APPENDIX 3.15B

Amoruso Ranch Specific Plan Focused Traffic Study

Focused Traffic Study for the Amoruso Ranch Specific Plan

Prepared for:
Impact Sciences

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FEHR PEERS

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1 INTRODUCTION

This study analyzes the transportation and traffic impacts of the Amoruso Ranch Specific Plan project in Roseville, California. It builds off the *Final Traffic Study for the Amoruso Ranch Specific Plan* (Fehr & Peers, February 2016) to evaluate four land use alternatives against the Cumulative No Project scenario of that transportation impact study (TIS).

This study evaluates traffic impacts at five intersections and two freeway segments. These are facilities that were significantly impacted by the Proposed Project, as identified in the *Final Traffic Study for the Amoruso Ranch Specific Plan* in the 2035 Cumulative scenario peak hours. These facilities are listed below:

Placer County Intersections (AM Peak Hour Analysis)

1. Cook Riolo Road / PFE Road
2. N Foothills Boulevard / Athens Avenue

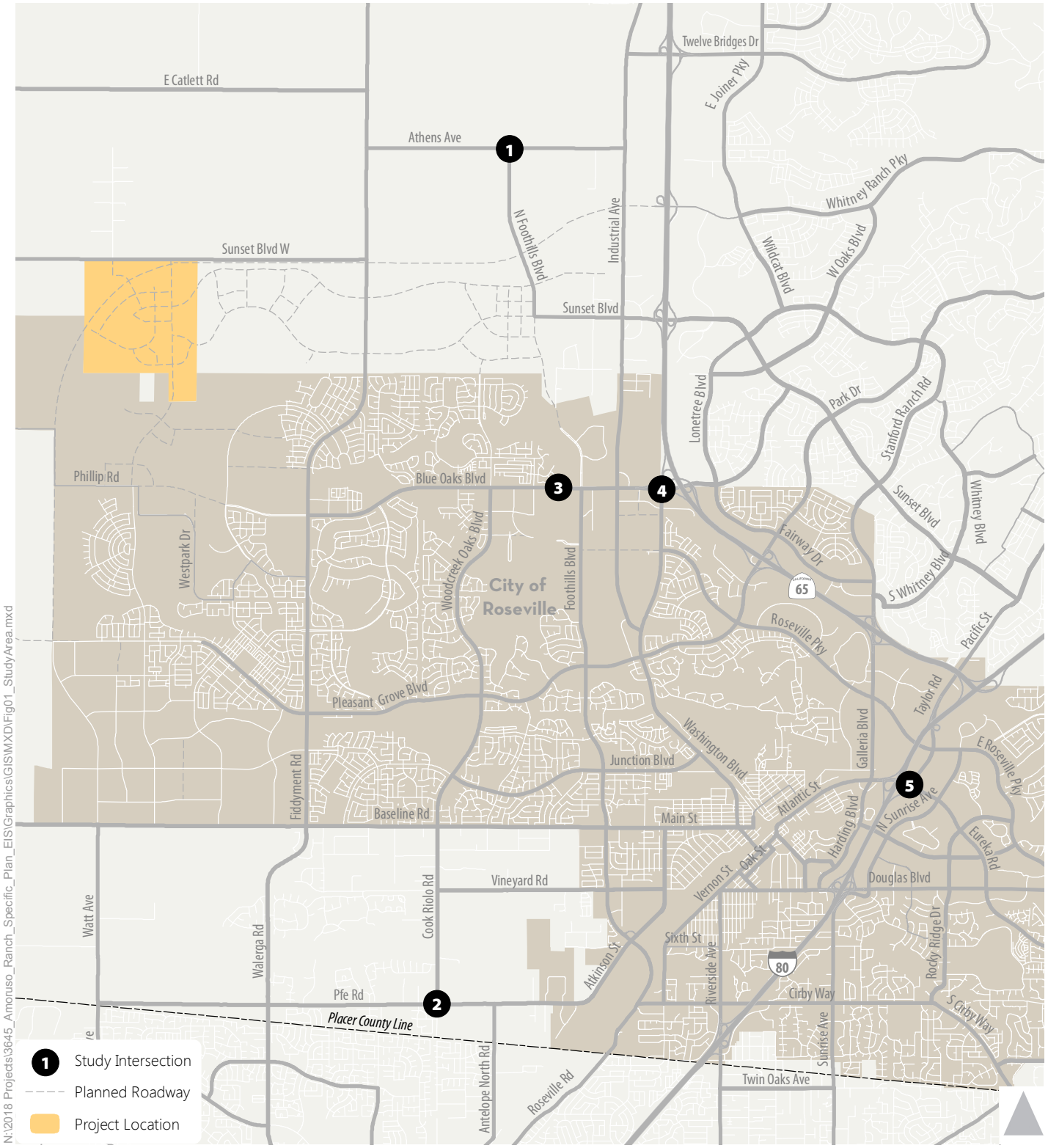
City of Roseville Intersections (PM Peak Hour Analysis)

3. Blue Oaks Boulevard / Collector C
4. Blue Oaks Boulevard / Washington Boulevard / SR 65 Southbound (SB) Ramps
5. Eureka Road / Taylor Rd / I-80 Eastbound (EB) Ramps

Freeway Facilities (AM Peak Hour Analysis)

- SR 65 Southbound (SB) between Ferrari Ranch Road and Lincoln Boulevard
- SR 65 Southbound (SB) between Twelve Bridges Drive and Placer Parkway

The study intersections as well as the location of the Amoruso Ranch Specific Plan are shown in Figure 1. This study focuses exclusively on the roadway network and does not include any descriptions or evaluations of other modes such as transit, walking, or bicycling because none of the project alternatives would materially affect these modes of travel in a manner different from that of the Proposed Project.



Note: Study intersections shown here were identified as cumulatively significant impacts in the Amoruso Ranch Specific Plan Draft EIR.

Figure 1

Study Area

1.1 Project Description

As shown in Figure 1, the Proposed Project would be situated on approximately 674 acres north of Blue Oaks Boulevard, west of Fiddyment Road, and south of Sunset Boulevard West. Project access would be provided to / from the south via the construction of Westbrook Boulevard to Blue Oaks Boulevard. Access would be provided from the north via two roadway connections to Sunset Boulevard West. Additionally, future year scenarios also include the construction of Placer Parkway (to / from the north), which would intersect with Westbrook Boulevard.

The land use inputs for the project alternatives were provided from Impact Sciences in April 2018. As mentioned previously, there are four land use alternatives. These alternatives are summarized in Table 1.

Table 1: Land Use Alternatives

Land Use	No Action	Proposed Action	Alternative 1 - South Avoidance	Alternative 2 – North Avoidance	Alternative 3 – Distributed Avoidance
Low Density Residential	773 du	1,302 du	1,078 du	1,158 du	1,211 du
Medium Density Residential	322 du	542 du	421 du	449 du	546 du
High Density Residential	519 du	873 du	700 du	701 du	864 du
Community Commercial	65 du	109 du	109 du	109 du	109 du
Retail	263 ksf	442 ksf	442 ksf	442 ksf	442 ksf
Office	20 ksf	34 ksf	34 ksf	34 ksf	34 ksf
Elementary School	800 students	800 students	800 students	800 students	800 students

Source: Impact Sciences, April 2018

It is important to note that the "No Action" scenario differs from what was studied in the *Final Traffic Study for the Amoruso Ranch Specific Plan* for the "No Project" Condition. In the previous study, "No Project" (e.g. Cumulative No Project) implied that there was no land use developed at the Amoruso site. However, in this study, the "No Action" alternative contains land use, but far less land use than the project alternatives. The "No Project" scenario from the *Final Traffic Study for the Amoruso Ranch Specific Plan* is used as the baseline for this analysis.

The "Proposed Action" alternative differs from the Proposed Project in the *Final Traffic Study for the Amoruso Ranch Specific Plan*. The Proposed Action alternative contains 1,302 low-density dwelling units and 542 medium-density dwelling units, whereas the Proposed Project in the *Final Traffic Study for the Amoruso Ranch Specific Plan* contains 1,167 low-density and 786 medium-density dwelling units. The Proposed Action generates approximately two percent (less than 1,000) fewer daily trips than the Proposed Project from the 2016 study. Because the difference in the Proposed Action versus the Proposed Project is marginal[1], the Proposed Action alternative is not studied in this report.

1.1 Analysis Scenarios

The following scenarios are presented or analyzed in this report:

- Existing Conditions – a summary of the Existing Conditions section of the *Final Traffic Study for the Amoruso Ranch Specific Plan*
- Cumulative No Project Conditions – represents 2035 conditions with no land use in the Amoruso Ranch site
- Cumulative No Action Conditions – represents 2035 conditions and buildout of the No Action alternative
- Cumulative Plus Alternative 1 Conditions – represents 2035 conditions and buildout of the South Avoidance alternative
- Cumulative Plus Alternative 2 Conditions – represents the 2035 conditions and buildout of the North Avoidance alternative
- Cumulative Plus Alternative 3 Conditions – represents the 2035 conditions and buildout of the Distributed Avoidance alternative.

As mentioned previously, the Cumulative Plus Proposed Action alternative is not evaluated in this report because its operating conditions would be nearly identical to the Cumulative Plus Project scenario studied in the *Final Traffic Study for the Amoruso Ranch Specific Plan*.

1.2 Analysis Methods

This study analyzes traffic operations using level of service (LOS) as the primary measure of performance. Automobile LOS is a qualitative description of traffic flow from the perspective of motorists. The *Highway Capacity Manual* (HCM) defines six levels of service from LOS A, representing the least congested traffic conditions, to LOS F, representing the most congested traffic conditions.

[1] Proposed Action is 109 fewer total single family dwelling units with the percentage of all single-family units increasing from 60 to 70 percent.

These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving, as well as speed, travel time, traffic interruptions, and freedom to maneuver.

1.2.1 Signalized Intersections

All signalized intersections within the City of Roseville were analyzed using procedures from the HCM. For this study, the three study intersections were analyzed in SimTraffic software, to remain consistent with the analysis in the *Final Traffic Study for the Amoruso Ranch Specific Plan*. Average overall delay and LOS are reported for these intersections. Table 2 shows the signalized LOS criteria for intersections.

1.2.2 Unsignalized Intersections

Unsignalized intersections in Placer County were analyzed using Synchro, which employs procedures from HCM 2000. For all-way stop-controlled intersections, average overall delay and LOS is reported. For side-street stop-controlled intersections, the delay and LOS of the overall intersection and the intersection's worst movement is reported. This reporting format for side-street stop-controlled intersections matches the 2016 study but differs for the current format required by Placer County, which shows the overall weighted average delay and LOS of movements that must yield right-of-way. Table 2 shows the unsignalized LOS criteria for unsignalized intersections.

Although Placer County standards require using the 2017 version of the HCM to analyze intersections, this study uses the 2000 HCM to preserve consistency with the *Final Traffic Study for the Amoruso Ranch Specific Plan*. Comparisons of results between the two methodologies have shown very little variation (i.e., delays changing less than one second) in results.

Table 2: Intersection Level of Service Criteria

Level of Service	Description	Delay in Seconds	
		Signalized	Unsignalized
A	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.	≤ 10.0	≤ 10.0
B	Progression is good, cycle lengths are short, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10.0 to 20.0	> 10.0 to 15.0
C	Higher congestion may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping.	> 20.0 to 35.0	> 15.0 to 25.0
D	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume to capacity ratios (V/C) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35.0 to 55.0	> 25.0 to 35.0

Table 2: Intersection Level of Service Criteria

Level of Service	Description	Delay in Seconds	
		Signalized	Unsignalized
E	This level is considered by many agencies 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.	> 55.0 to 80.0	> 35.0 to 50.0
F	This level is considered unacceptable with oversaturation, which is when arrival flow rates exceed the capacity of the intersection. This level may also occur at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to such delay levels.	> 80.0	> 50.0

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1.2.3 Freeway Facilities

Per Caltrans standards, freeway operations are evaluated using methodologies from the HCM. The LOS for freeway segments is based on the vehicle density (passenger car equivalents per hour per mile per lane) as shown in Table 3.

Table 3: Freeway Level of Service Criteria

Level of Service	Density (pcphpmpl)[1]		Description
	Mainline	Ramp Junctions	
A	≤ 11	≤ 10	Free-flow operations. Drivers are almost completely unimpeded in their ability to maneuver within the traffic stream.
B	> 11 to 18	> 10 to 20	Free-flow speeds are maintained. The ability to maneuver within the traffic stream is only slightly restricted.
C	> 18 to 26	> 20 to 28	Traffic flow with speeds at or near free-flow speed. The freedom to maneuver within the traffic steam is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.
D	> 26 to 35	> 28 to 35	Speeds begin to decline slightly with increasing flows. Freedom to maneuver within the traffic stream is noticeably limited.
E	> 35 to 45	> 35	Operations at or near capacity. There are virtually no useable gaps within the traffic stream, leaving little room to maneuver.
F	> 45 or Demand exceeds capacity	Demand exceeds capacity[2]	Breakdown in vehicular flow. Vehicular demand exceeds capacity.

Notes:
1. Density is expressed in passenger car equivalents per hour per mile per lane (pcpmpl). Density values are rounded to the nearest whole value and evaluated for LOS based on the above thresholds (i.e., 35 pcpmpl = LOS D)
2. Occurs when freeway demand exceeds upstream (diverge) or downstream (merge) freeway segment capacity, or if off-ramp demand exceeds off-ramp capacity.

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1.3 Significance Criteria

The following thresholds of significance have been used to determine whether implementing the Proposed Project alternatives would result in a significant transportation impact. The thresholds of significance are derived from questions posed in Appendix G of the CEQA Guidelines, thresholds of significance from applicable plans and previous environmental documents, and professional judgement.

1.3.1 City of Roseville

The City of Roseville's *General Plan 2035* (June 2016) identifies a level of service policy that calls for maintaining LOS C or better operations at a minimum of 70 percent of all signalized intersections and roadway segments in the City during the AM and PM peak hours. Exceptions to the LOS C standard may be considered for intersections where the City finds that the required improvements are unacceptable based on established criteria identified in the implementation measures. In addition, Pedestrian Overlay Districts may be exempted from the LOS standard.

The project would have a significant impact if it would:

1. Cause a signalized intersection in Roseville to be degraded as follows under Existing or Cumulative Conditions during the AM or PM peak hours:
    a. For intersections that currently operate at LOS C or better: worsen operations to LOS D or worse.
    b. For intersections that currently operate at less than LOS C: cause operations to further worsen by one or more service levels.
2. Cause the overall percentage of signalized intersections throughout the City of Roseville operating at LOS C or better during the AM or PM peak hours to fall below 70 percent.

1.3.2 Placer County

The Placer County *General Plan* (May 2013) establishes a minimum LOS C threshold for County roadways and intersections, except within one-half mile of state highways where the standard is LOS D.

The project would have a significant impact if it would:

1. Cause an unsignalized intersection in Placer County (located beyond one-half mile of a state highway) to worsen from LOS C or better to LOS D or worse during the AM or PM peak hours.
2. Cause an unsignalized intersection in Placer County that is already (or projected to be) operating unacceptably during the AM or PM peak hours to experience a three-second or greater increase in delay.

Criterion are not provided for unsignalized intersections located within one-half mile of a state highway or signalized intersections because all study intersections are beyond within one-half mile of state highway and not signalized.

1.3.3 Caltrans

The *State Route 65 Corridor System Management Plan* (CSMP) (Caltrans, 2009) identifies a 20-year concept LOS E for SR 65 north of Blue Oaks Boulevard into and through City of Lincoln. The document notes that "no further degradation of service from existing 'F' is acceptable, as indicated by delay performance measurement."

For freeway facilities, the applicable performance standard is density, which is expressed in passenger cars per hour per mile per lane. Since density values are rounded to the nearest integer value for reporting purposes, a minimum density increase of 0.5 would, by definition, cause an increase in the reported density measurement. Density is not reported for LOS F conditions but is reported for LOS A through E conditions. Through an iterative process, it was determined that a 40-peak hour vehicle increase in a given direction to a four-lane freeway operating at LOS E would approximately correspond to a 0.5 increase in density. Similarly, a 60-peak hour vehicle increase in a given direction to a six-lane freeway operating at LOS E would approximately correspond to a 0.5 increase in density. Accordingly, these thresholds of significance were used for segments operating at LOS F.

The project would have a significant impact if it would:

1. Cause a facility maintained by Caltrans to worsen from acceptable to unacceptable operations during the AM or PM peak hours.
2. Worsen unacceptable operations to a significant degree (as indicated by a change in the applicable performance measure) at a facility maintained by Caltrans during the AM or PM peak hours.
3. Cause traffic at an off-ramp maintained by Caltrans to queue back to the mainline or add traffic to an off-ramp that already queues back to the mainline.

2 EXISTING CONDITIONS

This section summarizes the Existing Conditions at the time the *Final Traffic Study for the Amoruso Ranch Specific Plan* was prepared. The counts for this study were conducted in January 2014.

2.1 City of Roseville Intersection Analysis

The signalized intersections in the City of Roseville were studied using SimTraffic software to apply the methodologies described in the *Highway Capacity Manual*. Table 4 summarizes the PM peak hour operations at the study intersections located in the City of Roseville. Table 4 shows that the Blue Oaks Boulevard / Washington Boulevard / SR 65 SB Ramps and Eureka Road / Taylor Road / I-80 EB Ramps intersections operate at LOS D.

During the PM peak hour, 81 percent of the 165 signalized intersections in City of Roseville operate at LOS C or better. Of the 30 intersections not operating at LOS C or better, 24 intersections operate at LOS D and six operate at LOS E.

Table 4: City of Roseville Signalized Intersection Operations – Existing Conditions

Intersection	PM Peak Hour Delay (s) / LOS
Blue Oaks Blvd / Collector C	Does Not Exist
Blue Oaks Blvd / Washington Blvd / SR 65 SB Ramps	37 / D
Eureka Rd / Taylor Rd / I-80 EB Ramps	44 / D

Source: *Final Traffic Study for Amoruso Ranch Specific Plan*, Fehr & Peers, 2016.

2.2 Placer County Intersection Analysis

Table 5 displays the AM Peak Hour operations at study intersections outside of Roseville, in Placer County. Both study intersections operate acceptably at LOS B or better. The worst movement for N Foothills Boulevard / Athens Avenue is the northbound left, which operates at LOS B.

Table 5: Placer County Intersection Operations – Existing Conditions

Intersection	Traffic Control	AM Peak Hour Delay (s) / LOS
Cook Riolo Rd / PFE Rd[1]	AWSC	15 / B
N Foothills Blvd / Athens Ave[2]	SSSC	2 (11) / A (B)

Notes:
AWSC = All-Way Stop-Control. SSSC = Side-Street Stop-Control
1) For all-way stop-controlled intersections in Placer County, the overall delay and LOS is shown.
2) For side-street stop-controlled intersections the overall delay and LOS is shown without parenthesis and the worst movement delay and LOS in parenthesis.
Source: *Final Traffic Study for Amoruso Ranch Specific Plan,* Fehr & Peers, 2016.

2.3 Freeway Analysis

Table 6 presents the AM Peak Hour operations at the two freeway study facilities. Both operate acceptably at LOS D or better.

Table 6: Freeway Operations – Existing Conditions

Freeway Segment	Segment Type	Lanes	AM Peak Hour	
			Density (pcphpmlpl[1])	LOS
SR 65 SB between Ferrari Ranch Rd and Lincoln Blvd	Basic	2	18	C
SR 65 SB between Twelve Bridges Dr and Sunset Blvd[2]	Basic	2	27	D

Notes:
1) Density is expressed in passenger car equivalents per hour per mile per lane (pcphpmpl). Density values are rounded to the nearest whole value.
2) The segment of SR 65 SB between Twelve Bridges Dr and Sunset Blvd. is reported because the Whitney Ranch Parkway interchange was not constructed at the time of the counts and analysis.
Source: *Final Traffic Study for Amoruso Ranch Specific Plan,* Fehr & Peers, 2016.

3 PROJECT TRAVEL CHARACTERISTICS

This section describes the project's travel characteristics. It presents the trip generation of each alternative in relation to the Proposed Project of the *Final Traffic Study for the Amoruso Ranch Specific Plan*.

The project's vehicular trip generation was estimated based on trip rates published in *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012) to maintain consistency with the *Final Traffic Study for the Amoruso Ranch Specific Plan* (versus using the 2017 Trip Generation Manual update). Table 7 shows the trip generation of the different land use alternatives for the Amoruso Specific Plan.

Table 7: Trip Generation Land Use Alternatives

Land Use	Quantity	Trip Rate			Trips		
		Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
No Action							
Single Family Residential	1,095 du	9.52	0.75	1.00	10,424	821	1,095
Multi-Family Residential	584 du	6.65	0.51	0.62	3,884	298	362
Retail	263 ksf	42.7	0.96	3.71	11,230	252	976
Office	20 ksf	11.03	1.56	1.49	221	31	30
Elementary School	800 students	1.29	0.45	0.15	1,032	360	120
				Gross Trips	26,791	1,762	2,583
				Internal Trips	-5,217	-383	-660
				Net External Trips	21,574	1,379	1,923
Alternative 1 – South Avoidance							
Single Family Residential	1,499 du	9.52	0.75	1.00	14,270	1,124	1,499
Multi-Family Residential	809 du	6.65	0.51	0.62	5,380	413	502
Retail	442 ksf	42.7	0.96	3.71	18,873	424	1,640
Office	34 ksf	11.03	1.56	1.49	375	53	51
Elementary School	800 students	1.29	0.45	0.15	1,032	360	120
				Gross Trips	39,930	2,374	3,811
				Internal Trips	-8,131	-524	-1,100
				Net External Trips	31,799	1,850	2,711
Alternative 2 – North Avoidance							
Single Family Residential	1,607 du	9.52	0.75	1.00	15,299	1,205	1,607
Multi-Family Residential	810 du	6.65	0.51	0.62	5,387	413	502
Retail	442 ksf	42.7	0.96	3.71	18,873	424	1,640
Office	34 ksf	11.03	1.56	1.49	375	53	51
Elementary School	800 students	1.29	0.45	0.15	1,032	360	120

Table 7: Trip Generation Land Use Alternatives

Land Use	Quantity	Trip Rate			Trips		
		Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
				Gross Trips	40,966	2,455	3,920
				Internal Trips	-8,269	-540	-1,057
				Net External Trips	32,697	1,915	2,863
Alternative 3 – Distributed Avoidance							
Single Family Residential	1,757 du	9.52	0.75	1.00	16,727	1,318	1,757
Multi-Family Residential	973 du	6.65	0.51	0.62	6,470	496	603
Retail	442 ksf	42.7	0.96	3.71	18,873	424	1,640
Office	34 ksf	11.03	1.56	1.49	375	53	51
Elementary School	800 students	1.29	0.45	0.15	1,032	360	120
				Gross Trips	43,477	2,651	4,171
				Internal Trips	-8,590	-565	-1,089
				Net External Trips	34,887	2,086	3,082

Source: Fehr & Peers, 2018.

The internalization of trips within the project site was estimated using a Mixed-Use Trip Generation Model (MXD), which was developed for the US Environmental Protection Agency (EPA) to estimate internal trip-making and external trips by non-auto travel modes. This model was developed by consultants and academic researchers to more accurately estimate the external vehicular trip generation of mixed-use land development projects than prior methods (e.g., ITE internalization spreadsheet). At the time of the *Final Traffic Study for the Amoruso Ranch Specific Plan* study, the model was developed based on empirical evidence at 240 mixed-use projects located across the US. The model considers various built environment variables, such as land use density, regional location, proximity to transit, and various design variables when calculating the project's internal trips, and external trips made by auto, transit, and non-motorized vehicles. The MXD model has been applied in numerous EIRs throughout California. The same methodology was used for the Proposed Project in the *Final Traffic Study for the Amoruso Ranch Specific Plan*, the trip generation of which is shown in Table 8.

Table 8: Trip Generation of Proposed Project in *Final Traffic Study for the Amoruso Ranch Specific Plan* (2016)

Land Use	Quantity	Trip Rate			Trips		
		Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Single Family Residential	1,954 du	9.52	0.75	1.00	18,602	1,466	1,954
Multi-Family Residential	982 du	6.65	0.51	0.62	6,530	501	609

Table 8: Trip Generation of Proposed Project in *Final Traffic Study for the Amoruso Ranch Specific Plan* (2016)

Land Use	Quantity	Trip Rate			Trips		
		Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Retail	442 ksf	42.7	0.96	3.71	18,873	424	1,640
Office	34 ksf	11.03	1.56	1.49	377	53	51
Elementary School	800 students	1.29	0.45	0.15	1,032	360	120
				Gross Trips	45,414	2,804	4,374
				Internal Trips	-8,823	-622	-1,118
				Net External Trips	36,591	2,182	3,256

Source: *Final Traffic Study for Amoruso Ranch Specific Plan,* Fehr & Peers, 2016.

Table 9 summarizes the percentage of net external trip generation for each alternative over the Proposed Project in the *Final Traffic Study for the Amoruso Ranch Specific Plan*.

Table 9: Trip Generation Summary

Study Period	Percentage of Trips as Compared to Proposed Project in the *Final Traffic Study for the Amoruso Ranch Specific Plan* (2016)			
	No Action Alternative	Alternative 1	Alternative 2	Alternative 3
Daily	58.9%	86.9%	89.4%	95.3%
AM Peak Hour	63.2%	84.8%	87.8%	95.6%
PM Peak Hour	59.1%	83.3%	87.9%	94.7%

Source: Fehr & Peers, 2018.

4 2035 CUMULATIVE CONDITIONS

This chapter describes the analysis of project alternative impacts under 2035 Cumulative Conditions for each project alternative. Cumulative Conditions represent projected future conditions based on proposed land developments and planned roadway improvements. The forecasts from the City of Roseville 2035 Cumulative model from the *Final Traffic Study for the Amoruso Ranch Specific Plan* are described below.

4.1 Land Use and Roadway Network Assumptions

This scenario assumes the following land use and roadway network improvements which were coded into the City of Roseville 2035 travel demand model that was used for the *Final Traffic Study for the Amoruso Ranch Specific Plan*:

Land Use Assumptions

- Build-out of City of Roseville (existing City including approved specific plans)
- Build-out of Regional University Specific Plan
- Build-out of Phase 1 of Placer Vineyards
- 2035 levels of residential market absorption in City of Lincoln
- Build-out of residential and 2035 market absorption levels of non-residential in City of Rocklin
- SACOG 2035 market absorption for specific projects outside of South Placer county including the Elverta Specific Plan (Sacramento County), Johnson Ranchos (Wheatland), and Sutter Pointe (Sutter County)
- Partial build-out of Placer Ranch (50% residential, 25% non-residential, and 25,000-student university)
- Campus Oaks (HP Campus Rezone) project including the extension of Roseville Parkway as a two- to four-lane street from Foothills Boulevard through the HP Campus northwesterly to Blue Oaks Boulevard

Roadway Network Assumptions

- I-80 improvements including new auxiliary lanes on EB I-80 from SR 65 to Rocklin Road and on WB I-80 from Douglas Boulevard to Riverside Avenue (included as a Tier 1 project in SACOG's 2035 MTP / SCS)

- Highway 65 is widened to six continuous lanes between I-80 and Blue Oaks Boulevard (partial funding being collected through SPRTA fee program, full funding expected to be available for construction in 21-year horizon period according to City staff)
- Baseline / Riego Road is widened to six lanes from Fiddyment Road to SR 99 through Roseville, Placer County, and Sutter County (funded through fee programs and local developer frontage improvement requirements)
- SR 99 / Riego Road interchange is constructed (now complete)
- Watt Avenue is widened to six lanes between Baseline Road and Sacramento County line, and to four lanes from the County line to Antelope Road (funded through fee programs and local developer frontage improvement requirements)
- Walerga Road is four lanes between Baseline and Sacramento County line (funded through fee programs and local developer frontage improvement requirements)
- Santucci Boulevard is constructed as six lanes from Baseline Road to Blue Oaks Boulevard (funded through City of Roseville CIP and local developer frontage improvement requirements).
- Blue Oaks Boulevard is widened to eight lanes from SR 65 to Woodcreek Oaks Boulevard, and six lanes from Woodcreek Oaks Boulevard to Santucci Boulevard (funded through City of Roseville CIP and local developer frontage improvement requirements)
- Placer Parkway Phase 1 is constructed as four lanes from SR 65 to Foothills Boulevard (included as a Tier 1 project in SACOG's 2035 MTP / SCS)
- Sunset Boulevard is widened to four lanes from west of SR 65 to Cincinnati Avenue (funded through Placer County CIP)
- Sunset Boulevard is widened to six lanes east of SR 65 (based on City of Rocklin General Plan Circulation Element Diagram 4-8, October 2012)
- Fiddyment Road is widened to four lanes from the Roseville city limits to Athens Avenue (included as a Tier 1 project in SACOG's 2035 MTP / SCS)
- Extension of Placer Parkway westerly as a four-lane roadway from Foothills Boulevard to Santucci Boulevard

These improvements were input into the City of Roseville 2035 travel demand model. The roadway network improvements are funded through various sources, including but not limited to the City of Roseville Capital Improvement Program (CIP).

4.2 Traffic Forecasts

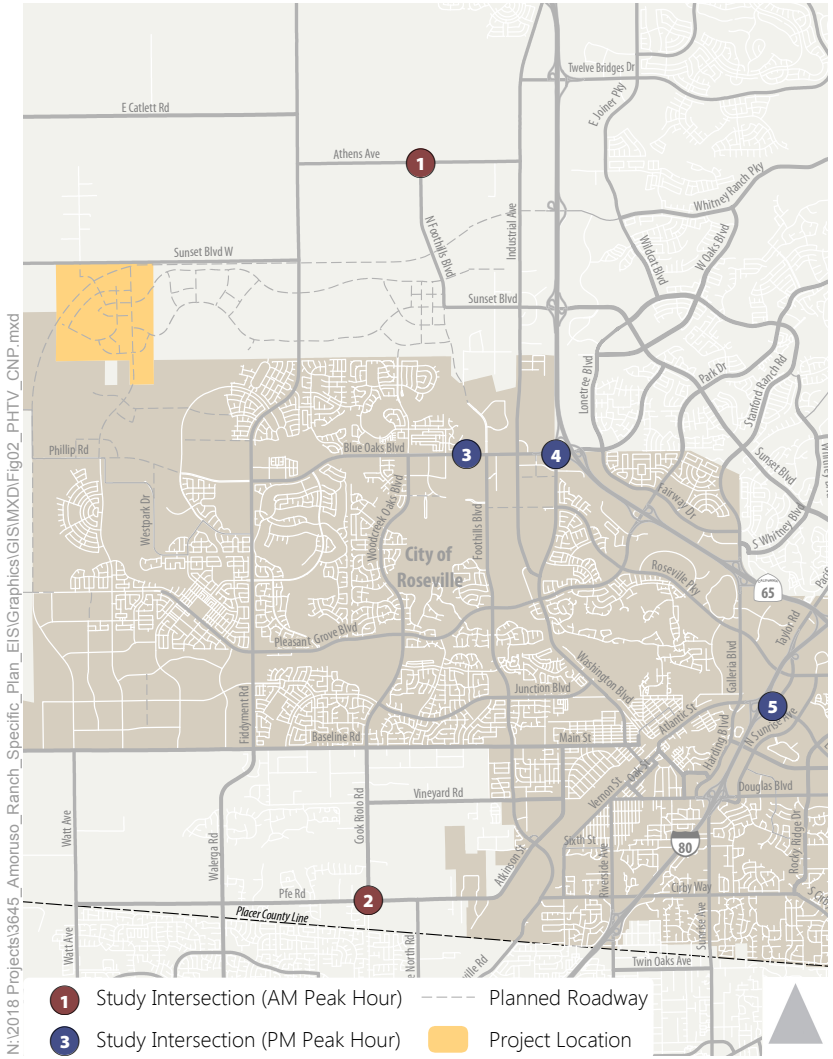
In the *Final Traffic Study for the Amoruso Ranch Specific Plan*, Cumulative traffic forecasts were developed using a process called the difference method. This procedure accounts for potential differences between the base year and existing traffic counts that could otherwise transfer to the future year traffic forecast. This forecasting procedure is calculated as follows:

2035 Cumulative Forecast = Existing Traffic Count +
(2035 Cumulative Raw Model Volume – Base Year Raw Model Volume)

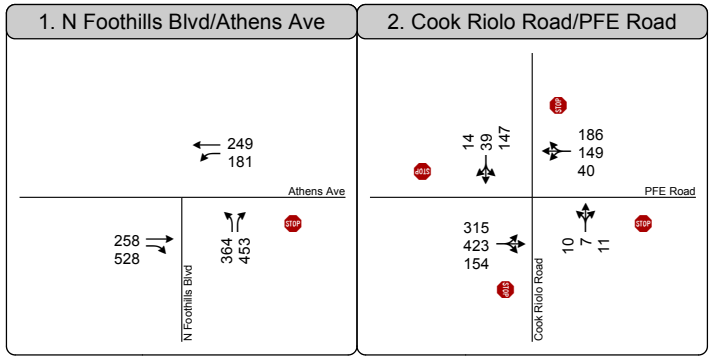
4.3 Plus Project Traffic Forecasting Methodology

In the *Final Traffic Study for the Amoruso Ranch Specific Plan*, the Proposed Project's land uses were added to the Cumulative year version of the City of Roseville travel demand model. The model was run, and the results were checked to confirm that the external vehicle trips generated from the project's traffic analysis zones matched the trip generation totals in Table 8. The model's predicted difference in trips at the study intersections, roadways, and freeway facilities was added to the existing volumes to yield "Cumulative Plus Project" traffic forecasts. This process is not a simple layering of project trips on top of "Cumulative No Project" volumes, rather, it considers the effects that the project could have on subregional travel patterns.

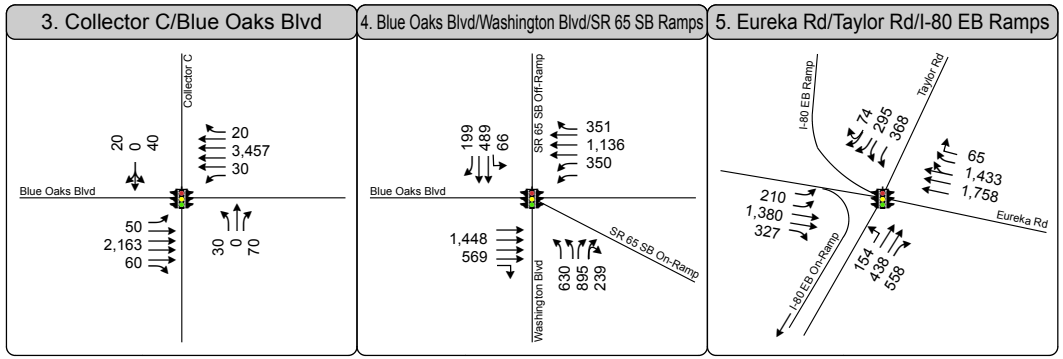
Traffic forecasts for the three project alternatives were developed using the same process as was used in *Final Traffic Study for the Amoruso Ranch Specific Plan*. The intersection forecasts for Cumulative No Project conditions are shown in Figure 2. The intersection forecasts for the No Action alternative as well as Alternatives 1, 2, and 3, are shown in Figure 3, Figure 4, Figure 5, and Figure 6, respectively.



AM Peak Hour



PM Peak Hour



Turn Lane

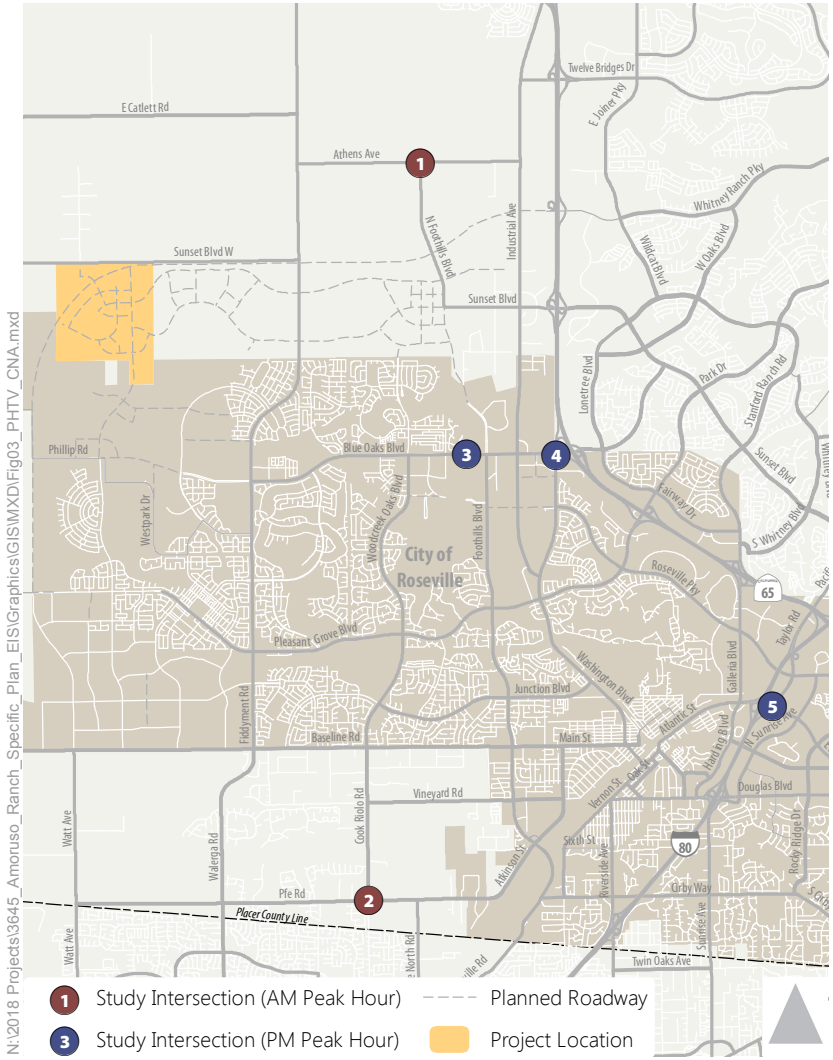
252 Peak Hour Traffic Volume

Traffic Signal

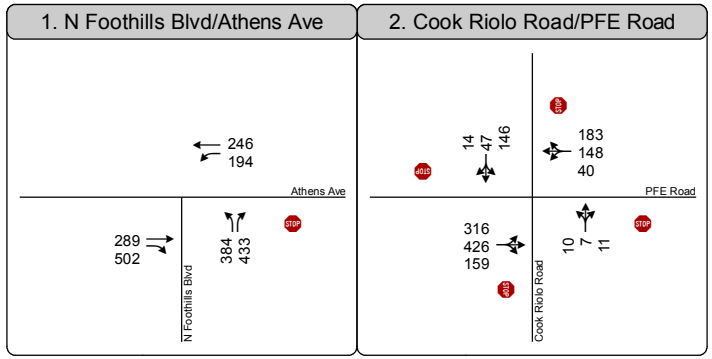
Stop Sign

Figure 2

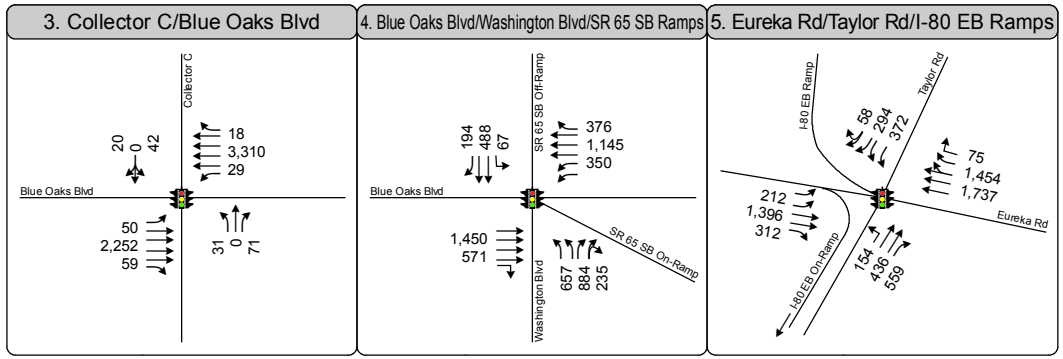
Peak Hour Traffic Volumes and Lane Configurations - Cumulative No Project Conditions



AM Peak Hour



PM Peak Hour



Turn Lane

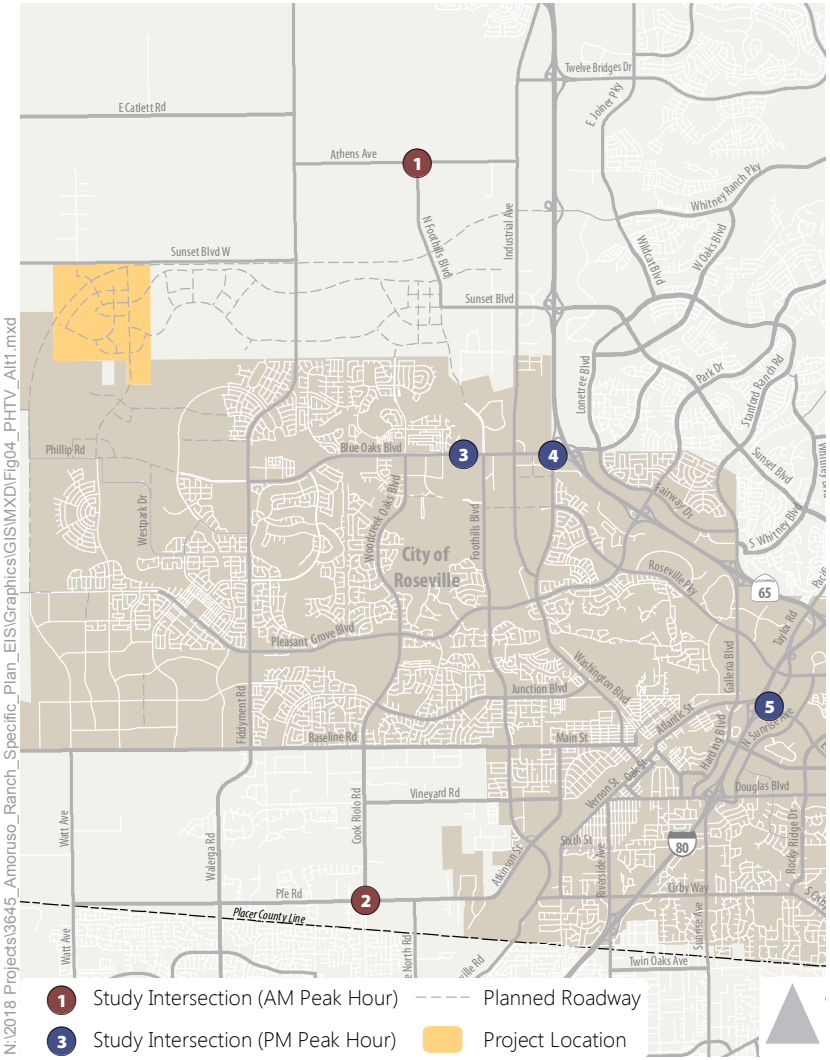
252 Peak Hour Traffic Volume

Traffic Signal

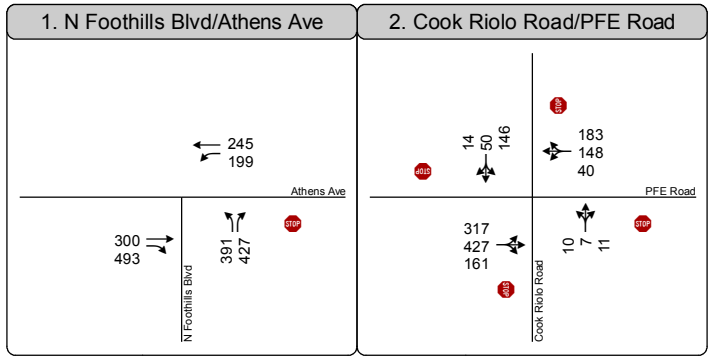
Stop Sign

Figure 3

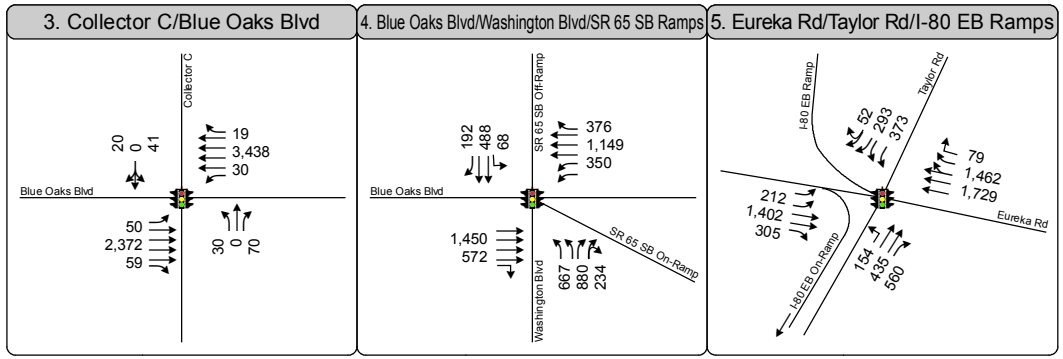
Peak Hour Traffic Volumes and Lane Configurations - Cumulative No Action Alternative Conditions



AM Peak Hour



PM Peak Hour



Turn Lane

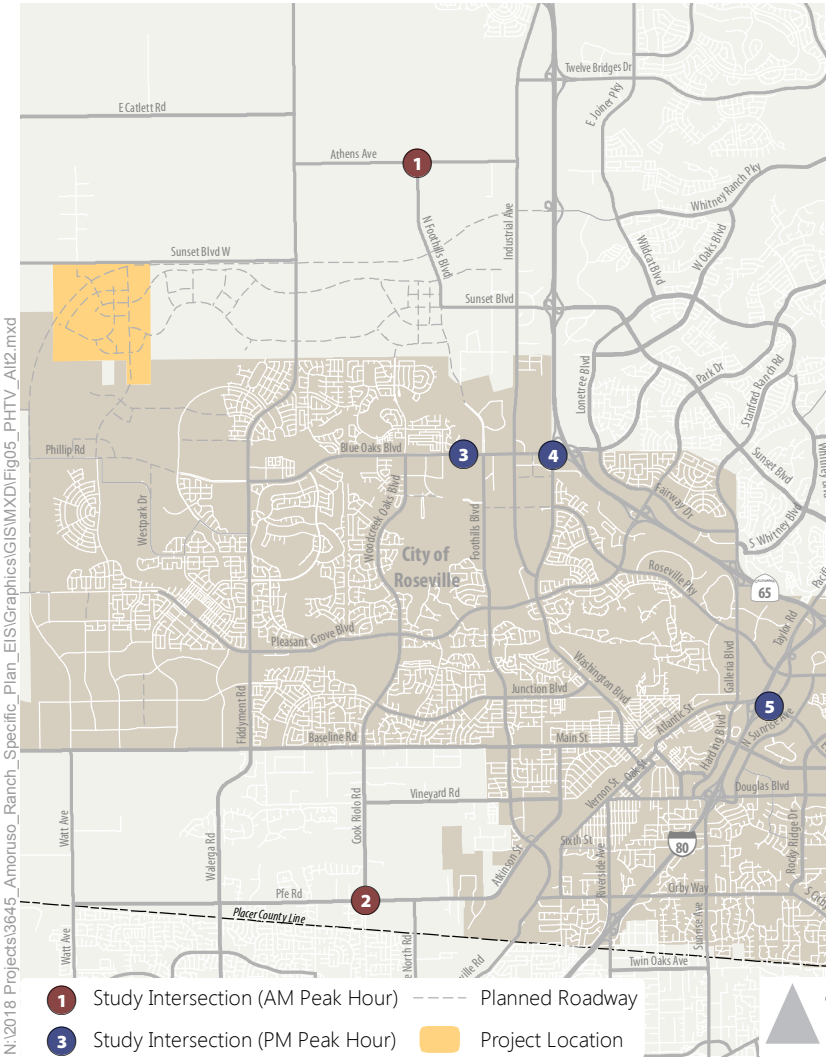
252 Peak Hour Traffic Volume

Traffic Signal

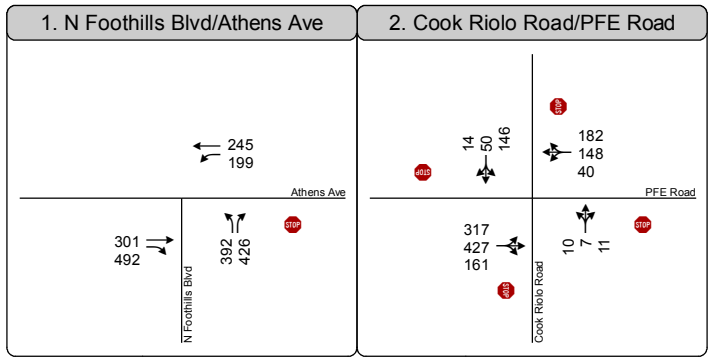
Stop Sign

Figure 4

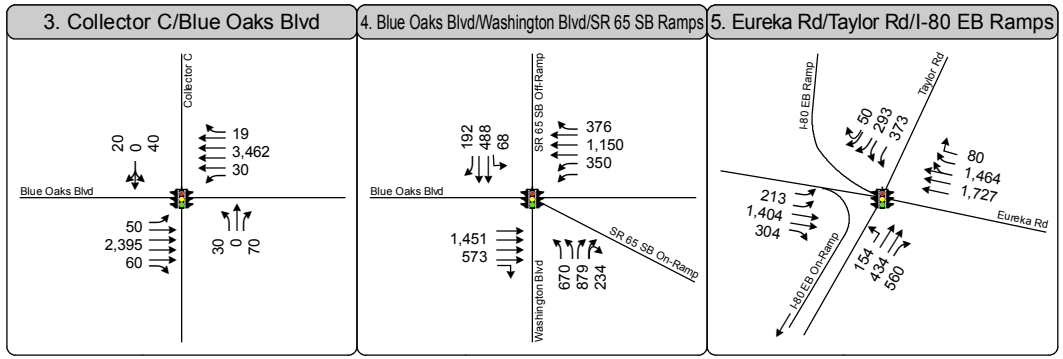
Peak Hour Traffic Volumes and Lane Configurations - Cumulative Plus Alternative 1 Conditions



AM Peak Hour



PM Peak Hour



Turn Lane

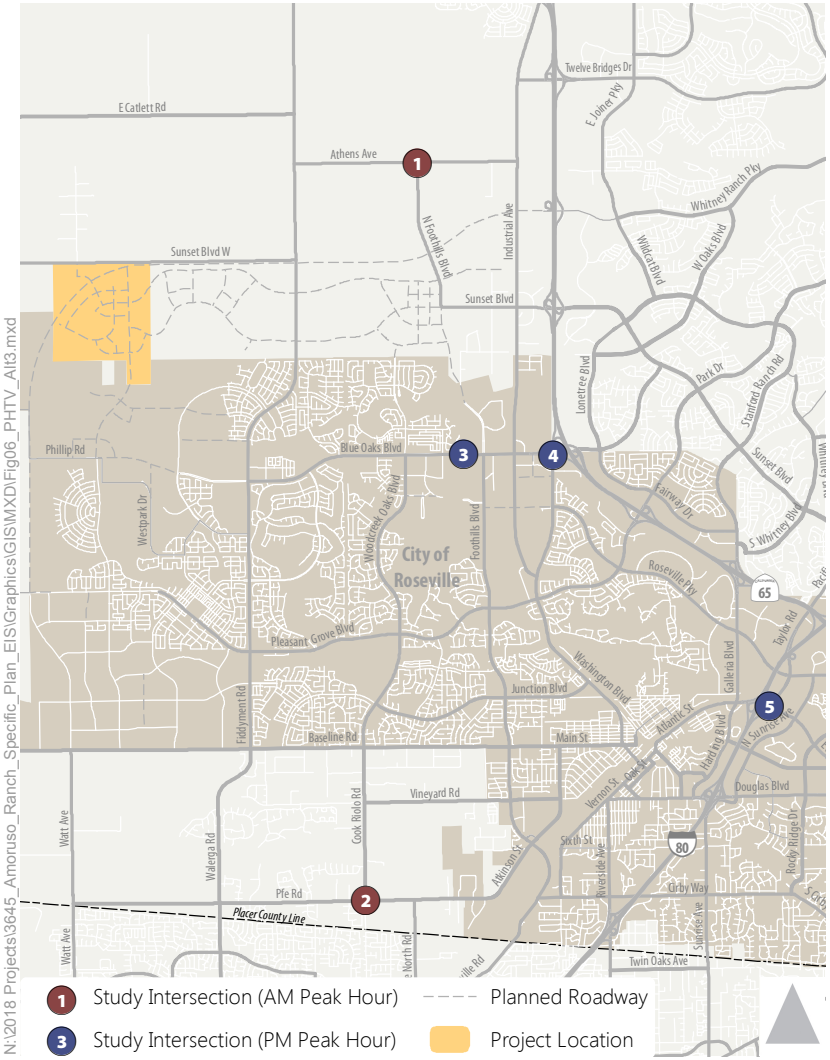
252 Peak Hour Traffic Volume

Traffic Signal

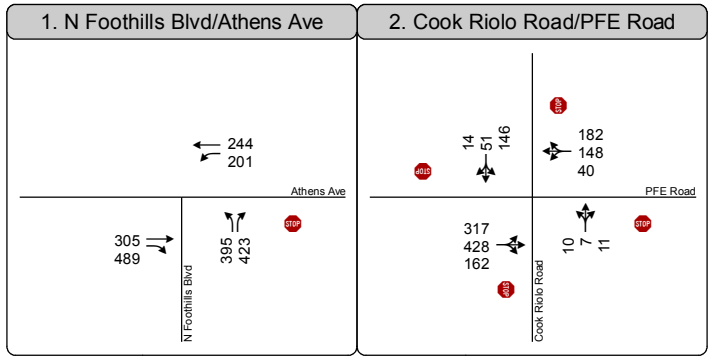
Stop Sign

Figure 5

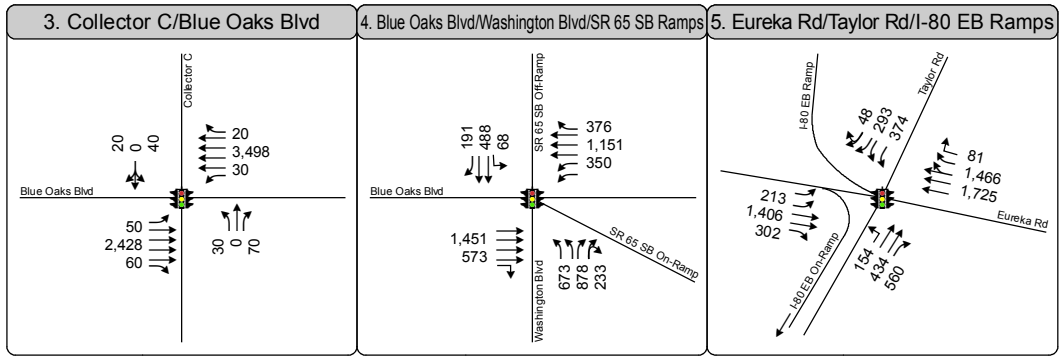
Peak Hour Traffic Volumes and Lane Configurations - Cumulative Plus Alternative 2 Conditions



AM Peak Hour



PM Peak Hour



Turn Lane

252 Peak Hour Traffic Volume

Traffic Signal

Stop Sign

Figure 6

Peak Hour Traffic Volumes and Lane Configurations - Cumulative Plus Alternative 3 Conditions

4.4 City of Roseville Intersection Analysis

Consistent with the *Final Traffic Study for the Amoruso Ranch Specific Plan*, the intersections were studied in SimTraffic software to apply the methodologies to calculate intersection delay and level of service from the *Highway Capacity Manual*. The results of this study are shown in Table 10.

Table 10: City of Roseville PM Peak Hour Intersection Operations - Cumulative Conditions

Intersection	Delay (s) / LOS				
	Cumulative No Project	Cumulative No Action	Cumulative Plus Alternative 1	Cumulative Plus Alternative 2	Cumulative Plus Alternative 3
Blue Oaks Blvd / Collector C	32 / C	34 / C	45 / D	45 / D	45 / D
Blue Oaks Blvd / Washington Blvd / SR 65 SB Ramps	52 / D	51 / D	55 / E	56 / E	56 / E
Eureka Rd / Taylor Rd / I-80 EB Ramps	53 / D	53 / D	54 / D	54 / D	56 / E

Source: Fehr & Peers, 2018.

Because the PM Peak Hour trip generation for Alternative 3 is 95 percent of that of the Proposed Project, the level of service results for the study intersections under Cumulative Plus Alternative 3 Conditions match that of Cumulative Plus Project in the *Final Traffic Study for the Amoruso Ranch Specific Plan*, except for the Eureka Road / Taylor Road / I-80 EB Ramps intersection. Under Cumulative Plus Project Conditions in the *Final Traffic Study for the Amoruso Ranch Specific Plan*, this intersection operates with 55 seconds of delay, which is on the threshold between LOS D and LOS E. This difference is likely the result of variation in SimTraffic runs.

According to Table 10, the project would cause the following impacts:

- Blue Oaks Boulevard / Collector C: degrades from LOS C under Cumulative No Project Conditions to LOS D under Cumulative Plus Alternative 1, Cumulative Plus Alternative 2, and Cumulative Plus Alternative 3 Conditions
- Blue Oaks Boulevard / Washington Boulevard / SR 65 SB Ramps: degrades from LOS D under Cumulative No Project Conditions to LOS E under Cumulative Plus Alternative 1, Cumulative Plus Alternative 2, and Cumulative Plus Alternative 3 Conditions
- Eureka Road / Taylor Road / I-80 EB Ramps: degrades from LOS D under Cumulative No Project Conditions to LOS E under Cumulative Plus Alternative 3 Conditions

4.5 Placer County Intersection Analysis

Table 11 shows the results of the AM Peak Hour intersection analysis for the Placer County study intersections. For consistency with the *Final Traffic Study for the Amoruso Ranch Specific Plan*, this analysis was performed in Synchro to apply the methodologies for calculating intersection delay and level of service in the *Highway Capacity Manual*.

Table 11: Placer County AM Peak Hour Intersection Operations - Cumulative Conditions

Intersection	Traffic Control	Delay (s) / LOS				
		Cumulative No Project	Cumulative No Action	Cumulative Plus Alternative 1	Cumulative Plus Alternative 2	Cumulative Plus Alternative 3
Cook Riolo Rd / PFE Rd	AWSC	193 / F	200 / F	203 / F	203 / F	205 / F
N Foothills Blvd / Athens Ave	SSSC	68 (352) / F (F)	94 (475) / F (F)	105 (527) / F (F)	106 (531) / F (F)	111 (554) / F (F)

AWSC = All-Way Stop-Control. SSSC = Side-Street Stop-Control

1) For all-way stop-controlled intersections in Placer County, the overall delay and LOS is shown.
2) For side-street stop-controlled intersections the overall delay and LOS is shown without parenthesis and the worst movement delay and LOS in parenthesis.

Source: Fehr & Peers, 2018.

Table 11 shows that both study intersections operate unacceptably at LOS F under Cumulative No Project Conditions, and operations are exacerbated with all project alternatives.

4.6 Freeway Analysis

Table 12 shows the results of the freeway operations analysis for the two freeway study segments under all Cumulative alternatives.

Table 12: AM Peak Hour Freeway Operations - Cumulative Conditions

Freeway Segment	Segment Type	Density (pcpmpl[1])/ LOS				
		Cumulative No Project	Cumulative No Action	Cumulative Plus Alternative 1	Cumulative Plus Alternative 2	Cumulative Plus Alternative 3
SR 65 SB between Ferrari Ranch Rd and Lincoln Blvd	Basic	44 / E	45 / E	45 / E	- / F	- / F
SR 65 SB between Twelve Bridges Dr and Placer Pkwy	Basic	45 / E	- / F	- / F	- / F	- / F

Density not reported for facilities operating at LOS F

Source: Fehr & Peers, 2018.

According to Table 12, SR 65 SB between Ferrari Ranch Road and Lincoln Boulevard operates acceptably at LOS E under Cumulative No Project, Cumulative No Action, and Cumulative Plus Alternative 1 Conditions, but operations worsen to unacceptable LOS F under Cumulative Plus Alternative 2 and Cumulative Plus Alternative 3 Conditions.

SR 65 SB between Twelve Bridges Drive and Placer Parkway operates acceptably at LOS E under Cumulative No Project Conditions but degrades to unacceptable operations (LOS F) for all project alternatives, including the No Action Alternative..

5 IMPACTS AND MITIGATION MEASURES

This chapter presents the cumulatively significant impacts to various intersections and freeway facilities. Specific impacts are described below, followed by recommended mitigation measures.

Impact TR-1 **The project would cause signalized intersections in the City of Roseville to be degraded to a significant degree under Cumulative Conditions. This is considered a significant impact.**

The project would cause the operations of the following intersections to degrade during the PM peak hour under Cumulative Conditions. This would be considered a ***significant impact***.

- Blue Oaks Boulevard / Collector C: degrades from LOS C under Cumulative No Project Conditions to LOS D under Cumulative Plus Alternative 1, Cumulative Plus Alternative 2, and Cumulative Plus Alternative 3 Conditions
- Blue Oaks Boulevard / Washington Boulevard / SR 65 SB Ramps: degrades from LOS D under Cumulative No Project Conditions to LOS E under Cumulative Plus Alternative 1, Cumulative Plus Alternative 2, and Cumulative Plus Alternative 3 Conditions
- Eureka Road / Taylor Road / I-80 EB Ramps: degrades from LOS D under Cumulative No Project Conditions to LOS E under Cumulative Plus Alternative 3 Conditions

Mitigation Measures: No feasible mitigations are available for these three impacted intersections. This is the same finding as the *Final Traffic Study for the Amoruso Ranch Specific Plan*. Each location is discussed below:

- *Blue Oaks Boulevard / Collector C*: This intersection would be situated 1,175 feet west of the Foothills Boulevard / Blue Oaks Boulevard intersection. Much of the delay at the Blue Oaks Boulevard / Collector C intersection is caused from the queue spill back from Blue Oaks Boulevard / Foothills Boulevard. In the *Final Traffic Study for the Amoruso Ranch Specific Plan*, the Blue Oaks Boulevard / Foothills Boulevard operated at LOS F under both Cumulative No Project and Cumulative Plus Project Conditions and could only serve 86 percent and 82 percent of travel demand, respectively. Because of these poor operations, it is unlikely that signal

timing modifications at either intersection along the corridor could restore operations at Blue Oaks Boulevard / Collector C to LOS C operations.

- *Blue Oaks Boulevard / Washington Boulevard / SR 65 Ramps*: The Cumulative Conditions analysis assumes additional planned widening (i.e., second northbound right-turn lane and third westbound through lane). No additional widening is possible.

- *Eureka Road / Taylor Road / I-80 EB Ramps*: Beyond what is currently constructed, only a second westbound right-turn lane is planned on Taylor Road in the future. This lane is assumed in place for the Cumulative Conditions analysis. No additional widening is possible.

No feasible mitigation measures are available for the significant impacts at the above three intersections, whose impacts would be considered **significant and unavoidable**.

Impact TR-2 **All project alternatives would cause intersections outside of the City of Roseville to be degraded to a significant degree under Cumulative Conditions. This is considered a significant impact.**

The project would cause the following unsignalized, Placer County intersections to experience degraded operations during the AM Peak Hour under Cumulative Conditions. This would be considered a ***significant impact***.

- Cook Riolo Road / PFE Road: LOS F operations exacerbated with all project alternatives. From Cumulative No Project Conditions, the project would increase overall delay at this intersection by seven seconds under Cumulative No Action, 10 seconds under Cumulative Plus Alternative 1 and Cumulative Plus Alternative 2 Conditions, and by 12 seconds under Cumulative Plus Alternative 3 Conditions.

- N Foothills Boulevard / Athens Avenue: LOS F operations exacerbated with all project alternatives. From Cumulative No Project Conditions, the project would increase overall delay at this intersection by 26 seconds under Cumulative No Action Conditions, 37 seconds under Cumulative Plus Alternative 1 Conditions, 38 seconds under Cumulative Plus Alternative 2 Conditions, and 43 seconds under Cumulative Plus Alternative 3 Conditions.

Mitigation Measures: The following mitigation measures are recommended to restore operations to an acceptable level at each intersection:

- **Mitigation Measure TR-2a**: The project applicant shall pay their fair share cost of any capacity enhancing improvements identified by Placer County at the Cook Riolo Road / PFE Road intersection.

  Placer County staff has indicated that the Dry Creek community does not desire a traffic signal at this location. No other planned improvements have been identified as part of the Dry Creek Community Plan. This mitigation requires the City of Roseville, on behalf of the project applicant, to negotiate in good faith with Placer County to identify the fair share funding contribution toward any capacity-enhancing improvements identified by the County for this intersection. Furthermore, since the type of improvement and its funding is not known, there is no assurance that the remaining funds necessary for construction will be collected. Therefore, the intersection impacts associated with this mitigation is considered **significant and unavoidable.**

- **Mitigation Measure TR-2b**: The project applicant shall pay their fair share cost of installing a traffic signal at the N Foothills Boulevard / Athens Avenue intersection.

  Installation of a traffic signal at this intersection would restore operations to LOS A during the AM Peak Hour for all project alternatives under Cumulative Conditions. This improvement is not included in any known fee program. The mitigation requires the City of Roseville, on behalf of the project applicant, to negotiate in good faith with Placer County to identify the fair share funding contribution. Furthermore, since this improvement is not included in any currently adopted fee program, there is no assurance that remaining funds necessary for construction will be collected. Therefore, the intersection impacts associated with this mitigation is considered **significant and unavoidable**.

Impact TR-3	**The project would cause the operations freeway facilities maintained by Caltrans to degrade by a significant degree under Cumulative Conditions. This is considered a significant impact.**

The project would cause the following significant freeway facility degradations during the AM Peak Hour of Cumulative Conditions. This is considered a ***significant impact***.

- SB SR 65 from Ferrari Ranch Road to Lincoln Boulevard: degrades from LOS E operations under Cumulative No Project Conditions to LOS F under Cumulative Plus Alternative 2 and Cumulative Plus Alternative 3 Conditions.

- SR 65 SB between Twelve Bridges Drive and Placer Parkway: degrades from LOS E under Cumulative No Project Conditions to LOS F under all project alternatives (Cumulative No Action, Cumulative Plus Alternative 1, Cumulative Plus Alternative 2, and Cumulative Plus Alternative 3 Conditions).

Mitigation Measure: The following mitigation measure is recommended to restore operations to an acceptable level of service at the freeway segment. This is the same finding as the *Final Traffic Study for the Amoruso Ranch Specific Plan*.

- **Mitigation Measure TR-3**: The project applicant shall pay the Highway 65 JPA Fee and the South Placer Regional Transportation Fee.

  The Highway 65 JPA Fee assesses fees on new development for the cost of interchange improvements along SR 65. The SPRTA fee provides funding for regional projects such as the State Route 65 Widening, interchange improvements along I-80, and Placer Parkway.

  Because the remaining funding necessary to widen SR 65 to six lanes from north of Whitney Ranch Parkway/Placer Parkway to Ferrari Ranch Road has not been identified, this impact is considered **significant and unavoidable**.

6 REFERENCES

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7 APPENDIX

Appendix A

Existing Conditions Technical Calculations

Intersection 17 **Washington Blvd/Blue Oaks Blvd** **Signal**

		Volume (veh/hr)			Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**% Served**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	384	384	100.1%	52.5	5.2	D
	Through						
	Right Turn	436	429	98.3%	54.0	11.1	D
	Subtotal	**820**	**813**	**99.2%**	**53.4**	**7.0**	**D**
SB	Left Turn	140	140	100.3%	48.2	5.3	D
	Through	256	262	102.5%	46.2	3.5	D
	Right Turn	272	281	103.4%	4.2	0.7	A
	Subtotal	**668**	**684**	**102.4%**	**29.3**	**2.5**	**C**
EB	Left Turn						
	Through	1,036	938	90.5%	37.9	4.4	D
	Right Turn	1,204	1,059	87.9%	50.0	7.3	D
	Subtotal	**2,240**	**1,997**	**89.1%**	**44.3**	**5.7**	**D**
WB	Left Turn	228	232	101.9%	45.9	4.6	D
	Through	684	637	93.2%	20.8	1.8	C
	Right Turn	412	395	95.9%	4.1	0.6	A
	Subtotal	**1,324**	**1,265**	**95.5%**	**20.2**	**1.5**	**C**
Total		**5,052**	**4,759**	**94.2%**	**37.3**	**2.4**	**D**

Intersection 86 **I-80 EB Ramps/Eureka Rd-Atlantic St** **Signalized**

		Volume (veh/hr)			Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**% Served**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	196	210	107.1%	61.5	15.4	E
	Through	628	588	93.6%	50.1	7.4	D
	Right Turn	424	408	96.3%	7.3	1.0	A
	Subtotal	**1248**	**1206**	**96.6%**	**37.7**	**4.8**	**D**
SB	Left Turn	284	271	95.4%	55.8	4.4	E
	Through						
	Right Turn	580	540	93.0%	55.1	14.6	E
	Subtotal	**864**	**810**	**93.8%**	**55.2**	**9.6**	**E**
EB	Left Turn	208	218	105.0%	51.9	5.8	D
	Through	1040	1094	105.2%	30.0	3.4	C
	Right Turn	260	258	99.2%	9.0	0.7	A
	Subtotal	**1508**	**1570**	**104.1%**	**29.6**	**2.9**	**C**
WB	Left Turn						
	Through	1100	1136	103.3%	53.9	11.9	D
	Right Turn	1264	1215	96.1%	49.8	10.2	D
	Subtotal	**2364**	**2351**	**99.4%**	**51.9**	**10.7**	**D**
Total		**5984**	**5937**	**99.2%**	**43.5**	**4.2**	**D**

Intersection 88 **Rocky Ridge Dr/Eureka Rd** **Signalized**

		Volume (veh/hr)			Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**% Served**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	384	374	97.4%	50.0	7.4	D
	Through	288	277	96.1%	26.7	4.4	C
	Right Turn	28	27	95.7%	3.0	0.6	A
	Subtotal	**700**	**678**	**96.8%**	**39.0**	**3.9**	**D**
SB	Left Turn	64	63	98.1%	49.9	6.4	D
	Through	300	286	95.3%	50.8	7.5	D
	Right Turn	128	136	106.3%	4.6	1.8	A
	Subtotal	**492**	**485**	**98.5%**	**37.8**	**7.1**	**D**
EB	Left Turn	124	128	102.9%	47.1	7.9	D
	Through	1004	1005	100.1%	26.7	4.0	C
	Right Turn	276	282	102.2%	2.8	0.4	A
	Subtotal	**1404**	**1414**	**100.7%**	**23.7**	**3.2**	**C**
WB	Left Turn	72	68	94.4%	55.1	6.7	E
	Through	1264	1257	99.5%	37.9	4.2	D
	Right Turn	40	41	103.0%	12.0	5.1	B
	Subtotal	**1376**	**1366**	**99.3%**	**38.0**	**4.1**	**D**
Total		**3972**	**3943**	**99.3%**	**33.1**	**2.9**	**C**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	67	322	7	34	81	80	4	7	15	110	44	58
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	79	379	8	40	95	94	5	8	18	129	52	68

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	466	229	31	249
Volume Left (vph)	79	40	5	129
Volume Right (vph)	8	94	18	68
Hadj (s)	0.06	-0.18	-0.28	-0.03
Departure Headway (s)	5.2	5.3	6.0	5.7
Degree Utilization, x	0.67	0.34	0.05	0.40
Capacity (veh/h)	675	638	487	575
Control Delay (s)	17.8	10.9	9.3	12.5
Approach Delay (s)	17.8	10.9	9.3	12.5
Approach LOS	C	B	A	B

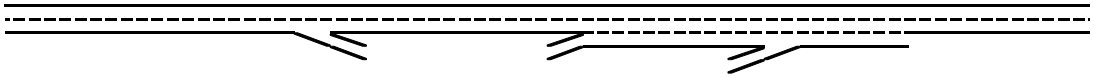
Intersection Summary				
Delay	14.6			
Level of Service	B			
Intersection Capacity Utilization	53.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	138	70	9	165	60	28
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	145	74	9	174	63	29
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			219		338	145
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			219		338	145
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		90	97
cM capacity (veh/h)			1350		653	902

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	145	74	9	174	63	29
Volume Left	0	0	9	0	63	0
Volume Right	0	74	0	0	0	29
cSH	1700	1700	1350	1700	653	902
Volume to Capacity	0.09	0.04	0.01	0.10	0.10	0.03
Queue Length 95th (ft)	0	0	1	0	8	3
Control Delay (s)	0.0	0.0	7.7	0.0	11.1	9.1
Lane LOS			A		B	A
Approach Delay (s)	0.0		0.4		10.5	
Approach LOS					B	

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		

Location	1	2	3	4	5	6



Key

<> Express Lane (HOV)

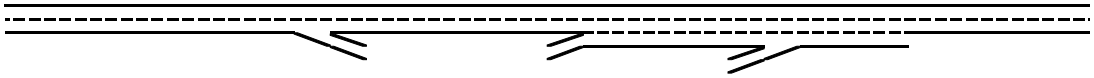
No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Define Freeway Segment						
Type	Basic	Diverge	Basic	Basic	Merge	Basic
Length (ft)	8,330	1,500	1,800	1,000	1,500	870
Accel Length					720	
Decel Length		150				
Mainline Volume	959	959	878	878	1,577	2,121
On Ramp Volume				699	544	
Off Ramp Volume		81				
Express Lane Volume						
EL On Ramp Volume						
EL Off Ramp Volume						
Calculate Flow Rate in General Purpose Lanes (GP)						
GP Volume (vph)	959	959	878	1,577	2,121	2,121
PHF	0.9	0.9	0.9	0.9	0.9	0.9
GP Lanes	2	2	2	3	3	2
Terrain	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.990	0.990	0.990	0.990	0.990	0.990
f_P	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,076	1,076	985	1,770	2,380	2,380
GP Flow (pcphpl)	538	538	493	590	793	1,190
Calculate Speed in General Purpose Lanes						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calculated FFS						
Measured FFS						
FFS Curve	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes						
v/c ratio	0.23	0.23	0.21	0.25	0.34	0.51
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0
Density (pcphpl)	8.3	8.3	7.6	9.1	12.2	18.3
LOS	A	A	A	A	B	C
Calculate Operations for Entering GP Lanes						
GP_{IN} Vol (pcph)		1,076		966	1,641	
GP_{IN} Cap (pcph)		4,700		4,700	7,050	
GP_{IN} v/c ratio		0.23		0.21	0.23	
Calculate Operations for Exiting GP Lanes						
GP_{OUT} Vol (pcph)		983			2,380	
GP_{OUT} Cap (pcph)		4,700			7,050	
GP_{OUT} v/c ratio		0.21			0.34	

Project: Amoruso Ranch EIR
Freeway Corridor: SB SR-65

Existing Conditions
Time Period: 2014 AM Peak Hour

Location	1	2	3	4	5	6



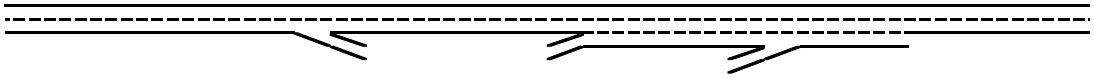
Key

<> Express Lane (HOV)

No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Flow Rate in Express Lanes (EL)						
EL Volume (vph)						
PHF						
Express Lanes	0	0	0	0	0	0
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T	1.5	1.5	1.5	1.5	1.5	
E_R	1.2	1.2	1.2	1.2	1.2	
f_{HV}	0.990	0.990	0.990	0.990	0.990	
f_P						
EL Flow (pcph)						
EL Flow (pcphpl)						
Calculate Speed in Express Lanes						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calc'd FFS						
Measured FFS						
FFS						
Calculate Operations in Express Lanes						
EL_{IN} v/c ratio						
Calculate On Ramp Flow Rate						
On Volume (vph)				699	544	
PHF				0.878	0.743	
Total Lanes				1	1	
Terrain				Level	Level	
Grade %				0.0%	0.0%	
Grade Length (mi)				0.00	0.00	
Truck & Bus %				2.0%	2.0%	
RV %				0.0%	0.0%	
E_T				1.5	1.5	
E_R				1.2	1.2	
f_{HV}				0.990	0.990	
f_P				1.00	1.00	
On Flow (pcph)				804	739	
On Flow (pcphpl)				804	739	
Calculate On Ramp Roadway Operations						
On Ramp Type				Right	Right	
On Ramp Speed (mph)				25	45	
On Ramp Cap (pcph)				1,900	2,100	
On Ramp v/c ratio				0.42	0.35	

Location	1	2	3	4	5	6



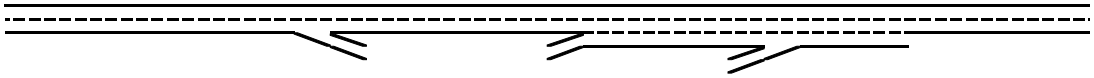
Key

<> Express Lane (HOV)

No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Off Ramp Flow Rate						
Off Volume (vph)		81				
PHF		0.88				
Total Lanes		1				
Terrain		Level				
Grade %		0.0%				
Grade Length (mi)		0.00				
Truck & Bus %		2.0%				
RV %		0.0%				
E_T		1.5				
E_R		1.2				
f_{HV}		0.990				
f_P		1.00				
Off Flow (pcph)		93				
Off Flow (pcphpl)		93				
Calculate Off Ramp Roadway Operations						
Off Ramp Type		Right				
Off Ramp Speed		45				
Off Ramp Cap (pcph)		2,100				
Off Ramp v/c ratio		0.04				
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps						
Up Type					On	
Up Distance					1,000	
Up Flow (pcph)					804	
Down Type						
Down Distance						
Down Flow (pcph)						
Calculate Merge Influence Area Operations						
Effective v_P (pcph)					1,641	
Up Ramp L_{EQ}					780	
Down Ramp L_{EQ}						
P_{FM} (Eqn 13-3)					0.598	
P_{FM} (Eqn 13-4)						
P_{FM} (Eqn 13-5)						
P_{FM}					0.598	
v_{12} (pcph)					981	
v_3 (pcph)					660	
v_{34} (pcph)						
v_{12a} (pcph)					981	
v_{R12a} (pcph)					1,720	
Merge Speed Index					0.28	
Merge Area Speed					58.6	
Outer Lanes Volume					660	
Outer Lanes Speed					64.4	
Segment Speed					60.1	
Merge v/c ratio					0.37	
Merge Density					14.0	
Merge LOS					B	

Location	1	2	3	4	5	6



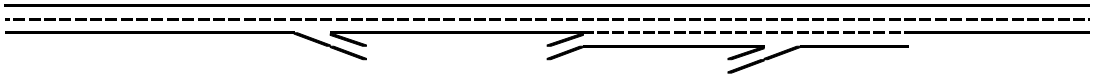
Key

<> Express Lane (HOV)

No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Diverge Influence Area Operations						
Effective v_P (pcph)		1,076				
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FD} (Eqn 13-9)		0.729				
P_{FD} (Eqn 13-10)						
P_{FD} (Eqn 13-11)						
P_{FD}		1.000				
v_{12} (pcph)		1,076				
v_3 (pcph)						
v_{34} (pcph)						
v_{12a} (pcph)		1,076				
Diverge Speed Index		0.31				
Diverge Area Speed		58.0				
Outer Lanes Volume						
Outer Lanes Speed						
Segment Speed		58.0				
Diverge v/c ratio		0.24				
Diverge Density		12.2				
Diverge LOS		B				
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments						
On to Off Volume (vph)						
PHF						
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T						
E_R						
f_{HV}						
f_P						
On to Off Flow (pcph)						
Calculate On Ramp to Mainline Flow Rate for Weave Segments						
On to ML Volume (vph)						
PHF						
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T						
E_R						
f_{HV}						
f_P						
On to ML Flow (pcph)						

Location	1	2	3	4	5	6



Key

<> Express Lane (HOV)

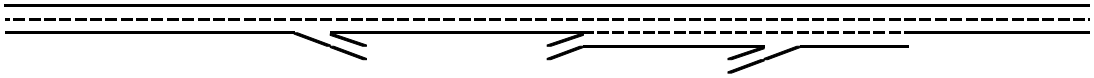
No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Mainline to Off Ramp Flow Rate for Weave Segments						
ML to Off Volume (vph)						
PHF						
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T						
E_R						
f_{HV}						
f_P						
ML to Off Flow (pcph)						
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segments						
GP to GP Volume (vph)						
PHF						
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T						
E_R						
f_{HV}						
f_P						
GP to GP Flow (pcph)						

Project: Amoruso Ranch EIR
Freeway Corridor: SB SR-65

Existing Conditions
Time Period: 2014 AM Peak Hour

Location	1	2	3	4	5	6



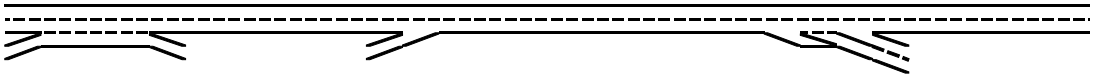
Key

<> Express Lane (HOV)

No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Weave Segment Operations						
Weave Type						
Weave Length						
Segment Lanes						
Weave Lanes						
Weave Flow (pcph)						
Non-Weave Flow						
Segment Flow						
Max Weave Length						
Length Check						
Ideal Weave Capacity						
f_{HV}						
f_P						
Capacity Condition 1						
Capacity Condition 2						
Weave v/c ratio						
Interchange Density						
Lane Changes On to ML						
Lane Changes ML to Off						
Lane Changes On to Off						
Min Lane Change Rate						
Weave LC Rate						
Non-Weave LC Rate 1						
Non-Weave LC Rate 2						
Non-Weave LC Rate 3						
Segment LC Rate						
Weave Intensity Factor						
Weave Speed						
Non-Weave Speed						
Segment Speed						
Weave Density						
Weave LOS						
Summarize Segment Operations						
Segment v/c ratio	0.23	0.24	0.21	0.25	0.37	0.51
Segment Density	8.3	12.2	7.6	9.1	14.0	18.3
Segment LOS	A	B	A	A	B	C
Over Capacity						

Location	7	8	9	10	11	12



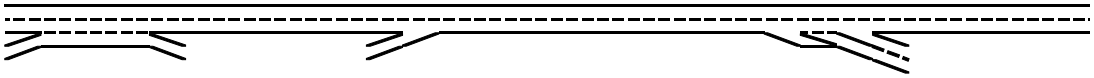
Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Susnet Blvd	Sunset Blvd Off-Ramp	Sunset Off to On-Ramp
Define Freeway Segment						
Type	Weave	Basic	Merge	Basic	Diverge	Basic
Length (ft)	3,050	1,120	1,500	7,650	1,500	2,000
Accel Length			450			
Decel Length					1,500	
Mainline Volume	2,121	2,496	2,496	3,068	3,068	2,508
On Ramp Volume	886		572			
Off Ramp Volume	511				560	
Express Lane Volume						
EL On Ramp Volume						
EL Off Ramp Volume						
Calculate Flow Rate in General Purpose Lanes (GP						
GP Volume (vph)	3,007	2,496	3,068	3,068	3,068	2,508
PHF	0.9	0.9	0.9	0.9	0.9	0.9
GP Lanes	3	2	2	2	2	2
Terrain	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.990	0.990	0.990	0.990	0.990	0.990
f_P	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,375	2,801	3,443	3,443	3,443	2,815
GP Flow (pcphpl)	1,125	1,401	1,721	1,721	1,721	1,407
Calculate Speed in General Purpose Lanes						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calculated FFS						
Measured FFS						
FFS Curve	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes						
v/c ratio	0.48	0.60	0.73	0.73	0.73	0.60
Speed (mph)	65.0	65.0	63.5	63.5	63.5	65.0
Density (pcphpl)	17.3	21.5	27.1	27.1	27.1	21.7
LOS	B	C	D	D	D	C
Calculate Operations for Entering GP Lanes						
GP_{IN} Vol (pcph)	2,372		2,828		3,443	
GP_{IN} Cap (pcph)	4,700		4,700		4,700	
GP_{IN} v/c ratio	0.50		0.60		0.73	
Calculate Operations for Exiting GP Lanes						
GP_{OUT} Vol (pcph)	2,636		3,443		2,708	
GP_{OUT} Cap (pcph)	4,700		4,700		4,700	
GP_{OUT} v/c ratio	0.56		0.73		0.58	

Location	7	8	9	10	11	12



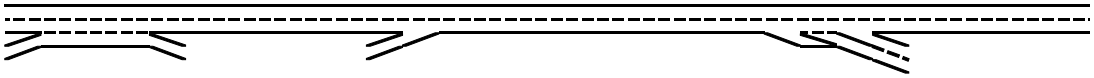
Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Susnet Blvd	Sunset Blvd Off-Ramp	Sunset Off to On-Ramp
Calculate Flow Rate in Express Lanes (EL)						
EL Volume (vph)						
PHF						
Express Lanes	0	0	0	0	0	0
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T	1.5	1.5	1.5		1.5	1.5
E_R	1.2	1.2	1.2		1.2	1.2
f_{HV}	0.990	0.990	0.990		0.990	0.990
f_P						
EL Flow (pcph)						
EL Flow (pcphpl)						
Calculate Speed in Express Lanes						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calc'd FFS						
Measured FFS						
FFS						
Calculate Operations in Express Lanes						
EL_{IN} v/c ratio						
Calculate On Ramp Flow Rate						
On Volume (vph)	886		572			
PHF	0.893		0.94			
Total Lanes	1		1			
Terrain	Level		Level			
Grade %	0.0%		0.0%			
Grade Length (mi)	0.00		0.00			
Truck & Bus %	2.0%		2.0%			
RV %	0.0%		0.0%			
E_T	1.5		1.5			
E_R	1.2		1.2			
f_{HV}	0.990		0.990			
f_P	1.00		1.00			
On Flow (pcph)	1,002		615			
On Flow (pcphpl)	1,002		615			
Calculate On Ramp Roadway Operations						
On Ramp Type	Right		Right			
On Ramp Speed (mph)	45		25			
On Ramp Cap (pcph)	2,100		1,900			
On Ramp v/c ratio	0.48		0.32			

Location	7	8	9	10	11	12



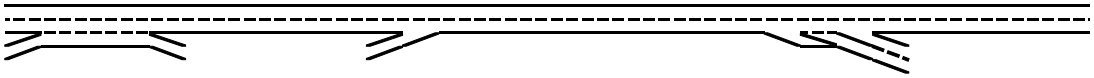
Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Susnet Blvd	Sunset Blvd Off-Ramp	Sunset Off to On-Ramp
Calculate Off Ramp Flow Rate						
Off Volume (vph)	511				560	
PHF	0.706				0.77	
Total Lanes	1				2	
Terrain	Level				Level	
Grade %	0.0%				0.0%	
Grade Length (mi)	0.00				0.00	
Truck & Bus %	4.0%				2.0%	
RV %	0.0%				0.0%	
E_T	1.5				1.5	
E_R	1.2				1.2	
f_{HV}	0.980				0.990	
f_P	1.00				1.00	
Off Flow (pcph)	738				735	
Off Flow (pcphpl)	738				367	
Calculate Off Ramp Roadway Operations						
Off Ramp Type	Right				Right	
Off Ramp Speed	45				45	
Off Ramp Cap (pcph)	2,100				4,200	
Off Ramp v/c ratio	0.35				0.17	
Determine Adjacent Ramp for Three-Lane Mainline						
Up Type						
Up Distance						
Up Flow (pcph)						
Down Type						
Down Distance						
Down Flow (pcph)						
Calculate Merge Influence Area Operations						
Effective v_P (pcph)			2,828			
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FM} (Eqn 13-3)			0.590			
P_{FM} (Eqn 13-4)						
P_{FM} (Eqn 13-5)						
P_{FM}			1.000			
v_{12} (pcph)			2,828			
v_3 (pcph)						
v_{34} (pcph)						
v_{12a} (pcph)			2,828			
v_{R12a} (pcph)			3,443			
Merge Speed Index			0.42			
Merge Area Speed			55.3			
Outer Lanes Volume						
Outer Lanes Speed						
Segment Speed			55.3			
Merge v/c ratio			0.75			
Merge Density			29.2			
Merge LOS			D			

Location	7	8	9	10	11	12



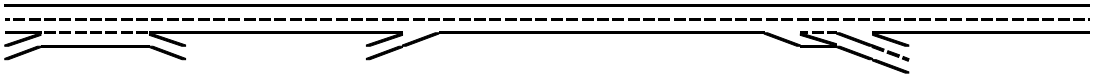
Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Susnet Blvd	Sunset Blvd Off-Ramp	Sunset Off to On-Ramp
Calculate Diverge Influence Area Operations						
Effective v_P (pcph)					3,443	
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FD} (Eqn 13-9)					0.640	
P_{FD} (Eqn 13-10)						
P_{FD} (Eqn 13-11)						
P_{FD}					1.000	
v_{12} (pcph)					3,443	
v_3 (pcph)						
v_{34} (pcph)						
v_{12a} (pcph)					3,443	
Diverge Speed Index					0.36	
Diverge Area Speed					56.6	
Outer Lanes Volume						
Outer Lanes Speed						
Segment Speed					56.6	
Diverge v/c ratio					0.78	
Diverge Density					20.4	
Diverge LOS					C	
Calculate On Ramp to Off Ramp Flow Rate for Wea						
On to Off Volume (vph)	89					
PHF	0.95					
Terrain	Level					
Grade %	0.0%					
Grade Length (mi)	0.00					
Truck & Bus %	3.0%					
RV %	0.0%					
E_T	1.5					
E_R	1.2					
f_{HV}	0.985					
f_P	1.00					
On to Off Flow (pcph)	95					
Calculate On Ramp to Mainline Flow Rate for Weav						
On to ML Volume (vph)	797					
PHF	0.95					
Terrain	Level					
Grade %	0.0%					
Grade Length (mi)	0.00					
Truck & Bus %	3.0%					
RV %	0.0%					
E_T	1.5					
E_R	1.2					
f_{HV}	0.985					
f_P	1.00					
On to ML Flow (pcph)	852					

Location	7	8	9	10	11	12



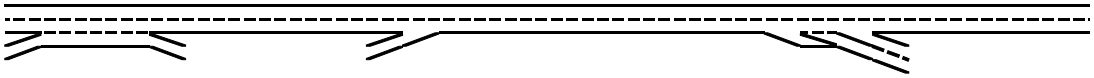
Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Susnet Blvd	Sunset Blvd Off-Ramp	Sunset Off to On-Ramp
Calculate Mainline to Off Ramp Flow Rate for Weav						
ML to Off Volume (vph)	422					
PHF	0.85					
Terrain	Level					
Grade %	0.0%					
Grade Length (mi)	0.00					
Truck & Bus %	2.0%					
RV %	0.0%					
E_T	1.5					
E_R	1.2					
f_{HV}	0.990					
f_P	1.00					
ML to Off Flow (pcph)	502					
Calculate General Purpose Lanes to General Purpo						
GP to GP Volume (vph)	1,699					
PHF	0.85					
Terrain	Level					
Grade %	0.0%					
Grade Length (mi)	0.00					
Truck & Bus %	2.0%					
RV %	0.0%					
E_T	1.5					
E_R	1.2					
f_{HV}	0.990					
f_P	1.00					
GP to GP Flow (pcph)	2,018					

Location	7	8	9	10	11	12



Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Susnet Blvd	Sunset Blvd Off-Ramp	Sunset Off to On-Ramp
Calculate Weave Segment Operations						
Weave Type	One-sided					
Weave Length	2,050					
Segment Lanes	3					
Weave Lanes	2					
Weave Flow (pcph)	1,354					
Non-Weave Flow	2,113					
Segment Flow	3,467					
Max Weave Length	6,575					
Length Check	OK					
Ideal Weave Capacity	2,004					
f_{HV}	0.989					
f_P	0.996					
Capacity Condition 1	5,922					
Capacity Condition 2	6,055					
Weave v/c ratio	0.58					
Interchange Density						
Lane Changes On to ML						
Lane Changes ML to Off						
Lane Changes On to Off						
Min Lane Change Rate						
Weave LC Rate						
Non-Weave LC Rate 1						
Non-Weave LC Rate 2						
Non-Weave LC Rate 3						
Segment LC Rate						
Weave Intensity Factor						
Weave Speed						
Non-Weave Speed						
Segment Speed						
Weave Density						
Weave LOS						
Summarize Segment Operations						
Segment v/c ratio	0.58	0.60	0.75	0.73	0.78	0.60
Segment Density		21.5	29.2	27.1	20.4	21.7
Segment LOS		C	D	D	C	C
Over Capacity						

Appendix B

Trip Generation Technical Calculations

MIXED USE TRIP GENERATION MODEL - BASIC INPUT

All shaded cells are inputs
Regular inputs (project-specific)
Inputs that may depend on regional values from census data, travel demand model, etc…
Treat like other inputs, but please send values and source to Mackenzie Watten so that a library of values can be compiled in future versions!

Section 1 - General Site Information

Site Name	Amoruso Ranch	int/sq mi	182

Geographic

		Notes / Instructions
Developed Area (in acres)	436.74	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	124	Count intersections either within or on the perimeter of the MXD. Check resulting intersections per square mile in blue above
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Proportion of households within 1/4 mile of a transit stop	0%	Enter as a percentage

Land Use - Surrounding Area

Is the site in a Central Business District and/or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	0	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	0	Include employment within the MXD itself
Total Regional Employment	966,900	Employment at MPO or similar level

This can be a difficult number to get - some suggestions are in the instructions tab in "disclaimers and warnings"
If in the 9 county Bay Area, can use the MTCJobsWithin30MinutesByTransit.xls sheet on the wiki!

Site Demographics

Enter Population Directly?	No	If "No", will apply average HH size factors (immediately below) to dwelling unit totals in section 2
Population		You do not need to enter population here. It will be calculated based on dwelling units below and average HH sizes.
Use Surrounding Area (Block Group) Demographics for On-Site Average HH Size?	Yes	If no project-specific information exists, can use block group average HH size (see below)
Use Surrounding Area (Block Group) Demographics for On-Site Average Veh Own?	Yes	If no project-specific information exists, can use block group average veh owned (see below)

Surrounding Area (Block Group) Demographics

Average HH size near Site	2.74	See http://factfinder2.census.gov/
Average Vehicles Owned per Dwelling Unit near Site	1.80	See http://factfinder2.census.gov/

Section 2 - Trip Generation

				Trip Equation Method			Trips		
	Quantity	Units		Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units									
Single Family	1095	DU		Average Rate	Average Rate	Average Rate	10,424	821	1,095
Multi-Family	584	DU		Average Rate	Average Rate	Average Rate	3,884	298	362
Townhouse	0	DU		Log Equation	Log Equation	Log Equation	0	0	0
High Rise Condo	0	DU		Linear Equation	Linear Equation	Linear Equation	0	0	0
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)									
General Retail other than those listed below	263	ksf		Average Rate	Average Rate	Average Rate	11,230	252	976
Supermarket	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Bank	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Health Club	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Restaurant (non-fast food)	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Fast-Food Restaurant	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Gas Station	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Auto Repair	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Home Improvement Superstore		ksf		Average Rate	Average Rate	Average Rate	0	0	0
Free-Standing Discount		ksf		Average Rate	Average Rate	Average Rate	0	0	0
Office									
Non-Medical	20	ksf		Average Rate	Average Rate	Average Rate	221	31	30
Medical	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Industrial									
Light Industrial	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Manufacturing	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Warehousing / Self-Storage	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Hotel (including restaurant, facilities, etc…)	0	Rooms		Average Rate	Average Rate	Average Rate	0	0	0
Motel		Rooms		Average Rate	Average Rate	Average Rate	0	0	0
Movie Theater (Theater with Matinee)				Average Rate	Average Rate	Average Rate	0	0	0
Movie Theater (Multiplex)	0	Screens		Average Rate	Average Rate	Average Rate	0	0	0
School									
University		Students		Linear Equation	Average Rate	Average Rate	0	0	0
High School		Students		Average Rate	Average Rate	Average Rate	0	0	0
Middle School		Students		Average Rate	Average Rate	Average Rate	0	0	0
Elementary	800	Students		Average Rate	Average Rate	Average Rate	1,032	360	120
Trips from Land uses not covered above ==>									
Daily									
AM Peak Hour									
PM Peak Hour									
Jobs in those Land Uses	0								

	Daily	AM Peak Hour	PM Peak Hour
Total "Raw" ITE Trips	**26,791**	**1,763**	**2,583**

External Vehicle Trips	Raw	Net	Reduction %
Daily	26,791	21,574	19%
AM Peak Hour	1,763	1,379	22%
PM Peak Hour	2,583	1,923	26%

MIXED USE TRIP GENERATION MODEL - BASIC INPUT

All shaded cells are inputs
Regular inputs (project-specific)
Inputs that may depend on regional values from census data, travel demand model, etc…
Treat like other inputs, but please send values and source to Mackenzie Watten so that a library of values can be compiled in future versions!

Section 1 - General Site Information

Site Name	Amoruso Ranch Alternative 1	int/sq mi	182

Geographic — **Notes / Instructions**

Developed Area (in acres)	436.74	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	124	Count intersections either within or on the perimeter of the MXD. Check resulting intersections per square mile in blue above
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Proportion of households within 1/4 mile of a transit stop	0%	Enter as a percentage

Land Use - Surrounding Area

Is the site in a Central Business District and/or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	0	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	0	Include employment within the MXD itself
Total Regional Employment	966,900	Employment at MPO or similar level

This can be a difficult number to get - some suggestions are in the instructions tab in "disclaimers and warnings"
If in the 9 county Bay Area, can use the MTCJobsWithin30MinutesByTransit.xls sheet on the wiki!

Site Demographics

Enter Population Directly?	No	If "No", will apply average HH size factors (immediately below) to dwelling unit totals in section 2
Population		You do not need to enter population here. It will be calculated based on dwelling units below and average HH sizes.
Use Surrounding Area (Block Group) Demographics for On-Site Average HH Size?	Yes	If no project-specific information exists, can use block group average HH size (see below)
Use Surrounding Area (Block Group) Demographics for On-Site Average Veh Own?	Yes	If no project-specific information exists, can use block group average veh owned (see below)

Surrounding Area (Block Group) Demographics

Average HH size near Site	2.74	See http://factfinder2.census.gov/
Average Vehicles Owned per Dwelling Unit near Site	1.80	See http://factfinder2.census.gov/

Section 2 - Trip Generation

			Trip Equation Method			Trips		
	Quantity	Units	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units								
Single Family	1499	DU	Average Rate	Average Rate	Average Rate	14,270	1,124	1,499
Multi-Family	809	DU	Average Rate	Average Rate	Average Rate	5,380	413	502
Townhouse	0	DU	Log Equation	Log Equation	Log Equation	0	0	0
High Rise Condo	0	DU	Linear Equation	Linear Equation	Linear Equation	0	0	0
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)								
General Retail other than those listed below	442	ksf	Average Rate	Average Rate	Average Rate	18,873	424	1,640
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Home Improvement Superstore		ksf	Average Rate	Average Rate	Average Rate	0	0	0
Free-Standing Discount		ksf	Average Rate	Average Rate	Average Rate	0	0	0
Office								
Non-Medical	34	ksf	Average Rate	Average Rate	Average Rate	375	53	51
Medical	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Industrial								
Light Industrial	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0
Motel		Rooms	Average Rate	Average Rate	Average Rate	0	0	0
Movie Theater (Theater with Matinee)			Average Rate	Average Rate	Average Rate	0	0	0
Movie Theater (Multiplex)	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0
School								
University		Students	Linear Equation	Average Rate	Average Rate	0	0	0
High School		Students	Average Rate	Average Rate	Average Rate	0	0	0
Middle School		Students	Average Rate	Average Rate	Average Rate	0	0	0
Elementary	800	Students	Average Rate	Average Rate	Average Rate	1,032	360	120
Trips from Land uses not covered above ==>								
Daily								
AM Peak Hour								
PM Peak Hour								
Jobs in those Land Uses	0							

	Daily	AM Peak Hour	PM Peak Hour
Total "Raw" ITE Trips	**39,931**	**2,374**	**3,811**

	External Vehicle Trips		
	Raw	Net	Reduction %
Daily	39,931	31,799	20.4%
AM Peak Hour	2,374	1,850	22.1%
PM Peak Hour	3,811	2,771	27.3%

MIXED USE TRIP GENERATION MODEL - BASIC INPUT

All shaded cells are inputs
Regular inputs (project-specific)
Inputs that may depend on regional values from census data, travel demand model, etc…
Treat like other inputs, but please send values and source to Mackenzie Watten so that a library of values can be compiled in future versions!

Section 1 - General Site Information

Site Name	Amoruso Ranch Alternative 2	int/sq mi	182

Geographic — **Notes / Instructions**

Developed Area (in acres)	436.74	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	124	Count intersections either within or on the perimeter of the MXD. Check resulting intersections per square mile in blue above
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Proportion of households within 1/4 mile of a transit stop	0%	Enter as a percentage

Land Use - Surrounding Area

Is the site in a Central Business District and/or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	0	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	0	Include employment within the MXD itself
Total Regional Employment	966,900	Employment at MPO or similar level

This can be a difficult number to get - some suggestions are in the instructions tab in "disclaimers and warnings"
If in the 9 county Bay Area, can use the MTCJobsWithin30MinutesByTransit.xls sheet on the wiki!

Site Demographics

Enter Population Directly?	No	If "No", will apply average HH size factors (immediately below) to dwelling unit totals in section 2
Population		You do not need to enter population here. It will be calculated based on dwelling units below and average HH sizes.
Use Surrounding Area (Block Group) Demographics for On-Site Average HH Size?	Yes	If no project-specific information exists, can use block group average HH size (see below)
Use Surrounding Area (Block Group) Demographics for On-Site Average Veh Own?	Yes	If no project-specific information exists, can use block group average veh owned (see below)

Surrounding Area (Block Group) Demographics

Average HH size near Site	2.74	See http://factfinder2.census.gov/
Average Vehicles Owned per Dwelling Unit near Site	1.80	See http://factfinder2.census.gov/

Section 2 - Trip Generation

			Trip Equation Method			Trips		
	Quantity	Units	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units								
Single Family	1607	DU	Average Rate	Average Rate	Average Rate	15,299	1,205	1,607
Multi-Family	810	DU	Average Rate	Average Rate	Average Rate	5,387	413	502
Townhouse	0	DU	Log Equation	Log Equation	Log Equation	0	0	0
High Rise Condo	0	DU	Linear Equation	Linear Equation	Linear Equation	0	0	0
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)								
General Retail other than those listed below	442	ksf	Average Rate	Average Rate	Average Rate	18,873	424	1,640
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Home Improvement Superstore		ksf	Average Rate	Average Rate	Average Rate	0	0	0
Free-Standing Discount		ksf	Average Rate	Average Rate	Average Rate	0	0	0
Office								
Non-Medical	34	ksf	Average Rate	Average Rate	Average Rate	375	53	51
Medical	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Industrial								
Light Industrial	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0
Motel		Rooms	Average Rate	Average Rate	Average Rate	0	0	0
Movie Theater (Theater with Matinee)			Average Rate	Average Rate	Average Rate	0	0	0
Movie Theater (Multiplex)	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0
School								
University		Students	Linear Equation	Average Rate	Average Rate	0	0	0
High School		Students	Average Rate	Average Rate	Average Rate	0	0	0
Middle School		Students	Average Rate	Average Rate	Average Rate	0	0	0
Elementary	800	Students	Average Rate	Average Rate	Average Rate	1,032	360	120
Trips from Land uses not covered above ==>								
Daily								
AM Peak Hour								
PM Peak Hour								
Jobs in those Land Uses	0							

	Daily	AM Peak Hour	PM Peak Hour
Total "Raw" ITE Trips	**40,966**	**2,456**	**3,920**

External Vehicle Trips

	Raw	Net	Reduction %
Daily	40,966	32,697	20%
AM Peak Hour	2,456	1,915	22%
PM Peak Hour	3,920	2,863	27%

MIXED USE TRIP GENERATION MODEL - BASIC INPUT

All shaded cells are inputs
Regular inputs (project-specific)
Inputs that may depend on regional values from census data, travel demand model, etc…
Treat like other inputs, but please send values and source to Mackenzie Watten so that a library of values can be compiled in future versions!

Section 1 - General Site Information

Site Name	Amoruso Ranch Alternative 3	int/sq mi 182

Geographic — **Notes / Instructions**

Developed Area (in acres)	436.74	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	124	Count intersections either within or on the perimeter of the MXD. Check resulting intersections per square mile in blue above
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Proportion of households within 1/4 mile of a transit stop	0%	Enter as a percentage

Land Use - Surrounding Area

Is the site in a Central Business District and/or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	0	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	0	Include employment within the MXD itself — This can be a difficult number to get - some suggestions are in the instructions tab in "disclaimers and warnings"
Total Regional Employment	966,900	Employment at MPO or similar level — If in the 9 county Bay Area, can use the MTCJobsWithin30MinutesByTransit.xls sheet on the wiki!

Site Demographics

Enter Population Directly?	No	If "No", will apply average HH size factors (immediately below) to dwelling unit totals in section 2
Population		You do not need to enter population here. It will be calculated based on dwelling units below and average HH sizes.
Use Surrounding Area (Block Group) Demographics for On-Site Average HH Size?	Yes	If no project-specific information exists, can use block group average HH size (see below)
Use Surrounding Area (Block Group) Demographics for On-Site Average Veh Own?	Yes	If no project-specific information exists, can use block group average veh owned (see below)

Surrounding Area (Block Group) Demographics

Average HH size near Site	2.74	See http://factfinder2.census.gov/
Average Vehicles Owned per Dwelling Unit near Site	1.80	See http://factfinder2.census.gov/

Section 2 - Trip Generation

				Trip Equation Method			Trips		
	Quantity	Units		Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units									
Single Family	1757	DU		Average Rate	Average Rate	Average Rate	16,727	1,318	1,757
Multi-Family	973	DU		Average Rate	Average Rate	Average Rate	6,470	496	603
Townhouse	0	DU		Log Equation	Log Equation	Log Equation	0	0	0
High Rise Condo	0	DU		Linear Equation	Linear Equation	Linear Equation	0	0	0
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)									
General Retail other than those listed below	442	ksf		Average Rate	Average Rate	Average Rate	18,873	424	1,640
Supermarket	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Bank	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Health Club	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Restaurant (non-fast food)	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Fast-Food Restaurant	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Gas Station	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Auto Repair	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Home Improvement Superstore		ksf		Average Rate	Average Rate	Average Rate	0	0	0
Free-Standing Discount		ksf		Average Rate	Average Rate	Average Rate	0	0	0
Office									
Non-Medical	34	ksf		Average Rate	Average Rate	Average Rate	375	53	51
Medical	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Industrial									
Light Industrial	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Manufacturing	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Warehousing / Self-Storage	0	ksf		Average Rate	Average Rate	Average Rate	0	0	0
Hotel (including restaurant, facilities, etc…)	0	Rooms		Average Rate	Average Rate	Average Rate	0	0	0
Motel		Rooms		Average Rate	Average Rate	Average Rate	0	0	0
Movie Theater (Theater with Matinee)				Average Rate	Average Rate	Average Rate	0	0	0
Movie Theater (Multiplex)	0	Screens		Average Rate	Average Rate	Average Rate	0	0	0
School									
University		Students		Linear Equation	Average Rate	Average Rate	0	0	0
High School		Students		Average Rate	Average Rate	Average Rate	0	0	0
Middle School		Students		Average Rate	Average Rate	Average Rate	0	0	0
Elementary	800	Students		Average Rate	Average Rate	Average Rate	1,032	360	120
Trips from Land uses not covered above ==>									
Daily									
AM Peak Hour									
PM Peak Hour									
Jobs in those Land Uses	0								

	Daily	AM Peak Hour	PM Peak Hour
Total "Raw" ITE Trips	**43,478**	**2,651**	**4,171**

External Vehicle Trips

	Raw	Net	Reduction %
Daily	43,478	34,887	20%
AM Peak Hour	2,651	2,086	21%
PM Peak Hour	4,171	3,082	26%

Appendix C

Cumulative Conditions Technical Calculations

Intersection 14 **Collector C/Blue Oaks Blvd** **Signal**

		Volume (veh/hr)			Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**% Served**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	32	25	78.8%	77.1	8.5	E
	Through						
	Right Turn	72	36	50.6%	226.4	178.7	F
	Subtotal	**104**	**62**	**59.2%**	**146.0**	**73.1**	**F**
SB	Left Turn	44	24	54.5%	197.3	99.1	F
	Through						
	Right Turn	20	18	90.0%	84.0	88.9	F
	Subtotal	**64**	**42**	**65.6%**	**147.6**	**86.1**	**F**
EB	Left Turn	52	50	95.4%	43.7	9.1	D
	Through	2,276	1,961	86.2%	54.4	10.5	D
	Right Turn	64	57	88.8%	61.6	17.3	E
	Subtotal	**2,392**	**2,068**	**86.4%**	**54.3**	**10.2**	**D**
WB	Left Turn	32	28	86.3%	87.4	20.7	F
	Through	3,640	2,998	82.4%	12.1	0.7	B
	Right Turn	20	15	76.0%	9.1	2.7	A
	Subtotal	**3,692**	**3,040**	**82.4%**	**12.8**	**0.9**	**B**
Total		**6,252**	**5,212**	**83.4%**	**31.7**	**5.0**	**C**

Intersection 16 **Fidelity Way/Blue Oaks Blvd** **Signal**

		Volume (veh/hr)			Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**% Served**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn						
	Through						
	Right Turn	356	367	103.0%	16.4	4.9	B
	Subtotal	**356**	**367**	**103.0%**	**16.4**	**4.9**	**B**
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	1,764	1,440	81.6%	5.9	1.4	A
	Right Turn	20	18	88.0%	1.4	1.0	A
	Subtotal	**1,784**	**1,457**	**81.7%**	**5.9**	**1.3**	**A**
WB	Left Turn	32	37	116.3%	25.6	13.9	C
	Through	2,036	1,966	96.6%	4.6	0.3	A
	Right Turn						
	Subtotal	**2,068**	**2,003**	**96.9%**	**5.0**	**0.3**	**A**
Total		**4,208**	**3,827**	**91.0%**	**6.4**	**0.8**	**A**

SimTraffic Post-Processor **Amoruso EIR - Blue Oaks**
Average Results from 10 Runs **2035 Cumulative No Project**
Volume and Delay by Movement **PM Peak Hour**

Intersection 146 **Washington Blvd/Blue Oaks Blvd** **Signal**

		Volume (vehicles)			Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**% Served**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	166	152	91.3%	116.4	24.8	F
	Through						
	Right Turn	299	301	100.5%	55.7	15.6	E
	Subtotal	**465**	**452**	**97.2%**	**76.3**	**12.7**	**E**
SB	Left Turn	17	18	105.9%	61.9	8.4	E
	Through	129	126	98.0%	72.8	11.9	E
	Right Turn	52	56	107.1%	22.0	9.8	C
	Subtotal	**198**	**200**	**101.1%**	**57.8**	**10.8**	**E**
EB	Left Turn						
	Through	381	317	83.2%	68.4	15.4	E
	Right Turn	150	132	88.2%	14.1	2.2	B
	Subtotal	**531**	**449**	**84.6%**	**52.6**	**12.0**	**D**
WB	Left Turn	92	92	100.3%	58.3	6.8	E
	Through	299	302	101.0%	26.5	1.7	C
	Right Turn	99	101	102.0%	5.0	0.7	A
	Subtotal	**490**	**495**	**101.1%**	**28.0**	**1.6**	**C**
Total		**1,684**	**1,597**	**94.8%**	**52.4**	**5.6**	**D**

Intersection 161 **Wood Meadow Dwy/Blue Oaks Blvd** **Signal**

		Volume (vehicles)			Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**% Served**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	166	160	96.4%	68.3	20.0	E
	Through	2	1	50.0%	41.5	41.5	D
	Right Turn	3	5	153.3%	42.4	18.8	D
	Subtotal	**171**	**166**	**96.9%**	**67.6**	**20.0**	**E**
SB	Left Turn	18	19	103.3%	64.5	19.2	E
	Through	1	1	90.0%	26.1	26.9	C
	Right Turn						
	Subtotal	**19**	**20**	**102.6%**	**63.7**	**18.3**	**E**
EB	Left Turn						
	Through	560	527	94.1%	11.2	0.8	B
	Right Turn	14	15	104.3%	7.2	0.8	A
	Subtotal	**574**	**541**	**94.3%**	**11.1**	**0.7**	**B**
WB	Left Turn	28	23	82.9%	83.3	7.5	F
	Through	778	661	85.0%	20.7	6.0	C
	Right Turn	7	7	92.9%	2.6	1.0	A
	Subtotal	**813**	**691**	**85.0%**	**22.6**	**5.9**	**C**
Total		**1,577**	**1,417**	**89.9%**	**24.2**	**4.5**	**C**

NB	Left Turn						
	Through						
	Right Turn	1,156	1,154	99.9%	1.9	0.5	A
	Subtotal	**1,156**	**1,154**	**99.9%**	**1.9**	**0.5**	**A**
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	864	833	96.4%	18.8	2.5	B
	Right Turn	744	673	90.4%	28.8	2.2	C
	Subtotal	**1,608**	**1,506**	**93.6%**	**23.3**	**2.2**	**C**
WB	Left Turn	1,008	807	80.1%	124.8	44.4	F
	Through	1,312	1,201	91.5%	7.8	1.7	A
	Right Turn						
	Subtotal	**2,320**	**2,008**	**86.6%**	**54.9**	**19.1**	**D**
Total		**5,084**	**4,668**	**91.8%**	**31.6**	**8.4**	**C**

Intersection 86 **I-80 EB Ramps/Eureka Rd-Atlantic St** **Signal**

		Volume (veh/hr)			Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**% Served**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	164	158	96.1%	55.4	13.5	E
	Through	460	446	96.9%	51.0	2.7	D
	Right Turn	588	596	101.4%	6.8	0.7	A
	Subtotal	**1,212**	**1,199**	**98.9%**	**29.5**	**2.2**	**C**
SB	Left Turn	388	346	89.2%	157.6	41.2	F
	Through						
	Right Turn	388	387	99.7%	101.4	39.3	F
	Subtotal	**776**	**733**	**94.4%**	**128.2**	**30.5**	**F**
EB	Left Turn	220	156	71.1%	237.3	68.6	F
	Through	1,452	1,471	101.3%	35.2	2.1	D
	Right Turn	344	321	93.3%	14.3	1.2	B
	Subtotal	**2,016**	**1,948**	**96.6%**	**47.8**	**4.5**	**D**
WB	Left Turn						
	Through	1,852	1,693	91.4%	46.7	19.9	D
	Right Turn	1,576	1,453	92.2%	50.7	17.2	D
	Subtotal	**3,428**	**3,146**	**91.8%**	**48.6**	**18.2**	**D**
Total		**7,432**	**7,026**	**94.5%**	**53.3**	**8.1**	**D**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	315	423	154	40	149	186	10	7	11	147	39	14
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	371	498	181	47	175	219	12	8	13	173	46	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	1049	441	33	235
Volume Left (vph)	371	47	12	173
Volume Right (vph)	181	219	13	16
Hadj (s)	0.00	-0.24	-0.13	0.14
Departure Headway (s)	5.6	5.6	7.5	6.9
Degree Utilization, x	1.0	0.69	0.07	0.45
Capacity (veh/h)	643	620	415	498
Control Delay (s)	311.6	20.4	11.0	15.4
Approach Delay (s)	311.6	20.4	11.0	15.4
Approach LOS	F	C	B	C

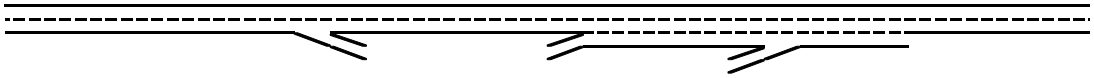
Intersection Summary			
Delay	193.3		
Level of Service	F		
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	258	528	181	249	364	453
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	272	556	191	262	383	477
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			827		915	272
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			827		915	272
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			76		0	38
cM capacity (veh/h)			804		231	767

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	272	556	191	262	383	477
Volume Left	0	0	191	0	383	0
Volume Right	0	556	0	0	0	477
cSH	1700	1700	804	1700	231	767
Volume to Capacity	0.16	0.33	0.24	0.15	1.66	0.62
Queue Length 95th (ft)	0	0	23	0	620	110
Control Delay (s)	0.0	0.0	10.9	0.0	351.8	17.1
Lane LOS			B		F	C
Approach Delay (s)	0.0		4.6		166.2	
Approach LOS					F	

Intersection Summary				
Average Delay	67.8			
Intersection Capacity Utilization	53.8%	ICU Level of Service		A
Analysis Period (min)	15			

Location	1	2	3	4	5	6



Key

<> Express Lane (HOV)

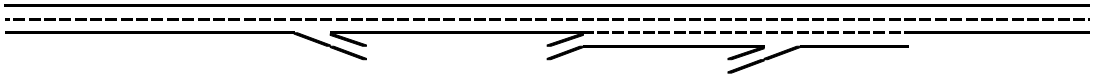
No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Define Freeway Segment						
Type	Basic	Diverge	Basic	Basic	Merge	Basic
Length (ft)	8,330	1,500	1,800	1,000	1,500	870
Accel Length					720	
Decel Length		150				
Mainline Volume	2,430	2,430	1,980	1,980	3,400	4,390
On Ramp Volume				1,420	990	
Off Ramp Volume		450				
Express Lane Volume						
EL On Ramp Volume						
EL Off Ramp Volume						
Calculate Flow Rate in General Purpose Lanes (GP)						
GP Volume (vph)	2,430	2,430	1,980	3,400	4,390	4,390
PHF	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	2	2	2	3	3	2
Terrain	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.990	0.990	0.990	0.990	0.990	0.990
f_P	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	2,583	2,583	2,105	3,615	4,667	4,667
GP Flow (pcphpl)	1,292	1,292	1,053	1,205	1,556	2,334
Calculate Speed in General Purpose Lanes						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calculated FFS						
Measured FFS						
FFS Curve	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes						
v/c ratio	0.55	0.55	0.45	0.51	0.66	0.99
Speed (mph)	65.0	65.0	65.0	65.0	64.7	52.6
Density (pcphpl)	19.9	19.9	16.2	18.5	24.1	44.3
LOS	C	C	B	C	C	E
Calculate Operations for Entering GP Lanes						
GP_{IN} Vol (pcph)		2,583		2,105	3,615	
GP_{IN} Cap (pcph)		4,700		4,700	7,050	
GP_{IN} v/c ratio		0.55		0.45	0.51	
Calculate Operations for Exiting GP Lanes						
GP_{OUT} Vol (pcph)		2,103			4,667	
GP_{OUT} Cap (pcph)		4,700			7,050	
GP_{OUT} v/c ratio		0.45			0.66	

Project: Amoruso Ranch EIR
Freeway Corridor: SB SR-65

2035 Cumulative No Project
Time Period: 2035 AM Peak Hour

Location	1	2	3	4	5	6



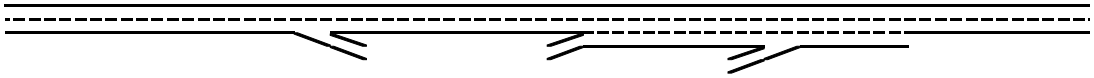
Key

<> Express Lane (HOV)

No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Flow Rate in Express Lanes (EL)						
EL Volume (vph)						
PHF						
Express Lanes	0	0	0	0	0	0
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T	1.5	1.5	1.5	1.5	1.5	
E_R	1.2	1.2	1.2	1.2	1.2	
f_{HV}	0.990	0.990	0.990	0.990	0.990	
f_P						
EL Flow (pcph)						
EL Flow (pcphpl)						
Calculate Speed in Express Lanes						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calc'd FFS						
Measured FFS						
FFS						
Calculate Operations in Express Lanes						
EL_{IN} v/c ratio						
Calculate On Ramp Flow Rate						
On Volume (vph)				1,420	990	
PHF				0.95	0.95	
Total Lanes				1	1	
Terrain				Level	Level	
Grade %				0.0%	0.0%	
Grade Length (mi)				0.00	0.00	
Truck & Bus %				2.0%	2.0%	
RV %				0.0%	0.0%	
E_T				1.5	1.5	
E_R				1.2	1.2	
f_{HV}				0.990	0.990	
f_P				1.00	1.00	
On Flow (pcph)				1,510	1,053	
On Flow (pcphpl)				1,510	1,053	
Calculate On Ramp Roadway Operations						
On Ramp Type				Right	Right	
On Ramp Speed (mph)				25	45	
On Ramp Cap (pcph)				1,900	2,100	
On Ramp v/c ratio				0.79	0.50	

Location	1	2	3	4	5	6



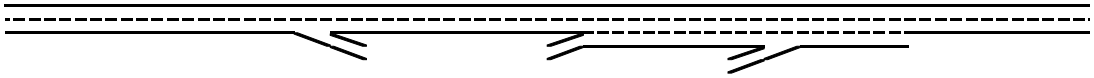
Key

<> Express Lane (HOV)

No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Off Ramp Flow Rate						
Off Volume (vph)		450				
PHF		0.95				
Total Lanes		1				
Terrain		Level				
Grade %		0.0%				
Grade Length (mi)		0.00				
Truck & Bus %		3.0%				
RV %		0.0%				
E_T		1.5				
E_R		1.2				
f_{HV}		0.985				
f_P		1.00				
Off Flow (pcph)		481				
Off Flow (pcphpl)		481				
Calculate Off Ramp Roadway Operations						
Off Ramp Type		Right				
Off Ramp Speed		45				
Off Ramp Cap (pcph)		2,100				
Off Ramp v/c ratio		0.23				
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps						
Up Type					On	
Up Distance					1,000	
Up Flow (pcph)					1,510	
Down Type					No	
Down Distance						
Down Flow (pcph)						
Calculate Merge Influence Area Operations						
Effective v_P (pcph)					3,615	
Up Ramp L_{EQ}					1,270	
Down Ramp L_{EQ}						
P_{FM} (Eqn 13-3)					0.598	
P_{FM} (Eqn 13-4)						
P_{FM} (Eqn 13-5)						
P_{FM}					0.598	
v_{12} (pcph)					2,160	
v_3 (pcph)					1,454	
v_{34} (pcph)						
v_{12a} (pcph)					2,160	
v_{R12a} (pcph)					3,213	
Merge Speed Index					0.35	
Merge Area Speed					56.9	
Outer Lanes Volume					1,454	
Outer Lanes Speed					61.6	
Segment Speed					58.3	
Merge v/c ratio					0.70	
Merge Density					25.5	
Merge LOS					C	

Location	1	2	3	4	5	6



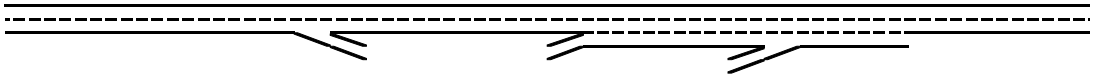
Key

<> Express Lane (HOV)

No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Diverge Influence Area Operations						
Effective v_P (pcph)		2,583				
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FD} (Eqn 13-9)		0.673				
P_{FD} (Eqn 13-10)						
P_{FD} (Eqn 13-11)						
P_{FD}		1.000				
v_{12} (pcph)		2,583				
v_3 (pcph)						
v_{34} (pcph)						
v_{12a} (pcph)		2,583				
Diverge Speed Index		0.34				
Diverge Area Speed		57.2				
Outer Lanes Volume						
Outer Lanes Speed						
Segment Speed		57.2				
Diverge v/c ratio		0.59				
Diverge Density		25.1				
Diverge LOS		C				
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments						
On to Off Volume (vph)						
PHF						
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T						
E_R						
f_{HV}						
f_P						
On to Off Flow (pcph)						
Calculate On Ramp to Mainline Flow Rate for Weave Segments						
On to ML Volume (vph)						
PHF						
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T						
E_R						
f_{HV}						
f_P						
On to ML Flow (pcph)						

Location	1	2	3	4	5	6



Key

<> Express Lane (HOV)

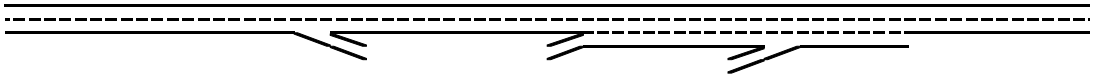
No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Mainline to Off Ramp Flow Rate for Weave Segments						
ML to Off Volume (vph)						
PHF						
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T						
E_R						
f_{HV}						
f_P						
ML to Off Flow (pcph)						
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segments						
GP to GP Volume (vph)						
PHF						
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T						
E_R						
f_{HV}						
f_P						
GP to GP Flow (pcph)						

Project: Amoruso Ranch EIR
Freeway Corridor: SB SR-65

2035 Cumulative No Project
Time Period: 2035 AM Peak Hour

Location	1	2	3	4	5	6



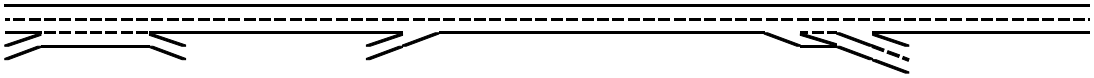
Key

<> Express Lane (HOV)

No Trucks

Name	Nelson Ln to Ferrari Ranch Rd	Ferrari Ranch Rd Off-ramp	Ferrari Ranch Rd Off to On Ramp	Ferrari Ranch Rd Loop On Ramp	Ferrari Ranch Rd Direct On Ramp	Ferrari Ranch Rd to Lincoln Blvd
Calculate Weave Segment Operations						
Weave Type						
Weave Length						
Segment Lanes						
Weave Lanes						
Weave Flow (pcph)						
Non-Weave Flow						
Segment Flow						
Max Weave Length						
Length Check						
Ideal Weave Capacity						
f_{HV}						
f_P						
Capacity Condition 1						
Capacity Condition 2						
Weave v/c ratio						
Interchange Density						
Lane Changes On to ML						
Lane Changes ML to Off						
Lane Changes On to Off						
Min Lane Change Rate						
Weave LC Rate						
Non-Weave LC Rate 1						
Non-Weave LC Rate 2						
Non-Weave LC Rate 3						
Segment LC Rate						
Weave Intensity Factor						
Weave Speed						
Non-Weave Speed						
Segment Speed						
Weave Density						
Weave LOS						
Summarize Segment Operations						
Segment v/c ratio	0.55	0.59	0.45	0.51	0.70	0.99
Segment Density	19.9	25.1	16.2	18.5	25.5	44.3
Segment LOS	C	C	B	C	C	E
Over Capacity						

Location	7	8	9	10	11	12



Key

<> Express Lane (HOV)

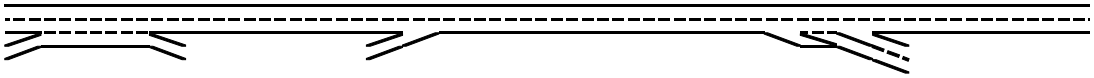
No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Placer Pkwy	Placer Pkwy off-ramp	Placer Pkwy off to on-ramp
Define Freeway Segment						
Type	Weave	Basic	Merge	Basic	Diverge	Basic
Length (ft)	3,050	1,120	1,500	2,210	1,500	1,830
Accel Length			450			
Decel Length					1,500	
Mainline Volume	4,390	4,090	4,090	4,420	4,420	3,740
On Ramp Volume	930		330			
Off Ramp Volume	1,230				680	
Express Lane Volume						
EL On Ramp Volume						
EL Off Ramp Volume						
Calculate Flow Rate in General Purpose Lanes (GP						
GP Volume (vph)	5,320	4,090	4,420	4,420	4,420	3,740
PHF	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	2	2	2	2	2
Terrain	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.990	0.990	0.990	0.990	0.990	0.990
f_P	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	5,656	4,348	4,699	4,699	4,699	3,976
GP Flow (pcphpl)	1,885	2,174	2,350	2,350	2,350	1,988
Calculate Speed in General Purpose Lanes						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calculated FFS						
Measured FFS						
FFS Curve	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes						
v/c ratio	0.80	0.93	1.00	1.00	1.00	0.85
Speed (mph)	61.7	56.5	52.2	52.2	52.2	60.1
Density (pcphpl)	30.6	38.5	45.0	45.0	45.0	33.1
LOS	D	E	E	E	E	D
Calculate Operations for Entering GP Lanes						
GP_{IN} Vol (pcph)	4,667		4,348		4,699	
GP_{IN} Cap (pcph)	4,700		4,700		4,700	
GP_{IN} v/c ratio	0.99		0.93		1.00	
Calculate Operations for Exiting GP Lanes						
GP_{OUT} Vol (pcph)	4,335		4,699		3,976	
GP_{OUT} Cap (pcph)	4,700		4,700		4,700	
GP_{OUT} v/c ratio	0.92		1.00		0.85	

Project: Amoruso Ranch EIR
Freeway Corridor: SB SR-65

2035 Cumulative No Project
Time Period: 2035 AM Peak Hour

Location	7	8	9	10	11	12



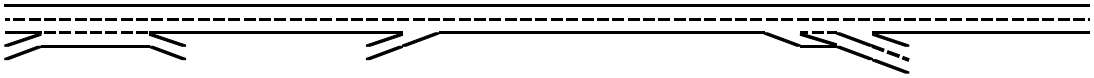
Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Placer Pkwy	Placer Pkwy off-ramp	Placer Pkwy off to on-ramp
Calculate Flow Rate in Express Lanes (EL)						
EL Volume (vph)						
PHF						
Express Lanes	0	0	0	0	0	0
Terrain						
Grade %						
Grade Length (mi)						
Truck & Bus %						
RV %						
E_T	1.5	1.5	1.5			
E_R	1.2	1.2	1.2			
f_{HV}	0.990	0.990	0.990			
f_P						
EL Flow (pcph)						
EL Flow (pcphpl)						
Calculate Speed in Express Lanes						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calc'd FFS						
Measured FFS						
FFS						
Calculate Operations in Express Lanes						
EL_{IN} v/c ratio						
Calculate On Ramp Flow Rate						
On Volume (vph)	930		330			
PHF	0.95		0.95			
Total Lanes	1		1			
Terrain	Level		Level			
Grade %	0.0%		0.0%			
Grade Length (mi)	0.00		0.00			
Truck & Bus %	2.0%		2.0%			
RV %	0.0%		0.0%			
E_T	1.5		1.5			
E_R	1.2		1.2			
f_{HV}	0.990		0.990			
f_P	1.00		1.00			
On Flow (pcph)	989		351			
On Flow (pcphpl)	989		351			
Calculate On Ramp Roadway Operations						
On Ramp Type	Right		Right			
On Ramp Speed (mph)	45		25			
On Ramp Cap (pcph)	2,100		1,900			
On Ramp v/c ratio	0.47		0.18			

Location	7	8	9	10	11	12



Key

<> Express Lane (HOV)

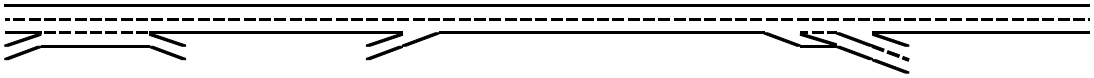
No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Placer Pkwy	Placer Pkwy off-ramp	Placer Pkwy off to on-ramp
Calculate Off Ramp Flow Rate						
Off Volume (vph)	1,230				680	
PHF	0.95				0.95	
Total Lanes	1				2	
Terrain	Level				Level	
Grade %	0.0%				0.0%	
Grade Length (mi)	0.00				0.00	
Truck & Bus %	4.0%				2.0%	
RV %	0.0%				0.0%	
E_T	1.5				1.5	
E_R	1.2				1.2	
f_{HV}	0.980				0.990	
f_P	1.00				1.00	
Off Flow (pcph)	1,321				723	
Off Flow (pcphpl)	1,321				361	
Calculate Off Ramp Roadway Operations						
Off Ramp Type	Right				Right	
Off Ramp Speed	45				45	
Off Ramp Cap (pcph)	2,100				4,200	
Off Ramp v/c ratio	0.63				0.17	
Determine Adjacent Ramp for Three-Lane Mainline						
Up Type						
Up Distance						
Up Flow (pcph)						
Down Type						
Down Distance						
Down Flow (pcph)						
Calculate Merge Influence Area Operations						
Effective v_P (pcph)			4,348			
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FM} (Eqn 13-3)			0.590			
P_{FM} (Eqn 13-4)						
P_{FM} (Eqn 13-5)						
P_{FM}			1.000			
v_{12} (pcph)			4,348			
v_3 (pcph)						
v_{34} (pcph)						
v_{12a} (pcph)			4,348			
v_{R12a} (pcph)			4,699			
Merge Speed Index			0.73			
Merge Area Speed			48.3			
Outer Lanes Volume						
Outer Lanes Speed						
Segment Speed			48.3			
Merge v/c ratio			1.02			
Merge Density			39.1			
Merge LOS			F			

Project: Amoruso Ranch EIR
Freeway Corridor: SB SR-65

2035 Cumulative No Project
Time Period: 2035 AM Peak Hour

Location	7	8	9	10	11	12



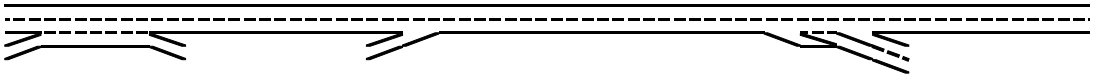
Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Placer Pkwy	Placer Pkwy off-ramp	Placer Pkwy off to on-ramp
Calculate Diverge Influence Area Operations						
Effective v_P (pcph)					4,699	
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FD} (Eqn 13-9)					0.609	
P_{FD} (Eqn 13-10)						
P_{FD} (Eqn 13-11)						
P_{FD}					1.000	
v_{12} (pcph)					4,699	
v_3 (pcph)						
v_{34} (pcph)						
v_{12a} (pcph)					4,699	
Diverge Speed Index					0.36	
Diverge Area Speed					56.6	
Outer Lanes Volume						
Outer Lanes Speed						
Segment Speed					56.6	
Diverge v/c ratio					1.07	
Diverge Density					31.2	
Diverge LOS					F	
Calculate On Ramp to Off Ramp Flow Rate for Wea						
On to Off Volume (vph)	93					
PHF	0.95					
Terrain	Level					
Grade %	0.0%					
Grade Length (mi)	0.00					
Truck & Bus %	3.0%					
RV %	0.0%					
E_T	1.5					
E_R	1.2					
f_{HV}	0.985					
f_P	1.00					
On to Off Flow (pcph)	99					
Calculate On Ramp to Mainline Flow Rate for Weav						
On to ML Volume (vph)	837					
PHF	0.95					
Terrain	Level					
Grade %	0.0%					
Grade Length (mi)	0.00					
Truck & Bus %	3.0%					
RV %	0.0%					
E_T	1.5					
E_R	1.2					
f_{HV}	0.985					
f_P	1.00					
On to ML Flow (pcph)	894					

Location	7	8	9	10	11	12



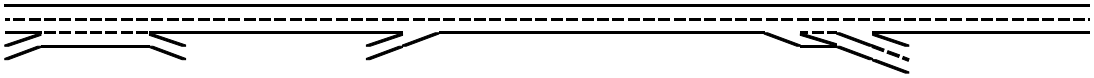
Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Placer Pkwy	Placer Pkwy off-ramp	Placer Pkwy off to on-ramp
Calculate Mainline to Off Ramp Flow Rate for Weav						
ML to Off Volume (vph)	1,137					
PHF	0.85					
Terrain	Level					
Grade %	0.0%					
Grade Length (mi)	0.00					
Truck & Bus %	2.0%					
RV %	0.0%					
E_T	1.5					
E_R	1.2					
f_{HV}	0.990					
f_P	1.00					
ML to Off Flow (pcph)	1,351					
Calculate General Purpose Lanes to General Purpo						
GP to GP Volume (vph)	3,253					
PHF	0.85					
Terrain	Level					
Grade %	0.0%					
Grade Length (mi)	0.00					
Truck & Bus %	2.0%					
RV %	0.0%					
E_T	1.5					
E_R	1.2					
f_{HV}	0.990					
f_P	1.00					
GP to GP Flow (pcph)	3,865					

Location	7	8	9	10	11	12



Key

<> Express Lane (HOV)

No Trucks

Name	Lincoln Blvd On Ramp to Twelve Bridges Off	Twelve Bridges Off to On Ramp	Twelve Bridges Loop On Ramp	Twelve Bridges to Placer Pkwy	Placer Pkwy off-ramp	Placer Pkwy off to on-ramp
Calculate Weave Segment Operations						
Weave Type	One-sided					
Weave Length	2,050					
Segment Lanes	3					
Weave Lanes	2					
Weave Flow (pcph)	2,245					
Non-Weave Flow	3,965					
Segment Flow	6,210					
Max Weave Length	6,254					
Length Check	OK					
Ideal Weave Capacity	2,028					
f_{HV}	0.989					
f_P	0.998					
Capacity Condition 1	6,007					
Capacity Condition 2	6,553					
Weave v/c ratio	1.02					
Interchange Density						
Lane Changes On to ML						
Lane Changes ML to Off						
Lane Changes On to Off						
Min Lane Change Rate						
Weave LC Rate						
Non-Weave LC Rate 1						
Non-Weave LC Rate 2						
Non-Weave LC Rate 3						
Segment LC Rate						
Weave Intensity Factor						
Weave Speed						
Non-Weave Speed						
Segment Speed						
Weave Density						
Weave LOS						
Summarize Segment Operations						
Segment v/c ratio	1.02	0.93	1.02	1.00	1.07	0.85
Segment Density	-	38.5	-	45.0	-	33.1
Segment LOS	F	E	F	E	F	D
Over Capacity	Weave		Merge		Diverge	

Intersection 14 **Collector C/Blue Oaks Blvd** **Signal**

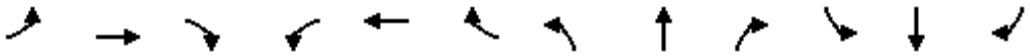
Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	31	29	94.4%	68.2	10.8	E
	Through						
	Right Turn	71	70	98.5%	29.3	10.0	C
	Subtotal	102	99	97.2%	41.0	5.3	D
SB	Left Turn	42	33	79.6%	127.5	68.7	F
	Through						
	Right Turn	20	17	85.5%	88.9	102.8	F
	Subtotal	62	51	81.5%	117.7	83.1	F
EB	Left Turn	50	52	103.4%	45.4	12.3	D
	Through	2,252	2,030	90.1%	31.6	4.4	C
	Right Turn	59	55	93.4%	28.5	5.7	C
	Subtotal	2,361	2,136	90.5%	31.8	4.4	C
WB	Left Turn	29	19	64.2%	65.0	23.9	E
	Through	3,310	2,869	86.7%	34.1	1.5	C
	Right Turn	18	16	86.6%	24.2	12.3	C
	Subtotal	3,357	2,903	86.5%	34.3	1.5	C
Total		5,882	5,189	88.2%	34.2	2.8	C

Intersection 17 **Washington Blvd/Blue Oaks Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	657	572	87.0%	125.5	41.8	F
	Through						
	Right Turn	1,119	1,112	99.3%	43.9	7.0	D
	Subtotal	1,776	1,683	94.8%	72.0	12.0	E
SB	Left Turn	67	74	111.2%	65.7	13.7	E
	Through	488	473	96.9%	74.0	16.8	E
	Right Turn	194	188	97.2%	23.3	13.5	C
	Subtotal	749	736	98.2%	60.2	16.2	E
EB	Left Turn						
	Through	1,450	1,229	84.8%	67.9	8.7	E
	Right Turn	571	492	86.1%	12.5	1.4	B
	Subtotal	2,021	1,721	85.2%	52.0	6.3	D
WB	Left Turn	350	338	96.5%	54.3	5.2	D
	Through	1,145	1,080	94.3%	23.8	2.0	C
	Right Turn	376	364	96.8%	4.2	0.4	A
	Subtotal	1,871	1,782	95.2%	25.6	1.1	C
Total		6,417	5,922	92.3%	50.8	3.4	D

Intersection 86 **Taylor Rd-I-80 EB Ramps/Eureka Rd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	154	154	100.2%	47.7	8.7	D
	Through	436	429	98.5%	51.5	4.1	D
	Right Turn	559	559	99.9%	7.2	0.4	A
	Subtotal	1,149	1,142	99.4%	29.3	2.1	C
SB	Left Turn	372	310	83.4%	143.0	45.7	F
	Through						
	Right Turn	352	294	83.4%	153.1	70.5	F
	Subtotal	724	604	83.4%	146.2	29.8	F
EB	Left Turn	212	149	70.1%	253.4	46.8	F
	Through	1,396	1,438	103.0%	29.7	2.7	C
	Right Turn	312	292	93.7%	9.5	0.7	A
	Subtotal	1,920	1,878	97.8%	44.2	4.8	D
WB	Left Turn						
	Through	3,191	2,940	92.1%	48.9	6.6	D
	Right Turn	75	73	97.8%	23.1	4.8	C
	Subtotal	3,266	3,013	92.3%	48.2	6.6	D
Total		7,059	6,638	94.0%	52.6	3.8	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	316	426	159	40	148	183	10	7	11	146	47	14
Future Volume (vph)	316	426	159	40	148	183	10	7	11	146	47	14
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	372	501	187	47	174	215	12	8	13	172	55	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	1060	436	33	243
Volume Left (vph)	372	47	12	172
Volume Right (vph)	187	215	13	16
Hadj (s)	0.00	-0.24	-0.13	0.14
Departure Headway (s)	5.7	5.7	7.5	6.9
Degree Utilization, x	1.67	0.69	0.07	0.46
Capacity (veh/h)	647	616	414	499
Control Delay (s)	322.3	20.3	11.0	15.7
Approach Delay (s)	322.3	20.3	11.0	15.7
Approach LOS	F	C	B	C

Intersection Summary			
Delay	200.2		
Level of Service	F		
Intersection Capacity Utilization	98.9%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	289	502	194	246	384	433
Future Volume (Veh/h)	289	502	194	246	384	433
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	304	528	204	259	404	456
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			832		971	304
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			832		971	304
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			75		0	38
cM capacity (veh/h)			801		209	736

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	304	528	204	259	404	456
Volume Left	0	0	204	0	404	0
Volume Right	0	528	0	0	0	456
cSH	1700	1700	801	1700	209	736
Volume to Capacity	0.18	0.31	0.25	0.15	1.93	0.62
Queue Length 95th (ft)	0	0	25	0	738	109
Control Delay (s)	0.0	0.0	11.0	0.0	475.2	17.5
Lane LOS			B		F	C
Approach Delay (s)	0.0		4.9		232.5	
Approach LOS					F	

Intersection Summary			
Average Delay	93.8		
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	Amoruso Ranch SP TIS
Freeway	Southbound SR 65
Segment	Ferrari Ranch Rd to Lincoln Blvd
Alternative	2035 Cumulative No Action
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	4,420	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,163	veh
Trucks and buses	2%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.990	
Driver popoulation factor, f_p	1.00	
Flow rate, v_p	4,699	pcph

Speed Inputs and Adjustments

Number of lanes, N	2	
Lane width		ft
Right-side lateral clearance		ft
Total ramp density, TRD		ramps/mi
Lane width adjustment, f_{LW}		mph
Lateral clearance adjustment, f_{LC}		mph
TRD adjustment		mph
Calculated free-flow speed, FFS		mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,350	pcphpl
Average passenger-car speed, S	52.2	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	45.0	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	Amoruso Ranch SP TIS
Freeway	Southbound SR 65
Segment	Twelve Bridges to Placer Pkwy
Alternative	2035 Cumulative No Action
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	4,430	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,166	veh
Trucks and buses	2%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.990	
Driver popoulation factor, f_p	1.00	
Flow rate, v_p	4,710	pcph

Speed Inputs and Adjustments

Number of lanes, N	2	
Lane width		ft
Right-side lateral clearance		ft
Total ramp density, TRD		ramps/mi
Lane width adjustment, f_{LW}		mph
Lateral clearance adjustment, f_{LC}		mph
TRD adjustment		mph
Calculated free-flow speed, FFS		mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,355	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

Intersection 14 **Collector C/Blue Oaks Blvd** **Signal**

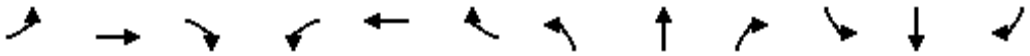
Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	30	29	96.3%	59.6	11.0	E
	Through						
	Right Turn	70	69	98.3%	48.7	10.8	D
	Subtotal	100	98	97.7%	50.9	9.4	D
SB	Left Turn	41	30	73.2%	194.9	131.6	F
	Through						
	Right Turn	20	15	76.0%	189.7	195.3	F
	Subtotal	61	45	74.1%	188.3	144.1	F
EB	Left Turn	50	47	94.2%	85.6	13.8	F
	Through	2,372	1,936	81.6%	66.9	22.3	E
	Right Turn	59	42	71.5%	98.1	40.5	F
	Subtotal	2,481	2,025	81.6%	68.1	22.2	E
WB	Left Turn	30	22	72.2%	51.0	16.4	D
	Through	3,438	2,734	79.5%	25.9	1.4	C
	Right Turn	19	10	54.0%	15.4	7.8	B
	Subtotal	3,487	2,766	79.3%	26.0	1.3	C
Total		6,129	4,934	80.5%	44.8	9.5	D

Intersection 17 **Washington Blvd/Blue Oaks Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	667	579	86.8%	144.8	20.1	F
	Through						
	Right Turn	1,114	1,077	96.7%	55.3	14.7	E
	Subtotal	1,781	1,656	93.0%	86.8	14.2	F
SB	Left Turn	68	68	100.0%	71.3	36.2	E
	Through	488	476	97.6%	81.1	30.7	F
	Right Turn	192	195	101.7%	32.4	35.8	C
	Subtotal	748	739	98.9%	67.5	33.2	E
EB	Left Turn						
	Through	1,450	1,261	87.0%	64.6	5.4	E
	Right Turn	572	461	80.7%	12.2	2.0	B
	Subtotal	2,022	1,723	85.2%	50.7	4.5	D
WB	Left Turn	350	336	96.0%	63.7	10.7	E
	Through	1,149	1,156	100.6%	24.6	2.3	C
	Right Turn	376	396	105.4%	4.6	1.0	A
	Subtotal	1,875	1,888	100.7%	27.4	3.2	C
Total		6,426	6,007	93.5%	55.4	8.1	E

Intersection 86 **Taylor Rd-I-80 EB Ramps/Eureka Rd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	154	149	96.7%	57.3	11.2	E
	Through	435	410	94.3%	53.0	4.6	D
	Right Turn	560	570	101.9%	7.1	0.6	A
	Subtotal	1,149	1,130	98.3%	30.5	2.7	C
SB	Left Turn	373	329	88.3%	152.1	25.4	F
	Through						
	Right Turn	345	324	94.0%	136.6	87.2	F
	Subtotal	718	654	91.0%	144.3	49.3	F
EB	Left Turn	212	151	71.3%	259.5	35.6	F
	Through	1,402	1,390	99.1%	26.0	2.3	C
	Right Turn	305	269	88.2%	8.4	1.2	A
	Subtotal	1,919	1,810	94.3%	43.0	4.3	D
WB	Left Turn						
	Through	3,191	2,939	92.1%	52.0	11.1	D
	Right Turn	79	80	101.5%	29.5	10.7	C
	Subtotal	3,270	3,019	92.3%	51.4	11.1	D
Total		7,056	6,613	93.7%	54.3	5.9	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	317	427	161	40	148	183	10	7	11	146	50	14
Future Volume (vph)	317	427	161	40	148	183	10	7	11	146	50	14
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	373	502	189	47	174	215	12	8	13	172	59	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	1064	436	33	247
Volume Left (vph)	373	47	12	172
Volume Right (vph)	189	215	13	16
Hadj (s)	0.00	-0.24	-0.13	0.13
Departure Headway (s)	5.7	5.7	7.5	6.9
Degree Utilization, x	1.68	0.69	0.07	0.47
Capacity (veh/h)	637	614	412	499
Control Delay (s)	327.7	20.5	11.0	15.9
Approach Delay (s)	327.7	20.5	11.0	15.9
Approach LOS	F	C	B	C

Intersection Summary				
Delay	203.3			
Level of Service	F			
Intersection Capacity Utilization	99.2%	ICU Level of Service	F	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	300	493	199	245	391	427
Future Volume (Veh/h)	300	493	199	245	391	427
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	316	519	209	258	412	449
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			835		992	316
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			835		992	316
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			74		0	38
cM capacity (veh/h)			798		201	724

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	316	519	209	258	412	449
Volume Left	0	0	209	0	412	0
Volume Right	0	519	0	0	0	449
cSH	1700	1700	798	1700	201	724
Volume to Capacity	0.19	0.31	0.26	0.15	2.05	0.62
Queue Length 95th (ft)	0	0	26	0	782	109
Control Delay (s)	0.0	0.0	11.1	0.0	527.3	17.7
Lane LOS			B		F	C
Approach Delay (s)	0.0		5.0		261.5	
Approach LOS					F	

Intersection Summary				
Average Delay	105.2			
Intersection Capacity Utilization	58.5%	ICU Level of Service		B
Analysis Period (min)	15			

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	Amoruso Ranch SP TIS
Freeway	Southbound SR 65
Segment	Ferrari Ranch Rd to Lincoln Blvd
Alternative	2035 Cumulative Plus Alternative 1
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	4,420	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,163	veh
Trucks and buses	2%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.990	
Driver popoulation factor, f_p	1.00	
Flow rate, v_p	4,699	pcph

Speed Inputs and Adjustments

Number of lanes, N	2	
Lane width		ft
Right-side lateral clearance		ft
Total ramp density, TRD		ramps/mi
Lane width adjustment, f_{LW}		mph
Lateral clearance adjustment, f_{LC}		mph
TRD adjustment		mph
Calculated free-flow speed, FFS		mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,350	pcphpl
Average passenger-car speed, S	52.2	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	45.0	pcpmpl
Level of service, LOS	E	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	Amoruso Ranch SP TIS
Freeway	Southbound SR 65
Segment	Twelve Bridges to Placer Pkwy
Alternative	2035 Cumulative Plus Alternative 1
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	4,430	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,166	veh
Trucks and buses	2%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.990	
Driver popoulation factor, f_p	1.00	
Flow rate, v_p	4,710	pcph

Speed Inputs and Adjustments

Number of lanes, N	2	
Lane width		ft
Right-side lateral clearance		ft
Total ramp density, TRD		ramps/mi
Lane width adjustment, f_{LW}		mph
Lateral clearance adjustment, f_{LC}		mph
TRD adjustment		mph
Calculated free-flow speed, FFS		mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,355	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

Intersection 14 **Collector C/Blue Oaks Blvd** **Signal**

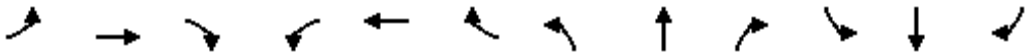
Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	30	21	69.7%	52.8	16.0	D
	Through						
	Right Turn	70	71	101.5%	45.5	13.1	D
	Subtotal	100	92	92.0%	47.3	10.4	D
SB	Left Turn	40	22	55.1%	151.3	61.4	F
	Through						
	Right Turn	20	13	62.7%	109.9	66.9	F
	Subtotal	60	35	57.6%	127.1	52.7	F
EB	Left Turn	50	47	94.2%	52.3	6.5	D
	Through	2,395	2,074	86.6%	46.1	13.9	D
	Right Turn	60	49	82.3%	66.3	31.6	E
	Subtotal	2,505	2,171	86.6%	46.7	14.0	D
WB	Left Turn	30	18	59.5%	66.3	20.9	E
	Through	3,462	2,847	82.2%	42.4	2.4	D
	Right Turn	19	14	76.0%	35.4	8.8	D
	Subtotal	3,511	2,879	82.0%	42.5	2.5	D
Total		6,176	5,176	83.8%	44.9	5.8	D

Intersection 17 **Washington Blvd/Blue Oaks Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	670	578	86.3%	147.8	57.0	F
	Through						
	Right Turn	1,113	1,094	98.3%	59.4	10.5	E
	Subtotal	1,783	1,672	93.8%	90.6	23.3	F
SB	Left Turn	68	74	108.4%	66.9	12.4	E
	Through	488	477	97.7%	77.6	18.9	E
	Right Turn	192	190	98.8%	28.7	16.8	C
	Subtotal	748	740	99.0%	64.0	17.2	E
EB	Left Turn						
	Through	1,451	1,252	86.3%	60.0	5.6	E
	Right Turn	573	487	85.0%	12.8	1.5	B
	Subtotal	2,024	1,739	85.9%	46.8	4.4	D
WB	Left Turn	350	342	97.8%	68.1	13.2	E
	Through	1,150	1,142	99.3%	24.6	1.3	C
	Right Turn	376	374	99.5%	4.7	0.5	A
	Subtotal	1,876	1,858	99.1%	28.8	3.5	C
Total		6,431	6,010	93.5%	55.5	7.6	E

Intersection 86 **Taylor Rd-I-80 EB Ramps/Eureka Rd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	154	143	92.5%	47.3	14.6	D
	Through	434	432	99.5%	51.6	3.2	D
	Right Turn	560	565	100.9%	7.1	0.8	A
	Subtotal	1,148	1,139	99.2%	29.2	2.6	C
SB	Left Turn	373	331	88.8%	161.4	39.1	F
	Through						
	Right Turn	343	328	95.6%	167.5	109.2	F
	Subtotal	716	659	92.1%	159.4	57.1	F
EB	Left Turn	213	150	70.6%	268.5	39.8	F
	Through	1,404	1,351	96.2%	29.2	3.6	C
	Right Turn	304	287	94.4%	8.7	1.4	A
	Subtotal	1,921	1,789	93.1%	46.0	5.4	D
WB	Left Turn						
	Through	3,191	2,884	90.4%	46.8	11.7	D
	Right Turn	80	78	97.9%	23.4	7.4	C
	Subtotal	3,271	2,962	90.6%	46.2	11.5	D
Total		7,056	6,549	92.8%	53.8	7.1	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	317	427	161	40	148	182	10	7	11	146	50	14
Future Volume (vph)	317	427	161	40	148	182	10	7	11	146	50	14
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	373	502	189	47	174	214	12	8	13	172	59	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	1064	435	33	247
Volume Left (vph)	373	47	12	172
Volume Right (vph)	189	214	13	16
Hadj (s)	0.00	-0.24	-0.13	0.13
Departure Headway (s)	5.7	5.7	7.5	6.9
Degree Utilization, x	1.68	0.69	0.07	0.47
Capacity (veh/h)	637	613	412	499
Control Delay (s)	327.4	20.4	11.0	15.9
Approach Delay (s)	327.4	20.4	11.0	15.9
Approach LOS	F	C	B	C

Intersection Summary			
Delay	203.2		
Level of Service	F		
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	301	492	199	245	392	426
Future Volume (Veh/h)	301	492	199	245	392	426
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	317	518	209	258	413	448
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			835		993	317
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			835		993	317
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			74		0	38
cM capacity (veh/h)			798		201	724

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	317	518	209	258	413	448
Volume Left	0	0	209	0	413	0
Volume Right	0	518	0	0	0	448
cSH	1700	1700	798	1700	201	724
Volume to Capacity	0.19	0.30	0.26	0.15	2.06	0.62
Queue Length 95th (ft)	0	0	26	0	786	108
Control Delay (s)	0.0	0.0	11.1	0.0	530.7	17.7
Lane LOS			B		F	C
Approach Delay (s)	0.0		5.0		263.8	
Approach LOS					F	

Intersection Summary				
Average Delay	106.1			
Intersection Capacity Utilization	58.6%	ICU Level of Service		B
Analysis Period (min)	15			

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	Amoruso Ranch SP TIS
Freeway	Southbound SR 65
Segment	Ferrari Ranch Rd to Lincoln Blvd
Alternative	Cumulative Plus Alternative 2
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	4,430	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,166	veh
Trucks and buses	2%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.990	
Driver popoulation factor, f_p	1.00	
Flow rate, v_p	4,710	pcph

Speed Inputs and Adjustments

Number of lanes, N	2	
Lane width		ft
Right-side lateral clearance		ft
Total ramp density, TRD		ramps/mi
Lane width adjustment, f_{LW}		mph
Lateral clearance adjustment, f_{LC}		mph
TRD adjustment		mph
Calculated free-flow speed, FFS		mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,355	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	Amoruso Ranch SP TIS
Freeway	Southbound SR 65
Segment	Twelve Bridges to Placer Pkwy
Alternative	Cumulative Plus Alternative 2
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	4,430	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,166	veh
Trucks and buses	2%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.990	
Driver popoulation factor, f_p	1.00	
Flow rate, v_p	4,710	pcph

Speed Inputs and Adjustments

Number of lanes, N	2	
Lane width		ft
Right-side lateral clearance		ft
Total ramp density, TRD		ramps/mi
Lane width adjustment, f_{LW}		mph
Lateral clearance adjustment, f_{LC}		mph
TRD adjustment		mph
Calculated free-flow speed, FFS		mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,355	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

Intersection 14 **Collector C/Blue Oaks Blvd** **Signal**

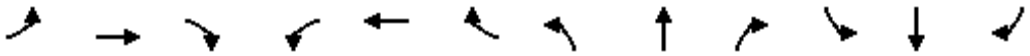
Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	30	29	96.3%	67.6	23.0	E
	Through						
	Right Turn	70	69	98.3%	42.7	15.4	D
	Subtotal	100	98	97.7%	49.9	9.6	D
SB	Left Turn	40	17	41.8%	243.1	127.0	F
	Through						
	Right Turn	20	10	49.4%	156.3	110.4	F
	Subtotal	60	27	44.3%	207.2	108.7	F
EB	Left Turn	50	51	102.6%	79.8	6.5	E
	Through	2,428	2,044	84.2%	53.2	19.6	D
	Right Turn	60	44	72.8%	77.2	39.7	E
	Subtotal	2,538	2,139	84.3%	54.3	19.5	D
WB	Left Turn	30	21	69.7%	76.8	20.2	E
	Through	3,498	2,954	84.4%	37.0	2.3	D
	Right Turn	20	12	60.8%	22.5	10.0	C
	Subtotal	3,548	2,987	84.2%	37.2	2.4	D
Total		6,246	5,250	84.1%	45.1	8.5	D

Intersection 17 **Washington Blvd/Blue Oaks Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	673	616	91.5%	106.4	37.8	F
	Through						
	Right Turn	1,111	1,063	95.7%	43.5	4.3	D
	Subtotal	1,784	1,679	94.1%	67.0	14.7	E
SB	Left Turn	68	52	76.6%	114.7	47.3	F
	Through	488	455	93.3%	139.2	42.6	F
	Right Turn	191	178	93.3%	87.2	45.6	F
	Subtotal	747	686	91.8%	123.8	43.6	F
EB	Left Turn						
	Through	1,451	1,211	83.5%	59.3	7.3	E
	Right Turn	573	463	80.8%	11.9	2.3	B
	Subtotal	2,024	1,675	82.7%	46.2	5.5	D
WB	Left Turn	350	352	100.4%	70.2	11.7	E
	Through	1,151	1,200	104.2%	27.0	1.0	C
	Right Turn	376	366	97.2%	4.7	0.3	A
	Subtotal	1,877	1,917	102.1%	30.7	3.2	C
Total		6,432	5,956	92.6%	56.0	7.1	E

Intersection 86 **Taylor Rd-I-80 EB Ramps/Eureka Rd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	154	157	102.2%	42.0	10.3	D
	Through	434	424	97.7%	50.1	2.9	D
	Right Turn	560	567	101.2%	6.9	0.7	A
	Subtotal	1,148	1,148	100.0%	27.6	2.2	C
SB	Left Turn	374	327	87.4%	148.0	51.2	F
	Through						
	Right Turn	341	293	85.8%	185.2	93.1	F
	Subtotal	715	619	86.6%	163.0	57.6	F
EB	Left Turn	213	153	71.7%	235.1	77.1	F
	Through	1,406	1,415	100.6%	28.4	2.5	C
	Right Turn	302	284	94.1%	8.3	0.8	A
	Subtotal	1,921	1,852	96.4%	42.3	6.3	D
WB	Left Turn						
	Through	3,191	2,953	92.5%	53.6	8.2	D
	Right Turn	81	75	92.9%	29.0	6.7	C
	Subtotal	3,272	3,028	92.5%	53.0	8.0	D
Total		7,056	6,648	94.2%	55.7	5.9	E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	317	428	162	40	148	182	10	7	11	146	51	14
Future Volume (vph)	317	428	162	40	148	182	10	7	11	146	51	14
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	373	504	191	47	174	214	12	8	13	172	60	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	1068	435	33	248
Volume Left (vph)	373	47	12	172
Volume Right (vph)	191	214	13	16
Hadj (s)	0.00	-0.24	-0.13	0.13
Departure Headway (s)	5.7	5.7	7.5	6.9
Degree Utilization, x	1.69	0.69	0.07	0.47
Capacity (veh/h)	637	613	412	499
Control Delay (s)	330.7	20.4	11.1	15.9
Approach Delay (s)	330.7	20.4	11.1	15.9
Approach LOS	F	C	B	C

Intersection Summary			
Delay	205.4		
Level of Service	F		
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	305	489	201	244	395	423
Future Volume (Veh/h)	305	489	201	244	395	423
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	321	515	212	257	416	445
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			836		1002	321
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			836		1002	321
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			73		0	38
cM capacity (veh/h)			798		197	720

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	321	515	212	257	416	445
Volume Left	0	0	212	0	416	0
Volume Right	0	515	0	0	0	445
cSH	1700	1700	798	1700	197	720
Volume to Capacity	0.19	0.30	0.27	0.15	2.11	0.62
Queue Length 95th (ft)	0	0	27	0	804	108
Control Delay (s)	0.0	0.0	11.1	0.0	554.4	17.8
Lane LOS			B		F	C
Approach Delay (s)	0.0		5.0		277.0	
Approach LOS					F	

Intersection Summary				
Average Delay	111.2			
Intersection Capacity Utilization	59.1%	ICU Level of Service		B
Analysis Period (min)	15			

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	Amoruso Ranch SP TIS
Freeway	Southbound SR 65
Segment	Ferrari Ranch Rd to Lincoln Blvd
Alternative	Cumulative Plus Alternative 3
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	4,430	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,166	veh
Trucks and buses	2%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.990	
Driver popoulation factor, f_p	1.00	
Flow rate, v_p	4,710	pcph

Speed Inputs and Adjustments

Number of lanes, N	2	
Lane width		ft
Right-side lateral clearance		ft
Total ramp density, TRD		ramps/mi
Lane width adjustment, f_{LW}		mph
Lateral clearance adjustment, f_{LC}		mph
TRD adjustment		mph
Calculated free-flow speed, FFS		mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,355	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

HCM 2010: Freeway Basic Segment

Basic Operational Analysis

Project	Amoruso Ranch SP TIS
Freeway	Southbound SR 65
Segment	Twelve Bridges to Placer Pkwy
Alternative	Cumulative Plus Alternative 3
Time period	AM Peak Hour

Flow Inputs and Adjustments

Volume, V	4,430	vph
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v_{15}	1,166	veh
Trucks and buses	2%	
Recreational vehicles	0%	
Terrain type	Level	
Grade		
Length		mi
Trucks and buses PCE, E_T	1.5	
Recreational vehicle PCE, E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.990	
Driver popoulation factor, f_p	1.00	
Flow rate, v_p	4,710	pcph

Speed Inputs and Adjustments

Number of lanes, N	2	
Lane width		ft
Right-side lateral clearance		ft
Total ramp density, TRD		ramps/mi
Lane width adjustment, f_{LW}		mph
Lateral clearance adjustment, f_{LC}		mph
TRD adjustment		mph
Calculated free-flow speed, FFS		mph
Measured free-flow speed, FFS		mph
Free-flow speed curve	65	mph

Capacity Checks for Segments with Ramps

	Actual		Maximum		Violation?
Entering freeway volume		pcph		pcph	
Exiting freeway volume		pcph		pcph	
On-ramp volume		pcph		pcph	
Off-ramp volume		pcph		pcph	

LOS and Performance Measures

Flow rate, v_p	2,355	pcphpl
Average passenger-car speed, S	-	mph
Volume-to-capacity ratio, v/c	1.00	
Density, D	-	pcpmpl
Level of service, LOS	F	

Appendix D

Cumulative Mitigations

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	300	493	199	245	391	427
Future Volume (vph)	300	493	199	245	391	427
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.57	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	1059	1863	1770	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	316	519	209	258	412	449
RTOR Reduction (vph)	0	332	0	0	0	266
Lane Group Flow (vph)	316	187	209	258	412	183
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	12.8	12.8	12.8	12.8	12.8	12.8
Effective Green, g (s)	12.8	12.8	12.8	12.8	12.8	12.8
Actuated g/C Ratio	0.36	0.36	0.36	0.36	0.36	0.36
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	669	569	380	669	636	569
v/s Ratio Prot	0.17			0.14	c0.23	
v/s Ratio Perm		0.12	c0.20			0.12
v/c Ratio	0.47	0.33	0.55	0.39	0.65	0.32
Uniform Delay, d1	8.8	8.3	9.1	8.5	9.5	8.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.3	1.7	0.4	2.3	0.3
Delay (s)	9.3	8.6	10.8	8.8	11.8	8.6
Level of Service	A	A	B	A	B	A
Approach Delay (s)	8.9			9.7	10.1	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	35.6	Sum of lost time (s)	10.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	301	492	199	245	392	426
Future Volume (vph)	301	492	199	245	392	426
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.57	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	1058	1863	1770	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	317	518	209	258	413	448
RTOR Reduction (vph)	0	332	0	0	0	265
Lane Group Flow (vph)	317	186	209	258	413	183
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	12.8	12.8	12.8	12.8	12.8	12.8
Effective Green, g (s)	12.8	12.8	12.8	12.8	12.8	12.8
Actuated g/C Ratio	0.36	0.36	0.36	0.36	0.36	0.36
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	669	569	380	669	636	569
v/s Ratio Prot	0.17			0.14	c0.23	
v/s Ratio Perm		0.12	c0.20			0.12
v/c Ratio	0.47	0.33	0.55	0.39	0.65	0.32
Uniform Delay, d1	8.8	8.3	9.1	8.5	9.5	8.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.3	1.7	0.4	2.3	0.3
Delay (s)	9.3	8.6	10.8	8.8	11.8	8.6
Level of Service	A	A	B	A	B	A
Approach Delay (s)	8.9			9.7	10.1	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	35.6	Sum of lost time (s)	10.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	305	489	201	244	395	423
Future Volume (vph)	305	489	201	244	395	423
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.57	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	1054	1863	1770	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	515	212	257	416	445
RTOR Reduction (vph)	0	329	0	0	0	262
Lane Group Flow (vph)	321	186	212	257	416	183
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	12.9	12.9	12.9	12.9	12.9	12.9
Effective Green, g (s)	12.9	12.9	12.9	12.9	12.9	12.9
Actuated g/C Ratio	0.36	0.36	0.36	0.36	0.36	0.36
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	671	570	379	671	637	570
v/s Ratio Prot	0.17			0.14	c0.24	
v/s Ratio Perm		0.12	c0.20			0.12
v/c Ratio	0.48	0.33	0.56	0.38	0.65	0.32
Uniform Delay, d1	8.8	8.3	9.2	8.5	9.6	8.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.3	1.8	0.4	2.4	0.3
Delay (s)	9.4	8.6	11.0	8.9	12.0	8.6
Level of Service	A	A	B	A	B	A
Approach Delay (s)	8.9			9.8	10.2	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	35.8	Sum of lost time (s)	10.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group