LnGrp LOS	F	B	B	E	A	A	F	A	E	F	A	E
Approach Vol, veh/h		804			2122			3			66	
Approach Delay, s/veh		22.2			0.5			128.5			84.3	
Approach LOS		C			A			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	6.3	125.5	4.9	13.3	9.8	121.9	9.4	8.9				
Change Period (Y+R _c), s	4.6	6.5	4.6	5.0	4.6	6.5	4.6	5.0				
Max Green Setting (Gmax), s	5.3	73.6	4.9	45.5	8.4	70.5	8.4	42.0				
Max Q Clear Time (g_c+l1), s	3.1	18.7	2.2	4.0	6.0	2.0	5.7	2.1				
Green Ext Time (p_c), s	0.0	4.6	0.0	0.1	0.0	26.1	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				8.3								
HCM 6th LOS				A								

Existing PM
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗	↑↑ ↗	↗	↖	↖ ↗	↖	↖ ↗	↑ ↗	↑	↖ ↗	↖ ↗	↖
Traffic Volume (veh/h)	55	585	154	62	1659	1015	342	544	86	334	216	52
Future Volume (veh/h)	55	585	154	62	1659	1015	342	544	86	334	216	52
Initial Q (Q _b), 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	57	609	160	65	1728	1057	356	567	90	348	225	54
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	62	759	422	739	1923	1042	405	492	78	402	488	115
Arrive On Green	0.01	0.05	0.05	0.42	0.54	0.54	0.12	0.16	0.16	0.12	0.17	0.17
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	3073	486	3456	2855	671
Grp Volume(v), veh/h	57	609	160	65	1728	1057	356	327	330	348	138	141
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1783	1728	1777	1750
Q Serve(g_s), s	4.8	17.7	3.7	3.3	65.2	58.1	15.2	24.0	24.0	14.8	10.5	10.9
Cycle Q Clear(g_c), s	4.8	17.7	3.7	3.3	65.2	58.1	15.2	24.0	24.0	14.8	10.5	10.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.27	1.00		0.38
Lane Grp Cap(c), veh/h	62	759	422	739	1923	1042	405	284	285	402	304	299
V/C Ratio(X)	0.92	0.80	0.38	0.09	0.90	1.01	0.88	1.15	1.16	0.87	0.46	0.47
Avail Cap(c_a), veh/h	62	2083	833	739	1923	1042	532	284	285	746	394	388
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.9	69.1	23.7	26.6	30.7	13.4	65.1	63.0	63.0	65.1	55.9	56.1
Incr Delay (d2), s/veh	85.6	8.7	2.6	0.0	7.2	31.5	10.5	100.5	102.4	2.2	0.4	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/lr	8.7	3.5	1.4	27.3	25.9	7.3	18.8	19.0	6.7	4.8	4.9	
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	159.5	77.8	26.3	26.7	37.9	45.0	75.6	163.5	165.4	67.4	56.3	56.5
LnGrp LOS	F	E	C	C	D	F	E	F	F	E	E	E
Approach Vol, veh/h		826			2850			1013			627	
Approach Delay, s/veh		73.5			40.3			133.2			62.5	
Approach LOS		E			D			F			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc),s	68.3	28.3	21.8	31.6	9.4	87.2	23.4	30.0				
Change Period (Y+Rc), s	6.0	* 6	* 4.2	* 6	* 4.2	6.0	* 6	* 6				
Max Green Setting (Gmax),s	* 61	* 23	* 33	* 5.2	68.0	* 32	* 24					
Max Q Clear Time (g_c+l),s	19.7	17.2	12.9	6.8	67.2	16.8	26.0					
Green Ext Time (p_c), s	0.0	2.6	0.4	1.0	0.0	0.7	0.6	0.0				

Intersection Summary

HCM 6th Ctrl Delay 65.8
HCM 6th LOS E

Notes

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

APPENDIX I

HCM ANALYSIS WORKSHEETS – EXISTING + PROJECT

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Existing + Proj AM
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (veh/h)	40	2083	40	166	468	139	47	136	286	403	189	47
Future Volume (veh/h)	40	2083	40	166	468	139	47	136	286	403	189	47
Initial Q (Q _b), 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		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	2264	43	180	509	136	51	148	246	438	205	51
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	55	2422	46	385	2868	890	209	258	219	483	224	56
Arrive On Green	0.03	0.47	0.47	0.22	1.00	1.00	0.12	0.14	0.14	0.14	0.16	0.16
Sat Flow, veh/h	1781	5159	98	3456	5106	1585	1781	1870	1585	3456	1446	360
Grp Volume(v), veh/h	43	1492	815	180	509	136	51	148	246	438	0	256
Grp Sat Flow(s), veh/h/ln	1781	1702	1853	1728	1702	1585	1781	1870	1585	1728	0	1806
Q Serve(g_s), s	3.6	62.1	62.5	6.8	0.0	0.0	3.9	11.1	16.3	18.7	0.0	20.9
Cycle Q Clear(g_c), s	3.6	62.1	62.5	6.8	0.0	0.0	3.9	11.1	16.3	18.7	0.0	20.9
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	55	1598	870	385	2868	890	209	258	219	483	0	280
V/C Ratio(X)	0.78	0.93	0.94	0.47	0.18	0.15	0.24	0.57	1.12	0.91	0.00	0.91
Avail Cap(c_a), veh/h	110	1659	903	385	2868	890	242	299	254	525	0	318
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.1	37.6	37.7	54.4	0.0	0.0	60.1	60.5	39.9	63.6	0.0	62.4
Incr Delay (d2), s/veh	8.3	11.5	18.6	0.3	0.1	0.4	0.2	0.7	96.8	17.7	0.0	26.3
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	1.7	26.6	30.8	2.7	0.0	0.1	1.8	5.4	12.3	9.5	0.0	11.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	80.5	49.1	56.2	54.7	0.1	0.4	60.4	61.3	136.7	81.3	0.0	88.7
LnGrp LOS	F	D	E	D	A	A	E	E	F	F	A	F
Approach Vol, veh/h	2350				825				445			694
Approach Delay, s/veh	52.1				12.1				102.8			84.0
Approach LOS	D				B				F			F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	22.7	76.4	22.6	28.3	8.9	90.3	25.2	25.7				
Change Period (Y+R _c), s	6.0	* 6	* 5	* 5	* 4.2	6.0	* 4.2	* 5				
Max Green Setting (Gmax), s	10.7	* 73	* 20	* 26	* 9.3	74.5	* 23	* 24				
Max Q Clear Time (g _{c+l1}), s	8.8	64.5	5.9	22.9	5.6	2.0	20.7	18.3				
Green Ext Time (p _c), s	0.1	5.9	0.0	0.3	0.0	2.1	0.2	0.5				
Intersection Summary												
HCM 6th Ctrl Delay				54.8								
HCM 6th LOS				D								
Notes												

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

HCM 6th Signalized Intersection Summary

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Existing + Proj AM
2: Kelly Dr & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙											
Traffic Volume (veh/h)	2	2721	107	207	673	4	89	0	257	0	0	8
Future Volume (veh/h)	2	2721	107	207	673	4	89	0	257	0	0	8
Initial Q (Q _b), 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	2	2895	114	220	716	4	95	0	273	0	0	8
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	5	2920	907	184	3435	1066	331	0	295	17	0	15
Arrive On Green	0.01	1.00	1.00	0.03	0.22	0.22	0.19	0.00	0.19	0.00	0.00	0.01
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	2	2895	114	220	716	4	95	0	273	0	0	8
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.2	0.0	0.0	15.5	17.2	0.3	6.9	0.0	25.4	0.0	0.0	0.8
Cycle Q Clear(g_c), s	0.2	0.0	0.0	15.5	17.2	0.3	6.9	0.0	25.4	0.0	0.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	5	2920	907	184	3435	1066	331	0	295	17	0	15
V/C Ratio(X)	0.42	0.99	0.13	1.20	0.21	0.00	0.29	0.00	0.93	0.00	0.00	0.53
Avail Cap(c_a), veh/h	59	2920	907	184	3435	1066	368	0	328	59	0	53
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.32	0.32	0.32	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	74.5	0.0	0.0	72.4	25.8	19.2	52.5	0.0	60.0	0.0	0.0	74.0
Incr Delay (d2), s/veh	6.9	7.6	0.1	128.7	0.1	0.0	0.2	0.0	28.6	0.0	0.0	10.5
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	0.1	2.1	0.0	14.0	7.8	0.1	3.1	0.0	12.6	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	81.4	7.6	0.1	201.2	25.9	19.2	52.7	0.0	88.6	0.0	0.0	84.5
LnGrp LOS	F	A	A	F	C	B	D	A	F	A	A	F
Approach Vol, veh/h		3011			940			368			8	
Approach Delay, s/veh		7.4			66.9			79.4			84.5	
Approach LOS		A			E			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.0	91.8		32.6	4.9	106.9		5.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	5.5	79.1		* 31	5.0	89.6		5.0				
Max Q Clear Time (g_c+mt), s	5.5	2.0		27.4	2.2	19.2		2.8				
Green Ext Time (p_c), s	0.0	33.1		0.5	0.0	2.9		0.0				

Intersection Summary

HCM 6th Ctrl Delay 26.6

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.

HCM 6th Signalized Intersection Summary

N:\2608\Analysis\Synchro\3. Existing + Proj AM.syn

Existing + Proj AM
3: Project Access 1 & El Camino Real

Marja Acres
01/16/2019

Intersection

Int Delay, s/veh 0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	2914	30	0	888	0	75
Future Vol, veh/h	2914	30	0	888	0	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3133	32	0	955	0	81

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 1583
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 *246
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - - *246
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	26.6
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	246	-	-	-
HCM Lane V/C Ratio	0.328	-	-	-
HCM Control Delay (s)	26.6	-	-	-
HCM Lane LOS	D	-	-	-
HCM 95th %tile Q(veh)	1.4	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Proj AM
4: Project Access 2 & El Camino Real

Marja Acres
01/16/2019

Intersection

Int Delay, s/veh 0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	2962	27	0	888	0	72
Future Vol, veh/h	2962	27	0	888	0	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3255	30	0	976	0	79

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 1643
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 *229
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *229
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
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HCM Control Delay, s 0 0 28.8

HCM LOS D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	229	-	-	-
HCM Lane V/C Ratio	0.346	-	-	-
HCM Control Delay (s)	28.8	-	-	-
HCM Lane LOS	D	-	-	-
HCM 95th %tile Q(veh)	1.5	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Proj AM
5: Lisa St/W Ranch St & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	97	2906	0	3	778	39	0	0	1	79	1	52
Future Volume (veh/h)	97	2906	0	3	778	39	0	0	1	79	1	52
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	104	3125	0	3	837	42	0	0	1	85	1	56
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	106	3982	0	6	3695	1215	1	0	58	76	3	171
Arrive On Green	0.06	0.78	0.00	0.01	1.00	1.00	0.00	0.00	0.04	0.04	0.11	0.11
Sat Flow, veh/h	1781	5274	0	1781	5106	1585	1781	0	1585	1781	28	1561
Grp Volume(v), veh/h	104	3125	0	3	837	42	0	0	1	85	0	57
Grp Sat Flow(s), veh/h/ln	1781	1702	0	1781	1702	1585	1781	0	1585	1781	0	1589
Q Serve(g_s), s	8.7	52.1	0.0	0.3	0.0	0.0	0.0	0.0	0.1	6.4	0.0	5.0
Cycle Q Clear(g_c), s	8.7	52.1	0.0	0.3	0.0	0.0	0.0	0.0	0.1	6.4	0.0	5.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		0.98
Lane Grp Cap(c), veh/h	106	3982	0	6	3695	1215	1	0	58	76	0	174
V/C Ratio(X)	0.98	0.78	0.00	0.54	0.23	0.03	0.00	0.00	0.02	1.12	0.00	0.33
Avail Cap(c_a), veh/h	106	3982	0	58	3695	1215	58	0	444	76	0	461
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	0.00	0.91	0.91	0.91	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	70.5	9.4	0.0	74.4	0.0	0.0	0.0	0.0	69.7	71.8	0.0	61.7
Incr Delay (d2), s/veh	82.2	1.6	0.0	57.7	0.1	0.0	0.0	0.0	0.1	139.0	0.0	1.1
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	6.3	14.5	0.0	0.2	0.0	0.0	0.0	0.0	0.0	5.9	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	152.7	11.0	0.0	132.1	0.1	0.0	0.0	0.0	69.8	210.8	0.0	62.7
LnGrp LOS	F	B	A	F	A	A	A	A	E	F	A	E
Approach Vol, veh/h		3229			882			1			142	
Approach Delay, s/veh		15.6			0.6			69.8			151.4	
Approach LOS		B			A			E			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.1	123.5	0.0	21.5	13.5	115.0	11.0	10.5				
Change Period (Y+Rc), s	4.6	6.5	4.6	5.0	4.6	6.5	4.6	5.0				
Max Green Setting (Gmax), s	4.9	76.0	4.9	43.5	8.9	72.0	6.4	42.0				
Max Q Clear Time (g_c+l1), s	2.3	54.1	0.0	7.0	10.7	2.0	8.4	2.1				
Green Ext Time (p_c), s	0.0	20.2	0.0	0.3	0.0	6.0	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			17.0									
HCM 6th LOS			B									
Notes												
User approved ignoring U-Turning movement.												

Existing + Proj AM
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙	↑ ↗ ↘ ↑ ↖ ↙
Traffic Volume (veh/h)	107	2336	473	64	528	410	176	184	82	982	709	110
Future Volume (veh/h)	107	2336	473	64	528	410	176	184	82	982	709	110
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	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											
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	110	2408	488	66	544	423	181	190	85	1012	731	113
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	130	2366	877	644	2714	1673	311	161	69	1009	792	122
Arrive On Green	0.15	0.93	0.93	0.36	0.76	0.76	0.09	0.07	0.07	0.29	0.26	0.26
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	2419	1041	3456	3085	477
Grp Volume(v), veh/h	110	2408	488	66	544	423	181	138	137	1012	421	423
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1683	1728	1777	1785
Q Serve(g_s), s	9.0	69.5	0.0	3.7	6.4	0.0	7.5	10.0	10.0	43.8	34.6	34.6
Cycle Q Clear(g_c), s	9.0	69.5	0.0	3.7	6.4	0.0	7.5	10.0	10.0	43.8	34.6	34.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.62	1.00		0.27
Lane Grp Cap(c), veh/h	130	2366	877	644	2714	1673	311	118	112	1009	456	458
V/C Ratio(X)	0.84	1.02	0.56	0.10	0.20	0.25	0.58	1.16	1.22	1.00	0.92	0.92
Avail Cap(c_a), veh/h	207	2366	877	644	2714	1673	311	118	112	1009	499	501
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.44	0.44	0.44	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.2	5.5	2.1	31.8	4.9	0.0	65.5	70.0	70.0	53.1	54.3	54.3
Incr Delay (d2), s/veh	4.4	17.0	1.1	0.0	0.2	0.4	1.9	132.6	157.3	29.0	21.0	21.0
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/lr	8.9	5.8	1.4	1.6	1.9	0.2	3.4	8.9	9.2	23.0	18.1	18.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	67.6	22.5	3.3	31.8	5.1	0.4	67.4	202.6	227.3	82.1	75.3	75.3
LnGrp LOS	E	F	A	C	A	A	E	F	F	F	E	E
Approach Vol, veh/h	3006			1033			456			1856		
Approach Delay, s/veh	21.0			4.9			156.4			79.0		
Approach LOS	C			A			F			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	61.0	75.5	19.5	44.5	15.2	121.4	48.0	16.0				
Change Period (Y+Rc), s	6.0	* 6	* 6	* 6	* 4.2	6.0	* 4.2	* 6				
Max Green Setting (Gmax), s	* 3	* 70	* 12	* 42	* 17	58.4	* 44	* 10				
Max Q Clear Time (g_c+l), s	7.5	71.5	9.5	36.6	11.0	8.4	45.8	12.0				
Green Ext Time (p_c), s	0.0	0.0	0.1	1.9	0.1	2.7	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 45.1
HCM 6th LOS D

Notes

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

Existing + Proj PM
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑		↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↑	
Traffic Volume (veh/h)	40	634	45	156	1493	247	34	126	95	136	130	21
Future Volume (veh/h)	40	634	45	156	1493	247	34	126	95	136	130	21
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	41	647	46	159	1523	226	35	129	87	139	133	21
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	465	2656	188	203	1693	526	227	249	211	459	210	33
Arrive On Green	0.26	0.55	0.55	0.08	0.44	0.44	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1781	4869	344	3456	5106	1585	1781	1870	1585	3456	1577	249
Grp Volume(v), veh/h	41	451	242	159	1523	226	35	129	87	139	0	154
Grp Sat Flow(s), veh/h/ln	1781	1702	1808	1728	1702	1585	1781	1870	1585	1728	0	1826
Q Serve(g_s), s	2.6	10.4	10.5	6.8	41.5	10.3	2.6	9.6	7.5	5.5	0.0	12.0
Cycle Q Clear(g_c), s	2.6	10.4	10.5	6.8	41.5	10.3	2.6	9.6	7.5	5.5	0.0	12.0
Prop In Lane	1.00		0.19	1.00		1.00	1.00		1.00	1.00		0.14
Lane Grp Cap(c), veh/h	465	1857	987	203	1693	526	227	249	211	459	0	243
V/C Ratio(X)	0.09	0.24	0.25	0.78	0.90	0.43	0.15	0.52	0.41	0.30	0.00	0.63
Avail Cap(c_a), veh/h	465	1857	987	272	1998	620	241	524	444	479	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.87	0.87	0.87	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.9	17.9	17.9	68.2	39.6	15.7	58.2	60.5	59.6	58.7	0.0	61.5
Incr Delay (d2), s/veh	0.0	0.3	0.6	6.1	7.1	2.2	0.1	0.6	0.5	0.1	0.0	1.0
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	1.1	4.0	4.3	3.0	16.2	3.9	1.2	4.6	3.1	2.4	0.0	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	42.0	18.2	18.5	74.3	46.8	18.0	58.3	61.1	60.1	58.9	0.0	62.5
LnGrp LOS	D	B	B	E	D	B	E	E	E	E	A	E
Approach Vol, veh/h		734			1908			251			293	
Approach Delay, s/veh		19.6			45.6			60.4			60.8	
Approach LOS		B			D			E			E	

Intersection Summary

HCM 6th Ctrl Delay	42.2
HCM 6th LOS	D

Notes

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙											
Traffic Volume (veh/h)	0	772	72	239	1903	0	47	0	90	0	0	2
Future Volume (veh/h)	0	772	72	239	1903	0	47	0	90	0	0	2
Initial Q (Q _b), 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	813	76	252	2003	0	49	0	95	0	0	2
Peak Hour Factor	0.95	0.95	0.95	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	2	2	2	2
Cap, veh/h	1	3267	1014	273	4204	1305	133	0	118	5	0	4
Arrive On Green	0.00	0.21	0.21	0.20	1.00	0.00	0.07	0.00	0.07	0.00	0.00	0.00
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	0	813	76	252	2003	0	49	0	95	0	0	2
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.0	19.9	5.8	20.8	0.0	0.0	3.9	0.0	8.8	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.0	19.9	5.8	20.8	0.0	0.0	3.9	0.0	8.8	0.0	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1	3267	1014	273	4204	1305	133	0	118	5	0	4
V/C Ratio(X)	0.00	0.25	0.07	0.92	0.48	0.00	0.37	0.00	0.80	0.00	0.00	0.47
Avail Cap(c_a), veh/h	59	3267	1014	362	4204	1305	384	0	341	69	0	61
HCM Platoon Ratio	0.33	0.33	0.33	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	0.97	0.97	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	29.1	23.6	58.8	0.0	0.0	66.0	0.0	68.3	0.0	0.0	74.7
Incr Delay (d2), s/veh	0.0	0.2	0.1	21.4	0.4	0.0	0.6	0.0	4.7	0.0	0.0	27.5
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	0.0	9.1	2.1	10.3	0.2	0.0	1.8	0.0	3.8	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	29.3	23.7	80.2	0.4	0.0	66.7	0.0	73.0	0.0	0.0	102.2
LnGrp LOS	A	C	C	F	A	A	E	A	E	A	A	F
Approach Vol, veh/h		889			2255			144			2	
Approach Delay, s/veh		28.8			9.3			70.8		102.2		
Approach LOS		C			A			E		F		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	27.5	102.0		15.9	0.0	129.5		4.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	20.5	62.0		* 32	5.0	87.5		5.8				
Max Q Clear Time (g_c+D), s	21.9			10.8	0.0	2.0		2.2				
Green Ext Time (p_c), s	0.2	3.4		0.4	0.0	13.0		0.0				

Intersection Summary

HCM 6th Ctrl Delay 17.3

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 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	838	92	0	2115	0	41
Future Vol, veh/h	838	92	0	2115	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
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	864	95	0	2180	0	42

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 480
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 *726
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *726
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	726	-	-	-
HCM Lane V/C Ratio	0.058	-	-	-
HCM Control Delay (s)	10.3	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	807	72	0	2115	0	39
Future Vol, veh/h	807	72	0	2115	0	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	823	73	0	2158	0	40

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 448
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 *743
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *743
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
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HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	743	-	-	-
HCM Lane V/C Ratio	0.054	-	-	-
HCM Control Delay (s)	10.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Proj PM
5: Lisa St/West Village & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	67	764	1	13	2073	65	2	0	1	43	0	22
Future Volume (veh/h)	67	764	1	13	2073	65	2	0	1	43	0	22
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	68	780	1	13	2115	66	2	0	1	44	0	22
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	86	4177	5	20	3859	1249	4	0	41	57	0	88
Arrive On Green	0.02	0.26	0.26	0.02	1.00	1.00	0.00	0.00	0.03	0.03	0.00	0.06
Sat Flow, veh/h	1781	5266	7	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	68	504	277	13	2115	66	2	0	1	44	0	22
Grp Sat Flow(s), veh/h/ln	1781	1702	1869	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	5.7	17.2	17.2	1.1	0.0	0.0	0.2	0.0	0.1	3.7	0.0	2.0
Cycle Q Clear(g_c), s	5.7	17.2	17.2	1.1	0.0	0.0	0.2	0.0	0.1	3.7	0.0	2.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	86	2700	1482	20	3859	1249	4	0	41	57	0	88
V/C Ratio(X)	0.79	0.19	0.19	0.65	0.55	0.05	0.53	0.00	0.02	0.77	0.00	0.25
Avail Cap(c_a), veh/h	100	2700	1482	63	3859	1249	58	0	444	100	0	481
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.09	0.09	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	73.0	17.8	17.8	73.0	0.0	0.0	74.8	0.0	71.2	72.1	0.0	67.8
Incr Delay (d2), s/veh	29.7	0.2	0.3	3.3	0.1	0.0	82.2	0.0	0.2	19.7	0.0	1.5
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	3.3	7.9	8.7	0.5	0.0	0.0	0.2	0.0	0.0	2.0	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	102.8	18.0	18.1	76.3	0.1	0.0	157.0	0.0	71.5	91.8	0.0	69.3
LnGrp LOS	F	B	B	E	A	A	F	A	E	F	A	E
Approach Vol, veh/h		849			2194			3			66	
Approach Delay, s/veh		24.8			0.5			128.5			84.3	
Approach LOS		C			A			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.3	125.5	4.9	13.3	11.9	119.9	9.4	8.9				
Change Period (Y+Rc), s	4.6	6.5	4.6	5.0	4.6	6.5	4.6	5.0				
Max Green Setting (Gmax), s	5.3	73.6	4.9	45.5	8.4	70.5	8.4	42.0				
Max Q Clear Time (g_c+l1), s	3.1	19.2	2.2	4.0	7.7	2.0	5.7	2.1				
Green Ext Time (p_c), s	0.0	4.8	0.0	0.1	0.0	28.0	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			9.0									
HCM 6th LOS				A								

Existing + Proj PM
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↗ ↘											
Traffic Volume (veh/h)	57	600	161	62	1705	1015	361	544	86	334	216	58
Future Volume (veh/h)	57	600	161	62	1705	1015	361	544	86	334	216	58
Initial Q (Q _b), 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	59	625	168	65	1776	1057	376	567	90	348	225	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	64	778	435	733	1918	1040	423	492	78	401	463	121
Arrive On Green	0.01	0.05	0.05	0.41	0.54	0.54	0.12	0.16	0.16	0.12	0.17	0.17
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	3073	486	3456	2789	727
Grp Volume(v), veh/h	59	625	168	65	1776	1057	376	327	330	348	141	144
Grp Sat Flow(s),veh/h/ln1781	1702	1585	1781	1777	1585	1728	1777	1783	1728	1777	1739	
Q Serve(g_s), s	5.0	18.2	3.8	3.3	69.0	58.1	16.1	24.0	24.0	14.8	10.8	11.3
Cycle Q Clear(g_c), s	5.0	18.2	3.8	3.3	69.0	58.1	16.1	24.0	24.0	14.8	10.8	11.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.27	1.00		0.42
Lane Grp Cap(c), veh/h	64	778	435	733	1918	1040	423	284	285	401	295	288
V/C Ratio(X)	0.92	0.80	0.39	0.09	0.93	1.02	0.89	1.15	1.16	0.87	0.48	0.50
Avail Cap(c_a), veh/h	64	2138	858	733	1918	1040	491	284	285	710	397	388
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.98	0.98	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.9	69.0	23.4	27.0	31.7	13.5	64.8	63.0	63.0	65.1	56.7	56.9
Incr Delay (d2), s/veh	82.2	8.5	2.5	0.0	9.2	32.1	15.0	100.5	102.4	2.3	0.5	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/lr	8.7	8.9	3.7	1.4	29.4	26.1	8.0	18.8	19.0	6.7	4.9	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	156.1	77.5	26.0	27.0	40.9	45.6	79.8	163.5	165.4	67.4	57.2	57.4
LnGrp LOS	F	E	C	C	D	F	E	F	F	E	E	E
Approach Vol, veh/h		852			2898			1033			633	
Approach Delay, s/veh		72.8			42.3			133.6			62.8	
Approach LOS		E			D			F			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc),s	67.7	28.8	22.5	30.9	9.6	87.0	23.4	30.0				
Change Period (Y+Rc), s	6.0	* 6	* 4.2	* 6	* 4.2	6.0	* 6	* 6				
Max Green Setting (Gmax),s	* 63	* 21	* 34	* 5.4	69.4	* 31	* 24					
Max Q Clear Time (g_c+l),s	20.2	18.1	13.3	7.0	71.0	16.8	26.0					
Green Ext Time (p_c), s	0.0	2.7	0.3	1.0	0.0	0.0	0.6	0.0				

Intersection Summary

HCM 6th Ctrl Delay 66.9

HCM 6th LOS E

Notes

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

HCM 6th Signalized Intersection Summary

N:\2608\Analysis\Synchro\4. Existing + Proj PM.syn

APPENDIX J

HCM ANALYSIS WORKSHEETS – EXISTING + CUMULATIVE PROJECTS (EXISTING CONDITION)

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Existing + Cuml AM
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑	↑
Traffic Volume (veh/h)	41	2113	40	173	492	146	47	137	299	420	191	50
Future Volume (veh/h)	41	2113	40	173	492	146	47	137	299	420	191	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		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	45	2297	43	188	535	145	51	149	260	457	208	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	58	2433	45	365	2841	882	209	256	217	501	228	59
Arrive On Green	0.03	0.47	0.47	0.21	1.00	1.00	0.12	0.14	0.14	0.15	0.16	0.16
Sat Flow, veh/h	1781	5161	96	3456	5106	1585	1781	1870	1585	3456	1432	372
Grp Volume(v), veh/h	45	1513	827	188	535	145	51	149	260	457	0	262
Grp Sat Flow(s), veh/h/ln	1781	1702	1853	1728	1702	1585	1781	1870	1585	1728	0	1803
Q Serve(g_s), s	3.8	63.5	63.8	7.2	0.0	0.0	3.9	11.2	16.3	19.5	0.0	21.4
Cycle Q Clear(g_c), s	3.8	63.5	63.8	7.2	0.0	0.0	3.9	11.2	16.3	19.5	0.0	21.4
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	58	1605	874	365	2841	882	209	256	217	501	0	287
V/C Ratio(X)	0.78	0.94	0.95	0.52	0.19	0.16	0.24	0.58	1.20	0.91	0.00	0.91
Avail Cap(c_a), veh/h	110	1645	896	365	2841	882	242	312	264	534	0	334
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.0	37.7	37.8	55.8	0.0	0.0	60.1	60.7	40.7	63.2	0.0	62.1
Incr Delay (d2), s/veh	8.0	12.5	19.9	0.6	0.1	0.4	0.2	0.8	125.1	18.6	0.0	24.6
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	1.8	27.3	31.7	2.9	0.0	0.1	1.8	5.4	14.0	9.9	0.0	11.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	80.0	50.2	57.7	56.4	0.1	0.4	60.4	61.5	165.8	81.8	0.0	86.7
LnGrp LOS	F	D	E	E	A	A	E	E	F	F	A	F
Approach Vol, veh/h		2385			868			460			719	
Approach Delay, s/veh		53.3			12.4			120.3			83.6	
Approach LOS		D			B			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.8	76.7	22.6	28.8	9.1	89.5	26.0	25.5				
Change Period (Y+Rc), s	6.0	* 6	* 5	* 5	* 4.2	6.0	* 4.2	* 5				
Max Green Setting (Gmax), s	9.9	* 73	* 20	* 28	* 9.3	73.1	* 23	* 25				
Max Q Clear Time (g_c+l1), s	9.2	65.8	5.9	23.4	5.8	2.0	21.5	18.3				
Green Ext Time (p_c), s	0.0	4.9	0.0	0.4	0.0	2.3	0.2	0.6				
Intersection Summary												
HCM 6th Ctrl Delay			57.2									
HCM 6th LOS			E									
Notes												

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

Existing + Cuml AM
2: Kelly Dr & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙											
Traffic Volume (veh/h)	2	2779	108	184	709	4	91	0	264	0	0	8
Future Volume (veh/h)	2	2779	108	184	709	4	91	0	264	0	0	8
Initial Q (Q _b), 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	2	2956	115	196	754	4	97	0	281	0	0	8
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	5	2897	899	184	3411	1059	339	0	302	17	0	15
Arrive On Green	0.01	1.00	1.00	0.03	0.22	0.22	0.19	0.00	0.19	0.00	0.00	0.01
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	2	2956	115	196	754	4	97	0	281	0	0	8
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.2	85.1	0.0	15.5	18.2	0.3	7.0	0.0	26.2	0.0	0.0	0.8
Cycle Q Clear(g_c), s	0.2	85.1	0.0	15.5	18.2	0.3	7.0	0.0	26.2	0.0	0.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	5	2897	899	184	3411	1059	339	0	302	17	0	15
V/C Ratio(X)	0.42	1.02	0.13	1.06	0.22	0.00	0.29	0.00	0.93	0.00	0.00	0.53
Avail Cap(c_a), veh/h	59	2897	899	184	3411	1059	368	0	328	59	0	53
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.27	0.27	0.27	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	74.5	0.0	0.0	72.4	26.5	19.5	52.0	0.0	59.7	0.0	0.0	74.0
Incr Delay (d2), s/veh	5.8	14.5	0.1	84.6	0.1	0.0	0.2	0.0	30.1	0.0	0.0	10.5
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	0.1	3.9	0.0	11.7	8.3	0.1	3.2	0.0	13.1	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	80.3	14.5	0.1	157.0	26.6	19.5	52.1	0.0	89.8	0.0	0.0	84.5
LnGrp LOS	F	F	A	F	C	B	D	A	F	A	A	F
Approach Vol, veh/h		3073			954			378			8	
Approach Delay, s/veh		14.0			53.4			80.1			84.5	
Approach LOS		B			D			F			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.0	91.1		33.3	4.9	106.2		5.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	5.5	79.1		* 31	5.0	89.6		5.0				
Max Q Clear Time (g_c+mt), s	5.5	87.1		28.2	2.2	20.2		2.8				
Green Ext Time (p_c), s	0.0	0.0		0.4	0.0	3.0		0.0				

Intersection Summary

HCM 6th Ctrl Delay 28.3
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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	2976	9	0	902	0	7
Future Vol, veh/h	2976	9	0	902	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3200	10	0	970	0	8

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 1605
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 *229
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *229
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	21.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	229	-	-	-
HCM Lane V/C Ratio	0.033	-	-	-
HCM Control Delay (s)	21.3	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Cuml AM
4: Project Access 2 & El Camino Real

Marja Acres
01/16/2019

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	2978	5	0	902	0	5
Future Vol, veh/h	2978	5	0	902	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3273	5	0	991	0	5

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 1639
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 *229
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *229
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	21.1
HCM LOS		C	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	229	-	-	-
HCM Lane V/C Ratio	0.024	-	-	-
HCM Control Delay (s)	21.1	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Cuml AM
5: Lisa St/W Ranch St & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	108	2844	0	3	761	156	0	0	1	228	1	144
Future Volume (veh/h)	108	2844	0	3	761	156	0	0	1	228	1	144
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	116	3058	0	3	818	168	0	0	1	245	1	155
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	139	3657	0	6	3274	1179	1	0	63	183	2	273
Arrive On Green	0.05	0.48	0.00	0.01	1.00	1.00	0.00	0.00	0.04	0.10	0.17	0.17
Sat Flow, veh/h	1781	5274	0	1781	5106	1585	1781	0	1585	1781	10	1576
Grp Volume(v), veh/h	116	3058	0	3	818	168	0	0	1	245	0	156
Grp Sat Flow(s), veh/h/ln	1781	1702	0	1781	1702	1585	1781	0	1585	1781	0	1587
Q Serve(g_s), s	9.7	78.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1	15.4	0.0	13.5
Cycle Q Clear(g_c), s	9.7	78.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1	15.4	0.0	13.5
Prop In Lane	1.00			1.00		1.00	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	139	3657	0	6	3274	1179	1	0	63	183	0	275
V/C Ratio(X)	0.83	0.84	0.00	0.54	0.25	0.14	0.00	0.00	0.02	1.34	0.00	0.57
Avail Cap(c_a), veh/h	235	3657	0	70	3274	1179	81	0	454	183	0	546
HCM Platoon Ratio	0.67	0.67	0.67	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	0.00	0.86	0.86	0.86	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	70.1	31.4	0.0	74.4	0.0	0.0	0.0	0.0	69.2	67.3	0.0	56.9
Incr Delay (d2), s/veh	12.0	2.4	0.0	55.1	0.2	0.2	0.0	0.0	0.1	184.9	0.0	1.8
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	4.9	33.2	0.0	0.2	0.0	0.1	0.0	0.0	0.0	16.4	0.0	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	82.1	33.8	0.0	129.5	0.2	0.2	0.0	0.0	69.3	252.2	0.0	58.7
LnGrp LOS	F	C	A	F	A	A	A	A	E	F	A	E
Approach Vol, veh/h		3174			989			1			401	
Approach Delay, s/veh		35.6			0.6			69.3			176.9	
Approach LOS		D			A			E			F	

Intersection Summary

HCM 6th Ctrl Delay	40.4
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Existing + Cuml AM
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑	↑↑	↑	↑↑	↑↑	↑↑	↑↑	↑↑	↑↑
Traffic Volume (veh/h)	124	2371	511	64	574	411	213	185	82	986	711	128
Future Volume (veh/h)	124	2371	511	64	574	411	213	185	82	986	711	128
Initial Q (Q _b), 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		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	128	2444	527	66	592	424	220	191	85	1016	733	132
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	148	2339	860	526	2425	1546	293	162	69	1014	792	142
Arrive On Green	0.17	0.92	0.92	0.30	0.68	0.68	0.08	0.07	0.07	0.29	0.26	0.26
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	2423	1038	3456	3008	542
Grp Volume(v), veh/h	128	2444	527	66	592	424	220	138	138	1016	433	432
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1684	1728	1777	1773
Q Serve(g_s), s	10.5	68.7	0.0	4.1	9.5	1.3	9.3	10.0	10.0	44.0	35.6	35.6
Cycle Q Clear(g_c), s	10.5	68.7	0.0	4.1	9.5	1.3	9.3	10.0	10.0	44.0	35.6	35.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.62	1.00		0.31
Lane Grp Cap(c), veh/h	148	2339	860	526	2425	1546	293	118	112	1014	468	467
V/C Ratio(X)	0.86	1.05	0.61	0.13	0.24	0.27	0.75	1.17	1.23	1.00	0.93	0.93
Avail Cap(c_a), veh/h	207	2339	860	526	2425	1546	293	118	112	1014	507	506
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.28	0.28	0.28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.7	6.3	2.6	38.6	9.1	0.1	67.1	70.0	70.0	53.0	53.8	53.8
Incr Delay (d2), s/veh	5.9	24.4	0.9	0.0	0.2	0.4	9.2	134.1	158.8	28.8	21.4	21.5
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	4.5	7.7	1.6	1.7	3.4	0.2	4.5	9.0	9.3	23.1	18.7	18.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.6	30.7	3.5	38.7	9.3	0.5	76.3	204.1	228.8	81.8	75.2	75.4
LnGrp LOS	E	F	A	D	A	A	E	F	F	F	E	E
Approach Vol, veh/h	3099			1082			496			1881		
Approach Delay, s/veh	27.6			7.7			154.3			78.8		
Approach LOS	C			A			F			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc),s	50.9	74.7	18.7	45.5	16.7	108.9	48.2	16.0				
Change Period (Y+Rc), s	6.0	* 6	* 6	* 6	* 4.2	6.0	* 4.2	* 6				
Max Green Setting (Gmax), s	* 69	* 11	* 43	* 17	58.2	* 44	* 10					
Max Q Clear Time (g_c+l1),s	70.7	11.3	37.6	12.5	11.5	46.0	12.0					
Green Ext Time (p_c), s	0.0	0.0	0.0	1.8	0.1	2.9	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 48.6
HCM 6th LOS D

Notes

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

Existing + Cumulative PM
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑↓		↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↓	
Traffic Volume (veh/h)	44	697	45	186	1556	273	34	128	123	157	131	23
Future Volume (veh/h)	44	697	45	186	1556	273	34	128	123	157	131	23
Initial Q (Q _b), 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	45	711	46	190	1588	253	35	131	117	160	134	23
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	444	2630	169	234	1752	544	228	249	211	460	207	36
Arrive On Green	0.25	0.54	0.54	0.09	0.46	0.46	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1781	4902	316	3456	5106	1585	1781	1870	1585	3456	1555	267
Grp Volume(v), veh/h	45	493	264	190	1588	253	35	131	117	160	0	157
Grp Sat Flow(s), veh/h/ln	1781	1702	1814	1728	1702	1585	1781	1870	1585	1728	0	1822
Q Serve(g_s), s	2.9	11.8	11.9	8.1	43.2	11.5	2.6	9.8	10.4	6.3	0.0	12.3
Cycle Q Clear(g_c), s	2.9	11.8	11.9	8.1	43.2	11.5	2.6	9.8	10.4	6.3	0.0	12.3
Prop In Lane	1.00		0.17	1.00		1.00	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	444	1826	973	234	1752	544	228	249	211	460	0	243
V/C Ratio(X)	0.10	0.27	0.27	0.81	0.91	0.47	0.15	0.53	0.55	0.35	0.00	0.65
Avail Cap(c_a), veh/h	444	1826	973	272	1998	620	241	524	444	479	0	516
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.85	0.85	0.85	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.4	18.8	18.9	67.3	38.5	15.0	58.2	60.6	60.8	59.1	0.0	61.6
Incr Delay (d2), s/veh	0.0	0.4	0.7	11.2	7.2	2.4	0.1	0.6	0.8	0.2	0.0	1.1
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	1.3	4.5	4.9	3.8	16.8	4.2	1.2	4.7	4.2	2.8	0.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.4	19.2	19.5	78.5	45.7	17.5	58.3	61.2	61.7	59.3	0.0	62.7
LnGrp LOS	D	B	B	E	D	B	E	E	E	A	E	
Approach Vol, veh/h		802			2031			283			317	
Approach Delay, s/veh		20.7			45.3			61.0			61.0	
Approach LOS		C			D			E			E	

Intersection Summary

HCM 6th Ctrl Delay	42.3
HCM 6th LOS	D

Notes

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

Existing + Cumulative PM
2: Kelly Dr & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↖ ↙ ↛ ↚ ↕ ↖ ↙ ↛ ↚											
Traffic Volume (veh/h)	0	881	75	179	2020	0	49	0	99	0	0	2
Future Volume (veh/h)	0	881	75	179	2020	0	49	0	99	0	0	2
Initial Q (Q _b), 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	927	79	188	2126	0	52	0	104	0	0	2
Peak Hour Factor	0.95	0.95	0.95	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	2	2	2	2
Cap, veh/h	1	3423	1063	208	4174	1296	144	0	128	5	0	4
Arrive On Green	0.00	0.22	0.22	0.23	1.00	0.00	0.08	0.00	0.08	0.00	0.00	0.00
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	0	927	79	188	2126	0	52	0	104	0	0	2
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.0	22.6	5.9	15.4	0.0	0.0	4.1	0.0	9.7	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.0	22.6	5.9	15.4	0.0	0.0	4.1	0.0	9.7	0.0	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1	3423	1063	208	4174	1296	144	0	128	5	0	4
V/C Ratio(X)	0.00	0.27	0.07	0.90	0.51	0.00	0.36	0.00	0.81	0.00	0.00	0.47
Avail Cap(c_a), veh/h	59	3423	1063	362	4174	1296	384	0	341	69	0	61
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	0.96	0.96	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	28.0	21.6	56.6	0.0	0.0	65.3	0.0	67.8	0.0	0.0	74.7
Incr Delay (d2), s/veh	0.0	0.2	0.1	7.8	0.4	0.0	0.6	0.0	4.7	0.0	0.0	27.5
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	0.0	10.3	2.1	6.3	0.2	0.0	1.9	0.0	4.1	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	28.2	21.7	64.4	0.4	0.0	65.9	0.0	72.5	0.0	0.0	102.2
LnGrp LOS	A	C	C	E	A	A	E	A	E	A	A	F
Approach Vol, veh/h		1006			2314			156			2	
Approach Delay, s/veh		27.7			5.6			70.3		102.2		
Approach LOS		C			A			E		F		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.0	106.6		16.8	0.0	128.6		4.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	30.5	62.0		* 32	5.0	87.5		5.8				
Max Q Clear Time (g_c+mt), s	24.6			11.7	0.0	2.0		2.2				
Green Ext Time (p_c), s	0.2	4.0		0.4	0.0	14.8		0.0				

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.

Existing + Cumulative PM
3: Project Access 1 & El Camino Real

Marja Acres
01/16/2019

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	949	28	0	2173	0	19
Future Vol, veh/h	949	28	0	2173	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
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	978	29	0	2240	0	20

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 504
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 *709
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *709
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	709	-	-	-
HCM Lane V/C Ratio	0.028	-	-	-
HCM Control Delay (s)	10.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	961	7	0	2173	0	17
Future Vol, veh/h	961	7	0	2173	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	981	7	0	2217	0	17

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 494
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 *709
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *709
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	709	-	-	-
HCM Lane V/C Ratio	0.024	-	-	-
HCM Control Delay (s)	10.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Cumulative PM
5: Lisa St/West Ranch Rd & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	212	751	1	13	2017	333	2	0	1	260	0	156
Future Volume (veh/h)	212	751	1	13	2017	333	2	0	1	260	0	156
Initial Q (Q _b), 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	216	766	1	13	2058	340	2	0	1	265	0	159
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	183	3624	5	20	3047	1140	4	0	63	219	0	254
Arrive On Green	0.03	0.23	0.23	0.02	1.00	1.00	0.00	0.00	0.04	0.12	0.00	0.16
Sat Flow, veh/h	1781	5266	7	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	216	495	272	13	2058	340	2	0	1	265	0	159
Grp Sat Flow(s), veh/h/ln	1781	1702	1869	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	15.4	17.7	17.7	1.1	0.0	0.0	0.2	0.0	0.1	18.4	0.0	14.0
Cycle Q Clear(g_c), s	15.4	17.7	17.7	1.1	0.0	0.0	0.2	0.0	0.1	18.4	0.0	14.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	183	2343	1286	20	3047	1140	4	0	63	219	0	254
V/C Ratio(X)	1.18	0.21	0.21	0.65	0.68	0.30	0.53	0.00	0.02	1.21	0.00	0.63
Avail Cap(c_a), veh/h	183	2343	1286	63	3047	1140	58	0	444	219	0	586
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.09	0.09	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.5	24.9	24.9	73.0	0.0	0.0	74.8	0.0	69.2	65.8	0.0	58.8
Incr Delay (d2), s/veh	123.8	0.2	0.4	3.3	0.1	0.1	82.2	0.0	0.1	130.3	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	13.7	8.1	9.0	0.5	0.0	0.0	0.2	0.0	0.0	16.3	0.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	196.2	25.1	25.3	76.3	0.1	0.1	157.0	0.0	69.3	196.1	0.0	61.3
LnGrp LOS	F	C	C	E	A	A	F	A	E	F	A	E
Approach Vol, veh/h		983			2411			3			424	
Approach Delay, s/veh		62.8			0.5			127.7			145.5	
Approach LOS		E			A			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	6.3	109.7	4.9	29.1	20.0	96.0	23.0	11.0				
Change Period (Y+R _c), s	4.6	6.5	4.6	5.0	4.6	6.5	4.6	5.0				
Max Green Setting (Gmax), s	5.3	63.6	4.9	55.5	15.4	53.5	18.4	42.0				
Max Q Clear Time (g_c+l1), s	3.1	19.7	2.2	16.0	17.4	2.0	20.4	2.1				
Green Ext Time (p_c), s	0.0	4.6	0.0	1.1	0.0	26.5	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			32.7									
HCM 6th LOS			C									

Existing + Cumulative PM
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗ ↗ ↗ ↗ ↗ ↗ ↗ ↗ ↗ ↗ ↗ ↗											
Traffic Volume (veh/h)	90	698	234	62	1802	1019	442	546	86	336	217	92
Future Volume (veh/h)	90	698	234	62	1802	1019	442	546	86	336	217	92
Initial Q (Q _b), 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	94	727	220	65	1877	955	460	569	81	350	226	87
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	69	888	495	747	2013	1083	479	406	58	404	305	114
Arrive On Green	0.03	0.12	0.12	0.42	0.57	0.57	0.14	0.13	0.13	0.12	0.12	0.12
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	3124	444	3456	2531	946
Grp Volume(v), veh/h	94	727	220	65	1877	955	460	323	327	350	157	156
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1791	1728	1777	1700
Q Serve(g_s), s	5.8	20.9	3.9	3.3	72.8	36.3	19.8	19.5	19.5	14.9	12.8	13.4
Cycle Q Clear(g_c), s	5.8	20.9	3.9	3.3	72.8	36.3	19.8	19.5	19.5	14.9	12.8	13.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.25	1.00		0.56
Lane Grp Cap(c), veh/h	69	888	495	747	2013	1083	479	231	233	404	214	205
V/C Ratio(X)	1.36	0.82	0.44	0.09	0.93	0.88	0.96	1.40	1.40	0.87	0.73	0.76
Avail Cap(c_a), veh/h	69	2124	879	747	2013	1083	479	231	233	813	403	385
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.87	0.87	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.1	64.0	22.3	26.3	29.9	8.6	64.2	65.3	65.3	65.1	63.6	63.9
Incr Delay (d2), s/veh	225.9	7.3	2.5	0.0	9.4	10.4	30.8	203.3	205.9	2.2	1.8	2.2
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/lr	6.9	9.7	4.8	1.4	30.6	12.1	10.8	21.9	22.2	6.7	5.9	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	299.0	71.3	24.8	26.3	39.3	19.0	95.0	268.6	271.2	67.3	65.5	66.2
LnGrp LOS	F	E	C	C	D	B	F	F	F	E	E	E
Approach Vol, veh/h	1041				2897			1110			663	
Approach Delay, s/veh	82.0				32.3			197.4			66.6	
Approach LOS	F				C			F			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	68.9	32.1	25.0	24.0	10.0	91.0	23.5	25.5				
Change Period (Y+Rc), s	6.0	* 6	* 4.2	* 6	* 4.2	6.0	* 6	* 6				
Max Green Setting (Gmax), s	* 62	* 21	* 34	* 5.8	69.0	* 35	* 20					
Max Q Clear Time (g_c+l ₁₃), s	22.9	21.8	15.4	7.8	74.8	16.9	21.5					
Green Ext Time (p _c), s	0.0	3.2	0.0	1.1	0.0	0.0	0.6	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			77.4									
HCM 6th LOS			E									
Notes												

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

APPENDIX K

HCM ANALYSIS WORKSHEETS – EXISTING + CUMULATIVE PROJECTS + PROJECT (EXISTING CONDITION)

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Existing + Cuml + Proj AM
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (veh/h)	41	2122	40	193	519	153	47	137	305	422	191	50
Future Volume (veh/h)	41	2122	40	193	519	153	47	137	305	422	191	50
Initial Q (Q _b), 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	45	2307	43	210	564	151	51	149	267	459	208	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	58	2449	46	357	2844	883	209	254	215	502	227	59
Arrive On Green	0.03	0.47	0.47	0.21	1.00	1.00	0.12	0.14	0.14	0.15	0.16	0.16
Sat Flow, veh/h	1781	5161	96	3456	5106	1585	1781	1870	1585	3456	1432	372
Grp Volume(v), veh/h	45	1520	830	210	564	151	51	149	267	459	0	262
Grp Sat Flow(s), veh/h/ln	1781	1702	1853	1728	1702	1585	1781	1870	1585	1728	0	1803
Q Serve(g_s), s	3.8	63.6	64.0	8.2	0.0	0.0	3.9	11.2	16.2	19.6	0.0	21.5
Cycle Q Clear(g_c), s	3.8	63.6	64.0	8.2	0.0	0.0	3.9	11.2	16.2	19.6	0.0	21.5
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	58	1615	879	357	2844	883	209	254	215	502	0	285
V/C Ratio(X)	0.78	0.94	0.94	0.59	0.20	0.17	0.24	0.59	1.24	0.91	0.00	0.92
Avail Cap(c_a), veh/h	110	1659	903	357	2844	883	242	299	254	525	0	317
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.98	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.0	37.4	37.5	56.6	0.0	0.0	60.1	60.9	41.0	63.2	0.0	62.2
Incr Delay (d2), s/veh	8.0	12.2	19.5	1.7	0.2	0.4	0.2	0.8	141.4	19.5	0.0	27.4
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	27.3	31.7	3.4	0.0	0.1	1.8	5.4	14.9	10.0	0.0	12.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	80.0	49.6	57.0	58.4	0.2	0.4	60.4	61.7	182.4	82.7	0.0	89.6
LnGrp LOS	F	D	E	E	A	A	E	E	F	F	A	F
Approach Vol, veh/h		2395			925			467			721	
Approach Delay, s/veh		52.8			13.4			130.6			85.2	
Approach LOS		D			B			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	21.5	77.2	22.6	28.7	9.1	89.6	26.0	25.4				
Change Period (Y+R _c), s	6.0	* 6	* 5	* 5	* 4.2	6.0	* 4.2	* 5				
Max Green Setting (Gmax), s	10.7	* 73	* 20	* 26	* 9.3	74.5	* 23	* 24				
Max Q Clear Time (g _{c+l1}), s	10.2	66.0	5.9	23.5	5.8	2.0	21.6	18.2				
Green Ext Time (p _c), s	0.0	5.2	0.0	0.3	0.0	2.4	0.2	0.6				
Intersection Summary												
HCM 6th Ctrl Delay				57.9								
HCM 6th LOS				E								
Notes												

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

HCM 6th Signalized Intersection Summary

N:\2608\Analysis\Synchro\7. Near-Term + Proj AM.syn



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑	↑↑↑	↑	↑	↓		↑	↑	
Traffic Volume (veh/h)	2	2796	108	215	763	4	91	0	266	0	0	8
Future Volume (veh/h)	2	2796	108	215	763	4	91	0	266	0	0	8
Initial Q (Q _b), 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	2	2974	115	229	812	4	97	0	283	0	0	8
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	5	2891	898	184	3405	1057	341	0	304	17	0	15
Arrive On Green	0.01	1.00	1.00	0.03	0.22	0.22	0.19	0.00	0.19	0.00	0.00	0.01
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	2	2974	115	229	812	4	97	0	283	0	0	8
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.2	84.9	0.0	15.5	19.6	0.3	7.0	0.0	26.4	0.0	0.0	0.8
Cycle Q Clear(g_c), s	0.2	84.9	0.0	15.5	19.6	0.3	7.0	0.0	26.4	0.0	0.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	5	2891	898	184	3405	1057	341	0	304	17	0	15
V/C Ratio(X)	0.42	1.03	0.13	1.24	0.24	0.00	0.28	0.00	0.93	0.00	0.00	0.53
Avail Cap(c_a), veh/h	59	2891	898	184	3405	1057	368	0	328	59	0	53
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.25	0.25	0.25	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	74.5	0.0	0.0	72.4	27.1	19.6	51.8	0.0	59.7	0.0	0.0	74.0
Incr Delay (d2), s/veh	5.4	17.1	0.1	147.1	0.2	0.0	0.2	0.0	30.4	0.0	0.0	10.5
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	4.6	0.0	14.9	9.0	0.1	3.2	0.0	13.2	0.0	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.9	17.1	0.1	219.5	27.3	19.6	52.0	0.0	90.1	0.0	0.0	84.5
LnGrp LOS	E	F	A	F	C	B	D	A	F	A	A	F
Approach Vol, veh/h	3091			1045			380			8		
Approach Delay, s/veh	16.5			69.4			80.4			84.5		
Approach LOS	B			E			F			F		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.0	90.9		33.4	4.9	106.0		5.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	5.5	79.1		* 31	5.0	89.6		5.0				
Max Q Clear Time (g_c+mt), s	5.5	86.9		28.4	2.2	21.6		2.8				
Green Ext Time (p_c), s	0.0	0.0		0.4	0.0	3.3		0.0				

Intersection Summary

HCM 6th Ctrl Delay 34.2

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 0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	2998	30	0	987	0	75
Future Vol, veh/h	2998	30	0	987	0	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	0
Mvmt Flow	3189	32	0	1050	0	80

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 1611
Stage 1	-	-	- - -
Stage 2	-	-	- - -
Critical Hdwy	-	-	- - 7.1
Critical Hdwy Stg 1	-	-	- - -
Critical Hdwy Stg 2	-	-	- - -
Follow-up Hdwy	-	-	- - 3.8
Pot Cap-1 Maneuver	-	- 0	- 0 *219
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *219
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	30.6
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	219	-	-	-
HCM Lane V/C Ratio	0.364	-	-	-
HCM Control Delay (s)	30.6	-	-	-
HCM Lane LOS	D	-	-	-
HCM 95th %tile Q(veh)	1.6	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
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Lane Configurations						
Traffic Vol, veh/h	3046	27	0	987	0	72
Future Vol, veh/h	3046	27	0	987	0	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	0
Mvmt Flow	3275	29	0	1061	0	77

Major/Minor	Major1	Major2	Minor1
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Conflicting Flow All	0	0	-	-	-	1652
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.8
Pot Cap-1 Maneuver	-	-	0	-	0	*219
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-	1
Mov Cap-1 Maneuver	-	-	-	-	-	*219
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
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HCM Control Delay, s	0	0	30.2
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
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Capacity (veh/h)	219	-	-	-
HCM Lane V/C Ratio	0.354	-	-	-
HCM Control Delay (s)	30.2	-	-	-
HCM Lane LOS	D	-	-	-
HCM 95th %tile Q(veh)	1.5	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Cuml + Proj AM
5: Lisa St/W Ranch St & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	169	2918	0	3	785	156	0	0	1	228	1	144
Future Volume (veh/h)	169	2918	0	3	785	156	0	0	1	228	1	144
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	182	3138	0	3	844	168	0	0	1	245	1	155
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	208	3657	0	6	3078	1118	1	0	63	183	2	273
Arrive On Green	0.08	0.48	0.00	0.01	1.00	1.00	0.00	0.00	0.04	0.10	0.17	0.17
Sat Flow, veh/h	1781	5274	0	1781	5106	1585	1781	0	1585	1781	10	1576
Grp Volume(v), veh/h	182	3138	0	3	844	168	0	0	1	245	0	156
Grp Sat Flow(s), veh/h/ln	1781	1702	0	1781	1702	1585	1781	0	1585	1781	0	1587
Q Serve(g_s), s	15.2	81.5	0.0	0.3	0.0	0.0	0.0	0.0	0.1	15.4	0.0	13.5
Cycle Q Clear(g_c), s	15.2	81.5	0.0	0.3	0.0	0.0	0.0	0.0	0.1	15.4	0.0	13.5
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	208	3657	0	6	3078	1118	1	0	63	183	0	275
V/C Ratio(X)	0.88	0.86	0.00	0.54	0.27	0.15	0.00	0.00	0.02	1.34	0.00	0.57
Avail Cap(c_a), veh/h	328	3657	0	70	3078	1118	81	0	454	183	0	546
HCM Platoon Ratio	0.67	0.67	0.67	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	0.00	0.85	0.85	0.85	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.1	32.3	0.0	74.4	0.0	0.0	0.0	0.0	69.2	67.3	0.0	56.9
Incr Delay (d2), s/veh	14.8	2.8	0.0	54.5	0.2	0.2	0.0	0.0	0.1	184.9	0.0	1.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	7.8	34.7	0.0	0.2	0.1	0.1	0.0	0.0	0.0	16.4	0.0	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	82.9	35.1	0.0	129.0	0.2	0.2	0.0	0.0	69.3	252.2	0.0	58.7
LnGrp LOS	F	D	A	F	A	A	A	A	E	F	A	E
Approach Vol, veh/h		3320			1015				1		401	
Approach Delay, s/veh		37.7			0.6				69.3		176.9	
Approach LOS		D			A				E		F	

Intersection Summary

HCM 6th Ctrl Delay	41.6
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

HCM 6th Signalized Intersection Summary

N:\2608\Analysis\Synchro\7. Near-Term + Proj AM.syn

Existing + Cuml + Proj AM
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗
Traffic Volume (veh/h)	131	2418	531	64	590	411	219	185	82	986	711	130
Future Volume (veh/h)	131	2418	531	64	590	411	219	185	82	986	711	130
Initial Q (Q _b), 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		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	135	2493	547	66	608	424	226	191	85	1016	733	134
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	2342	862	548	2456	1560	294	162	69	1014	789	144
Arrive On Green	0.17	0.92	0.92	0.31	0.69	0.69	0.09	0.07	0.07	0.29	0.26	0.26
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	2423	1038	3456	3000	548
Grp Volume(v), veh/h	135	2493	547	66	608	424	226	138	138	1016	434	433
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1684	1728	1777	1772
Q Serve(g_s), s	11.1	68.8	0.0	4.0	9.6	0.9	9.6	10.0	10.0	44.0	35.7	35.8
Cycle Q Clear(g_c), s	11.1	68.8	0.0	4.0	9.6	0.9	9.6	10.0	10.0	44.0	35.7	35.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.62	1.00		0.31
Lane Grp Cap(c), veh/h	155	2342	862	548	2456	1560	294	118	112	1014	467	466
V/C Ratio(X)	0.87	1.06	0.63	0.12	0.25	0.27	0.77	1.17	1.23	1.00	0.93	0.93
Avail Cap(c_a), veh/h	213	2342	862	548	2456	1560	294	118	112	1014	501	500
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.24	0.24	0.24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.1	6.2	2.5	37.3	8.6	0.0	67.2	70.0	70.0	53.0	53.9	53.9
Incr Delay (d2), s/veh	5.6	31.8	0.9	0.0	0.2	0.4	10.6	134.1	158.8	28.8	22.3	22.5
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	4.7	9.3	1.6	1.7	3.3	0.2	4.7	9.0	9.3	23.1	18.9	18.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	66.7	38.0	3.4	37.4	8.9	0.5	77.8	204.1	228.8	81.8	76.3	76.4
LnGrp LOS	E	F	A	D	A	A	E	F	F	F	E	E
Approach Vol, veh/h	3175			1098			502			1883		
Approach Delay, s/veh	33.3			7.3			154.0			79.3		
Approach LOS	C			A			F			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	52.8	74.8	18.8	45.4	17.3	110.3	48.2	16.0				
Change Period (Y+Rc), s	6.0	* 6	* 6	* 6	* 4.2	6.0	* 4.2	* 6				
Max Green Setting (Gmax), s	* 6.8	* 69	* 12	* 42	* 18	57.7	* 44	* 10				
Max Q Clear Time (g_c+l1), s	70.8	11.6	37.8	13.1	11.6	46.0	12.0					
Green Ext Time (p_c), s	0.0	0.0	0.0	1.7	0.1	3.0	0.0	0.0				

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.

HCM 6th Signalized Intersection Summary

N:\2608\Analysis\Synchro\7. Near-Term + Proj AM.syn

Existing + Cuml + Proj PM
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (veh/h)	44	724	45	193	1565	275	34	128	142	163	131	23
Future Volume (veh/h)	44	724	45	193	1565	275	34	128	142	163	131	23
Initial Q (Q _b), 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		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	45	739	46	197	1597	255	35	131	134	166	134	23
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	441	2627	163	241	1760	546	228	249	211	460	207	36
Arrive On Green	0.25	0.53	0.53	0.09	0.46	0.46	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1781	4915	305	3456	5106	1585	1781	1870	1585	3456	1555	267
Grp Volume(v), veh/h	45	511	274	197	1597	255	35	131	134	166	0	157
Grp Sat Flow(s), veh/h/ln	1781	1702	1816	1728	1702	1585	1781	1870	1585	1728	0	1822
Q Serve(g_s), s	2.9	12.3	12.4	8.4	43.5	11.5	2.6	9.8	12.0	6.6	0.0	12.3
Cycle Q Clear(g_c), s	2.9	12.3	12.4	8.4	43.5	11.5	2.6	9.8	12.0	6.6	0.0	12.3
Prop In Lane	1.00		0.17	1.00		1.00	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	441	1820	970	241	1760	546	228	249	211	460	0	243
V/C Ratio(X)	0.10	0.28	0.28	0.82	0.91	0.47	0.15	0.53	0.63	0.36	0.00	0.65
Avail Cap(c_a), veh/h	441	1820	970	272	1998	620	241	524	444	479	0	516
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.84	0.84	0.84	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.6	19.1	19.1	67.1	38.4	14.9	58.2	60.6	61.5	59.2	0.0	61.6
Incr Delay (d2), s/veh	0.0	0.4	0.7	12.2	7.2	2.4	0.1	0.6	1.2	0.2	0.0	1.1
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	1.3	4.7	5.2	3.9	16.9	4.3	1.2	4.7	4.9	2.9	0.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.6	19.5	19.9	79.3	45.6	17.3	58.3	61.2	62.7	59.4	0.0	62.7
LnGrp LOS	D	B	B	E	D	B	E	E	E	A	E	
Approach Vol, veh/h		830			2049			300			323	
Approach Delay, s/veh		20.9			45.3			61.5			61.0	
Approach LOS		C			D			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	14.6	86.2	24.2	25.0	43.1	57.7	24.2	25.0				
Change Period (Y+R _c), s	* 4.2	6.0	* 5	* 5	6.0	* 6	* 4.2	* 5				
Max Green Setting (Gmax), s	* 12	56.0	* 20	* 43	9.1	* 59	* 21	* 42				
Max Q Clear Time (g_c+l1), s	10.4	14.4	4.6	14.3	4.9	45.5	8.6	14.0				
Green Ext Time (p_c), s	0.0	2.8	0.0	0.6	0.0	6.2	0.2	0.7				

Intersection Summary

HCM 6th Ctrl Delay 42.4
HCM 6th LOS D

Notes

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙											
Traffic Volume (veh/h)	0	933	75	252	2038	0	49	0	105	0	0	2
Future Volume (veh/h)	0	933	75	252	2038	0	49	0	105	0	0	2
Initial Q (Q _b), 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	982	79	265	2145	0	52	0	111	0	0	2
Peak Hour Factor	0.95	0.95	0.95	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	2	2	2	2
Cap, veh/h	1	3185	989	283	4151	1288	152	0	135	5	0	4
Arrive On Green	0.00	0.21	0.21	0.32	1.00	0.00	0.09	0.00	0.09	0.00	0.00	0.00
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	0	982	79	265	2145	0	52	0	111	0	0	2
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.0	24.5	6.0	21.7	0.0	0.0	4.1	0.0	10.3	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.0	24.5	6.0	21.7	0.0	0.0	4.1	0.0	10.3	0.0	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1	3185	989	283	4151	1288	152	0	135	5	0	4
V/C Ratio(X)	0.00	0.31	0.08	0.94	0.52	0.00	0.34	0.00	0.82	0.00	0.00	0.47
Avail Cap(c_a), veh/h	59	3185	989	362	4151	1288	384	0	341	69	0	61
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	0.95	0.95	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	32.1	24.8	50.4	0.0	0.0	64.7	0.0	67.5	0.0	0.0	74.7
Incr Delay (d2), s/veh	0.0	0.2	0.2	25.0	0.5	0.0	0.5	0.0	4.7	0.0	0.0	27.5
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	0.0	11.2	2.2	9.7	0.2	0.0	1.9	0.0	4.4	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	32.4	25.0	75.4	0.5	0.0	65.2	0.0	72.2	0.0	0.0	102.2
LnGrp LOS	A	C	C	E	A	A	E	A	E	A	A	F
Approach Vol, veh/h		1061			2410			163			2	
Approach Delay, s/veh		31.8			8.7			69.9		102.2		
Approach LOS		C			A			E		F		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	28.4	99.6		17.5	0.0	127.9		4.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	30.5	62.0		* 32	5.0	87.5		5.8				
Max Q Clear Time (g_c+D3), s	26.5			12.3	0.0	2.0		2.2				
Green Ext Time (p_c), s	0.2	4.3		0.4	0.0	15.1		0.0				

Intersection Summary

HCM 6th Ctrl Delay 18.2

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 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
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Lane Configurations						
Traffic Vol, veh/h	1014	92	0	2264	0	41
Future Vol, veh/h	1014	92	0	2264	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
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	1045	95	0	2334	0	42

Major/Minor	Major1	Major2	Minor1
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Conflicting Flow All	0	0	-	-	-	570
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	*692
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-	1
Mov Cap-1 Maneuver	-	-	-	-	-	*692
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
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HCM Control Delay, s	0	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
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Capacity (veh/h)	692	-	-	-
HCM Lane V/C Ratio	0.061	-	-	-
HCM Control Delay (s)	10.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	983	72	0	2264	0	39
Future Vol, veh/h	983	72	0	2264	0	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1003	73	0	2310	0	40

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 538
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 *692
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *692
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	692	-	-	-
HCM Lane V/C Ratio	0.058	-	-	-
HCM Control Delay (s)	10.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Cuml + Proj PM
5: Lisa St/West Ranch Rd & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↜ ↞ ↞ ↞ ↙ ↘			↑ ↗ ↘ ↙ ↖ ↛ ↜ ↞ ↞ ↞ ↙ ↘		↑ ↗ ↘ ↙ ↖ ↛ ↜ ↞ ↞ ↞ ↙ ↘	↑ ↗ ↘ ↙ ↖ ↛ ↜ ↞ ↞ ↞ ↙ ↘	↑ ↗ ↘ ↙ ↖ ↛ ↜ ↞ ↞ ↞ ↙ ↘	↑ ↗ ↘ ↙ ↖ ↛ ↜ ↞ ↞ ↞ ↙ ↘	↑ ↗ ↘ ↙ ↖ ↛ ↜ ↞ ↞ ↞ ↙ ↘	↑ ↗ ↘ ↙ ↖ ↛ ↜ ↞ ↞ ↞ ↙ ↘	↑ ↗ ↘ ↙ ↖ ↛ ↜ ↞ ↞ ↞ ↙ ↘
Traffic Volume (veh/h)	232	775	1	13	2088	333	2	0	1	260	0	156
Future Volume (veh/h)	232	775	1	13	2088	333	2	0	1	260	0	156
Initial Q (Q _b), 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	237	791	1	13	2131	340	2	0	1	265	0	159
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	183	3660	5	20	3081	1140	4	0	63	207	0	244
Arrive On Green	0.03	0.23	0.23	0.02	1.00	1.00	0.00	0.00	0.04	0.12	0.00	0.15
Sat Flow, veh/h	1781	5267	7	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	237	511	281	13	2131	340	2	0	1	265	0	159
Grp Sat Flow(s), veh/h/ln	1781	1702	1869	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	15.4	18.3	18.3	1.1	0.0	0.0	0.2	0.0	0.1	17.4	0.0	14.2
Cycle Q Clear(g_c), s	15.4	18.3	18.3	1.1	0.0	0.0	0.2	0.0	0.1	17.4	0.0	14.2
Prop In Lane	1.00			1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	183	2365	1299	20	3081	1140	4	0	63	207	0	244
V/C Ratio(X)	1.30	0.22	0.22	0.65	0.69	0.30	0.53	0.00	0.02	1.28	0.00	0.65
Avail Cap(c_a), veh/h	183	2365	1299	63	3081	1140	58	0	444	207	0	576
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.09	0.09	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.5	24.7	24.7	73.0	0.0	0.0	74.8	0.0	69.2	66.3	0.0	59.7
Incr Delay (d2), s/veh	167.4	0.2	0.4	3.3	0.1	0.1	82.2	0.0	0.1	158.8	0.0	2.9
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	15.9	8.4	9.2	0.5	0.0	0.0	0.2	0.0	0.0	17.0	0.0	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	239.9	24.9	25.1	76.3	0.1	0.1	157.0	0.0	69.3	225.1	0.0	62.6
LnGrp LOS	F	C	C	E	A	A	F	A	E	F	A	E
Approach Vol, veh/h	1029				2484			3			424	
Approach Delay, s/veh	74.5				0.5			127.7			164.2	
Approach LOS	E				A			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	6.3	110.7	4.9	28.1	20.0	97.0	22.0	11.0				
Change Period (Y+R _c), s	4.6	6.5	4.6	5.0	4.6	6.5	4.6	5.0				
Max Green Setting (Gmax), s	5.3	64.6	4.9	54.5	15.4	54.5	17.4	42.0				
Max Q Clear Time (g_c+l1), s	3.1	20.3	2.2	16.2	17.4	2.0	19.4	2.1				
Green Ext Time (p_c), s	0.0	4.8	0.0	1.1	0.0	28.3	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				37.5								
HCM 6th LOS				D								

Existing + Cuml + Proj PM
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↗ ↘											
Traffic Volume (veh/h)	92	713	241	62	1848	1019	461	546	86	336	217	98
Future Volume (veh/h)	92	713	241	62	1848	1019	461	546	86	336	217	98
Initial Q (Q _b), 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	96	743	251	65	1925	952	480	569	80	350	226	92
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	69	908	488	729	1992	1074	449	426	60	404	336	132
Arrive On Green	0.03	0.12	0.12	0.41	0.56	0.56	0.13	0.14	0.14	0.12	0.13	0.13
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	3129	439	3456	2488	982
Grp Volume(v), veh/h	96	743	251	65	1925	952	480	322	327	350	159	159
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1791	1728	1777	1694
Q Serve(g_s), s	5.8	21.3	5.0	3.4	77.9	37.2	19.5	20.4	20.4	14.9	12.8	13.4
Cycle Q Clear(g_c), s	5.8	21.3	5.0	3.4	77.9	37.2	19.5	20.4	20.4	14.9	12.8	13.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.24	1.00		0.58
Lane Grp Cap(c), veh/h	69	908	488	729	1992	1074	449	242	244	404	240	228
V/C Ratio(X)	1.39	0.82	0.51	0.09	0.97	0.89	1.07	1.33	1.34	0.87	0.66	0.69
Avail Cap(c_a), veh/h	69	2192	887	729	1992	1074	449	242	244	746	394	376
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.1	63.7	22.5	27.2	31.6	9.1	65.2	64.8	64.8	65.1	61.7	61.9
Incr Delay (d2), s/veh	236.7	7.1	3.3	0.0	13.7	10.8	61.9	175.8	178.2	2.2	1.2	1.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	7.1	9.9	5.6	1.4	33.8	12.7	12.5	21.1	21.4	6.7	5.9	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	309.8	70.8	25.8	27.2	45.3	19.9	127.2	240.6	243.0	67.3	62.9	63.4
LnGrp LOS	F	E	C	C	D	B	F	F	F	E	E	E
Approach Vol, veh/h	1090				2942			1129			668	
Approach Delay, s/veh	81.5				36.7			193.1			65.3	
Approach LOS	F				D			F			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	67.4	32.7	23.7	26.2	10.0	90.1	23.5	26.4				
Change Period (Y+Rc), s	6.0	* 6	* 4.2	* 6	* 4.2	6.0	* 6	* 6				
Max Green Setting (Gmax), s	* 64	* 20	* 33	* 5.8	71.0	* 32	* 20					
Max Q Clear Time (g_c+I), s	23.3	21.5	15.4	7.8	79.9	16.9	22.4					
Green Ext Time (p_c), s	0.0	3.4	0.0	1.1	0.0	0.0	0.6	0.0				

Intersection Summary

HCM 6th Ctrl Delay 78.6
HCM 6th LOS E

Notes

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

HCM 6th Signalized Intersection Summary

N:\2608\Analysis\Synchro\8. Near-Term + Proj PM.syn

APPENDIX L
HCM ANALYSIS WORKSHEETS – EXISTING + CUMULATIVE PROJECTS
(W/COLLEGE BOULEVARD)

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Existing + Cumulative AM (College Ext.)
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑↑	↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (veh/h)	41	2126	40	185	528	147	47	137	303	420	191	50
Future Volume (veh/h)	41	2126	40	185	528	147	47	137	303	420	191	50
Initial Q (Q _b), 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	45	2311	43	201	574	146	51	149	264	457	208	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	58	2441	45	359	2841	882	209	256	217	501	228	59
Arrive On Green	0.03	0.47	0.47	0.21	1.00	1.00	0.12	0.14	0.14	0.15	0.16	0.16
Sat Flow, veh/h	1781	5161	96	3456	5106	1585	1781	1870	1585	3456	1432	372
Grp Volume(v), veh/h	45	1522	832	201	574	146	51	149	264	457	0	262
Grp Sat Flow(s), veh/h/ln	1781	1702	1853	1728	1702	1585	1781	1870	1585	1728	0	1803
Q Serve(g_s), s	3.8	64.0	64.4	7.8	0.0	0.0	3.9	11.2	16.3	19.5	0.0	21.4
Cycle Q Clear(g_c), s	3.8	64.0	64.4	7.8	0.0	0.0	3.9	11.2	16.3	19.5	0.0	21.4
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	58	1610	877	359	2841	882	209	256	217	501	0	287
V/C Ratio(X)	0.78	0.95	0.95	0.56	0.20	0.17	0.24	0.58	1.22	0.91	0.00	0.91
Avail Cap(c_a), veh/h	110	1645	896	359	2841	882	242	312	264	534	0	334
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.98	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.0	37.7	37.8	56.3	0.0	0.0	60.1	60.7	40.9	63.2	0.0	62.1
Incr Delay (d2), s/veh	8.0	12.8	20.3	1.2	0.2	0.4	0.2	0.8	132.8	18.6	0.0	24.6
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	1.8	27.6	32.0	3.2	0.0	0.1	1.8	5.4	14.4	9.9	0.0	11.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	80.0	50.4	58.0	57.5	0.2	0.4	60.4	61.5	173.7	81.8	0.0	86.7
LnGrp LOS	F	D	E	E	A	A	E	E	F	F	A	F
Approach Vol, veh/h		2399			921			464			719	
Approach Delay, s/veh		53.6			12.7			125.2			83.6	
Approach LOS		D			B			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	21.6	76.9	22.6	28.8	9.1	89.5	26.0	25.5				
Change Period (Y+R _c), s	6.0	* 6	* 5	* 5	* 4.2	6.0	* 4.2	* 5				
Max Green Setting (Gmax), s	9.9	* 73	* 20	* 28	* 9.3	73.1	* 23	* 25				
Max Q Clear Time (g _{c+l1}), s	9.8	66.4	5.9	23.4	5.8	2.0	21.5	18.3				
Green Ext Time (p _c), s	0.0	4.6	0.0	0.4	0.0	2.4	0.2	0.6				
Intersection Summary												
HCM 6th Ctrl Delay			57.4									
HCM 6th LOS			E									
Notes												

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↗	↑ ↗ ↗	↗	↗ ↗ ↗	↗ ↗ ↗	↗	↗	↖ ↖	↖	↖ ↖	↖ ↖	↖
Traffic Volume (veh/h)	2	2798	108	186	760	4	91	0	265	0	0	8
Future Volume (veh/h)	2	2798	108	186	760	4	91	0	265	0	0	8
Initial Q (Q _b), 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	2	2977	115	198	809	4	97	0	282	0	0	8
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	5	2894	898	184	3408	1058	340	0	303	17	0	15
Arrive On Green	0.01	1.00	1.00	0.03	0.22	0.22	0.19	0.00	0.19	0.00	0.00	0.01
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	2	2977	115	198	809	4	97	0	282	0	0	8
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.2	0.0	0.0	15.5	19.6	0.3	7.0	0.0	26.3	0.0	0.0	0.8
Cycle Q Clear(g_c), s	0.2	0.0	0.0	15.5	19.6	0.3	7.0	0.0	26.3	0.0	0.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	5	2894	898	184	3408	1058	340	0	303	17	0	15
V/C Ratio(X)	0.42	1.03	0.13	1.08	0.24	0.00	0.29	0.00	0.93	0.00	0.00	0.53
Avail Cap(c_a), veh/h	59	2894	898	184	3408	1058	368	0	328	59	0	53
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.26	0.26	0.26	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	74.5	0.0	0.0	72.4	27.1	19.6	51.9	0.0	59.7	0.0	0.0	74.0
Incr Delay (d2), s/veh	5.6	17.2	0.1	87.9	0.2	0.0	0.2	0.0	30.3	0.0	0.0	10.5
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	0.1	4.6	0.0	11.9	8.9	0.1	3.2	0.0	13.1	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	80.1	17.2	0.1	160.4	27.2	19.6	52.1	0.0	90.0	0.0	0.0	84.5
LnGrp LOS	F	F	A	F	C	B	D	A	F	A	A	F
Approach Vol, veh/h		3094			1011			379			8	
Approach Delay, s/veh		16.6			53.3			80.3			84.5	
Approach LOS		B			D			F			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.0	91.0		33.4	4.9	106.1		5.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	5.5	79.1		* 31	5.0	89.6		5.0				
Max Q Clear Time (g_c+mt), s	2.0			28.3	2.2	21.6		2.8				
Green Ext Time (p_c), s	0.0	35.7		0.4	0.0	3.3		0.0				

Intersection Summary

HCM 6th Ctrl Delay 30.4

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	EBT	EBR	WBL	WBT	NBL	NBR
----------	-----	-----	-----	-----	-----	-----

Lane Configurations						
Traffic Vol, veh/h	2995	9	0	955	0	7
Future Vol, veh/h	2995	9	0	955	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3220	10	0	1027	0	8

Major/Minor	Major1	Major2	Minor1
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Conflicting Flow All	0	0	-	-	-	1615
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	*212
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-	1
Mov Cap-1 Maneuver	-	-	-	-	-	*212
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
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HCM Control Delay, s	0	0	22.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
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Capacity (veh/h)	212	-	-	-
HCM Lane V/C Ratio	0.036	-	-	-
HCM Control Delay (s)	22.6	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
----------	-----	-----	-----	-----	-----	-----

Lane Configurations						
Traffic Vol, veh/h	2997	5	0	955	0	5
Future Vol, veh/h	2997	5	0	955	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3293	5	0	1049	0	5

Major/Minor	Major1	Major2	Minor1
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Conflicting Flow All	0	0	-	-	-	1649
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	*212
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-	1
Mov Cap-1 Maneuver	-	-	-	-	-	*212
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
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HCM Control Delay, s	0	0	22.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
-----------------------	-------	-----	-----	-----

Capacity (veh/h)	212	-	-	-
HCM Lane V/C Ratio	0.026	-	-	-
HCM Control Delay (s)	22.4	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Cumulative AM (College Ext.)
5: Lisa St/W Ranch St & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	108	2863	0	3	814	156	0	0	1	228	1	144
Future Volume (veh/h)	108	2863	0	3	814	156	0	0	1	228	1	144
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	116	3078	0	3	875	168	0	0	1	245	1	155
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	139	3657	0	6	3274	1179	1	0	63	183	2	273
Arrive On Green	0.05	0.48	0.00	0.01	1.00	1.00	0.00	0.00	0.04	0.10	0.17	0.17
Sat Flow, veh/h	1781	5274	0	1781	5106	1585	1781	0	1585	1781	10	1576
Grp Volume(v), veh/h	116	3078	0	3	875	168	0	0	1	245	0	156
Grp Sat Flow(s), veh/h/ln	1781	1702	0	1781	1702	1585	1781	0	1585	1781	0	1587
Q Serve(g_s), s	9.7	78.9	0.0	0.3	0.0	0.0	0.0	0.0	0.1	15.4	0.0	13.5
Cycle Q Clear(g_c), s	9.7	78.9	0.0	0.3	0.0	0.0	0.0	0.0	0.1	15.4	0.0	13.5
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	139	3657	0	6	3274	1179	1	0	63	183	0	275
V/C Ratio(X)	0.83	0.84	0.00	0.54	0.27	0.14	0.00	0.00	0.02	1.34	0.00	0.57
Avail Cap(c_a), veh/h	235	3657	0	70	3274	1179	81	0	454	183	0	546
HCM Platoon Ratio	0.67	0.67	0.67	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	0.00	0.84	0.84	0.84	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	70.1	31.6	0.0	74.4	0.0	0.0	0.0	0.0	69.2	67.3	0.0	56.9
Incr Delay (d2), s/veh	12.0	2.5	0.0	54.0	0.2	0.2	0.0	0.0	0.1	184.9	0.0	1.8
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	4.9	33.6	0.0	0.2	0.1	0.1	0.0	0.0	0.0	16.4	0.0	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	82.1	34.1	0.0	128.4	0.2	0.2	0.0	0.0	69.3	252.2	0.0	58.7
LnGrp LOS	F	C	A	F	A	A	A	A	E	F	A	E
Approach Vol, veh/h		3194			1046				1		401	
Approach Delay, s/veh		35.9			0.5				69.3		176.9	
Approach LOS		D			A				E		F	

Intersection Summary

HCM 6th Ctrl Delay	40.1
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Existing + Cumulative AM (College Ext.)
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑	↑
Traffic Volume (veh/h)	124	2390	511	91	627	165	213	185	92	397	711	128
Future Volume (veh/h)	124	2390	511	91	627	165	213	185	92	397	711	128
Initial Q (Q _b), 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	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	128	2464	527	94	646	170	220	191	95	409	733	132
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	148	2429	872	658	2750	1438	258	452	216	460	722	130
Arrive On Green	0.17	0.95	0.95	0.37	0.77	0.77	0.07	0.19	0.19	0.13	0.24	0.24
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	2333	1113	3456	3008	542
Grp Volume(v), veh/h	128	2464	527	94	646	170	220	144	142	409	433	432
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1670	1728	1777	1773
Q Serve(g_s), s	10.5	71.4	0.0	5.3	7.5	1.7	9.4	10.6	11.3	17.5	36.0	36.0
Cycle Q Clear(g_c), s	10.5	71.4	0.0	5.3	7.5	1.7	9.4	10.6	11.3	17.5	36.0	36.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.67	1.00		0.31
Lane Grp Cap(c), veh/h	148	2429	872	658	2750	1438	258	344	323	460	426	425
V/C Ratio(X)	0.86	1.01	0.60	0.14	0.23	0.12	0.85	0.42	0.44	0.89	1.02	1.02
Avail Cap(c_a), veh/h	226	2505	896	658	2750	1438	258	344	323	592	426	425
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.27	0.27	0.27	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.7	3.6	1.5	31.5	4.7	0.7	68.6	53.0	53.3	63.9	57.0	57.0
Incr Delay (d2), s/veh	3.9	13.3	0.8	0.0	0.2	0.2	22.1	0.3	0.4	11.2	47.4	47.6
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	4.4	1.0	2.2	2.2	0.3	5.0	4.8	4.8	8.4	21.8	21.7	
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	65.6	17.0	2.3	31.5	4.9	0.9	90.7	53.3	53.7	75.1	104.4	104.6
LnGrp LOS	E	F	A	C	A	A	F	D	D	E	F	F
Approach Vol, veh/h	3119				910			506			1274	
Approach Delay, s/veh	16.5				6.9			69.7			95.1	
Approach LOS	B				A			E			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	62.2	78.5	17.2	42.0	16.7	124.0	24.1	35.1				
Change Period (Y+Rc), s	6.0	* 6	* 6	* 6	* 4.2	6.0	* 4.2	* 6				
Max Green Setting (Gmax), s	* 8.8	* 74	* 11	* 36	* 19	63.4	* 26	* 22				
Max Q Clear Time (g_c+I1), s	73.4	11.4	38.0	12.5	9.5	19.5	13.3					
Green Ext Time (p_c), s	0.0	0.2	0.0	0.0	0.1	2.7	0.5	0.7				

Intersection Summary

HCM 6th Ctrl Delay 36.9

HCM 6th LOS D

Notes

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

HCM 6th Signalized Intersection Summary

N:\2608\Analysis\Synchro\9. Near-Term AM (College).syn

Existing + Cumulative PM (College Ext.)
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↓	
Traffic Volume (veh/h)	44	741	45	193	1577	274	34	128	136	159	131	23
Future Volume (veh/h)	44	741	45	193	1577	274	34	128	136	159	131	23
Initial Q (Q _b), 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	45	756	46	197	1609	254	35	131	130	162	134	23
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	437	2631	159	241	1770	550	228	249	211	460	207	36
Arrive On Green	0.25	0.53	0.53	0.09	0.46	0.46	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1781	4922	298	3456	5106	1585	1781	1870	1585	3456	1555	267
Grp Volume(v), veh/h	45	522	280	197	1609	254	35	131	130	162	0	157
Grp Sat Flow(s), veh/h/ln	1781	1702	1817	1728	1702	1585	1781	1870	1585	1728	0	1822
Q Serve(g_s), s	2.9	12.6	12.7	8.4	43.8	11.4	2.6	9.8	11.6	6.4	0.0	12.3
Cycle Q Clear(g_c), s	2.9	12.6	12.7	8.4	43.8	11.4	2.6	9.8	11.6	6.4	0.0	12.3
Prop In Lane	1.00		0.16	1.00		1.00	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	437	1820	971	241	1770	550	228	249	211	460	0	243
V/C Ratio(X)	0.10	0.29	0.29	0.82	0.91	0.46	0.15	0.53	0.62	0.35	0.00	0.65
Avail Cap(c_a), veh/h	437	1820	971	272	1998	620	241	524	444	479	0	516
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.84	0.84	0.84	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.8	19.2	19.2	67.1	38.2	14.8	58.2	60.6	61.4	59.1	0.0	61.6
Incr Delay (d2), s/veh	0.0	0.4	0.7	12.2	7.2	2.3	0.1	0.6	1.1	0.2	0.0	1.1
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	1.3	4.8	5.3	3.9	17.0	4.2	1.2	4.7	4.8	2.8	0.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.8	19.6	20.0	79.3	45.5	17.1	58.3	61.2	62.5	59.3	0.0	62.7
LnGrp LOS	D	B	B	E	D	B	E	E	E	A	E	
Approach Vol, veh/h		847			2060			296			319	
Approach Delay, s/veh		21.0			45.2			61.4			61.0	
Approach LOS		C			D			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	14.6	86.2	24.2	25.0	42.8	58.0	24.2	25.0				
Change Period (Y+R _c), s	* 4.2	6.0	* 5	* 5	6.0	* 6	* 4.2	* 5				
Max Green Setting (Gmax), s	* 12	56.0	* 20	* 43	9.1	* 59	* 21	* 42				
Max Q Clear Time (g _{c+l1}), s	10.4	14.7	4.6	14.3	4.9	45.8	8.4	13.6				
Green Ext Time (p _c), s	0.0	2.9	0.0	0.6	0.0	6.2	0.2	0.7				

Intersection Summary

HCM 6th Ctrl Delay 42.2
HCM 6th LOS D

Notes

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙											
Traffic Volume (veh/h)	0	942	75	180	2049	0	49	0	102	0	0	2
Future Volume (veh/h)	0	942	75	180	2049	0	49	0	102	0	0	2
Initial Q (Q _b), 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	992	79	189	2157	0	52	0	107	0	0	2
Peak Hour Factor	0.95	0.95	0.95	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	2	2	2	2
Cap, veh/h	1	3411	1059	209	4164	1293	147	0	131	5	0	4
Arrive On Green	0.00	0.22	0.22	0.24	1.00	0.00	0.08	0.00	0.08	0.00	0.00	0.00
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	0	992	79	189	2157	0	52	0	107	0	0	2
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.0	24.3	5.9	15.5	0.0	0.0	4.1	0.0	10.0	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.0	24.3	5.9	15.5	0.0	0.0	4.1	0.0	10.0	0.0	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1	3411	1059	209	4164	1293	147	0	131	5	0	4
V/C Ratio(X)	0.00	0.29	0.07	0.90	0.52	0.00	0.35	0.00	0.82	0.00	0.00	0.47
Avail Cap(c_a), veh/h	59	3411	1059	362	4164	1293	384	0	341	69	0	61
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	0.95	0.95	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	28.9	21.7	56.5	0.0	0.0	65.0	0.0	67.7	0.0	0.0	74.7
Incr Delay (d2), s/veh	0.0	0.2	0.1	8.1	0.5	0.0	0.5	0.0	4.7	0.0	0.0	27.5
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	0.0	11.1	2.1	6.4	0.2	0.0	1.9	0.0	4.2	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	29.1	21.9	64.7	0.5	0.0	65.6	0.0	72.4	0.0	0.0	102.2
LnGrp LOS	A	C	C	E	A	A	E	A	E	A	A	F
Approach Vol, veh/h		1071			2346			159			2	
Approach Delay, s/veh		28.5			5.6			70.2			102.2	
Approach LOS		C			A			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	2.1	106.2		17.1	0.0	128.3		4.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	30.5	62.0		* 32	5.0	87.5		5.8				
Max Q Clear Time (g_c+mt), s	26.3			12.0	0.0	2.0		2.2				
Green Ext Time (p_c), s	0.2	4.3		0.4	0.0	15.3		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			15.4									
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 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	1013	28	0	2203	0	19
Future Vol, veh/h	1013	28	0	2203	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
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	1044	29	0	2271	0	20

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 537
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 *692
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *692
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	692	-	-	-
HCM Lane V/C Ratio	0.028	-	-	-
HCM Control Delay (s)	10.4	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	1025	7	0	2203	0	17
Future Vol, veh/h	1025	7	0	2203	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1046	7	0	2248	0	17

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 527
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 *692
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *692
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	692	-	-	-
HCM Lane V/C Ratio	0.025	-	-	-
HCM Control Delay (s)	10.3	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Cumulative PM (College Ext.)
5: Lisa St/West Ranch Rd & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑	↑	↑	↑↑↑	↑	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	212	815	1	13	2047	333	2	0	1	260	0	156
Future Volume (veh/h)	212	815	1	13	2047	333	2	0	1	260	0	156
Initial Q (Q _b), 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	216	832	1	13	2089	340	2	0	1	265	0	159
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	183	3625	4	20	3047	1140	4	0	63	219	0	254
Arrive On Green	0.03	0.23	0.23	0.02	1.00	1.00	0.00	0.00	0.04	0.12	0.00	0.16
Sat Flow, veh/h	1781	5267	6	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	216	538	295	13	2089	340	2	0	1	265	0	159
Grp Sat Flow(s), veh/h/ln	1781	1702	1869	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	15.4	19.3	19.3	1.1	0.0	0.0	0.2	0.0	0.1	18.4	0.0	14.0
Cycle Q Clear(g_c), s	15.4	19.3	19.3	1.1	0.0	0.0	0.2	0.0	0.1	18.4	0.0	14.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	183	2343	1286	20	3047	1140	4	0	63	219	0	254
V/C Ratio(X)	1.18	0.23	0.23	0.65	0.69	0.30	0.53	0.00	0.02	1.21	0.00	0.63
Avail Cap(c_a), veh/h	183	2343	1286	63	3047	1140	58	0	444	219	0	586
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.17	0.17	0.17	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.5	25.5	25.5	73.0	0.0	0.0	74.8	0.0	69.2	65.8	0.0	58.8
Incr Delay (d2), s/veh	123.8	0.2	0.4	6.1	0.2	0.1	82.2	0.0	0.1	130.3	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	13.7	8.8	9.8	0.5	0.1	0.0	0.2	0.0	0.0	16.3	0.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	196.2	25.8	26.0	79.1	0.2	0.1	157.0	0.0	69.3	196.1	0.0	61.3
LnGrp LOS	F	C	C	E	A	A	F	A	E	F	A	E
Approach Vol, veh/h	1049			2442			3			424		
Approach Delay, s/veh	60.9			0.6			127.7			145.5		
Approach LOS	E			A			F			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	6.3	109.7	4.9	29.1	20.0	96.0	23.0	11.0				
Change Period (Y+R _c), s	4.6	6.5	4.6	5.0	4.6	6.5	4.6	5.0				
Max Green Setting (Gmax), s	5.3	63.6	4.9	55.5	15.4	53.5	18.4	42.0				
Max Q Clear Time (g_c+l1), s	3.1	21.3	2.2	16.0	17.4	2.0	20.4	2.1				
Green Ext Time (p_c), s	0.0	5.1	0.0	1.1	0.0	27.2	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				32.5								
HCM 6th LOS				C								

Existing + Cumulative PM (College Ext.)
6: Cannon Rd & El Camino Real

Marja Acres
01/16/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗
Traffic Volume (veh/h)	90	762	234	78	1832	410	442	546	120	136	217	92
Future Volume (veh/h)	90	762	234	78	1832	410	442	546	120	136	217	92
Initial Q (Q _b), 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		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	94	794	244	81	1908	427	460	569	113	142	226	86
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	107	965	524	760	2018	985	488	572	113	186	299	110
Arrive On Green	0.04	0.13	0.13	0.43	0.57	0.57	0.14	0.19	0.19	0.05	0.12	0.12
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	2956	585	3456	2540	938
Grp Volume(v), veh/h	94	794	244	81	1908	427	460	341	341	142	156	156
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1765	1728	1777	1701
Q Serve(g_s), s	7.9	22.7	4.4	4.1	75.2	9.7	19.8	28.8	28.9	6.1	12.7	13.4
Cycle Q Clear(g_c), s	7.9	22.7	4.4	4.1	75.2	9.7	19.8	28.8	28.9	6.1	12.7	13.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.33	1.00		0.55
Lane Grp Cap(c), veh/h	107	965	524	760	2018	985	488	344	341	186	209	200
V/C Ratio(X)	0.88	0.82	0.47	0.11	0.95	0.43	0.94	0.99	1.00	0.76	0.75	0.78
Avail Cap(c_a), veh/h	107	2689	1059	760	2018	985	488	344	341	189	209	200
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.87	0.87	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.4	63.1	23.5	25.8	30.2	8.0	63.8	60.4	60.5	70.0	64.0	64.3
Incr Delay (d2), s/veh	45.3	6.9	2.6	0.0	10.8	1.4	26.5	46.7	48.3	15.0	12.2	16.1
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	4.9	10.6	5.6	1.7	31.9	3.0	10.5	17.4	17.5	3.1	6.5	6.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	70.0	26.1	25.8	41.0	9.4	90.3	107.1	108.8	85.0	76.2	80.4	
LnGrp LOS	F	E	C	C	D	A	F	F	F	E	F	
Approach Vol, veh/h	1132			2416			1142			454		
Approach Delay, s/veh	64.4			34.9			100.8			80.4		
Approach LOS	E			C			F			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	34.4	25.4	23.7	13.2	91.2	14.1	35.0				
Change Period (Y+Rc), s	6.0	* 6	* 4.2	* 6	* 4.2	6.0	* 6	* 6				
Max Green Setting (Gmax), s	* 79	* 21	* 16	* 9	83.4	* 8.2	* 29					
Max Q Clear Time (g_c+l1), s	24.7	21.8	15.4	9.9	77.2	8.1	30.9					
Green Ext Time (p_c), s	0.0	3.6	0.0	0.1	0.0	4.6	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 60.0
HCM 6th LOS E

Notes

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

APPENDIX M

HCM ANALYSIS WORKSHEETS – EXISTING + CUMULATIVE PROJECTS + PROJECT (W/COLLEGE BOULEVARD)

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↓	
Traffic Volume (veh/h)	41	2135	40	205	555	154	47	137	309	422	191	50
Future Volume (veh/h)	41	2135	40	205	555	154	47	137	309	422	191	50
Initial Q (Q _b), 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	45	2321	43	223	603	153	51	149	271	459	208	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	58	2447	45	356	2841	882	209	255	216	503	228	59
Arrive On Green	0.03	0.47	0.47	0.21	1.00	1.00	0.12	0.14	0.14	0.15	0.16	0.16
Sat Flow, veh/h	1781	5162	95	3456	5106	1585	1781	1870	1585	3456	1432	372
Grp Volume(v), veh/h	45	1529	835	223	603	153	51	149	271	459	0	262
Grp Sat Flow(s), veh/h/ln	1781	1702	1853	1728	1702	1585	1781	1870	1585	1728	0	1803
Q Serve(g_s), s	3.8	64.3	64.7	8.8	0.0	0.0	3.9	11.2	16.2	19.6	0.0	21.4
Cycle Q Clear(g_c), s	3.8	64.3	64.7	8.8	0.0	0.0	3.9	11.2	16.2	19.6	0.0	21.4
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	58	1614	878	356	2841	882	209	255	216	503	0	287
V/C Ratio(X)	0.78	0.95	0.95	0.63	0.21	0.17	0.24	0.59	1.26	0.91	0.00	0.91
Avail Cap(c_a), veh/h	110	1645	896	356	2841	882	242	312	264	534	0	334
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.98	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.0	37.7	37.8	56.9	0.0	0.0	60.1	60.8	41.0	63.1	0.0	62.1
Incr Delay (d2), s/veh	8.0	13.0	20.5	2.6	0.2	0.4	0.2	0.8	147.3	18.7	0.0	24.6
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	1.8	27.7	32.3	3.6	0.0	0.1	1.8	5.4	15.3	10.0	0.0	11.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	80.0	50.7	58.3	59.5	0.2	0.4	60.4	61.6	188.3	81.9	0.0	86.7
LnGrp LOS	F	D	E	E	A	A	E	E	F	F	A	F
Approach Vol, veh/h		2409			979			471			721	
Approach Delay, s/veh		53.9			13.7			134.4			83.6	
Approach LOS		D			B			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	21.5	77.1	22.6	28.8	9.1	89.5	26.0	25.4				
Change Period (Y+R _c), s	6.0	* 6	* 5	* 5	* 4.2	6.0	* 4.2	* 5				
Max Green Setting (Gmax), s	9.9	* 73	* 20	* 28	* 9.3	73.1	* 23	* 25				
Max Q Clear Time (g_c+l1), s	10.8	66.7	5.9	23.4	5.8	2.0	21.6	18.2				
Green Ext Time (p_c), s	0.0	4.4	0.0	0.4	0.0	2.6	0.2	0.6				

Intersection Summary

HCM 6th Ctrl Delay 58.2

HCM 6th LOS E

Notes

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑
Traffic Volume (veh/h)	2	2815	108	217	814	4	91	0	267	0	0	8
Future Volume (veh/h)	2	2815	108	217	814	4	91	0	267	0	0	8
Initial Q (Q _b), 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		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	2	2995	115	231	866	4	97	0	284	0	0	8
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	5	2888	897	184	3402	1056	342	0	305	17	0	15
Arrive On Green	0.01	1.00	1.00	0.03	0.22	0.22	0.19	0.00	0.19	0.00	0.00	0.01
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	2	2995	115	231	866	4	97	0	284	0	0	8
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.2	0.0	0.0	15.5	21.0	0.3	7.0	0.0	26.4	0.0	0.0	0.8
Cycle Q Clear(g_c), s	0.2	0.0	0.0	15.5	21.0	0.3	7.0	0.0	26.4	0.0	0.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	5	2888	897	184	3402	1056	342	0	305	17	0	15
V/C Ratio(X)	0.42	1.04	0.13	1.25	0.25	0.00	0.28	0.00	0.93	0.00	0.00	0.53
Avail Cap(c_a), veh/h	59	2888	897	184	3402	1056	368	0	328	59	0	53
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.23	0.23	0.23	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	74.5	0.0	0.0	72.4	27.7	19.6	51.8	0.0	59.6	0.0	0.0	74.0
Incr Delay (d2), s/veh	5.0	20.0	0.1	151.3	0.2	0.0	0.2	0.0	30.6	0.0	0.0	10.5
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	0.1	5.3	0.0	15.1	9.6	0.1	3.2	0.0	13.2	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	79.5	20.0	0.1	223.7	27.9	19.6	51.9	0.0	90.3	0.0	0.0	84.5
LnGrp LOS	E	F	A	F	C	B	D	A	F	A	A	F
Approach Vol, veh/h		3112			1101			381			8	
Approach Delay, s/veh		19.3			69.0			80.5			84.5	
Approach LOS		B			E			F			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.0	90.9		33.5	4.9	106.0		5.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	5.5	79.1		* 31	5.0	89.6		5.0				
Max Q Clear Time (g_c+mt), s	2.0			28.4	2.2	23.0		2.8				
Green Ext Time (p_c), s	0.0	36.2		0.4	0.0	3.6		0.0				

Intersection Summary

HCM 6th Ctrl Delay 36.3

HCM 6th LOS D

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 0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	3017	30	0	1040	0	75
Future Vol, veh/h	3017	30	0	1040	0	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3244	32	0	1118	0	81

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 1638
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 *212
Stage 1	-	0	0 -
Stage 2	-	0	0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - - *212
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	32
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	212	-	-	-
HCM Lane V/C Ratio	0.38	-	-	-
HCM Control Delay (s)	32	-	-	-
HCM Lane LOS	D	-	-	-
HCM 95th %tile Q(veh)	1.7	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	3065	27	0	1040	0	72
Future Vol, veh/h	3065	27	0	1040	0	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3065	30	0	1143	0	79

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 1548
Stage 1	-	-	- - -
Stage 2	-	-	- - -
Critical Hdwy	-	-	- - - 7.14
Critical Hdwy Stg 1	-	-	- - -
Critical Hdwy Stg 2	-	-	- - -
Follow-up Hdwy	-	-	- - - 3.8
Pot Cap-1 Maneuver	-	- 0	- 0 *201
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - - *201
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
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HCM Control Delay, s	0	0	34.1
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	201	-	-	-
HCM Lane V/C Ratio	0.394	-	-	-
HCM Control Delay (s)	34.1	-	-	-
HCM Lane LOS	D	-	-	-
HCM 95th %tile Q(veh)	1.7	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Cuml + Proj AM (College Ext.)
5: Lisa St/W Ranch St & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	169	2937	0	3	838	156	0	0	1	228	1	144
Future Volume (veh/h)	169	2937	0	3	838	156	0	0	1	228	1	144
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	182	3158	0	3	901	168	0	0	1	245	1	155
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	205	3657	0	6	3085	1120	1	0	63	183	2	273
Arrive On Green	0.08	0.48	0.00	0.01	1.00	1.00	0.00	0.00	0.04	0.10	0.17	0.17
Sat Flow, veh/h	1781	5274	0	1781	5106	1585	1781	0	1585	1781	10	1576
Grp Volume(v), veh/h	182	3158	0	3	901	168	0	0	1	245	0	156
Grp Sat Flow(s), veh/h/ln	1781	1702	0	1781	1702	1585	1781	0	1585	1781	0	1587
Q Serve(g_s), s	15.2	82.4	0.0	0.3	0.0	0.0	0.0	0.0	0.1	15.4	0.0	13.5
Cycle Q Clear(g_c), s	15.2	82.4	0.0	0.3	0.0	0.0	0.0	0.0	0.1	15.4	0.0	13.5
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	205	3657	0	6	3085	1120	1	0	63	183	0	275
V/C Ratio(X)	0.89	0.86	0.00	0.54	0.29	0.15	0.00	0.00	0.02	1.34	0.00	0.57
Avail Cap(c_a), veh/h	235	3657	0	70	3085	1120	81	0	454	183	0	546
HCM Platoon Ratio	0.67	0.67	0.67	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	0.00	0.84	0.84	0.84	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.2	32.5	0.0	74.4	0.0	0.0	0.0	0.0	69.2	67.3	0.0	56.9
Incr Delay (d2), s/veh	28.4	3.0	0.0	54.0	0.2	0.2	0.0	0.0	0.1	184.9	0.0	1.8
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	8.6	35.1	0.0	0.2	0.1	0.1	0.0	0.0	0.0	16.4	0.0	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	96.7	35.5	0.0	128.4	0.2	0.2	0.0	0.0	69.3	252.2	0.0	58.7
LnGrp LOS	F	D	A	F	A	A	A	A	E	F	A	E
Approach Vol, veh/h		3340			1072			1			401	
Approach Delay, s/veh		38.8			0.6			69.3			176.9	
Approach LOS		D			A			E			F	

Intersection Summary

HCM 6th Ctrl Delay 41.8

HCM 6th LOS D

Notes

User approved ignoring U-Turning movement.

HCM 6th Signalized Intersection Summary

N:\2608\Analysis\Synchro\11. Near-Term + Proj AM (College).syn



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗
Traffic Volume (veh/h)	131	2437	531	91	643	165	219	185	92	397	711	130
Future Volume (veh/h)	131	2437	531	91	643	165	219	185	92	397	711	130
Initial Q (Q _b), 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		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	135	2512	547	94	663	170	226	191	95	409	733	134
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	2492	893	494	2453	1305	260	425	203	459	682	125
Arrive On Green	0.17	0.98	0.98	0.28	0.69	0.69	0.08	0.18	0.18	0.13	0.23	0.23
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	2333	1113	3456	3000	548
Grp Volume(v), veh/h	135	2512	547	94	663	170	226	144	142	409	434	433
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1670	1728	1777	1772
Q Serve(g_s), s	11.1	73.2	0.0	6.0	10.7	3.2	9.7	10.8	11.4	17.5	34.1	34.1
Cycle Q Clear(g_c), s	11.1	73.2	0.0	6.0	10.7	3.2	9.7	10.8	11.4	17.5	34.1	34.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.67	1.00		0.31
Lane Grp Cap(c), veh/h	155	2492	893	494	2453	1305	260	323	304	459	404	403
V/C Ratio(X)	0.87	1.01	0.61	0.19	0.27	0.13	0.87	0.44	0.47	0.89	1.07	1.08
Avail Cap(c_a), veh/h	240	2543	909	494	2453	1305	260	323	304	571	404	403
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.23	0.23	0.23	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.1	1.8	0.7	41.3	8.8	2.6	68.6	54.6	54.9	64.0	57.9	58.0
Incr Delay (d2), s/veh	3.3	10.6	0.7	0.1	0.3	0.2	24.4	0.4	0.4	12.3	66.1	66.4
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	4.6	3.1	0.6	2.6	3.7	0.9	5.2	4.9	4.9	8.5	22.7	22.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	64.3	12.4	1.4	41.4	9.1	2.8	93.0	55.0	55.3	76.3	124.0	124.3
LnGrp LOS	E	F	A	D	A	A	F	D	E	E	F	F
Approach Vol, veh/h	3194				927			512			1276	
Approach Delay, s/veh	12.7				11.2			71.9			108.8	
Approach LOS	B				B			E			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	48.9	80.0	17.3	40.1	17.3	111.5	24.1	33.3				
Change Period (Y+Rc), s	6.0	* 6	* 6	* 6	* 4.2	6.0	* 4.2	* 6				
Max Green Setting (Gmax), s	9.5	* 75	* 11	* 34	* 20	64.0	* 25	* 21				
Max Q Clear Time (g_c+l), s	18.0	75.2	11.7	36.1	13.1	12.7	19.5	13.4				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.1	2.8	0.4	0.6				

Intersection Summary

HCM 6th Ctrl Delay 38.4

HCM 6th LOS D

Notes

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

Existing + Cuml + Proj PM (College Ext.)
1: Tamarack Ave & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑↓		↑↑	↑↑↑	↑	↑	↑	↑	↑↑	↑↓	
Traffic Volume (veh/h)	44	768	45	200	1586	276	34	128	155	165	131	23
Future Volume (veh/h)	44	768	45	200	1586	276	34	128	155	165	131	23
Initial Q (Q _b), 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	45	784	46	204	1618	256	35	131	149	168	134	23
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	434	2628	154	247	1778	552	228	249	211	460	207	36
Arrive On Green	0.24	0.53	0.53	0.10	0.46	0.46	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1781	4934	288	3456	5106	1585	1781	1870	1585	3456	1555	267
Grp Volume(v), veh/h	45	540	290	204	1618	256	35	131	149	168	0	157
Grp Sat Flow(s), veh/h/ln	1781	1702	1818	1728	1702	1585	1781	1870	1585	1728	0	1822
Q Serve(g_s), s	2.9	13.2	13.3	8.7	44.1	11.5	2.6	9.8	13.5	6.6	0.0	12.3
Cycle Q Clear(g_c), s	2.9	13.2	13.3	8.7	44.1	11.5	2.6	9.8	13.5	6.6	0.0	12.3
Prop In Lane	1.00		0.16	1.00		1.00	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	434	1813	968	247	1778	552	228	249	211	460	0	243
V/C Ratio(X)	0.10	0.30	0.30	0.83	0.91	0.46	0.15	0.53	0.71	0.36	0.00	0.65
Avail Cap(c_a), veh/h	434	1813	968	272	1998	620	241	524	444	479	0	516
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.84	0.84	0.84	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	44.0	19.5	19.5	66.9	38.1	14.7	58.2	60.6	62.2	59.2	0.0	61.6
Incr Delay (d2), s/veh	0.0	0.4	0.8	13.3	7.3	2.3	0.1	0.6	1.6	0.2	0.0	1.1
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	1.3	5.1	5.5	4.1	17.1	4.2	1.2	4.7	5.6	2.9	0.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	44.0	19.9	20.3	80.3	45.4	17.0	58.3	61.2	63.8	59.4	0.0	62.7
LnGrp LOS	D	B	C	F	D	B	E	E	E	A	E	
Approach Vol, veh/h		875			2078			315		325		
Approach Delay, s/veh		21.3			45.3			62.1		61.0		
Approach LOS		C			D			E		E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	14.9	85.9	24.2	25.0	42.6	58.2	24.2	25.0				
Change Period (Y+R _c), s	* 4.2	6.0	* 5	* 5	6.0	* 6	* 4.2	* 5				
Max Green Setting (Gmax), s	* 12	56.0	* 20	* 43	9.1	* 59	* 21	* 42				
Max Q Clear Time (g _{c+l1}), s	10.7	15.3	4.6	14.3	4.9	46.1	8.6	15.5				
Green Ext Time (p _c), s	0.0	3.0	0.0	0.6	0.0	6.1	0.2	0.7				

Intersection Summary

HCM 6th Ctrl Delay 42.3

HCM 6th LOS D

Notes

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

HCM 6th Signalized Intersection Summary

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↛ ↙											
Traffic Volume (veh/h)	0	994	75	253	2067	0	49	0	108	0	0	2
Future Volume (veh/h)	0	994	75	253	2067	0	49	0	108	0	0	2
Initial Q (Q _b), 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	1046	79	266	2176	0	52	0	114	0	0	2
Peak Hour Factor	0.95	0.95	0.95	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	2	2	2	2
Cap, veh/h	1	3172	985	284	4141	1285	155	0	138	5	0	4
Arrive On Green	0.00	0.21	0.21	0.32	1.00	0.00	0.09	0.00	0.09	0.00	0.00	0.00
Sat Flow, veh/h	1781	5106	1585	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	0	1046	79	266	2176	0	52	0	114	0	0	2
Grp Sat Flow(s), veh/h/ln	1781	1702	1585	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	0.0	26.2	6.0	21.7	0.0	0.0	4.1	0.0	10.6	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.0	26.2	6.0	21.7	0.0	0.0	4.1	0.0	10.6	0.0	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1	3172	985	284	4141	1285	155	0	138	5	0	4
V/C Ratio(X)	0.00	0.33	0.08	0.94	0.53	0.00	0.34	0.00	0.83	0.00	0.00	0.47
Avail Cap(c_a), veh/h	59	3172	985	362	4141	1285	384	0	341	69	0	61
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	0.94	0.94	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	33.0	25.0	50.3	0.0	0.0	64.4	0.0	67.4	0.0	0.0	74.7
Incr Delay (d2), s/veh	0.0	0.3	0.1	25.2	0.5	0.0	0.5	0.0	4.7	0.0	0.0	27.5
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	0.0	12.0	2.2	9.7	0.2	0.0	1.9	0.0	4.5	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	33.3	25.1	75.5	0.5	0.0	64.9	0.0	72.0	0.0	0.0	102.2
LnGrp LOS	A	C	C	E	A	A	E	A	E	A	A	F
Approach Vol, veh/h		1125			2442			166			2	
Approach Delay, s/veh		32.7			8.6			69.8		102.2		
Approach LOS		C			A			E		F		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	28.4	99.2		17.8	0.0	127.6		4.6				
Change Period (Y+Rc), s	4.5	6.0		* 4.7	4.5	6.0		4.2				
Max Green Setting (Gmax), s	30.5	62.0		* 32	5.0	87.5		5.8				
Max Q Clear Time (g_c+D3), s	28.2			12.6	0.0	2.0		2.2				
Green Ext Time (p_c), s	0.2	4.6		0.5	0.0	15.6		0.0				

Intersection Summary

HCM 6th Ctrl Delay 18.7
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 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
----------	-----	-----	-----	-----	-----	-----

Lane Configurations						
Traffic Vol, veh/h	1078	92	0	2294	0	41
Future Vol, veh/h	1078	92	0	2294	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
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	1111	95	0	2365	0	42

Major/Minor	Major1	Major2	Minor1
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Conflicting Flow All	0	0	-	-	-	603
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	*674
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-	1
Mov Cap-1 Maneuver	-	-	-	-	-	*674
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
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HCM Control Delay, s	0	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
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Capacity (veh/h)	674	-	-	-
HCM Lane V/C Ratio	0.063	-	-	-
HCM Control Delay (s)	10.7	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑		↑
Traffic Vol, veh/h	1047	72	0	2294	0	39
Future Vol, veh/h	1047	72	0	2294	0	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1068	73	0	2341	0	40

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 571
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 *674
Stage 1	-	0	- 0 -
Stage 2	-	0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *674
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
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HCM Control Delay, s	0	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	674	-	-	-
HCM Lane V/C Ratio	0.059	-	-	-
HCM Control Delay (s)	10.7	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Existing + Cumulative + Proj PM (College Ext.)
5: Lisa St/West Ranch Rd & El Camino Real

Marja Acres
01/16/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑↓		↑	↑↑↑	↑	↑	↑		↑	↑	
Traffic Volume (veh/h)	232	839	1	13	2118	333	2	0	1	260	0	156
Future Volume (veh/h)	232	839	1	13	2118	333	2	0	1	260	0	156
Initial Q (Q _b), 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	237	856	1	13	2161	340	2	0	1	265	0	159
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	183	3625	4	20	3047	1140	4	0	63	219	0	254
Arrive On Green	0.03	0.23	0.23	0.02	1.00	1.00	0.00	0.00	0.04	0.12	0.00	0.16
Sat Flow, veh/h	1781	5267	6	1781	5106	1585	1781	0	1585	1781	0	1585
Grp Volume(v), veh/h	237	553	304	13	2161	340	2	0	1	265	0	159
Grp Sat Flow(s), veh/h/ln	1781	1702	1869	1781	1702	1585	1781	0	1585	1781	0	1585
Q Serve(g_s), s	15.4	19.9	19.9	1.1	0.0	0.0	0.2	0.0	0.1	18.4	0.0	14.0
Cycle Q Clear(g_c), s	15.4	19.9	19.9	1.1	0.0	0.0	0.2	0.0	0.1	18.4	0.0	14.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	183	2343	1286	20	3047	1140	4	0	63	219	0	254
V/C Ratio(X)	1.30	0.24	0.24	0.65	0.71	0.30	0.53	0.00	0.02	1.21	0.00	0.63
Avail Cap(c_a), veh/h	183	2343	1286	63	3047	1140	58	0	444	219	0	586
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.11	0.11	0.11	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.5	25.8	25.8	73.0	0.0	0.0	74.8	0.0	69.2	65.8	0.0	58.8
Incr Delay (d2), s/veh	167.4	0.2	0.4	4.0	0.2	0.1	82.2	0.0	0.1	130.3	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	15.9	9.1	10.1	0.5	0.0	0.0	0.2	0.0	0.0	16.3	0.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	239.9	26.0	26.2	77.0	0.2	0.1	157.0	0.0	69.3	196.1	0.0	61.3
LnGrp LOS	F	C	C	E	A	A	F	A	E	F	A	E
Approach Vol, veh/h		1094			2514			3			424	
Approach Delay, s/veh		72.4			0.5			127.7			145.5	
Approach LOS		E			A			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R _c), s	6.3	109.7	4.9	29.1	20.0	96.0	23.0	11.0				
Change Period (Y+R _c), s	4.6	6.5	4.6	5.0	4.6	6.5	4.6	5.0				
Max Green Setting (Gmax), s	5.3	63.6	4.9	55.5	15.4	53.5	18.4	42.0				
Max Q Clear Time (g_c+l1), s	3.1	21.9	2.2	16.0	17.4	2.0	20.4	2.1				
Green Ext Time (p_c), s	0.0	5.3	0.0	1.1	0.0	28.6	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				35.4								
HCM 6th LOS				D								



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗ ↘ ↙ ↖ ↛ ↕ ↖ ↙ ↘ ↗ ↘											
Traffic Volume (veh/h)	92	777	241	78	1878	410	461	546	120	136	217	98
Future Volume (veh/h)	92	777	241	78	1878	410	461	546	120	136	217	98
Initial Q (Q _b), 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	96	809	251	81	1956	427	480	569	113	142	226	92
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	107	982	525	793	2096	1020	479	564	112	186	293	116
Arrive On Green	0.04	0.13	0.13	0.45	0.59	0.59	0.14	0.19	0.19	0.05	0.12	0.12
Sat Flow, veh/h	1781	5106	1585	1781	3554	1585	3456	2956	585	3456	2488	982
Grp Volume(v), veh/h	96	809	251	81	1956	427	480	341	341	142	159	159
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1781	1777	1585	1728	1777	1765	1728	1777	1694
Q Serve(g_s), s	8.0	23.2	4.5	4.0	75.3	9.6	20.8	28.6	28.6	6.1	13.0	13.7
Cycle Q Clear(g_c), s	8.0	23.2	4.5	4.0	75.3	9.6	20.8	28.6	28.6	6.1	13.0	13.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.33	1.00		0.58
Lane Grp Cap(c), veh/h	107	982	525	793	2096	1020	479	339	337	186	209	199
V/C Ratio(X)	0.90	0.82	0.48	0.10	0.93	0.42	1.00	1.01	1.01	0.76	0.76	0.80
Avail Cap(c_a), veh/h	107	2689	1055	793	2096	1020	479	339	337	189	209	199
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.87	0.87	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.5	62.9	25.4	24.2	28.1	7.8	64.6	60.7	60.7	70.0	64.1	64.4
Incr Delay (d2), s/veh	50.2	6.8	2.7	0.0	9.2	1.3	41.5	50.8	52.2	15.0	13.7	18.3
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	5.1	10.8	6.0	1.6	31.2	2.9	11.9	17.7	17.7	3.1	6.7	6.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	121.7	69.7	28.1	24.2	37.3	9.1	106.1	111.5	112.9	85.0	77.8	82.7
LnGrp LOS	F	E	C	C	D	A	F	F	F	F	E	F
Approach Vol, veh/h	1156				2464			1162			460	
Approach Delay, s/veh	65.0				32.0			109.7			81.7	
Approach LOS	E				C			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	2.8	34.9	25.0	23.7	13.2	94.5	14.1	34.6				
Change Period (Y+Rc), s	6.0	* 6	* 4.2	* 6	* 4.2	6.0	* 6	* 6				
Max Green Setting (Gmax), s	3.8	* 79	* 21	* 16	* 9	83.8	* 8.2	* 29				
Max Q Clear Time (g_c+l1), s	25.2	22.8	15.7	10.0	77.3	8.1	30.6					
Green Ext Time (p_c), s	0.0	3.7	0.0	0.0	0.0	4.8	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 60.8

HCM 6th LOS E

Notes

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

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