

Lake Jennings Residential Subdivision (MPA 13-002)
San Diego County (Lakeside)
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Draft Focused Traffic Impact Study

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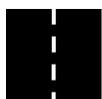
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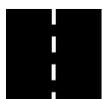
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Glossary of Terms and Acronyms

ADT.....	Average Daily Traffic
LOS.....	Level of Service
MPH.....	Miles per Hour
TIS.....	Traffic Impact Study
V/C.....	Volume to Capacity Ratio



Executive Summary

Lake Jennings Residential Subdivision (MPA 13-002)

The Lake Jennings residential subdivision consists of 18 lots located on the southeast corner of Lake Jennings Park Road and Jennings Vista Drive in the unincorporated San Diego County community of Lakeside, California.

The project trip generation was calculated using SANDAG trip rates from the *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, April 2002. Based on SANDAG rates, the project is calculated to generate 180 Average Daily Trips (ADT), 14 AM peak hour trips (4 inbound and 10 outbound), and 18 PM peak hour trips (13 inbound and 5 outbound). On-site grading is proposed as part of the project.

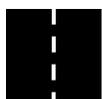
The applicant has stated that no import or export is anticipated because the on-site grading will be balanced.

The project is calculated to have no direct impacts; therefore, no mitigations measures are needed. A summary of project impacts is shown in **Table E-1**.

TABLE E-1: SUMMARY OF PROJECT IMPACTS AND MITIGATION

Roadway Facility	Direct Impacts
Intersections	0 (no mitigation required)
Segments	0 (no mitigation required)

NA: Not Applicable because project traffic is below threshold required for analysis.



1.0 Introduction

This report describes the existing roadway network in the vicinity of the project site and includes a review of the existing and proposed activities for weekday peak AM and PM periods, and daily traffic conditions when the project is completed. The format of this study includes the following chapters:

- 1.0 Introduction
- 2.0 Existing Conditions
- 3.0 Project Impact Analysis
- 4.0 General Plan Consistency and Build Out Analysis
- 5.0 Summary of Recommended Mitigation and Project Design Features
- 6.0 References
- 7.0 List of Preparers and Persons and Organizations Contacted

1.1 Purpose of the Report

The purpose of this traffic impact study is to determine and analyze potential traffic impacts for the proposed Lake Jennings residential subdivision project.

1.2 Project Location and Description

The Lake Jennings project is an 18 lot residential subdivision located on the southeast corner of Lake Jennings Park Road and Jennings Vista Drive in the unincorporated San Diego County community of Lakeside, California. The location of the project is shown in **Figure 1**. The map of the Focused Traffic Impact Study (TIS) area is shown in **Figure 2**. A preliminary site plan is shown in **Figure 3**.

On-site grading is proposed as part of the project. The applicant has stated that no import or export is anticipated because the on-site grading will be balanced.

1.3 Planning Requirements

The project use is consistent with the existing general plan. The project applicant does NOT propose a General Plan Amendment, Specific Plan Amendment, or Rezone.

The Congestion Management Program (CMP), adopted in 2008 by the SANDAG Transportation Committee, is intended to determine if a large project (greater than 2,400 daily trips or 200 peak hour trips) will adversely impact the CMP transportation system. A CMP analysis is NOT included because this project is calculated to generate less than 2,400 ADT and less than 200 peak hour trips.

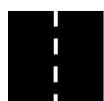


Figure 1: Project Location

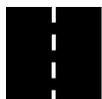
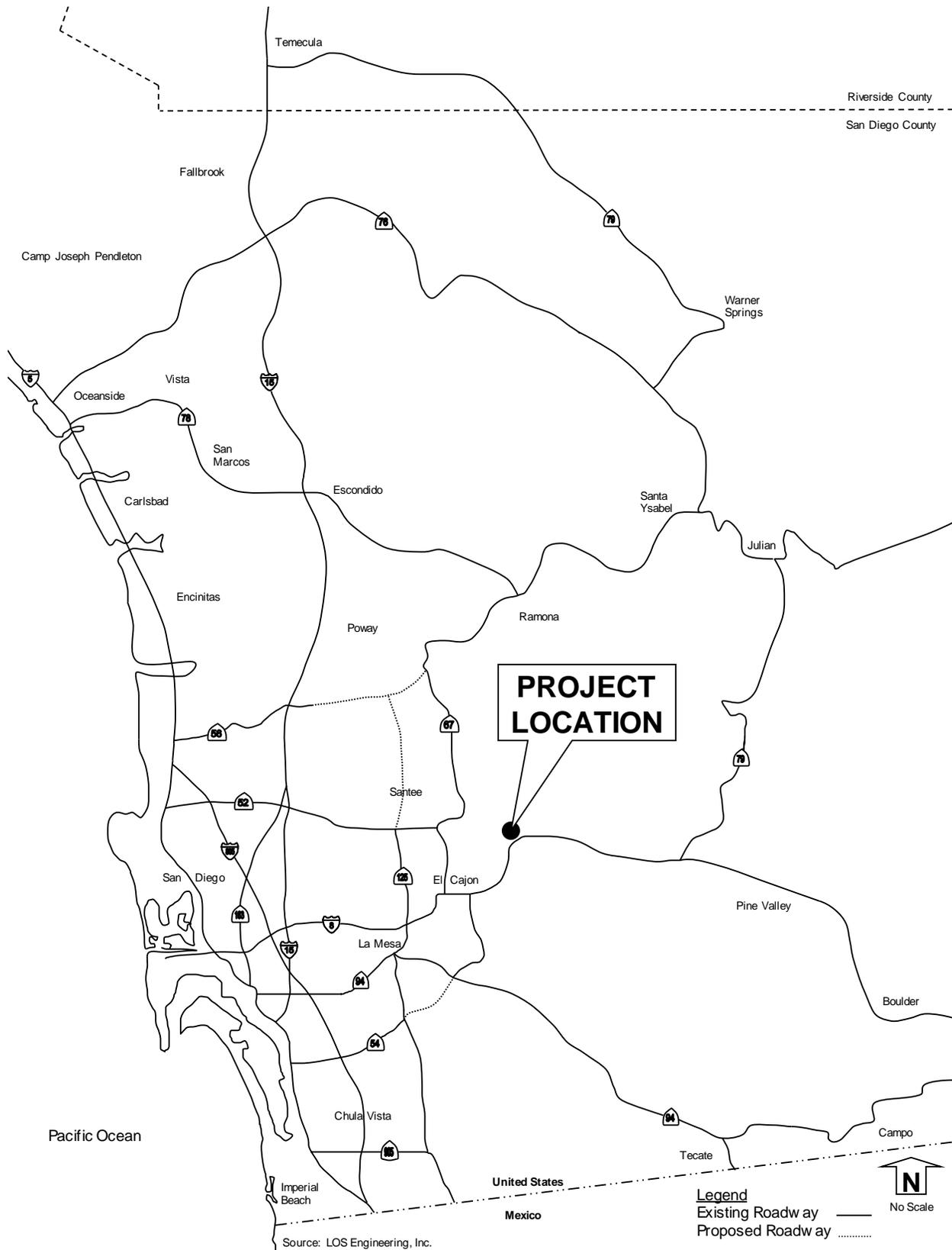


Figure 2: Focused TIS Study Area

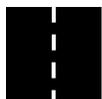
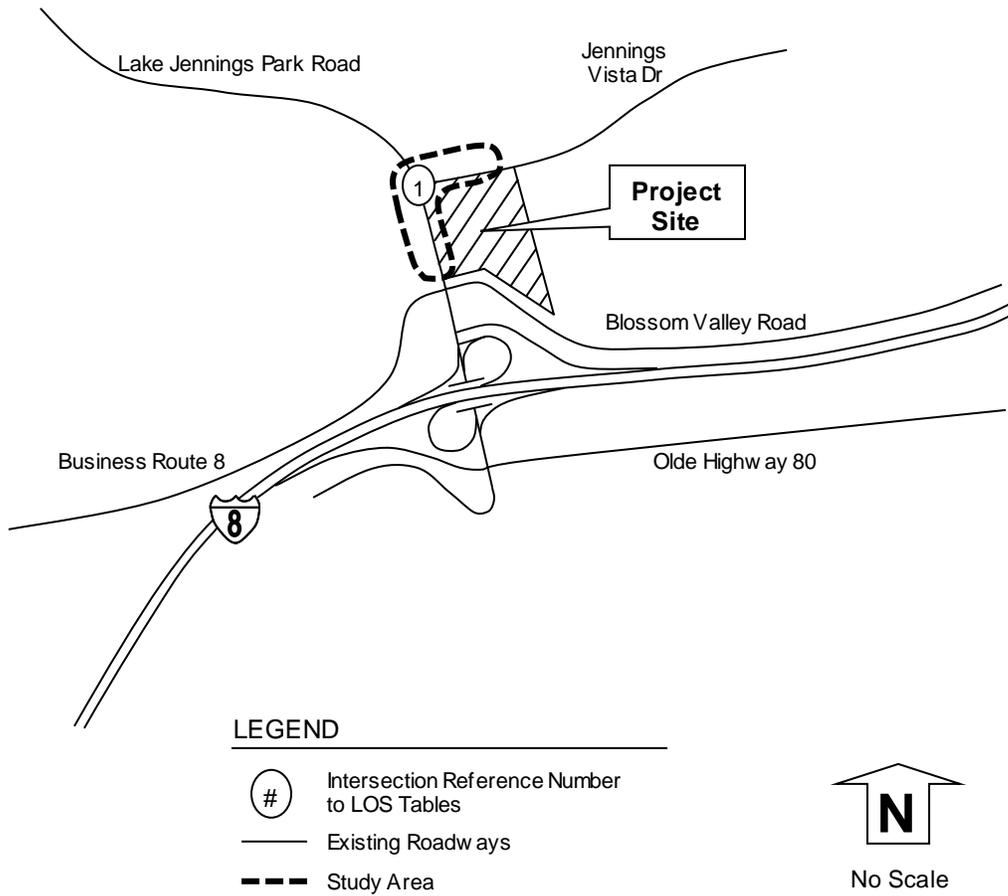
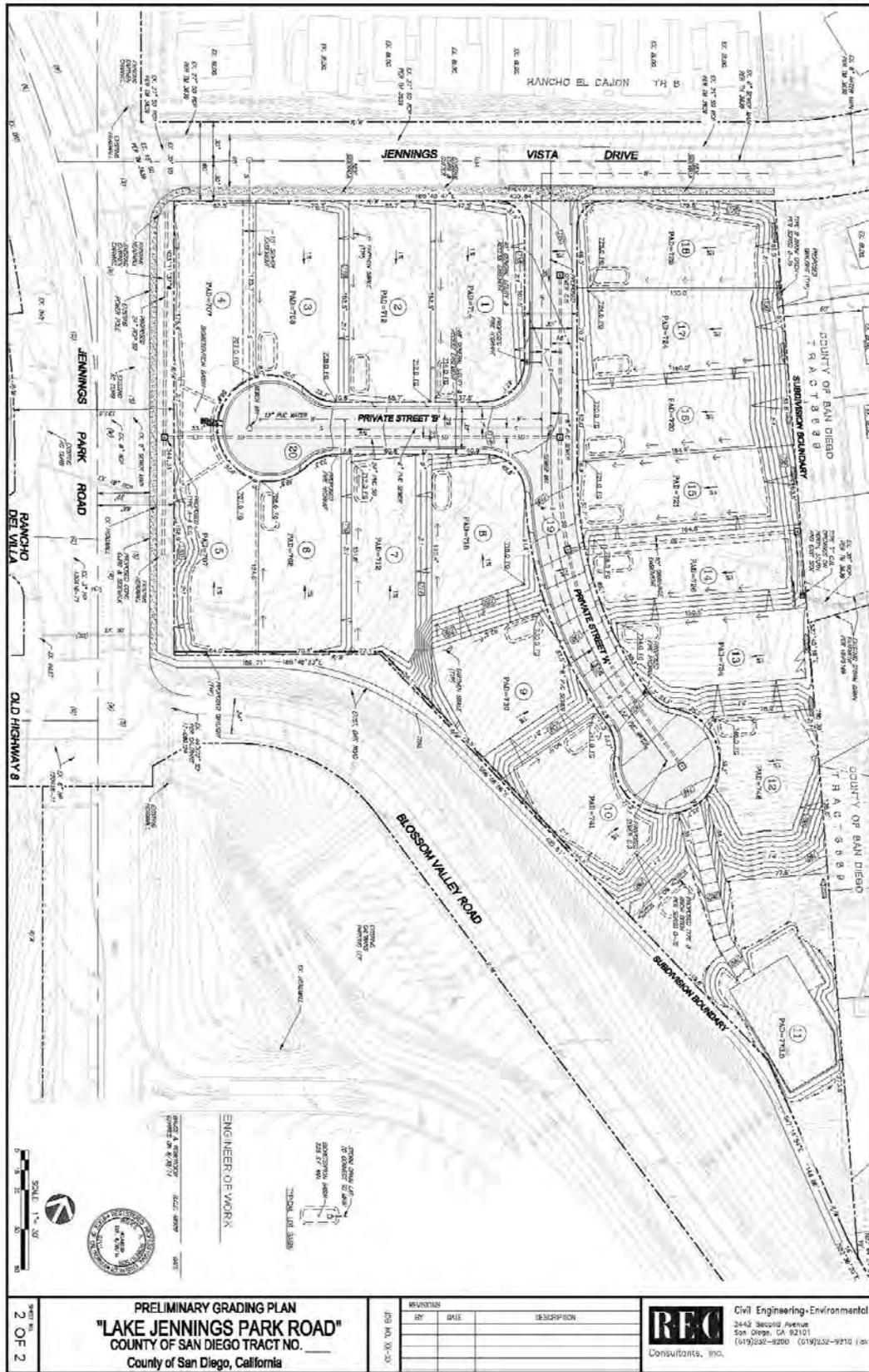


Figure 3: Site Plan



Source: REC Consultants, Inc.



1.4 Significance Criteria

This section describes traffic impact significance criteria applied to this project and the SANDAG Congestion Management Program (CMP) requirements.

1.4.1 County of San Diego Guidelines for Determining Significance

Based on the San Diego County *Report Format & Content Requirements Transportation and Traffic*, dated August 24, 2011, a project may have the following allowable increases on congested roadway segments and intersections as shown in **Table 1**.

TABLE 1: COUNTY OF SAN DIEGO SIGNIFICANT TRAFFIC IMPACT THRESHOLDS

Measures of Significant Project Impacts to Congestion Allowable Increases on Congested Roads and Intersections					
Operations	Road Segments			Intersections	
	2-Lane Road	4-Lane Road	6-Lane Road	Signalized	Un-signalized
LOS E	200 ADT	400 ADT	600 ADT	Delay of 2 seconds or less	20 or less peak hour trips on a critical movement
LOS F	100 ADT	200 ADT	300 ADT	Either a Delay of 1 second, or 5 peak hour trips or less on a critical movement	5 or less peak hour trips on a critical movement

Source: County of San Diego *Guidelines for Determining Significance* Tables 1 and 2. Note: A critical movement is one that is experiencing excessive queues. By adding proposed project trips from a list of projects, these same tables are used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project that contributes any trips must mitigate its share of the cumulative impacts. The County may also determine impacts have occurred on roads even when a project's traffic or cumulative impacts do not trigger an unacceptable level of service, when such traffic uses a significant amount of remaining road capacity.

A direct impact would occur when the significance criteria are exceeded. If the proposed project exceeds the values provided in the above table, then the individually proposed project would result in a direct traffic impact. Specific improvements to mitigate direct impacts must be identified.

A cumulative impact would occur when two conditions are met: 1) build-out of all near-term projects results in a cumulative traffic impact and 2) the amount of traffic generated by the individual proposed project contributes (even in a small part) to that cumulative impact. Both conditions must be met for an individual project to result in a cumulative traffic impact.

Potential mitigation measures may include traffic signal improvements (i.e. signal coordination), physical road improvements, street re-striping and parking prohibitions, fair-share contributions, and transportation demand management programs.

1.4.2 SANDAG Congestion Management Program Requirements

The Congestion Management Program, adopted in 2008 by the SANDAG Transportation Committee, is intended to determine if a large project (greater than 2,400 daily trips or 200 peak hour trips) will adversely impact the CMP transportation system. A CMP analysis is NOT included because this project is calculated to generate less than 2,400 ADT and less than 200 peak hour trips.



2.0 Existing Conditions

This section describes the study area street system, peak hour intersection volumes and daily roadway volumes.

2.1 Existing Transportation Conditions

The study area includes the segments of Lake Jennings Park Road from Jennings Vista Drive to Blossom Valley Road, and Jennings Vista Drive from Lake Jennings Park Road to the proposed project driveway.

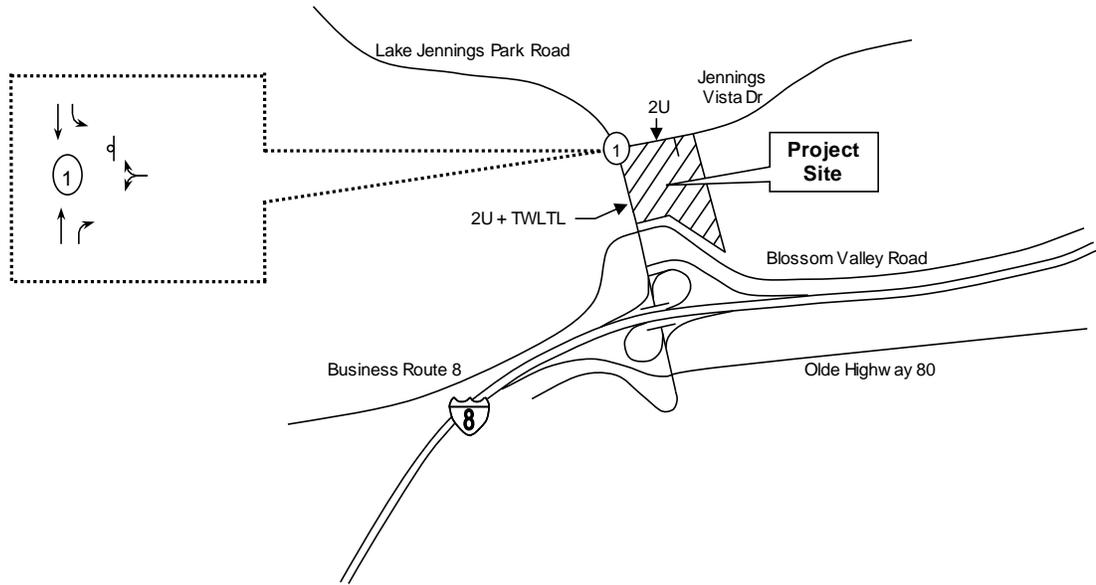
Lake Jennings Park Road from Jennings Vista Drive to Blossom Valley Road is classified as a *4.1B Major Road* (with Intermittent Turn Lanes) on the County Mobility Element Network map (a copy of the County Mobility Element map is included in **Appendix A**). Lake Jennings Park Road from Jennings Vista Drive to Blossom Valley Road has at a minimum one 12 foot travel lane in each direction, a 12 foot center Two Way Left Turn Lane (TWLTL), and a 5 foot bike lane in each direction. The roadway capacity was based on a 2.2B Light Collector with a continuous turn lane to reflect the current roadway condition. The 85th percentile speed on this portion was measured at 39 miles per hour (MPH) in the northbound direction and 36 MPH in the southbound direction.

Jennings Vista Drive east of Lake Jennings Park Road is not classified on the County Mobility Element Network map. This segment is constructed with one travel lane in each direction within approximately 40 feet of pavement. The roadway capacity was based on a Non-Mobility Residential Collector to reflect current roadway conditions with a capacity of 4,500 ADT at LOS C according to Tables 1 and 2B of the County of San Diego Department of Public Works *Public Road Standards*, March 2012 (excerpt included in **Appendix B**). On-street parking was observed. The 85th percentile speed was measured at 33 MPH in the eastbound direction and 38 MPH in the westbound direction.

The 85th percentile speed data are included in **Appendix C**. The existing roadway conditions are shown in **Figure 4**.



Figure 4: Existing Roadway Conditions

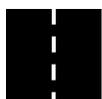


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- ⊘ Stop Sign ▽ Yield
- ↑ Through Lane ↶ Left Turn Lane
- ↷ Right Turn Lane ↶↷ Combination Left-Through
- ↷↶ Combination Left-Through-Right Lane
- ↷↶↷ Combination Right-Through
- ↶↷↶ Combination Left-Right Lane
- 2U Two Lane Undivided Roadway
- 4D Four Lane Divided Roadway
- RTOL Right Turn Over Lap
- P On-Street Parking
- TWLT Center Two Way Left Turn Lane



No Scale



2.1.1 Existing Traffic Volumes and LOS Analyses

Existing AM and PM peak hour intersection volumes (with count dates) for the following intersection was collected and analyzed for this study:

- 1) Lake Jennings Park Road/Jennings Vista Drive (Thurs, 2/13/2014)

The existing AM, PM, and ADT volumes are shown on **Figure 5**, with count data included in **Appendix D**. Intersection and segment LOS are shown in **Tables 1 and 2**, respectively.

TABLE 2: EXISTING INTERSECTION LEVEL OF SERVICE

Intersection and (Analysis) ¹	Movement	Peak Hour	Existing	
			Delay ²	LOS ³
1) Lake Jennings Park Rd at Jennings Vista (U)	Westbound	AM	25.5	D
	Westbound	PM	31.8	D

Notes: 1) Analysis: (U) Unsignalized. 2) Delay: HCM Average Control Delay in seconds. 3) LOS: Level of Service

TABLE 3: EXISTING SEGMENT ADT VOLUMES AND LEVEL OF SERVICE

Segment	Classification (as built)	Existing			
		Daily Volume	# of lanes	LOS E Capacity	V/C LOS
Lake Jennings Park Road	4.1B Major Rd				
Jennings Vista Dr to Blossom Valley Rd	(2U+TWLTL)	14,217	2	19,000	0.75 E
Jennings Vista Drive					
Lake Jennings Park Road to Project Dwy	Not Class. (2U)	2,469	2	4,500*	0.55 C

Notes: Classification (as built): 2U = 2 lane undivided roadway. Not Class. = Not Classified on Mobility Element. Daily volume is a 24 hour volume. LOS: Level of Service. V/C: Volume to Capacity ratio. *At LOS C.

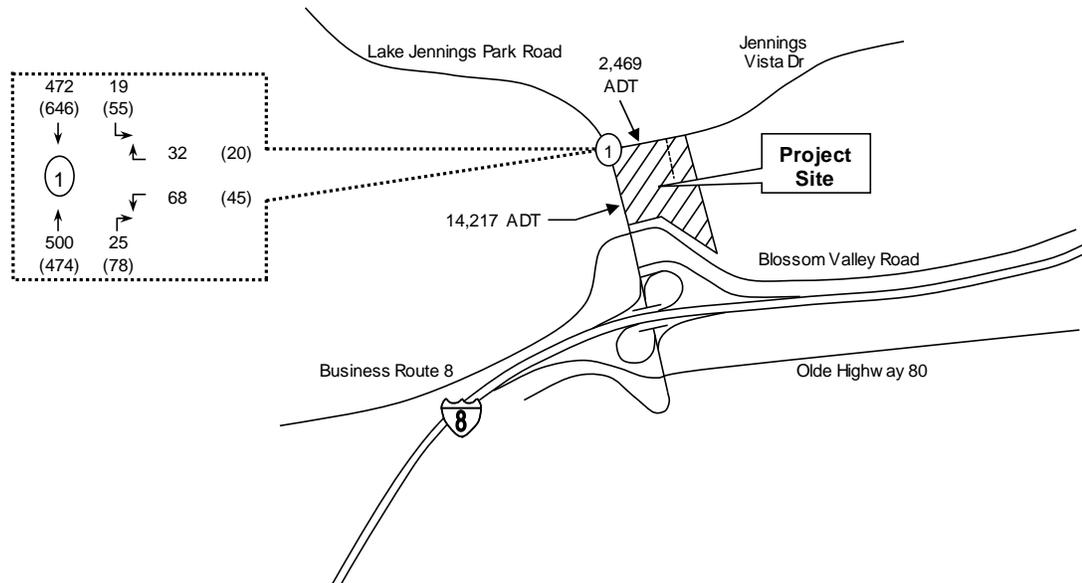
Under existing conditions, all study intersections and roadways were calculated to operate at LOS D or better with the exception of the segment of Lake Jennings Park Rd from Jennings Vista to Blossom Valley (LOS E, daily basis). Intersection LOS calculations are included in **Appendix E**.

2.2 Existing Parking, Transit and On-site Circulation

The existing project site is vacant; therefore, no existing on-site parking and no on-site circulation exist.

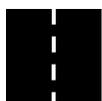


Figure 5: Existing Volumes



LEGEND

- XX AM peak hour volumes at intersections
- (YY) PM peak hour volumes at intersections
- Z,ZZZ ADT volumes shown along segments
- (#) Intersection Reference Number to LOS Tables
- Existing Roadways
- Planned On-Site Roadways



3.0 Project Impact Analysis

This section describes the traffic analysis methodology.

3.1 Analysis and Methodology

The project study area was based on direction from County staff and guidelines as outlined in the County of San Diego *Guidelines for Determining Significance and Report Format and Content Requirements Transportation and Traffic* dated August 24, 2011.

The traffic analyses prepared for this study were based on the *2000 Highway Capacity Manual* (HCM) operations analysis using Level of Service (LOS) evaluation criteria. The operating conditions of the study intersections, roadway segments, and highway segments are measured using the HCM LOS designations, which range from A through F. LOS A represents the best operating condition and LOS F denotes the worst operating condition. The individual LOS criteria for each roadway component are described below.

3.1.1 Intersections

The study intersections were analyzed based on the **operational analysis** outlined in the 2000 HCM. This process defines LOS in terms of **average control delay** per vehicle, which is measured in seconds. LOS at the intersections were calculated using the computer software program Synchro 8.0. The HCM LOS for the range of delay by seconds for un-signalized intersections is described in **Table 4**.

TABLE 4: UN-SIGNALIZED INTERSECTION LEVEL OF SERVICE (HCM 2000)

Level of Service	Un-Signalized Average Control Delay (seconds/vehicle)
A	0-10
B	> 10-15
C	> 15-25
D	> 25-35
E	> 35-50
F	> 50

Source: Highway Capacity Manual 2000.

3.1.2 Street Segments

The street segments were analyzed based on the functional classification of the roadway using the County of San Diego *Average Daily Vehicle Trips* capacity lookup table. The roadway segment capacity and LOS standards used to analyze street segments are summarized in **Table 5**.

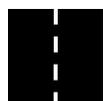


TABLE 5: STREET SEGMENT DAILY CAPACITY AND LOS (COUNTY OF SAN DIEGO GENERAL PLAN UPDATE)

Proposed GPU Road Classification		LOS A	LOS B	LOS C	LOS D	LOS E
Expressway	6.1	<36,000	<54,000	<70,000	<86,000	<108,000
Prime Arterial	6.2	<22,200	<37,000	<44,600	<50,000	<57,000
Major Road w/raised median	4.1A	<14,800	<24,700	<29,600	<33,400	<37,000
Major Rd w/intermittent turn lanes	4.1B	<13,700	<22,800	<27,400	<30,800	<34,200
Boulevard w/raised median	4.2A	<18,000	<21,000	<24,000	<27,000	<30,000
Boulevard w/Intermittent turn lanes	4.2B	<16,800	<19,600	<22,500	<25,000	<28,000
Community Collector w/raised median	2.1A	<10,000	<11,700	<13,400	<15,000	<19,000
Community Collector w/cont. turn lane	2.1B	<3,000	<6,000	<9,500	<13,500	<19,000
Community Collector w/intermit. turn lane	2.1C	<3,000	<6,000	<9,500	<13,500	<19,000
Community Collector w/improvement opt.	2.1D	<3,000	<6,000	<9,500	<13,500	<19,000
Community Collector	2.1E	<1,900	<4,100	<7,100	<10,900	<16,200
Light Collector w/raised median	2.2A	<3,000	<6,000	<9,500	<13,500	<19,000
Light Collector w/continuous left turn lane	2.2B	<3,000	<6,000	<9,500	<13,500	<19,000
Light Collector w/intermittent turn lane	2.2C	<3,000	<6,000	<9,500	<13,500	<19,000
Light Collector w/ passing lane	2.2D	<3,000	<6,000	<9,500	<13,500	<19,000
Light Collector - no median	2.2E	<1,900	<4,100	<7,100	<10,900	<16,200
Light Collector w/ reduced shoulder	2.2F	<5,800	<6,800	<7,800	<8,700	<9,700
Minor Collector w/raised median	2.3A	<3,000	<6,000	<7,000	<8,000	<9,000
Minor Collector w/intermittent turn lane	2.3B	<3,000	<6,000	<7,000	<8,000	<9,000
Minor Collector – no median	2.3C	<1,900	<4,100	<6,000	<7,000	<8,000

Source: County of San Diego Public Road Standards, March, 2012.

3.2 Project Trip Generation

The project trip generation was calculated using SANDAG trip rates from the *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, April 2002. Based on SANDAG rates, the project is calculated to generate 180 Average Daily Trips (ADT), 14 AM peak hour trips (4 inbound and 10 outbound), and 18 PM peak hour trips (13 inbound and 5 outbound) as shown in **Table 6**.

TABLE 6: PROJECT TRIP GENERATION

Proposed Land Use	Rate	Size & Units	ADT	%	Split	AM			PM		
						IN	OUT	%	Split	IN	OUT
Residential	10 /DU	18 DU	180	8%	0.3 0.7	4	10	10%	0.7 0.3	13	5

Source: SANDAG *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, April 2002.

DU: Dw elling Unit. ADT-Average Daily Traffic; Split-percent inbound and outbound.

On-site grading is proposed as part of the project. The applicant has stated that no import or export is anticipated because the on-site grading will be balanced.

3.3 Project Trip Distribution and Assignment

Project trips were distributed based on a review of background traffic and the proximity to I-8. The distribution at Lake Jennings Park Road and Jennings Vista Drive was based on the background turn moves because this intersection will also serve the proposed project. A distribution of 37% to/from the north on Lake Jennings Park Road and 63% to/from the south on Lake Jennings Park Road was calculated from back ground turn moves (calculations included in **Appendix F**). The distribution is shown in **Figure 6** and the project trip assignment is shown in **Figure 7**.

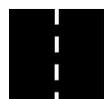
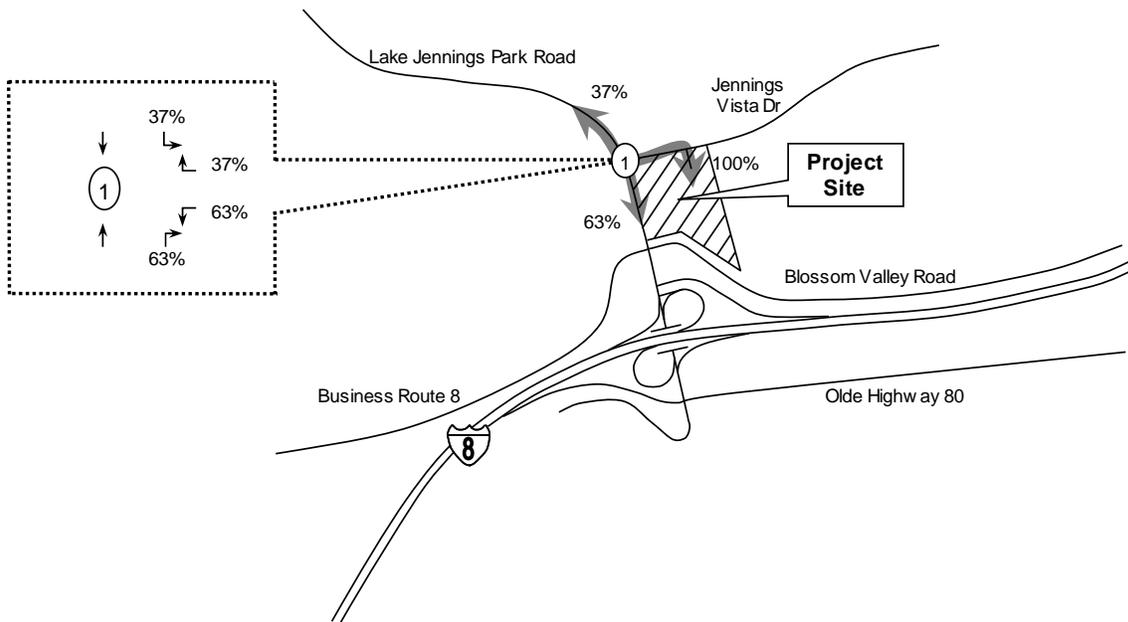


Figure 6: Distribution



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Distribution

Intersection Reference Number to LOS Tables

Existing Roadways



No Scale

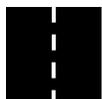
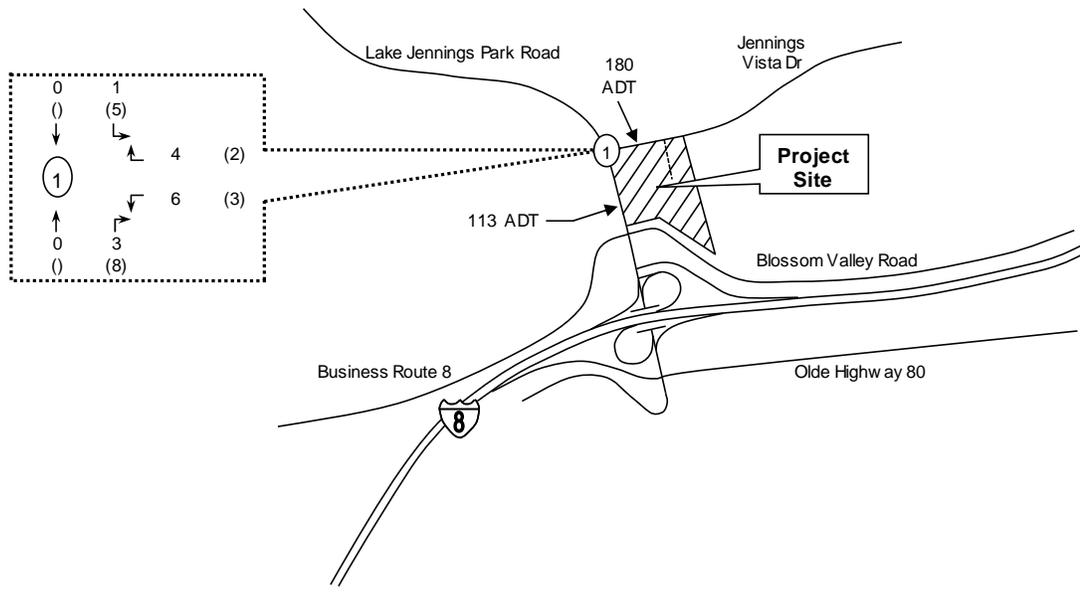
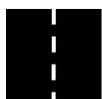


Figure 7: Assignment



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- XX AM peak hour volumes at intersections
- (YY) PM peak hour volumes at intersections
- An empty () represents a 0 PM volume
- Z,ZZZ ADT volumes shown along segments
- (#) Intersection Reference Number to LOS Tables
- Existing Roadways
- Planned On-Site Roadways



3.4 Existing + Project Conditions

This section will summarize the analysis for the addition of project traffic onto the existing background traffic for AM, PM and ADT conditions. The peak hour intersection volumes and daily traffic volumes for this scenario of existing + project are shown in **Figure 8**. The LOS calculated for the intersections and street segments are shown in **Tables 7 and 8**, respectively.

TABLE 7: EXISTING + PROJECT INTERSECTION LEVEL OF SERVICE

Intersection and (Analysis) ¹	Movement	Peak Hour	Existing		Existing + Project			
			Delay ²	LOS ³	Delay ²	LOS ³	Delta ⁴	Sig ⁵
1) Lake Jennings Park Rd at Jennings Vista (U)	Westbound	AM	25.5	D	26.7	D	1.2	No
	Westbound	PM	31.8	D	33.5	D	1.7	No

Notes: 1) Analysis: (U) Unsignalized. 2) Delay: HCM Average Control Delay in seconds. 3) LOS: Level of Service
4) Delta is the increase in delay from project. 5) Significant Impact? (yes or no).

TABLE 8: EXISTING + PROJECT SEGMENT ADT VOLUMES AND LEVEL OF SERVICE

Segment	Classification (as built)	Existing				Project		Existing + Project				
		Daily Volume	LOS E Capacity	V/C	LOS	Daily Volume	Daily Volume	LOS E Capacity	V/C	LOS	Change in V/C	Direct Impact?
Lake Jennings Park Road	4.1B Major Rd											
Jennings Vista Dr to Blossom Valley Rd	(2U+TWLTL)	14,217	19,000	0.748	E	113	14,330	19,000	0.754	E	0.006	No
Jennings Vista Drive												
Lake Jennings Park Road to Project Dwy	Not Class. (2U)	2,469	4,500*	0.549	C	180	2,649	4,500*	0.589	C	0.040	No

Notes: Classification (as built): 2U = 2 lane undivided roadway. Not Class. = Not Classified on Mobility Element.

Daily volume is a 24 hour volume. LOS: Level of Service. V/C: Volume to Capacity ratio. *At LOS C.

Under existing + project conditions, all study intersections and roadways were calculated to operate at LOS D or better with the exception of the segment of Lake Jennings Park Rd from Jennings Vista to Blossom Valley (LOS E, daily basis). No direct impacts were calculated because the project traffic does not exceed the allowable increase in segment volume along Lake Jennings Park Road. Intersection LOS calculations are included in **Appendix G**.

3.5 Ramps

A ramp analysis was not prepared because the project is calculated to add less than 20 peak hour trips to the surrounding Caltrans freeway on-ramps.

3.6 Congestion Management Program

The Congestion Management Program (CMP), adopted in 2008 by the SANDAG Transportation Committee, is intended to determine if a large project (greater than 2,400 daily trips or 200 peak hour trips) will adversely impact the CMP transportation system. A CMP analysis is NOT included because this project is calculated to generate less than 2,400 ADT and less than 200 peak hour trips.

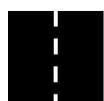
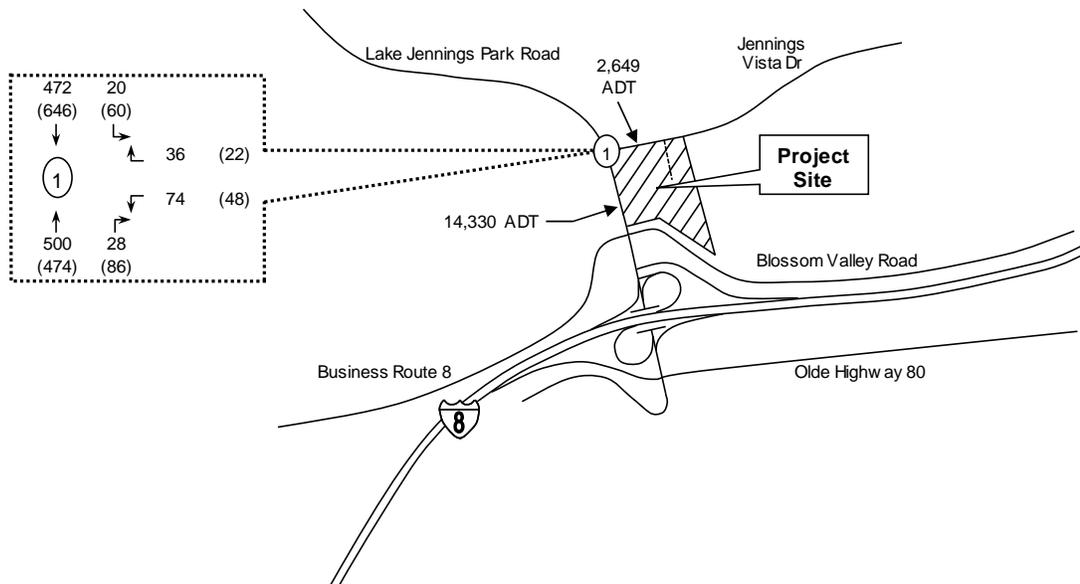
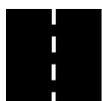


Figure 8: Existing + Project Volumes



LEGEND

- XX AM peak hour volumes at intersections
- (YY) PM peak hour volumes at intersections
- An empty () represents a 0 PM volume
- Z,ZZZ ADT volumes shown along segments
- (#) Intersection Reference Number to LOS Tables
- Existing Roadways
- Planned On-Site Roadways



3.7 Hazards Due To An Existing Transportation Design Feature

Project has frontage along Lake Jennings Park Road and Jennings Vista Drive. Any required improvements will be constructed to maintain existing conditions as it relates to existing design features.

3.7.1 Signal Warrant Analysis (Lake Jennings Park Rd at Jennings Vista Dr)

Lake Jennings Park Road at Jennings Vista Drive is a T-intersection with stop control on the minor leg (Jennings Vista Drive). The existing configuration was shown previously in Figure 4 and includes a northbound through lane, a northbound right turn lane (2 lane approach on the Major Street), a southbound through lane, a southbound left turn lane within the center TWLTL (2 lane approach on the Major Street), and a combination left-right turn lane on Jennings Vista Drive (1 lane approach on the Minor St). The warrant analysis was based on the *California Manual on Uniform Traffic Control Devices (MUTCD) 2012 Edition* as identified on the Caltrans' web site (http://www.dot.ca.gov/hq/_traffops/signtech/mutcdsupp/ca_mutcd2012.htm). A copy of the California 2012 MUTCD Chapter 4C dated January 13, 2012 is included in **Appendix H**. The signal warrant calculations are included in **Appendix I**, with the findings summarized in **Table 9**.

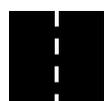
TABLE 9: SIGNAL WARRANT SUMMARY (EXISTING AND EXISTING + PROJECT CONDITIONS)

California MUTCD ¹ 2012 Edition, as amended for use in California	Existing	Existing + Project
	Satisfied?	Satisfied?
Warrant 1 – Eight Hour Vehicular Volume	No	No
Warrant 2 – Four Hour Vehicular Volume	No	No
Warrant 3 – Peak Hour Vehicular Volume	No	No
Warrant 4 – Pedestrian Volume	NA ²	NA ²
Warrant 5 – School Crossing	NA ³	NA ³
Warrant 6 – Coordinated Signal System	No	No
Warrant 7 – Crash Experience Warrant	No	NA ⁴
Warrant 8 – Roadway Network	NA ⁵	NA ⁵
Warrant 9 – Intersection Near a Grade Crossing	NA ⁶	NA ⁶

Notes: ¹California MUTCD is based on the Manual on Uniform Traffic Control Devices, 2012 Edition, as amended for use in California. ²MUTCD states this warrant shall not be applied where the nearest traffic control signal is less than 300 feet from the study intersection. Lake Jennings Park Road at Harritt Road has a traffic signal with pedestrian call buttons and is less than 300 feet (about 225 feet) from Vista Jennings Drive. ³MUTCD states this warrant shall not be applied for the same reason as noted in footnote number 2. ⁴Not possible to forecast the future number of crashes for an existing + project condition. ⁵Not applicable because Jennings Vista Drive does not meet the MUTCD definition of a Major Route. ⁶The study intersection is not adjacent to a railroad grade crossing.

3.7.2 Corner Sight Distance Analysis (Lake Jennings Park Rd at Jennings Vista Dr)

A corner sight distance analysis was prepared for the westbound approach to the intersection of Lake Jennings Park Road at Jennings Vista Drive to determine if sufficient corner sight distance exists for vehicles turning left or right from Jennings Vista Drive onto Lake Jennings Park Road.



The corner sight distance was based on the higher speed between the 85th percentile speed collected on Lake Jennings Park Road approaching Jennings Vista Drive and the minimum design speed of a roadway classification of 4.1B for Lake Jennings Park Road. The 85th percentile speed was collected in the northbound (39 MPH) and southbound (36 PM) along Lake Jennings Park Road on Thursday, February 13, 2014 (data included in **Attachment J**). The minimum design speed for Lake Jennings Park Road with a classification of 4.1B is 55 MPH. Therefore, the higher 55 MPH design speeds were used for the corner sight distance analysis.

An unobstructed sight distance was observed looking north and south within the right-of-way of Lake Jennings Park Road from Jennings Vista Drive per the San Diego County Public Road Standards dated March, 2012 (corner sight distance pictures included in **Attachment K**) as summarized in **Table 10**.

TABLE 10: CORNER SIGHT DISTANCE SUMMARY (LAKE JENNINGS PARK RD AT JENNINGS VISTA DR)

Intersection Location	Observed Direction When Leaving Jennings Vista Drive	Design Speed ¹	County Minimum Corner Sight Distance ² and Observation
Lake Jennings Park Road at Jennings Vista Dr	Looking North from Minor Leg of Jennings Vista Drive	55 MPH	550 feet Observed Within ROW
Lake Jennings Park Road at Jennings Vista Dr	Looking South from Minor Leg of Jennings Vista Drive	55 MPH	550 feet Observed Within ROW

Source: ¹Design speeds from Mobility Element classification for Lake Jennings Park Road. ²County of San Diego Department of Public Works *Public Road Standards* March, 2012. ROW: Right of Way.

3.8 Hazards To Pedestrians or Bicyclists

Project access is proposed on Jennings Vista Drive. Any required improvements will be constructed to maintain existing conditions as it relates to pedestrian and bicyclists.

3.9 Public Transportation

Metropolitan Transit System Bus Route 864 (map included in **Appendix L**) serves Lake Jennings Park Road at Blossom Valley Road in the vicinity of the project site.

3.10 Impact Summary Table

No direct impacts were calculated as summarized in **Table 11**.

TABLE 11: IMPACT SUMMARY TABLE

Roadway Facility	Direct Impacts	Cumulative Impacts
Intersections	0	4
Segments	0	4

NA: Not Applicable because project traffic is below threshold required for analysis.



4.0 General Plan Consistency and Build-out Analysis

The project use is consistent with the existing general plan. The project applicant does NOT propose a General Plan Amendment, Specific Plan Amendment, or Rezone. Therefore, a build-out analysis is not required.

5.0 Summary of Recommended Mitigation and Project Design Features

The project is calculated to have no direct impacts; therefore, no mitigation measures are required. A summary of project impacts and mitigation is shown in **Table 12**.

TABLE 12: SUMMARY OF PROJECT IMPACTS AND MITIGATION

Roadway Facility	Direct Impacts
Intersections	0 (no mitigation required)
Segments	0 (no mitigation required)

NA: Not Applicable because project traffic is below threshold required for analysis.

6.0 References

County of San Diego. August 24, 2011. *Guidelines for Determining Significance and Report Format and Content Requirements Traffic and Transportation*. Print.

San Diego Association of Governments (SANDAG). April 2002. *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*. Print.

Trafficware Corporation, 2011. Synchro 8.0 computer software. CD ROM.

Transportation Research Board National Research Council Washington, D.C. 2000. *Highway Capacity Manual 2000*. CD ROM.

7.0 List of Preparers and Persons and Organizations Contacted

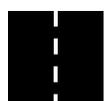
7.1 List of Preparers

Justin Rasas, P.E. (RCE 60690), LOS Engineering, Inc. Author

7.2 Organizations Contacted

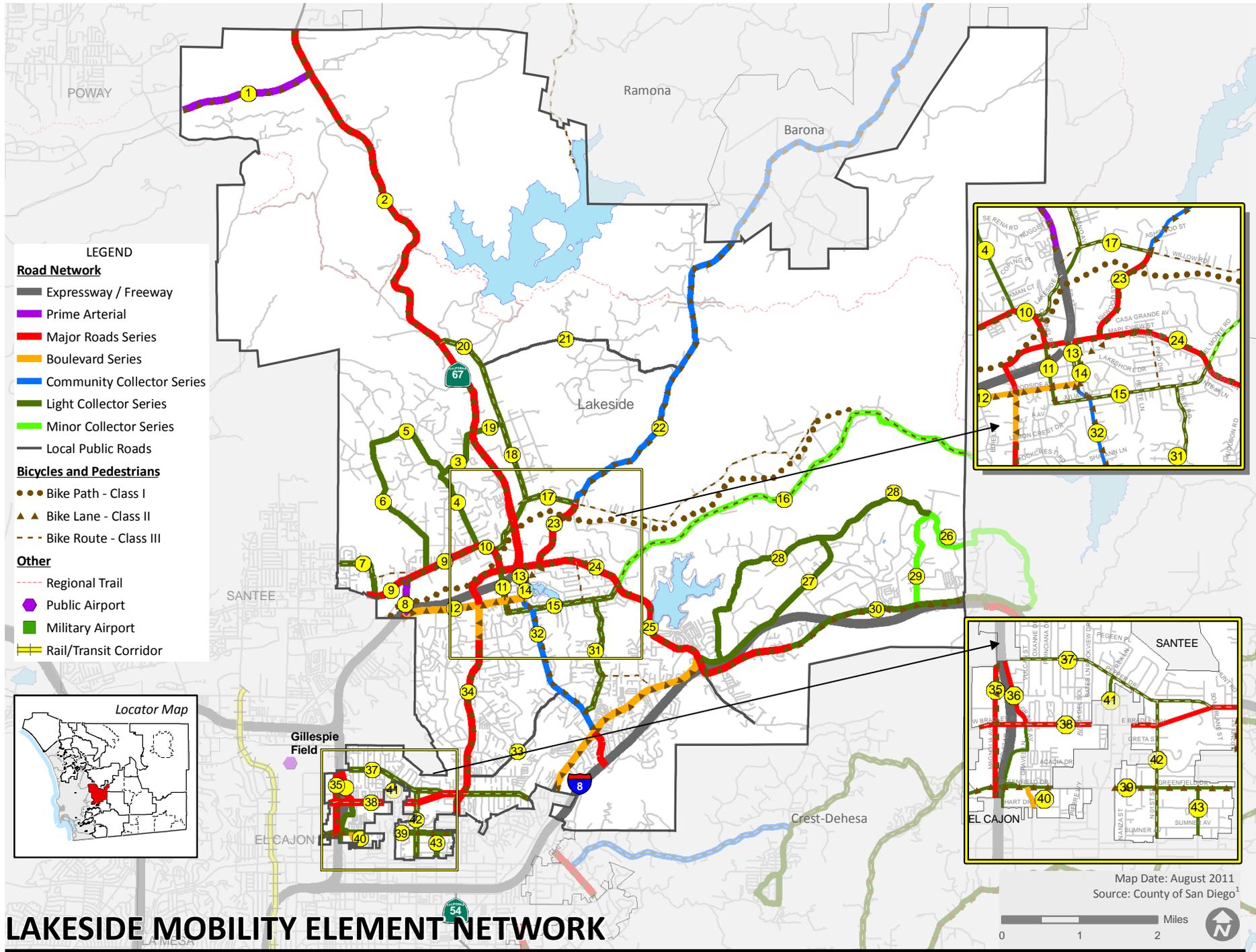
Hedy Levine, REC Consultants, Inc. - Client

Will Brown, Pacific Technical Data – Data Collection Firm



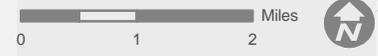
Appendix A

County of San Diego Mobility Element Excerpts



LAKESIDE MOBILITY ELEMENT NETWORK

Map Date: August 2011
 Source: County of San Diego¹



Mobility Element Network—Lakeside Community Planning Area Matrix			
ID ^a	Road Segment	Designation/Improvement #.#X = [# of lanes],[roadway classification][improvement]	Special Circumstances
16	El Monte Road (SC 1920) <u>Segment:</u> Lake Jennings Park Road to Mountain Empire Subregion boundary	2.3C Minor Collector	None
17	Willow Road (SA 820) <u>Segment:</u> SR-67 to Wildcat Canyon Road	2.2E Light Collector	Recommended Improvement Align Willow Road with Lakeside Avenue and provide underpass at SR- 67
18	Moreno Avenue (SC 1772) <u>Segment:</u> Vigilante Road to Willow Road	2.2E Light Collector	None
19	San Vicente Avenue (SC 1790) <u>Segment:</u> SR-67 to Moreno Avenue	2.2E Light Collector	None
20	Vigilante Road (SC 1772) <u>Segment:</u> SR-67 to Moreno Avenue	2.2B Light Collector Continuous Turn Lane	Recommended Improvement Align Slaughterhouse Canyon Road with Vigilante Road to form a four-way signalized intersection at SR-67
21	(Unnamed) Muth Valley Connection <u>Segment:</u> Moreno Avenue to Wildcat Canyon Road	Local Public Road	Public Road on Mobility Element Provide emergency access and connectivity for future development
22	Wildcat Canyon Road (SA 340.2) <u>Segment:</u> Willow Road to Ramona CPA boundary	2.1D Community Collector Improvement Options [Passing Lanes]	Accepted at LOS F <u>Segment:</u> Willow Road to Ramona CPA boundary
23	Ashwood Street (SA 340) <u>Segment:</u> Willow Road to Mapleview Street	4.1A Major Road Raised Median	None
24	Mapleview Street (SC 1805) <u>Segment:</u> Winter Gardens Boulevard to Lake Jennings Park Road	4.1A Major Road Raised Median	Accepted at LOS F Maine Avenue to Ashwood Street Recommended Improvement Underpass at SR-67
25	Lake Jennings Park Road (SA 810) <u>Segment:</u> Mapleview Street to Old Highway 80	4.1B Major Road Intermittent Turn Lanes	Accepted at LOS F <u>Segment:</u> I-8 Business Route to I-8 westbound ramp



Mobility Element Network—Lakeside Community Planning Area Matrix			
ID ^a	Road Segment	Designation/Improvement #. #X = [# of lanes].[roadway classification][improvement]	Special Circumstances
26	Broad Oaks Road (SC 1930) <u>Segment:</u> Hawley Road to Alpine CPA boundary	2.3C Minor Collector	None
27	Blossom Valley Road (SA 830.1) <u>Segment:</u> Lake Jennings Park Road to Quail Canyon Road	2.2D Light Collector Improvement Options—Lake Jennings Park Road to Quail Canyon Road 2.2E Light Collector Intermittent Turn Lanes—Quail Canyon Road to Quail Canyon Road	None
28	Quail Canyon Road <u>Segment:</u> Blossom Valley Road to Hawley Road	2.2E Light Collector	None
29	Hawley Road (SC 1940) <u>Segment:</u> Old Highway 80 to Broad Oaks Road	2.3C Minor Collector	None
30	Old Highway 80 (SA 895) <u>Segment:</u> Pepper Drive to Alpine CPA boundary	4.2B Boulevard with Intermittent Turn Lanes Intermittent Turn Lanes—Pepper Drive to Lake Jennings Park Road 4.1B Major Road Intermittent Turn Lanes—Lake Jennings Park Road to Marina Springs Lane 2.2B Light Collector Continuous Turn Lane—Marina Springs Lane to Alpine CPA boundary	None
31	Lakeview Road (SC 1890) <u>Segment:</u> Los Coches Road to Julian Avenue	2.2E Light Collector	None
32	Los Coches Road (SF 1400) <u>Segment:</u> Julian Avenue to Interstate 8	2.1D Community Collector Improvement Options—Julian Avenue to Old Highway 80 4.1B Major Road Continuous Turn Lane—Old Highway 80 to Interstate 8	Accepted at LOS E/F <u>Segment:</u> Woodside Avenue to I-8 Business Route Shoulder as Parking Lane Separate Bike Lane required—Mapleview Street to Woodside Avenue

Appendix B

County of San Diego DPW Public Road Standards Excerpt

PUBLIC ROAD STANDARDS



COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS

March 2012

**TABLE 1
AVERAGE DAILY VEHICLE TRIPS***

MOBILITY ELEMENT ROADS		LEVELS OF SERVICE					
Road Classification	# of Travel Lanes	A	B	C	D	E	
Expressway (6.1)	6	<36,000	<54,000	<70,000	<86,000	<108,000	
Prime Arterial (6.2)	6	<22,200	<37,000	<44,600	<50,000	<57,000	
Major Road	w/ Raised Median (4.1A)	4	<14,800	<24,700	<29,600	<33,400	<37,000
	w/ Intermittent Turn Lanes (4.1B)	4	<13,700	<22,800	<27,400	<30,800	<34,200
Boulevard	w/ Raised Median (4.2A)	4	<18,000	<21,000	<24,000	<27,000	<30,000
	w/ Intermittent Turn Lanes (4.2B)	4	<16,800	<19,600	<22,500	<25,000	<28,000
Community Collector	w/ Raised Median (2.1A)	2	<10,000	<11,700	<13,400	<15,000	<19,000
	w/ Continuous Left Turn Lane (2.1B)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Intermittent Turn Lane (2.1C)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Passing Lane (2.1D)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	No Median (2.1E)	2	<1,900	<4,100	<7,100	<10,900	<16,200
Light Collector	w/ Raised Median (2.2A)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Continuous Left Turn Lane (2.2B)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Intermittent Turn Lane (2.2C)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Passing Lane (2.2D)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	No Median (2.2E)	2	<1,900	<4,100	<7,100	<10,900	<16,200
	w/ Reduced Shoulder (2.2F)	2	<5,800	<6,800	<7,800	<8,700	<9,700
Minor Collector	w/ Raised Median (2.3A)	2	<3,000	<6,000	<7,000	<8,000	<9,000
	w/ Intermittent Turn Lane (2.3B)	2	<3,000	<6,000	<7,000	<8,000	<9,000
	No Median (2.3C)	2	<1,900	<4,100	<6,000	<7,000	<8,000
NON-MOBILITY ELEMENT ROADS**		LEVELS OF SERVICE					
Residential Collector	2	-	-	<4,500	-	-	
Rural Residential Collector***	2	-	-	<4,500	-	-	
Residential Road	2	-	-	<1,500	-	-	
Rural Residential Road***	2	-	-	<1,500	-	-	
Residential Cul-de-Sac or Loop Road	2	-	-	<200	-	-	

* The values shown are subject to adjustment based on the geometry of the roadway, side frictions, and other relevant factors as determined by the Director, Department of Public Works.

** Levels of service are not applied to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.

*** Rural Residential Collectors and Rural Residential Roads are intended to serve areas with lot sizes of 2 acres or more which do not have a demand for on-street parking. On-street parking is not assured for these cross sections. Additional right-of-way is needed if on-street parking is in paved area.

**** See Tables 2A and 2B for roadway surfacing and right-of-way widths.

TABLE 2A: COUNTY OF SAN DIEGO - PUBLIC ROAD STANDARDS

MOBILITY ELEMENT ROAD CLASSIFICATIONS									
ROAD CLASSIFICATION	# LANES / LANE WIDTH	MEDIAN WIDTH	ROAD SURFACING WIDTH	R.O.W. WIDTH	PAVED SHOULDERS (# / WIDTH)	PARKWAY WIDTH	MIN. CURVE RADIUS	MAX. DESIRABLE GRADE	MIN. DESIGN SPEED (MPH)
Expressway (6.1)	6 / 12'	34'	126'	146'	2 / 10'	10'	1,700'	6%	65
Prime Arterial (6.2)	6 / 12'	14'	102'	122'	2 / 8'	10'	1,700'	6%	65
Major Road									
With Raised Median (4.1A)	4 / 12'	14'	78'	98'	2 / 8'	10'	1,200'	7%	55
With Intermittent Turn Lanes (4.1B)	4 / 12'	-	64' - 78'	84' - 98'	2 / 8'	10'	1,200'	7%	55
Boulevard									
With Raised Median (4.2A)	4 / 12'	14'	78'	106'	2 / 8'	14'	500'	9%	40
With Intermittent Turn Lanes (4.2B)	4 / 12'	-	64' - 78'	92' - 106'	2 / 8'	14'	500'	9%	40
Community Collector									
With Raised Median (2.1A)	2 / 12'	14'	54'	74'	2 / 8'	10'	700'	9%	45
With Continuous Left Turn Lane (2.1B)	2 / 12'	14'	54'	74'	2 / 8'	10'	700'	9%	45
With Intermittent Turn Lanes (2.1C)	2 / 12'	-	40' - 54'	60' - 74'	2 / 8'	10'	700'	9%	45
With Improvement Options (2.1D)	2 / 12'	-	40' - 54'	84'	2 / 8'	15' - 22'	700'	9%	45
No Median (2.1E)	2 / 12'	-	40'	60'	2 / 8'	10'	700'	9%	45
Light Collector									
With Raised Median (2.2A)	2 / 12'	14'	54'	78'	2 / 8'	12'	500'	9%	40
With Continuous Left Turn Lane (2.2B)	2 / 12'	14'	54'	78'	2 / 8'	12'	500'	9%	40
With Intermittent Turn Lanes (2.2C)	2 / 12'	-	40' - 54'	64' - 78'	2 / 8'	12'	500'	9%	40
With Improvement Options (2.2D)	2 / 12'	-	40' - 54'	88'	2 / 8'	17' - 24'	500'	9%	40
No Median (2.2E)	2 / 12'	-	40'	64'	2 / 8'	12'	500'	9%	40
With Reduced Shoulder (2.2F)	2 / 12'	-	28'	52'	2 / 2'	12'	500'	9%	40
Minor Collector									
With Raised Median (2.3A)	2 / 12'	14'	54'	82'	2 / 8'	14'	350'	12%	35
With Intermittent Turn Lanes (2.3B)	2 / 12'	-	40' - 54'	68' - 82'	2 / 8'	14'	350'	12%	35
No Median (2.3C)	2 / 12'	-	40'	68'	2 / 8'	14'	350'	12%	35

NOTES:

- 1 Minimum longitudinal gradient shall be 1.0 percent for all road classificationis shown above.
- 2 The maximum grade for a permanent cul-de-sac street turning area shall be 6 percent.
- 3 The maximum grade for a temporary cul-de-sac street turning area shall be that of the classification of the road being constructed.
- 4 For standards, see County Design Standard Drawing DS-2, DS-3, DS-4, and Section 4.5N of these Standards.
- 5 Additional pavement and ROW may be required for ME Boulevards / Community Collectors (4 feet) and Light Collectors (12 feet) in Industrial/Commercial Zones.
- 6 ME roads needing additional turn or passing lanes will require an additional 12 to 14 feet of pavement and ROW for each lane.
- 7 The maximum superelevation allowed on ME roads is 6%. Superelevation is not normally required on Non-ME roads.
- 8 ME roads designated with Bike Lanes will require an additional 10 feet of pavement and ROW. This may be increased to 12' for four-lane roads and above based upon the provisions in Section 7.3 of these standards.
- 9 The minimum curve radii, shown in the table above, are based on the design speed with 6% superelevation.
- 10 Interim roads are to be a minimum of 28 feet A.C. within a 40 feet graded roadbed. They may be larger if traffic volumes require more travel lanes.
- 11 Road surfacing widths include median width.

TABLE 2B: COUNTY OF SAN DIEGO - PUBLIC ROAD STANDARDS

NON-MOBILITY ELEMENT ROAD CLASSIFICATIONS									
ROAD CLASSIFICATION	# LANES / LANE WIDTH	MEDIAN WIDTH	ROAD SURFACING WIDTH	R.O.W. WIDTH	PAVED SHOULDERS (# / WIDTH)	PARKWAY WIDTH	MINIMUM CURVE RADIUS	MAXIMUM DESIRABLE GRADE	MINIMUM DESIGN SPEED (MPH)
Residential Collector	2 / 12'	-	40'	60'	2 / 8'	10'	300'	12%	30
Rural Residential Collector *	2 / 12'	-	28'	48'	2 / 2'	10'	300'	12%	30
Residential Road	2 / 12'	-	36'	56'	2 / 6'	10'	200'	15%	30
Rural Residential Road *	2 / 12'	-	28'	48'	2 / 2'	10'	200'	15%	30
Residential Cul-de-sac	2 / 12'	-	32'	52'	2 / 4'	10'	200'	15%	30
Residential Loop	2 / 12'	-	32'	52'	2 / 4'	10'	200'	15%	30
Industrial/Commerical Collector	4 / 12'	-	68'	88'	2 / 10'	10'	300'	8%	30
Industrial/Commerical	2 / 16'	-	52'	72'	2 / 10'	10'	200'	8%	30
Industrial/Commercial Cul-de-sac	2 / 16'	-	52'	72'	2 / 10'	10'	200	8%	30
Frontage	2 / 12'	-	32' min	52' min	1 / 8'	10'	See above	See above	-
Alley	2 / 10'	-	20-30'	20-30'	None	None	50'	12%	n/a
Hillside Residential	See NOTE 4	-	-	-	-	-	-	-	-

- NOTES:**
- 1 Minimum longitudinal gradient shall be 1.0 percent for all road classificationis shown above.
 - 2 The maximum grade for a permanent cul-de-sac street turning area shall be 6 percent.
 - 3 The maximum grade for a temporary cul-de-sac street turning area shall be that of the classification of the road being constructed.
 - 4 For standards, see County Design Standard Drawing DS-2, DS-3, DS-4, and Section 4.5N of these Standards.
 - 5 The minimum curve radii, shown in the table above, are based on the design speed with 6% superelevation.
 - 6 Interim roads are to be a minimum of 28 feet A.C. within a 40 feet graded roadbed. They may be larger if traffic volumes require more travel lanes.

LEGEND: * Serves lots > 2 acres in size w/
no demand for on-street parking

Appendix C

85th Percentile Speed Data

LAKE JENNINGS S-O VISTA JENNINGS

PTD14-0214-01

NORTHBOUND

24HR 85TH PERCENTILE = 39

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 AM	0	0	0	0	0	0	2	2	1	0	0	0	0	5	0.07%
12:15:00 AM	0	0	0	1	1	2	5	3	0	0	1	0	0	13	0.18%
12:30:00 AM	0	0	0	1	1	3	4	4	0	0	0	0	0	13	0.18%
12:45:00 AM	0	0	0	0	2	0	5	4	2	0	0	0	0	13	0.18%
1:00:00 AM	0	0	0	1	0	0	2	3	0	0	0	0	0	6	0.08%
1:15:00 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.01%
1:30:00 AM	0	0	0	1	0	1	5	1	0	0	0	0	0	8	0.11%
1:45:00 AM	0	0	1	0	0	1	2	2	0	1	0	0	0	7	0.10%
2:00:00 AM	0	0	0	0	1	0	0	2	0	0	0	0	0	3	0.04%
2:15:00 AM	0	0	0	0	1	1	1	1	0	0	0	0	0	4	0.06%
2:30:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.01%
2:45:00 AM	0	0	1	0	0	2	0	1	1	0	0	0	0	5	0.07%
3:00:00 AM	0	0	0	0	0	2	1	1	0	0	0	0	0	4	0.06%
3:15:00 AM	0	0	0	1	0	0	0	3	0	0	0	0	0	4	0.06%
3:30:00 AM	0	0	0	0	1	2	1	2	1	0	0	0	0	7	0.10%
3:45:00 AM	0	0	0	0	0	2	2	2	0	0	0	0	0	6	0.08%
4:00:00 AM	0	0	0	0	1	2	0	0	0	0	0	0	0	3	0.04%
4:15:00 AM	0	0	0	0	3	3	5	1	1	1	0	0	0	14	0.20%
4:30:00 AM	0	0	0	0	0	2	2	6	4	1	0	0	0	15	0.21%
4:45:00 AM	0	0	0	0	6	3	8	9	3	0	0	0	0	29	0.41%
5:00:00 AM	0	0	0	0	1	1	5	8	2	0	0	0	0	17	0.24%
5:15:00 AM	0	0	0	1	5	11	9	6	2	1	0	0	0	35	0.49%
5:30:00 AM	0	0	1	0	3	15	7	7	2	0	0	0	0	35	0.49%
5:45:00 AM	0	0	1	0	7	10	19	9	7	1	0	0	0	54	0.76%
6:00:00 AM	0	0	0	1	4	26	21	6	4	3	0	0	0	65	0.92%
6:15:00 AM	0	1	0	4	18	16	20	14	3	0	0	0	0	76	1.07%
6:30:00 AM	0	0	4	15	21	30	32	6	0	1	0	0	0	109	1.54%
6:45:00 AM	2	5	5	8	23	57	25	14	3	0	0	0	0	142	2.00%
7:00:00 AM	0	0	2	15	32	35	22	9	5	1	0	0	0	121	1.70%
7:15:00 AM	0	0	2	8	34	49	28	7	2	0	0	0	0	130	1.83%
7:30:00 AM	2	3	5	12	25	50	24	7	0	0	0	0	0	128	1.80%
7:45:00 AM	1	8	11	12	30	41	22	10	2	0	1	0	0	138	1.94%
8:00:00 AM	2	1	4	12	32	44	21	12	1	1	0	0	0	130	1.83%
8:15:00 AM	2	3	9	14	11	44	28	8	1	0	0	0	0	120	1.69%
8:30:00 AM	0	0	0	13	25	42	21	6	2	0	0	0	0	109	1.54%
8:45:00 AM	0	0	2	10	26	35	15	11	0	0	0	0	0	99	1.39%
9:00:00 AM	0	1	0	2	19	41	25	10	0	1	0	0	0	99	1.39%
9:15:00 AM	0	0	0	5	23	37	13	6	1	0	0	0	0	85	1.20%
9:30:00 AM	1	1	1	4	26	37	21	3	1	0	0	0	0	95	1.34%
9:45:00 AM	0	1	5	10	24	23	11	4	0	0	0	0	0	78	1.10%
10:00:00 AM	0	0	3	6	15	48	19	6	0	0	0	0	0	97	1.37%
10:15:00 AM	1	0	1	6	25	17	18	8	1	0	0	0	0	77	1.08%
10:30:00 AM	1	0	2	6	22	17	13	3	0	0	0	0	0	64	0.90%
10:45:00 AM	0	0	2	3	29	34	11	5	1	0	0	0	0	85	1.20%
11:00:00 AM	3	0	7	9	21	29	13	3	1	0	0	0	0	86	1.21%
11:15:00 AM	0	0	0	5	9	34	16	3	2	0	0	0	0	69	0.97%
11:30:00 AM	0	1	4	12	17	22	16	2	0	0	0	0	0	74	1.04%
11:45:00 AM	0	0	5	10	31	42	17	5	2	1	0	0	0	113	1.59%
AM TOTAL	15	25	78	208	575	913	558	245	59	13	2	0	0	2,691	37.91%
PERCENTAGE	0.6%	0.9%	2.9%	7.7%	21.4%	33.9%	20.7%	9.1%	2.2%	0.5%	0.1%	0.0%	0.0%		
CUMULATIVE	15	40	118	326	901	1,814	2,372	2,617	2,676	2,689	2,691	2,691	2,691		
PERCENTAGE	0.6%	1.5%	4.4%	12.1%	33.5%	67.4%	88.1%	97.3%	99.4%	99.9%	100.0%	100.0%	100.0%		

15th Percentile	27	Mean Speed Average	33
50th Percentile	33	10 MPH Pace Speed	27-36
85th Percentile	39	Number in Pace	1688
95th Percentile	43	Percent in Pace	63%

**LAKE JENNINGS S-O VISTA JENNINGS
NORTHBOUND**

PTD14-0214-01

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 PM	1	0	2	8	34	34	12	9	1	0	0	0	0	101	1.42%
12:15:00 PM	0	1	0	8	28	32	19	1	1	0	0	0	0	90	1.27%
12:30:00 PM	0	0	2	11	19	37	11	7	0	1	0	0	0	88	1.24%
12:45:00 PM	0	0	1	11	45	43	18	3	2	0	0	0	0	123	1.73%
1:00:00 PM	0	0	2	17	35	35	14	3	1	0	0	0	0	107	1.51%
1:15:00 PM	0	4	4	5	26	33	11	10	2	1	0	0	0	96	1.35%
1:30:00 PM	0	0	4	17	19	33	24	8	1	0	0	0	0	106	1.49%
1:45:00 PM	2	0	8	7	21	29	13	4	1	0	0	0	0	85	1.20%
2:00:00 PM	2	0	0	11	46	30	13	3	0	0	0	0	0	105	1.48%
2:15:00 PM	0	0	3	19	34	55	12	4	1	2	0	0	0	130	1.83%
2:30:00 PM	0	0	6	19	28	46	15	6	2	0	0	0	0	122	1.72%
2:45:00 PM	0	0	2	11	29	40	38	6	1	0	0	0	0	127	1.79%
3:00:00 PM	0	0	4	11	29	38	14	12	3	0	0	0	0	111	1.56%
3:15:00 PM	0	7	3	6	31	48	21	8	1	0	0	0	0	125	1.76%
3:30:00 PM	2	0	4	7	24	48	30	4	2	0	0	0	0	121	1.70%
3:45:00 PM	0	1	1	10	37	51	25	18	3	1	0	0	0	147	2.07%
4:00:00 PM	2	2	3	19	41	38	28	9	1	0	0	0	0	143	2.01%
4:15:00 PM	0	0	0	8	40	55	35	8	2	0	0	0	0	148	2.08%
4:30:00 PM	0	2	14	17	40	44	19	11	1	0	0	0	0	148	2.08%
4:45:00 PM	1	4	1	21	34	49	13	5	3	0	0	0	0	131	1.85%
5:00:00 PM	0	0	0	9	33	65	27	13	1	0	0	0	0	148	2.08%
5:15:00 PM	4	0	5	21	30	44	20	5	0	0	0	0	0	129	1.82%
5:30:00 PM	0	0	1	7	30	60	31	10	0	0	0	0	0	139	1.96%
5:45:00 PM	0	1	3	5	38	51	34	9	1	0	0	0	0	142	2.00%
6:00:00 PM	0	0	2	2	36	39	23	9	1	1	0	0	0	113	1.59%
6:15:00 PM	0	0	5	22	43	29	20	11	2	0	1	0	0	133	1.87%
6:30:00 PM	0	0	0	10	47	38	22	13	1	0	0	0	0	131	1.85%
6:45:00 PM	0	1	1	2	28	28	17	6	1	2	0	0	0	86	1.21%
7:00:00 PM	0	0	1	10	36	29	13	4	0	0	0	0	0	93	1.31%
7:15:00 PM	0	0	1	6	12	31	19	8	0	0	0	0	0	77	1.08%
7:30:00 PM	0	0	0	4	17	18	15	10	2	0	0	0	0	66	0.93%
7:45:00 PM	0	0	0	4	17	29	10	9	2	0	0	0	0	71	1.00%
8:00:00 PM	0	2	1	5	9	19	16	12	1	0	0	0	0	65	0.92%
8:15:00 PM	0	0	0	11	21	26	16	2	3	0	0	0	0	79	1.11%
8:30:00 PM	0	0	2	5	16	12	19	8	1	0	0	0	0	63	0.89%
8:45:00 PM	0	0	0	12	15	15	11	8	1	0	0	0	0	62	0.87%
9:00:00 PM	0	0	0	1	13	10	15	13	3	1	0	0	0	56	0.79%
9:15:00 PM	0	0	0	7	17	23	21	5	1	0	0	0	0	74	1.04%
9:30:00 PM	0	0	0	2	5	18	15	8	3	0	0	0	0	51	0.72%
9:45:00 PM	0	0	0	0	12	16	11	3	1	0	0	0	0	43	0.61%
10:00:00 PM	0	0	0	2	5	11	16	6	3	0	0	0	0	43	0.61%
10:15:00 PM	0	0	0	2	2	11	9	5	2	1	0	0	0	32	0.45%
10:30:00 PM	0	0	1	2	2	8	4	7	1	0	0	0	0	25	0.35%
10:45:00 PM	0	0	2	0	11	5	13	1	1	0	0	0	0	33	0.46%
11:00:00 PM	0	0	0	4	4	8	9	4	1	2	0	0	0	32	0.45%
11:15:00 PM	0	0	0	0	7	4	8	3	1	2	0	0	0	25	0.35%
11:30:00 PM	0	0	0	0	2	7	9	4	1	0	0	0	0	23	0.32%
11:45:00 PM	0	0	0	1	2	6	8	3	0	0	0	0	0	20	0.28%
PM TOTAL	14	25	89	399	1,150	1,478	836	338	64	14	1	0	0	4,408	62.09%
PERCENTAGE	0.3%	0.6%	2.0%	9.1%	26.1%	33.5%	19.0%	7.7%	1.5%	0.3%	0.0%	0.0%	0.0%		
CUMULATIVE	14	39	128	527	1,677	3,155	3,991	4,329	4,393	4,407	4,408	4,408	4,408		
PERCENTAGE	0.3%	0.9%	2.9%	12.0%	38.0%	71.6%	90.5%	98.2%	99.7%	100.0%	100.0%	100.0%	100.0%		

15th Percentile	26	Mean Speed Average	32
50th Percentile	32	10 MPH Pace Speed	27-36
85th Percentile	39	Number in Pace	2242
95th Percentile	43	Percent in Pace	51%

DAY TOTAL	29	50	167	607	1,725	2,391	1,394	583	123	27	3	0	0	7,099	100.00%
PERCENTAGE	0.4%	0.7%	2.4%	8.6%	24.3%	33.7%	19.6%	8.2%	1.7%	0.4%	0.0%	0.0%	0.0%	7,099	100.00%

Speed Report

Date: 11/27/07

Site: [811.07] Lake Jennings Pk Rd btwn Jennings Vista Dr & Blossom Vly Rd

NORTHBOUND

		5	15	20	25	30	35	40	45	50	55	60	65	70	
Time		14	19	24	29	34	39	44	49	54	59	64	69	74+	Total
00:00	AM	0	0	1	5	8	13	6	3	1	0	0	0	0	37
01:00		0	1	0	5	12	6	10	3	0	0	0	0	0	37
02:00		0	0	1	1	4	8	4	2	0	1	0	0	0	21
03:00		0	0	2	4	3	5	5	0	1	0	0	0	0	20
04:00		0	1	1	6	8	15	17	1	1	0	0	0	0	50
05:00		0	1	10	23	50	54	42	10	1	0	0	0	0	191
06:00		4	9	59	108	172	95	47	6	1	0	0	0	0	501
07:00		3	7	33	140	212	101	34	3	0	0	0	0	0	533
08:00		3	23	47	96	172	69	31	3	1	0	0	0	0	445
09:00		1	8	39	97	115	57	16	3	0	1	0	0	0	337
10:00		0	10	24	94	89	56	17	2	1	0	0	0	0	293
11:00		1	10	14	88	116	59	19	2	0	0	0	0	0	309
12:00	PM	4	7	33	89	132	69	30	7	1	0	0	0	0	372
13:00		8	12	32	104	132	70	22	3	0	0	0	0	0	383
14:00		4	4	39	147	173	85	27	6	2	0	0	0	0	487
15:00		5	11	48	176	201	89	28	7	1	0	0	0	0	566
16:00		5	3	41	157	262	85	22	3	0	0	0	0	0	578
17:00		6	5	25	146	217	113	27	7	0	0	0	0	0	546
18:00		0	5	27	113	146	87	18	4	0	2	0	0	0	402
19:00		0	0	12	77	109	69	24	2	1	0	0	0	0	294
20:00		0	0	4	54	79	59	31	8	1	0	0	0	0	236
21:00		0	1	8	39	45	51	28	8	0	0	0	0	0	180
22:00		0	0	2	21	29	31	31	10	0	2	0	0	0	126
23:00		0	0	2	8	17	20	18	3	1	0	0	0	0	69
Totals		44	118	504	1798	2503	1366	554	106	14	6	0	0	0	7013
% of Totals		1%	2%	7%	26%	36%	19%	8%	2%	0%	0%				100%
% AM		0%	1%	3%	10%	14%	8%	4%	1%	0%	0%				40%
AM Peak Hour		06:00	08:00	06:00	07:00	07:00	07:00	06:00	05:00		02:00				07:00
Volume		4	23	59	140	212	101	47	10	1	1				533
% PM		0%	1%	4%	16%	22%	12%	4%	1%	0%	0%				60%
PM Peak Hour		13:00	13:00	15:00	15:00	16:00	17:00	20:00	22:00	14:00	18:00				16:00
Volume		8	12	48	176	262	113	31	10	2	2				578

Average Speed	50th Percentile	85th Percentile
32.2	32	39

Speed Report

Date: 11/27/07

Site: [811.07] Lake Jennings Pk Rd btwn Jennings Vista Dr & Blossom Vly Rd

SOUTHBOUND

		5	15	20	25	30	35	40	45	50	55	60	65	70	
Time		14	19	24	29	34	39	44	49	54	59	64	69	74+	Total
00:00	AM	0	0	1	3	15	8	14	11	0	0	0	0	0	52
01:00		0	1	1	4	7	5	5	1	1	0	0	0	0	25
02:00		0	0	1	1	3	2	3	1	0	0	0	0	0	11
03:00		1	1	1	4	5	5	12	5	0	1	0	0	0	35
04:00		0	0	5	12	19	7	9	5	5	0	0	0	0	62
05:00		3	15	46	55	54	25	22	6	1	0	0	0	0	227
06:00		47	75	113	102	105	64	15	5	0	0	0	0	0	526
07:00		44	110	126	138	116	35	12	4	0	0	0	0	0	585
08:00		47	77	119	114	96	46	11	2	1	0	0	0	0	513
09:00		28	54	97	112	75	40	12	1	0	0	0	0	0	419
10:00		22	31	50	89	69	33	17	1	0	0	0	0	0	312
11:00		15	34	70	95	78	34	11	2	1	0	0	0	0	340
12:00	PM	12	33	60	95	89	37	19	3	2	0	0	0	0	350
13:00		21	28	69	119	86	29	22	4	1	0	0	0	0	379
14:00		22	43	77	130	135	50	9	4	0	0	0	0	0	470
15:00		45	85	134	118	93	44	11	2	0	0	0	0	0	532
16:00		55	82	139	149	96	63	11	2	0	0	0	0	0	597
17:00		51	76	118	172	142	57	8	1	0	0	0	0	0	625
18:00		18	47	92	165	98	45	11	0	0	0	0	0	0	476
19:00		0	3	25	70	120	57	15	4	1	1	0	0	0	296
20:00		0	1	13	38	60	60	19	3	0	0	0	0	0	194
21:00		0	1	7	35	61	47	24	6	0	0	0	0	0	181
22:00		0	1	8	21	33	32	15	6	2	0	0	0	0	118
23:00		1	0	2	7	13	18	18	7	0	0	0	0	0	66
Totals		432	798	1374	1848	1668	843	325	86	15	2	0	0	0	7391
% of Totals		6%	11%	19%	25%	23%	11%	4%	1%	0%	0%				100%
% AM		3%	5%	9%	10%	9%	4%	2%	1%	0%	0%				42%
AM Peak Hour		06:00	07:00	07:00	07:00	07:00	06:00	05:00		04:00	03:00				07:00
Volume		47	110	126	138	116	64	22	11	5	1				585
% PM		3%	5%	10%	15%	14%	7%	2%	1%	0%	0%				58%
PM Peak Hour		16:00	15:00	16:00	17:00	17:00	16:00	21:00	23:00	12:00	19:00				17:00
Volume		55	85	139	172	142	63	24	7	2	1				625

Average Speed	50th Percentile	85th Percentile
27.7	28	36

Report Generated by "Turning Point Traffic Service" all rights reserved

VISTA JENNINGS E-O LAKE JENNINGS PARK

PTD14-0214-01

WESTBOUND

24HR 85TH PERCENTILE = 38

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
12:15:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
12:30:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
12:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
1:00:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08%
1:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
1:30:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.08%
1:45:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08%
2:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
2:15:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.08%
2:30:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
2:45:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
3:00:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.08%
3:15:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08%
3:30:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
3:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
4:00:00 AM	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0.16%
4:15:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.08%
4:30:00 AM	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0.16%
4:45:00 AM	0	0	0	0	1	3	4	0	0	0	0	0	0	8	0.66%
5:00:00 AM	0	0	0	0	1	3	3	0	0	0	0	0	0	7	0.57%
5:15:00 AM	0	0	0	0	2	1	2	0	0	0	0	0	0	5	0.41%
5:30:00 AM	0	0	0	1	0	5	4	1	0	0	0	0	0	11	0.90%
5:45:00 AM	0	0	0	0	2	8	6	1	0	0	0	0	0	17	1.40%
6:00:00 AM	0	0	0	0	1	11	5	1	1	0	0	0	0	19	1.56%
6:15:00 AM	0	0	0	1	1	6	9	1	0	0	0	0	0	18	1.48%
6:30:00 AM	0	0	0	0	6	11	11	1	0	0	0	0	0	29	2.38%
6:45:00 AM	0	0	0	0	6	16	11	0	0	0	0	0	0	33	2.71%
7:00:00 AM	0	1	1	2	5	12	12	2	0	0	0	0	0	35	2.87%
7:15:00 AM	0	0	0	0	3	19	10	1	0	0	0	0	0	33	2.71%
7:30:00 AM	0	0	0	3	2	11	10	2	0	0	0	0	0	28	2.30%
7:45:00 AM	0	0	1	0	4	11	7	1	0	0	0	0	0	24	1.97%
8:00:00 AM	0	0	0	2	6	9	3	1	0	0	0	0	0	21	1.72%
8:15:00 AM	0	1	0	3	3	12	8	1	0	0	0	0	0	28	2.30%
8:30:00 AM	0	0	2	2	5	5	7	1	0	0	0	0	0	22	1.81%
8:45:00 AM	0	0	0	0	4	9	7	1	0	0	0	0	0	21	1.72%
9:00:00 AM	0	0	1	3	3	2	9	1	0	0	0	0	0	19	1.56%
9:15:00 AM	0	0	0	3	2	10	6	0	0	0	0	0	0	21	1.72%
9:30:00 AM	0	0	0	2	4	10	1	3	0	0	0	0	0	20	1.64%
9:45:00 AM	0	0	0	1	6	4	3	1	0	0	0	0	0	15	1.23%
10:00:00 AM	0	0	0	1	4	6	4	2	0	0	0	0	0	17	1.40%
10:15:00 AM	0	0	0	2	2	4	6	3	0	0	0	0	0	17	1.40%
10:30:00 AM	0	0	0	1	2	3	7	3	0	0	0	0	0	16	1.31%
10:45:00 AM	0	0	0	0	0	8	7	1	1	0	0	0	0	17	1.40%
11:00:00 AM	0	0	0	0	2	9	5	0	0	0	0	0	0	16	1.31%
11:15:00 AM	0	0	0	0	3	4	2	1	0	0	0	0	0	10	0.82%
11:30:00 AM	0	1	0	2	4	9	6	1	0	0	0	0	0	23	1.89%
11:45:00 AM	0	0	0	1	3	4	3	1	0	0	0	0	0	12	0.99%
AM TOTAL	0	3	5	30	91	230	182	33	2	0	0	0	0	576	47.29%
PERCENTAGE	0.0%	0.5%	0.9%	5.2%	15.8%	39.9%	31.6%	5.7%	0.3%	0.0%	0.0%	0.0%	0.0%		
CUMULATIVE	0	3	8	38	129	359	541	574	576	576	576	576	576		
PERCENTAGE	0.0%	0.5%	1.4%	6.6%	22.4%	62.3%	93.9%	99.7%	100.0%	100.0%	100.0%	100.0%	100.0%		

15th Percentile	29	Mean Speed Average	34
50th Percentile	34	10 MPH Pace Speed	30-39
85th Percentile	38	Number in Pace	442
95th Percentile	40	Percent in Pace	77%

**VISTA JENNINGS E-O LAKE JENNINGS PARK
WESTBOUND**

PTD14-0214-01

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 PM	0	0	0	2	7	8	6	1	0	0	0	0	0	24	1.97%
12:15:00 PM	0	0	0	2	0	6	4	2	0	0	0	0	0	14	1.15%
12:30:00 PM	0	0	0	0	0	4	4	2	0	0	0	0	0	10	0.82%
12:45:00 PM	0	0	0	1	2	4	3	0	0	0	0	0	0	10	0.82%
1:00:00 PM	0	0	0	2	2	4	5	0	0	0	0	0	0	13	1.07%
1:15:00 PM	0	0	0	2	1	12	6	2	0	0	0	0	0	23	1.89%
1:30:00 PM	0	0	0	0	4	3	3	2	0	0	0	0	0	12	0.99%
1:45:00 PM	0	0	0	0	4	6	4	0	0	0	0	0	0	14	1.15%
2:00:00 PM	0	0	0	1	5	10	4	1	0	0	0	0	0	21	1.72%
2:15:00 PM	0	0	0	0	3	7	3	0	0	0	0	0	0	13	1.07%
2:30:00 PM	2	1	0	2	8	5	4	0	0	0	0	0	0	22	1.81%
2:45:00 PM	0	0	0	1	1	14	5	1	0	0	0	0	0	22	1.81%
3:00:00 PM	0	0	0	0	1	5	5	1	1	0	0	0	0	13	1.07%
3:15:00 PM	0	0	0	0	2	2	9	0	0	0	0	0	0	13	1.07%
3:30:00 PM	0	0	0	0	3	7	8	1	0	0	0	0	0	19	1.56%
3:45:00 PM	0	0	0	1	3	10	8	0	0	0	0	0	0	22	1.81%
4:00:00 PM	0	0	2	2	7	9	4	2	0	0	0	0	0	26	2.13%
4:15:00 PM	0	0	0	0	3	5	3	1	0	0	0	0	0	12	0.99%
4:30:00 PM	0	0	0	0	3	8	2	1	0	0	0	0	0	14	1.15%
4:45:00 PM	0	0	0	0	4	7	7	0	0	0	0	0	0	18	1.48%
5:00:00 PM	0	0	0	0	1	6	4	1	0	0	0	0	0	12	0.99%
5:15:00 PM	0	0	0	0	4	5	8	0	0	0	0	0	0	17	1.40%
5:30:00 PM	0	0	0	0	3	7	6	1	0	0	0	0	0	17	1.40%
5:45:00 PM	0	0	0	1	5	10	2	1	0	0	0	0	0	19	1.56%
6:00:00 PM	0	0	0	1	2	8	6	0	0	0	0	0	0	17	1.40%
6:15:00 PM	0	0	0	2	7	3	6	2	0	0	0	0	0	20	1.64%
6:30:00 PM	0	0	1	0	4	12	4	0	0	0	0	0	0	21	1.72%
6:45:00 PM	0	0	1	0	3	6	0	2	0	0	0	0	0	12	0.99%
7:00:00 PM	0	0	0	1	5	6	3	0	0	0	0	0	0	15	1.23%
7:15:00 PM	0	0	0	0	1	5	4	2	1	0	0	0	0	13	1.07%
7:30:00 PM	0	0	0	0	6	8	6	1	0	0	0	0	0	21	1.72%
7:45:00 PM	0	0	0	0	0	8	4	0	0	0	0	0	0	12	0.99%
8:00:00 PM	0	0	0	0	3	7	4	1	0	0	0	0	0	15	1.23%
8:15:00 PM	0	0	0	1	4	6	4	1	0	0	0	0	0	16	1.31%
8:30:00 PM	0	0	0	0	2	12	5	1	0	0	0	0	0	20	1.64%
8:45:00 PM	0	0	0	2	4	6	2	1	0	0	0	0	0	15	1.23%
9:00:00 PM	0	0	0	0	2	3	1	0	0	0	0	0	0	6	0.49%
9:15:00 PM	0	0	0	1	2	4	3	0	0	0	0	0	0	10	0.82%
9:30:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0.16%
9:45:00 PM	0	0	0	0	0	3	3	1	0	0	0	0	0	7	0.57%
10:00:00 PM	0	0	0	0	1	3	0	1	0	0	0	0	0	5	0.41%
10:15:00 PM	0	0	0	0	1	3	2	0	0	0	0	0	0	6	0.49%
10:30:00 PM	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0.16%
10:45:00 PM	0	0	1	0	0	1	1	0	0	0	0	0	0	3	0.25%
11:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
11:15:00 PM	0	0	0	0	0	1	2	0	0	0	0	0	0	3	0.25%
11:30:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
11:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
PM TOTAL	2	1	5	25	124	271	179	33	2	0	0	0	0	642	52.71%
PERCENTAGE	0.3%	0.2%	0.8%	3.9%	19.3%	42.2%	27.9%	5.1%	0.3%	0.0%	0.0%	0.0%	0.0%		
CUMULATIVE	2	3	8	33	157	428	607	640	642	642	642	642	642		
PERCENTAGE	0.3%	0.5%	1.2%	5.1%	24.5%	66.7%	94.5%	99.7%	100.0%	100.0%	100.0%	100.0%	100.0%		

15th Percentile	29	Mean Speed Average	33
50th Percentile	34	10 MPH Pace Speed	30-39
85th Percentile	38	Number in Pace	502
95th Percentile	39	Percent in Pace	78%

DAY TOTAL	2	4	10	55	215	501	361	66	4	0	0	0	0	1,218	100.00%
PERCENTAGE	0.2%	0.3%	0.8%	4.5%	17.7%	41.1%	29.6%	5.4%	0.3%	0.0%	0.0%	0.0%	0.0%	1,218	100.00%

VISTA JENNINGS E-O LAKE JENNINGS PARK

PTD14-0214-01

EASTBOUND

24HR 85TH PERCENTILE = 33

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0.16%
12:15:00 AM	0	0	0	1	1	0	1	0	0	0	0	0	0	3	0.24%
12:30:00 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.08%
12:45:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.08%
1:00:00 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0.16%
1:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
1:30:00 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.08%
1:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
2:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
2:15:00 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0.16%
2:30:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
2:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
3:00:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.08%
3:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
3:30:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.08%
3:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
4:00:00 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.08%
4:15:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.08%
4:30:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
4:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
5:00:00 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.08%
5:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
5:30:00 AM	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0.16%
5:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
6:00:00 AM	0	0	0	0	1	1	1	0	0	0	0	0	0	3	0.24%
6:15:00 AM	0	0	0	1	7	0	0	0	0	0	0	0	0	8	0.64%
6:30:00 AM	0	0	0	1	1	1	0	0	0	0	0	0	0	3	0.24%
6:45:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
7:00:00 AM	0	0	0	2	3	1	0	0	0	0	0	0	0	6	0.48%
7:15:00 AM	0	0	0	2	2	5	0	0	0	0	0	0	0	9	0.72%
7:30:00 AM	0	0	0	3	3	4	0	0	0	0	0	0	0	10	0.80%
7:45:00 AM	1	1	2	2	2	2	0	0	0	0	0	0	0	10	0.80%
8:00:00 AM	0	0	1	3	7	6	0	0	0	0	0	0	0	17	1.36%
8:15:00 AM	0	1	2	4	1	2	0	0	0	0	0	0	0	10	0.80%
8:30:00 AM	0	1	0	3	6	2	1	0	0	0	0	0	0	13	1.04%
8:45:00 AM	0	1	3	0	5	2	0	0	0	0	0	0	0	11	0.88%
9:00:00 AM	0	0	0	1	3	3	0	0	0	0	0	0	0	7	0.56%
9:15:00 AM	0	0	3	2	4	5	1	0	0	0	0	0	0	15	1.20%
9:30:00 AM	0	0	2	4	2	3	1	0	0	0	0	0	0	12	0.96%
9:45:00 AM	0	0	2	3	2	4	0	0	0	1	0	0	0	12	0.96%
10:00:00 AM	0	0	1	1	7	6	0	0	0	0	0	0	0	15	1.20%
10:15:00 AM	0	0	0	1	2	4	2	0	0	0	0	0	0	9	0.72%
10:30:00 AM	0	1	0	0	2	4	0	0	0	0	0	0	0	7	0.56%
10:45:00 AM	0	0	0	1	7	5	1	0	0	0	0	0	0	14	1.12%
11:00:00 AM	0	2	1	1	4	3	0	0	0	0	0	0	0	11	0.88%
11:15:00 AM	0	1	0	5	6	5	1	0	0	0	0	0	0	18	1.44%
11:30:00 AM	0	0	0	2	7	2	2	1	0	0	0	0	0	14	1.12%
11:45:00 AM	0	0	0	2	5	7	2	0	0	0	0	0	0	16	1.28%
AM TOTAL	1	8	18	49	95	85	13	1	0	1	0	0	0	271	21.66%
PERCENTAGE	0.4%	3.0%	6.6%	18.1%	35.1%	31.4%	4.8%	0.4%	0.0%	0.4%	0.0%	0.0%	0.0%		
CUMULATIVE	1	9	27	76	171	256	269	270	270	271	271	271	271		
PERCENTAGE	0.4%	3.3%	10.0%	28.0%	63.1%	94.5%	99.3%	99.6%	99.6%	100.0%	100.0%	100.0%	100.0%		

15th Percentile	23	Mean Speed Average	28
50th Percentile	29	10 MPH Pace Speed	25-34
85th Percentile	33	Number in Pace	192
95th Percentile	35	Percent in Pace	71%

**VISTA JENNINGS E-O LAKE JENNINGS PARK
EASTBOUND**

PTD14-0214-01

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 PM	0	0	1	1	5	4	1	0	0	0	0	0	0	12	0.96%
12:15:00 PM	0	0	1	2	11	6	0	0	0	0	0	0	0	20	1.60%
12:30:00 PM	0	0	0	3	6	5	3	0	0	0	0	0	0	17	1.36%
12:45:00 PM	0	0	0	1	9	6	2	0	0	0	0	0	0	18	1.44%
1:00:00 PM	0	0	2	6	11	5	2	0	0	0	0	0	0	26	2.08%
1:15:00 PM	0	0	0	0	7	2	2	0	0	0	0	0	0	11	0.88%
1:30:00 PM	0	0	0	1	8	4	1	0	0	0	0	0	0	14	1.12%
1:45:00 PM	0	0	1	2	6	5	1	0	0	0	0	0	0	15	1.20%
2:00:00 PM	0	0	0	5	8	6	1	0	0	0	0	0	0	20	1.60%
2:15:00 PM	0	0	1	2	9	6	0	0	0	0	0	0	0	18	1.44%
2:30:00 PM	0	0	3	3	12	4	1	0	0	0	0	0	0	23	1.84%
2:45:00 PM	1	1	1	7	10	6	1	0	0	0	0	0	0	27	2.16%
3:00:00 PM	0	0	1	1	9	8	0	0	0	0	0	0	0	19	1.52%
3:15:00 PM	0	0	0	1	18	10	0	0	0	0	0	0	0	29	2.32%
3:30:00 PM	0	0	0	2	11	12	1	1	0	0	0	0	0	27	2.16%
3:45:00 PM	0	0	0	7	17	9	3	0	0	0	0	0	0	36	2.88%
4:00:00 PM	0	2	0	8	10	5	2	0	0	0	0	0	0	27	2.16%
4:15:00 PM	0	0	0	3	16	15	0	0	0	0	0	0	0	34	2.72%
4:30:00 PM	0	0	0	4	15	12	1	1	0	0	0	0	0	33	2.64%
4:45:00 PM	0	0	0	3	13	14	1	0	0	0	0	0	0	31	2.48%
5:00:00 PM	0	0	1	4	9	14	2	0	0	0	0	0	0	30	2.40%
5:15:00 PM	0	0	1	1	11	19	1	0	0	0	0	0	0	33	2.64%
5:30:00 PM	0	0	0	3	15	17	1	0	0	0	0	0	0	36	2.88%
5:45:00 PM	1	0	0	6	18	6	0	0	0	0	0	0	0	31	2.48%
6:00:00 PM	0	0	0	3	16	5	1	0	0	0	0	0	0	25	2.00%
6:15:00 PM	0	0	0	9	19	12	0	0	0	0	0	0	0	40	3.20%
6:30:00 PM	0	0	0	2	15	13	1	0	0	0	0	0	0	31	2.48%
6:45:00 PM	0	0	2	7	9	4	2	0	0	0	0	0	0	24	1.92%
7:00:00 PM	0	0	0	6	22	9	1	0	0	0	0	0	0	38	3.04%
7:15:00 PM	0	0	0	2	7	10	1	0	0	0	0	0	0	20	1.60%
7:30:00 PM	0	0	0	3	9	6	2	0	0	0	0	0	0	20	1.60%
7:45:00 PM	0	0	0	1	2	4	1	0	0	0	0	0	0	8	0.64%
8:00:00 PM	0	0	0	2	7	3	1	0	0	0	0	0	0	13	1.04%
8:15:00 PM	0	0	0	1	15	7	2	0	0	0	0	0	0	25	2.00%
8:30:00 PM	0	0	1	0	9	7	1	0	0	0	0	0	0	18	1.44%
8:45:00 PM	0	1	0	5	12	6	3	0	0	0	0	0	0	27	2.16%
9:00:00 PM	0	0	0	2	6	2	0	0	0	0	0	0	0	10	0.80%
9:15:00 PM	0	0	0	1	10	4	2	1	0	0	0	0	0	18	1.44%
9:30:00 PM	0	0	0	3	3	3	0	0	0	0	0	0	0	9	0.72%
9:45:00 PM	1	0	0	0	5	3	0	0	0	0	0	0	0	9	0.72%
10:00:00 PM	0	0	0	2	6	2	1	0	0	0	0	0	0	11	0.88%
10:15:00 PM	0	0	0	0	5	3	2	0	0	0	0	0	0	10	0.80%
10:30:00 PM	0	0	0	2	2	3	1	0	0	0	0	0	0	8	0.64%
10:45:00 PM	0	0	0	1	3	1	0	0	0	0	0	0	0	5	0.40%
11:00:00 PM	0	0	0	4	2	6	0	0	0	0	0	0	0	12	0.96%
11:15:00 PM	0	0	0	0	4	1	0	0	0	0	0	0	0	5	0.40%
11:30:00 PM	0	0	0	0	4	1	1	0	0	0	0	0	0	6	0.48%
11:45:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.08%
PM TOTAL	3	4	16	132	456	316	50	3	0	0	0	0	0	980	78.34%
PERCENTAGE	0.3%	0.4%	1.6%	13.5%	46.5%	32.2%	5.1%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%		
CUMULATIVE	3	7	23	155	611	927	977	980	980	980	980	980	980		
PERCENTAGE	0.3%	0.7%	2.3%	15.8%	62.3%	94.6%	99.7%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		

15th Percentile	26	Mean Speed Average	29
50th Percentile	30	10 MPH Pace Speed	25-34
85th Percentile	33	Number in Pace	828
95th Percentile	35	Percent in Pace	84%

DAY TOTAL	4	12	34	181	551	401	63	4	0	1	0	0	0	1,251	100.00%
PERCENTAGE	0.3%	1.0%	2.7%	14.5%	44.0%	32.1%	5.0%	0.3%	0.0%	0.1%	0.0%	0.0%	0.0%	1,251	100.00%
	0.3%	1.3%	4.0%	18.5%	62.5%	94.6%	99.6%	99.9%	99.9%	100.0%	100.0%	100.0%	100.0%		

Appendix D

Count Data

VISTA JENNINGS E-O LAKE JENNINGS PARK

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB			
00:00			2	0	12:00			12	24			
00:15			3	1	12:15			20	14			
00:30			1	1	12:30			17	10			
00:45			1	7	0	2	9	18	67	10	58	125
01:00			2	1	13:00			26	13			
01:15			0	0	13:15			11	23			
01:30			1	1	13:30			14	12			
01:45			0	3	1	3	6	15	66	14	62	128
02:00			0	0	14:00			20	21			
02:15			2	1	14:15			18	13			
02:30			1	0	14:30			23	22			
02:45			0	3	1	2	5	27	88	22	78	166
03:00			1	1	15:00			19	13			
03:15			0	1	15:15			29	13			
03:30			1	0	15:30			27	19			
03:45			0	2	0	2	4	36	111	22	67	178
04:00			1	2	16:00			27	26			
04:15			1	1	16:15			34	12			
04:30			0	2	16:30			33	14			
04:45			0	2	8	13	15	31	125	18	70	195
05:00			1	7	17:00			30	12			
05:15			0	5	17:15			33	17			
05:30			2	11	17:30			36	17			
05:45			0	3	17	40	43	31	130	19	65	195
06:00			3	19	18:00			25	17			
06:15			8	18	18:15			40	20			
06:30			3	29	18:30			31	21			
06:45			1	15	33	99	114	24	120	12	70	190
07:00			6	35	19:00			38	15			
07:15			9	33	19:15			20	13			
07:30			10	28	19:30			20	21			
07:45			10	35	24	120	155	8	86	12	61	147
08:00			17	21	20:00			13	15			
08:15			10	28	20:15			25	16			
08:30			13	22	20:30			18	20			
08:45			11	51	21	92	143	27	83	15	66	149
09:00			7	19	21:00			10	6			
09:15			15	21	21:15			18	10			
09:30			12	20	21:30			9	2			
09:45			12	46	15	75	121	9	46	7	25	71
10:00			15	17	22:00			11	5			
10:15			9	17	22:15			10	6			
10:30			7	16	22:30			8	2			
10:45			14	45	17	67	112	5	34	3	16	50
11:00			11	16	23:00			12	0			
11:15			18	10	23:15			5	3			
11:30			14	23	23:30			6	1			
11:45			16	59	12	61	120	1	24	0	4	28

Total Vol.			271	576	847			980	642	1622
-------------------	--	--	-----	-----	------------	--	--	-----	-----	-------------

		Daily Totals				
		NB	SB	EB	WB	Combined
				1251	1218	2469

	AM			PM		
Split %	32.0%	68.0%	34.3%	60.4%	39.6%	65.7%
Peak Hour	11:45	06:30	06:45	18:15	15:15	17:30
Volume	65	130	155	133	80	205
P.H.F.	0.81	0.93	0.92	0.83	0.77	0.85

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TECHNICAL DATA

DATE:
2/13/14
THURSDAY

LOCATION:
NORTH & SOUTH:
EAST & WEST:

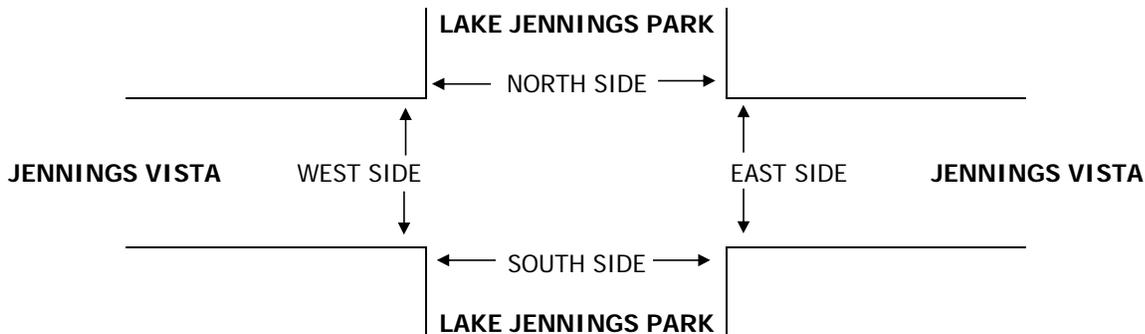
LAKESIDE
LAKE JENNINGS PARK
JENNINGS VISTA

PROJECT #: PTD14-0214-01
LOCATION #: 1
CONTROL: 1-WAY STOP (WB)

NOTES:	AM		▲	
	PM		N	
	MD	◀ W	S	E ▶
	OTHER		▼	
	OTHER			

	NORTHBOUND LAKE JENNINGS PARK			SOUTHBOUND LAKE JENNINGS PARK			EASTBOUND JENNINGS VISTA			WESTBOUND JENNINGS VISTA			TOTAL
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
LANES:	X	1	1	1	1	X	X	X	X	0.5	X	0.5	

	NORTHBOUND LAKE JENNINGS PARK			SOUTHBOUND LAKE JENNINGS PARK			EASTBOUND JENNINGS VISTA			WESTBOUND JENNINGS VISTA			TOTAL
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
AM													
7:00 AM		118	4	2	109					14		16	263
7:15 AM		125	3	4	113					13		21	279
7:30 AM		119	8	4	111					17		10	269
7:45 AM		133	5	3	120					15		8	284
8:00 AM		130	8	8	102					17		7	272
8:15 AM		118	4	4	139					19		7	291
8:30 AM		85	12	2	106					16		6	227
8:45 AM		88	8	4	108					15		7	230
VOLUMES	0	916	52	31	908	0	0	0	0	126	0	82	2,115
APPROACH %	0%	95%	5%	3%	97%	0%	0%	0%	0%	61%	0%	39%	
APP/DEPART	968	/	998	939	/	1,034	0	/	83	208	/	0	0
BEGIN PEAK HR	7:30 AM												
VOLUMES	0	500	25	19	472	0	0	0	0	68	0	32	1,116
APPROACH %	0%	95%	5%	4%	96%	0%	0%	0%	0%	68%	0%	32%	
PEAK HR FACTOR	0.951			0.858			0.000			0.926			0.959
APP/DEPART	525	/	532	491	/	540	0	/	44	100	/	0	0
PM													
4:00 PM		119	19	10	133					9		5	295
4:15 PM		130	22	11	139					8		6	316
4:30 PM		120	21	8	150					14		4	317
4:45 PM		133	13	17	167					8		4	342
5:00 PM		115	20	17	172					13		4	341
5:15 PM		112	23	13	151					12		6	317
5:30 PM		114	22	8	156					12		6	318
5:45 PM		116	18	10	141					10		5	300
VOLUMES	0	959	158	94	1,209	0	0	0	0	86	0	40	2,546
APPROACH %	0%	86%	14%	7%	93%	0%	0%	0%	0%	68%	0%	32%	
APP/DEPART	1,117	/	999	1,303	/	1,295	0	/	252	126	/	0	0
BEGIN PEAK HR	4:45 PM												
VOLUMES	0	474	78	55	646	0	0	0	0	45	0	20	1,318
APPROACH %	0%	86%	14%	8%	92%	0%	0%	0%	0%	69%	0%	31%	
PEAK HR FACTOR	0.945			0.927			0.000			0.903			0.963
APP/DEPART	552	/	494	701	/	691	0	/	133	65	/	0	0



Appendix E

Existing LOS Calculations

AM Existing

1: Lake Jennings Park Rd & Jennings Vista Dr

HCM Unsignalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	68	32	500	25	19	472
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	35	543	27	21	513
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	1098	543			571	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1098	543			571	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	68	94			98	
cM capacity (veh/h)	231	539			1002	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	109	543	27	21	513	
Volume Left	74	0	0	21	0	
Volume Right	35	0	27	0	0	
cSH	282	1700	1700	1002	1700	
Volume to Capacity	0.38	0.32	0.02	0.02	0.30	
Queue Length 95th (ft)	43	0	0	2	0	
Control Delay (s)	25.5	0.0	0.0	8.7	0.0	
Lane LOS	D			A		
Approach Delay (s)	25.5	0.0		0.3		
Approach LOS	D					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			39.4%		ICU Level of Service	A
Analysis Period (min)			15			

PM Existing
1: Lake Jennings Park Rd & Jennings Vista Dr

HCM Unsignalized Intersection Capacity Analysis

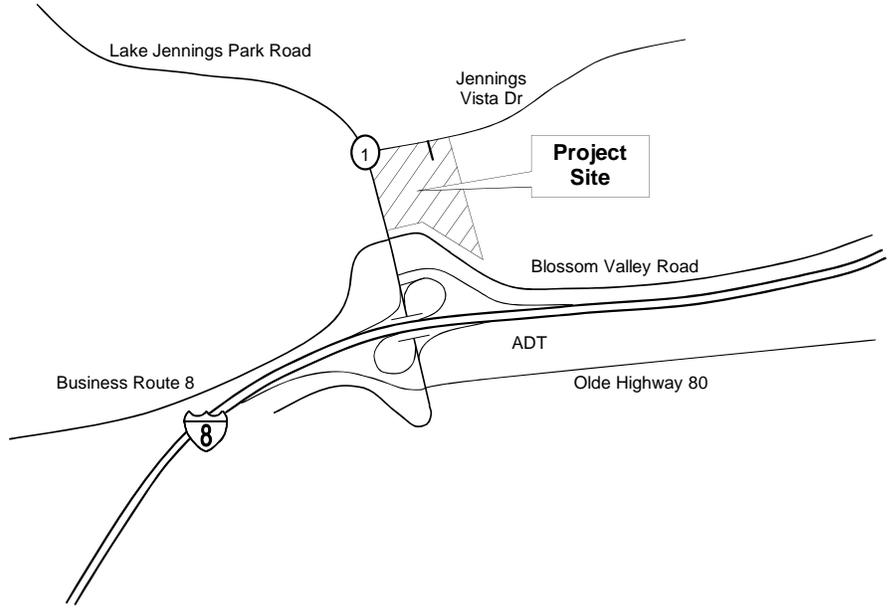
						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	45	20	474	78	55	646
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	22	515	85	60	702
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1337	515			600	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1337	515			600	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	69	96			94	
cM capacity (veh/h)	159	560			977	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	71	515	85	60	702	
Volume Left	49	0	0	60	0	
Volume Right	22	0	85	0	0	
cSH	203	1700	1700	977	1700	
Volume to Capacity	0.35	0.30	0.05	0.06	0.41	
Queue Length 95th (ft)	37	0	0	5	0	
Control Delay (s)	31.8	0.0	0.0	8.9	0.0	
Lane LOS	D			A		
Approach Delay (s)	31.8	0.0		0.7		
Approach LOS	D					
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization			44.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Appendix F

Project Distribution Calculations

Distribution for Intersection #1 based on background traffic

Existing turn moves	19 (55)	32 (20)	68 (45)
Existing turn move percentages for AM & PM	43% AM 41% PM	32% AM 31% PM	68% AM 69% PM
Average for AM	38%	38%	62%
Average for PM	36%	36%	64%
Average from AM & PM for distribution	37%	37%	63%



Appendix G

Existing + Project LOS Calculations

AM Existing + Project
1: Lake Jennings Park Rd & Jennings Vista Dr

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	74	36	500	28	20	472
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	39	543	30	22	513
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	1100	543			574	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1100	543			574	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	65	93			98	
cM capacity (veh/h)	230	539			999	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	120	543	30	22	513	
Volume Left	80	0	0	22	0	
Volume Right	39	0	30	0	0	
cSH	283	1700	1700	999	1700	
Volume to Capacity	0.42	0.32	0.02	0.02	0.30	
Queue Length 95th (ft)	50	0	0	2	0	
Control Delay (s)	26.7	0.0	0.0	8.7	0.0	
Lane LOS	D			A		
Approach Delay (s)	26.7	0.0		0.4		
Approach LOS	D					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			40.0%	ICU Level of Service	A	
Analysis Period (min)			15			

PM Existing + Project
1: Lake Jennings Park Rd & Jennings Vista Dr

HCM Unsignalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	48	22	474	86	60	646
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	24	515	93	65	702
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	1348	515			609	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1348	515			609	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	66	96			93	
cM capacity (veh/h)	155	560			970	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	76	515	93	65	702	
Volume Left	52	0	0	65	0	
Volume Right	24	0	93	0	0	
cSH	201	1700	1700	970	1700	
Volume to Capacity	0.38	0.30	0.05	0.07	0.41	
Queue Length 95th (ft)	41	0	0	5	0	
Control Delay (s)	33.5	0.0	0.0	9.0	0.0	
Lane LOS	D			A		
Approach Delay (s)	33.5	0.0		0.8		
Approach LOS	D					
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			45.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Appendix H

California 2012 MUTCD

CALIFORNIA DEPARTMENT OF TRANSPORTATION

[Caltrans](#) > [Traffic Operations](#) > [Office of Traffic Engineering](#) > California MUTCD 2012

California MUTCD 2012



As of January 13, 2012 California Department of Transportation has adopted the California Manual on Uniform Traffic Control Devices (California MUTCD) 2012 edition to provide for uniform standards and specifications for all official traffic control devices in California. This action was taken pursuant to the provisions of California Vehicle Code Section 21400 and the recommendation of the California Traffic Control Devices Committee (CTCDC). The Department requested and has received a letter to confirm substantial conformance from the Federal Highway Administration (FHWA) for California MUTCD 2012 edition.

The California MUTCD 2012 edition includes FHWA's MUTCD 2009 edition dated December 19, 2009, as amended for use in California. The California MUTCD 2012 also includes all policies on traffic control devices issued by the Department since January 21, 2010, and other corrections and format changes that were necessary to update the previous documents.

The California MUTCD 2012 edition supersedes and replaces the previously adopted (on January 21, 2010) California MUTCD as well as Chapters 4, 5, 6, 8, 10, 11, 12, and the traffic signals portion of chapter 9 of the 1996 Caltrans Traffic Manual, as amended, and all previous editions thereof.

[List of Significant Changes](#) (compares to CA MUTCD 2010) - file updated 4/9/12

[Known Errors](#) - 3/8/13

New as of 1/8/13: The [hotlinks version of California MUTCD 2012](#) is now placed on the California MUTCD web site to assist readers who use the electronic version of the California MUTCD in navigating through the many cross-references that are contained within the Manual. Hotlinks to cross-referenced Part, Chapter, Section, Figure, Table, Page, or Appendix; links to [California Vehicle Code](#); and web sites are all included in this hotlinks version of the California MUTCD 2012.

Instructions on How to Use the New Features of the Hotlinks Version of the California MUTCD 2012:

1. Download: The hotlinked CA MUTCD 2012 pdf and the 2012 California Vehicle Code are listed below in the stand-alone documents. Place both files in the same location (same level) on your computer to use the hotlinks properly. Whether they are in a folder, or anywhere on your computer, as long as they're both in the same physical location on your computer's harddrive.
2. Internal Hotlinks: Anywhere in the document that another Part, Chapter, Section, Figure, Table, Page, or Appendix within the California MUTCD 2012 is referenced, you can select this reference and be navigated to the referenced location within the document. To return to the page that had the hotlink, use the "Left Arrow" key while holding down the "Alt" key, or right-mouse-click and select "Previous View".
3. Links to external documents and web sites: Select in-text web site URLs and references to external documents to open the web page or document in a new window.

***Note about the .pdf files:** Some of the files are very large. If you are having difficulty opening a file within your browser, right-click on the file link, select "Save Target As..." to save directly to your computer, then view the file offline. Allow the file to download completely first (it will take some time) before you attempt to view the file. If you are still having difficulty, please [email our webmaster](#).

Stand-alone Documents:

[California MUTCD
\(Entire Document\)](#)

(Cover, Table of Contents,
Introduction, Parts 1 thru 9,

[Temporary Traffic
Control](#)

(Cover, Introduction,
Parts 1, 6 and Appendix)

CHAPTER 4C. TRAFFIC CONTROL SIGNAL NEEDS STUDIES

Section 4C.01 Studies and Factors for Justifying Traffic Control Signals

Standard:

01 An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.

02 The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants:

Warrant 1, Eight-Hour Vehicular Volume

Warrant 2, Four-Hour Vehicular Volume

Warrant 3, Peak Hour

Warrant 4, Pedestrian Volume

Warrant 5, School Crossing

Warrant 6, Coordinated Signal System

Warrant 7, Crash Experience

Warrant 8, Roadway Network

Warrant 9, Intersection Near a Grade Crossing

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

Support:

04 Sections 8C.09 and 8C.10 contain information regarding the use of traffic control signals instead of gates and/ or flashing-light signals at highway-rail grade crossings and highway-light rail transit grade crossings, respectively.

Guidance:

05 A traffic control signal should not be installed unless one or more of the factors described in this Chapter are met.

06 A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.

07 A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.

08 The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the signal warrants listed in Paragraph 2.

09 Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics should dictate whether an approach is considered as one lane or two lanes. For example, for an approach with one lane for through and right-turning traffic plus a left-turn lane, if engineering judgment indicates that it should be considered a one-lane approach because the traffic using the left-turn lane is minor, the total traffic volume approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles.

10 Similar engineering judgment and rationale should be applied to a street approach with one through/left-turn lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.

11 At a location that is under development or construction and where it is not possible to obtain a traffic count that would represent future traffic conditions, hourly volumes should be estimated as part of an engineering study for comparison with traffic signal warrants. Except for locations where the engineering study uses the satisfaction of Warrant 8 to justify a signal, a traffic control signal installed under projected conditions should

have an engineering study done within 1 year of putting the signal into stop-and-go operation to determine if the signal is justified. If not justified, the signal should be taken out of stop-and-go operation or removed.

12 For signal warrant analysis, a location with a wide median, even if the median width is greater than 30 feet, should be considered as one intersection.

Option:

13 At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the "minor-street" volume and the corresponding single direction of opposing traffic on the major street as the "major street" volume ~~volume of the major-street left-turn volumes plus the higher volume minor-street approach as the "minor street" volume and both approaches of the major street minus the higher of the major-street left-turn volume as "major street" volume.~~

14 For signal warrants requiring conditions to be present for a certain number of hours in order to be satisfied, any four sequential 15-minute periods may be considered as 1 hour if the separate 1-hour periods used in the warrant analysis do not overlap each other and both the major-street volume and the minor-street volume are for the same specific one-hour periods.

15 For signal warrant analysis, bicyclists may be counted as either vehicles or pedestrians.

Support:

16 When performing a signal warrant analysis, bicyclists riding in the street with other vehicular traffic are usually counted as vehicles and bicyclists who are clearly using pedestrian facilities are usually counted as pedestrians.

Option:

17 Engineering study data may include the following:

- A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.
- B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is greatest.
- C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Item B and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.
- D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons might not be adequately reflected in the pedestrian volume count if the absence of a signal restrains their mobility.
- E. The posted or statutory speed limit or the 85th-percentile speed on the uncontrolled approaches to the location.
- F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.
- G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.

18 The following data, which are desirable for a more precise understanding of the operation of the intersection, may be obtained during the periods described in Item B of Paragraph 17:

- A. Vehicle-hours of stopped time delay determined separately for each approach.
- B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance from the minor street.
- C. The posted or statutory speed limit or the 85th-percentile speed on controlled approaches at a point near to the intersection but unaffected by the control.

- D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or Sunday.
- E. Queue length on stop-controlled approaches.

Standard:

¹⁹ Delay, congestion, approach conditions, driver confusion, future land use or other evidence of the need for right of way assignment beyond that which could be provided by stop sign shall be demonstrated.

Support:

- ²⁰ Figure 4C-101(CA) and 4C-103(CA) are examples of warrant sheets.

Guidance:

²¹ *Figure 4C-103(CA) should be used only for new intersections or other locations where it is not reasonable to count actual traffic volumes.*

Section 4C.02 Warrant 1, Eight-Hour Vehicular Volume

Support:

- ⁰¹ The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.
- ⁰² The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.
- ⁰³ It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.

Standard:

⁰⁴ The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:

- A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or**
- B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.**

In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

Option:

- ⁰⁵ If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

Guidance:

⁰⁶ *The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.*

Standard:

⁰⁷ The need for a traffic control signal shall be considered if an engineering study finds that both of the following conditions exist for each of any 8 hours of an average day:

- A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and**
- B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.**

These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

Option:

08 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.

Section 4C.03 Warrant 2, Four-Hour Vehicular Volume

Support:

01 The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

Standard:

02 **The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.**

Option:

03 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.

Section 4C.04 Warrant 3, Peak Hour

Support:

01 The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

Standard:

02 **This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.**

03 **The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:**

A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:

- 1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach; and**
- 2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and**
- 3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.**

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

Option:

04 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to evaluate the criteria in the second category of the Standard.

05 If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal may be operated in the flashing mode during the hours that the volume criteria of this warrant are not met.

Guidance:

06 *If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal should be traffic-actuated.*

Section 4C.05 Warrant 4, Pedestrian Volume

Support:

01 The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

Standard:

02 **The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that one of the following criteria is met:**

- A. For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the curve in Figure 4C-5; or**
- B. For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) falls above the curve in Figure 4C-7.**

Option:

03 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 35 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-6 may be used in place of Figure 4C-5 to evaluate Criterion A in Paragraph 2, and Figure 4C-8 may be used in place of Figure 4C-7 to evaluate Criterion B in Paragraph 2.

Standard:

04 **The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.**

05 **If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4E.**

Guidance:

06 *If this warrant is met and a traffic control signal is justified by an engineering study, then:*

- A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated, and should include pedestrian detection.*
- B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance, and the installation should include suitable standard signs and pavement markings.*
- C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.*

Option:

07 The criterion for the pedestrian volume crossing the major street may be reduced as much as 50 percent if the 15th-percentile crossing speed of pedestrians is less than 3.5 feet per second.

08 A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street.

Section 4C.06 Warrant 5, School Crossing

Support:

⁰¹ The School Crossing signal warrant is intended for application where the fact that schoolchildren cross the major street is the principal reason to consider installing a traffic control signal. For the purposes of this warrant, the word "schoolchildren" includes elementary through high school students.

Standard:

⁰² **The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of schoolchildren at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the schoolchildren are using the crossing is less than the number of minutes in the same period (see Section 7A.03) and there are a minimum of 20 schoolchildren during the highest crossing hour.**

⁰³ **Before a decision is made to install a traffic control signal, consideration shall be given to the implementation of other remedial measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.**

⁰⁴ **The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.**

Guidance:

⁰⁵ *If this warrant is met and a traffic control signal is justified by an engineering study, then:*

- A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated, and should include pedestrian detection.*
- B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance, and the installation should include suitable standard signs and pavement markings.*
- C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.*

Section 4C.07 Warrant 6, Coordinated Signal System

Support:

⁰¹ Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.

Standard:

⁰² **The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:**

- A. On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.**
- B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.**

Guidance:

⁰³ *The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 1,000 feet.*

Section 4C.08 Warrant 7, Crash Experience

Support:

⁰¹ The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.

Standard:

02 The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:

- A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and**
- B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and**
- C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.**

Option:

03 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.

Section 4C.09 Warrant 8, Roadway Network

Support:

01 Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.

Standard:

02 The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:

- A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or**
- B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).**

03 A major route as used in this signal warrant shall have at least one of the following characteristics:

- A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow.**
- B. It includes rural or suburban highways outside, entering, or traversing a city.**
- C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.**

Section 4C.10 Warrant 9, Intersection Near a Grade Crossing

Support:

01 The Intersection Near a Grade Crossing signal warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.

Guidance:

02 *This signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing. Among the alternatives that should be considered or tried are:*

- A. Providing additional pavement that would enable vehicles to clear the track or that would provide space for an evasive maneuver, or*

B. Reassigning the stop controls at the intersection to make the approach across the track a non-stopping approach.

Standard:

03 The need for a traffic control signal shall be considered if an engineering study finds that both of the following criteria are met:

- A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and**
- B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in Figure 4C-9 or 4C-10 for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance as defined in Section 1A.13.**

Guidance:

04 The following considerations apply when plotting the traffic volume data on Figure 4C-9 or 4C-10:

- A. Figure 4C-9 should be used if there is only one lane approaching the intersection at the track crossing location and Figure 4C-10 should be used if there are two or more lanes approaching the intersection at the track crossing location.*
- B. After determining the actual distance D, the curve for the distance D that is nearest to the actual distance D should be used. For example, if the actual distance D is 95 feet, the plotted point should be compared to the curve for D = 90 feet.*
- C. If the rail traffic arrival times are unknown, the highest traffic volume hour of the day should be used.*

Option:

05 The minor-street approach volume may be multiplied by up to three adjustment factors as provided in Paragraphs 6 through 8.

06 Because the curves are based on an average of four occurrences of rail traffic per day, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-2 for the appropriate number of occurrences of rail traffic per day.

07 Because the curves are based on typical vehicle occupancy, if at least 2% of the vehicles crossing the track are buses carrying at least 20 people, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-3 for the appropriate percentage of high-occupancy buses.

08 Because the curves are based on tractor-trailer trucks comprising 10% of the vehicles crossing the track, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-4 for the appropriate distance and percentage of tractor-trailer trucks.

Standard:

09 If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, then:

- A. The traffic control signal shall have actuation on the minor street;**
- B. Preemption control shall be provided in accordance with Sections 4D.27, 8C.09, and 8C.10; and**
- C. The grade crossing shall have flashing-light signals (see Chapter 8C).**

Guidance:

10 If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, the grade crossing should have automatic gates (see Chapter 8C).

Section 4C.101(CA) Criterion for School Crossing Traffic Signals

01 Standard:

- A. The signal shall be designed for full-time operation.**
- B. Pedestrian signal faces of the International Symbol type shall be installed at all marked crosswalks at signalized intersections along the "Suggested Route to School."**
- C. If an intersection is signalized under this guideline for school pedestrians, the entire intersection shall be signalized.**

D. School area traffic signals shall be traffic actuated type with push buttons or other detectors for pedestrians.

Option:

02 Non-intersection school pedestrian crosswalk locations may be signalized when justified.

Section 4C.102(CA) Bicycle Signal Warrant

Guidance:

01 *A bicycle signal should be considered for use only when the volume and collision or volume and geometric warrants have been met:*

1. *Volume; When $W = B \times V$ and $W \geq 50,000$ and $B \geq 50$.*

Where: W is the volume warrant. B is the number of bicycles at the peak hour entering the intersection. V is the number of vehicles at the peak hour entering the intersection. B and V shall use the same peak hour.

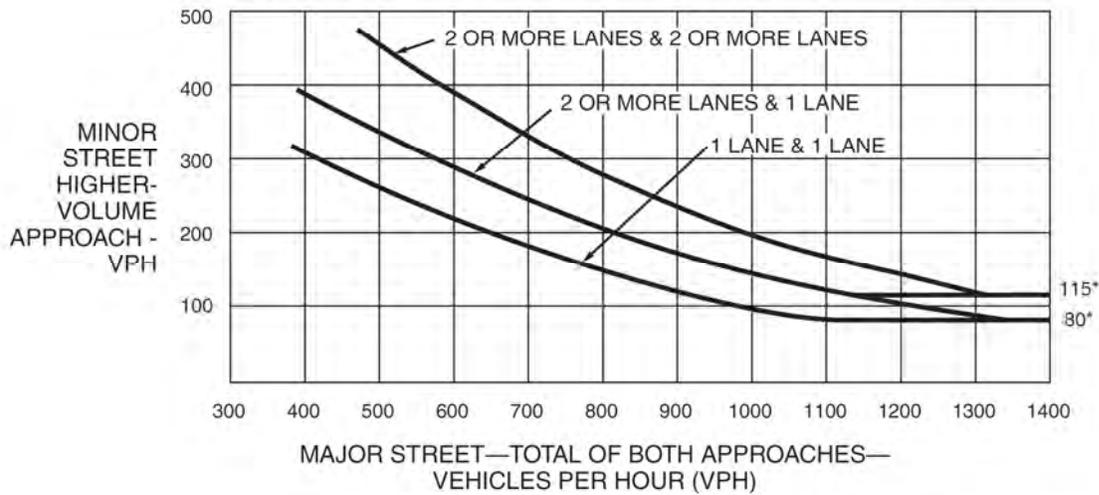
2. *Collision; When 2 or more bicycle/vehicle collisions of types susceptible to correction by a bicycle signal have occurred over a 12-month period and the responsible public works official determines that a bicycle signal will reduce the number of collisions.*

3. *Geometric;*

(a) Where a separate bicycle/ multi use path intersects a roadway.

(b) At other locations to facilitate a bicycle movement that is not permitted for a motor vehicle.

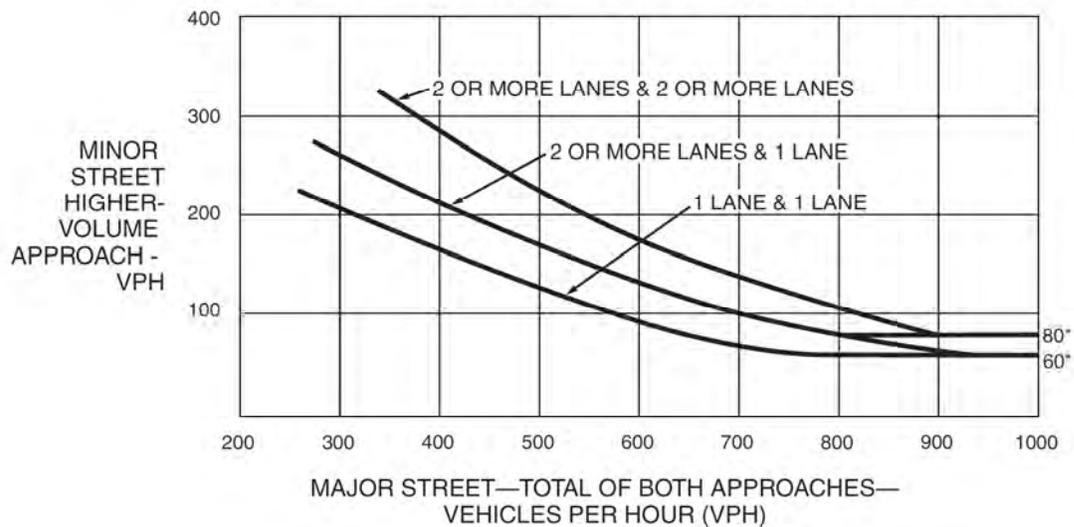
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

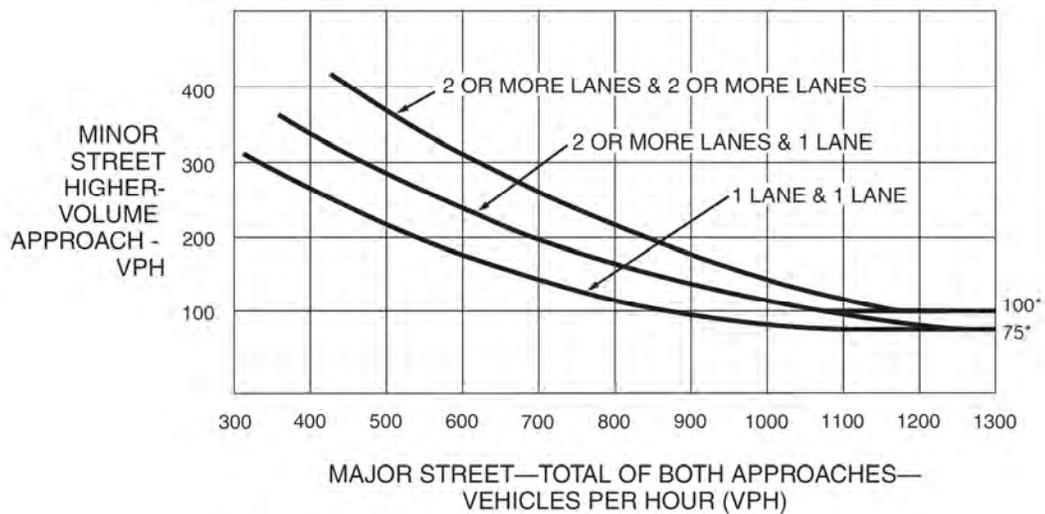
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



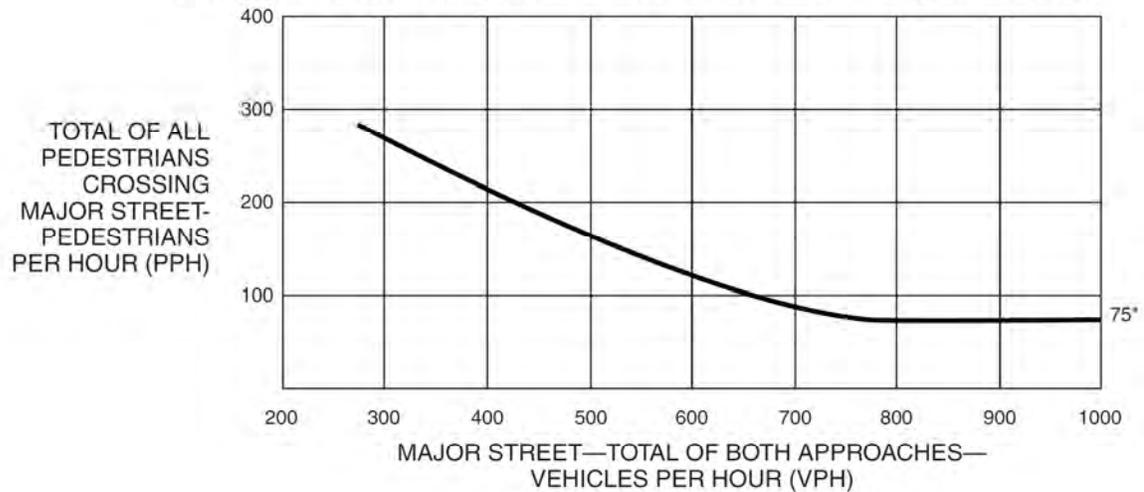
*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume



*Note: 107 pph applies as the lower threshold volume.

Figure 4C-6. Warrant 4, Pedestrian Four-Hour Volume (70% Factor)



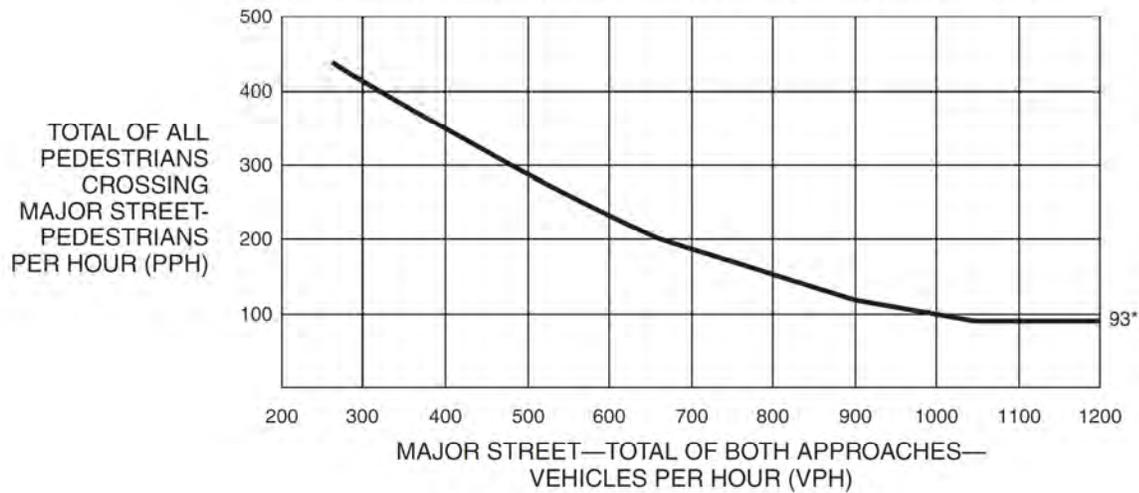
*Note: 75 pph applies as the lower threshold volume.

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



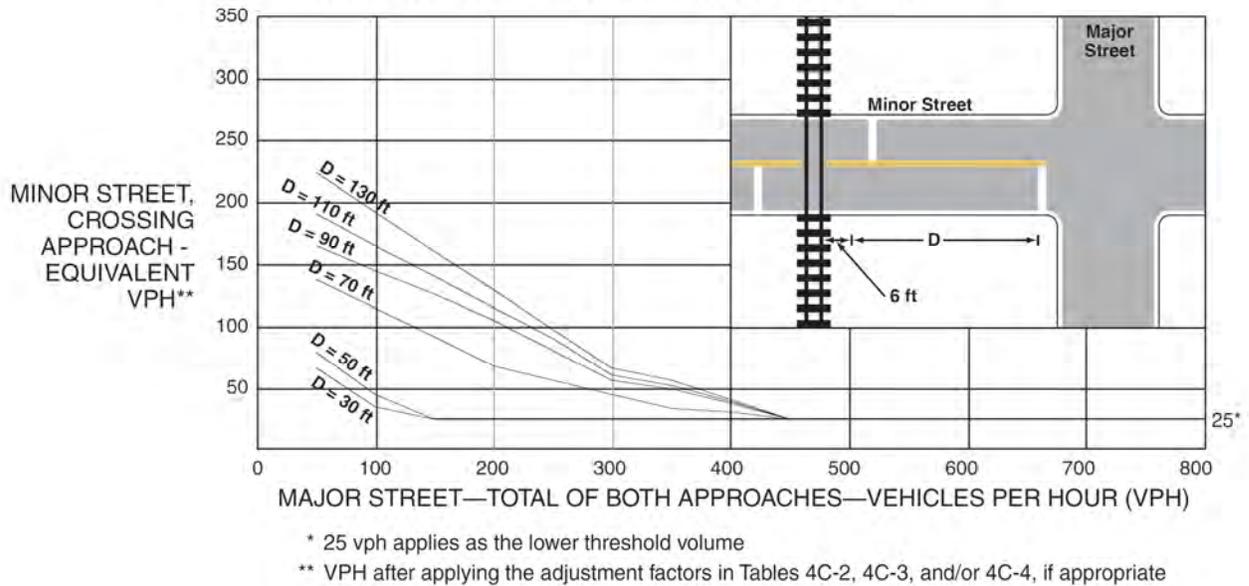
*Note: 133 pph applies as the lower threshold volume.

Figure 4C-8. Warrant 4, Pedestrian Peak Hour (70% Factor)



*Note: 93 pph applies as the lower threshold volume.

**Figure 4C-9. Warrant 9, Intersection Near a Grade Crossing
 (One Approach Lane at the Track Crossing)**



**Figure 4C-10. Warrant 9, Intersection Near a Grade Crossing
 (Two or More Approach Lanes at the Track Crossing)**

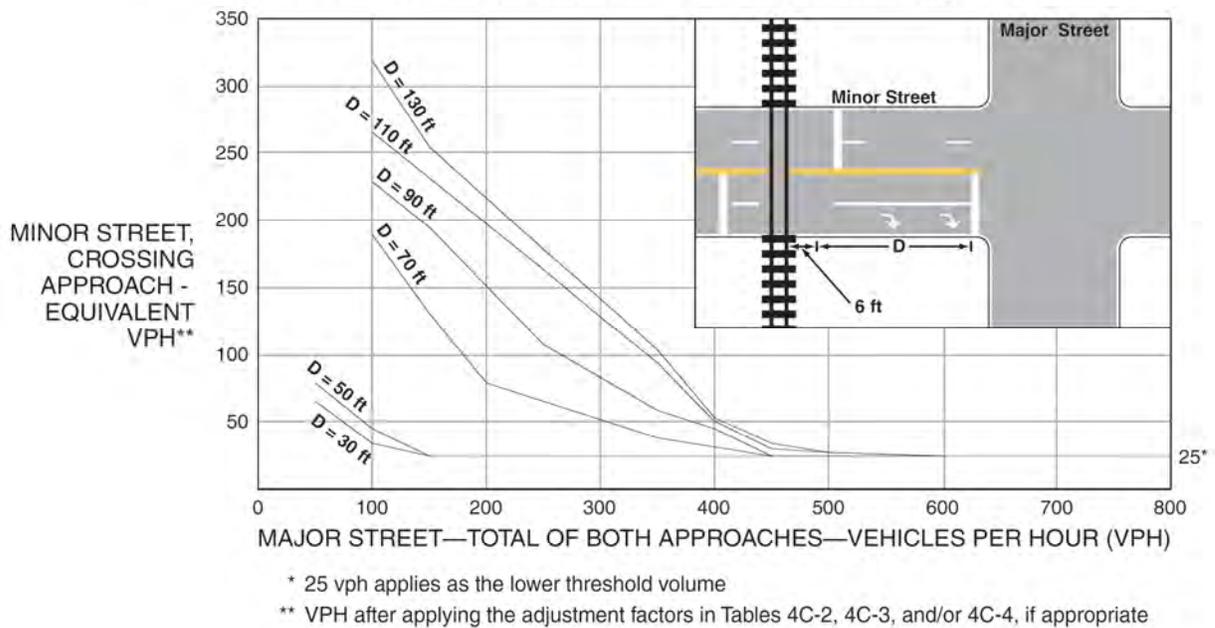


Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 1 of 5)

COUNT DATE _____

CALC _____ DATE _____

CHK _____ DATE _____

DIST _____ CO _____ RTE _____ PM _____

Major St: _____ Critical Approach Speed _____ mph

Minor St: _____ Critical Approach Speed _____ mph

Speed limit or critical speed on major street traffic > 40 mph..... or } **RURAL (R)**

In built up area of isolated community of < 10,000 population..... } **URBAN (U)**

WARRANT 1 - Eight Hour Vehicular Volume SATISFIED YES NO
 (Condition A or Condition B or combination of A and B must be satisfied)

Condition A - Minimum Vehicle Volume 100% SATISFIED YES NO

80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				Hour
	U	R	U	R	
	1		2 or More		/
Both Approaches Major Street	500 (400)	350 (280)	600 (480)	420 (336)	/
Highest Approach Minor Street	150 (120)	105 (84)	200 (160)	140 (112)	/

Condition B - Interruption of Continuous Traffic 100% SATISFIED YES NO

80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				Hour
	U	R	U	R	
	1		2 or More		/
Both Approaches Major Street	750 (600)	525 (420)	900 (720)	630 (504)	/
Highest Approach Minor Street	75 (60)	53 (42)	100 (80)	70 (56)	/

Combination of Conditions A & B SATISFIED YES NO

REQUIREMENT	CONDITION	✓	FULFILLED
TWO CONDITIONS SATISFIED 80%	A. MINIMUM VEHICULAR VOLUME		Yes <input type="checkbox"/> No <input type="checkbox"/>
	AND, B. INTERRUPTION OF CONTINUOUS TRAFFIC		
AND, AN ADEQUATE TRIAL OF OTHER ALTERNATIVES THAT COULD CAUSE LESS DELAY AND INCONVENIENCE TO TRAFFIC HAS FAILED TO SOLVE THE TRAFFIC PROBLEMS			Yes <input type="checkbox"/> No <input type="checkbox"/>

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

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 2 of 5)

WARRANT 2 - Four Hour Vehicular Volume

SATISFIED* YES NO

Record hourly vehicular volumes for any four hours of an average day.

APPROACH LANES	One		2 or More		Hour
Both Approaches - Major Street					
Higher Approach - Minor Street					

*All plotted points fall above the applicable curve in Figure 4C-1. (URBAN AREAS)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<u>OR</u> , All plotted points fall above the applicable curve in Figure 4C-2. (RURAL AREAS)	Yes <input type="checkbox"/>	No <input type="checkbox"/>

**WARRANT 3 - Peak Hour
 (Part A or Part B must be satisfied)**

SATISFIED YES NO

PART A

SATISFIED YES NO

(All parts 1, 2, and 3 below must be satisfied for the same one hour, for any four consecutive 15-minute periods)

1. The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach, or five vehicle-hours for a two-lane approach; <u>AND</u>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2. The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; <u>AND</u>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
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 <input type="checkbox"/>	No <input type="checkbox"/>

PART B

SATISFIED YES NO

APPROACH LANES	One		2 or More		Hour
Both Approaches - Major Street					
Higher Approach - Minor Street					

The plotted point falls above the applicable curve in Figure 4C-3. (URBAN AREAS)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<u>OR</u> , The plotted point falls above the applicable curve in Figure 4C-4. (RURAL AREAS)	Yes <input type="checkbox"/>	No <input type="checkbox"/>

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

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 3 of 5)

**WARRANT 4 - Pedestrian Volume
 (Parts 1 and 2 Must Be Satisfied)**

SATISFIED YES NO

Part 1 (Parts A or B must be satisfied)

Hours -->

A.	Vehicles per hour for any 4 hours				
	Pedestrians per hour for any 4 hours				

Figure 4C-5 or Figure 4C-6
 SATISFIED YES NO

Hours -->

B.	Vehicles per hour for any 1 hour				
	Pedestrians per hour for any 1 hour				

Figure 4C-7 or Figure 4C-8
 SATISFIED YES NO

Part 2

SATISFIED YES NO

<u>AND</u> , The distance to the nearest traffic signal along the major street is greater than 300 ft	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<u>OR</u> , The proposed traffic signal will not restrict progressive traffic flow along the major street.	Yes <input type="checkbox"/>	No <input type="checkbox"/>

**WARRANT 5 - School Crossing
 (Parts A and B Must Be Satisfied)**

SATISFIED YES NO

**Part A
 Gap/Minutes and # of Children**

SATISFIED YES NO

Gaps vs Minutes	Minutes Children Using Crossing		Hour
	Number of Adequate Gaps		
School Age Pedestrians Crossing Street / hr			

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

<u>AND</u> , Consideration has been given to less restrictive remedial measures.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
--	------------------------------	-----------------------------

Part B

SATISFIED YES NO

The distance to the nearest traffic signal along the major street is greater than 300 ft	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<u>OR</u> , The proposed signal will not restrict the progressive movement of traffic.	Yes <input type="checkbox"/>	No <input type="checkbox"/>

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

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 4 of 5)

WARRANT 6 - Coordinated Signal System SATISFIED YES NO
 (All Parts Must Be Satisfied)

MINIMUM REQUIREMENTS	DISTANCE TO NEAREST SIGNAL	
≥ 1000 ft	N _____ ft, S _____ ft, E _____ ft, W _____ ft	Yes <input type="checkbox"/> No <input type="checkbox"/>
On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.		Yes <input type="checkbox"/> No <input type="checkbox"/>
<u>OR</u> , On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.		

WARRANT 7 - Crash Experience Warrant SATISFIED YES NO
 (All Parts Must Be Satisfied)

Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency.		Yes <input type="checkbox"/> No <input type="checkbox"/>
REQUIREMENTS	Number of crashes reported within a 12 month period susceptible to correction by a traffic signal, and involving injury or damage exceeding the requirements for a reportable crash.	Yes <input type="checkbox"/> No <input type="checkbox"/>
5 OR MORE		
REQUIREMENTS	CONDITIONS	✓
ONE CONDITION SATISFIED 80%	Warrant 1, Condition A - Minimum Vehicular Volume	Yes <input type="checkbox"/> No <input type="checkbox"/>
	<u>OR</u> , Warrant 1, Condition B - Interruption of Continuous Traffic	
	<u>OR</u> , Warrant 4, Pedestrian Volume Condition Ped Vol ≥ 152 for any hour <u>OR</u> , Ped Vol ≥ 80 for any 4 hours	

WARRANT 8 - Roadway Network SATISFIED YES NO
 (All Parts Must Be Satisfied)

MINIMUM VOLUME REQUIREMENTS	ENTERING VOLUMES - ALL APPROACHES	✓	FULFILLED
1000 Veh/Hr	During Typical Weekday Peak Hour _____ Veh/Hr and has 5-year projected traffic volumes that meet one or more of Warrants 1, 2, and 3 during an average weekday.		Yes <input type="checkbox"/> No <input type="checkbox"/>
	<u>OR</u> During Each of Any 5 Hrs. of a Sat. or Sun _____ Veh/Hr		
CHARACTERISTICS OF MAJOR ROUTES		MAJOR ROUTE A	MAJOR ROUTE B
Hwy. System Serving as Principal Network for Through Traffic			
Rural or Suburban Highway Outside Of, Entering, or Traversing a City			
Appears as Major Route on an Official Plan			
Any Major Route Characteristics Met, Both Streets			Yes <input type="checkbox"/> No <input type="checkbox"/>

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

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 5 of 5)

**WARRANT 9 - Intersection Near a Grade Crossing
 (Both Parts A and B Must Be Satisfied)**

SATISFIED YES NO

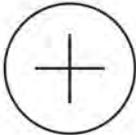
<p>PART A</p> <p>A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach. Track Center Line to Limit Line _____ ft</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>
<p>PART B</p> <p>There is one minor street approach lane at the track crossing - During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point falls above the applicable curve in Figure 4C-9.</p> <p>Major Street - Total of both approaches: _____ VPH Minor Street - Crosses the track (one direction only, approaching the intersection): _____ VPH X AF (Use Tables 4C-2, 3, & 4 below to calculate AF) = _____ VPH</p> <hr style="border-top: 1px dashed black;"/> <p>OR, There are two or more minor street approach lanes at the track crossing - During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point falls above the applicable curve in Figure 4C-10.</p> <p>Major Street - Total of both approaches : _____ VPH Minor Street - Crosses the track (one direction only, approaching the intersection): _____ VPH X AF (Use Tables 4C-2, 3, & 4 below to calculate AF) = _____ VPH</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>

The minor street approach volume may be multiplied by up to three following adjustment factors (AF) as described in Section 4C.10.

- 1- Number of Rail Traffic per Day _____ Adjustment factor from table 4C-2 _____
- 2- Percentage of High-Occupancy Buses on Minor Street Approach _____ Adjustment factor from table 4C-3 _____
- 3- Percentage of Tractor-Trailer Trucks on Minor Street Approach _____ Adjustment factor from table 4C-4 _____

NOTE: If no data is available or known, then use AF = 1 (no adjustment)

Figure 4C-102 (CA). Traffic Count Worksheet



Insert North Point

Not to Scale

Number of Lanes	Pedestrians	
	Total*	Peak
AM Peak	PM Peak	Total*
()	()	()
()	()	()
()	()	()
Pedestrians		
Total*		
Peak		
Number of Lanes		

AM Peak	PM Peak	Total*
()	()	()
()	()	()
()	()	()

AM Peak	PM Peak	Total*
()	()	()
()	()	()
()	()	()

AM Peak	PM Peak	Total*
()	()	()
()	()	()
()	()	()

AM Peak	PM Peak	Total*
()	()	()
()	()	()
()	()	()

***Entire Count Period**

Pedestrians	
Total*	Peak
Number of Lanes	

DIRECTIONAL TRAFFIC COUNT

Dist _____ Co _____ Rte _____ PM _____

Intersection Give Name _____

City _____

Day _____ Date _____

Hour _____ to Hour _____

Total Volume _____

AM Peak _____

Hour _____ Volume _____

PM Peak _____

Hour _____ Volume _____

**Figure 4C-103 (CA). Traffic Signal Warrants Worksheet
 (Average Traffic Estimate Form)**

COUNT DATE _____

CALC _____ DATE _____

CHK _____ DATE _____

DIST _____ CO _____ RTE _____ PM _____

Major St: _____ Critical Approach Speed _____ mph

Minor St: _____ Critical Approach Speed _____ mph

Speed limit or critical speed on major street traffic > 40 mph..... } **RURAL (R)**

or

} **RURAL (R)**

In built up area of isolated community of < 10,000 population..... } **URBAN (U)**

(Based on Estimated Average Daily Traffic - See Note)

URBAN.....		RURAL.....		Minimum Requirements EADT			
CONDITION A - Minimum Vehicular Volume				Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied _____ Not Satisfied _____							
Number of lanes for moving traffic on each approach							
Major Street	Minor Street	Major Street	Minor Street	Urban	Rural	Urban	Rural
1.....	1.....	1.....	1.....	8,000	5,600	2,400	1,680
2 or More.....	1.....	2 or More.....	1.....	9,600	6,720	2,400	1,680
2 or More.....	2 or More.....	2 or More.....	2 or More.....	9,600	6,720	3,200	2,240
1.....	2 or More.....	1.....	2 or More.....	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic				Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied _____ Not Satisfied _____							
Number of lanes for moving traffic on each approach							
Major Street	Minor Street	Major Street	Minor Street	Urban	Rural	Urban	Rural
1.....	1.....	1.....	1.....	12,000	8,400	1,200	850
2 or More.....	1.....	2 or More.....	1.....	14,400	10,080	1,200	850
2 or More.....	2 or More.....	2 or More.....	2 or More.....	14,400	10,080	1,600	1,120
1.....	2 or More.....	1.....	2 or More.....	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B				2 CONDITIONS 80%		2 CONDITIONS 80%	
Satisfied _____ Not Satisfied _____							
<u>No one condition satisfied</u> , but following conditions fulfilled 80% or more..... <u> </u> A <u> </u> B							

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

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

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

^a Basic minimum hourly volume

^b Used for combination of Conditions A and B after adequate trial of other remedial measures

^c May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

^d May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Table 4C-2. Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 4C-3. Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor-Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people.

Table 4C-4. Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

Appendix I

Signal Warrant Calculations

**Summary of Approach Volumes Used In Signal Warrant Analysis
For Lake Jennings Park Road at Jennings Vista Drive**

February 13, 2014 Thursday Time	Major St (Both Approaches) Lake Jennings Park Road			Minor St (Single Approach) Jennings Vista Drive	Total For All Approaches	Ranking used for 8 Hr Calc	Ranking used for 4 Hr Calc
	Northbound	Southbound	Total	Westbound			
	5:00 AM - 6:00 AM	141	160	301			
6:00 AM - 7:00 AM	392	267	659	99	758		2
7:00 AM - 8:00 AM	517	464	981	120	1101	4	1
8:00 AM - 9:00 AM	458	466	924	92	1016	7	3
9:00 AM - 10:00 AM	357	406	763	75	838		
10:00 AM - 11:00 AM	323	378	701	67	768		
11:00 AM - 12:00 PM	342	378	720	61	781		
12:00 PM - 1:00 PM	402	344	746	58	804		
1:00 PM - 2:00 PM	394	398	792	62	854	8	
2:00 PM - 3:00 PM	484	481	965	78	1043	6	4
3:00 PM - 4:00 PM	504	555	1059	67	1126	3	
4:00 PM - 5:00 PM	570	617	1187	70	1257	2	
5:00 PM - 6:00 PM	558	648	1206	65	1271	1	
6:00 PM - 7:00 PM	463	557	1020	70	1090	5	
7:00 PM - 8:00 PM	307	340	647	61	708		
8:00 PM - 9:00 PM	269	275	544	66	610		

Eight hour ranking based on highest from all hours

Four hour ranking based on higher Minor Street approach volumes

LAKE JENNINGS PARK N-O VISTA JENNINGS

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00		8			12:00		81		
00:15		10			12:15		85		
00:30		11			12:30		90		
00:45		5	34		12:45		88	344	344
01:00		10			13:00		104		
01:15		4			13:15		88		
01:30		3			13:30		92		
01:45		3	20		13:45		114	398	398
02:00		3			14:00		102		
02:15		6			14:15		107		
02:30		7			14:30		118		
02:45		5	21		14:45		154	481	481
03:00		5			15:00		134		
03:15		1			15:15		146		
03:30		6			15:30		148		
03:45		6	18		15:45		127	555	555
04:00		8			16:00		136		
04:15		4			16:15		156		
04:30		10			16:30		142		
04:45		13	35		16:45		183	617	617
05:00		24			17:00		177		
05:15		30			17:15		162		
05:30		38			17:30		164		
05:45		68	160		17:45		145	648	648
06:00		47			18:00		151		
06:15		47			18:15		148		
06:30		69			18:30		147		
06:45		104	267		18:45		111	557	557
07:00		112			19:00		113		
07:15		114			19:15		83		
07:30		113			19:30		73		
07:45		125	464		19:45		71	340	340
08:00		110			20:00		73		
08:15		138			20:15		63		
08:30		118			20:30		70		
08:45		100	466		20:45		69	275	275
09:00		120			21:00		56		
09:15		100			21:15		62		
09:30		92			21:30		59		
09:45		94	406		21:45		52	229	229
10:00		89			22:00		51		
10:15		81			22:15		25		
10:30		111			22:30		25		
10:45		97	378		22:45		31	132	132
11:00		114			23:00		19		
11:15		81			23:15		19		
11:30		92			23:30		20		
11:45		91	378		23:45		21	79	79

Total Vol.	2647		2647				4655		4655
-------------------	------	--	-------------	--	--	--	------	--	-------------

		Daily Totals					
		NB	SB	EB	WB	Combined	
			7302			7302	

	AM		PM	
Split %	100.0%	36.3%	100.0%	63.7%
Peak Hour	07:45	07:45	16:45	16:45
Volume	491	491	686	686
P.H.F.	0.89	0.89	0.94	0.94

LAKE JENNINGS PARK S-O VISTA JENNINGS

AM Period					PM Period						
NB	SB	EB	WB	NB	SB	EB	WB	EB	WB		
00:00	5	10			12:00	101	106				
00:15	13	15			12:15	90	100				
00:30	13	11			12:30	88	97				
00:45	13	44	9	45	89	12:45	123	402	90	393	795
01:00	6	16			13:00	107	80				
01:15	1	8			13:15	96	95				
01:30	8	7			13:30	106	103				
01:45	7	22	9	40	62	13:45	85	394	87	365	759
02:00	3	5			14:00	105	105				
02:15	4	4			14:15	130	114				
02:30	1	6			14:30	122	116				
02:45	5	13	5	20	33	14:45	127	484	97	432	916
03:00	4	7			15:00	111	91				
03:15	4	6			15:15	125	103				
03:30	7	8			15:30	121	112				
03:45	6	21	9	30	51	15:45	147	504	131	437	941
04:00	3	11			16:00	143	144				
04:15	14	7			16:15	148	152				
04:30	15	12			16:30	148	168				
04:45	29	61	10	40	101	16:45	131	570	177	641	1211
05:00	17	11			17:00	148	181				
05:15	35	15			17:15	129	152				
05:30	35	21			17:30	139	166				
05:45	54	141	26	73	214	17:45	142	558	158	657	1215
06:00	65	28			18:00	113	155				
06:15	76	40			18:15	133	162				
06:30	109	58			18:30	131	142				
06:45	142	392	55	181	573	18:45	86	463	131	590	1053
07:00	121	119			19:00	93	128				
07:15	130	121			19:15	77	131				
07:30	128	135			19:30	66	111				
07:45	138	517	130	505	1022	19:45	71	307	90	460	767
08:00	130	122			20:00	65	66				
08:15	120	151			20:15	79	51				
08:30	109	121			20:30	63	50				
08:45	99	458	120	514	972	20:45	62	269	42	209	478
09:00	99	105			21:00	56	52				
09:15	85	99			21:15	74	58				
09:30	95	106			21:30	51	40				
09:45	78	357	103	413	770	21:45	43	224	41	191	415
10:00	97	88			22:00	43	33				
10:15	77	90			22:15	32	37				
10:30	64	98			22:30	25	32				
10:45	85	323	91	367	690	22:45	33	133	18	120	253
11:00	86	88			23:00	32	21				
11:15	69	70			23:15	25	19				
11:30	74	84			23:30	23	20				
11:45	113	342	81	323	665	23:45	20	100	12	72	172
Total Vol.	2691	2551			5242	4408	4567				8975
								Daily Totals			
						NB	SB	EB	WB		Combined
						7099	7118				14217
										AM	PM
Split %	51.3%	48.7%			36.9%	49.1%	50.9%				63.1%
Peak Hour	07:15	07:30			07:30	15:45	16:15				16:15
Volume	526	538			1054	586	678				1253
P.H.F.	0.95	0.89			0.97	0.99	0.94				0.95

VISTA JENNINGS E-O LAKE JENNINGS PARK

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB			
00:00			2	0	12:00			12	24			
00:15			3	1	12:15			20	14			
00:30			1	1	12:30			17	10			
00:45			1	7	0	2	9	18	67	10	58	125
01:00			2	1	13:00			26	13			
01:15			0	0	13:15			11	23			
01:30			1	1	13:30			14	12			
01:45			0	3	1	3	6	15	66	14	62	128
02:00			0	0	14:00			20	21			
02:15			2	1	14:15			18	13			
02:30			1	0	14:30			23	22			
02:45			0	3	1	2	5	27	88	22	78	166
03:00			1	1	15:00			19	13			
03:15			0	1	15:15			29	13			
03:30			1	0	15:30			27	19			
03:45			0	2	0	2	4	36	111	22	67	178
04:00			1	2	16:00			27	26			
04:15			1	1	16:15			34	12			
04:30			0	2	16:30			33	14			
04:45			0	2	8	13	15	31	125	18	70	195
05:00			1	7	17:00			30	12			
05:15			0	5	17:15			33	17			
05:30			2	11	17:30			36	17			
05:45			0	3	17	40	43	31	130	19	65	195
06:00			3	19	18:00			25	17			
06:15			8	18	18:15			40	20			
06:30			3	29	18:30			31	21			
06:45			1	15	33	99	114	24	120	12	70	190
07:00			6	35	19:00			38	15			
07:15			9	33	19:15			20	13			
07:30			10	28	19:30			20	21			
07:45			10	35	24	120	155	8	86	12	61	147
08:00			17	21	20:00			13	15			
08:15			10	28	20:15			25	16			
08:30			13	22	20:30			18	20			
08:45			11	51	21	92	143	27	83	15	66	149
09:00			7	19	21:00			10	6			
09:15			15	21	21:15			18	10			
09:30			12	20	21:30			9	2			
09:45			12	46	15	75	121	9	46	7	25	71
10:00			15	17	22:00			11	5			
10:15			9	17	22:15			10	6			
10:30			7	16	22:30			8	2			
10:45			14	45	17	67	112	5	34	3	16	50
11:00			11	16	23:00			12	0			
11:15			18	10	23:15			5	3			
11:30			14	23	23:30			6	1			
11:45			16	59	12	61	120	1	24	0	4	28

Total Vol. 271 576 **847** 980 642 **1622**

		Daily Totals			
NB	SB	EB	WB	Combined	
		1251	1218	2469	

Split %	AM			PM		
	32.0%	68.0%	34.3%	60.4%	39.6%	65.7%
Peak Hour	11:45	06:30	06:45	18:15	15:15	17:30
Volume	65	130	155	133	80	205
P.H.F.	0.81	0.93	0.92	0.83	0.77	0.85

EXISTING CONDITIONS.

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 1 of 5)

COUNT DATE 2/13/2014
 CALC _____ DATE _____
 CHK _____ DATE _____

DIST _____ CO _____ RTE _____ PM _____

Major St: LAKE JENNINGS PARK ROAD
 Minor St: JENNINGS VISTA DR

Critical Approach Speed 36 MPH SOUTHBOUND mph 39 MPH NORTHBOUND
 Critical Approach Speed _____ mph 38 mph WESTBOUND

Speed limit or critical speed on major street traffic > 40 mph... NO or } RURAL (R)
 In built up area of isolated community of < 10,000 population... NO }
LAKESIDE POPULATION = 20,648 (2010 CENSUS) URBAN (U)

WARRANT 1 - Eight Hour Vehicular Volume SATISFIED YES NO
 (Condition A or Condition B or combination of A and B must be satisfied)

Condition A - Minimum Vehicle Volume 100% SATISFIED YES NO
 80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)												
	U		R										
	1		2 or More										
Both Approaches Major Street	500 (400)	350 (280)	600 (480)	420 (336)	1206	1187	1059	981	1020	965	924	792	Hour
Highest Approach Minor Street	150 (120)	105 (84)	200 (160)	140 (112)	65	70	67	120	70	78	92	62	x

Condition B - Interruption of Continuous Traffic 100% SATISFIED YES NO
 80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)												
	U		R										
	1		2 or More										
Both Approaches Major Street	750 (600)	525 (420)	900 (720)	630 (504)	1206	1187	1059	981	1020	965	924	792	Hour
Highest Approach Minor Street	75 (60)	53 (42)	100 (80)	70 (56)	65	70	67	120	70	78	92	62	x

Combination of Conditions A & B SATISFIED YES NO

REQUIREMENT	CONDITION	✓	FULFILLED
TWO CONDITIONS SATISFIED 80%	A. MINIMUM VEHICULAR VOLUME	NO	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
	AND, B. INTERRUPTION OF CONTINUOUS TRAFFIC	NA	Yes <input type="checkbox"/> No <input type="checkbox"/>
AND, AN ADEQUATE TRIAL OF OTHER ALTERNATIVES THAT COULD CAUSE LESS DELAY AND INCONVENIENCE TO TRAFFIC HAS FAILED TO SOLVE THE TRAFFIC PROBLEMS			Yes <input type="checkbox"/> No <input type="checkbox"/>

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

EXISTING CONDITIONS

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 2 of 5)

WARRANT 2 - Four Hour Vehicular Volume

SATISFIED* YES NO

Record hourly vehicular volumes for any four hours of an average day.

APPROACH LANES	One		2 or More		Hour			
	One	More	1 AM	6 AM	8 AM	2 PM		
Both Approaches - Major Street		<input checked="" type="checkbox"/>	981	659	924	965		
Higher Approach - Minor Street	<input checked="" type="checkbox"/>		120	99	92	78		

*All plotted points fall above the applicable curve in Figure 4C-1. (URBAN AREAS)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<u>OR</u> , All plotted points fall above the applicable curve in Figure 4C-2. (RURAL AREAS)	Yes <input type="checkbox"/>	No <input type="checkbox"/>

N.A.

WARRANT 3 - Peak Hour
(Part A or Part B must be satisfied)

7-8 AM

SATISFIED YES NO

PART A

SATISFIED YES NO

(All parts 1, 2, and 3 below must be satisfied for the same one hour, for any four consecutive 15-minute periods)

1. The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach, or five vehicle-hours for a two-lane approach; <u>AND</u>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
2. The volume on the same minor street approach (one direction only) equals or exceeds <u>(100)</u> vph for one moving lane of traffic or 150 vph for two moving lanes; <u>AND</u>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more approaches or <u>(650)</u> vph for intersections with three approaches.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

AM PK HR MINOR ST APPROACH DELAY = 25.5 SECONDS X 100 VEH = 2,550 VEH-SEC = 0.71 VEH-HR

PART B

SATISFIED YES NO

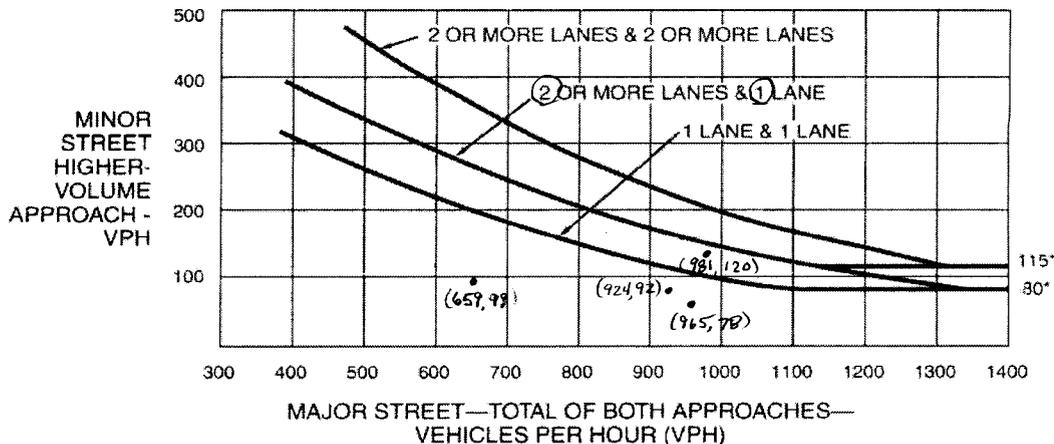
APPROACH LANES	One		2 or More		Hour	
	One	More	1 AM			
Both Approaches - Major Street		<input checked="" type="checkbox"/>	981			
Higher Approach - Minor Street	<input checked="" type="checkbox"/>		120			

The plotted point falls above the applicable curve in Figure 4C-3. (URBAN AREAS)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
<u>OR</u> , The plotted point falls above the applicable curve in Figure 4C-4. (RURAL AREAS)	Yes <input type="checkbox"/>	No <input type="checkbox"/>

N.A.

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

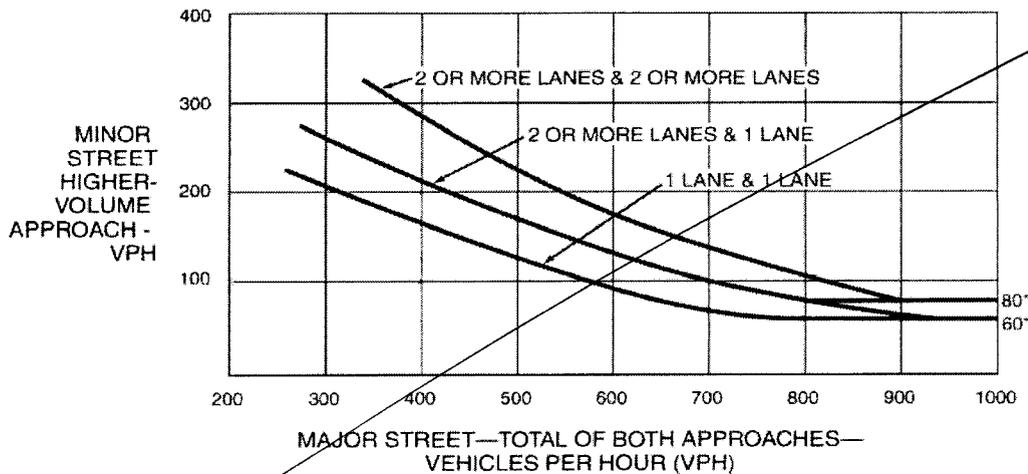
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

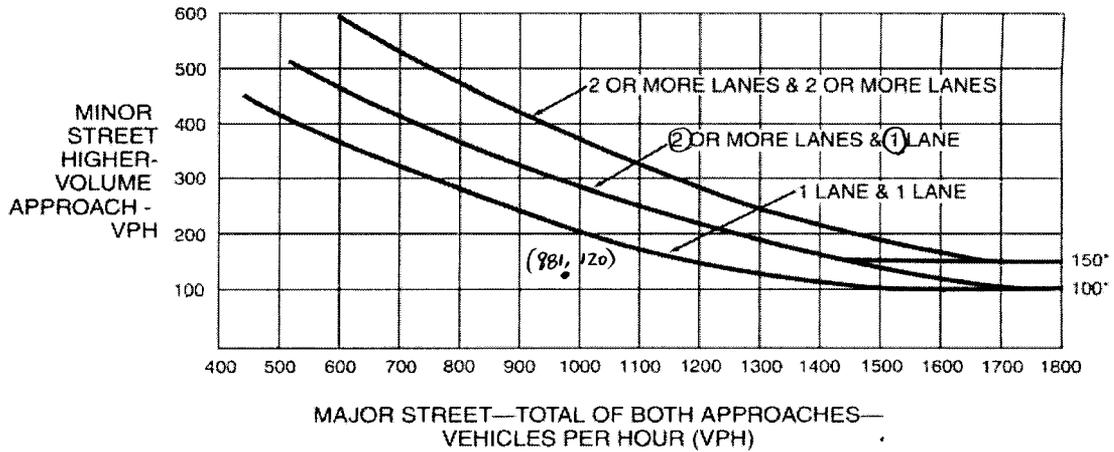


*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

AM Existing
1: Lake Jennings Park Rd & Jennings Vista Dr

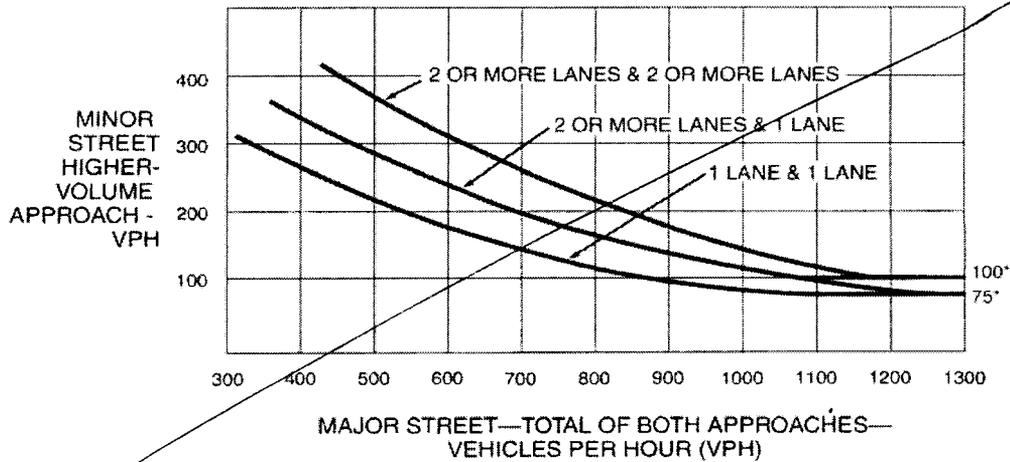
						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	68	32	500	25	19	472
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	35	543	27	21	513
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1098	543			571	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1098	543			571	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	68	94			98	
cM capacity (veh/h)	231	539			1002	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	109	543	27	21	513	
Volume Left	74	0	0	21	0	
Volume Right	35	0	27	0	0	
cSH	282	1700	1700	1002	1700	
Volume to Capacity	0.38	0.32	0.02	0.02	0.30	
Queue Length 95th (ft)	43	0	0	2	0	
Control Delay (s)	25.5	0.0	0.0	8.7	0.0	
Lane LOS	D			A		
Approach Delay (s)	25.5	0.0		0.3		
Approach LOS	D					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			39.4%		ICU Level of Service	A
Analysis Period (min)			15			

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
 (COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*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 approach with one lane.

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 3 of 5)

WARRANT 4 - Pedestrian Volume
(Parts 1 and 2 Must Be Satisfied)

MUTCD STATES

SATISFIED YES NO N.A.
THIS WARRANT SHALL NOT BE APPLIED WHERE THE NEAREST TRAFFIC CONTROL SIGNAL IS LESS

Part 1 (Parts A or B must be satisfied)

Hours - - ->

A.	Vehicles per hour for any 4 hours				
	Pedestrians per hour for any 4 hours				

Figure 4C-5 or Figure 4C-6

SATISFIED YES NO

THAN 300 FEET FROM THE STUDY INTERSECTION. LAKE JENNINGS PARK ROAD AT HARRITT RD HAS A

Hours - - ->

B.	Vehicles per hour for any 1 hour				
	Pedestrians per hour for any 1 hour				

Figure 4C-7 or Figure 4C-8

SATISFIED YES NO

TRAFFIC SIGNAL WITH PED CROSSINGS AND IS LESS THAN 300 FEET FROM

Part 2

SATISFIED YES NO

<u>AND</u> . The distance to the nearest traffic signal along the major street is greater than 300 ft	Yes <input type="checkbox"/> No <input type="checkbox"/>
<u>OR</u> . The proposed traffic signal will not restrict progressive traffic flow along the major street.	Yes <input type="checkbox"/> No <input type="checkbox"/>

VISTA JENNINGS DRIVE.

WARRANT 5 - School Crossing
(Parts A and B Must Be Satisfied)

THIS WARRANT NOT REQUIRED FOR SAME REASON

SATISFIED YES NO N.A.

Part A

Gap/Minutes and # of Children

Gaps vs Minutes	Minutes Children Using Crossing	
	Number of Adequate Gaps	
School Age Pedestrians Crossing Street / hr		

Hour

SATISFIED YES NO NOTED IN

WARRANT 4.

Gaps < Minutes YES NO

AND Children > 20/hr YES NO

<u>AND</u> . Consideration has been given to less restrictive remedial measures.	Yes <input type="checkbox"/> No <input type="checkbox"/>
--	--

Part B

SATISFIED YES NO

The distance to the nearest traffic signal along the major street is greater than 300 ft	Yes <input type="checkbox"/> No <input type="checkbox"/>
<u>OR</u> . The proposed signal will not restrict the progressive movement of traffic.	Yes <input type="checkbox"/> No <input type="checkbox"/>

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

EXISTING CONDITIONS

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 4 of 5)

**WARRANT 6 - Coordinated Signal System
(All Parts Must Be Satisfied)**

SATISFIED YES NO

MINIMUM REQUIREMENTS	DISTANCE TO NEAREST SIGNAL	
≥ 1000 ft	N <u>225</u> ft, S <u>425</u> ft, E <u>NA</u> ft, W <u>NA</u> ft	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.		Yes <input type="checkbox"/> No <input type="checkbox"/> NA.
OR, On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.		

**WARRANT 7 - Crash Experience Warrant
(All Parts Must Be Satisfied)**

SATISFIED YES NO

Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency.		Yes <input type="checkbox"/> No <input type="checkbox"/>
REQUIREMENTS	Number of crashes reported within a <u>12 month</u> period susceptible to correction by a traffic signal, and involving injury or damage exceeding the requirements for a reportable crash.	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
5 OR MORE	<u>0 (ZERO)*</u>	
REQUIREMENTS	CONDITIONS	✓
ONE CONDITION SATISFIED 80%	Warrant 1, Condition A - Minimum Vehicular Volume	
	OR, Warrant 1, Condition B - Interruption of Continuous Traffic	Yes <input type="checkbox"/> No <input type="checkbox"/>
	OR, Warrant 4, Pedestrian Volume Condition Ped Vol ≥ 152 for any hour OR, Ped Vol ≥ 80 for any 4 hours	

* DATA ON FILE AT THE COUNTY OF SAN DIEGO

**WARRANT 8 - Roadway Network
(All Parts Must Be Satisfied)**

SATISFIED YES NO N.A.

MINIMUM VOLUME REQUIREMENTS	ENTERING VOLUMES - ALL APPROACHES	✓	FULFILLED
1000 Veh/Hr	During Typical Weekday Peak Hour _____ Veh/Hr and has 5-year projected traffic volumes that meet <u>one</u> or more of Warrants 1, 2, and 3 during an average weekday.		Yes <input type="checkbox"/> No <input type="checkbox"/>
	OR During Each of Any 5 Hrs. of a Sat. or Sun _____ Veh/Hr		
CHARACTERISTICS OF MAJOR ROUTES		MAJOR ROUTE A	MAJOR ROUTE B
Hwy. System Serving as Principal Network for Through Traffic			
Rural or Suburban Highway Outside Of, Entering, or Traversing a City			
Appears as Major Route on an Official Plan			
Any Major Route Characteristics Met, Both Streets			Yes <input type="checkbox"/> No <input type="checkbox"/>

NOT APPLICABLE BECAUSE BOTH ROUTES NEED TO BE MAJOR ROUTES WHERE VISTA JENNINGS DR DOES NOT MATCH MAJOR RT DESCRIPTION IN MUTCD.

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

EXISTING CONDITIONS

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 5 of 5)

**WARRANT 9 - Intersection Near a Grade Crossing
 (Both Parts A and B Must Be Satisfied)**

SATISFIED YES NO *N.A.*

<p><u>PART A</u></p> <p>A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach. Track Center Line to Limit Line _____ ft</p>	Yes <input type="checkbox"/> No <input type="checkbox"/>
<p><u>PART B</u></p> <p>There is one minor street approach lane at the track crossing - During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point falls above the applicable curve in Figure 4C-9.</p> <p>Major Street - Total of both approaches: _____ VPH Minor Street - Crosses the track (one direction only, approaching the intersection): _____ VPH X AF (Use Tables 4C-2, 3, & 4 below to calculate AF) = _____ VPH</p> <p style="text-align: center;">-----</p> <p><u>OR</u>, There are two or more minor street approach lanes at the track crossing - During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point falls above the applicable curve in Figure 4C-10.</p> <p>Major Street - Total of both approaches : _____ VPH Minor Street - Crosses the track (one direction only, approaching the intersection): _____ VPH X AF (Use Tables 4C-2, 3, & 4 below to calculate AF) = _____ VPH</p>	Yes <input type="checkbox"/> No <input type="checkbox"/>

The minor street approach volume may be multiplied by up to three following adjustment factors (AF) as described in Section 4C.10.

- 1- Number of Rail Traffic per Day _____ Adjustment factor from table 4C-2 _____
- 2- Percentage of High-Occupancy Buses on Minor Street Approach _____ Adjustment factor from table 4C-3 _____
- 3- Percentage of Tractor-Trailer Trucks on Minor Street Approach _____ Adjustment factor from table 4C-4 _____

NOTE: If no data is available or known, then use AF = 1 (no adjustment)

Project Traffic Forecasted For Major and Minor Approaches For Signal Warrant Based On Percentage Of Traffic On Vista Jennings Drive

SANDAG nor ITE has a 24 hour distribution of traffic for single family dwelling units. Therefore, the 24 hour distribution was based on background traffic on Vista Jennings Drive because Vista Jennings Drive serves residential dwelling units. The eastbound (EB) direction leads into the residential area, thus was taken as the inbound while the westbound (WB) leads out of the residential area and was taken as the outbound.

February 13, 2014 Thursday	Vista Jennings Dr Hourly Volumes		Project Inbound Trips on Major Street Both Approaches				Project Outbound Trips on Minor Street One Approaches				Total Major + Minor for Ranking	Highest 8 Hrs		
	Time	EB	WB	EB%	P ADT ¹ 90	P ² Adj	E	E+P	WB%	P ADT ³ 90			P ² Adj	E
5:00 AM - 6:00 AM	3	40	0.2%	0	0	301	301	3.3%	3	3	40	43	344	
6:00 AM - 7:00 AM	15	99	1.2%	1	1	659	660	8.1%	7	7	99	106	766	
7:00 AM - 8:00 AM	35	120	2.8%	3	4	981	985	9.9%	9	10	120	130	1115	4
8:00 AM - 9:00 AM	51	92	4.1%	4	4	924	928	7.6%	7	7	92	99	1026	7
9:00 AM - 10:00 AM	46	75	3.7%	3	3	763	766	6.2%	6	6	75	81	847	
10:00 AM - 11:00 AM	45	67	3.6%	3	3	701	704	5.5%	5	5	67	72	776	
11:00 AM - 12:00 PM	59	61	4.7%	4	4	720	724	5.0%	5	5	61	66	790	
12:00 PM - 1:00 PM	67	58	5.4%	5	5	746	751	4.8%	4	4	58	62	813	
1:00 PM - 2:00 PM	66	62	5.3%	5	5	792	797	5.1%	5	5	62	67	863	8
2:00 PM - 3:00 PM	88	78	7.0%	6	6	965	971	6.4%	6	6	78	84	1055	6
3:00 PM - 4:00 PM	111	67	8.9%	8	8	1059	1067	5.5%	5	5	67	72	1139	3
4:00 PM - 5:00 PM	125	70	10.0%	9	9	1187	1196	5.7%	5	5	70	75	1271	2
5:00 PM - 6:00 PM	130	65	10.4%	9	13	1206	1219	5.3%	5	5	65	70	1289	1
6:00 PM - 7:00 PM	120	70	9.6%	9	9	1020	1029	5.7%	5	5	70	75	1104	5
7:00 PM - 8:00 PM	86	61	6.9%	6	6	647	653	5.0%	5	5	61	66	719	
8:00 PM - 9:00 PM	83	66	6.6%	6	6	544	550	5.4%	5	5	66	71	621	
9:00 PM - 5:00 AM (8 hrs)	121	67	9.7%	9	4			5.5%	5	4				
Total by direction (24 hrs)	1251	1218	100.0%	90	90			100.0%	90	90				
Total ADT (24 hrs)	2469													

Notes: 1) P ADT is the project inbound ADT, which equals 90 based on a total 180 ADT (inbound and outbound). 2) P Adj is the adjustment of the peak hour (i.e. adjusted up) to match the SANDAG peak hour trip generation (i.e. the AM inbound was increased from 3 trips to 4 and shown in BOLD to match the SANDAG trip generation. The daily was balanced by reducing the equivalent from the 9pm to 5am period also shown in BOLD). 3) P ADT is the project outbound ADT, which equals 90 based on a total 180 ADT.

EXISTING + PROJECT CONDITIONS

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 1 of 5)

COUNT DATE 2/13/2014

CALC _____ DATE _____

CHK _____ DATE _____

DIST _____ CO _____ RTE _____ PM _____

Major St: LAKE JENNINGS PARK ROAD Critical Approach Speed 36 MPH SOUTH BOUND mph 39 MPH NORTHBOUND

Minor St: JENNINGS VISTA DR Critical Approach Speed 38 mph WESTBOUND

Speed limit or critical speed on major street traffic > 40 mph... NO or } RURAL (R)

In built up area of isolated community of < 10,000 population... NO or } URBAN (U)

LAKESIDE POPULATION = 20,648 (2010 CENSUS)

WARRANT 1 - Eight Hour Vehicular Volume SATISFIED YES NO
(Condition A or Condition B or combination of A and B must be satisfied)

Condition A - Minimum Vehicle Volume 100% SATISFIED YES NO
80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)												
	1		2 or More										
	U	R	U	R									
Both Approaches Major Street	500 (400)	350 (280)	600 (480)	420 (336)	1219	1196	1067	985	1029	971	928	797	Hour
Highest Approach Minor Street	150 (120)	105 (84)	200 (160)	140 (112)	70	75	72	130	75	84	99	67	x
					5-6 PM	4-5 PM	3-4 PM	7-8 AM	6-7 PM	2-3 PM	8-9 AM	1-2 PM	

Condition B - Interruption of Continuous Traffic 100% SATISFIED YES NO
80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)												
	1		2 or More										
	U	R	U	R									
Both Approaches Major Street	750 (600)	525 (420)	900 (720)	630 (504)	1219	1196	1067	985	1029	971	928	797	Hour
Highest Approach Minor Street	75 (60)	53 (42)	100 (80)	70 (56)	70	75	72	130	75	84	99	67	x
					5-6 PM	4-5 PM	3-4 PM	7-8 AM	6-7 PM	2-3 PM	8-9 AM	1-2 PM	

Combination of Conditions A & B SATISFIED YES NO

REQUIREMENT	CONDITION	✓	FULFILLED
TWO CONDITIONS SATISFIED 80%	A. MINIMUM VEHICULAR VOLUME	NO	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
	AND, B. INTERRUPTION OF CONTINUOUS TRAFFIC	NA	
AND, AN ADEQUATE TRIAL OF OTHER ALTERNATIVES THAT COULD CAUSE LESS DELAY AND INCONVENIENCE TO TRAFFIC HAS FAILED TO SOLVE THE TRAFFIC PROBLEMS			Yes <input type="checkbox"/> No <input type="checkbox"/> NA

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

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 2 of 5)

WARRANT 2 - Four Hour Vehicular Volume

SATISFIED* YES NO

Record hourly vehicular volumes for any four hours of an average day

APPROACH LANES	2 or		Hour			
	One	More	1 AM	6 AM	8 AM	2 PM
Both Approaches - Major Street		<input checked="" type="checkbox"/>	985	660	928	971
Higher Approach - Minor Street	<input checked="" type="checkbox"/>		130	106	99	84

*All plotted points fall above the applicable curve in Figure 4C-1. (URBAN AREAS)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
OR, All plotted points fall above the applicable curve in Figure 4C-2. (RURAL AREAS)	Yes <input type="checkbox"/>	No <input type="checkbox"/> N.A.

WARRANT 3 - Peak Hour
 (Part A or Part B must be satisfied)

7-8 AM

SATISFIED YES NO

PART A

SATISFIED YES NO

(All parts 1, 2, and 3 below must be satisfied for the same one hour, for any four consecutive 15-minute periods)

1. The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach, or five vehicle-hours for a two-lane approach; AND	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
2. The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>

AM(E+P) PK HR MINOR ST DELAY = 26.7 SECONDS x 110 VEH = 2,937 VEH-SEC = 0.82 VEH-HRS

PART B

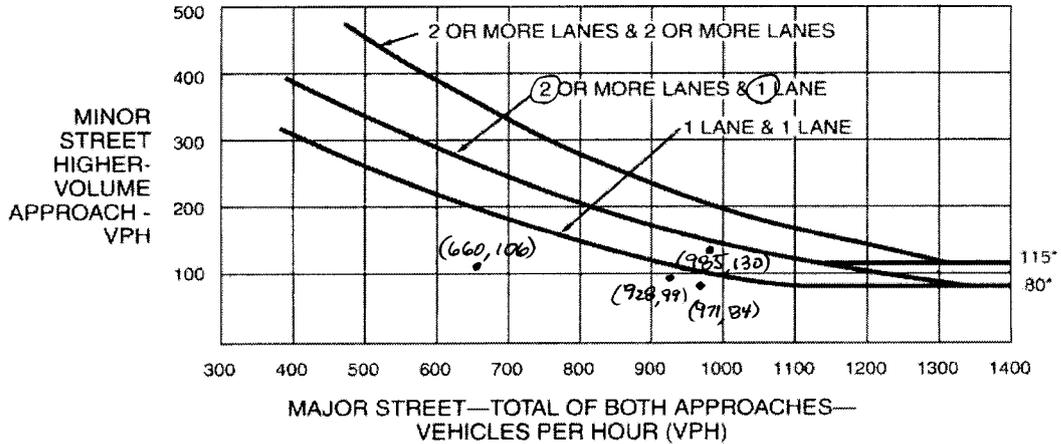
SATISFIED YES NO

APPROACH LANES	2 or		Hour
	One	More	7 AM
Both Approaches - Major Street		<input checked="" type="checkbox"/>	985
Higher Approach - Minor Street	<input checked="" type="checkbox"/>		130

The plotted point falls above the applicable curve in Figure 4C-3. (URBAN AREAS)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
OR, The plotted point falls above the applicable curve in Figure 4C-4. (RURAL AREAS)	Yes <input type="checkbox"/>	No <input type="checkbox"/> N.A.

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

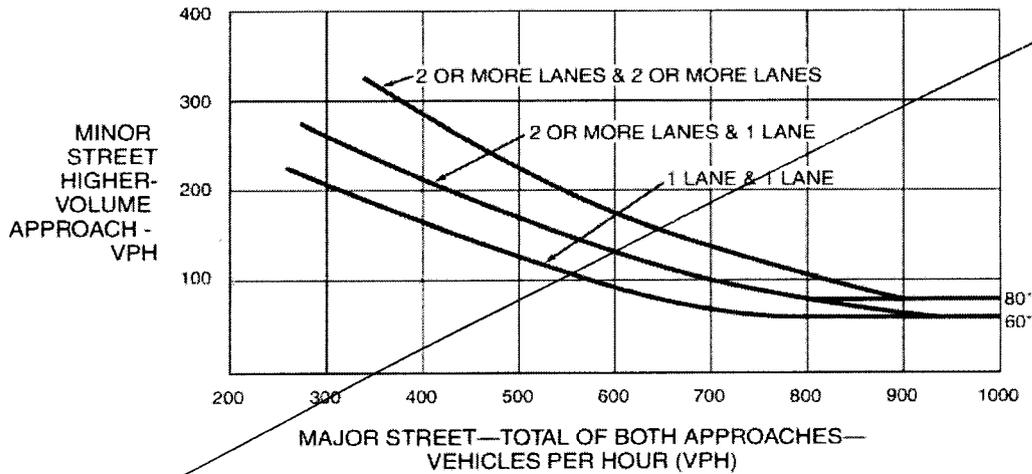
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

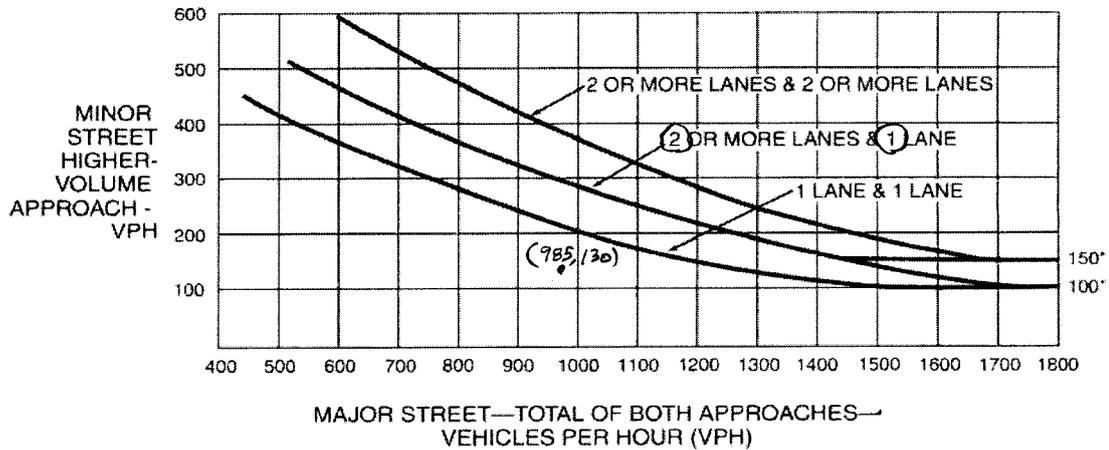


*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

AM Existing + Project
1: Lake Jennings Park Rd & Jennings Vista Dr

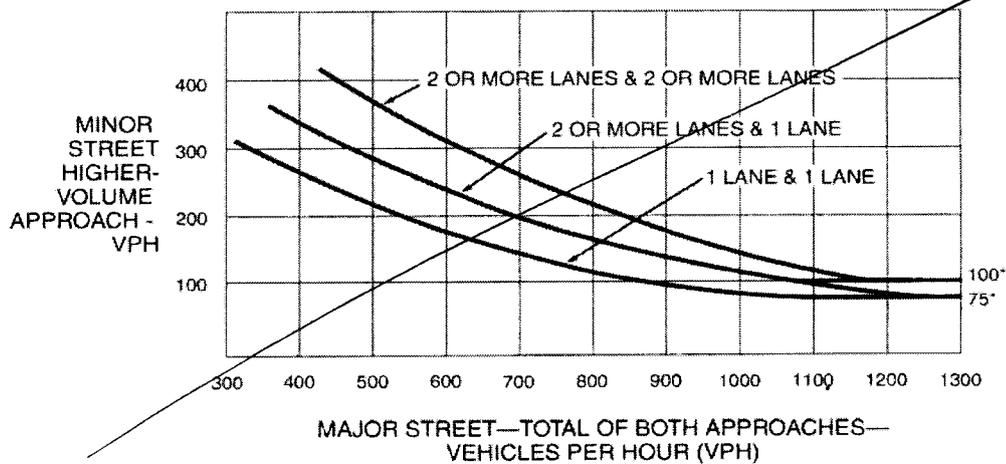
						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	74	36	500	28	20	472
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	39	543	30	22	513
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1100	543			574	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1100	543			574	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	65	93			98	
cM capacity (veh/h)	230	539			999	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	120	543	30	22	513	
Volume Left	80	0	0	22	0	
Volume Right	39	0	30	0	0	
cSH	283	1700	1700	999	1700	
Volume to Capacity	0.42	0.32	0.02	0.02	0.30	
Queue Length 95th (ft)	50	0	0	2	0	
Control Delay (s)	26.7	0.0	0.0	8.7	0.0	
Lane LOS	D			A		
Approach Delay (s)	26.7	0.0		0.4		
Approach LOS	D					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			40.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
 (COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*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 approach with one lane.

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 3 of 5)

WARRANT 4 - Pedestrian Volume
(Parts 1 and 2 Must Be Satisfied)

MUTCD STATES

SATISFIED YES NO N.A.
THIS WARRANT SHALL NOT BE APPLIED WHERE THE NEAREST TRAFFIC CONTROL SIGNAL IS LESS

Part 1 (Parts A or B must be satisfied)

Hours --->

A. Vehicles per hour for any 4 hours					
Pedestrians per hour for any 4 hours					

Figure 4C-5 or Figure 4C-6

SATISFIED YES NO

THAN 300 FEET FROM THE STUDY INTERSECTION. LAKE JENNINGS PARK ROAD AT HARRITT RD HAS A

Hours --->

B. Vehicles per hour for any 1 hour					
Pedestrians per hour for any 1 hour					

Figure 4C-7 or Figure 4C-8

SATISFIED YES NO

TRAFFIC SIGNAL WITH PED CROSSINGS AND IS LESS THAN 300 FEET FROM

Part 2

SATISFIED YES NO

<u>AND</u> . The distance to the nearest traffic signal along the major street is greater than 300 ft	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<u>OR</u> . The proposed traffic signal will not restrict progressive traffic flow along the major street.	Yes <input type="checkbox"/>	No <input type="checkbox"/>

VISTA JENNINGS DRIVE.

WARRANT 5 - School Crossing
(Parts A and B Must Be Satisfied)

THIS WARRANT NOT REQUIRED FOR SAME REASON

SATISFIED YES NO N.A.

Part A

Gap/Minutes and # of Children

Gaps vs Minutes	Minutes Children Using Crossing	
	Number of Adequate Gaps	
School Age Pedestrians Crossing Street / hr		

Hour

SATISFIED YES NO NOTED IN WARRANT 4.

Gaps < Minutes YES NO

AND Children > 20/hr YES NO

<u>AND</u> . Consideration has been given to less restrictive remedial measures.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
--	------------------------------	-----------------------------

Part B

SATISFIED YES NO

The distance to the nearest traffic signal along the major street is greater than 300 ft	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<u>OR</u> . The proposed signal will not restrict the progressive movement of traffic.	Yes <input type="checkbox"/>	No <input type="checkbox"/>

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

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 4 of 5)

**WARRANT 6 - Coordinated Signal System
 (All Parts Must Be Satisfied)**

SATISFIED YES NO

MINIMUM REQUIREMENTS	DISTANCE TO NEAREST SIGNAL	
≥ 1000 ft	N <u>225</u> ft, S <u>425</u> ft, E <u>NA</u> ft, W <u>NA</u> ft	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.		Yes <input type="checkbox"/> No <input type="checkbox"/>
OR, On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.		Yes <input type="checkbox"/> No <input type="checkbox"/>

**WARRANT 7 - Crash Experience Warrant
 (All Parts Must Be Satisfied)**

N.A. NOT POSSIBLE TO FORECAST FUTURE NUMBER OF CRASHES.
 SATISFIED YES NO

Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency.		Yes <input type="checkbox"/> No <input type="checkbox"/>
REQUIREMENTS	Number of crashes reported within a 12 month period susceptible to correction by a traffic signal, and involving injury or damage exceeding the requirements for a reportable crash.	Yes <input type="checkbox"/> No <input type="checkbox"/>
5 OR MORE		
REQUIREMENTS	CONDITIONS	✓
ONE CONDITION SATISFIED 80%	Warrant 1, Condition A - Minimum Vehicular Volume	
	OR, Warrant 1, Condition B - Interruption of Continuous Traffic	Yes <input type="checkbox"/> No <input type="checkbox"/>
	OR, Warrant 4, Pedestrian Volume Condition Ped Vol ≥ 152 for any hour OR, Ped Vol ≥ 80 for any 4 hours	

**WARRANT 8 - Roadway Network
 (All Parts Must Be Satisfied)**

NOT APPLICABLE BECAUSE BOTH ROUTES NEED TO BE MAJOR ROUTES WHERE VISTA JENNINGS DR DOES NOT MATCH MAJOR ROUTE DESCRIPTION IN THE MUTCD.
 SATISFIED YES NO

MINIMUM VOLUME REQUIREMENTS	ENTERING VOLUMES - ALL APPROACHES	✓	FULFILLED
1000 Veh/Hr	During Typical Weekday Peak Hour _____ Veh/Hr and has 5-year projected traffic volumes that meet one or more of Warrants 1, 2, and 3 during an average weekday.		Yes <input type="checkbox"/> No <input type="checkbox"/>
	OR During Each of Any 5 Hrs. of a Sat. or Sun _____ Veh/Hr		
CHARACTERISTICS OF MAJOR ROUTES		MAJOR ROUTE A	MAJOR ROUTE B
Hwy. System Serving as Principal Network for Through Traffic			
Rural or Suburban Highway Outside Of, Entering, or Traversing a City			
Appears as Major Route on an Official Plan			
Any Major Route Characteristics Met, Both Streets			Yes <input type="checkbox"/> No <input type="checkbox"/>

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

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 5 of 5)

**WARRANT 9 - Intersection Near a Grade Crossing
 (Both Parts A and B Must Be Satisfied)**

SATISFIED YES NO *N.A.*

<p>PART A</p> <p>A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach. Track Center Line to Limit Line _____ ft</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>
<p>PART B</p> <p>There is one minor street approach lane at the track crossing - During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point falls above the applicable curve in Figure 4C-9.</p> <p>Major Street - Total of both approaches: _____ VPH Minor Street - Crosses the track (one direction only, approaching the intersection): _____ VPH X AF (Use Tables 4C-2, 3, & 4 below to calculate AF) = _____ VPH</p> <hr/> <p>OR, There are two or more minor street approach lanes at the track crossing - During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point falls above the applicable curve in Figure 4C-10.</p> <p>Major Street - Total of both approaches : _____ VPH Minor Street - Crosses the track (one direction only, approaching the intersection): _____ VPH X AF (Use Tables 4C-2, 3, & 4 below to calculate AF) = _____ VPH</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>

The minor street approach volume may be multiplied by up to three following adjustment factors (AF) as described in Section 4C.10.

- 1- Number of Rail Traffic per Day _____ Adjustment factor from table 4C-2 _____
- 2- Percentage of High-Occupancy Buses on Minor Street Approach _____ Adjustment factor from table 4C-3 _____
- 3- Percentage of Tractor-Trailer Trucks on Minor Street Approach _____ Adjustment factor from table 4C-4 _____

NOTE: If no data is available or known, then use AF = 1 (no adjustment)

Appendix J

85th Percentile Approach Speeds for Corner Sight Distance Analysis

LAKE JENNINGS S-O VISTA JENNINGS

PTD14-0214-01

NORTHBOUND

24HR 85TH PERCENTILE = 39

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 AM	0	0	0	0	0	0	2	2	1	0	0	0	0	5	0.07%
12:15:00 AM	0	0	0	1	1	2	5	3	0	0	1	0	0	13	0.18%
12:30:00 AM	0	0	0	1	1	3	4	4	0	0	0	0	0	13	0.18%
12:45:00 AM	0	0	0	0	2	0	5	4	2	0	0	0	0	13	0.18%
1:00:00 AM	0	0	0	1	0	0	2	3	0	0	0	0	0	6	0.08%
1:15:00 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.01%
1:30:00 AM	0	0	0	1	0	1	5	1	0	0	0	0	0	8	0.11%
1:45:00 AM	0	0	1	0	0	1	2	2	0	1	0	0	0	7	0.10%
2:00:00 AM	0	0	0	0	1	0	0	2	0	0	0	0	0	3	0.04%
2:15:00 AM	0	0	0	0	1	1	1	1	0	0	0	0	0	4	0.06%
2:30:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.01%
2:45:00 AM	0	0	1	0	0	2	0	1	1	0	0	0	0	5	0.07%
3:00:00 AM	0	0	0	0	0	2	1	1	0	0	0	0	0	4	0.06%
3:15:00 AM	0	0	0	1	0	0	0	3	0	0	0	0	0	4	0.06%
3:30:00 AM	0	0	0	0	1	2	1	2	1	0	0	0	0	7	0.10%
3:45:00 AM	0	0	0	0	0	2	2	2	0	0	0	0	0	6	0.08%
4:00:00 AM	0	0	0	0	1	2	0	0	0	0	0	0	0	3	0.04%
4:15:00 AM	0	0	0	0	3	3	5	1	1	1	0	0	0	14	0.20%
4:30:00 AM	0	0	0	0	0	2	2	6	4	1	0	0	0	15	0.21%
4:45:00 AM	0	0	0	0	6	3	8	9	3	0	0	0	0	29	0.41%
5:00:00 AM	0	0	0	0	1	1	5	8	2	0	0	0	0	17	0.24%
5:15:00 AM	0	0	0	1	5	11	9	6	2	1	0	0	0	35	0.49%
5:30:00 AM	0	0	1	0	3	15	7	7	2	0	0	0	0	35	0.49%
5:45:00 AM	0	0	1	0	7	10	19	9	7	1	0	0	0	54	0.76%
6:00:00 AM	0	0	0	1	4	26	21	6	4	3	0	0	0	65	0.92%
6:15:00 AM	0	1	0	4	18	16	20	14	3	0	0	0	0	76	1.07%
6:30:00 AM	0	0	4	15	21	30	32	6	0	1	0	0	0	109	1.54%
6:45:00 AM	2	5	5	8	23	57	25	14	3	0	0	0	0	142	2.00%
7:00:00 AM	0	0	2	15	32	35	22	9	5	1	0	0	0	121	1.70%
7:15:00 AM	0	0	2	8	34	49	28	7	2	0	0	0	0	130	1.83%
7:30:00 AM	2	3	5	12	25	50	24	7	0	0	0	0	0	128	1.80%
7:45:00 AM	1	8	11	12	30	41	22	10	2	0	1	0	0	138	1.94%
8:00:00 AM	2	1	4	12	32	44	21	12	1	1	0	0	0	130	1.83%
8:15:00 AM	2	3	9	14	11	44	28	8	1	0	0	0	0	120	1.69%
8:30:00 AM	0	0	0	13	25	42	21	6	2	0	0	0	0	109	1.54%
8:45:00 AM	0	0	2	10	26	35	15	11	0	0	0	0	0	99	1.39%
9:00:00 AM	0	1	0	2	19	41	25	10	0	1	0	0	0	99	1.39%
9:15:00 AM	0	0	0	5	23	37	13	6	1	0	0	0	0	85	1.20%
9:30:00 AM	1	1	1	4	26	37	21	3	1	0	0	0	0	95	1.34%
9:45:00 AM	0	1	5	10	24	23	11	4	0	0	0	0	0	78	1.10%
10:00:00 AM	0	0	3	6	15	48	19	6	0	0	0	0	0	97	1.37%
10:15:00 AM	1	0	1	6	25	17	18	8	1	0	0	0	0	77	1.08%
10:30:00 AM	1	0	2	6	22	17	13	3	0	0	0	0	0	64	0.90%
10:45:00 AM	0	0	2	3	29	34	11	5	1	0	0	0	0	85	1.20%
11:00:00 AM	3	0	7	9	21	29	13	3	1	0	0	0	0	86	1.21%
11:15:00 AM	0	0	0	5	9	34	16	3	2	0	0	0	0	69	0.97%
11:30:00 AM	0	1	4	12	17	22	16	2	0	0	0	0	0	74	1.04%
11:45:00 AM	0	0	5	10	31	42	17	5	2	1	0	0	0	113	1.59%
AM TOTAL	15	25	78	208	575	913	558	245	59	13	2	0	0	2,691	37.91%
PERCENTAGE	0.6%	0.9%	2.9%	7.7%	21.4%	33.9%	20.7%	9.1%	2.2%	0.5%	0.1%	0.0%	0.0%		
CUMULATIVE	15	40	118	326	901	1,814	2,372	2,617	2,676	2,689	2,691	2,691	2,691		
PERCENTAGE	0.6%	1.5%	4.4%	12.1%	33.5%	67.4%	88.1%	97.3%	99.4%	99.9%	100.0%	100.0%	100.0%		

15th Percentile	27	Mean Speed Average	33
50th Percentile	33	10 MPH Pace Speed	27-36
85th Percentile	39	Number in Pace	1688
95th Percentile	43	Percent in Pace	63%

**LAKE JENNINGS S-O VISTA JENNINGS
NORTHBOUND**

PTD14-0214-01

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 PM	1	0	2	8	34	34	12	9	1	0	0	0	0	101	1.42%
12:15:00 PM	0	1	0	8	28	32	19	1	1	0	0	0	0	90	1.27%
12:30:00 PM	0	0	2	11	19	37	11	7	0	1	0	0	0	88	1.24%
12:45:00 PM	0	0	1	11	45	43	18	3	2	0	0	0	0	123	1.73%
1:00:00 PM	0	0	2	17	35	35	14	3	1	0	0	0	0	107	1.51%
1:15:00 PM	0	4	4	5	26	33	11	10	2	1	0	0	0	96	1.35%
1:30:00 PM	0	0	4	17	19	33	24	8	1	0	0	0	0	106	1.49%
1:45:00 PM	2	0	8	7	21	29	13	4	1	0	0	0	0	85	1.20%
2:00:00 PM	2	0	0	11	46	30	13	3	0	0	0	0	0	105	1.48%
2:15:00 PM	0	0	3	19	34	55	12	4	1	2	0	0	0	130	1.83%
2:30:00 PM	0	0	6	19	28	46	15	6	2	0	0	0	0	122	1.72%
2:45:00 PM	0	0	2	11	29	40	38	6	1	0	0	0	0	127	1.79%
3:00:00 PM	0	0	4	11	29	38	14	12	3	0	0	0	0	111	1.56%
3:15:00 PM	0	7	3	6	31	48	21	8	1	0	0	0	0	125	1.76%
3:30:00 PM	2	0	4	7	24	48	30	4	2	0	0	0	0	121	1.70%
3:45:00 PM	0	1	1	10	37	51	25	18	3	1	0	0	0	147	2.07%
4:00:00 PM	2	2	3	19	41	38	28	9	1	0	0	0	0	143	2.01%
4:15:00 PM	0	0	0	8	40	55	35	8	2	0	0	0	0	148	2.08%
4:30:00 PM	0	2	14	17	40	44	19	11	1	0	0	0	0	148	2.08%
4:45:00 PM	1	4	1	21	34	49	13	5	3	0	0	0	0	131	1.85%
5:00:00 PM	0	0	0	9	33	65	27	13	1	0	0	0	0	148	2.08%
5:15:00 PM	4	0	5	21	30	44	20	5	0	0	0	0	0	129	1.82%
5:30:00 PM	0	0	1	7	30	60	31	10	0	0	0	0	0	139	1.96%
5:45:00 PM	0	1	3	5	38	51	34	9	1	0	0	0	0	142	2.00%
6:00:00 PM	0	0	2	2	36	39	23	9	1	1	0	0	0	113	1.59%
6:15:00 PM	0	0	5	22	43	29	20	11	2	0	1	0	0	133	1.87%
6:30:00 PM	0	0	0	10	47	38	22	13	1	0	0	0	0	131	1.85%
6:45:00 PM	0	1	1	2	28	28	17	6	1	2	0	0	0	86	1.21%
7:00:00 PM	0	0	1	10	36	29	13	4	0	0	0	0	0	93	1.31%
7:15:00 PM	0	0	1	6	12	31	19	8	0	0	0	0	0	77	1.08%
7:30:00 PM	0	0	0	4	17	18	15	10	2	0	0	0	0	66	0.93%
7:45:00 PM	0	0	0	4	17	29	10	9	2	0	0	0	0	71	1.00%
8:00:00 PM	0	2	1	5	9	19	16	12	1	0	0	0	0	65	0.92%
8:15:00 PM	0	0	0	11	21	26	16	2	3	0	0	0	0	79	1.11%
8:30:00 PM	0	0	2	5	16	12	19	8	1	0	0	0	0	63	0.89%
8:45:00 PM	0	0	0	12	15	15	11	8	1	0	0	0	0	62	0.87%
9:00:00 PM	0	0	0	1	13	10	15	13	3	1	0	0	0	56	0.79%
9:15:00 PM	0	0	0	7	17	23	21	5	1	0	0	0	0	74	1.04%
9:30:00 PM	0	0	0	2	5	18	15	8	3	0	0	0	0	51	0.72%
9:45:00 PM	0	0	0	0	12	16	11	3	1	0	0	0	0	43	0.61%
10:00:00 PM	0	0	0	2	5	11	16	6	3	0	0	0	0	43	0.61%
10:15:00 PM	0	0	0	2	2	11	9	5	2	1	0	0	0	32	0.45%
10:30:00 PM	0	0	1	2	2	8	4	7	1	0	0	0	0	25	0.35%
10:45:00 PM	0	0	2	0	11	5	13	1	1	0	0	0	0	33	0.46%
11:00:00 PM	0	0	0	4	4	8	9	4	1	2	0	0	0	32	0.45%
11:15:00 PM	0	0	0	0	7	4	8	3	1	2	0	0	0	25	0.35%
11:30:00 PM	0	0	0	0	2	7	9	4	1	0	0	0	0	23	0.32%
11:45:00 PM	0	0	0	1	2	6	8	3	0	0	0	0	0	20	0.28%
PM TOTAL	14	25	89	399	1,150	1,478	836	338	64	14	1	0	0	4,408	62.09%
PERCENTAGE	0.3%	0.6%	2.0%	9.1%	26.1%	33.5%	19.0%	7.7%	1.5%	0.3%	0.0%	0.0%	0.0%		
CUMULATIVE	14	39	128	527	1,677	3,155	3,991	4,329	4,393	4,407	4,408	4,408	4,408		
PERCENTAGE	0.3%	0.9%	2.9%	12.0%	38.0%	71.6%	90.5%	98.2%	99.7%	100.0%	100.0%	100.0%	100.0%		

15th Percentile	26	Mean Speed Average										32			
50th Percentile	32	10 MPH Pace Speed										27-36			
85th Percentile	39	Number in Pace										2242			
95th Percentile	43	Percent in Pace										51%			
DAY TOTAL	29	50	167	607	1,725	2,391	1,394	583	123	27	3	0	0	7,099	100.00%
PERCENTAGE	0.4%	0.7%	2.4%	8.6%	24.3%	33.7%	19.6%	8.2%	1.7%	0.4%	0.0%	0.0%	0.0%	7,099	100.00%
	0.4%	1.1%	3.5%	12.0%	36.3%	70.0%	89.6%	97.8%	99.6%	100.0%	100.0%	100.0%	100.0%		

LAKE JENNINGS N-O VISTA JENNINGS

PTD14-0214-01

SOUTHBOUND

24HR 85TH PERCENTILE = 36

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 AM	0	0	1	1	0	2	3	1	0	0	0	0	0	8	0.11%
12:15:00 AM	0	0	0	0	0	3	3	2	2	0	0	0	0	10	0.14%
12:30:00 AM	0	0	0	2	0	5	3	1	0	0	0	0	0	11	0.15%
12:45:00 AM	0	0	0	0	0	2	1	2	0	0	0	0	0	5	0.07%
1:00:00 AM	0	0	2	2	0	0	2	2	2	0	0	0	0	10	0.14%
1:15:00 AM	0	0	0	1	0	0	3	0	0	0	0	0	0	4	0.05%
1:30:00 AM	0	0	0	0	1	0	2	0	0	0	0	0	0	3	0.04%
1:45:00 AM	0	0	0	1	0	0	2	0	0	0	0	0	0	3	0.04%
2:00:00 AM	0	0	0	1	0	0	2	0	0	0	0	0	0	3	0.04%
2:15:00 AM	0	0	0	1	0	0	3	0	2	0	0	0	0	6	0.08%
2:30:00 AM	0	0	1	1	1	0	1	3	0	0	0	0	0	7	0.10%
2:45:00 AM	0	0	0	0	0	2	1	2	0	0	0	0	0	5	0.07%
3:00:00 AM	0	0	0	0	0	1	2	1	1	0	0	0	0	5	0.07%
3:15:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.01%
3:30:00 AM	0	0	0	0	0	4	2	0	0	0	0	0	0	6	0.08%
3:45:00 AM	0	0	0	2	0	1	2	1	0	0	0	0	0	6	0.08%
4:00:00 AM	0	0	0	0	0	1	4	2	1	0	0	0	0	8	0.11%
4:15:00 AM	0	0	0	0	0	0	3	1	0	0	0	0	0	4	0.05%
4:30:00 AM	0	0	0	1	3	4	0	2	0	0	0	0	0	10	0.14%
4:45:00 AM	0	0	0	3	2	2	1	3	1	1	0	0	0	13	0.18%
5:00:00 AM	0	0	0	3	0	8	5	8	0	0	0	0	0	24	0.33%
5:15:00 AM	0	0	2	6	2	4	7	8	1	0	0	0	0	30	0.41%
5:30:00 AM	0	0	1	10	8	7	8	3	1	0	0	0	0	38	0.52%
5:45:00 AM	0	0	2	22	12	10	11	9	2	0	0	0	0	68	0.93%
6:00:00 AM	0	0	0	6	1	14	17	7	1	1	0	0	0	47	0.64%
6:15:00 AM	0	0	4	9	6	8	15	3	2	0	0	0	0	47	0.64%
6:30:00 AM	0	0	4	15	12	14	15	9	0	0	0	0	0	69	0.94%
6:45:00 AM	1	5	25	30	15	10	18	0	0	0	0	0	0	104	1.42%
7:00:00 AM	2	6	15	29	23	18	18	1	0	0	0	0	0	112	1.53%
7:15:00 AM	2	2	15	38	29	16	10	2	0	0	0	0	0	114	1.56%
7:30:00 AM	3	2	24	34	23	18	6	3	0	0	0	0	0	113	1.55%
7:45:00 AM	2	3	16	44	34	17	9	0	0	0	0	0	0	125	1.71%
8:00:00 AM	3	7	21	41	20	13	4	0	1	0	0	0	0	110	1.51%
8:15:00 AM	1	13	13	58	26	20	5	1	0	0	0	1	0	138	1.89%
8:30:00 AM	4	7	27	36	13	19	11	1	0	0	0	0	0	118	1.62%
8:45:00 AM	0	1	21	36	18	16	7	1	0	0	0	0	0	100	1.37%
9:00:00 AM	1	6	15	33	26	17	19	2	1	0	0	0	0	120	1.64%
9:15:00 AM	0	0	13	26	28	23	8	1	1	0	0	0	0	100	1.37%
9:30:00 AM	4	8	11	27	16	12	12	2	0	0	0	0	0	92	1.26%
9:45:00 AM	1	2	10	35	13	21	8	3	0	0	1	0	0	94	1.29%
10:00:00 AM	0	0	3	23	15	25	20	3	0	0	0	0	0	89	1.22%
10:15:00 AM	0	1	6	29	18	20	4	2	1	0	0	0	0	81	1.11%
10:30:00 AM	2	2	20	19	38	15	13	1	1	0	0	0	0	111	1.52%
10:45:00 AM	2	1	15	40	16	12	8	3	0	0	0	0	0	97	1.33%
11:00:00 AM	4	1	16	37	32	16	6	1	1	0	0	0	0	114	1.56%
11:15:00 AM	0	2	14	26	14	11	13	1	0	0	0	0	0	81	1.11%
11:30:00 AM	2	2	13	34	21	9	9	2	0	0	0	0	0	92	1.26%
11:45:00 AM	0	2	12	31	24	16	5	1	0	0	0	0	0	91	1.25%
AM TOTAL	34	73	342	793	510	437	331	101	22	2	1	1	0	2,647	36.25%
PERCENTAGE	1.3%	2.8%	12.9%	30.0%	19.3%	16.5%	12.5%	3.8%	0.8%	0.1%	0.0%	0.0%	0.0%		
CUMULATIVE	34	107	449	1,242	1,752	2,189	2,520	2,621	2,643	2,645	2,646	2,647	2,647		
PERCENTAGE	1.3%	4.0%	17.0%	46.9%	66.2%	82.7%	95.2%	99.0%	99.8%	99.9%	100.0%	100.0%	100.0%		

15th Percentile	21	Mean Speed Average	27
50th Percentile	26	10 MPH Pace Speed	21-30
85th Percentile	36	Number in Pace	1395
95th Percentile	40	Percent in Pace	53%

**LAKE JENNINGS N-O VISTA JENNINGS
SOUTHBOUND**

PTD14-0214-01

Thursday, February 13, 2014

PREPARED BY: PACIFIC TECHNICAL DATA, LLC

Time	1 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 +	TOTAL	%VEHICLES
12:00:00 PM	0	4	6	34	12	11	12	1	1	0	0	0	0	81	1.11%
12:15:00 PM	1	0	2	29	19	23	11	0	0	0	0	0	0	85	1.16%
12:30:00 PM	3	3	5	25	20	23	7	4	0	0	0	0	0	90	1.23%
12:45:00 PM	0	1	5	30	17	14	17	4	0	0	0	0	0	88	1.21%
1:00:00 PM	1	3	13	22	25	27	11	1	1	0	0	0	0	104	1.42%
1:15:00 PM	1	2	12	38	16	6	11	1	1	0	0	0	0	88	1.21%
1:30:00 PM	0	1	6	23	25	25	10	2	0	0	0	0	0	92	1.26%
1:45:00 PM	5	8	17	32	19	13	19	1	0	0	0	0	0	114	1.56%
2:00:00 PM	1	3	7	31	19	32	6	3	0	0	0	0	0	102	1.40%
2:15:00 PM	0	3	11	27	25	19	16	5	1	0	0	0	0	107	1.47%
2:30:00 PM	0	3	17	42	31	13	9	2	1	0	0	0	0	118	1.62%
2:45:00 PM	11	12	26	53	21	20	11	0	0	0	0	0	0	154	2.11%
3:00:00 PM	4	3	6	30	51	26	11	3	0	0	0	0	0	134	1.84%
3:15:00 PM	7	4	17	57	41	14	6	0	0	0	0	0	0	146	2.00%
3:30:00 PM	2	2	21	55	43	14	10	1	0	0	0	0	0	148	2.03%
3:45:00 PM	8	8	25	33	23	16	11	2	1	0	0	0	0	127	1.74%
4:00:00 PM	4	5	12	59	25	23	7	1	0	0	0	0	0	136	1.86%
4:15:00 PM	11	12	9	61	31	15	12	4	1	0	0	0	0	156	2.14%
4:30:00 PM	9	5	9	52	26	19	20	2	0	0	0	0	0	142	1.94%
4:45:00 PM	11	9	21	78	33	18	12	1	0	0	0	0	0	183	2.51%
5:00:00 PM	4	6	19	66	39	26	16	1	0	0	0	0	0	177	2.42%
5:15:00 PM	6	15	38	35	37	22	9	0	0	0	0	0	0	162	2.22%
5:30:00 PM	2	7	19	64	22	28	21	1	0	0	0	0	0	164	2.25%
5:45:00 PM	3	16	26	55	29	8	7	1	0	0	0	0	0	145	1.99%
6:00:00 PM	11	9	23	43	34	20	6	4	1	0	0	0	0	151	2.07%
6:15:00 PM	6	10	19	61	34	13	5	0	0	0	0	0	0	148	2.03%
6:30:00 PM	1	4	17	37	28	46	14	0	0	0	0	0	0	147	2.01%
6:45:00 PM	0	2	17	35	28	18	9	2	0	0	0	0	0	111	1.52%
7:00:00 PM	2	2	20	34	21	26	7	1	0	0	0	0	0	113	1.55%
7:15:00 PM	1	4	6	17	16	22	13	2	2	0	0	0	0	83	1.14%
7:30:00 PM	0	1	7	20	15	17	10	3	0	0	0	0	0	73	1.00%
7:45:00 PM	0	1	5	13	12	14	22	4	0	0	0	0	0	71	0.97%
8:00:00 PM	1	1	5	5	16	23	21	1	0	0	0	0	0	73	1.00%
8:15:00 PM	1	0	5	5	6	19	22	3	2	0	0	0	0	63	0.86%
8:30:00 PM	1	1	6	11	5	21	18	7	0	0	0	0	0	70	0.96%
8:45:00 PM	0	0	7	14	15	12	12	8	1	0	0	0	0	69	0.94%
9:00:00 PM	0	2	1	3	5	21	21	2	1	0	0	0	0	56	0.77%
9:15:00 PM	1	0	4	9	12	16	15	4	1	0	0	0	0	62	0.85%
9:30:00 PM	0	0	3	14	12	19	7	4	0	0	0	0	0	59	0.81%
9:45:00 PM	0	1	1	10	4	13	19	4	0	0	0	0	0	52	0.71%
10:00:00 PM	0	0	2	7	8	22	11	1	0	0	0	0	0	51	0.70%
10:15:00 PM	0	0	0	0	2	6	12	3	2	0	0	0	0	25	0.34%
10:30:00 PM	0	0	1	4	4	13	2	1	0	0	0	0	0	25	0.34%
10:45:00 PM	0	0	3	0	2	10	9	4	3	0	0	0	0	31	0.42%
11:00:00 PM	0	1	0	2	2	3	10	1	0	0	0	0	0	19	0.26%
11:15:00 PM	0	0	1	3	3	2	8	2	0	0	0	0	0	19	0.26%
11:30:00 PM	0	0	1	6	1	4	3	4	0	1	0	0	0	20	0.27%
11:45:00 PM	0	0	1	1	2	4	7	5	1	0	0	0	0	21	0.29%
PM TOTAL	119	174	504	1,385	936	839	565	111	21	1	0	0	0	4,655	63.75%
PERCENTAGE	2.6%	3.7%	10.8%	29.8%	20.1%	18.0%	12.1%	2.4%	0.5%	0.0%	0.0%	0.0%	0.0%		
CUMULATIVE	119	293	797	2,182	3,118	3,957	4,522	4,633	4,654	4,655	4,655	4,655	4,655		
PERCENTAGE	2.6%	6.3%	17.1%	46.9%	67.0%	85.0%	97.1%	99.5%	100.0%	100.0%	100.0%	100.0%	100.0%		

15th Percentile	20	Mean Speed Average	27
50th Percentile	27	10 MPH Pace Speed	21-30
85th Percentile	35	Number in Pace	2089
95th Percentile	39	Percent in Pace	45%

DAY TOTAL	153	247	846	2,178	1,446	1,276	896	212	43	3	1	1	0	7,302	100.00%
PERCENTAGE	2.1%	3.4%	11.6%	29.8%	19.8%	17.5%	12.3%	2.9%	0.6%	0.0%	0.0%	0.0%	0.0%	7,302	100.00%
	2.1%	5.5%	17.1%	46.9%	66.7%	84.2%	96.4%	99.3%	99.9%	100.0%	100.0%	100.0%	100.0%		

Appendix K

Corner Sight Distance Data

Corner Sight Distance Looking North on Lake Jennings Park Rd from Jennings Vista Drive



Corner Sight Distance Looking South on Lake Jennings Park Rd from Jennings Vista Drive

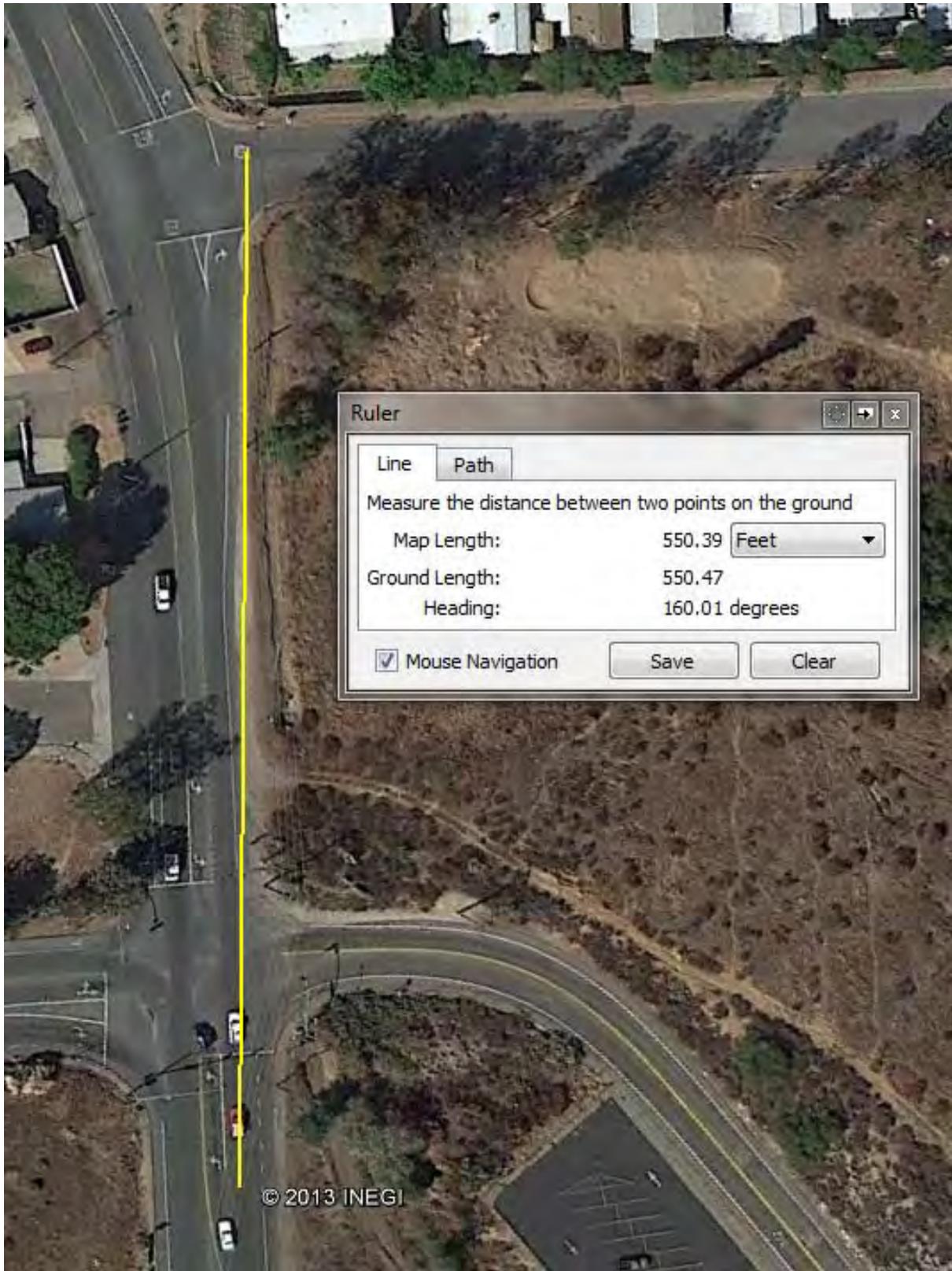


Corner Sight Distance Looking North on Lake Jennings Park Rd from Jennings Vista Drive



Source: Google Earth

Corner Sight Distance Looking South on Lake Jennings Park Rd from Jennings Vista Drive



Source: Google Earth

Appendix L

Transit Service Near Project

Source: MTS Webpage

