

PLACENTIA ALTA VISTA

TRAFFIC ANALYSIS

PREPARED BY: Janette Cachola | jcachola@urbanxroads.com
 Marlie Whiteman, P.E. | mwhiteman@urbanxroads.com
 John Kain, AICP | jkain@urbanxroads.com

TABLE OF CONTENTS

Table of Contents	ii
Appendices.....	iv
List of Exhibits.....	v
List of Tables	vi
List of Abbreviated Terms	vii
1 Executive summary	1
1.1 Study Area	1
1.2 Analysis Findings	1
1.3 Circulation System Operations and Recommended Improvements	3
1.4 On-Site Roadway and Site Access Improvements	3
2 Introduction.....	5
2.1 Site Location and Study Area Boundaries	5
2.2 Existing Land Use, Approved and Proposed Project	5
2.3 Committed and Proposed Developments in the Vicinity of the Project.....	7
2.4 Existing and Proposed Roadways and Intersections.....	7
2.5 Analysis Scenarios	16
3 Methodology and Thresholds.....	17
3.1 Level of Service	17
3.2 Intersection Capacity Analysis	17
3.3 Traffic Signal Warrant Analysis Methodology.....	18
3.4 Minimum Acceptable Levels of Service (LOS).....	19
3.5 Deficiency Criteria	19
4 Level of Service (LOS) Analysis.....	21
4.1 Existing Traffic Analysis	21
4.2 Project Trip Generation.....	21
4.3 Project Trip Distribution.....	25
4.4 Modal Split	25
4.5 Project Trip Assignment	25
4.6 Background Traffic	25
4.7 Existing plus Approved and Pending Projects Traffic Conditions	25
4.8 Existing plus Approved and Pending Projects plus Project Traffic Conditions	28
5 Traffic Signal Warrants.....	33

6	Site Access Analysis.....	35
6.1	Site Access.....	35
6.2	Queuing Analysis and Entry Gate Operations.....	35
7	Active Transportation and Public Transit.....	39
7-1	Transit Service.....	39
7-2	Pedestrian and Bicycle Facilities.....	39
8	References.....	43

APPENDICES

Appendix 2.1: Traffic Study Scoping Agreement

Appendix 2.2: Traffic Counts – December 2021 and July 2022

Appendix 4.1: Existing (2022) Conditions Intersection Operations Analysis Worksheets

Appendix 4.2: Existing plus Approved and Pending Projects Conditions
Intersection Operations Analysis Worksheets

Appendix 4.3: Existing plus Approved and Pending Projects Plus Project Conditions
Intersection Operations Analysis Worksheets

Appendix 5.1: Traffic Signal Warrant Analysis Worksheets

LIST OF EXHIBITS

Exhibit 1-1: Study Area.....	2
Exhibit 2-1: Preliminary Site Plan	6
Exhibit 2-2: Cumulative Development Location Map	8
Exhibit 2-3: Cumulative Only Traffic Volumes	10
Exhibit 2-4: Existing Number of Through Lanes and Intersection Controls	11
Exhibit 2-5: City of Placentia General Plan Circulation Element.....	12
Exhibit 2-6: City of Placentia General Plan Roadway Cross-Sections	13
Exhibit 2-7: Existing (2022) Traffic Volumes	15
Exhibit 4-1: Project Trip Distribution.....	26
Exhibit 4-2: Project Only Traffic volumes	27
Exhibit 4-3: Existing plus Approved and Pending Projects Traffic Volumes	30
Exhibit 4-4: Existing plus Approved and Pending Projects Plus Project Traffic Volumes	32
Exhibit 6-1: Site Access Recommendations	36
Exhibit 7-1: City of Placentia General Plan Existing and Proposed Bike Network	40
Exhibit 7-2: Existing Pedestrian Facilities	41

LIST OF TABLES

Table 1-1: Intersection Analysis Locations	1
Table 2-1: Cumulative Development Land Use Summary	9
Table 2-2: Existing Count Data Seasonal Adjustment	14
Table 3-1: Signalized Intersection LOS Thresholds.....	17
Table 3-2: Unsignalized Intersection LOS Thresholds	18
Table 4-1: Intersection Analysis for Existing (2022) Conditions	22
Table 4-2: Project Trip Generation Summary	23
Table 4-3: Project Trip Generation Comparison	24
Table 4-4: Intersection Analysis for Existing plus Approved and Pending Projects Conditions	29
Table 4-5: Intersection Analysis for Existing plus Approved and Pending Projects Plus Project Conditions	31
Table 6-1: Project Access Queuing Analysis for Existing Plus Approved and Pending Projects Plus Project Conditions	37

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
CAMUTCD	California Manual on Uniform Traffic Control Devices
Caltrans	California Department of Transportation
DU	Dwelling Unit
HCM	Highway Capacity Manual
ICU	Intersection Capacity Utilization
ITE	Institute of Transportation Engineers
LOS	Level of Service
Project	Placentia Alta Vista
TSF	Thousand Square Feet
TA	Traffic Analysis

This page intentionally left blank

1 EXECUTIVE SUMMARY

This report presents the results of the traffic analysis (TA) for Placentia Alta Vista residential project (“Project”). The Placentia Alta Vista Project is a 100-unit single family residential project generally located north of Alta Vista Street and east of N Rose Drive in the City of Placentia, as shown on Exhibit 1-1. The City of Placentia previously prepared an initial study/mitigated negative declaration (IS/MND) and approved a vesting tentative subdivision map for 74 single family residences. The prior property owner recorded a final subdivision map for a total of 62 single-family lots with a remainder parcel covering the existing oil operations area. Consequently, the purpose of this Traffic Analysis (TA) is to evaluate the traffic impacts associated with the Project’s net increase in 26 dwelling units compared to the prior approved residential project and the cumulative traffic impacts of the 100-unit Project.

1.1 STUDY AREA

The following study area intersections shown on Exhibit 1-1 and listed in Table 1-1 were selected for this TA based on consultation with City of Placentia.

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

#	Intersection
1	Rose Drive / Alta Vista Street
2	Project Driveway-Alta Vista Residential / Alta Vista Street
3	Jefferson Street / Alta Vista Street

1.2 ANALYSIS FINDINGS

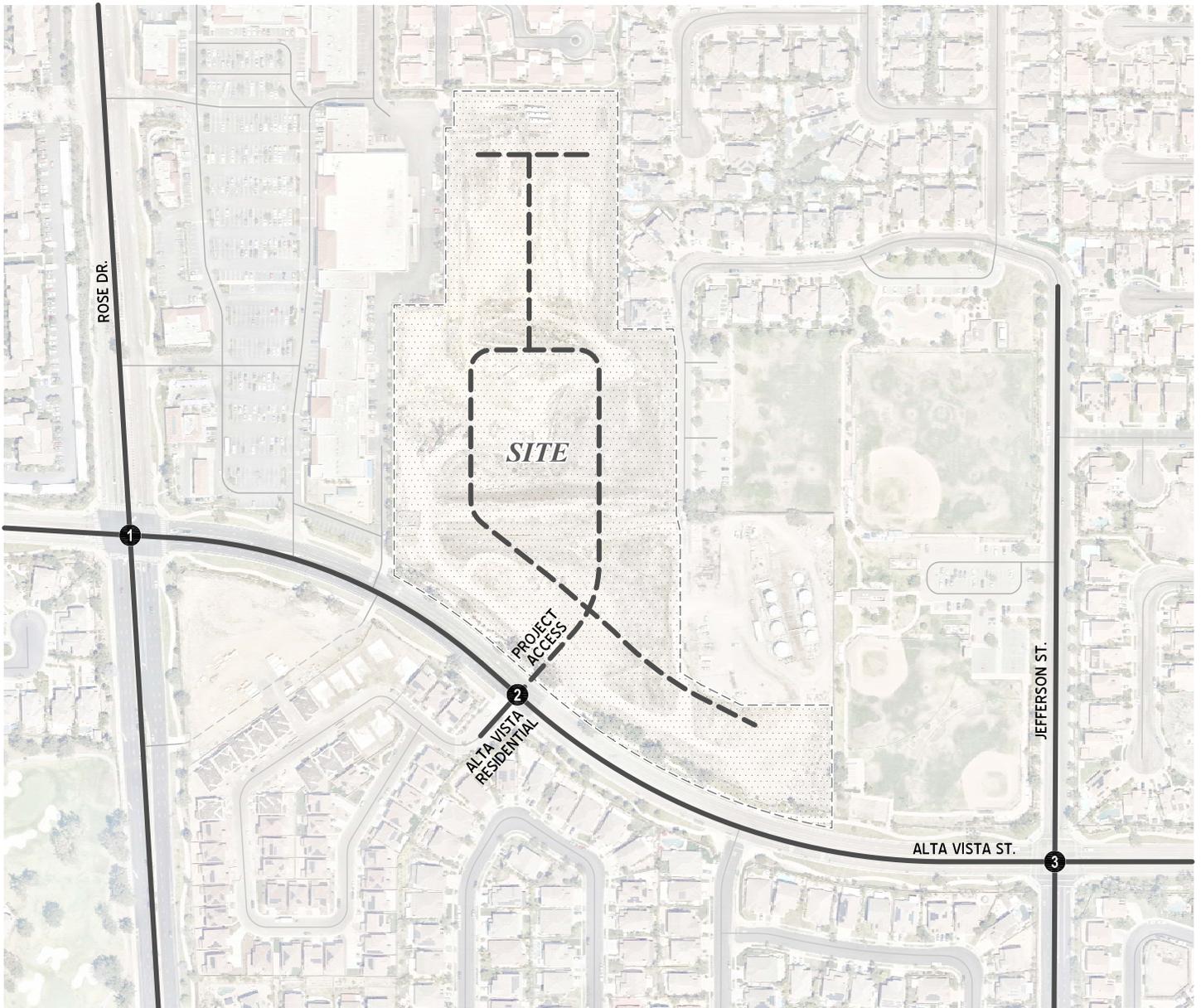
The City of Placentia approved Vesting Tentative Tract Map #15700 for 74 single family residences and recorded the final Tract Map #15700 allowing the development of 62 homes on 62 lots. Tract Map 15700 divides the Property today into 62 lots with a remainder parcel. Toll Brothers is proposing to process a new subdivision map for the Project that would increase the number of lots compared to the original VTM Tract Map 15700. . Vesting TTM 19250 adds 26 additional residential units, for a total of 100 lots. The analysis evaluated the traffic impacts associated with the 26-lot increase compared to the prior IS/MND analysis and approved Tract Map #15700 and the cumulative impacts associated with the entire 100-unit Project.

This circulation and access evaluation focuses on Existing (2022), Existing plus Other Approved and Pending Projects, and Existing plus Other Approved and Pending Projects plus Full Project (100 dwelling units).

1.2.1 EXISTING (2022) CONDITIONS

For Existing (2022) traffic conditions, the study intersections currently operate at an acceptable LOS (LOS “D” or better) during the AM and PM peak hours. The existing unsignalized intersection (Alta Vista Residential at Alta Vista Street) does not currently meet the volume warrants for installation of a traffic signal.

EXHIBIT 1-1: TRAFFIC ANALYSIS STUDY AREA



LEGEND:

- ① = INTERSECTION ANALYSIS LOCATION
- = FUTURE ROADWAY



1.2.2 EXISTING PLUS APPROVED AND PENDING PROJECTS CONDITIONS

For Existing plus Approved and Pending Projects and Existing plus Approved and Pending Projects plus Project traffic conditions, study intersections continue to operate at an acceptable LOS (i.e., LOS "D" or better) during AM and PM peak hours, with or without the addition of Project traffic. The unsignalized intersection (Project Driveway - Alta Vista Residential at Alta Vista Street) is not anticipated to meet the volume warrants for installation of a traffic signal.

1.3 CIRCULATION SYSTEM OPERATIONS AND RECOMMENDED IMPROVEMENTS

The Traffic Analysis determined that study area intersections would experience acceptable intersection operations with cross-street stop control for the Project Driveway at Alta Vista Street.

1.4 ON-SITE ROADWAY AND SITE ACCESS IMPROVEMENTS

Access to the Project will be provided to Alta Vista Street, east of Rose Drive via one gated full access driveway. The gated Project entry is aligned opposite the existing local street entry to the residential area south of Alta Vista Street. Along Alta Vista Street, an existing two-way left turn striped median accommodates vehicles turning left.

Roadway improvements necessary to provide site access consist of one resident bypass lane and one visitor lane with unstaffed call box. Outbound from the site, one southbound shared left-through lane and one southbound defacto right turn lane are provided. Southbound cross-street stop control is adequate at the Project exit, and a traffic signal is not warranted. These Project access improvements shall be in place prior to occupancy of the first on-site residential unit.

This page intentionally left blank

2 INTRODUCTION

This report presents the results of the TA for Placentia Alta Vista (“Project”), which is generally located north of Alta Vista Street and east of N Rose Drive in the City of Placentia, as shown on Exhibit 2-1.

The purpose of this TA is to evaluate the potential circulation system deficiencies that may result from the development of the proposed Project (based on the 26-unit increase in lots and the total 100-unit cumulative condition), and recommend improvements to achieve acceptable circulation system operational conditions. This TA has been prepared based in accordance with the City of Placentia’s Traffic Impact Analysis Guidelines for Vehicle Miles Traveled and Level of Service Assessment (January 2021). (1) To ensure that this TA satisfies the City of Placentia’s traffic study requirements, Urban Crossroads, Inc. prepared a traffic study scoping package for review by City staff prior to the preparation of this report. The Agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology. The Agreement is included in Appendix 2.1.

This section provides a summary of the existing circulation network, the City of Placentia General Plan Circulation Network, and a review of existing conditions traffic volumes.

2.1 SITE LOCATION AND STUDY AREA BOUNDARIES

The Project study area was defined in coordination with the City of Placentia. According to the guidelines, intersections should be identified for analysis based on Project contribution of 51 or more peak hour trips. For this access evaluation, two off-site nearby intersections are included for analysis purposes (in addition to the Project entry). Exhibit 1-1 (previously presented) shows the study area and intersection analysis locations.

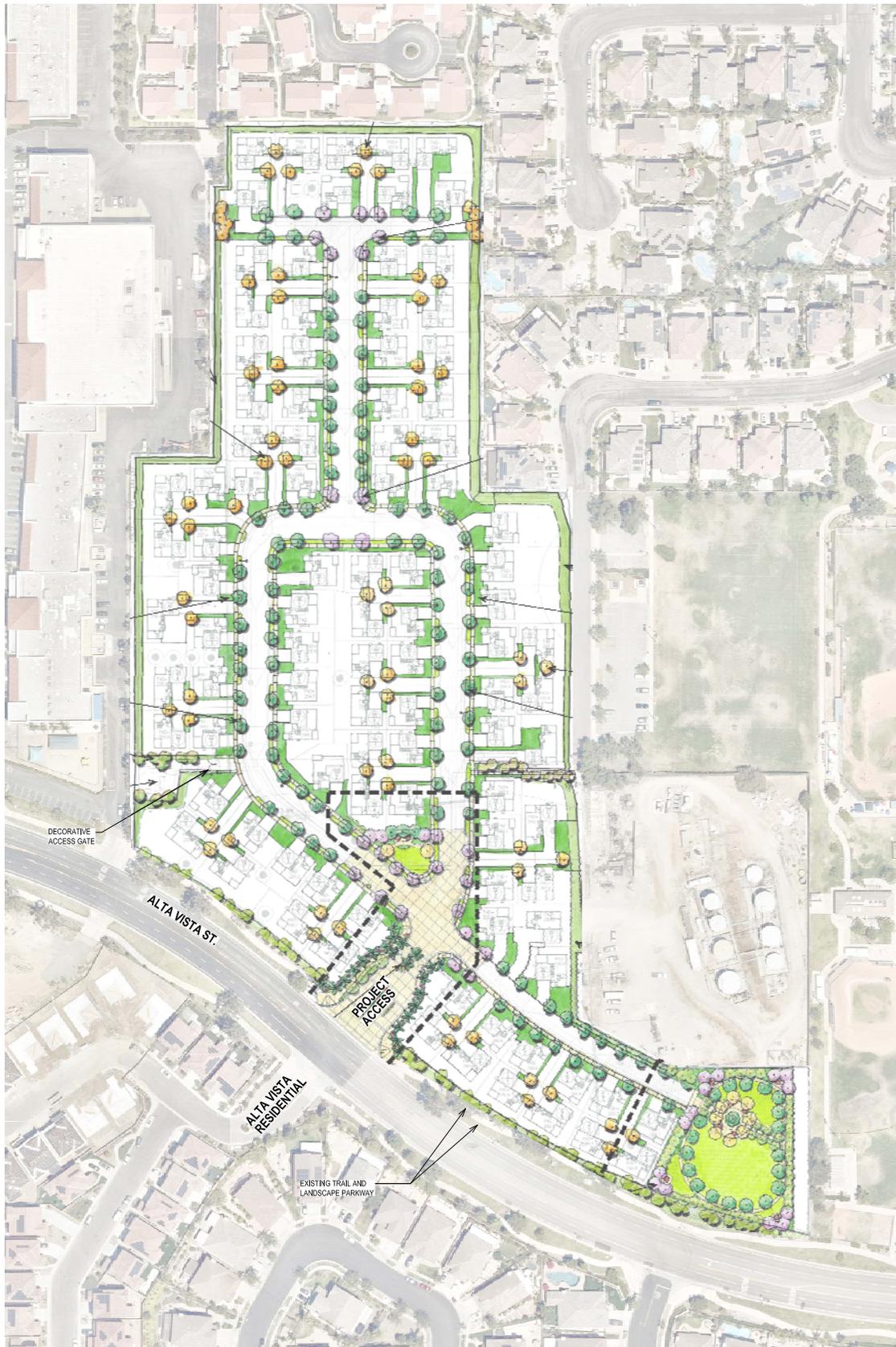
To ensure that this TA satisfies the needs of the City of Placentia, Urban Crossroads, Inc. prepared a Project specific traffic study scoping agreement for review by County staff prior to the preparation of this TA. The agreement provides an outline of the study area, trip generation, trip distribution, and analysis methodology.

2.2 EXISTING LAND USE, APPROVED AND PROPOSED PROJECT

The existing site land use is vacant. Tract #15700 was approved by the City of Placentia and it remains the current land use entitlement for the property. It authorized 74 single family residences. The current Project (Vesting TTM 19250) adds 26 additional residential units, for a total of 100 lots.

It is anticipated that the Project would be occupied by year 2024. A preliminary site plan of the proposed Project is shown in Exhibit 2-1. The Project will have one gated full access driveway at Alta Vista Street, east of Rose Drive.

EXHIBIT 2-1: PRELIMINARY SITE PLAN



In order to develop the traffic characteristics of the proposed project, trip-generation statistics published in the Institute of Transportation Engineers (ITE) *Trip Generation* (11th Edition, 2021) manual for land use code 210 – Single Family Detached are utilized.

The Project is anticipated to generate a total of 943 trip-ends per day with 70 AM peak hour trips and 94 PM peak hour trips for the cumulative 100 single family dwelling units. In comparison to the prior approval of 74 single family residential units, the 26-unit increase included in the proposed Project is anticipated to increase the Project's trip generation by 245 additional trips per day, 19 additional AM peak hour trips, and 24 additional PM peak hour trips. The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.2 *Project Trip Generation* of this report.

2.3 COMMITTED AND PROPOSED DEVELOPMENTS IN THE VICINITY OF THE PROJECT

The cumulative projects listed are those that would generate traffic and would contribute traffic due to pending and reasonably foreseeable development at study area intersections.

Exhibit 2-2 illustrates the cumulative development location map. A summary of cumulative development projects and their proposed land uses are shown on Table 2-1. If applicable, the traffic generated by individual cumulative projects was manually added to the Opening Year Cumulative forecasts to ensure that traffic generated by the listed cumulative development projects on Table 2-1 are reflected as part of the background traffic. In addition to the seasonal adjustment, traffic counts are further increased to account for background growth and traffic conditions shown previously in nearby studies as identified in Section 4.6 *Background Traffic*. Cumulative ADT and peak hour intersection turning movement volumes are shown on Exhibit 2-3.

2.4 EXISTING AND PROPOSED ROADWAYS AND INTERSECTIONS

At the City staff's direction (Appendix 1.1), the study area includes 3 existing and future intersections as shown previously on Exhibit 1-1. Exhibit 2-4 illustrates the study area intersections located near the proposed Project and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

2.4.1 CITY OF PLACENTIA GENERAL PLAN CIRCULATION ELEMENT

The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the study area, as identified on the City of Placentia General Plan Circulation Element, are described below. Exhibit 2-5 shows the City of Placentia General Plan Circulation Element and Exhibit 2-6 illustrates the City of Placentia General Plan roadway cross-sections.

Rose Drive is classified as a Modified Major within the study area with six travel lanes and multi-use trails.

EXHIBIT 2-2: CUMULATIVE DEVELOPMENT LOCATION MAP

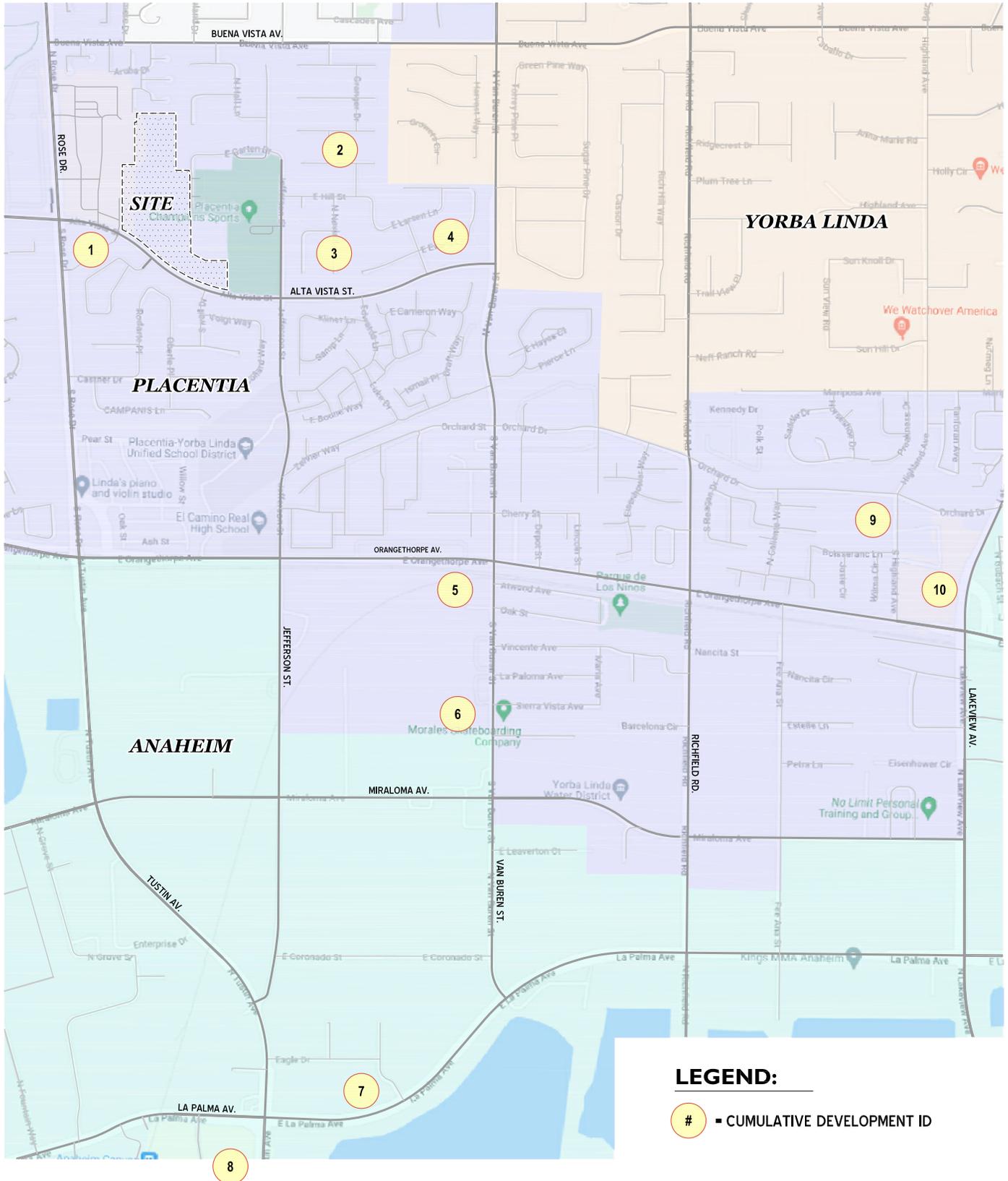
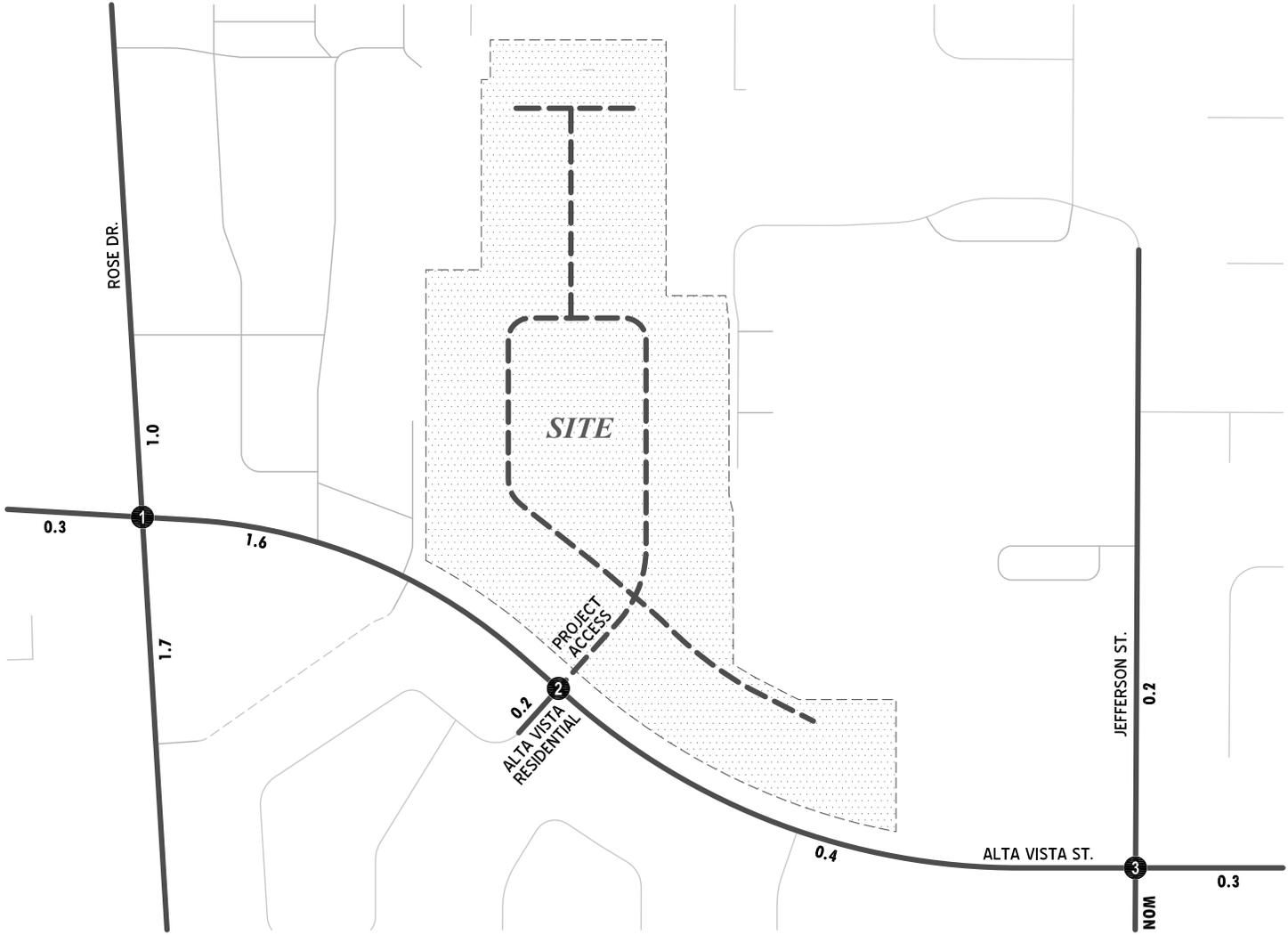


TABLE 2-1: CUMULATIVE DEVELOPMENT LAND USE SUMMARY

ID	Project	Land Use	Quantity	Units ¹
1	Alta Vista Commercial/Residential (ZCA 2017-09; DPR 2017-03; UP 2017-09;VTM 18176)	Fast Casual Restaurant	8.6	TSF
		Coffee Shop	2	TSF
		Single Family Residential (remaining DU yet to be occupied)	18	DU
2	TPM 2022-123 1451 Howard Place (APN: 341-431-01)	Single Family Residential	3	DU
3	TPM 2022-127 (1421 Cisneros) TTM 19233 (421 N. Nevin) TPM 2022-126 (412 Tidland) TPM 2022-125 (406 Nevin) TAZ 3 Total	Single Family Residential	2	DU
		Single Family Residential	7	DU
		Single Family Residential	2	DU
		Single Family Residential	2	DU
			13	DU
4	TPM 2022-124 502 Gerhold Ln. (APN: 341-421-33)	Single Family Residential	2	DU
5	Van Buren & Orantherpe Residential (ZC 2018-01; DPR 2018-01; TTM 19104)	Multifamily Housing (Low-Rise)	139	DU
6	DPR 2017-02	General Light Industrial	118.410	TSF
7	La Palma Industrial	Office (Existing Use)	20.16	TSF
		General Light Industrial (Proposed Use)	38.251	TSF
8	1011-1091 N. Tustin Av.	Multifamily Housing (Mid-Rise)	406	DU
		Retail	5.0	TSF
9	SWC of Orchard Dr. & Highland Av. (DPR 2018-03; UP 2018-04; TTM 18129)	Multifamily Housing (Low-Rise)	16	DU
10	NWC of E. Orangethorpe Av. & N. Lakevie (UP 2020-07; DPR 2020-02)	Commercial	4.311	TSF

¹ DU = Dwelling Units; TSF = Thousand Square Feet

EXHIBIT 2-3: CUMULATIVE DEVELOPMENT ONLY TRAFFIC VOLUMES



AM PEAK HOUR

1	2	3
Rose Dr. & Alta Vista St.	Alta Vista Residential - Project Access & Alta Vista St.	Jefferson St. & Alta Vista St.

PM PEAK HOUR

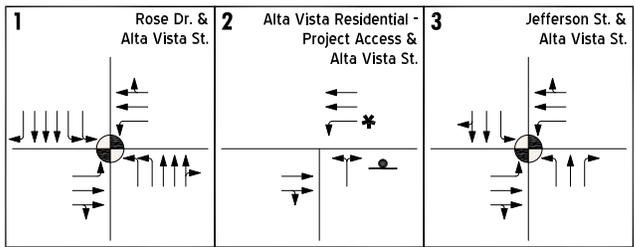
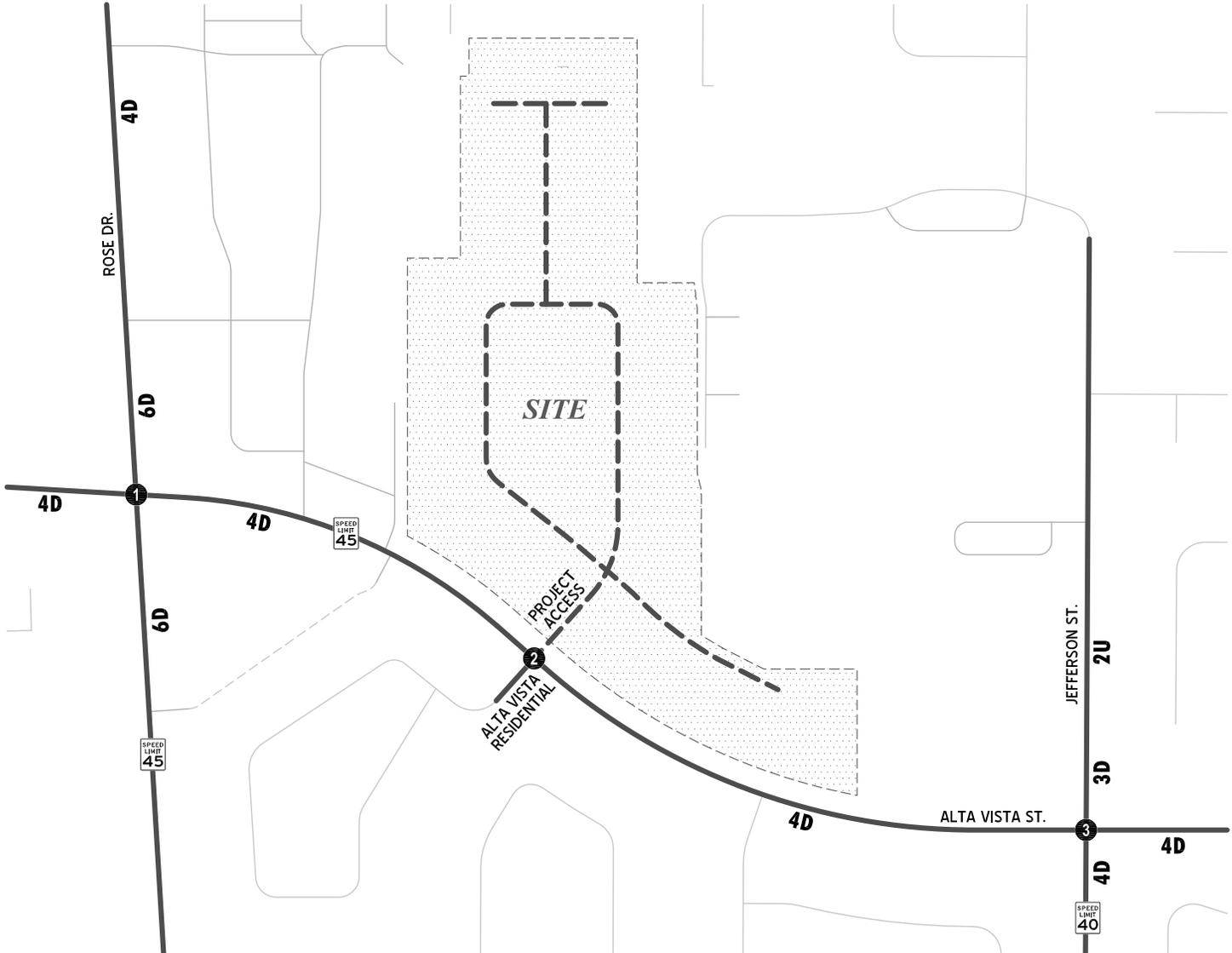
1	2	3
Rose Dr. & Alta Vista St.	Alta Vista Residential - Project Access & Alta Vista St.	Jefferson St. & Alta Vista St.

LEGEND:

- INTERSECTION ID
- PEAK HOUR INTERSECTION VOLUMES
- 10.0** = VEHICLES PER DAY (1000'S)
- NOM** = NOMINAL, LESS THAN 50 VEHICLES PER DAY
- FUTURE ROADWAY



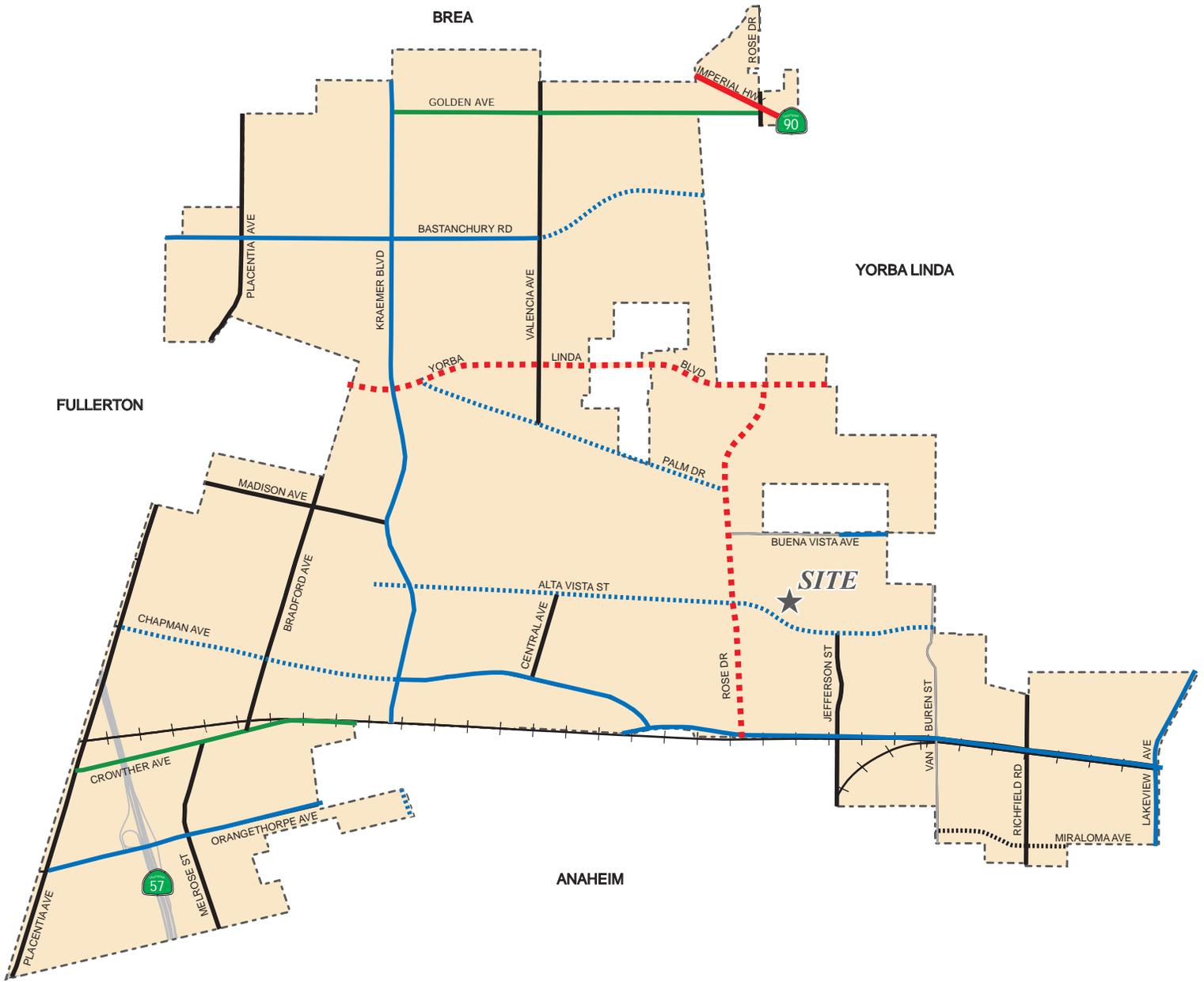
EXHIBIT 2-4: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



- LEGEND:**
- 3 = INTERSECTION ID
 - ◐ = TRAFFIC SIGNAL
 - = STOP SIGN
 - 4 = NUMBER OF LANES
 - D = DIVIDED
 - U = UNDIVIDED
 - DEF = DEFACTO RIGHT TURN LANE
 - *
- * = TURN LANE ACCOMMODATED WITHIN TWO-WAY LEFT-TURN LANE (TWLTL) STRIPED MEDIAN



**EXHIBIT 2-5: CITY OF PLACENTIA
GENERAL PLAN FUNCTIONAL ROADWAY CLASSIFICATIONS**



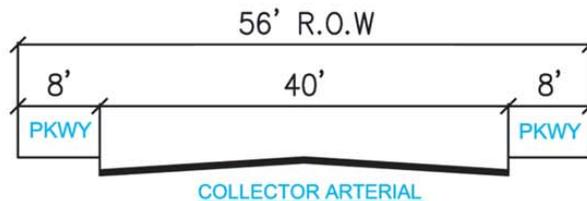
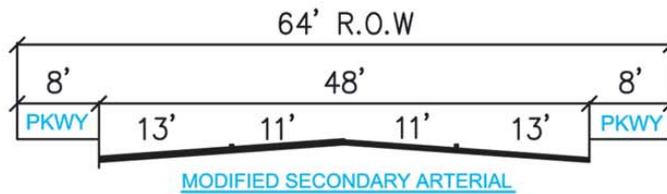
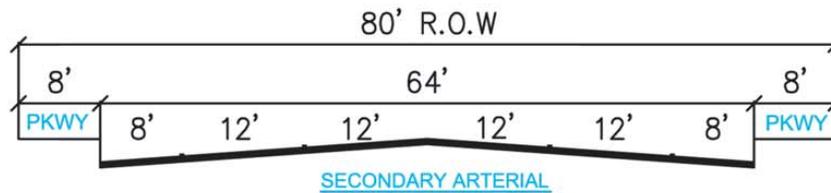
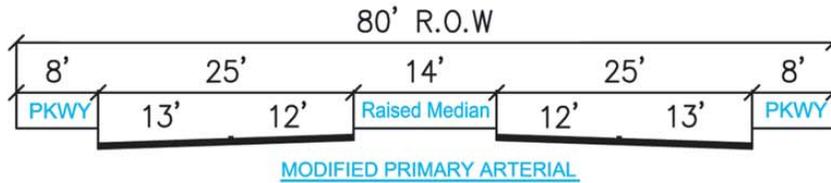
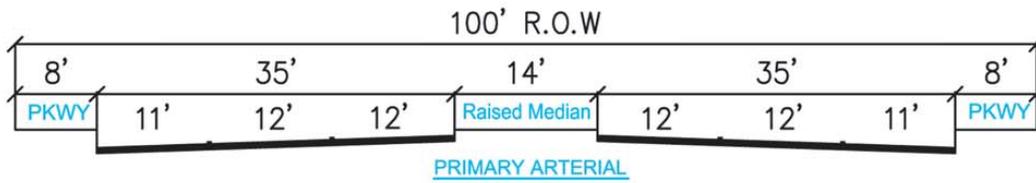
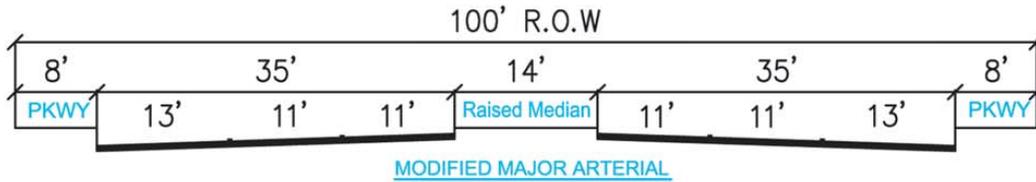
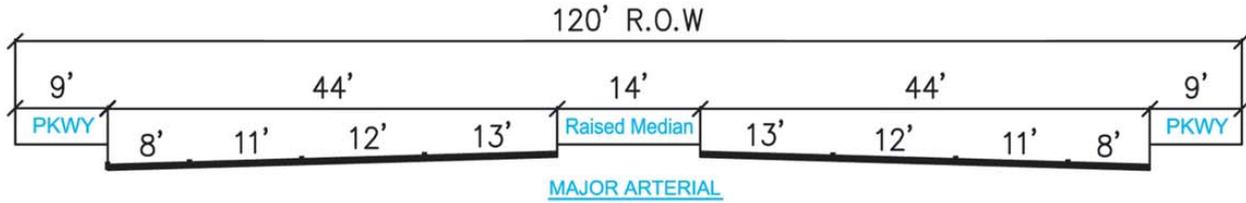
LEGEND

- Placentia City Limits
- ++++ Railroad
- Major
- - - Modified Major
- Primary
- - - Modified Primary
- Secondary
- - - Modified Secondary
- Divided Collector
- Collector



SOURCE: CITY OF PLACENTIA

**EXHIBIT 2-6: CITY OF PLACENTIA
GENERAL PLAN ROADWAY CROSS-SECTIONS**



SOURCE: CITY OF PLACENTIA

Alta Vista Street is classified as a Modified Primary within the study area and currently exists with four travel lanes. A multi-use trail is shown on the north and south sides of Alta Vista Street.

Jefferson Street is classified as a Secondary within the study area. Jefferson currently has 2 lanes southbound and 1 lane northbound, with sidewalks on both sides. The outside southbound lane is shared with bicyclists via sharrow markings.

2.4.2 EXISTING (2022) TRAFFIC VOLUMES

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in December 2021 and July 2022. The following peak hours were selected for analysis:

- Weekday AM Peak Hour (peak hour between 7:00 AM and 9:00 AM)
- Weekday PM Peak Hour (peak hour between 4:00 PM and 6:00 PM)

The raw manual peak hour turning movement traffic count data sheets are included in Appendix 2.2.

At the intersection of Rose Drive at Alta Vista Street, December 2021 and July 2022 counts are provided in Appendix 2.2. Appendix 2.2 also includes July 2022 count data for the intersections of Alta Vista Residential / Alta Vista Street and Jefferson Street / Alta Vista Street. Table 2-2 provides a comparison of December 2021 and July 2022 count data for the intersection of Rose Drive at Alta Vista Street. For Rose Drive at Alta Vista Street, the December 2021 count is used as the seasonally adjusted baseline. At the Alta Vista Residential / Alta Vista Street and Jefferson Street / Alta Vista Street intersections, seasonal adjustments of 1.42 for AM peak hour and 1.04 for PM peak hour are applied to the raw July 2022 count data.

TABLE 2-2: EXISTING COUNT DATA SEASONAL ADJUSTMENT

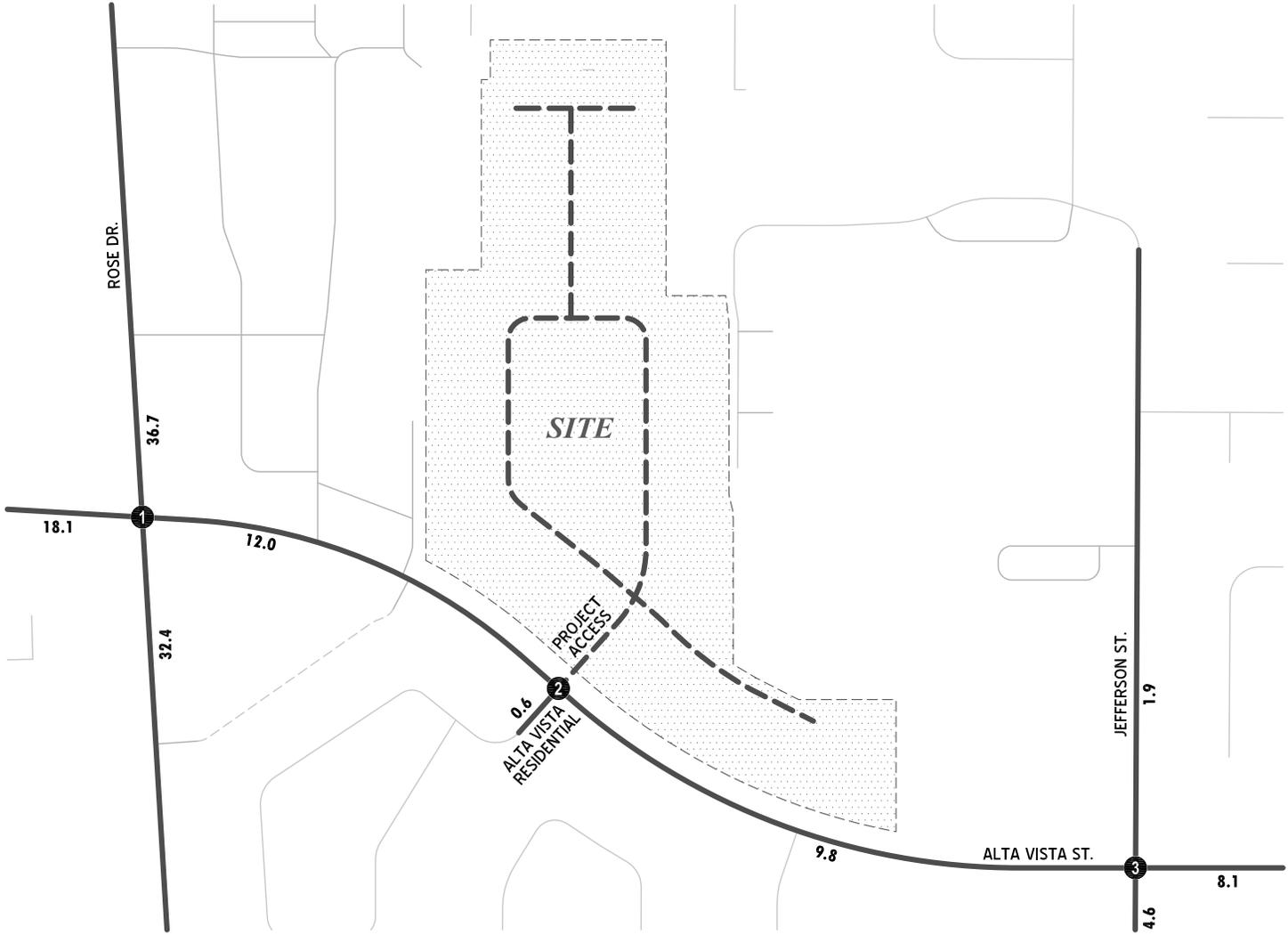
#	Intersection	Existing Raw Counts						AM	PM
		Existing 12/9/21			Existing 7/28/22				
		AM	PM	Total	AM	PM	Total		
1	Rose Dr. / Alta Vista St.	3,060	2,950	6,010	2,160	2,836	4,996	41.67%	4.02%

Existing traffic volumes are further increased to account for traffic conditions shown previously in nearby studies (1. *Alta Vista Commercial/Residential Project, December 2017, prepared by EDP Solutions & 2. City of Placentia General Plan Mobility Element Update Technical Traffic Study, July 2018, prepared by KOA*).

The upwardly adjusted weekday existing volumes used in this analysis are shown on Exhibit 2-7. Where actual 24-hour tube count data was not available, existing ADT volumes were based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

$$\text{Weekday AM \& PM Peak Hours (Approach Volume + Exit Volume) x 6.623 = Leg Volume}$$

EXHIBIT 2-7: EXISTING (2022) TRAFFIC VOLUMES



AM PEAK HOUR

1	Rose Dr. & Alta Vista St.	2	Alta Vista Residential - Project Access & Alta Vista St.	3	Jefferson St. & Alta Vista St.
	<p>260 1438 133</p> <p>131 261 118</p> <hr/> <p>301 278 226</p> <p>95 561 24</p>	<p>385 4</p> <hr/> <p>297 23</p> <p>18</p>	<p>89 223</p> <p>240 63</p> <hr/> <p>16 225 76</p> <p>69 59</p>		

PM PEAK HOUR

1	Rose Dr. & Alta Vista St.	2	Alta Vista Residential - Project Access & Alta Vista St.	3	Jefferson St. & Alta Vista St.
	<p>216 859 129</p> <p>93 261 114</p> <hr/> <p>304 233 129</p> <p>173 114 45</p>	<p>380</p> <hr/> <p>418 11</p> <p>25</p>	<p>38 223</p> <p>13 203 13</p> <hr/> <p>30 306 70</p> <p>116 16 94</p>		

LEGEND:

- INTERSECTION ID
- PEAK HOUR INTERSECTION VOLUMES
- 10.0** = VEHICLES PER DAY (1000'S)
- FUTURE ROADWAY



2.5 ANALYSIS SCENARIOS

For the purposes of this TA, potential deficiencies to traffic and circulation have been assessed for each of the following conditions:

- Existing (2022) Conditions
- Existing plus Approved and Pending Projects Conditions
- Existing plus Approved and Pending Projects plus Project Conditions

Existing (2022) conditions analysis is based upon the data presented in Section 2.4.2.

The Existing Plus Approved and Pending Projects conditions analysis determines traffic deficiencies that would occur on the existing roadway system with the addition of traffic from known nearby approved and pending projects. The entire 100-unit Project is anticipated to be implemented within 2 years, and the background traffic increases from existing conditions are further increased to account for background growth and traffic conditions shown previously in nearby studies. The cumulative project list was compiled from information provided by the City of Placentia.

The Existing Plus Approved and Pending Projects Plus Project traffic conditions analysis determines the potential near-term cumulative circulation system deficiencies.

3 METHODOLOGY AND THRESHOLDS

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with the City of Placentia Traffic Study Guidelines. (1)

3.1 LEVEL OF SERVICE

Traffic operations of roadway facilities are described using the term “Level of Service” (LOS). LOS is a qualitative description of traffic flow based on several factors, such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near Capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow.

3.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The City of Placentia Guidelines call for the use of Intersection Capacity Utilization (ICU) analysis to evaluate signalized intersections. The 6th Edition Highway Capacity Manual (HCM) methodology used for unsignalized intersections expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (2)

3.2.1 SIGNALIZED INTERSECTIONS

Intersection Capacity Utilization (ICU) analysis is based on peak hour volumes and individual turn movements and the corresponding intersection lane geometry to estimate level of service. Use of the ICU methodology is consistent with the City of Placentia’s traffic analysis guidelines, and by practice the ICU methodology assumes that intersections are signalized. The ICU value is usually expressed as a decimal percent (e.g., 0.86). The decimal percent represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity.

TABLE 3-1: SIGNALIZED INTERSECTION LOS THRESHOLDS

Level of Service (LOS)	Volume/Capacity (V/C) Ratio Range
A	0.00 - 0.60
B	0.61 - 0.70
C	0.71 - 0.80
D	0.81 - 0.90
E	0.91 - 1.00
F	Above 1.00

3.2.2 UNSIGNALIZED INTERSECTIONS

The traffic modeling and signal timing optimization software package Synchro (Version 11) has been utilized to analyze signalized intersections. Synchro is a macroscopic traffic software program that is based on the signalized intersection Capacity analysis as specified in the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and Capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

The City of Placentia requires that the operations of unsignalized intersections be evaluated using the methodology described in the HCM. (2) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 3-2). At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. Delay for the intersection is reported for the worst individual movement at a two-way stop-controlled intersection. For all-way stop controlled intersections, LOS is computed for the intersection as a whole (average delay).

TABLE 3-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), $V/C \leq 1.0$	Level of Service, $V/C \leq 1.0^1$
Little or no delays.	0 to 10.00	A
Short traffic delays.	10.01 to 15.00	B
Average traffic delays.	15.01 to 25.00	C
Long traffic delays.	25.01 to 35.00	D
Very long traffic delays.	35.01 to 50.00	E
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F

Source: HCM, 6th Edition

¹ If V/C is greater than 1.0 then LOS is F per HCM.

3.3 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term “signal warrants” refers to the list of established criteria used by Caltrans and other public agencies to quantitatively justify or determine the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TA uses the signal warrant criteria presented in the latest edition of the Caltrans California Manual on Uniform Traffic Control Devices (CA MUTCD). (3)

The signal warrant criteria for Existing study area intersections are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. The CA MUTCD indicates that the installation of a traffic signal should be considered if one or

more of the signal warrants are met. (3) Specifically, this TA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions and for all future analysis scenarios for existing unsignalized intersections. Warrant 3 is appropriate to use for this TA because it provides specialized warrant criteria for intersections with rural characteristics. For the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection. Urban warrants have been used as posted speed limits on the major roadways with unsignalized intersections are 40 miles per hour or below and rural warrants have been used on roadways with speeds greater than 40 miles per hour.

Future intersections that do not currently exist have been assessed regarding the potential need for new traffic signals based on future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets. Similarly, the speed limit has been used as the basis for determining the use of Urban and Rural warrants. Traffic signal warrant analyses were performed for the Project Driveway at Alta Vista Street.

Traffic signal warrant analysis for Existing, Existing plus Approved and Pending Projects, and Existing plus Approved and Pending Projects Plus Project conditions is presented in Section 5 of this report.

It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

3.4 MINIMUM ACCEPTABLE LEVELS OF SERVICE (LOS)

The City of Placentia' General Plan recommends a minimum LOS standard of LOS D or better. If during the LOS evaluations an intersection City of Placentia or roadway segment is found to not meet the requisite LOS standard as established by the' General Plan, improvement modifications will be evaluated to bring the forecasted deficiency to within acceptable LOS thresholds.

3.5 DEFICIENCY CRITERIA

This section outlines the methodology used in this analysis related to identifying circulation system deficiencies. The following deficiency criteria has been utilized for the City of Placentia to determine whether the addition of project-related traffic at a study intersection would result in a deficiency:

- A deficiency occurs at study area intersections if the pre-Project condition is at or better than LOS D (i.e., acceptable LOS), and the addition of project trips causes the peak hour LOS of the study area intersection to operate at unacceptable LOS (i.e., LOS E or F).

This page intentionally left blank

4 LEVEL OF SERVICE (LOS) ANALYSIS

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment onto the study area roadway network. It provides a review of existing peak hour intersection operations and traffic signal warrant analyses.

The Project includes an additional 26 units compared to the original 74-unit residential development for a total of 100 single family detached units. It is anticipated that the Project would be occupied by year 2024. The Project will have one gated full access driveway at Alta Vista Street, east of Rose Drive.

4.1 EXISTING TRAFFIC ANALYSIS

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 3.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized on Table 4-1, which indicates that study area intersections operate at acceptable LOS (LOS "D" or better) during the AM and PM peak hours. The intersection operations analysis worksheets are included in Appendix 4.1 of this TA.

4.2 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development.

Trip-generation rates published in the Institute of Transportation Engineers (ITE) Trip Generation (11th Edition, 2021) manual for the proposed land use (210 – Single Family Detached) are utilized. Table 4-2 shows the vehicle trip generation rates for the Project, as well as the vehicle trip generation summary with daily and peak hour trip generation estimates. As shown on Table 4-2, the Project is anticipated to generate a total of 943 trip-ends per day with 70 AM peak hour trips and 94 PM peak hour trips.

As mentioned previously, Tract #15700 was approved for the Project site by the City of Placentia and it remains the approved land use entitlement for the property. It authorized 74 single family residences for the property. The proposed Project (Vesting TTM 19250) adds 26 additional residential units, for a total of 100 lots (including the 74 units that previously were approved on the property for which a final subdivision map was recorded for 62 of the lots). Table 4-3 shows the change in trip generation associated with the additional units as compared to the previous 74-unit approval. As shown in Table 4-3, the proposed Project with the additional 26 DU results in an increase in Project trip generation by 245 additional trips per day, 19 additional AM peak hour trips, and 24 additional PM peak hour trips.

TABLE 4-1: INTERSECTION ANALYSIS FOR EXISTING (2022) CONDITIONS

#	Intersection	Traffic Control ¹	Intersection Approach Lanes ²												LOS Method	V/C or Delay ³		Level of Service	
			Northbound			Southbound			Eastbound			Westbound				AM	PM	AM	PM
			L	T	R	L	T	R	L	T	R	L	T	R					
1	Rose Dr. / Alta Vista St.	TS	2	3	0	2	3	1	1	2	0	1	2	0	ICU	0.727	0.637	C	B
2	Alta Vista Residential - Project Access / Alta Vista St.	CSS	0	1!	0	0	0	0	0	2	0	1*	2	0	HCM	11.6	13.1	B	B
3	Jefferson St. / Alta Vista St.	TS	1	1	1	1	2	0	1	2	0	1	2	0	ICU	0.293	0.285	A	A

¹ TS = Traffic Signal; CSS = Cross-street Stop

² When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1! = Shared Left/Through/Right lane;

* = Left turn accommodated within two-way left turn lane (TWLTL) striped median

³ For signalized intersections, the volume-to-capacity ratio (v/c) and level of service is presented based on the based on the Intersection Capacity Utilization (ICU) methodology. Volume/Capacity Ratio and Level of Service are calculated using the TRAFFIX operation analysis software, Traffix Version 8.0 R1 (2008).

For unsignalized intersections, the delay (in seconds) and level or service is presented based on Highway Capacity Manual (6th Edition) methodology.

The delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

TABLE 4-2: PROJECT TRIP GENERATION SUMMARY

Trip Generation Rates ¹									
Land Use	ITE LU Code	Quantity ²	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Single Family Detached	210	100 DU	0.18	0.52	0.70	0.59	0.35	0.94	9.43

Trip Generation Results									
Land Use	ITE LU Code	Quantity ²	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Single Family Detached	210	100 DU	18	52	70	59	35	94	943

¹ Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 11th Edition (2021).

² DU = Dwelling Units

TABLE 4-3: PROJECT TRIP GENERATION COMPARISON

Trip Generation Rates ¹									
Land Use	ITE LU Code	Quantity ²	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Single Family Detached	210	varies DU	0.18	0.52	0.70	0.59	0.35	0.94	9.43

Trip Generation Results									
Land Use ³	ITE LU Code	Quantity ²	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Proposed (additional 26 DU)	210	100 DU	18	52	70	59	35	94	943
Prior Approval	210	74 DU	13	38	51	44	26	70	698
Delta (Proposed - Prior Approval)			5	14	19	15	9	24	245

¹ Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 11th Edition (2021).

² DU = Dwelling Units

² SFDR = Single Family Detached Residential

4.3 PROJECT TRIP DISTRIBUTION

The Project trip distribution and assignment process represents the directional orientation of traffic to and from the Project site. The trip distribution pattern is heavily influenced by the geographical location of the site, the location of surrounding uses, and the proximity to the regional freeway system. Trip distribution patterns proposed for the Project are illustrated on Exhibit 4-1.

4.4 MODAL SPLIT

The potential for Project trips to be reduced by the use of public transit, walking or bicycling have not been included as part of the Project's estimated trip generation. Essentially, the Project's traffic projections are "conservative" in that these alternative travel modes would reduce the forecasted traffic volumes.

4.5 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project weekday ADT and weekday peak hour intersection turning movement volumes are shown on Exhibit 4-2.

4.6 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon existing conditions, which includes adjustments for seasonal conditions and traffic conditions shown previously in nearby studies. Traffic generated by the development of future projects that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies is also included.

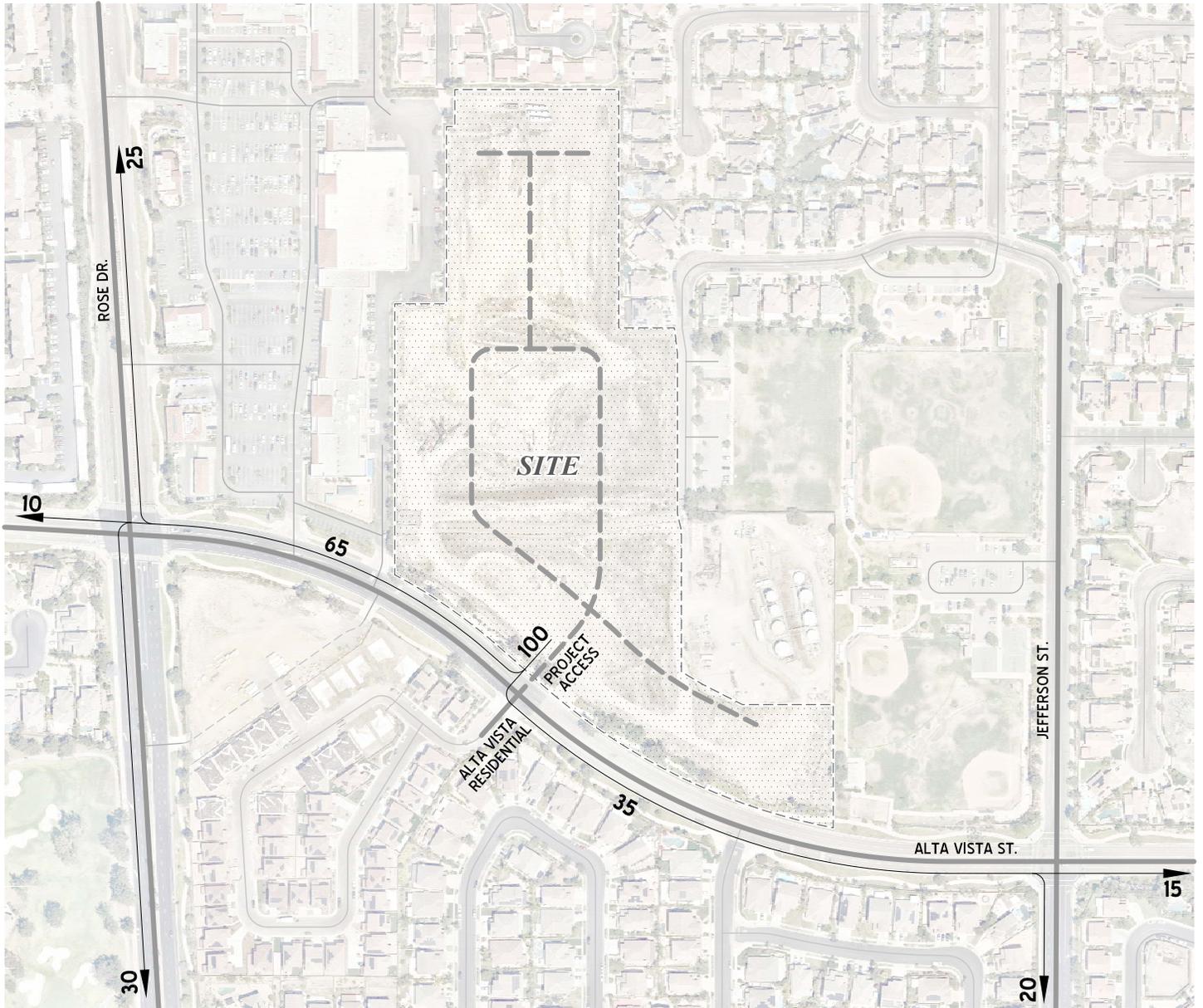
The near-term traffic analysis includes the following traffic conditions, with the various traffic components:

- Existing plus Approved and Pending Projects Traffic Volumes (2024)
 - Existing (2022) volumes
 - Approved and Pending Projects
- Existing plus Approved and Pending Projects Plus Project Traffic Volumes (2024)
 - Existing (2022) volumes
 - Existing plus Approved and Pending Projects
 - Project Traffic

4.7 EXISTING PLUS APPROVED AND PENDING PROJECTS TRAFFIC CONDITIONS

The "buildup" approach has been utilized which combines existing traffic volumes with traffic volumes generated by cumulative development projects included to assess the Existing plus Approved and Pending Projects traffic conditions.

EXHIBIT 4-1: PROJECT TRIP DISTRIBUTION CONTEXT

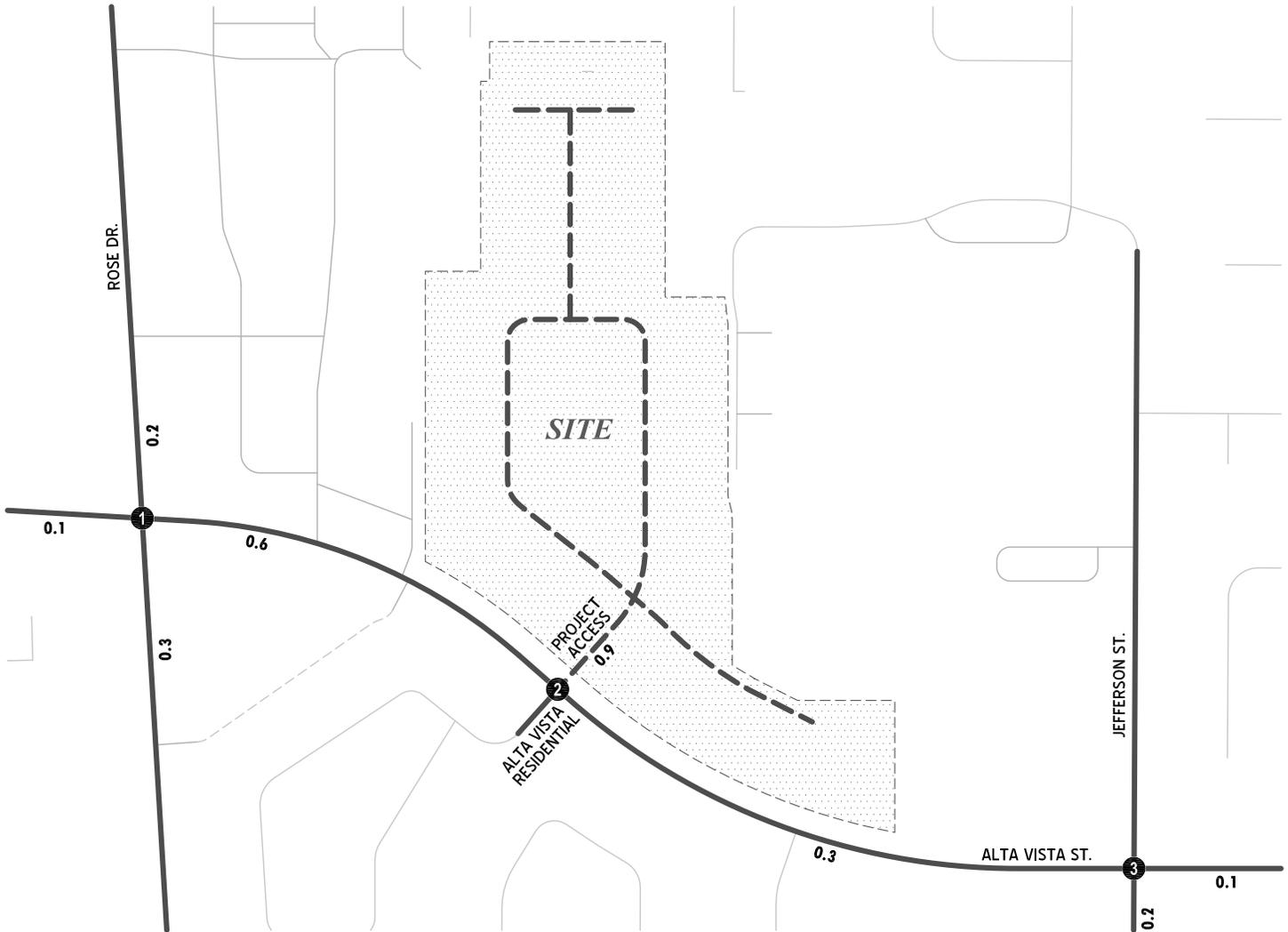


LEGEND:

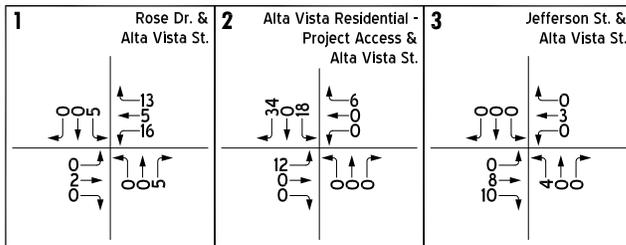
- 10 = PERCENT FROM/TO PROJECT
- FUTURE ROADWAY



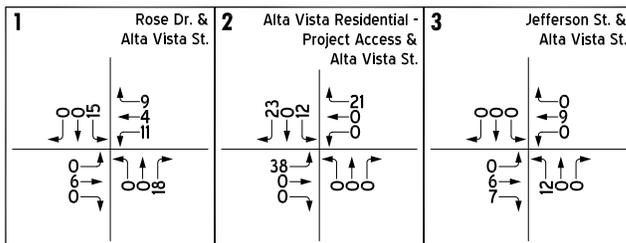
EXHIBIT 4-2: PROJECT ONLY TRAFFIC VOLUMES



AM PEAK HOUR



PM PEAK HOUR



LEGEND:

- INTERSECTION ID
- PEAK HOUR INTERSECTION VOLUMES
- 10.0** = VEHICLES PER DAY (1000'S)
- FUTURE ROADWAY



The lane configurations and traffic controls assumed to be in place for Existing plus Approved and Pending Projects conditions are consistent with those shown previously on Exhibit 2-4, with the exception of cumulative project driveways and those facilities assumed to be constructed by the approved and pending Projects to provide site access are also assumed to be in place for Existing plus Approved and Pending Projects conditions only (e.g., intersection and roadway improvements at the cumulative Project's frontage and driveways).

The weekday ADT and weekday peak hour intersection turning movement volumes which can be expected for Existing plus Approved and Pending Projects traffic conditions are shown on Exhibit 4-3.

Existing plus Approved and Pending Projects peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 3 *Methodology and Thresholds* of this TA. The intersection analysis results are summarized in Table 4-4, which indicates that study area intersections operate at an acceptable LOS (LOS "D" or better) under Existing plus Approved and Pending Projects conditions. The intersection operations analysis worksheets for Existing plus Approved and Pending Projects traffic conditions are included in Appendix 4.2 of this TA.

4.8 EXISTING PLUS APPROVED AND PENDING PROJECTS PLUS PROJECT TRAFFIC CONDITIONS

The Project traffic volumes have been added to the Existing plus Approved and Pending Projects traffic forecasts for 2024 with Project conditions.

The lane configurations and traffic controls assumed to be in place for Existing plus Approved and Pending Projects Plus Project conditions are consistent with those shown previously on Exhibit 2-4, with the exception of the Project driveway, which connects as the north leg of the intersection of Alta Vista Residential at Alta Vista Street.

The weekday ADT and weekday peak hour intersection turning movement volumes which can be expected for Existing plus Approved and Pending Projects Plus Project traffic conditions are shown on Exhibit 4-4.

Existing plus Approved and Pending Projects Plus Project peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 3 *Methodology and Thresholds* of this TA. The intersection analysis results are summarized in Table 4-5, which indicates that study area intersections operate at an acceptable LOS (LOS "D" or better) under Existing plus Approved and Pending Projects conditions. The intersection operations analysis worksheets for Existing plus Approved and Pending Projects Plus Project traffic conditions is included in Appendix 4.3 of this TA.

TABLE 4-4: INTERSECTION ANALYSIS FOR EXISTING PLUS APPROVED AND PENDING PROJECTS

#	Intersection	Traffic Control ¹	Intersection Approach Lanes ²												LOS Method	V/C or Delay ³		Level of Service	
			Northbound			Southbound			Eastbound			Westbound				AM	PM	AM	PM
			L	T	R	L	T	R	L	T	R	L	T	R					
1	Rose Dr. / Alta Vista St.	TS	2	3	0	2	3	1	1	2	0	1	2	0	ICU	0.736	0.654	C	B
2	Alta Vista Residential - Project Access / Alta Vista St.	CSS	0	1!	0	0	0	0	0	2	0	1*	2	0	HCM	11.9	13.4	B	B
3	Jefferson St. / Alta Vista St.	TS	1	1	1	1	2	0	1	2	0	1	2	0	ICU	0.300	0.299	A	A

¹ TS = Traffic Signal; CSS = Cross-street Stop

² When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

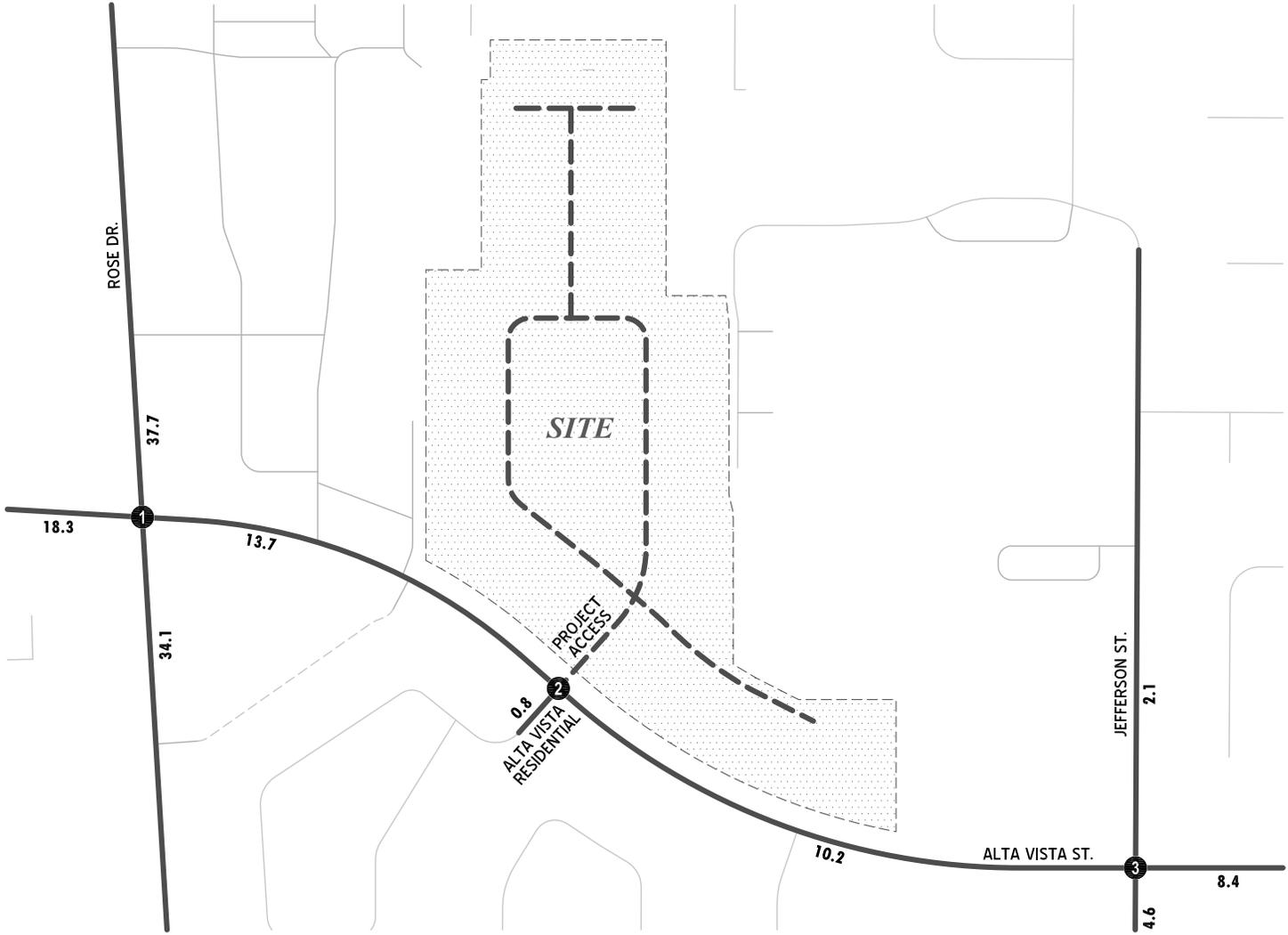
L = Left; T = Through; R = Right; 1! = Shared Left/Through/Right lane;

* = Left turn accommodated within two-way left turn lane (TWLTL) striped median

³ For signalized intersections, the volume-to-capacity ratio (v/c) and level of service is presented based on the based on the Intersection Capacity Utilization (ICU) methodology. Volume/Capacity Ratio and Level of Service are calculated using the TRAFFIX operation analysis software, Traffix Version 8.0 R1 (2008).

For unsignalized intersections, the delay (in seconds) and level or service is presented based on Highway Capacity Manual (6th Edition) methodology. The delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

EXHIBIT 4-3: EXISTING PLUS APPROVED AND PENDING PROJECTS TRAFFIC VOLUMES



AM PEAK HOUR

1	Rose Dr. & Alta Vista St.	2	Alta Vista Residential - Project Access & Alta Vista St.	3	Jefferson St. & Alta Vista St.

PM PEAK HOUR

1	Rose Dr. & Alta Vista St.	2	Alta Vista Residential - Project Access & Alta Vista St.	3	Jefferson St. & Alta Vista St.

LEGEND:

- INTERSECTION ID
- PEAK HOUR INTERSECTION VOLUMES
- 10.0** = VEHICLES PER DAY (1000'S)
- FUTURE ROADWAY



TABLE 4-5: INTERSECTION ANALYSIS FOR EXISTING PLUS APPROVED AND PENDING PROJECTS PLUS PROJECT

#	Intersection	Traffic Control ¹	Intersection Approach Lanes ²												LOS Method	V/C or Delay ³		Level of Service	
			Northbound			Southbound			Eastbound			Westbound				AM	PM	AM	PM
			L	T	R	L	T	R	L	T	R	L	T	R					
1	Rose Dr. / Alta Vista St.	TS	2	3	0	2	3	1	1	2	0	1	2	0	ICU	0.785	0.705	C	C
2	Alta Vista Residential - Project Access / Alta Vista St.	CSS	0	1!	0	<u>0.5</u>	<u>0.5</u>	d	1*	2	0	1*	2	0	HCM	16.6	21.4	C	C
3	Jefferson St. / Alta Vista St.	TS	1	1	1	1	2	0	1	2	0	1	2	0	ICU	0.325	0.317	A	A

¹ TS = Traffic Signal; CSS = Cross-street Stop

² When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1! = Shared Left/Through/Right lane; d = Defacto Right Turn Lane;

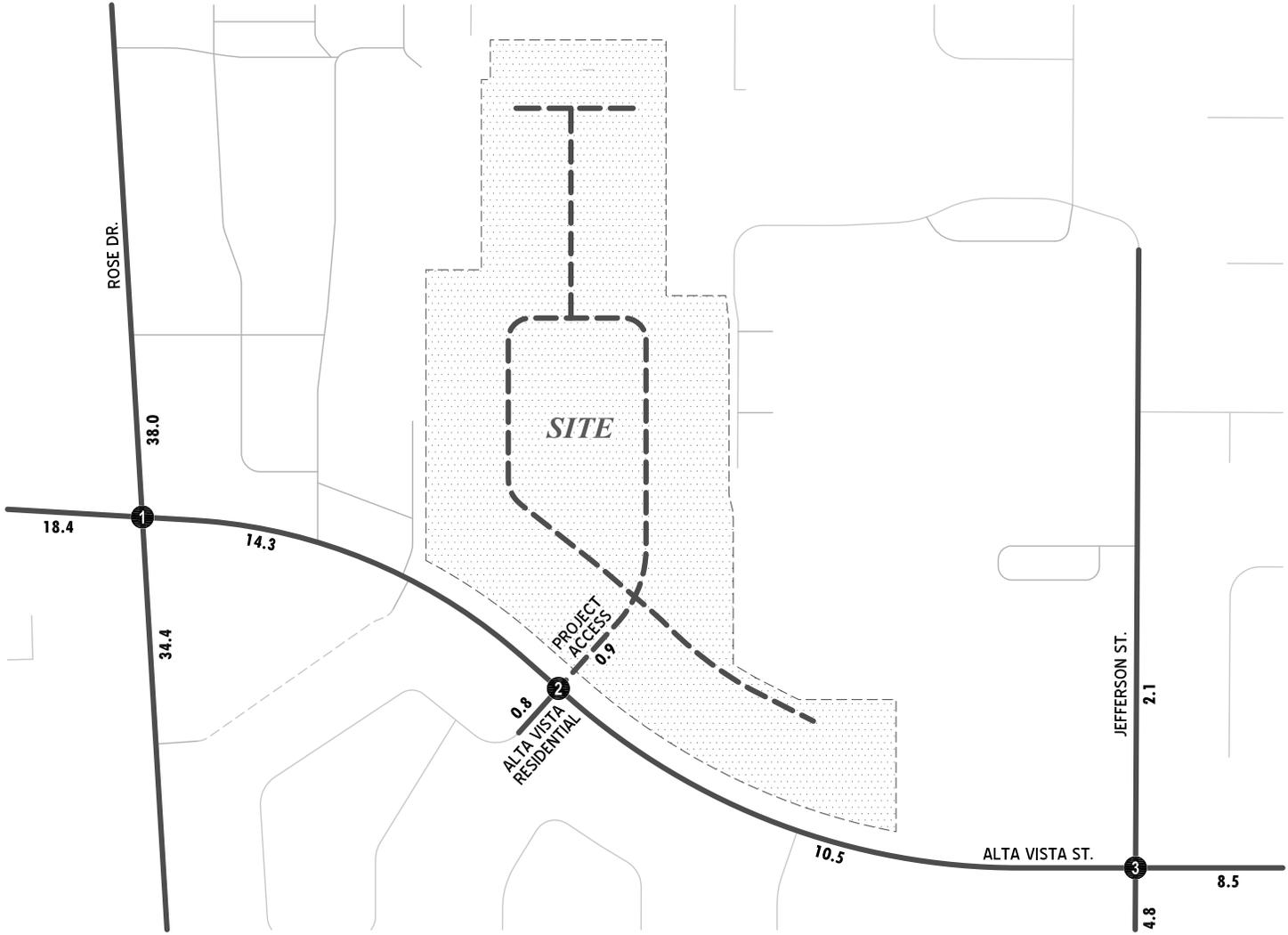
* = Left turn accommodated within two-way left turn lane (TWLTL) striped median; **1** = Improvement

³ For signalized intersections, the volume-to-capacity ratio (v/c) and level of service is presented based on the based on the Intersection Capacity Utilization (ICU) methodology. Volume/Capacity Ratio and Level of Service are calculated using the TRAFFIX operation analysis software, Traffix Version 8.0 R1 (2008).

For unsignalized intersections, the delay (in seconds) and level or service is presented based on Highway Capacity Manual (6th Edition) methodology.

The delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

EXHIBIT 4-4: EXISTING PLUS APPROVED AND PENDING PROJECTS PLUS PROJECT TRAFFIC VOLUMES



AM PEAK HOUR

1	Rose Dr. & Alta Vista St.	2	Alta Vista Residential - Project Access & Alta Vista St.	3	Jefferson St. & Alta Vista St.

PM PEAK HOUR

1	Rose Dr. & Alta Vista St.	2	Alta Vista Residential - Project Access & Alta Vista St.	3	Jefferson St. & Alta Vista St.

LEGEND:

- INTERSECTION ID
- PEAK HOUR INTERSECTION VOLUMES
- 10.0** = VEHICLES PER DAY (1000'S)
- FUTURE ROADWAY



5 TRAFFIC SIGNAL WARRANTS

As mentioned previously, a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

For Existing (2022) and Existing plus Approved and Pending Projects (2024) traffic conditions, the unsignalized intersection of Alta Vista Residential / Alta Vista Street (#2) does not currently meet volume warrants for installation of a traffic signal. Appendix 5.1 presents the traffic signal warrant calculations for existing traffic conditions at this location.

The traffic signal warrant analysis for Existing plus Approved and Pending Projects Plus Project traffic conditions are also provided in Appendix 5.1. The unsignalized intersection of Project Driveway-Alta Vista Residential / Alta Vista Street (#2) does not meet volume warrants for installation of a traffic signal.

This page intentionally left blank

6 SITE ACCESS ANALYSIS

One full access driveway along Alta Vista Street would provide access to the Property. Exhibit 6-1 depicts the lane geometrics recommended at the Project access point, which should be in place prior to occupancy of the Project.

6.1 SITE ACCESS

Access to the Project will be provided to Alta Vista Street, east of Rose Drive via one gated full access driveway. The gated Project entry is aligned opposite the existing local street entry to the residential area south of Alta Vista Street. Along Alta Vista Street, an existing two-way left turn striped median accommodates vehicles turning left.

Roadway improvements necessary to provide site access consist of one resident bypass lane and one visitor lane with unstaffed call box. Outbound from the site, one southbound shared left-through lane and one southbound defacto right turn lane are provided. Southbound cross-street stop control is adequate at the Project exit, and a traffic signal is not warranted. These Project access improvements shall be in place prior to occupancy of the first on-site residential unit.

Sight distance for project traffic entering and exiting Project Access is addressed in this section. The American Association of State Highway and Transportation Officials (AASHTO) intersection sight distance methodology utilizes sight triangles to recommend areas that should be clear of obstructions that might block a driver's view of potentially conflicting vehicles. The site triangles are based on the roadway design speed and the anticipated time gap for vehicles exiting the driveway to enter the major road. This methodology provides sufficient sight distance for a stopped driver on the driveway approach to enter the major road. Likewise, this methodology also provides drivers of vehicles on the major road enough time to slow or stop if vehicles on the minor road approach are departing.

The speed limit on Alta Vista Street is 45 miles per hour (mph) and the required stopping sight distance is 360'. Limited use area sight lines are plotted at the Project Access/Alta Vista Street intersection. Exhibit 6-1 shows the minimum sight distance requirements for vehicles approaching Alta Vista Street at the Project access location. Per AASHTO's *A Policy on Geometric Design of Highways and Streets* and California Department of Transportation (Caltrans) *Highway Design Manual*, the limited use area must remain clear of objects taller than 3.5 feet.

6.2 QUEUING ANALYSIS AND ENTRY GATE OPERATIONS

The anticipated 95th percentile queues for vehicles turning at the Project driveway are shown on Table 6-1, based upon peak hour traffic flows evaluated using SimTraffic. SimTraffic uses the input parameters from Synchro to generate random simulations. Driver behavior characteristics (ranging from passive to aggressive) are assigned to each vehicle by the model, affecting the queue discharge headways, and other behavioral attributes. The variation in each vehicle's behavior is simulated in a manner reflecting real-world operations. The average of five simulation runs has been utilized for the purposes of this assessment.

EXHIBIT 6-1: SITE ACCESS RECOMMENDATIONS

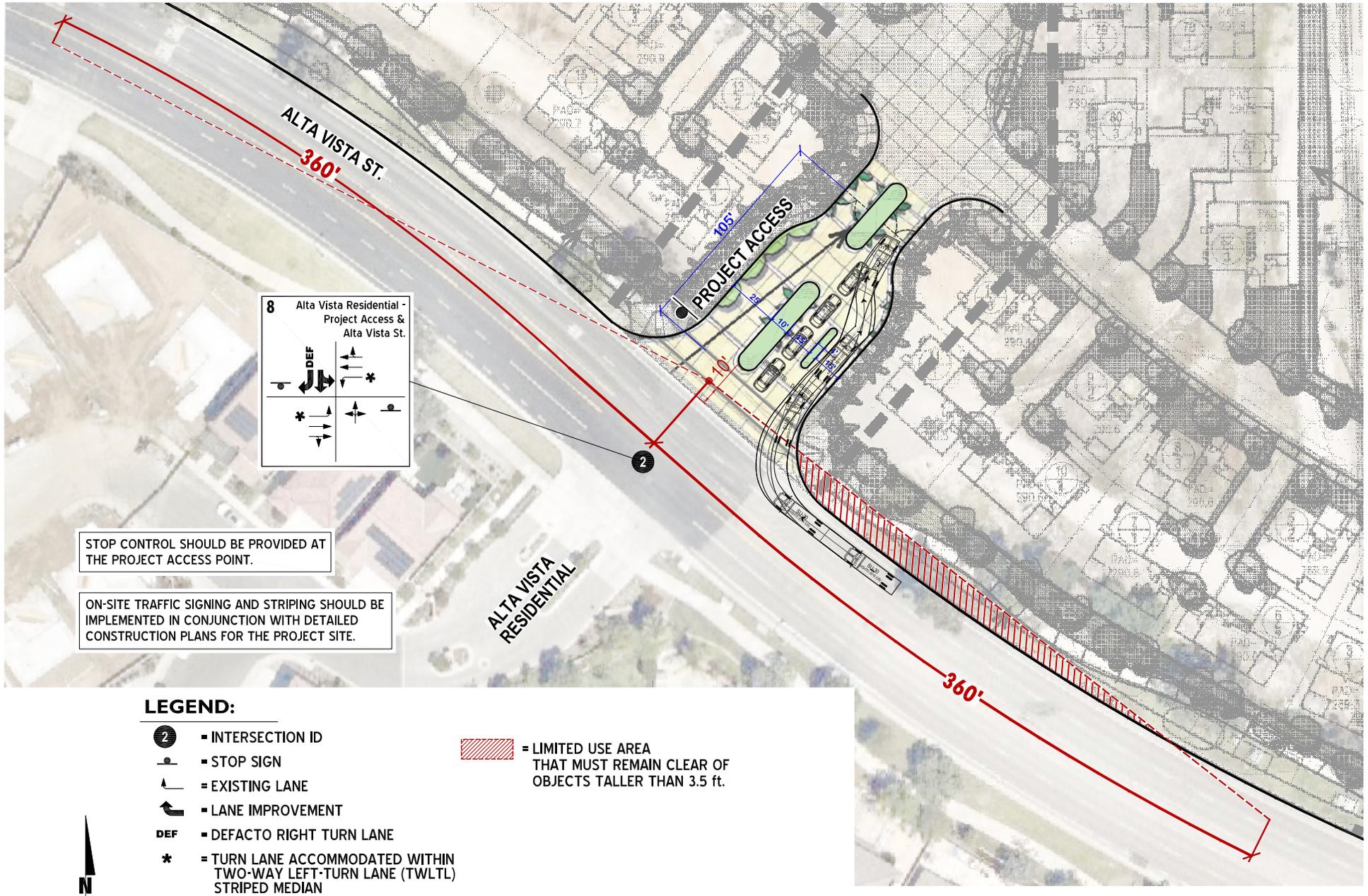


TABLE 6-1: PROJECT ACCESS QUEUEING ANALYSIS FOR EXISTING PLUS APPROVED AND PENDING PROJECTS PLUS PROJECT CONDITIONS

ID	Intersection	Movement	# of Lanes	Existing + Approved & Pending Projects + Project				Storage Length ² (ft.)	95th Percentile Queue Length (ft.) ¹	
				AM	PM	Peak	Volume		AM	PM
2	Alta Vista Residential - Project Access / Alta Vista St.	SBL	1	18	12	AM	18	105	61	36
		SBR	1	34	23	AM	34	105	48	48
		EBL	1	12	38	PM	38	150+ ³	13	20

Location	Movement	# of Lanes	Project Volumes				Storage Length ² (ft.)	95th Percentile Queue Length (ft.) ¹	
			AM	PM	Peak	Volume		AM	PM
Project Access Gate	NBT (Inbound)	1	18	59	PM	59	105	39	45
	SBT (Outbound)	1	52	35	AM	52	105	50	50

¹ Queue length calculated using SimTraffic.

² Existing length of storage.

³ Storage Lane within Two-Way Left Turn Lane Median (TWLTL).

The minimum stacking distances required, based on the anticipated 95th percentile queues, are also shown in Table 6-1. The highest queue length during either the AM or PM peak hour is shown in bold. The queue lengths shown in Table 6-1 represent the typical worst-case queuing lengths for the proposed Project driveway.

As shown in Table 6-1, the maximum 95th percentile Project driveway AM or PM peak hour inbound queue is 45 feet in the PM peak hour. However, at least 100 feet of storage is recommended to accommodate 4 vehicles. Queuing analysis worksheets are included in Attachment 6-1.

The findings in Exhibit 6-1 account for the Project entry gate, which requires vehicles to stop while the entry gates open. The gate located in the Project driveway is approximately 105 feet north of Alta Vista Street. Residents accessing the gate will have an automatic opening device, such as a transponder or remote control. A separate visitor lane is provided to the side, which includes a call box (unstaffed) for visitor access to the Project.

The project driveway has a throat of sufficient length to allow vehicles to enter the project area without causing subsequent vehicles to back out onto Alta Vista Street.

7 ACTIVE TRANSPORTATION AND PUBLIC TRANSIT

Public transit and active transportation opportunities in the study area are addressed in this section.

7-1 TRANSIT SERVICE

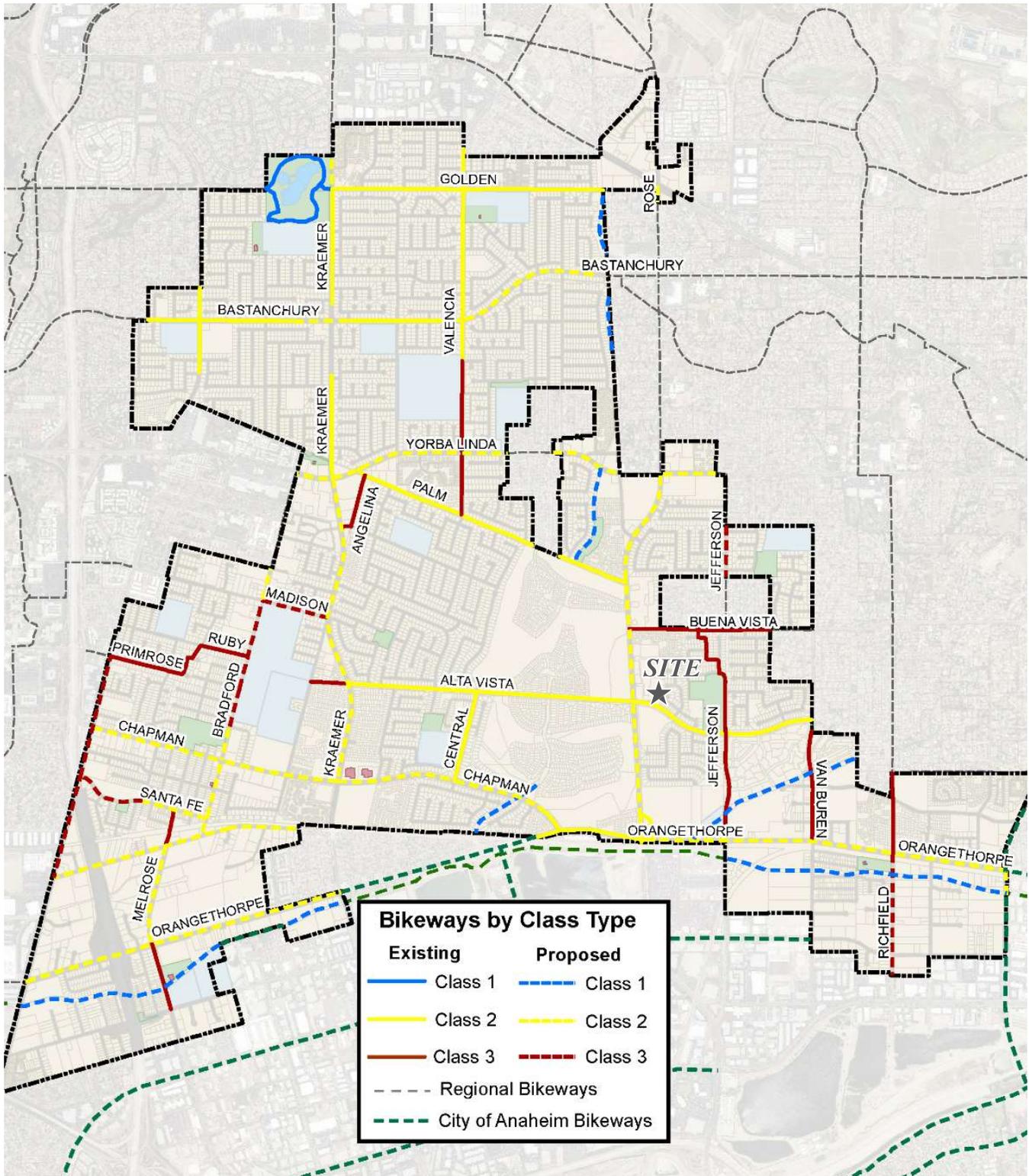
The City of Placentia is currently served by the Orange County Transportation Authority (OCTA), and Route 71 serves the Project study area along Rose Drive. Residents of the Project site will utilize a multi-use trail is provided on the north side of Alta Vista Street and adjacent to the Project to access OCTA Route 71. Transit service is reviewed and updated by OCTA periodically to address ridership, budget and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate.

7-2 PEDESTRIAN AND BICYCLE FACILITIES

Exhibit 7-1 illustrates the City of Placentia existing and proposed bike network. Existing Class 2 bikeways are shown on Alta Vista Street, whereas future Class 2 bikeways are shown on Rose Drive. Jefferson Street has existing Class 3 bikeways.

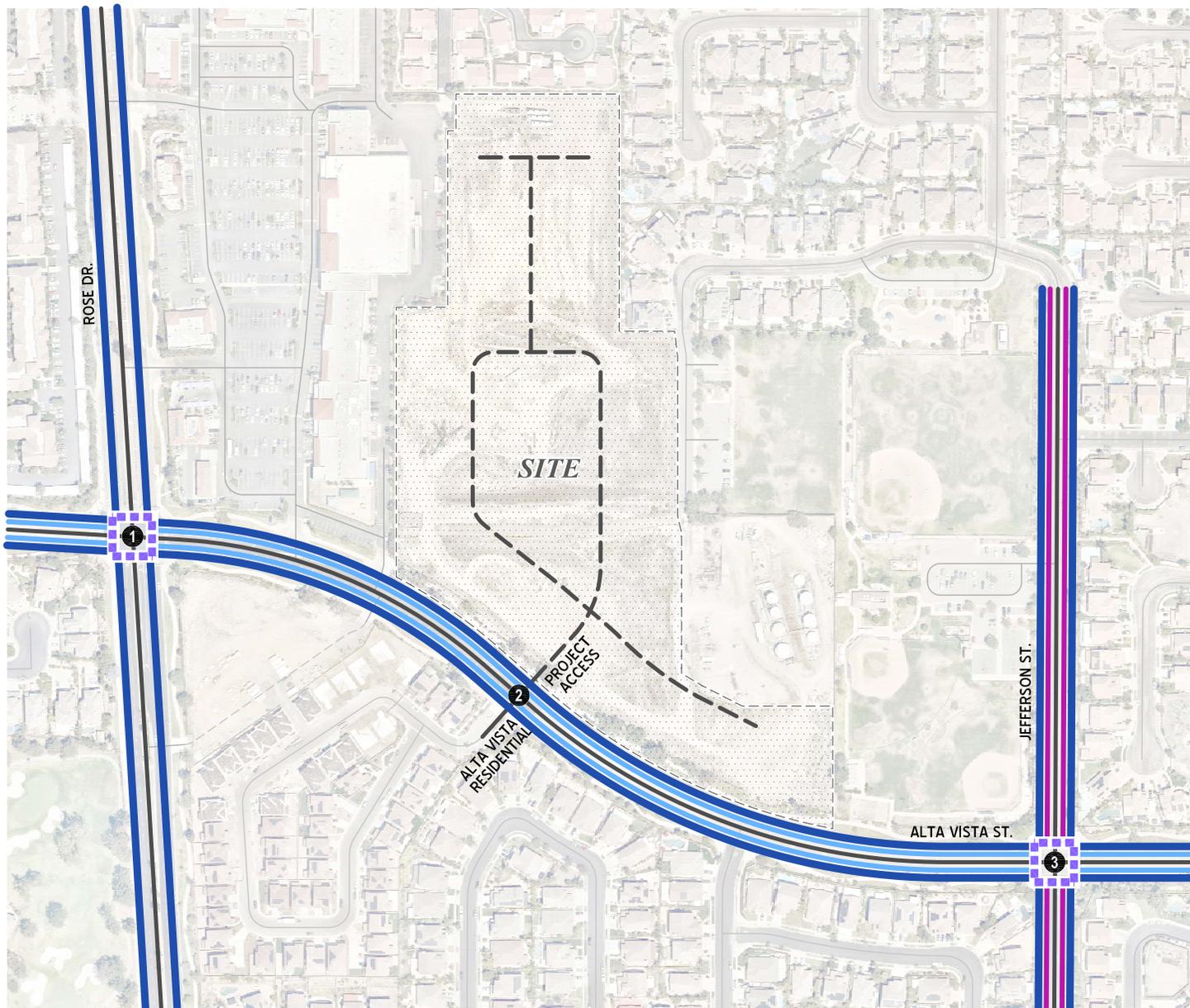
The existing pedestrian facilities within the study area are shown on Exhibit 7-2. Rose Drive and Alta Vista Street have existing multi-use trails on both sides of the streets. Jefferson Street has existing sidewalks in the Project area.

**EXHIBIT 7-1: CITY OF PLACENTIA
GENERAL PLAN EXISTING AND PROPOSED BIKE NETWORK**



SOURCE: CITY OF PLACENTIA

EXHIBIT 7-2: EXISTING PEDESTRIAN FACILITIES



LEGEND:

- 3 = INTERSECTION ID
- = SIDEWALK/TRAIL PATH
- = CROSSWALK
- = ON-STREET BIKE LANES (CLASS II)
- = BIKE ROUTES (CLASS III)



This page intentionally left blank

8 REFERENCES

1. **City of Placentia.** *Traffic Impact Analysis Guidelines for Vehicle Miles Traveled and Level of Service Assessment*. City of Placentia : s.n., January 2021.
2. **Transportation Research Board.** *Highway Capacity Manual (HCM), 6th Edition*. s.l. : National Academy of Sciences, 2016.
3. **California Department of Transportation.** California Manual on Uniform Traffic Control Devices (CA MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CA MUTCD)*. 2014, Updated March 30, 2021 (Revision 6).
4. **Institute of Transportation Engineers.** Trip Generation Manual. 11th Edition, 2021.

This page intentionally left blank