MAY 2009

09-1196

TRAFFIC IMPACT STUDY

Las Pilitas Rock Quarry

San Luis Obispo County

VISALIA
222 N. Garden, Suite 100
Visalia, California 93291
T 559.739.8072
F 559.739.8377

SAN LUIS OBISPO
560 Higuera Street, Suite E
San Luis Obispo, California 93401
T 805.547.9498
F 805.547.9596

COLORADO
1950 W. Littleton Blvd, Suite 101
Littleton, Colorado 80120
T 303.797.0989
F 303.797.0987

tpgconsulting@tpgconsulting.net
www.tpgconsulting.net

TPG Consulting Incorporated

TRAFFIC IMPACT STUDY

FOR THE

LAS PILITAS ROCK QUARRY

San Luis Obispo County, California

May 2009

Prepared for:
Mr. Ken Johnston
Las Pilitas Resources
PO Box 975
Santa Margarita, CA 93453

Prepared by:
TPG Consulting, Inc.
222 N Garden, Suite 100
Visalia, CA 93291
(559) 739-8072

Charles Clouse, AICP, PTP, Principal-in-Charge
Walter V. Hutcheson, TE Project Manager
Nabor Solorio, Graphics
Carlos Salazar Jr., Technician

This report and the data contained herein have been prepared expressly for the purposes of this project. The use of this data, the conclusions contained in the report or the information provided herein by individuals or agencies is done so at their sole discretion and at their own responsibility. Publication of this document does not warrant the use of the data, the conclusions or the information for any purpose other than that described within this report.

TABLE OF CONTENTS ***PAGE***

INTRODUCTION 1
Figure 1: Vicinity Map 2

EXECUTIVE SUMMARY 3
Table 1: Weekday Levels Of Service Summary For The Study Segments and Intersections 4
Table 2: Proportionate Share Percentages 6

PROJECT 6
Figure 2: Site Plan 7
Table 3: Project Trip Generation Data 8
Figure 3: Project Trip Distribution Percentages 9
Figure 4: Project Trip Assignment 10

EXISTING CONDITIONS 11
Table 4: Description Of Existing Street System 11
Table 5: Existing Intersection Control 12
Table 6: Existing Conditions Analysis Intersection Weekday Level Of Service 12
Figure 5: Existing Traffic Conditions 13

EXISTING PLUS PROJECT CONDITIONS 15
Table 7: Existing Plus Project Conditions Analysis Intersection Weekday Level Of Service 15
Figure 6: Existing Plus Project Traffic Conditions 16

2030 NO PROJECT CONDITIONS 17
Figure 7: 2030 No Project Intersection Peak Hour Traffic Volumes 18
Table 8: 2030 No Project Conditions Analysis Intersection Weekday Level Of Service 19

2030 PROJECT CONDITIONS 20
Table 9: 2030 Project Conditions Analysis Intersection Weekday Level Of Service 20
Figure 8: 2030 Project Intersection Peak Hour Traffic Volumes 21

MITIGATED 2030 PROJECT CONDITIONS 22
Table 10: Mitigated 2030 Project Conditions Analysis Intersection Weekday Level Of Service 24
Figure 9: Mitigated 2030 Project Intersection Lane Configurations and Intersection Control 25

CONCLUSIONS AND RECOMMENDATIONS 26
Table 11: Proportionate Share Percentages 28

Appendix A Analysis Methodology
Appendix B Project Trip Generation Calculations
Appendix C Existing Conditions Intersection Levels of Service Calculations
Appendix D Existing Plus Project Conditions Intersection Levels of Service Calculations
Appendix E 2030 No Project Conditions Intersection Levels of Service Calculations
Appendix F 2030 Project Conditions Intersection Levels of Service Calculations
Appendix G Mitigated 2030 Project Conditions Intersection Levels of Service Calculations
Appendix H Peak Hour Signal Warrant Analyses
Appendix I School Crossing & Traffic Control Analysis

TRAFFIC IMPACT STUDY
FOR THE
LAS PILITAS ROCK QUARRY

INTRODUCTION

This Traffic Impact Study (TIS) was prepared to assess the traffic impacts due to the proposed Las Pilitas Rock Quarry (Project), which will be located on the north side of State Route (SR) 58/Calf Canyon Highway, east of the Salinas River, in San Luis Obispo County. The Project site is currently unoccupied. The proposed Project will produce 495,000 tons per year (tpy) when operating at full capacity. This study evaluates the impacts of the proposed development on adjacent intersection operations and provides an assessment of the Project driveway. Figure 1 shows the Project location.

The Project study area for the analysis of traffic impacts extends from El Camino Real to the Project Driveway along SR 58. This report analyzes four (4) intersections for two (2) time periods (weekday AM and PM peak hours). Unsignalized and signalized intersection levels of service were calculated using *Synchro 7.0* software, which incorporates the *2000 Highway Capacity Manual* *(HCM 2000)* methodologies. Signal warrants were prepared using the *California Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways*. The analysis methodology used in this report is summarized in Appendix A.

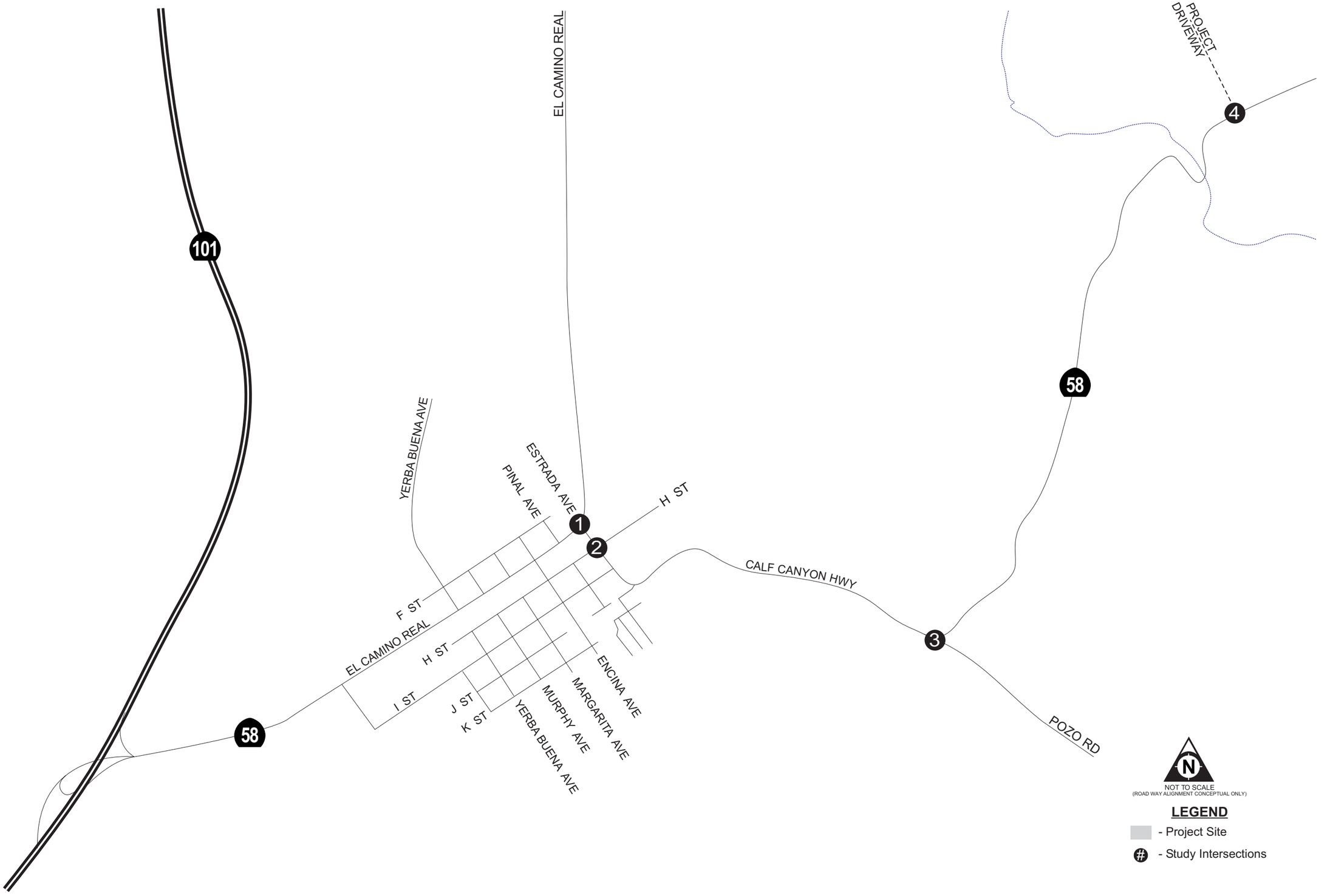
To analyze the traffic impacts resulting from the build out of the Project, the following four (4) scenarios were evaluated:

- Existing (2009) Traffic Conditions
- Existing Plus Project Traffic Conditions
- 2030 No Project Traffic Conditions
- 2030 Project Traffic Conditions
- Mitigated 2030 Project Traffic Conditions

The following intersections were analyzed:

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street
- W Pozo Road at Calf Canyon Highway
- Project Driveway at Calf Canyon Highway

The SR 101 interchange at El Camino Real was not analyzed in this report. It is the applicant's opinion that the interchange will not likely experience a change in trips due to the operation of the proposed Project. The Project will operate in the same quarry, recycling, and asphalt market as the already operational Hansen Quarry located on El Camino Real, north of Santa Margarita. Hansen already operates trucks through Santa Margarita to the SR 101 interchange. The Project is contending that its own operations will likely remove Hansen trucks at the interchange while replacing those with Project trucks, resulting in a net balance of current "quarry-related" trips through the interchange.



09-1196

Las Pilitas Rock Quarry
San Margarita, CA

Figure 1

VICINITY MAP

TPG Consulting Incorporated

EXECUTIVE SUMMARY

Table 1 shows the levels of service (LOS) for the study intersections for the various scenarios. Intersections with movements currently operating below or with movements projected to operate below the County of San Luis Obispo or Caltrans' adopted level of service standards are shown in bold in Table 1. The signalized intersection levels of service shown in Table 1 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown in Table 1.

Level of Service Impacts

As shown in Table 1, the following locations, by scenario, are projected to operate below the appropriate adopted level of service standard:

2030 No Project

- Estrada Avenue at El Camino Real
    - NB Approach – AM and PM peak hours
- Estrada Avenue at H Street
    - EB Approach – AM peak hour

2030 Project

- Estrada Avenue at El Camino Real
    - NB Approach – AM and PM peak hours
- Estrada Avenue at H Street
    - EB Approach – AM peak hour
    - WB Approach – AM peak hour

Signal Warrants

Peak Hour signal warrants were prepared for all unsignalized study intersections. Based on the warrant, the following locations, by scenario, are projected to meet the Peak Hour signal warrant:

Existing

- Estrada Avenue at El Camino Real

Existing Plus Project

- Estrada Avenue at El Camino Real

2030 No Project

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street

2030 Project

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street

TABLE 1:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE STUDY SEGMENTS AND INTERSECTIONS

	Existing		Existing Plus Project		2030 No Project		2030 Project		Mitigated 2030 Project	
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Estrada Ave at El Camino Real									B/A	18.1/8.6
• WB Left-Through	A/A	4.1/3.8	A/A	4.1/3.8	A/A	4.7/5.0	A/A	4.8/5.0		
• **NB Approach**	C/B	19.7/12.7	C/B	21.2/13.3	**F/D**	**255.7/31.6**	**F/E**	**285.4/37.0**		
Estrada Ave at H Street										
• **EB Approach**	C/B	15.2/11.0	C/B	15.6/11.1	**D**/B	**30.2**/14.4	**D**/B	**31.7**/14.7	**D**/B	**31.7**/14.7
• **WB Approach**	B/B	12.5/10.2	B/B	12.8/10.3	C/B	24.7/12.9	**D**/B	**26.**1/13.2	**D**/B	**26.**1/13.2
• NB Approach	A/A	0.3/0.6	A/A	0.3/0.5	A/A	0.3/0.6	A/A	0.3/0.6	A/A	0.3/0.6
• SB Approach	A/A	6.1/0.9	A/A	5.7/0.9	A/A	6.8/0.9	A/A	6.6/0.9	A/A	6.6/0.9
W Pozo Road at Calf Canyon Hwy										
• EB Left-Through	A/A	4.6/6.2	A/A	5.5/6.5	A/A	4.9/8.1	A/A	5.6/8.4	A/A	5.6/8.4
• SB Approach	A/A	9.3/9.3	A/A	9.4/9.9	B/B	10.0/12.3	B/B	10.2/14.4	B/B	10.2/14.4
Calf Canyon Hwy at Project Driveway										
• EB Left	n/a	n/a	A/A	7.6/7.3	n/a	n/a	A/A	7.7/7.4	A/A	7.7/7.4
• SB Approach	n/a	n/a	A/A	9.1/8.9	n/a	n/a	A/A	9.6/9.0	A/A	9.6/9.0

[1] *delay per vehicle* *secs = seconds* *NB = northbound* *SB = southbound* *EB = eastbound* *WB = westbound* *n/a = not applicable*

Recommended Improvements

To mitigate the intersections that are projected to operate below the appropriate adopted level of service standard and/or meet the Peak Hour signal warrant, the following improvements by scenario are recommended:

Estrada Avenue at El Camino Real

- Signalize the intersection

The Estrada Avenue at El Camino Real intersection currently meets the Peak Hour signal warrant and is projected to continue to meet the warrant in all study scenarios. Since the intersection is currently operating at acceptable levels of service and is projected to do so in the Existing Plus Project scenarios, the installation of the traffic signal is not recommended. However, the intersection operates below the level of service standard and continues to meet the Peak Hour signal warrant in the 2030 No Project and 2030 Project scenarios. Although the Project does not cause the level of service failure or trigger the Peak Hour signal warrant, it will contribute to those impacts. The Project may be responsible for paying its fair-share for the proposed improvement.

The proposed installation of a traffic signal for the Estrada Avenue at El Camino Real intersection does not include widening the existing paved sections to accommodate additional lanes/shoulder/etc. since the intersection is projected to operate acceptably with a permitted WB left-turn movement. However, the *Salinas River Area Plan* and the *Santa Margarita Design Plan* both call for additional improvements to this intersection. A channelized left-turn lane and installation of bike lanes and sidewalks are both proposed for El Camino Real at this intersection. A landscaped median may or may not be included in this improvement as well. Since these improvements are not currently funded, they are not included in the proposed mitigation

Estrada Avenue at H Street

The Estrada Avenue at H Street intersection is projected to operate below the level of service standard and meet the Peak Hour signal warrant in the 2030 No Project and 2030 Project scenarios. The level of service impacts to the Estrada Avenue at H Street intersection occur during the AM peak hour and are due mostly to the SB left-turns and WB right-turns associated with the elementary school drop-off. The following unique criteria apply to this intersection:

- The majority of the school-associated AM peak hour traffic occurs in a 15-30 minute period. This tends to increase delay for the minor street movements for that short time period, but leaves the remainder of the peak hour with lower impacts.
- The level of delay experienced by the minor street movements is somewhat alleviated by a crossing guard located on the north side of the intersection. The crossing guard provides regular breaks in the major street traffic which provides gaps for some minor street movements that would normally not occur during this period.
- While the intersection meets the Peak Hour signal warrant, it is unknown whether or not it will meet other signal warrants, now or in the future. Additional warrants may not be met which are more paramount to the operation of the intersection than the Peak Hour warrant.

It is suggested that this intersection be monitored and at such time that the intersection level of service falls below the adopted thresholds and/or meets additional signal warrants, that a determination of the improvements be made. Although the Project does not cause the level of service failure or trigger the Peak Hour signal warrant, it will contribute to those impacts. The Project may be responsible for paying its fair-share for any improvements to this intersection.

Proportionate Share Percentages

The Caltrans Proportionate Share Percentage was calculated by taking the Project trips and dividing by the total 2030 Project volumes minus the Existing volumes for the given intersection. The formula used in calculating the Proportionate Share Percentage is:

Proportionate Share Percentage = Project only trips / 2030 Project volume – Existing volume

Table 2 shows the volumes used to calculate the Proportionate Share Percentages and the resulting percentages for intersections that have proposed improvements. The volumes projected to cause the highest proportionate share percentage are shown bolded in Table 2.

TABLE 2:
PROPORTIONATE SHARE PERCENTAGES

Intersections	Existing AM/PM	Project Trips AM/PM	2030 Project AM/PM	Proportionate Share % AM/PM
Estrada Ave at El Camino Real	**704**/621	**28**/23	**1,174**/1,071	**5.96**/5.11
Estrada Ave at H Street	599/**392**	28/**23**	1,017/**732**	6.70/**6.76**

PROJECT

The proposed Project will produce 495,000 tons per year (tpy) when operating at full capacity. The Project will be located on the north side of State Route (SR) 58/Calf Canyon Highway, east of the Salinas River, in San Luis Obispo County. The Project site is currently unoccupied. The project will operate from 6:00 AM to 5:00 PM on weekdays. Figure 2 shows the Project site plan.

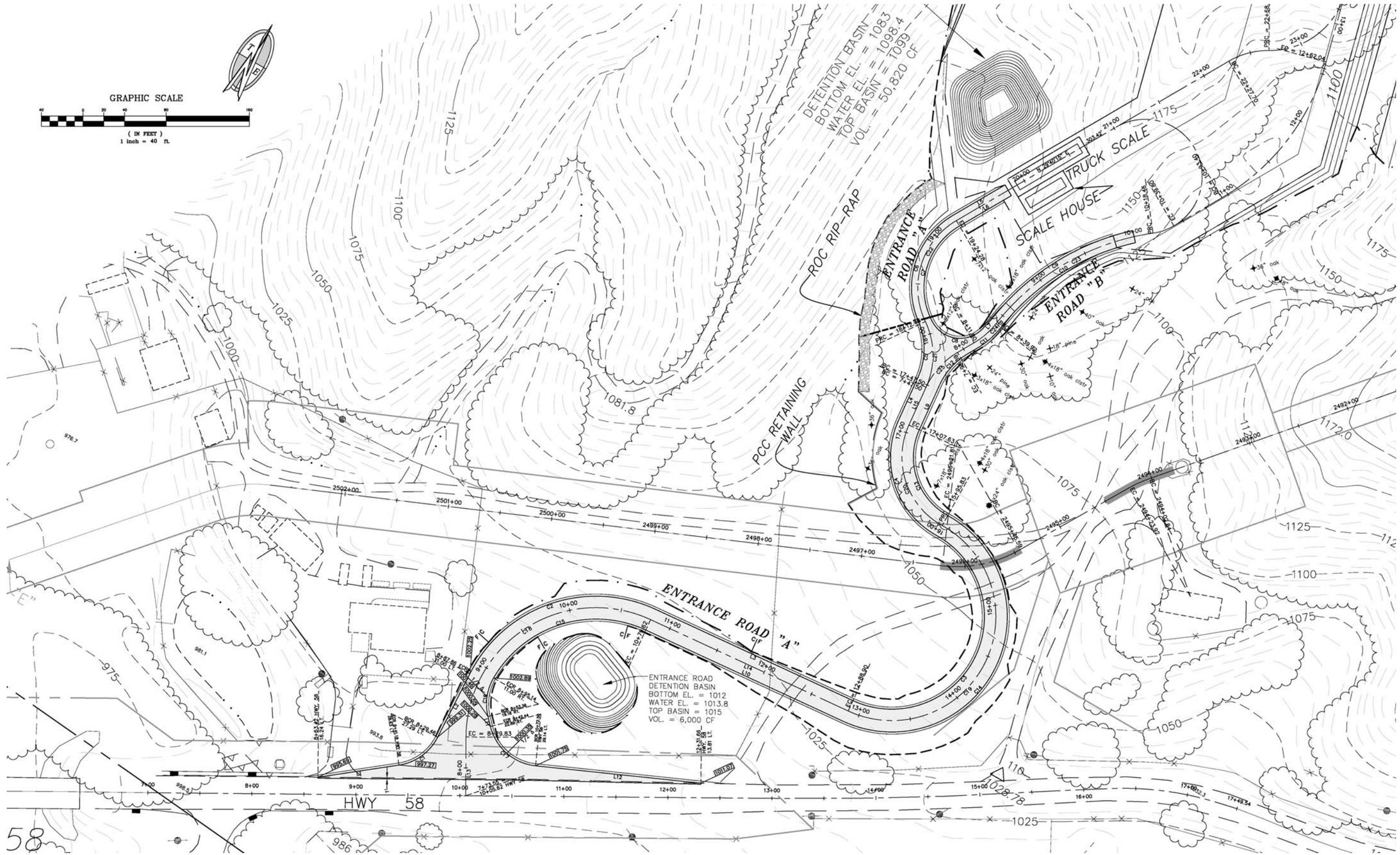
Project Access

The Project is proposing to construct a single access point to be used by trucks and employees. This access point will be located east of the Salinas River bridge and west of Park Hill Road. The driveway will be located between two (2) existing residential homes and out-buildings currently located on the north side of Calf Canyon Highway. Due to the relatively low volume of Project trips, low background traffic on Calf Canyon Highway, and acceptable levels of service, a separate left-turn lane is not necessary for acceptable operation of the Project Driveway. However, the Project is proposing to construct an eastbound left-turn lane on Calf Canyon Highway at the project driveway. Based on the projected peak hour eastbound left-turn volumes at this location, the turn lane should provide sufficient storage to accommodate 1 truck and 1 passenger car.[1]

Project Trip Generation

The Project trip generation information was developed from the production and employee information provided by the applicant. Details of the Project trip generation calculations are included in Appendix B. Table 3 shows the projected number of daily, AM and PM peak hour trips that would be generated by the Project.

[1] *Highway Design Manual*, Caltrans, September 1, 2006, Section 405.2(2)(e).



09-1196

Las Pilitas Rock Quarry
San Margarita, CA

Figure 2

PROJECT SITE PLAN

TPG Consulting Incorporated

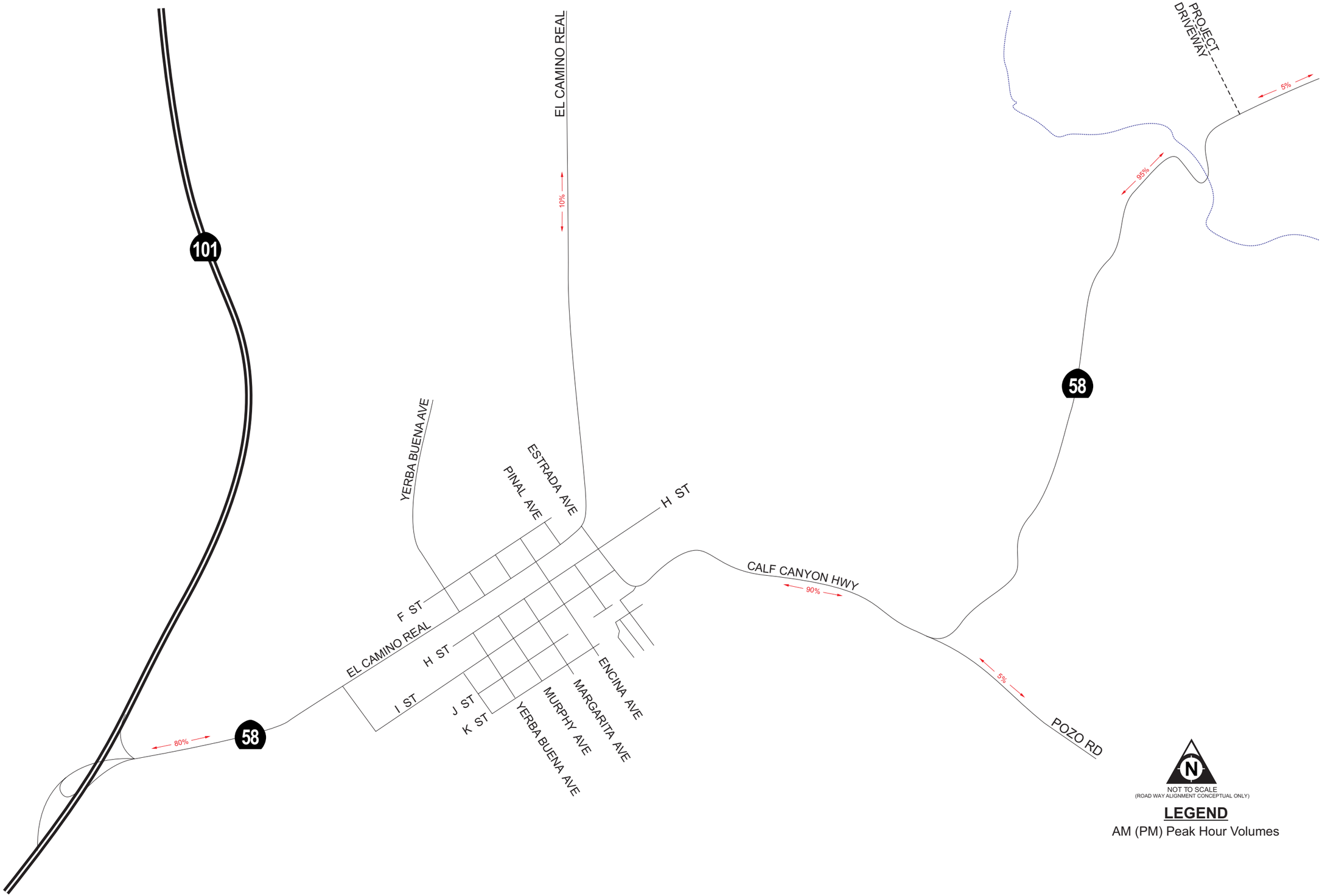
TABLE 3:
PROJECT TRIP GENERATION DATA

Project Trip Types	Daily (trips)[1]	AM Enter (trips)	AM Exit (trips)	AM Total	PM Enter (trips)	PM Exit (trips)	PM Total
Employee Trips	10	5	0	5	0	5	5
Truck Trips	198	14	13	27	11	11	22
Total Project Trips	**208**	**19**	**13**	**32**	**11**	**16**	**27**

[1] *Daily trip ends (1-directional)*

Project Trip Distribution

Trip distribution for the Project trips was based on client provided information. The majority of Project trips (employees and trucks) are projected to travel between SR 101 and the Project site. The Project's market will primarily be south of Santa Margarita and SR 101 is the main north-south corridor in the area. Approximately 20% of project trips are shown traveling outside the projected route (north on El Camino Real, east on W Pozo Road, and north on Calf Canyon Highway). Using this trip distribution, all Project trips travel through the study intersections. Figure 3 shows trip distribution percentages for all analysis years. Figure 4 shows the intersection assignment for Project trips for all analysis trips.



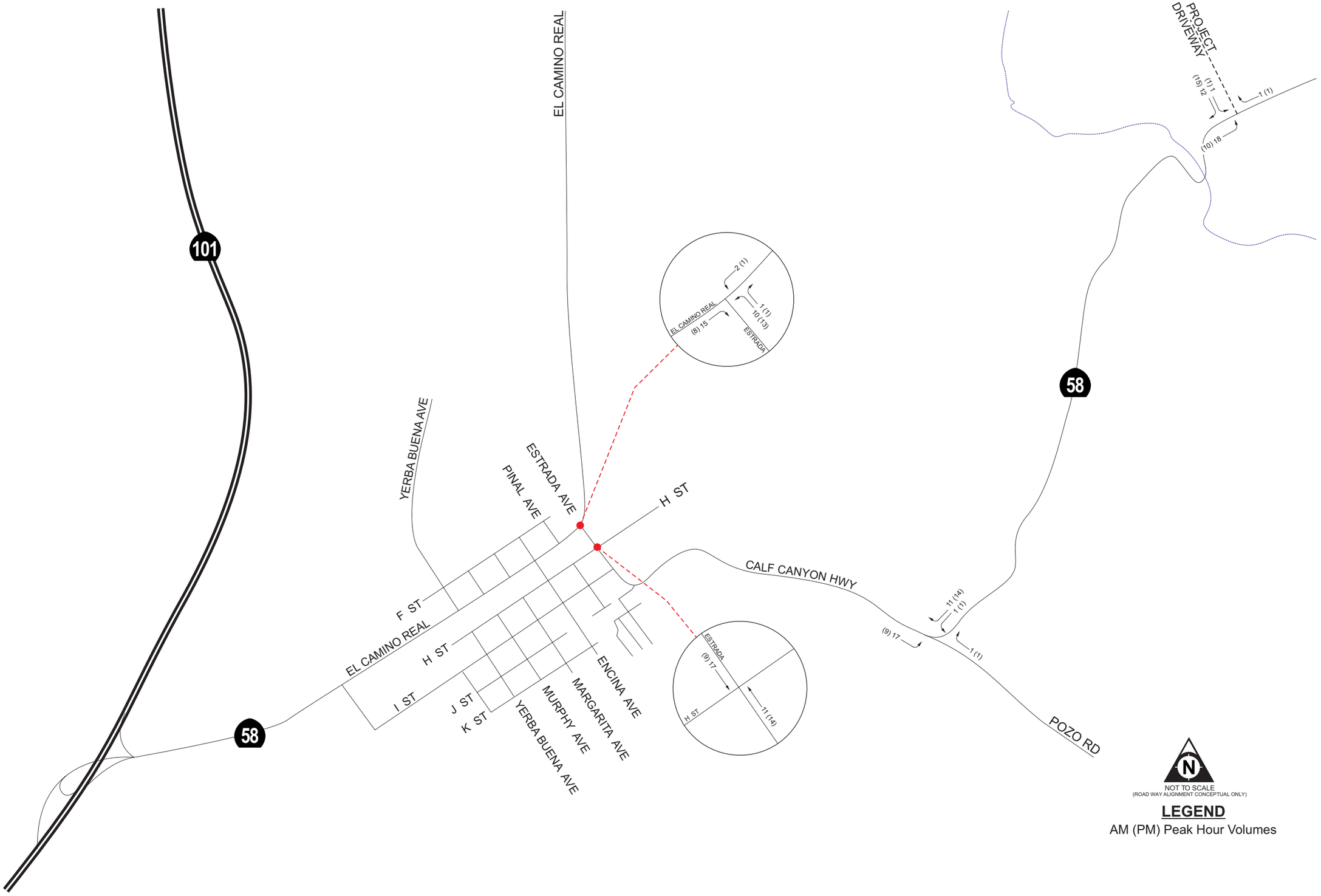
09-1196

Las Pilitas Rock Quarry
San Margarita, CA

Figure 3

TRIP DISTRIBUTION PERCENTAGES
Project Trips

TPG Consulting Incorporated



09-1196

Las Pilitas Rock Quarry
San Margarita, CA

Figure 4

PEAK HOUR TRAFFIC VOLUMES
Project Trips

TPG Consulting Incorporated

EXISTING CONDITIONS

Transit

Currently, the Regional Transit Authority (RTA) operates one (1) transit route in the study area. Route 9, operates between San Miguel, Paso Robles, Templeton, Atascadero, Santa Margarita, and San Luis Obispo. Route 9 has one (1) stop in Santa Margarita near the intersection of El Camino Real and Encina Avenue. Since this route does not operate a stop within walking distance of the Project site, no employee trips are anticipated to utilize transit.

The Atascadero Unified School District operates three (3) bus routes that travel through the study area. Routes 7 and 8 pick up students from Pozo and Santa Margarita and deliver them to Santa Margarita Elementary (Route 8) and Atascadero High School and Junior High (Route 7). Route 9 picks up students from the rural area between Santa Margarita and Atascadero and delivers them to Santa Margarita Elementary and Atascadero High School and Junior High.

Bike Facilities

Portions of SR 58, in the study area, are designated as a Bike Route with appropriate signing. Shoulder widths vary along SR 58 and cannot always accommodate bicyclists. Bike Lanes are located on El Camino Real east/north of its intersection with Estrada Avenue. No other designated bicycle facilities are located in the study area.

Pedestrian Facilities

Due to the rural nature of Santa Margarita, sidewalks are limited in the study area. The only sidewalk in the study area is located on the north side of H Street, east of Estrada Avenue. A pedestrian bridge is also located on the north side of H Street, west of Estrada Avenue, to cross a small creek. A marked crosswalk is also located on the north side of the Estrada Avenue at H Street intersection. These limited pedestrian facilities serve the Santa Margarita Elementary School. According to the *Santa Margarita Design Plan*, improvement of pedestrian facilities throughout the community is recommended, particularly along Estrada Avenue. Further analysis of the Estrada Avenue at H Street intersection and the school crossing is included in Appendix I.

Roadways

Table 4 describes the Existing street system in the study area including the street classification, number of lanes, and the posted speed limits.

TABLE 4:
DESCRIPTION OF EXISTING STREET SYSTEM

Street	Classification	No. of Lanes (2-dir)	Posted Speed Limit (mph)
State Route 58[1]	Principal Arterial	2	35-55
El Camino Real	Arterial	2	35-55
Estrada Avenue	Local Street	2	25[2]-35
H Street	Local Street	2	25
W Pozo Road	Rural Road	2	55
Calf Canyon Highway	Rural Road	2	55

[1] *Portions of El Camino Real, Estrada Ave, W Pozo Rd, and Calf Canyon Hwy are all designated as State Route 58*
[2] *25 mph posted for school zone*

Table 5 lists the study intersections and their associated intersection control.

TABLE 5:
EXISTING INTERSECTION CONTROL

Intersection	Signalized/Unsignalized	Type
Estrada Ave at El Camino Real	Unsignalized	TWSC
Estrada Ave at H Street	Unsignalized	TWSC
W Pozo Road at Calf Canyon Hwy	Unsignalized	TWSC
Calf Canyon Hwy at Project Driveway	n/a	n/a

TWSC = two-way stop-control *n/a = not applicable*

The existing traffic counts taken for this Project were compared to traffic counts taken in 2006 for the *Santa Margarita Ranch Transportation Impact Analysis*[2]. Based on this comparison, certain movements currently have fewer vehicles in the peak hour(s) in 2009 than were counted in 2006. Due to the relatively low number of vehicles for all movements, the minor decreases in vehicles are not outside a typical day-to-day fluctuation. However, all movements which are currently showing a lower number of vehicles were adjusted to the 2006 counts. This adjustment should be considered a worst-case scenario.

Level of Service

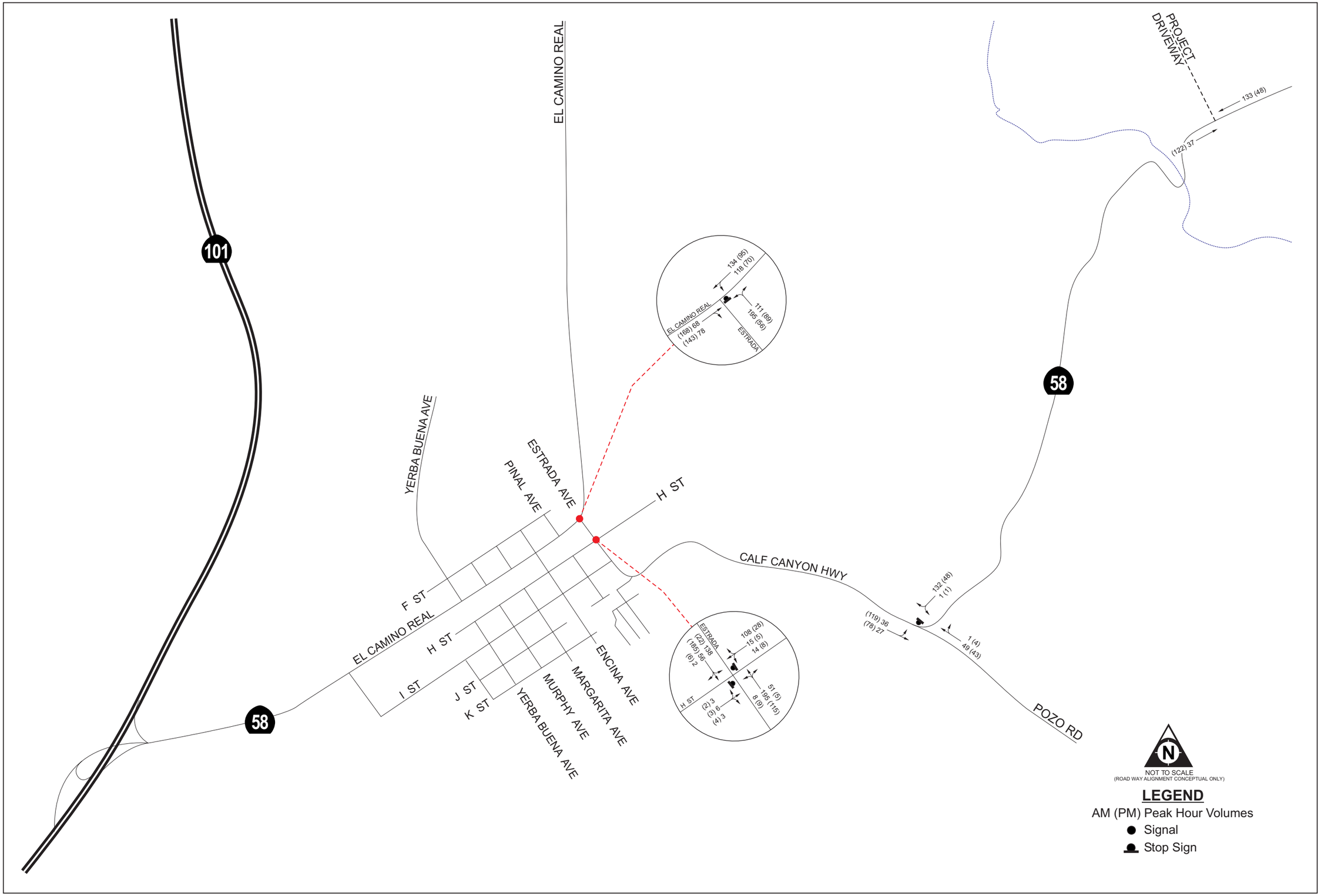
The Existing intersection lane configurations, intersection control, and peak hour traffic volumes are shown on Figure 5. Using the lane configurations and volumes shown on Figure 5, the intersections were analyzed for Existing levels of service. Table 6 shows the Existing levels of service for the study intersections. The Existing intersection levels of service calculations are included in Appendix C.

TABLE 6:
EXISTING CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

	AM Peak Hour		PM Peak Hour	
Intersection	LOS	Delay[1] (secs)	LOS	Delay[1] (secs)
Estrada Ave at El Camino Real				
• WB Left-Through	A	4.1	A	3.8
• NB Approach	C	19.7	B	12.7
Estrada Ave at H Street				
• EB Approach	C	15.2	B	11.0
• WB Approach	B	12.5	B	10.2
• NB Approach	A	0.3	A	0.6
• SB Approach	A	6.1	A	0.9
W Pozo Road at Calf Canyon Hwy				
• EB Left-Through	A	4.6	A	6.2
• SB Approach	A	9.3	A	9.3
Calf Canyon Hwy at Project Driveway				
• EB Left-Through	n/a	n/a	n/a	n/a
• SB Approach	n/a	n/a	n/a	n/a

[1] *Delay per vehicle* *secs = seconds* *SB = southbound* *NB = northbound*
EB = eastbound *WB = westbound* *n/a = not applicable*

[2] *Santa Margarita Ranch Transportation Impact Analysis*, Fehr and Peers, December 2006.



09-1196

Las Pilitas Rock Quarry
San Margarita, CA

Figure 5

PEAK HOUR TRAFFIC VOLUMES AND INTERSECTION CONFIGURATIONS

Existing

TPG Consulting Incorporated

As shown in Table 6, all the study intersections are currently operating at or above the appropriate adopted level or service standard in the Existing conditions scenario.

Signal Warrants

Peak Hour signal warrants were also prepared for the following three (3) unsignalized intersection:

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street
- W Pozo Road at Calf Canyon Road

Based on the Peak Hour signal warrants, a traffic signal is currently warranted at the Estrada Avenue at El Camino Real intersection in the Existing conditions scenario. The remaining study intersections do not currently meet the Peak Hour signal warrant. These warrant analyses are limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendix H.

EXISTING PLUS PROJECT CONDITIONS

The Existing Plus Project traffic conditions were developed using the Existing traffic volumes shown in Figure 6 and the Project trips shown in Figure 4.

Level of Service

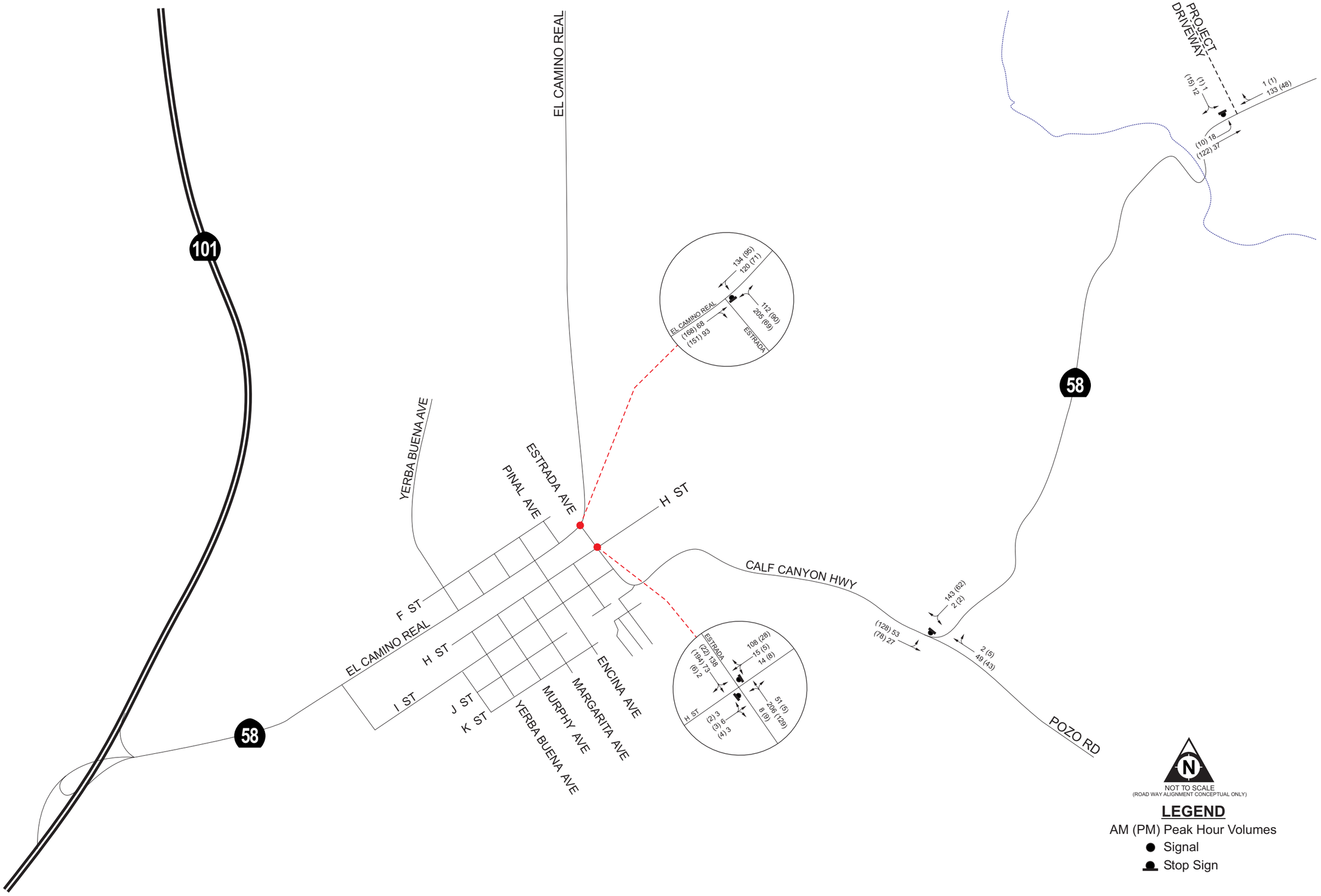
The Existing Plus Project intersection lane configurations, intersection controls, and peak hour traffic volumes are shown on Figure 6. Using the lane configurations and volumes shown on Figure 6, the intersections were analyzed for Existing Plus Project levels of service. Table 7 shows the Existing Plus Project levels of service for the study intersections. The Existing Plus Project intersection levels of service calculations are included in Appendix D.

TABLE 7:
EXISTING PLUS PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Estrada Ave at El Camino Real				
• WB Left-Through	A	4.1	A	3.8
• NB Approach	C	21.2	B	13.3
Estrada Ave at H Street				
• EB Approach	C	15.6	B	11.1
• WB Approach	B	12.8	B	10.3
• NB Approach	A	0.3	A	0.5
• SB Approach	A	5.7	A	0.9
W Pozo Road at Calf Canyon Hwy				
• EB Left-Through	A	5.5	A	6.5
• SB Approach	A	9.4	A	9.9
Calf Canyon Hwy at Project Driveway				
• EB Left	A	7.6	A	7.3
• SB Approach	A	9.1	A	8.9

[1] *Delay per vehicle* *secs = seconds* *SB = southbound* *NB = northbound*
EB = eastbound *WB = westbound*

As shown in Table 7, all the study intersections are currently operating at or above the appropriate adopted level or service standard in the Existing Plus Project conditions scenario.



09-1196

Las Pilitas Rock Quarry
San Margarita, CA

Figure 6

PEAK HOUR TRAFFIC VOLUMES AND INTERSECTION CONFIGURATIONS

Existing Plus Project

TPG Consulting Incorporated

Signal Warrants

Peak Hour signal warrants were again prepared for the following three (3) unsignalized intersection:

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street
- W Pozo Road at Calf Canyon Road

Signal warrants were not prepared for the Calf Canyon Highway at Project Driveway intersection since the low projected Project Driveway volumes will not satisfy any part of the Peak Hour signal warrant. Based on the Peak Hour signal warrants, a traffic signal is still warranted at the Estrada Avenue at El Camino Real intersection in the Existing Plus Project conditions scenario. The remaining study intersections are not projected to meet the Peak Hour signal warrant. These warrant analyses are limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendix H.

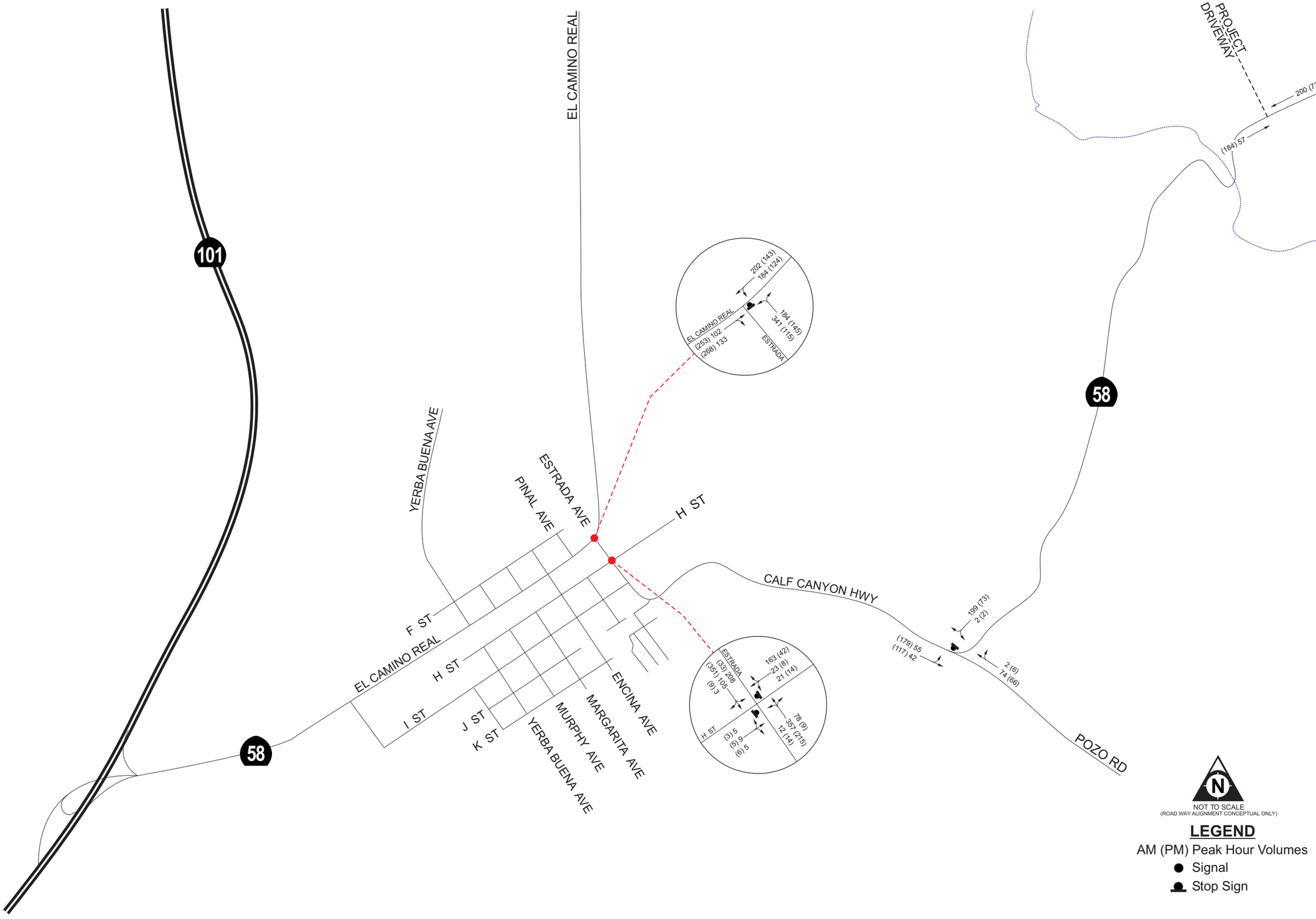
2030 NO PROJECT CONDITIONS

The 2030 No Project traffic conditions were developed using a historic growth rate calculated using traffic volumes along SR 58 through the study area. Based on Caltrans counts from the past 5 years, SR 58 has experienced 1.88% growth per year. This growth rate was applied to the Existing traffic volumes to develop the "base" 2030 traffic volumes. In addition to the historic growth, projected traffic from one (1) approved project was added to the "base" 2030 traffic volumes. The Santa Margarita Ranch development was recently approved to construct 112 single-family dwelling units to be located south of the existing Santa Margarita urban area. The projected trip generation and distribution for this development was taken from the *Santa Margarita Ranch Transportation Impact Analysis*[3]. The approved portion of the Santa Margarita Ranch development is referred to as the Agricultural Residential Cluster Subdivision (ARCS). Additionally, this project has proposed a Future Development Plan (FDP) which will construct and additional 431 homes as well as several other uses including a golf course, wineries, churches, etc.). The FDP has not been approved by the San Luis Obispo Board of Supervisors and is therefore not included in the 2030 No Project and 2030 Project analyses.

Level of Service

The 2030 No Project intersection lane configurations, intersection controls, and peak hour traffic volumes are shown on Figure 7. Using the lane configurations and volumes shown on Figure 7, the intersections were analyzed for 2030 No Project levels of service. Table 8 shows the 2030 No Project levels of service for the study intersections. The 2030 No Project intersection levels of service calculations are included in Appendix E.

[3] *Santa Margarita Ranch Transportation Impact Analysis*, Fehr and Peers, December 2006.



09-1196

Las Pilitas Rock Quarry
San Margarita, CA

Figure 7

PEAK HOUR TRAFFIC VOLUMES AND INTERSECTION CONFIGURATIONS
2030 No Project

TPG Consulting incorporated

TABLE 8:
2030 NO PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay[1] (secs)	LOS	Delay[1] (secs)
Estrada Ave at El Camino Real				
• WB Left-Through	A	4.7	A	5.0
• **NB Approach**	**F**	**255.7**	**D**	**31.6**
Estrada Ave at H Street				
• **EB Approach**	**D**	**30.2**	B	14.4
• WB Approach	C	24.7	B	12.9
• NB Approach	A	0.3	A	0.6
• SB Approach	A	6.8	A	0.9
W Pozo Road at Calf Canyon Hwy				
• EB Left-Through	A	4.9	A	8.1
• SB Approach	B	10.0	B	12.3
Calf Canyon Hwy at Project Driveway				
• EB Left-Through	n/a	n/a	n/a	n/a
• SB Approach	n/a	n/a	n/a	n/a

[1] *Delay per vehicle* *secs = seconds* *SB = southbound* *NB = northbound*
EB = eastbound *WB = westbound* *n/a = not applicable*

As shown in Table 8, the following study intersections, by time period, are projected to operate below the appropriate level of service standard in the 2030 No Project conditions scenario:

- Estrada Avenue at El Camino Real
  - NB Approach – AM and PM peak hours
- Estrada Avenue at H Street
  - EB Approach – AM peak hour

All the remaining study intersections are projected to operate at or above the appropriate adopted level or service standard in the 2030 No Project conditions scenario.

Signal Warrants

Peak Hour signal warrants were again prepared for the following three (3) unsignalized intersection:

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street
- W Pozo Road at Calf Canyon Road

Signal warrants were not prepared for the Calf Canyon Highway at Project Driveway intersection since the low projected Project Driveway volumes will not satisfy any part of the Peak Hour signal warrant. Based on the Peak Hour signal warrants, a traffic signal is still warranted at the Estrada Avenue at El Camino Real intersection in the 2030 No Project conditions scenario. The Estrada Avenue at H Street intersection is also projected to meet the Peak Hour signal warrant in the 2030 No Project conditions scenario. The remaining study intersection is not projected to meet the Peak Hour signal warrant. These warrant analyses are limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendix H.

2030 PROJECT CONDITIONS

The Existing Plus Project traffic conditions were developed using the 2030 No Project traffic volumes shown in Figure 9 and the Project trips shown in Figure 4.

Level of Service

The 2030 Project intersection lane configurations, intersection controls, and peak hour traffic volumes are shown on Figure 8. Using the lane configurations and volumes shown on Figure 8, the intersections were analyzed for 2030 Project levels of service. Table 9 shows the 2030 Project levels of service for the study intersections. The 2030 Project intersection levels of service calculations are included in Appendix F.

TABLE 9:
2030 PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

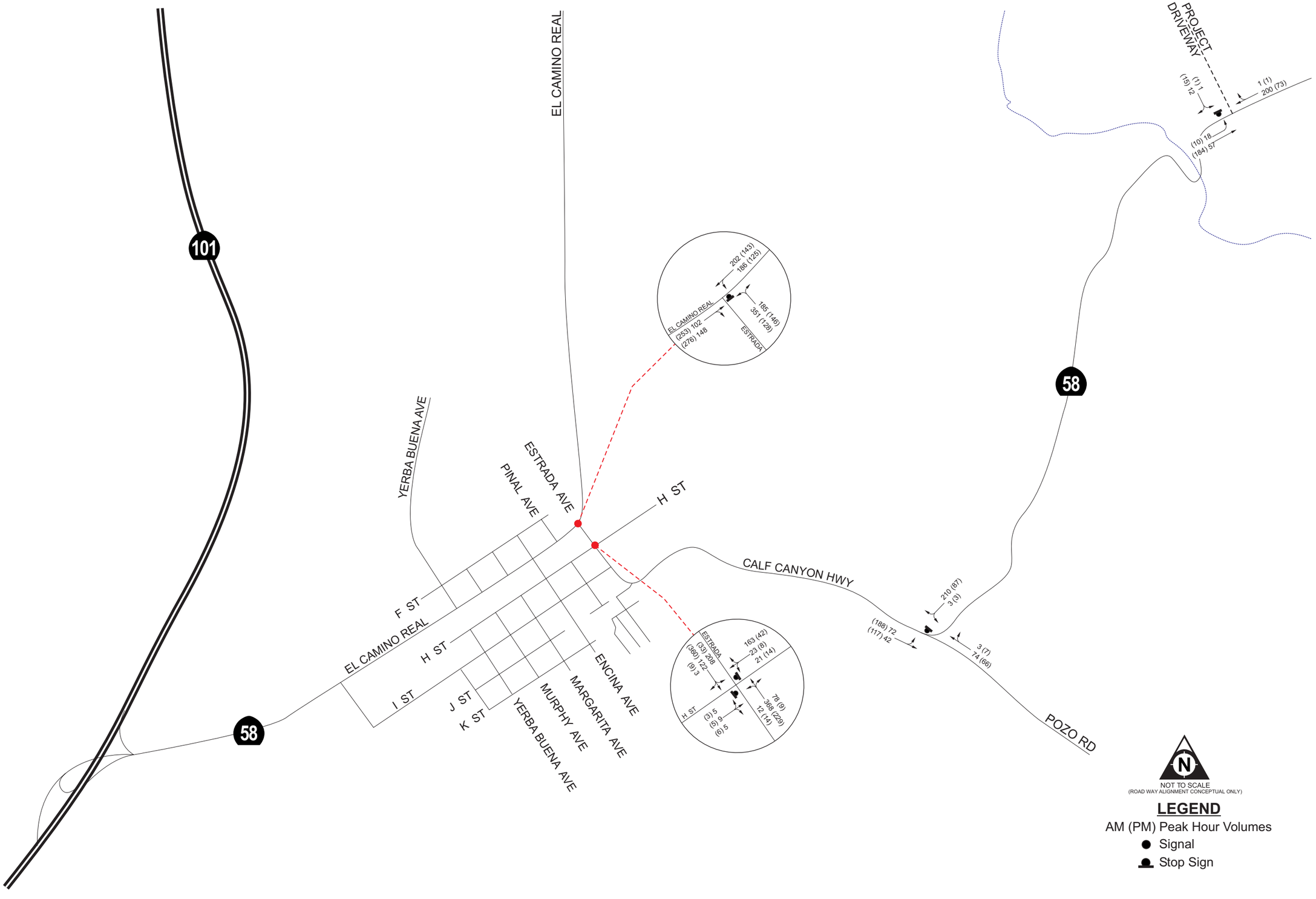
	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Estrada Ave at El Camino Real				
• WB Left-Through	A	4.8	A	5.0
• **NB Approach**	**F**	**285.4**	**E**	**37.0**
Estrada Ave at H Street				
• **EB Approach**	**D**	**31.7**	B	14.7
• **WB Approach**	**D**	**26.1**	B	13.2
• NB Approach	A	0.3	A	0.6
• SB Approach	A	6.6	A	0.9
W Pozo Road at Calf Canyon Hwy				
• EB Left-Through	A	5.6	A	8.5
• SB Approach	B	10.2	B	14.4
Calf Canyon Hwy at Project Driveway				
• EB Left	A	7.7	A	7.4
• SB Approach	A	9.6	A	9.0

[1] Delay per vehicle *secs = seconds* *SB = southbound* *NB = northbound*
EB = eastbound *WB = westbound*

As shown in Table 9, the following study intersections, by time period, are projected to operate below the appropriate level of service standard in the 2030 Project conditions scenario:

- Estrada Avenue at El Camino Real
  - NB Approach – AM and PM peak hours
- Estrada Avenue at H Street
  - EB Approach – AM peak hour
  - WB Approach – AM peak hour

All the remaining study intersections are projected to operate at or above the appropriate adopted level or service standard in the 2030 Project conditions scenario.



09-1196

Las Pilitas Rock Quarry
San Margarita, CA

Figure 8

PEAK HOUR TRAFFIC VOLUMES AND INTERSECTION CONFIGURATIONS
2030 Project

TPG Consulting Incorporated

Signal Warrants

Peak Hour signal warrants were again prepared for the following three (3) unsignalized intersection:

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street
- W Pozo Road at Calf Canyon Road

Signal warrants were not prepared for the Calf Canyon Highway at Project Driveway intersection since the low projected Project Driveway volumes will not satisfy any part of the Peak Hour signal warrant. Based on the Peak Hour signal warrants, a traffic signal is still warranted at the Estrada Avenue at El Camino Real and the Estrada Avenue at H Street intersections in the 2030 Project conditions scenario. The remaining study intersection is not projected to meet the Peak Hour signal warrant. These warrant analyses are limited to the peak hour volume warrant only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendix H.

MITIGATED 2030 PROJECT CONDITIONS

Level of Service Impacts

Based on the information provided in the previous sections, the following locations, by scenario, are projected to operate below the appropriate adopted level of service standard:

2030 No Project

- Estrada Avenue at El Camino Real
  - NB Approach – AM and PM peak hours
- Estrada Avenue at H Street
  - EB Approach – AM peak hour

2030 Project

- Estrada Avenue at El Camino Real
  - NB Approach – AM and PM peak hours
- Estrada Avenue at H Street
  - EB Approach – AM peak hour
  - WB Approach – AM peak hour

Signal Warrants

Peak Hour signal warrants were also prepared for all unsignalized study intersections. Based on the warrant, the following locations, by scenario, are projected to meet the Peak Hour signal warrant:

Existing

- Estrada Avenue at El Camino Real

Existing Plus Project

- Estrada Avenue at El Camino Real

2030 No Project

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street

2030 Project

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street

Recommended Improvements

To mitigate the intersections that are projected to operate below the appropriate adopted level of service standard and/or meet the Peak Hour signal warrant, the following improvements by scenario are recommended:

Estrada Avenue at El Camino Real

- Signalize the intersection

The Estrada Avenue at El Camino Real intersection currently meets the Peak Hour signal warrant and is projected to continue to meet the warrant in all study scenarios. Since the intersection is currently operating at acceptable levels of service and is projected to do so in the Existing Plus Project scenarios, the installation of the traffic signal is not recommended. However, the intersection operates below the level of service standard and continues to meet the Peak Hour signal warrant in the 2030 No Project and 2030 Project scenarios. Although the Project does not cause the level of service failure or trigger the Peak Hour signal warrant, it will contribute to those impacts. The Project may be responsible for paying its fair-share for the proposed improvement.

The proposed installation of a traffic signal for the Estrada Avenue at El Camino Real intersection does not include widening the existing paved sections to accommodate additional lanes/shoulder/etc. since the intersection is projected to operate acceptably with a permitted WB left-turn movement. However, the *Salinas River Area Plan* and the *Santa Margarita Design Plan* both call for additional improvements to this intersection. A channelized left-turn lane and installation of bike lanes and sidewalks are both proposed for El Camino Real at this intersection. A landscaped median may or may not be included in this improvement as well. Since these improvements are not currently funded, they are not included in the proposed mitigation

Estrada Avenue at H Street

The Estrada Avenue at H Street intersection is projected to operate below the level of service standard and meet the Peak Hour signal warrant in the 2030 No Project and 2030 Project scenarios. The level of service impacts to the Estrada Avenue at H Street intersection occur during the AM peak hour and are due mostly to the SB left-turns and WB right-turns associated with the elementary school drop-off. The following unique criteria apply to this intersection:

- The majority of the school-associated AM peak hour traffic occurs in a 15-30 minute period. This tends to increase delay for the minor street movements for that short time period, but leaves the remainder of the peak hour with lower impacts.
- The level of delay experienced by the minor street movements is somewhat alleviated by a crossing guard located on the north side of the intersection. The crossing guard provides regular breaks in the major street traffic which provides gaps for some minor street movements that would normally not occur during this period.

- While the intersection meets the Peak Hour signal warrant, it is unknown whether or not it will meet other signal warrants, now or in the future. Additional warrants may not be met which are more paramount to the operation of the intersection than the Peak Hour warrant.

It is suggested that this intersection be monitored and at such time that the intersection level of service falls below the adopted thresholds and/or meets additional signal warrants, that a determination of the improvements be made. Although the Project does not cause the level of service failure or trigger the Peak Hour signal warrant, it will contribute to those impacts. The Project may be responsible for paying its fair-share for any improvements to this intersection.

Level of Service

The Mitigated 2030 Project intersection lane configurations, intersection controls, and peak hour traffic volumes are shown on Figure 9. Using the lane configurations and volumes shown on Figure 9, the intersections were analyzed for Mitigated 2030 Project levels of service. Table 10 shows the Mitigated 2030 Project levels of service for the study intersections. The Mitigated 2030 Project intersection levels of service calculations are included in Appendix G.

TABLE 10:
MITIGATED 2030 PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

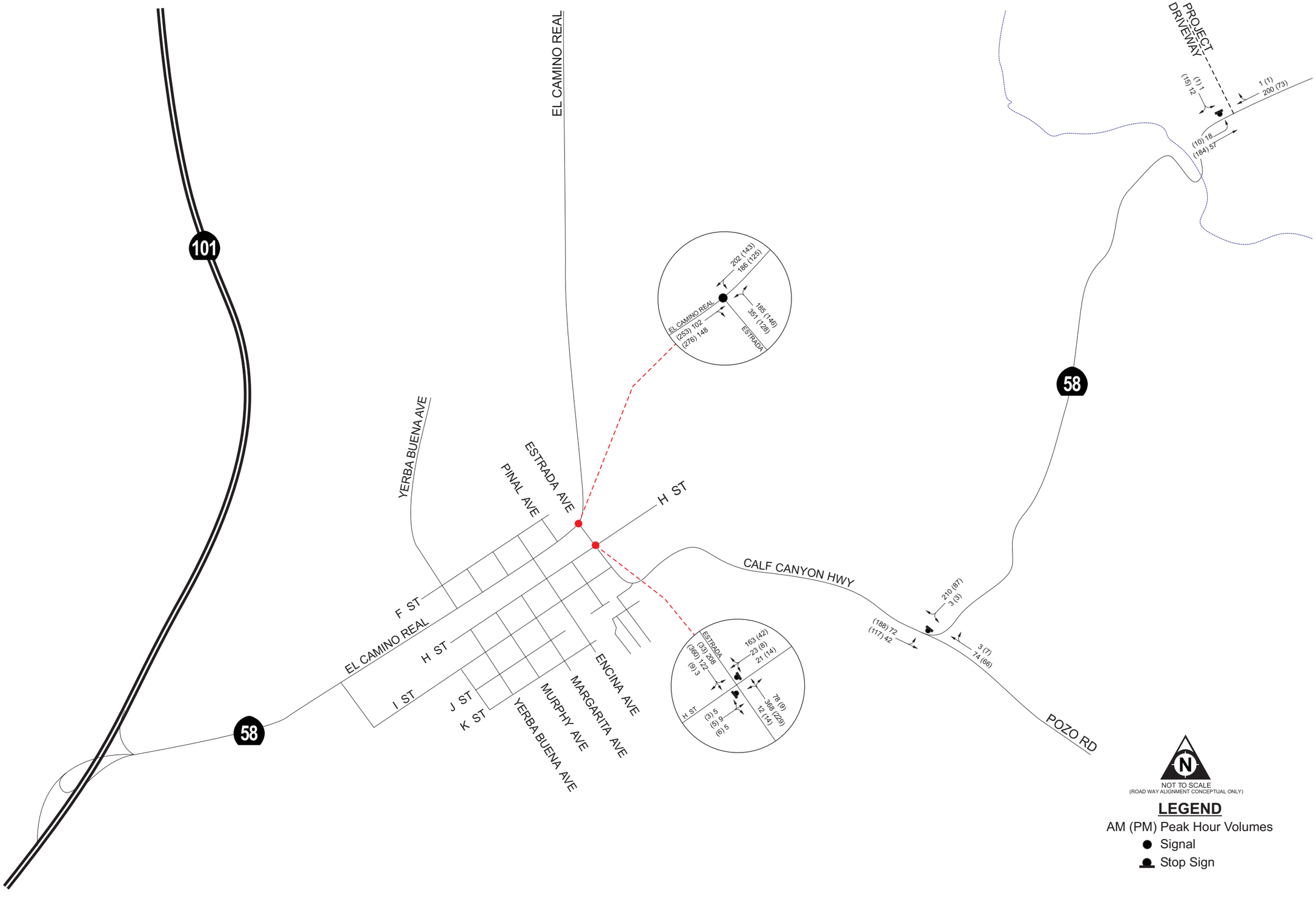
	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Estrada Ave at El Camino Real	B	18.1	A	8.6
Estrada Ave at H Street				
• **EB Approach**	**D**	**31.7**	B	14.7
• **WB Approach**	**D**	**26.1**	B	13.2
• NB Approach	A	0.3	A	0.6
• SB Approach	A	6.6	A	0.9
W Pozo Road at Calf Canyon Hwy				
• EB Left-Through	A	5.6	A	8.5
• SB Approach	B	10.2	B	14.4
Calf Canyon Hwy at Project Driveway				
• EB Left	A	7.7	A	7.4
• SB Approach	A	9.6	A	9.0

[1] *Delay per vehicle* *secs = seconds* *SB = southbound* *NB = northbound*
EB = eastbound *WB = westbound*

As shown in Table 10, the following study intersections, by time period, are projected to operate below the appropriate level of service standard in the Mitigated 2030 Project conditions scenario:

- Estrada Avenue at H Street
  - EB Approach – AM peak hour
  - WB Approach – AM peak hour

With the recommended improvements, all the remaining study intersections are projected to operate at or above the appropriate adopted level or service standard in the Mitigated 2030 Project conditions scenario.



09-1196

Las Pilitas Rock Quarry
San Margarita, CA

Figure 9

PEAK HOUR TRAFFIC VOLUMES AND INTERSECTION CONFIGURATIONS

Mitigated 2030 Project

TPG Consulting Incorporated

CONCLUSIONS AND RECOMMENDATIONS

As shown in the previous sections, the following impacts and improvements are recommended for the study locations.

Level of Service

As shown in Table 1, the following locations, by scenario, are projected to operate below the appropriate adopted level of service standard:

2030 No Project

- Estrada Avenue at El Camino Real
    - NB Approach – AM and PM peak hours
- Estrada Avenue at H Street
    - EB Approach – AM peak hour

2030 Project

- Estrada Avenue at El Camino Real
    - NB Approach – AM and PM peak hours
- Estrada Avenue at H Street
    - EB Approach – AM peak hour
    - WB Approach – AM peak hour

Signal Warrants

Peak Hour signal warrants were also prepared for all unsignalized study intersections. Based on the warrant, the following locations, by scenario, are projected to meet the Peak Hour signal warrant:

Existing

- Estrada Avenue at El Camino Real

Existing Plus Project

- Estrada Avenue at El Camino Real

2030 No Project

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street

2030 Project

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street

Recommended Improvements

To mitigate the intersections that are projected to operate below the appropriate adopted level of service standard and/or meet the Peak Hour signal warrant, the following improvements by scenario are recommended:

Estrada Avenue at El Camino Real

- Signalize the intersection

The Estrada Avenue at El Camino Real intersection currently meets the Peak Hour signal warrant and is projected to continue to meet the warrant in all study scenarios. Since the intersection is currently operating at acceptable levels of service and is projected to do so in the Existing Plus Project scenarios, the installation of the traffic signal is not recommended. However, the intersection operates below the level of service standard and continues to meet the Peak Hour signal warrant in the 2030 No Project and 2030 Project scenarios. Although the Project does not cause the level of service failure or trigger the Peak Hour signal warrant, it will contribute to those impacts. The Project may be responsible for paying its fair-share for the proposed improvement.

The proposed installation of a traffic signal for the Estrada Avenue at El Camino Real intersection does not include widening the existing paved sections to accommodate additional lanes/shoulder/etc. since the intersection is projected to operate acceptably with a permitted WB left-turn movement. However, the *Salinas River Area Plan* and the *Santa Margarita Design Plan* both call for additional improvements to this intersection. A channelized left-turn lane and installation of bike lanes and sidewalks are both proposed for El Camino Real at this intersection. A landscaped median may or may not be included in this improvement as well. Since these improvements are not currently funded, they are not included in the proposed mitigation

Estrada Avenue at H Street

The Estrada Avenue at H Street intersection is projected to operate below the level of service standard and meet the Peak Hour signal warrant in the 2030 No Project and 2030 Project scenarios. The level of service impacts to the Estrada Avenue at H Street intersection occur during the AM peak hour and are due mostly to the SB left-turns and WB right-turns associated with the elementary school drop-off. The following unique criteria apply to this intersection:

- The majority of the school-associated AM peak hour traffic occurs in a 15-30 minute period. This tends to increase delay for the minor street movements for that short time period, but leaves the remainder of the peak hour with lower impacts.
- The level of delay experienced by the minor street movements is somewhat alleviated by a crossing guard located on the north side of the intersection. The crossing guard provides regular breaks in the major street traffic which provides gaps for some minor street movements that would normally not occur during this period.
- While the intersection meets the Peak Hour signal warrant, it is unknown whether or not it will meet other signal warrants, now or in the future. Additional warrants may not be met which are more paramount to the operation of the intersection than the Peak Hour warrant.

It is suggested that this intersection be monitored and at such time that the intersection level of service falls below the adopted thresholds and/or meets additional signal warrants, that a determination of the improvements be made. Although the Project does not cause the level of service failure or trigger the Peak Hour signal warrant, it will contribute to those impacts. The Project may be responsible for paying its fair-share for any improvements to this intersection.

Proportionate Share Percentages

The Caltrans Proportionate Share Percentage was calculated by taking the Project trips and dividing by the total 2030 Project volumes minus the Existing volumes for the given intersection. The formula used in calculating the Proportionate Share Percentage is:

Proportionate Share Percentage = Project only trips / 2030 Project volume – Existing volume

Table 11 shows the volumes used to calculate the Proportionate Share Percentages and the resulting percentages for intersections that have proposed improvements. The volumes projected to cause the highest proportionate share percentage are shown bolded in Table 11.

TABLE 11:
PROPORTIONATE SHARE PERCENTAGES

Intersections	**Existing AM/PM**	**Project Trips AM/PM**	**2030 Project AM/PM**	**Proportionate Share % AM/PM**
Estrada Ave at El Camino Real	**704**/621	**28**/23	**1,174**/1,071	**5.96**/5.11
Estrada Ave at H Street	599/**392**	28/**23**	1,017/**732**	6.70/**6.76**

APPENDIX A

ANALYSIS METHODOLOGY

ANALYSIS METHODOLOGY

In order to prepare the traffic evaluation for the Project, a variety of data and technical assumptions had to be developed. This section of the report describes the various sources, data and technical assumptions used in this evaluation.

Sources

This report was prepared using information taken from the following sources:

- *2000 Highway Capacity Manual* (*HCM 2000*), Transportation Research Board, 2000.
- *Guide for the Preparation of Traffic Impact Studies*, State of California Department of Transportation, December, 2002.
- *Synchro 7.0*, Trafficware, 2007.
- *Salinas River Area Plan*, County of San Luis Obispo, Revised January 2007.
- *Santa Margarita Design Plan*, Department of Planning and Building, County of San Luis Obispo, October 9, 2001.
- *Santa Margarita Ranch Transportation Impact Analysis*, Fehr and Peers, December 2006.
- *Traffic Impact Analysis for Site Development*, A Recommended Practice, ITE, Transportation Planners Council Task Force on Traffic Access/Impact Studies, 2006.
- *Vision 2025: A Regional Transportation Plan*, San Luis Obispo Council of Governments, April 6, 2005.

Scenarios

The scenarios that were analyzed for this study included:

- Existing (2009) Traffic Conditions
- Existing Plus Project Traffic Conditions
- 2030 No Project Traffic Conditions
- 2030 Project Traffic Conditions
- Mitigated 2030 Project Traffic Conditions

The Existing Plus Project and 2030 Project scenarios reflect cumulative conditions analysis as required by CEQA.

Study Locations

The following intersections were analyzed:

- Estrada Avenue at El Camino Real
- Estrada Avenue at H Street
- W Pozo Road at Calf Canyon Highway
- Project Driveway at Calf Canyon Highway

Analysis Time Periods

According to *Traffic Impact Analyses for Site Development*, the overall purpose of a traffic impact study is to determine the project impacts that are likely to occur to the surrounding street system. In order to accomplish this purpose you need to determine what occurs when the peak of the project generated traffic overlays the peak of the street traffic. *Traffic Impact Analyses for Site Development* states "the peak periods [of the adjacent street and highway system] are generally the weekday morning (7-9 a.m.) and evening (4-6 p.m.) peak hours, although local area characteristics occasionally result in other peaks (e.g., at major shopping or recreational centers)". The peak hours analyzed in this study were:

- 7:00 to 9:00 AM
- 4:00 to 6:00 PM

These are the standard peak hours of the street typically used for study in the City of Fresno as stated in the *Traffic Impact Study Report Guidelines*.

Traffic Counts

According to the Caltrans *Guide for the Preparation of Traffic Impact Studies*, one of the common rules for counting vehicular traffic is:

> "Vehicle counts should be conducted on Tuesdays, Wednesdays, or Thursdays during weeks not containing a holiday and conducted in favorable weather conditions."[4]

The City of Fresno *Traffic Impact Study Report Guidelines* states that "Counts shall be collected during A.M. (7:00 a.m. to 9:00 a.m.) and P.M. (4:00 p.m. to 6:00 p.m.) peak hours, unless otherwise specified (such as midday or weekend peak periods)".[5]

Table A1 shows the date and day the Existing intersection count was taken for this Project. Prior to conducting these counts it was verified that these were non-holiday weeks.

TABLE A1:
EXISTING INTERSECTION COUNTS
DATES AND DAYS COUNTED

Intersections	Day	Date
Estrada Ave at El Camino Real	Tuesday	4/7/09
Estrada Ave at H Street	Tuesday	4/7/09
W Pozo Road at Calf Canyon Hwy	Tuesday	4/7/09
Calf Canyon Hwy at Project Driveway	Tuesday-Wednesday	4/7/09-4/8/09

As shown in Table A1, all intersection counts were conducted on days that were appropriate to count. The existing traffic counts were compared to traffic counts taken in 2006 for the *Santa Margarita Ranch Transportation Impact Analysis*[6]. Based on this comparison, certain movements at the study intersections currently have fewer vehicles in the peak hour(s) in 2009 than were counted in 2006. Due to the relatively low number of vehicles for all movements, the minor decreases in vehicles are not outside a typical day-to-day fluctuation. However, all movements which are currently showing a

[4] *Guide for the Preparation of Traffic Impact Studies*, State of California Department of Transportation, December 2002, page 4.
[5] Traffic Impact Study Report Guideline, City of Fresno, March 2006, page 5.
[6] *Santa Margarita Ranch Transportation Impact Analysis*, Fehr and Peers, December 2006.

lower number of vehicles were adjusted to the 2006 counts. This adjustment should be considered a worst-case scenario.

Approved/Pending/Proposed Project Trips

One (1) Approved/Pending/Proposed Projects was identified in the Project area and was included for analysis in this study. The Santa Margarita Ranch development was recently approved to construct 112 single-family dwelling units to be located south of the existing Santa Margarita urban area. The projected trip generation and distribution for this development was taken from the *Santa Margarita Ranch Transportation Impact Analysis*[7]. The approved portion of the Santa Margarita Ranch development is referred to as the Agricultural Residential Cluster Subdivision (ARCS). Additionally, this project has proposed a Future Development Plan (FDP) which will construct and additional 431 homes as well as several other uses including a golf course, wineries, churches, etc.).

Intersection Analysis and Volume Adjustments

Intersection heavy vehicle percentages were developed from the Existing conditions count data. Heavy vehicle percentages used in the analysis were the greater of either the counted or the *HCM 2000* 2% default. These percentages were used in all scenarios. The urban default peak hour factor (PHF) of 0.92 was used at the Estrada Avenue at El Camino Real and Estrada Avenue at H Street intersections and the rural default PHF of 0.88 was used at the W Pozo Road at Calf Canyon Highway and Project Driveway at Calf Canyon Highway intersections.

Signal Warrant Analysis

Peak Hour signal warrants (Warrant 3) were prepared for all unsignalized intersections, except the Project Driveway, based on the methodology presented in the *California Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways*, pages 4C-4, 4C-5 and 4C-10. A copy of this warrant is included in Appendix D. According to the MUTCD, "the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal." Therefore prior to making a final determination on installation of a proposed signal, a thorough engineering investigation, including collision history, should be conducted.

Level of Service Analysis Methods

Unsignalized and signalized intersection analyses were completed using *Synchro 7.0*, which incorporates the *HCM 2000* methodologies. *Synchro 7.0* allows for optimization of signals to provide for the greatest reduction in overall intersection delay. This optimization process can result in different signal cycle lengths for both the AM and PM peak hours of a given scenario and across all scenarios. The changing of the signal cycle length somewhat reflects the agency process whereby the agency will adjust intersection signal cycle lengths for differing traffic conditions based on current count data.

Level of Service

For analysis purposes, the *HCM 2000* defines six levels of service for various facility types. The six levels are given letter designations ranging from "A" to "F", with "A" representing the best operating conditions and "F" the worst. Quantifiable measures of effectiveness that best describe the quality of operation on the subject facility type are used to determine the facilities level of service. For

[7] *Santa Margarita Ranch Transportation Impact Analysis*, Fehr and Peers, December 2006.

signalized and unsignalized intersections, the quantifiable measure of effectiveness is average control delay.[8]

Control delay for two-way stop-controlled (TWSC) intersections, which have stop signs on only the minor street approaches, is per vehicle and is computed for the stop-controlled or minor street movements only since theoretically the through movements on the major street are not experiencing any delay. Since there is no aggregation of delay for a TWSC intersection, there is no intersection level of service as a whole, only levels of service for the individual minor movements. The minor movements generally consist of separate lefts on the major street approaches and all movements on both minor street approaches.

Table A2 shows the six levels of service and their corresponding ranges of average control delay for both signalized and unsignalized intersections. Table A2 also contains a brief traffic flow description for signalized intersections for each level of service category. The level of service diagrams provided throughout the report show the levels of service for the study intersections. The levels of service shown for signalized intersections are representative of the overall level of service for that intersection. For TWSC intersections, the level of service shown on the maps is the level of service for the worst operating movement at that intersection as opposed to the overall intersection level of service.

TABLE A2: INTERSECTION LEVEL OF SERVICE DESCRIPTION			**Intersections**	
			Signalized	**Unsignalized[1]**
Level of Service	**Conditions**	**Signalized Intersection Description**	**Delay (secs/veh)**	**Delay (secs/veh)**
"A"	Free Flow	*Users experience very low delay. Progression is favorable and most vehicles do not stop at all.*	≤10.0	≤10.0
"B"	Stable Operations	*Vehicles travel with good progression. Some vehicles stop, causing slight delay.*	>10.0 – 20.0	>10.0 – 15.0
"C"	Stable Operations	*Higher delays result from fair progression. A significant number of vehicles stop, although many continue to pass through the intersection without stopping.*	>20.0 to 35.0	>15.0 – 25.0
"D"	Approaching Unstable	*Congestion is noticeable. Progression is unfavorable, with more vehicles stopping rather than passing through the intersection.*	>35.0 – 55.0	>25.0 – 35.0
"E"	Unstable Operations	*Traffic volumes are at capacity. Users experience poor progression and long delays.*	>55.0 – 80.0	>35.0 – 50.0
"F"	Forced Flow	*Intersection's capacity is oversaturated, causing poor progression and unusually long delays.*	>80.0	>50.0

Source: 2000 Highway Capacity Manual, Transportation Research Board.
[1] Unsignalized intersections include TWSC and AWSC

Level of Service Standards

The County of San Luis Obispo policy calls for a LOS "C" threshold in rural areas and a LOS "D" threshold in urban areas. Although two (2) of the study intersections are within the "urban" area of Santa Margarita, the rural character of the town and roadways justifies using the rural area threshold for all study locations. This should be considered a worst-case scenario.

[8] Control delay, according to the *2000 Highway Capacity Manual*, page 16-1, includes initial acceleration delay, queue move-up time, stopped delay, and final acceleration delay.

"Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less than the appropriate target LOS, the existing measures of effectiveness should be maintained."[9]

Based on the LOS standards of the two (2) controlling agencies, all study locations will be evaluated against the LOS "C" threshold.

[9] *Guide for the Preparation of Traffic Impact Studies*, State of California Department of Transportation, December, 2002.

APPENDIX B

PROJECT TRIP GENERATION CALCULATIONS

Las Pilitas Resources: Project Trip Generation

Max Annual Volume
225,000 CY 2.2 Tons Per CY

250 Maximum Working Days
20 Tons Per Truck Load

6AM to 5PM Operating Hours
11 Hours Per Day Working

AM peak hour = 1.5 x Loads per Hour
PM peak hour = 1.2 x Loads per Hour

495,000 Total Tons Annually

24,750 Total Annual Loads
99.0 Average Daily Truck Loads
9.0 Loads Per Hour

14 Estimated AM Peak Loads
11 Estimated PM Peak Loads

Trucks

49,500 Annual Trip Ends
198.0 Daily Trip Ends
18.0 Trip Ends Per Hour

27 Estimated AM Peak Trip Ends
22 Estimated PM Peak Trip Ends

	Enter	Exit
AM	**14**	**13**
PM	**11**	**11**

Employees 5

2,500 Annual Trip Ends
10.0 Daily Trip Ends

5 Estimated AM Peak Trip Ends
5 Estimated PM Peak Trip Ends

	Enter	Exit
AM	**5**	**0**
PM	**0**	**5**

APPENDIX C

EXISTING CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	68	78	118	134	195	111
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	85	128	146	212	121
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			159		518	116
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			159		518	116
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		55	87
cM capacity (veh/h)			1415		469	933

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	159	274	333
Volume Left	0	128	212
Volume Right	85	0	121
cSH	1700	1415	572
Volume to Capacity	0.09	0.09	0.58
Queue Length 95th (ft)	0	7	93
Control Delay (s)	0.0	4.1	19.7
Lane LOS		A	C
Approach Delay (s)	0.0	4.1	19.7
Approach LOS			C

Intersection Summary			
Average Delay	10.0		
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	168	143	70	95	56	89
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	183	155	76	103	61	97
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			338		516	260
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			338		516	260
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			94		87	87
cM capacity (veh/h)			1210		480	769

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	338	179	158
Volume Left	0	76	61
Volume Right	155	0	97
cSH	1700	1210	624
Volume to Capacity	0.20	0.06	0.25
Queue Length 95th (ft)	0	5	25
Control Delay (s)	0.0	3.8	12.7
Lane LOS		A	B
Approach Delay (s)	0.0	3.8	12.7
Approach LOS			B

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	6	3	14	15	108	8	195	51	138	56	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	7	3	15	16	117	9	212	55	150	61	2
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	745	647	62	626	620	240	63			267		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	745	647	62	626	620	240	63			267		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	98	100	96	95	85	99			88		
cM capacity (veh/h)	246	342	1003	352	353	797	1540			1279		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	13	149	276	213
Volume Left	3	15	9	150
Volume Right	3	117	55	2
cSH	367	629	1540	1279
Volume to Capacity	0.04	0.24	0.01	0.12
Queue Length 95th (ft)	3	23	0	10
Control Delay (s)	15.2	12.5	0.3	6.1
Lane LOS	C	B	A	A
Approach Delay (s)	15.2	12.5	0.3	6.1
Approach LOS	C	B		

Intersection Summary				
Average Delay	5.3			
Intersection Capacity Utilization	43.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	3	4	8	5	28	9	115	5	22	185	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	3	4	9	5	30	10	125	5	24	201	7
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	433	402	204	405	403	128	208			130		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	433	402	204	405	403	128	208			130		
tC, single (s)	7.2	6.6	6.3	7.2	6.6	6.3	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3			2.3		
p0 queue free %	100	99	99	98	99	97	99			98		
cM capacity (veh/h)	496	518	826	533	518	912	1340			1431		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	45	140	232
Volume Left	2	9	10	24
Volume Right	4	30	5	7
cSH	614	740	1340	1431
Volume to Capacity	0.02	0.06	0.01	0.02
Queue Length 95th (ft)	1	5	1	1
Control Delay (s)	11.0	10.2	0.6	0.9
Lane LOS	B	B	A	A
Approach Delay (s)	11.0	10.2	0.6	0.9
Approach LOS	B	B		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	36	27	49	1	1	132
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	144	108	56	1	1	150
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	57				452	56
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	57				452	56
tC, single (s)	4.1				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.4
p0 queue free %	91				100	85
cM capacity (veh/h)	1561				506	999

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	252	57	151
Volume Left	144	0	1
Volume Right	0	1	150
cSH	1561	1700	992
Volume to Capacity	0.09	0.03	0.15
Queue Length 95th (ft)	8	0	13
Control Delay (s)	4.6	0.0	9.3
Lane LOS	A		A
Approach Delay (s)	4.6	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	119	78	43	4	1	48
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	476	312	49	5	1	55
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	53				1315	51
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	53				1315	51
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	70				99	95
cM capacity (veh/h)	1565				121	1017

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	788	53	56
Volume Left	476	0	1
Volume Right	0	5	55
cSH	1565	1700	884
Volume to Capacity	0.30	0.03	0.06
Queue Length 95th (ft)	32	0	5
Control Delay (s)	6.2	0.0	9.3
Lane LOS	A		A
Approach Delay (s)	6.2	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX D

EXISTING PLUS PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	68	93	120	134	205	112
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	101	130	146	223	122
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			175		531	124
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			175		531	124
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		52	87
cM capacity (veh/h)			1395		460	924

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	175	276	345
Volume Left	0	130	223
Volume Right	101	0	122
cSH	1700	1395	559
Volume to Capacity	0.10	0.09	0.62
Queue Length 95th (ft)	0	8	104
Control Delay (s)	0.0	4.1	21.2
Lane LOS		A	C
Approach Delay (s)	0.0	4.1	21.2
Approach LOS			C

Intersection Summary			
Average Delay	10.6		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	168	151	71	95	69	90
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	183	164	77	103	75	98
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			347		522	265
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			347		522	265
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			94		84	87
cM capacity (veh/h)			1201		475	764

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	347	180	173
Volume Left	0	77	75
Volume Right	164	0	98
cSH	1700	1201	605
Volume to Capacity	0.20	0.06	0.29
Queue Length 95th (ft)	0	5	29
Control Delay (s)	0.0	3.8	13.3
Lane LOS		A	B
Approach Delay (s)	0.0	3.8	13.3
Approach LOS			B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	6	3	14	15	108	8	206	51	138	73	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	7	3	15	16	117	9	224	55	150	79	2
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	775	677	80	656	651	252	82			279		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	775	677	80	656	651	252	82			279		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	98	100	95	95	85	99			88		
cM capacity (veh/h)	234	328	980	335	339	785	1516			1266		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	13	149	288	232
Volume Left	3	15	9	150
Volume Right	3	117	55	2
cSH	351	613	1516	1266
Volume to Capacity	0.04	0.24	0.01	0.12
Queue Length 95th (ft)	3	24	0	10
Control Delay (s)	15.6	12.8	0.3	5.7
Lane LOS	C	B	A	A
Approach Delay (s)	15.6	12.8	0.3	5.7
Approach LOS	C	B		

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	3	4	8	5	28	9	129	5	22	194	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	3	4	9	5	30	10	140	5	24	211	7
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	458	427	214	430	428	143	217			146		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	458	427	214	430	428	143	217			146		
tC, single (s)	7.2	6.6	6.3	7.2	6.6	6.3	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3			2.3		
p0 queue free %	100	99	99	98	99	97	99			98		
cM capacity (veh/h)	476	501	816	513	501	894	1329			1412		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	45	155	241
Volume Left	2	9	10	24
Volume Right	4	30	5	7
cSH	597	721	1329	1412
Volume to Capacity	0.02	0.06	0.01	0.02
Queue Length 95th (ft)	1	5	1	1
Control Delay (s)	11.1	10.3	0.5	0.9
Lane LOS	B	B	A	A
Approach Delay (s)	11.1	10.3	0.5	0.9
Approach LOS	B	B		

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	27.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	53	27	49	2	2	143
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	212	108	56	2	2	162
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	58				589	57
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	58				589	57
tC, single (s)	4.1				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.4
p0 queue free %	86				99	84
cM capacity (veh/h)	1559				401	998

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	320	58	165
Volume Left	212	0	2
Volume Right	0	2	162
cSH	1559	1700	978
Volume to Capacity	0.14	0.03	0.17
Queue Length 95th (ft)	12	0	15
Control Delay (s)	5.5	0.0	9.4
Lane LOS	A		A
Approach Delay (s)	5.5	0.0	9.4
Approach LOS			A

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	128	78	43	5	2	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	512	312	49	6	2	70
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	55				1388	52
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	55				1388	52
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	67				98	93
cM capacity (veh/h)	1564				106	1016

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	824	55	73
Volume Left	512	0	2
Volume Right	0	6	70
cSH	1564	1700	801
Volume to Capacity	0.33	0.03	0.09
Queue Length 95th (ft)	36	0	7
Control Delay (s)	6.5	0.0	9.9
Lane LOS	A		A
Approach Delay (s)	6.5	0.0	9.9
Approach LOS			A

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	37	133	1	1	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	20	42	151	1	1	14
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	152				235	152
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	152				235	152
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				100	98
cM capacity (veh/h)	1428				747	900

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	20	42	152	15
Volume Left	20	0	0	1
Volume Right	0	0	1	14
cSH	1428	1700	1700	886
Volume to Capacity	0.01	0.02	0.09	0.02
Queue Length 95th (ft)	1	0	0	1
Control Delay (s)	7.6	0.0	0.0	9.1
Lane LOS	A			A
Approach Delay (s)	2.5		0.0	9.1
Approach LOS				A

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	23.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	122	48	1	1	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.25	0.25
Hourly flow rate (vph)	11	139	55	1	4	60
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	56				216	55
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56				216	55
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				99	94
cM capacity (veh/h)	1549				771	1017

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	11	139	56	64
Volume Left	11	0	0	4
Volume Right	0	0	1	60
cSH	1549	1700	1700	997
Volume to Capacity	0.01	0.08	0.03	0.06
Queue Length 95th (ft)	1	0	0	5
Control Delay (s)	7.3	0.0	0.0	8.9
Lane LOS	A			A
Approach Delay (s)	0.6		0.0	8.9
Approach LOS				A

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	17.2%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX E

2030 NO PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	102	133	184	202	341	184
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	111	145	200	220	371	200
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			255		803	183
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			255		803	183
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		0	77
cM capacity (veh/h)			1304		298	857

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	255	420	571
Volume Left	0	200	371
Volume Right	145	0	200
cSH	1700	1304	386
Volume to Capacity	0.15	0.15	1.48
Queue Length 95th (ft)	0	14	755
Control Delay (s)	0.0	4.7	255.7
Lane LOS		A	F
Approach Delay (s)	0.0	4.7	255.7
Approach LOS			F

Intersection Summary			
Average Delay	118.7		
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	253	268	124	143	115	145
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	275	291	135	155	125	158
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			566		846	421
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			566		846	421
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			86		56	75
cM capacity (veh/h)			996		283	624

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	566	290	283
Volume Left	0	135	125
Volume Right	291	0	158
cSH	1700	996	407
Volume to Capacity	0.33	0.14	0.69
Queue Length 95th (ft)	0	12	128
Control Delay (s)	0.0	5.0	31.6
Lane LOS		A	D
Approach Delay (s)	0.0	5.0	31.6
Approach LOS			D

Intersection Summary			
Average Delay	9.1		
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	9	5	21	23	163	12	357	78	208	105	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	10	5	23	25	177	13	388	85	226	114	3
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	1214	1067	116	1035	1026	430	117			473		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1214	1067	116	1035	1026	430	117			473		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	94	99	86	86	72	99			79		
cM capacity (veh/h)	85	174	937	166	183	623	1471			1074		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	225	486	343
Volume Left	5	23	13	226
Volume Right	5	177	85	3
cSH	164	403	1471	1074
Volume to Capacity	0.13	0.56	0.01	0.21
Queue Length 95th (ft)	11	83	1	20
Control Delay (s)	30.2	24.7	0.3	6.8
Lane LOS	D	C	A	A
Approach Delay (s)	30.2	24.7	0.3	6.8
Approach LOS	D	C		

Intersection Summary				
Average Delay	8.0			
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

2030 No Project PM
2: H Street & Estrada Avenue / SR 58

4/28/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	5	6	14	8	42	14	215	9	33	351	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	5	7	15	9	46	15	234	10	36	382	10
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	777	732	386	736	732	239	391			243		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	777	732	386	736	732	239	391			243		
tC, single (s)	7.2	6.6	6.3	7.2	6.6	6.3	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3			2.3		
p0 queue free %	99	98	99	95	97	94	99			97		
cM capacity (veh/h)	277	330	653	312	330	791	1146			1300		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	15	70	259	427
Volume Left	3	15	15	36
Volume Right	7	46	10	10
cSH	398	524	1146	1300
Volume to Capacity	0.04	0.13	0.01	0.03
Queue Length 95th (ft)	3	11	1	2
Control Delay (s)	14.4	12.9	0.6	0.9
Lane LOS	B	B	A	A
Approach Delay (s)	14.4	12.9	0.6	0.9
Approach LOS	B	B		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	55	42	74	2	2	199
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	220	168	84	2	2	226
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	86				693	85
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	86				693	85
tC, single (s)	4.1				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.4
p0 queue free %	86				99	77
cM capacity (veh/h)	1523				345	963

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	388	86	228
Volume Left	220	0	2
Volume Right	0	2	226
cSH	1523	1700	946
Volume to Capacity	0.14	0.05	0.24
Queue Length 95th (ft)	13	0	24
Control Delay (s)	4.9	0.0	10.0
Lane LOS	A		B
Approach Delay (s)	4.9	0.0	10.0
Approach LOS			B

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	179	117	66	6	2	73
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	716	468	75	7	2	83
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	82				1978	78
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	82				1978	78
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	53				94	92
cM capacity (veh/h)	1528				36	982

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1184	82	85
Volume Left	716	0	2
Volume Right	0	7	83
cSH	1528	1700	578
Volume to Capacity	0.47	0.05	0.15
Queue Length 95th (ft)	64	0	13
Control Delay (s)	8.1	0.0	12.3
Lane LOS	A		B
Approach Delay (s)	8.1	0.0	12.3
Approach LOS			B

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX F

2030 PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	102	148	186	202	351	185
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	111	161	202	220	382	201
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			272		815	191
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			272		815	191
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		0	76
cM capacity (veh/h)			1286		291	848

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	272	422	583
Volume Left	0	202	382
Volume Right	161	0	201
cSH	1700	1286	377
Volume to Capacity	0.16	0.16	1.55
Queue Length 95th (ft)	0	14	812
Control Delay (s)	0.0	4.8	285.4
Lane LOS		A	F
Approach Delay (s)	0.0	4.8	285.4
Approach LOS			F

Intersection Summary			
Average Delay	131.9		
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	253	276	125	143	128	146
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	275	300	136	155	139	159
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			575		852	425
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			575		852	425
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			86		50	74
cM capacity (veh/h)			988		280	621

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	575	291	298
Volume Left	0	136	139
Volume Right	300	0	159
cSH	1700	988	396
Volume to Capacity	0.34	0.14	0.75
Queue Length 95th (ft)	0	12	152
Control Delay (s)	0.0	5.0	37.0
Lane LOS		A	E
Approach Delay (s)	0.0	5.0	37.0
Approach LOS			E

Intersection Summary			
Average Delay	10.7		
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	9	5	21	23	163	12	368	78	208	122	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	10	5	23	25	177	13	400	85	226	133	3
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	1245	1097	134	1065	1057	442	136			485		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1245	1097	134	1065	1057	442	136			485		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	94	99	86	86	71	99			79		
cM capacity (veh/h)	80	166	915	158	175	613	1448			1063		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	225	498	362
Volume Left	5	23	13	226
Volume Right	5	177	85	3
cSH	155	390	1448	1063
Volume to Capacity	0.13	0.58	0.01	0.21
Queue Length 95th (ft)	11	87	1	20
Control Delay (s)	31.7	26.1	0.3	6.6
Lane LOS	D	D	A	A
Approach Delay (s)	31.7	26.1	0.3	6.6
Approach LOS	D	D		

Intersection Summary				
Average Delay	8.2			
Intersection Capacity Utilization	66.5%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	5	6	14	8	42	14	229	9	33	360	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	5	7	15	9	46	15	249	10	36	391	10
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	802	757	396	761	757	254	401			259		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	802	757	396	761	757	254	401			259		
tC, single (s)	7.2	6.6	6.3	7.2	6.6	6.3	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3			2.3		
p0 queue free %	99	98	99	95	97	94	99			97		
cM capacity (veh/h)	266	319	645	300	319	775	1136			1283		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	15	70	274	437
Volume Left	3	15	15	36
Volume Right	7	46	10	10
cSH	386	508	1136	1283
Volume to Capacity	0.04	0.14	0.01	0.03
Queue Length 95th (ft)	3	12	1	2
Control Delay (s)	14.7	13.2	0.6	0.9
Lane LOS	B	B	A	A
Approach Delay (s)	14.7	13.2	0.6	0.9
Approach LOS	B	B		

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	72	42	74	3	3	210
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	288	168	84	3	3	239
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	88				830	86
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	88				830	86
tC, single (s)	4.1				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.4
p0 queue free %	81				99	75
cM capacity (veh/h)	1521				271	962

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	456	88	242
Volume Left	288	0	3
Volume Right	0	3	239
cSH	1521	1700	929
Volume to Capacity	0.19	0.05	0.26
Queue Length 95th (ft)	17	0	26
Control Delay (s)	5.6	0.0	10.2
Lane LOS	A		B
Approach Delay (s)	5.6	0.0	10.2
Approach LOS			B

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	32.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	188	117	66	7	3	87
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	752	468	75	8	3	99
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	83				2051	79
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	83				2051	79
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	51				89	90
cM capacity (veh/h)	1527				31	981

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1220	83	102
Volume Left	752	0	3
Volume Right	0	8	99
cSH	1527	1700	486
Volume to Capacity	0.49	0.05	0.21
Queue Length 95th (ft)	71	0	20
Control Delay (s)	8.4	0.0	14.4
Lane LOS	A		B
Approach Delay (s)	8.4	0.0	14.4
Approach LOS			B

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	57	200	1	1	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	20	65	227	1	1	14
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	228				334	228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	228				334	228
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	98
cM capacity (veh/h)	1340				655	816

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	20	65	228	15
Volume Left	20	0	0	1
Volume Right	0	0	1	14
cSH	1340	1700	1700	801
Volume to Capacity	0.02	0.04	0.13	0.02
Queue Length 95th (ft)	1	0	0	1
Control Delay (s)	7.7	0.0	0.0	9.6
Lane LOS	A			A
Approach Delay (s)	1.9		0.0	9.6
Approach LOS				A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	184	73	1	1	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.25	0.25
Hourly flow rate (vph)	11	209	83	1	4	60
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	84				315	84
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	84				315	84
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				99	94
cM capacity (veh/h)	1513				677	981

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	11	209	84	64
Volume Left	11	0	0	4
Volume Right	0	0	1	60
cSH	1513	1700	1700	955
Volume to Capacity	0.01	0.12	0.05	0.07
Queue Length 95th (ft)	1	0	0	5
Control Delay (s)	7.4	0.0	0.0	9.0
Lane LOS	A			A
Approach Delay (s)	0.4		0.0	9.0
Approach LOS				A

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX G

MITIGATED 2030 PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	102	148	186	202	351	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6			4.6	4.6	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.92			1.00	0.95	
Flt Protected	1.00			0.98	0.97	
Satd. Flow (prot)	1649			1802	1703	
Flt Permitted	1.00			0.70	0.97	
Satd. Flow (perm)	1649			1295	1703	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	111	161	202	220	382	201
RTOR Reduction (vph)	94	0	0	0	34	0
Lane Group Flow (vph)	178	0	0	422	549	0
Heavy Vehicles (%)	6%	6%	3%	3%	3%	3%
Turn Type			Perm			
Protected Phases	2			6	8	
Permitted Phases			6			
Actuated Green, G (s)	19.9			19.9	18.8	
Effective Green, g (s)	19.9			19.9	18.8	
Actuated g/C Ratio	0.42			0.42	0.39	
Clearance Time (s)	4.6			4.6	4.6	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	685			538	668	
v/s Ratio Prot	0.11				c0.32	
v/s Ratio Perm				c0.33		
v/c Ratio	0.26			0.78	0.82	
Uniform Delay, d1	9.2			12.1	13.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.2			7.4	8.0	
Delay (s)	9.4			19.5	21.1	
Level of Service	A			B	C	
Approach Delay (s)	9.4			19.5	21.1	
Approach LOS	A			B	C	

Intersection Summary

HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	47.9	Sum of lost time (s)	9.2
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	253	276	125	143	128	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6			4.6	4.6	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.93			1.00	0.93	
Flt Protected	1.00			0.98	0.98	
Satd. Flow (prot)	1732			1785	1625	
Flt Permitted	1.00			0.57	0.98	
Satd. Flow (perm)	1732			1038	1625	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	300	136	155	139	159
RTOR Reduction (vph)	78	0	0	0	93	0
Lane Group Flow (vph)	497	0	0	291	205	0
Heavy Vehicles (%)	2%	2%	4%	4%	6%	6%
Turn Type			Perm			
Protected Phases	2			6	8	
Permitted Phases			6			
Actuated Green, G (s)	16.8			16.8	7.7	
Effective Green, g (s)	16.8			16.8	7.7	
Actuated g/C Ratio	0.50			0.50	0.23	
Clearance Time (s)	4.6			4.6	4.6	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	863			517	371	
v/s Ratio Prot	c0.29				c0.13	
v/s Ratio Perm				0.28		
v/c Ratio	0.58			0.56	0.55	
Uniform Delay, d1	5.9			5.9	11.5	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.9			1.4	1.8	
Delay (s)	6.9			7.3	13.3	
Level of Service	A			A	B	
Approach Delay (s)	6.9			7.3	13.3	
Approach LOS	A			A	B	

Intersection Summary

HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	33.7	Sum of lost time (s)	9.2
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX H

PEAK HOUR SIGNAL WARRANT ANALYSES

WARRANT 3 - Peak Hour

El Camino Real at Estrada Avenue

Existing Conditions

PART A or PART B SATISFIED **YES** NO

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — **YES** NO

PART B

SATISFIED (Figure 4C-4) **YES** NO

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		398	476
Highest Approach Minor Street	√		306	145

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / EL CAMINO REAL Critical Approach Speed 35/55 mph

MINOR STREET: SR 58 / ESTRADA AVENUE Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [X]

[ ] URBAN (U)

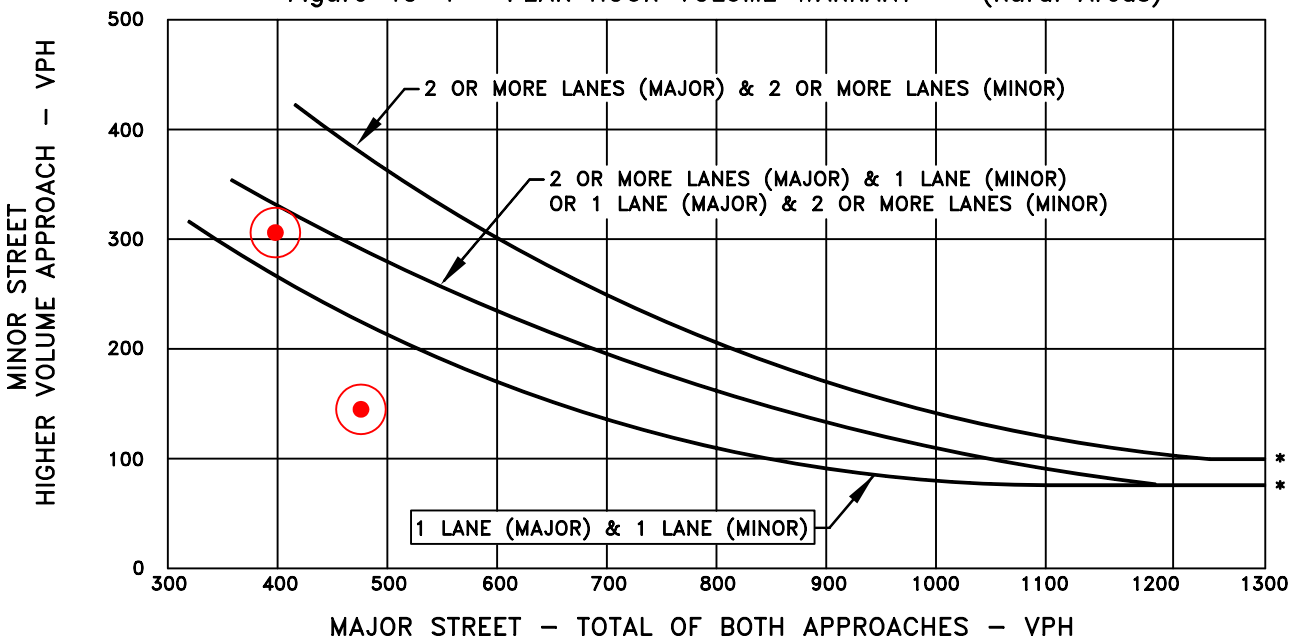
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		398	476				
Highest Approaches – Minor Street	✓		306	145				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

H Street at Estrada Avenue

Existing Conditions

PART A or PART B SATISFIED YES **NO**

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — YES **NO**

PART B

SATISFIED (Figure 4C-4) YES **NO**

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		450	342
Highest Approach Minor Street	√		137	41

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / ENCINA AVENUE Critical Approach Speed 35 mph

MINOR STREET: H STREET Critical Approach Speed 25 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☒ URBAN (U)

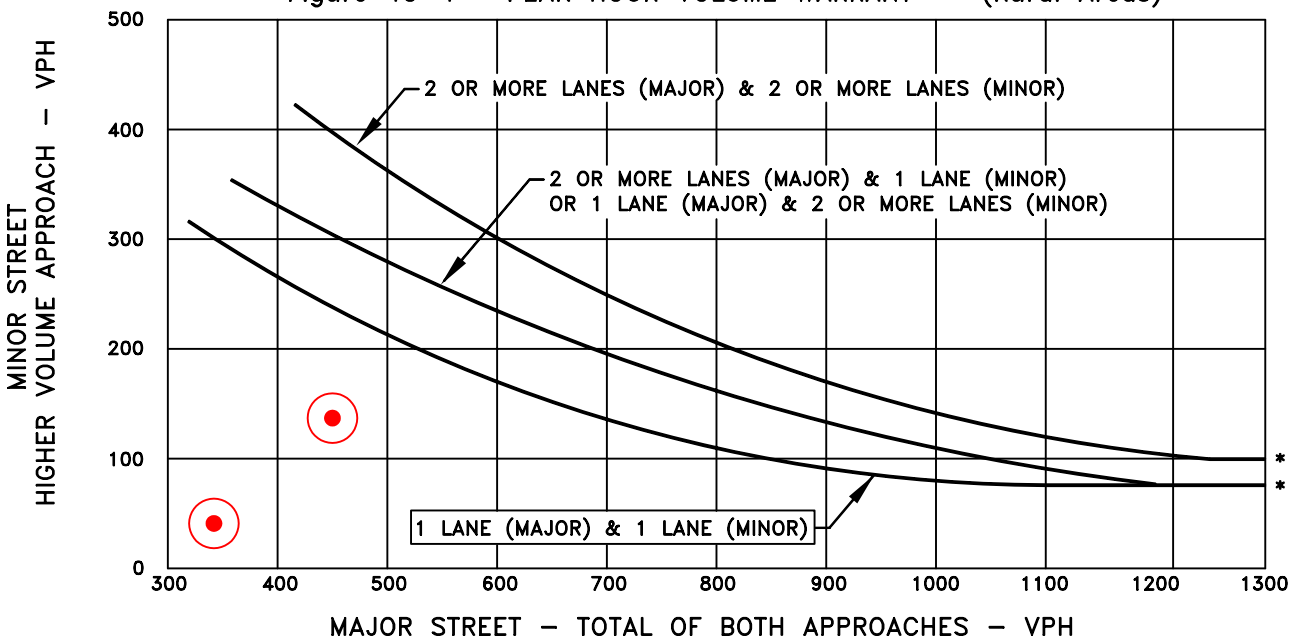
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		450	342				
Highest Approaches – Minor Street	✓		137	41				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

Pozo Road at Calf Canyon Highway

Existing Conditions

PART A or PART B SATISFIED YES **NO**

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — YES **NO**

PART B

SATISFIED (Figure 4C-4) YES **NO**

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		113	244
Highest Approach Minor Street	√		133	49

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / W POZO STREET Critical Approach Speed 55 mph

MINOR STREET: SR 58 / CALF CANYON HWY Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [X]

[ ] URBAN (U)

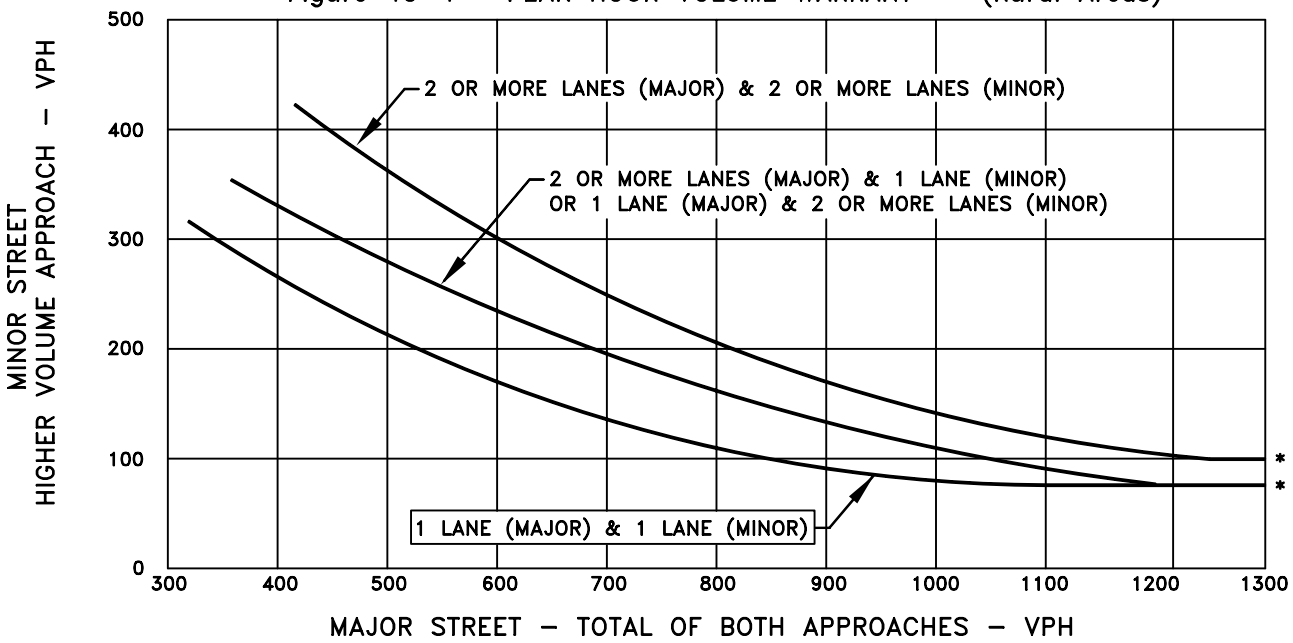
CONDITION: EXISTING

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		113	244				
Highest Approaches – Minor Street	✓		133	49				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

El Camino Real at Estrada Avenue

Existing Plus Project Conditions

PART A or PART B SATISFIED **YES** NO

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — **YES** NO

PART B

SATISFIED (Figure 4C-4) **YES** NO

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		415	485
Highest Approach Minor Street	√		317	159

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / EL CAMINO REAL Critical Approach Speed 35/55 mph

MINOR STREET: SR 58 / ESTRADA AVENUE Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [X]

[ ] URBAN (U)

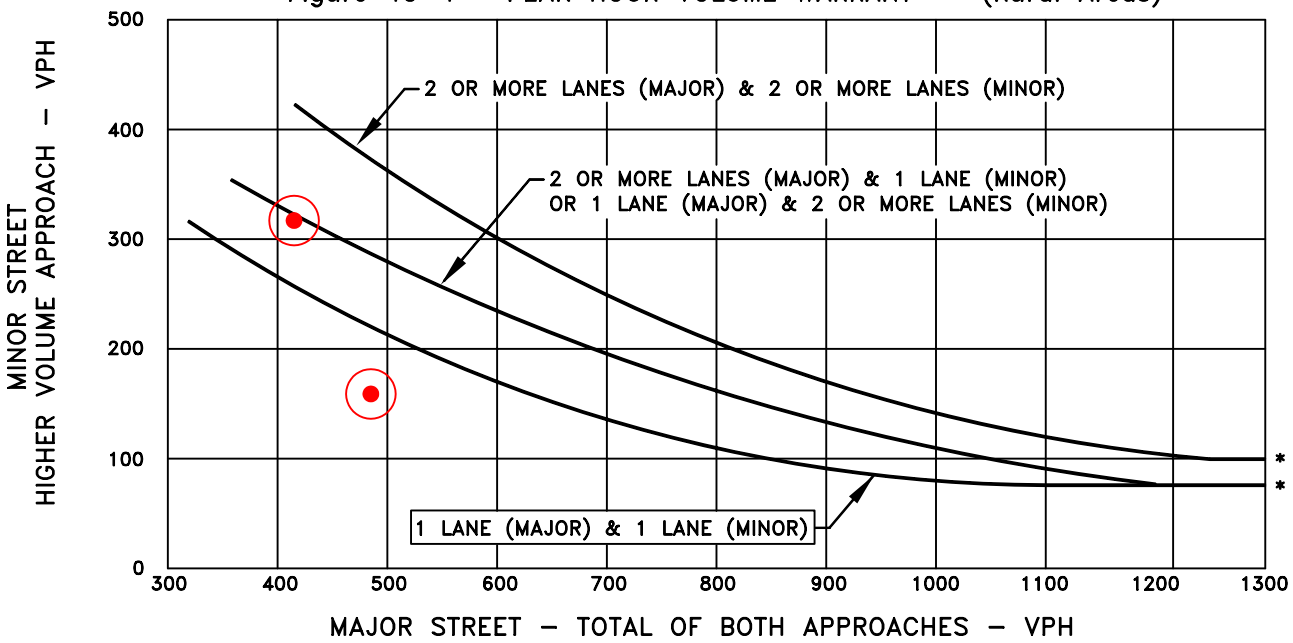
CONDITION: EXISTING PLUS PROJECT (PHASE 2)

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		415	485				
Highest Approaches – Minor Street	✓		317	159				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

H Street at Estrada Avenue

Existing Plus Project Conditions

PART A or PART B SATISFIED YES **NO**

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — YES **NO**

PART B

SATISFIED (Figure 4C-4) YES **NO**

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		478	365
Highest Approach Minor Street	√		137	41

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / ENCINA AVENUE Critical Approach Speed 35 mph

MINOR STREET: H STREET Critical Approach Speed 25 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☒ URBAN (U)

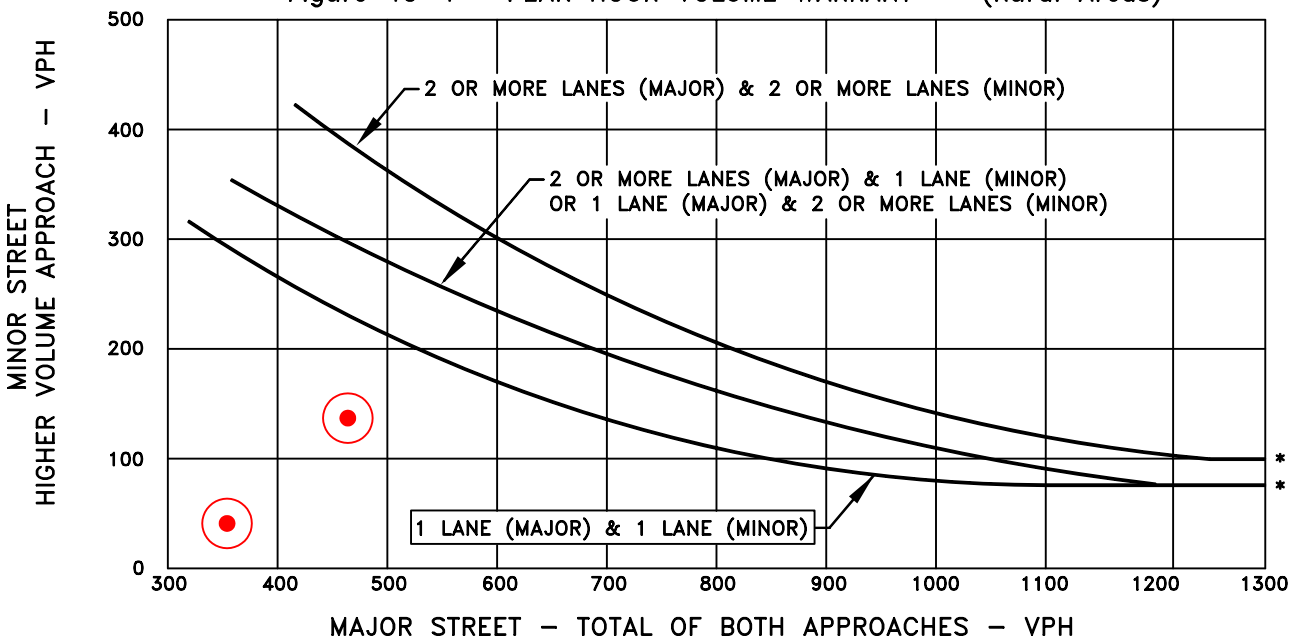
CONDITION: EXISTING PLUS PROJECT (PHASE 2)

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		478	365				
Highest Approaches – Minor Street	✓		137	41				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

Pozo Road at Calf Canyon Highway

Existing Plus Project Conditions

PART A or PART B SATISFIED YES **NO**

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — YES **NO**

PART B

SATISFIED (Figure 4C-4) YES **NO**

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		131	254
Highest Approach Minor Street	√		145	64

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / W POZO STREET Critical Approach Speed 55 mph

MINOR STREET: SR 58 / CALF CANYON HWY Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [X]

[ ] URBAN (U)

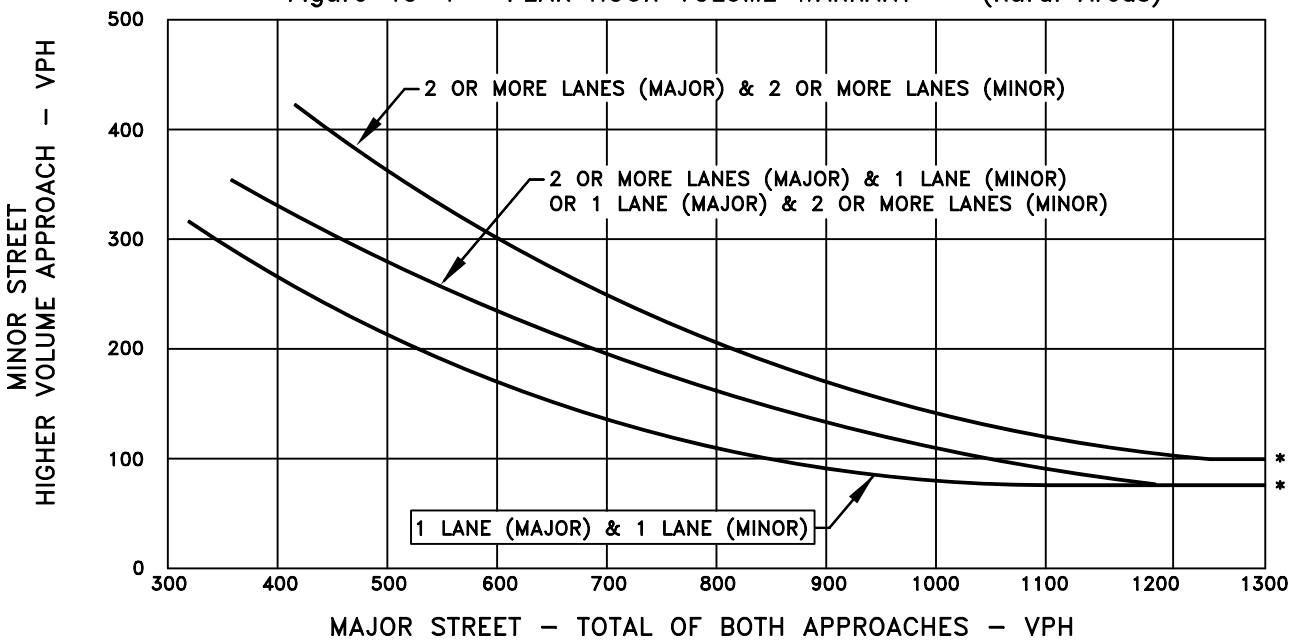
CONDITION: EXISTING PLUS PROJECT (PHASE 2)

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		131	254				
Highest Approaches – Minor Street	✓		145	64				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

El Camino Real at Estrada Avenue

2030 No Project Conditions

PART A or PART B SATISFIED **YES** NO

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND **YES** NO

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. **YES** NO

PART B

SATISFIED (Figure 4C-4) **YES** NO

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		621	788
Highest Approach Minor Street	√		525	260

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / EL CAMINO REAL Critical Approach Speed 35/55 mph

MINOR STREET: SR 58 / ESTRADA AVENUE Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [X]

[ ] URBAN (U)

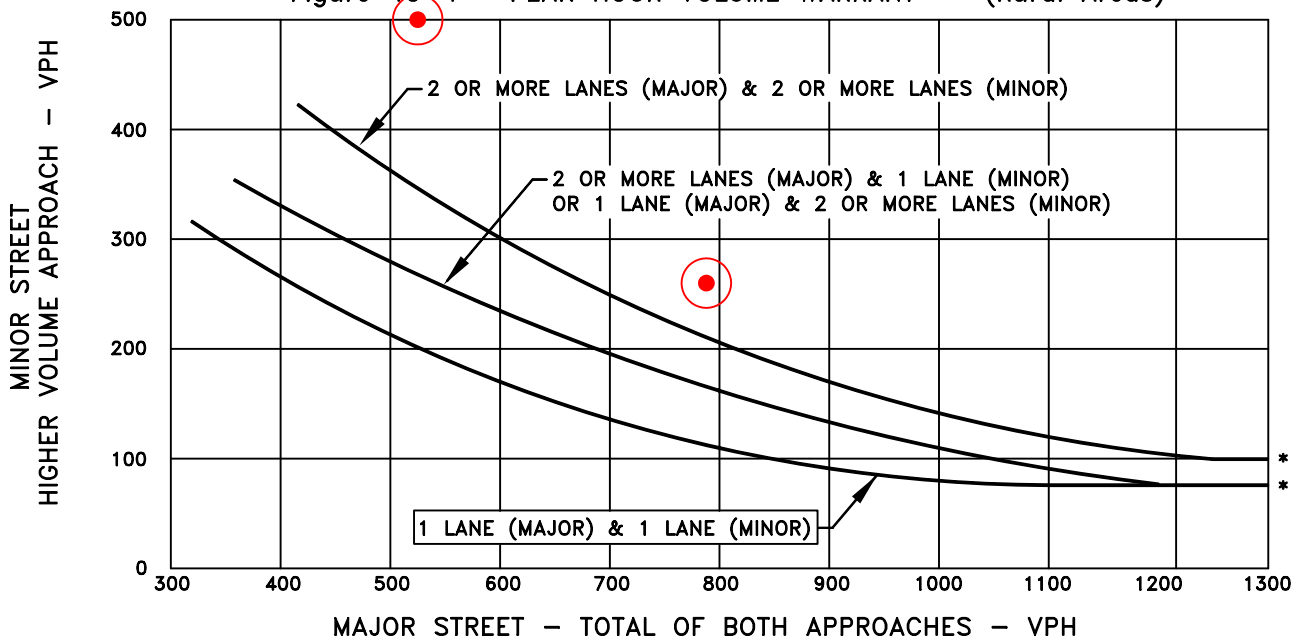
CONDITION: 2030 NO PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		621	788				
Highest Approaches – Minor Street	✓		525	260				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

H Street at Estrada Avenue

2030 No Project Conditions

PART A or PART B SATISFIED **YES** NO

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — **YES** NO

PART B

SATISFIED (Figure 4C-4) **YES** NO

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		763	631
Highest Approach Minor Street	√		207	64

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / ENCINA AVENUE Critical Approach Speed 35 mph

MINOR STREET: H STREET Critical Approach Speed 25 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☒ URBAN (U)

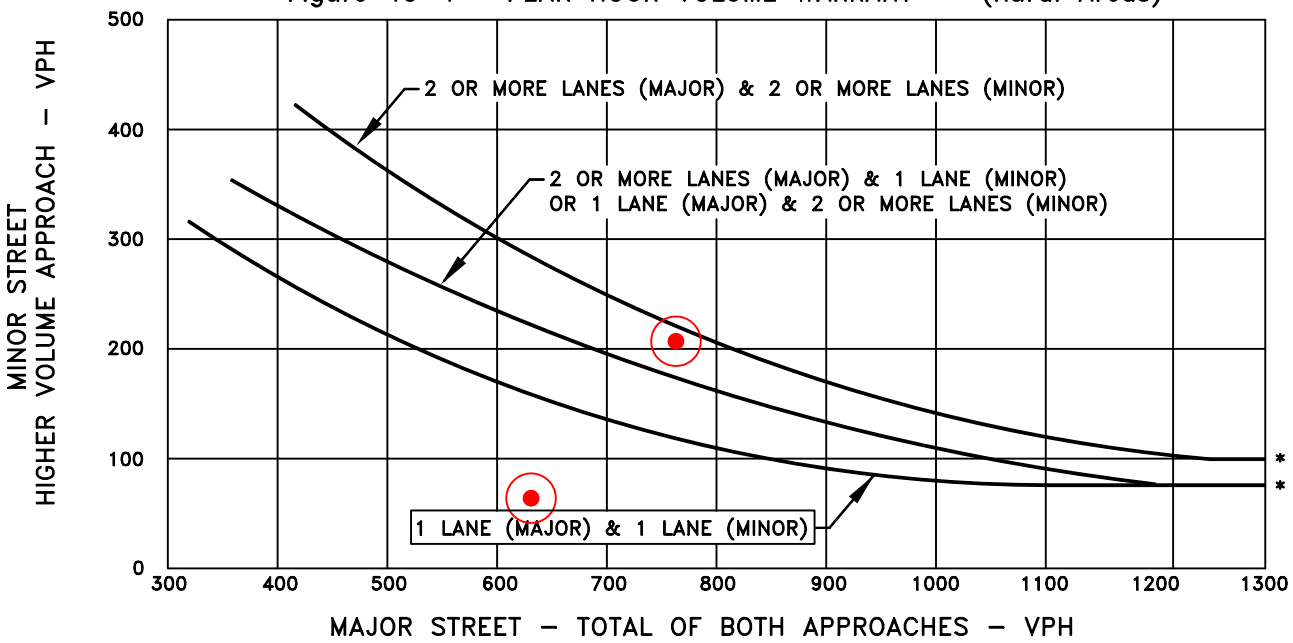
CONDITION: 2030 NO PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		763	631				
Highest Approaches – Minor Street	✓		207	64				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

Pozo Road at Calf Canyon Highway

2030 No Project Conditions

PART A or PART B SATISFIED YES **NO**

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — YES **NO**

PART B

SATISFIED (Figure 4C-4) YES **NO**

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		173	368
Highest Approach Minor Street	√		201	75

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / W POZO STREET Critical Approach Speed 55 mph

MINOR STREET: SR 58 / CALF CANYON HWY Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [X]

[ ] URBAN (U)

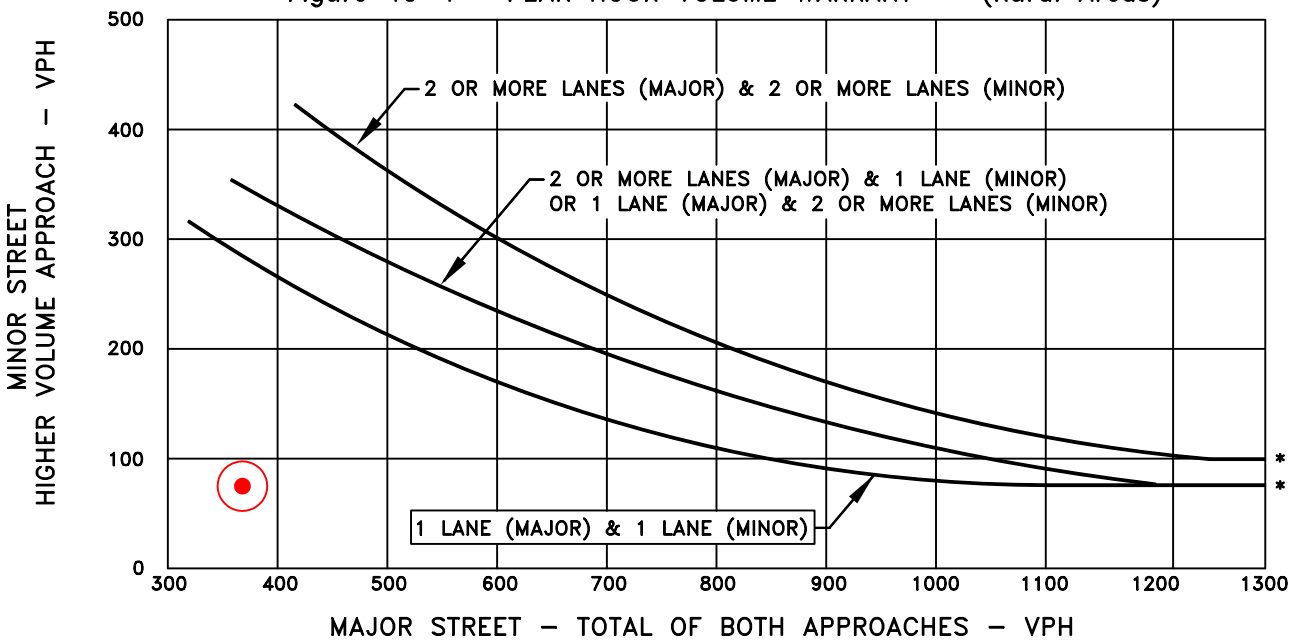
CONDITION: 2030 NO PROJECT

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		173	368				
Highest Approaches – Minor Street	✓		201	75				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

El Camino Real at Estrada Avenue

2030 Project Conditions

PART A or PART B SATISFIED **YES** NO

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND **YES** NO

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. **YES** NO

PART B

SATISFIED (Figure 4C-4) **YES** NO

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		638	797
Highest Approach Minor Street	√		536	274

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / EL CAMINO REAL Critical Approach Speed 35/55 mph

MINOR STREET: SR 58 / ESTRADA AVENUE Critical Approach Speed 35 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [X]

[ ] URBAN (U)

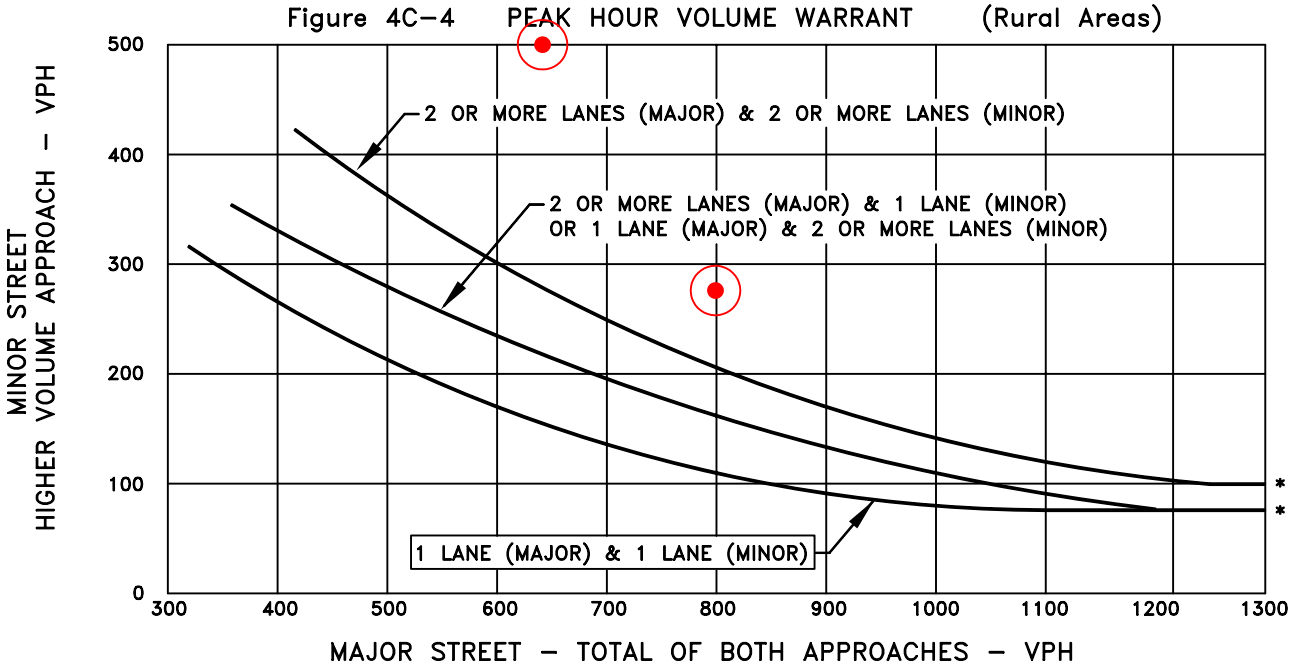
CONDITION: 2030 PROJECT (PHASE 2)

WARRANT 3 – Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		638	797				
Highest Approaches – Minor Street	✓		536	274				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

H Street at Estrada Avenue

2030 Project Conditions

PART A or PART B SATISFIED **YES** NO

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — **YES** NO

PART B

SATISFIED (Figure 4C-4) **YES** NO

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		791	654
Highest Approach Minor Street	√		207	64

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / ENCINA AVENUE Critical Approach Speed 35 mph

MINOR STREET: H STREET Critical Approach Speed 25 mph

Critical speed of major street traffic > 40 mph ---------- ☐ or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- ☒ URBAN (U)

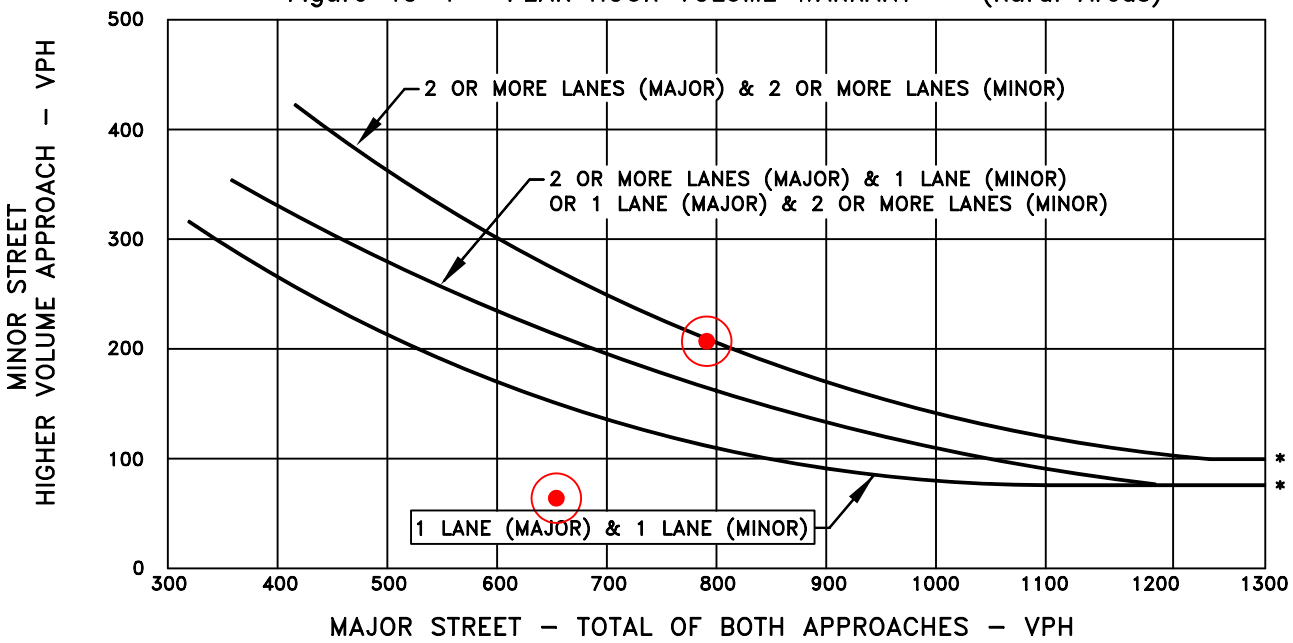
CONDITION: 2030 PROJECT (PHASE 2)

WARRANT 3 – Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		791	654				
Highest Approaches – Minor Street	✓		207	64				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

WARRANT 3 - Peak Hour

Pozo Road at Calf Canyon Highway

2030 Project Conditions

PART A or PART B SATISFIED YES **NO**

PART A

(All parts 1,2, and 3 below must be satisfied)

1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; AND — YES **NO**

2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND — **YES** NO

3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or 650 vph for intersections with three approaches. — YES **NO**

PART B

SATISFIED (Figure 4C-4) YES **NO**

APPROACH LANES	One	2 or More	AM Peak	PM Peak
Both Approaches Major Street	√		191	378
Highest Approach Minor Street	√		213	90

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume vehicle minor street approach (one direction only) for one hour (any four consecutive 15 minute periods) fall above the applicable curves in MUTCD Figure 4C-3 or 4C-4.

TRAFFIC SIGNAL WARRANTS

CALC WH DATE 4/27/09 CHK _____ DATE _____

MAJOR STREET: SR 58 / W POZO STREET Critical Approach Speed 55 mph

MINOR STREET: SR 58 / CALF CANYON HWY Critical Approach Speed 55 mph

Critical speed of major street traffic > 40 mph ---------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. -------- [X]

[ ] URBAN (U)

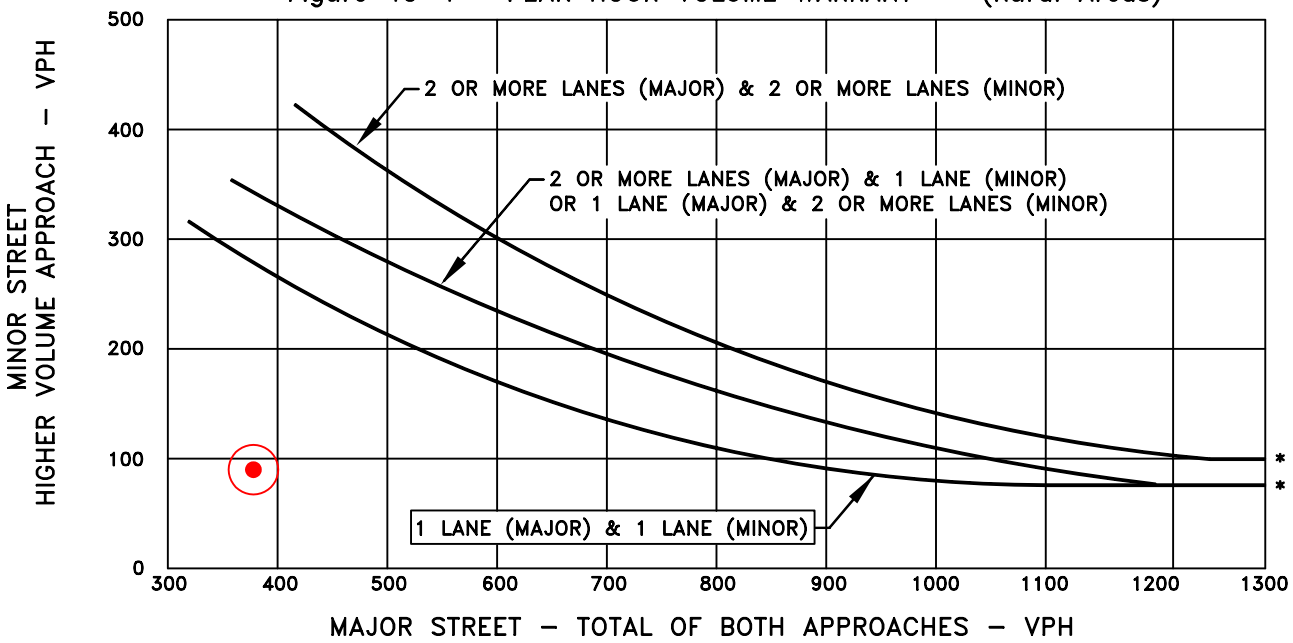
CONDITION: 2030 PROJECT (PHASE 2)

WARRANT 3 – Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK				Hour
Both Approaches – Major Street	✓		191	378				
Highest Approaches – Minor Street	✓		213	90				

* Refer to Fig. 4C–3 (URBAN AREAS) or Fig. 4C–4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C–4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TPG Consulting Incorporated

APPENDIX I

SCHOOL CROSSING & TRAFFIC CONTROL ANALYSIS

SCHOOL CROSSING AND TRAFFIC CONTROL ANALYSIS

This analysis was prepared to address the operations of the school zone near the intersection of Estrada Avenue at H Street. The analysis includes the level of school signing and striping on the adjacent roadways, the potential need for a controlled pedestrian crossing, and the level of truck trips through the intersection.

Signing and Striping

Current school street signs and street crossings were analyzed for conformity with the *California Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways*. Field measurements/ observations were conducted in the vicinity of the Santa Margarita Elementary School. Based on the current school related signing/striping, the following conformities with the *MUTCD* were observed:

- The single crosswalk on Estrada Avenue on the north side of its intersection with H Street is appropriately positioned and striped (yellow).
- School Crosswalk Warning signs (Assembly B) are properly located immediately adjacent to the crosswalk on Estrada Avenue.
- School Speed Reduction signs (Assembly C) are located at appropriate distances from the school boundaries.
- School Advance Warning signs (Assembly D) are properly located in advance of Assembly C signs on the north and south approaches of Estrada Avenue.
    - The pavement marking on the northern approach (southbound traffic) is located immediately on the southwest corner of the Estrada Avenue at El Camino Real intersection since space is limited between El Camino Real and H Street.
- End School Zone signs (MUTCD S5-2) or standard speed limit signs are appropriately located at the end of the School Zone.
- [Slow School Xing] pavement markings located on Estrada Avenue are properly striped (yellow) and located a minimum of 100 feet away from the crosswalk as recommended in the *MUTCD*.
    - The pavement marking on the southern approach (northbound traffic) is located on the incline of the vertical curve located on Estrada Avenue to give drivers advance notice since they are unable to see the crosswalk more from more than approximately 225 feet away.
    - The pavement marking on the northern approach (southbound traffic) is located approximately midway between El Camino Real and H Street to allow drivers to navigate the El Camino Real intersection and cross the railroad tracks prior to encountering the pavement markings.
- [School] pavement marking located on H Street, east of Estrada Avenue, is properly located with the Assembly B sign on H Street.

The crosswalk at Estrada Avenue is also attended by an adult crossing guard during morning arrival and afternoon release times. The crossing guard was present during the majority of the school age pedestrian crossings observed. All observed school age pedestrians traveled to/from south Estrada Avenue and west H Street. Some pedestrians were observed crossing the south leg of Estrada Avenue, where there is no marked crosswalk. There are currently no pedestrian facilities located on either of these roadways. Pedestrians traveled within the roadway right-of-way or on limited shoulders after crossing the crosswalk.

Due to the limited pedestrian facilities (sidewalks) near the school, additional crosswalks are not recommended at the study intersection. Installation of additional crosswalks may imply that suitable pedestrian facilities are available on the adjacent roadways. The limited pedestrian facilities on the adjacent roadways are a deficiency acknowledged in the *Santa Margarita Design Plan* and recommendations include future installation of sidewalks or paths to accommodate pedestrians outside the traveled way.

Signal Warrants

In addition to the Peak Hour signal warrant (Warrant 3) prepared in the report, the Pedestrian Volume (Warrant 4) and School Crossing (Warrant 5) signal warrants were also prepared for Existing conditions only. It was found that neither of the pedestrian warrants is currently satisfied for the Estrada Avenue at H Street intersection. The following page includes the actual signal warrant worksheets.

Heavy Truck Trips

The Estrada Avenue at H Street intersection currently has approximately 5% heavy vehicles traveling through the intersection. The majority of the heavy vehicle trips are northbound and southbound through movements. The proposed Project will require trucks to travel through the Estrada Avenue at H Street intersection. All Project truck trips will travel on Estrada Avenue with no trips projected to utilize H Street. Approximately 23 truck trips (11 northbound and 12 southbound) are projected to travel through the intersection during the AM peak hour which generally coincides with the peak period of pedestrian travel (7:30 am – 8:30 am). The PM peak hour occurs outside the pedestrian travel period for this intersection. However, the Project will likely operate up to 9 truck trips (split northbound and southbound), which is half of the average number of truck trips per hour, during the afternoon peak period of pedestrian travel (2:45 pm – 3:15 pm).

Recommendations

As described above, the current school signing and striping meets current standards according to the *MUTCD*. The study intersection also does not currently meet warrants for installation of a traffic signal to provide pedestrian crossing opportunities. Given these factors, there are still inadequate pedestrian facilities in the surrounding area as well as inadequate sight distance on Estrada Avenue due to a crest vertical curve. Based on these concerns, the following recommendations should be considered:

- Establish a “Safe Routes to School Program” for the Santa Margarita Elementary School. (short-term)
    - This will help provide school children with recommended routes to and from school as well as notify school children to cross Estrada Avenue in the marked crosswalk as opposed to crossing the unmarked south leg.

- Install a flashing warning beacon on Estrada Avenue south of the vertical curve to warn drivers of the school crossing at H Street. (mid-/long-term)
    - The warning beacon should only be installed once the crossing meets the criteria of the *MUTCD* Section 4K-103. The observed pedestrian volume does not currently meet the criteria for the warning beacon.
- Install sidewalks or paths along Estrada Avenue and/or H Street to provide for pedestrian travel outside the roadway, as funding allows. (mid-/long-term)
- Reduce the vertical curve located on Estrada Avenue to allow adequate stopping sight distance for vehicles approaching the crosswalk, as funding allows. (long-term)

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 3 of 4)

WARRANT 4 - Pedestrian Volume (All Parts Must Be Satisfied)

SATISFIED YES ☐ NO ☒

Part A (Parts 1 or 2 must be satisfied)

SATISFIED YES ☐ NO ☒

Hours - - ->	0700	0800	1400	1500
1. Pedestrian Volume	3	18	7	9
Adequate Crossing Gaps	71	59	50	67

Any hour ≥ 190	Yes ☐	No ☒
OR any 4 hours ≥ 100	Yes ☐	No ☒
AND < 60 gap/hr	Yes ☒	No ☐

2. Pedestrian Volume	Any hour ≥ 95	Yes ☐	No ☒
	OR Any 4 hours ≥ 50	Yes ☐	No ☒
	AND ped crossing < 1.2m/s (4 ft/sec)	Yes ☐	No ☒

Part B

SATISFIED YES ☐ NO ☒

AND, The distance to the nearest traffic signal along the major street is greater than 90 m (300 ft)	Yes ☒	No ☐
OR, The proposed traffic signal will not restrict progressive traffic flow along the major street.	Yes ☐	No ☒

WARRANT 5 - School Crossing (Parts A and B, or Part C Must Be Satisfied)

SATISFIED YES ☐ NO ☒

Part A

SATISFIED YES ☐ NO ☒

Gap/Minutes and # of Children

Hour	0730
Gaps vs Minutes: Minutes Children Using Crossing	~60
Gaps vs Minutes: Number of Adequate Gaps	58
School Age Pedestrians Crossing Street / hr	21

Gaps < Minutes	YES ☒	NO ☐
AND Children > 20/hr	YES ☒	NO ☐

AND, Consideration has been given to less restrictive remedial measures.	Yes ☐	No ☒

Part B

SATISFIED YES ☐ NO ☒

The distance to the nearest traffic signal along the major street is greater than 90 m (300 ft)	Yes ☒	No ☐
OR, The proposed signal will not restrict the progressive movement of traffic.	Yes ☐	No ☒

Part C (All Parts 1, 2, and 3 below must be satisfied)

SATISFIED YES ☐ NO ☒

	U	R_y*	0730	1445		
1. Vehicles/hr	500	350	450	263	Yes ☒	No ☐
AND, School Age Pedestrians Crossing Street / hr	100	70	21	15	Yes ☐	No ☒
OR, School Age Pedestrians Crossing Street / day	500	350	~37	~37	Yes ☐	No ☒

* When the critical (85th percentile approach speed exceeds 55 km/h (35 mph) or the sight distance to the intersection is less than the required stopping distance, rural criteria should be used.

2. Other signal warrants are met.	Yes ☐	No ☒
3. The distance to the nearest controlled crossing is greater than 180 m (600 ft).	Yes ☒	No ☐

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

PEDESTRIAN COUNTS

Estrada Avenue at H Street

Starting Time	Intersection Leg							
	South (Estrada)		East (H)		North[1] (Estrada)		West (H)	
	#Peds	#Groups	#Peds	#Groups	#Peds	#Groups	#Peds	#Groups
6:00 AM	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	2	1	0	0
7:45 AM	0	0	1	1	1	1	2	2
8:00 AM	0	0	1	1	2	2	0	0
8:15 AM	8	3	3	3	8	5	2	2
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0
2:45 PM	0	0	7	5	7	2	1	1
3:00 PM	3	3	2	1	4	2	2	2
3:15 PM	0	0	0	0	0	0	1	1
3:30 PM	0	0	1	1	1	1	2	1
3:45 PM	0	0	6	4	1	1	0	0

[1] only north leg has a marked crosswalk