Appendix H1
Traffic Analysis

Citrus Valley (Tentative Tract Map No. 20336)

TRAFFIC ANALYSIS

CITY OF REDLANDS

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13264-08 TA Report

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
APN	Accessor's Parcel Number
CA MUTCD	California Manual on Uniform Traffic Control Devices
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CMP	Congestion Management Program
DIF	Development Impact Fee
E+P	Existing Plus Project
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
mph	miles per hour
NCHRP	National Cooperative Highway Research Program
OPR	Office of Planning and Research
PHF	Peak Hour Factor
Project	Citrus Valley
RTP	Regional Transportation Plan
SB 743	Senate Bill 743
SBCTA	San Bernardino County Transportation Authority
SBTAM	San Bernardino Transportation Analysis Model
SCAG	Southern California Association of Governments
SCS	Sustainable Communities Strategy
SHS	State Highway System
TIA	Traffic Impact Analysis
VMT	Vehicle Miles Traveled
vphgpl	vehicles per hour green per lane

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1 INTRODUCTION

This report presents the results of the traffic analysis (TA) for the proposed Citrus Valley (Project) development, which is located north of Domestic Avenue and west of Texas Street in the City of Redlands, as shown on Exhibit 1-1.

The purpose of this TA is to evaluate the potential circulation system deficiencies that may result from the development of the proposed Project, and where necessary recommend improvements to achieve acceptable operations consistent with General Plan level of service goals and policies. This TA has been prepared in accordance with the San Bernardino County Congestion Management Program (CMP) Guidelines for CMP Traffic Impact Analysis Reports (Appendix B, 2016 Update), the County of San Bernardino Transportation Impact Study Guidelines (dated July 9, 2019), the California Department of Transportation (Caltrans) Guide for the Preparation of Traffic Impact Studies (December 2002), and consultation with City staff during the TA scoping process. (1) (2) (3) The City approved Project Traffic Study Scoping agreement is provided in Appendix 1.1 of this TA.

1.1 SUMMARY OF FINDINGS

The Project is to construct the following improvements as design features in conjunction with development of the site:

- Project to construct Domestic Avenue at its ultimate half-section width as a collector (64-foot right-of-way) and one eastbound travel lane from the Project's western boundary to the Project's eastern boundary consistent with the City's standards. The Project will construct the cul-de-sac at the western terminus of Domestic Avenue. Project also to construct Domestic Avenue with a minimum of one lane in each direction from the Project's eastern boundary to Texas Street in order to facilitate site access, consistent with the City's standards.
- Project to construct Street N at its ultimate half-section width as a Local Street (60-foot right-of-way) and a minimum of one lane in the westbound direction from the Project's western boundary to the Project's eastern boundary consistent with the City's standards. Project to construct Street N with a minimum of one lane in each direction from the Project's eastern boundary to Texas Street in order to facilitate site access, consistent with the City's standards.
- Project to construct Texas Street with a minimum of one lane in each direction from the northern boundary of the adjacent existing residential development to Street N in order to facilitate site access, consistent with the City's standards.
- Project to install a stop control on the northbound and southbound approaches at the intersection of Texas Street & Domestic Avenue, converting the intersection to an all-way stop control.

Additional details and intersection lane geometrics are provided in Section 1.7 *Recommendations* of this report.

EXHIBIT 1-1: PRELIMINARY SITE PLAN

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The development of the proposed Project is not anticipated to require the construction of any off-site improvements, however, there are improvement needs identified at off-site intersections for future traffic analysis scenarios where the Project would contribute traffic. As such, the Project Applicant's responsibility for the Project's contributions towards off-site intersection deficiencies is fulfilled through payment of fair share or participation in the pre-existing fee programs that would be assigned to construction of the identified recommended improvements. The Project Applicant would be required to pay requisite fair share contributions and fee payments consistent with the City's requirements (see Section 8 *Local and Regional Funding Mechanisms*).

1.2 PROJECT OVERVIEW

The Project is proposed to consist of 317 single family residential dwelling units and ball fields (6 small soccer fields and 1 ball field). It is anticipated that the Project would be developed in a single phase with an anticipated Opening Year of 2025. The Project is proposed to take access via Domestic Avenue and the future extension of Texas Street to the north (via new Street N roadway connection).

Trips generated by the Project's proposed land uses have been estimated based on trip generation rates collected by the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, 2017 and the City of San Diego Municipal Code Land Development Code Trip Generation Manual, May 2003. (4) (5) The proposed Project is anticipated to generate a total of 3,254 vehicle trip-ends per day with 239 AM peak hour trips and 368 PM peak hour trips. The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.1 *Project Trip Generation* of this report.

1.3 ANALYSIS SCENARIOS

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

- Existing (2020)
- Existing plus Project (E+P)
- Opening Year Cumulative (2025) Without Project
- Opening Year Cumulative (2025) With Project
- Horizon Year (2040) Without Project
- Horizon Year (2040) With Project

1.3.1 EXISTING (2020) CONDITIONS

Information for Existing (2020) conditions is disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared.

1.3.2 EXISTING PLUS PROJECT CONDITIONS

The E+P analysis determines traffic deficiencies that would occur on the existing roadway system with the addition of Project traffic.

1.3.3 OPENING YEAR CUMULATIVE (2025) CONDITIONS

The Opening Year Cumulative conditions analysis determines the potential near-term cumulative circulation system deficiencies. To account for background traffic growth, traffic associated with other known cumulative development projects in conjunction with an ambient growth factor from Existing conditions of 2% per year (compounded annually) are included for Opening Year Cumulative (2025) traffic conditions. This comprehensive list was compiled from information provided by the City of Redlands and other near-by agencies.

1.3.4 HORIZON YEAR (2040) CONDITIONS

Traffic projections for Horizon Year (2040) with Project conditions were derived from the San Bernardino Transportation Analysis Model (SBTAM) modified to represent buildout of the City of Redlands. The Horizon Year (2040) conditions analysis will be utilized to determine if improvements funded through regional transportation mitigation fee programs, such as the City's Development Impact Fee (DIF) program, or other approved funding mechanisms can accommodate the long-range cumulative traffic at the target level of service (LOS) identified by the City of Redlands (lead agency). It should be noted that the City of Redlands has updated their DIF program to also include appropriate contributions towards regionally significant improvements that have been identified via the San Bernardino County CMP regional fee program study. If the planned and funded improvements can provide the target LOS, then the Project's payment into established fee programs will be considered as an improvement to address deficiencies. Other improvements needed beyond the "funded" improvements (such as localized improvements to non-DIF facilities) are identified as such.

1.4 STUDY AREA

To ensure that this TA satisfies the City of Redlands' traffic study requirements, Urban Crossroads, Inc. prepared a project 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 approved by the City is included in Appendix 1.1.

The following 6 study area intersections shown on Exhibit 1-2 and listed in Table 1-2 were selected for this TA based on consultation with City of Redlands staff. The "50 peak hour trip" criterion utilized by the City of Redlands is consistent with the methodology employed by the County of San Bernardino, and generally represents a minimum number of trips at which a typical intersection would have the potential to be affected by a given development proposal. Although each intersection may have unique operating characteristics, this traffic engineering rule of thumb is a widely utilized tool for estimating a potential area of influence (i.e., study area).

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction	CMP?
1	I-210 SB Ramps/Citrus Plaza Dr. & San Bernardino Av.	Caltrans	No
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.	Caltrans	No
3	Tennessee St.& San Bernardino Av.	Redlands	No
4	Texas St.& Domestic Av.	Redlands	No
5	Texas St. & Pioneer Av.	Redlands	No
6	Texas St. & San Bernardino Av.	Redlands	No

The intent of a CMP is to more directly link land use, transportation, and air quality, thereby prompting reasonable growth management programs that will effectively utilize new transportation funds, alleviate traffic congestion and related deficiencies, and improve air quality. Counties within California have developed CMPs with varying methods and strategies to meet the intent of the CMP legislation. Study area intersections that are identified as CMP facilities in the County of San Bernardino per the San Bernardino County Transportation Authority (SBCTA) CMP are indicated in Table 1-1. (1)

1.5 SENATE BILL 743 – VEHICLE MILES TRAVELED (VMT)

Changes to California Environmental Quality Act (CEQA) Guidelines were adopted in December 2018, which requires all lead agencies to adopt VMT as a replacement for automobile delay-based level of service (LOS) as the new measure for identifying transportation impacts for land use projects. This statewide mandate takes effect July 1, 2020. To aid in this transition, the Governor's Office of Planning and Research (OPR) released a Technical Advisory on Evaluating Transportation Impacts in CEQA (December of 2018). The San Bernardino County Transportation Authority (SBCTA) has recently conducted a multi-jurisdictional study to develop a set of procedures and provide local jurisdictions with sufficient information to adopt VMT baselines and thresholds of significance at or around the July 2020 required implementation date. In February 2020, the San Bernardino County Transportation Authority (SBCTA) released Recommended Traffic Impact Analysis Guidelines for Vehicle Miles Traveled and Level of Service Assessment that address both traditional automobile delay-based level of service (LOS) and new VMT analysis requirements.

EXHIBIT 1-2: LOCATION MAP

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It is our understanding that the City of Redlands utilizes the SBCTA VMT Screening Tool. The Screening Tool allows users to input an assessor's parcel number (APN) to determine if a project's location meets one or more of the screening thresholds for land use projects identified in the Governor's Office of Planning and Research (OPR) Technical Advisory on Evaluating Transportation Impacts in CEQA. The City Guidelines provides details on appropriate "screening thresholds" that can be used to identify when a proposed land use project is anticipated to result in a less-than-significant impact without conducting a more detailed analysis.

The revised Caltrans traffic impact analysis guidelines are set to be available in Spring/Summer 2020, however, Caltrans acknowledges automobile delay will no longer be considered a CEQA impact for development projects and will use VMT as the metric for determining traffic impacts on the State Highway System (SHS).

VMT analysis for the Project has been prepared under separate cover. As such, the LOS operations included in this TA for study area intersections are informational and are not anticipated to support the environmental document.

1.6 DEFICIENCIES

This section provides a summary of deficiencies by analysis scenario. Section 2 *Methodologies* provides information on the methodologies used in the analysis and Section 5 *Existing Plus Project Traffic Conditions*, Section 5 *E+P Traffic Conditions*, Section 6 *Opening Year Cumulative (2025) Traffic Conditions*, and Section 7 *Horizon Year (2040) Traffic Conditions* includes the detailed analysis. A summary of LOS results for all analysis scenarios is presented on Exhibit 1-3.

1.6.1 E+P CONDITIONS

Intersections

Consistent with Existing (2020) traffic conditions, the following intersections are anticipated to operate at an unacceptable LOS during the peak hours (no new deficiencies with the addition of Project traffic):

- I-210 NB Ramps/Tennessee St. & San Bernardino Av. (#2) – LOS E mid-day peak hour; LOS F PM peak hour
- Tennessee St. & San Bernardino Av. (#3) – LOS F AM, mid-day, and PM peak hours

Off-Ramp Queues

There are no movements that are anticipated to experience queuing issues during the weekday AM, weekday mid-day, or weekday PM peak 95th percentile traffic flows, consistent with Existing (2020) traffic conditions.

EXHIBIT 1-3: SUMMARY OF DEFICIENT INTERSECTIONS BY ANALYSIS SCENARIO

#	Intersection	Existing (2020)	E+P	Opening Year Cumulative (2025) Without Project	Opening Year Cumulative (2025) With Project	Horizon Year (2040) Without Project	Horizon Year (2040) With Project
1	I-210 SB Ramps/Citrus Plaza Dr. & San Bernardino Av. *						
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av. *						
3	Tennessee St. & San Bernardino Av.						
4	Texas St. & Domestic Av.						
5	Texas St. & Pioneer Av.						
6	Texas St. & San Bernardino Av.						

LEGEND:

= AM PEAK HOUR

= PM PEAK HOUR

= MID-DAY PEAK HOUR

= LOS A-C

= LOS D-E

= LOS F

* = LOS D ACCEPTABLE FOR CALTRANS RAMP INTERSECTIONS

1.6.2 OPENING YEAR CUMULATIVE (2025) CONDITIONS

Intersections

The following study area intersections are anticipated to operate at an unacceptable LOS under Opening Year Cumulative (2025) Without Project traffic conditions:

- I-210 SB Ramps/Citrus Plaza Drive & San Bernardino Avenue (#1) – LOS E PM peak hour only
- I-210 NB Ramps/Tennessee Street & San Bernardino Avenue (#2) – LOS F mid-day and PM peak hours
- Tennessee Street & San Bernardino Avenue (#3) – LOS F AM, mid-day, and PM peak hours
- Texas Street & Domestic Avenue (#4) – LOS F AM peak hour only
- Texas Street & Pioneer Avenue (#5) – LOS D mid-day peak hour only
- Texas Street & San Bernardino Avenue (#6) – LOS D AM and mid-day peak hours; LOS F PM peak hour

With the addition of Project traffic, there are no additional study area intersections that are anticipated to operate at a deficient LOS during one or both peak hours, in addition to the locations identified above for Opening Year Cumulative (2025) Without Project traffic conditions. It should be noted with the implementation of the Project design features as discussed in Section 1.7 *Recommendations* the intersection of Texas Street & Domestic Avenue is anticipated to result in acceptable intersection operations during the peak hours.

Off-Ramp Queues

There are no movements that are anticipated to experience queuing issues during the weekday AM, weekday mid-day, or weekday PM peak 95th percentile traffic flows, consistent with Existing (2020) traffic conditions.

1.6.2 HORIZON YEAR (2040) CONDITIONS

Intersections

The following study area intersections are anticipated to operate at an unacceptable LOS under Horizon Year (2040) Without Project traffic conditions:

- I-210 SB Ramps/Citrus Plaza Drive & San Bernardino Avenue (#1) – LOS E AM and mid-day peak hours; LOS F PM peak hour
- I-210 NB Ramps/Tennessee Street & San Bernardino Avenue (#2) – LOS F AM, mid-day, and PM peak hours
- Tennessee Street & San Bernardino Avenue (#3) – LOS F AM, mid-day, and PM peak hours
- Texas Street & Pioneer Avenue (#5) – LOS E mid-day peak hour; LOS D PM peak hour
- Texas Street & San Bernardino Avenue (#6) – LOS F AM, mid-day, and PM peak hours

With the addition of Project traffic, there are no additional study area intersections that are anticipated to operate at a deficient LOS during one or both peak hours, in addition to the locations identified above for Horizon Year (2040) Without Project traffic conditions.

Off-Ramp Queues

There are no movements that are anticipated to experience queuing issues during the weekday AM, weekday mid-day, or weekday PM peak 95th percentile traffic flows, consistent with Existing (2020) traffic conditions.

1.7 RECOMMENDATIONS

1.7.1 SITE ADJACENT AND SITE ACCESS RECOMMENDATIONS

The following recommendations are based on the improvements needed to accommodate site access. The site adjacent recommendations are shown on Exhibit 1-4.

Recommendation 1.1 – ***Street L & Street N*** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the northbound approach and a right turn lane.
- Project to construct a westbound left turn lane.

Recommendation 2.1 – ***Street I & Street N*** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the northbound approach and a shared left-right turn lane.
- Project to construct an eastbound shared through-right turn lane.
- Project to construct a westbound shared left-through lane.

Recommendation 3.1 – ***Street K & Street N*** – The following improvements are necessary to accommodate site access:

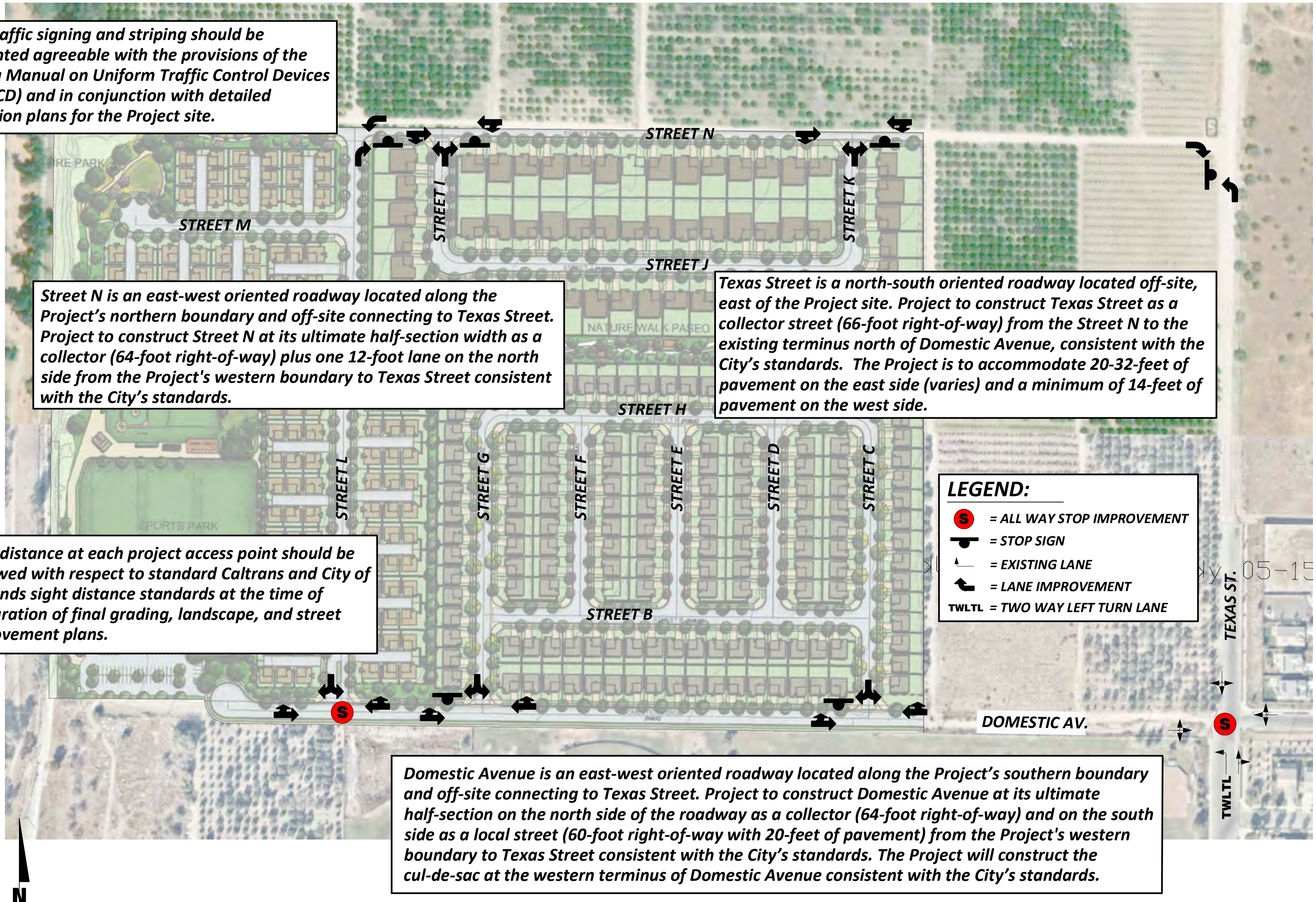
- Project to install a stop control on the northbound approach and a shared left-right turn lane.
- Project to construct an eastbound shared through-right turn lane.
- Project to construct a westbound shared left-through lane.

Recommendation 4.1 – ***Street L & Domestic Avenue*** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on all approaches (all-way stop control).
- Project to construct a southbound shared left-right turn lane.
- Project to construct an eastbound shared left-through lane.
- Project to construct a westbound shared through-right turn lane.

EXHIBIT 1-4: SITE ADJACENT ROADWAY AND SITE ACCESS RECOMMENDATIONS

On-site traffic signing and striping should be implemented agreeable with the provisions of the California Manual on Uniform Traffic Control Devices (CA MUTCD) and in conjunction with detailed construction plans for the Project site.



Street N is an east-west oriented roadway located along the Project's northern boundary and off-site connecting to Texas Street. Project to construct Street N at its ultimate half-section width as a collector (64-foot right-of-way) plus one 12-foot lane on the north side from the Project's western boundary to Texas Street consistent with the City's standards.

Texas Street is a north-south oriented roadway located off-site, east of the Project site. Project to construct Texas Street as a collector street (66-foot right-of-way) from the Street N to the existing terminus north of Domestic Avenue, consistent with the City's standards. The Project is to accommodate 20-32-feet of pavement on the east side (varies) and a minimum of 14-feet of pavement on the west side.

Sight distance at each project access point should be reviewed with respect to standard Caltrans and City of Redlands sight distance standards at the time of preparation of final grading, landscape, and street improvement plans.

Domestic Avenue is an east-west oriented roadway located along the Project's southern boundary and off-site connecting to Texas Street. Project to construct Domestic Avenue at its ultimate half-section on the north side of the roadway as a collector (64-foot right-of-way) and on the south side as a local street (60-foot right-of-way with 20-feet of pavement) from the Project's western boundary to Texas Street consistent with the City's standards. The Project will construct the cul-de-sac at the western terminus of Domestic Avenue consistent with the City's standards.

Recommendation 5.1 – ***Street G & Domestic Avenue*** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the southbound approach and a shared left-right turn lane.
- Project to construct an eastbound shared left-through lane.
- Project to construct a westbound shared through-right turn lane.

Recommendation 6.1 – ***Street C & Domestic Avenue*** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the southbound approach and a shared left-right turn lane.
- Project to construct an eastbound shared left-through lane.
- Project to construct a westbound shared through-right turn lane.

Recommendation 7.1 – ***Texas Street & Street N*** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the eastbound approach and a right turn lane.
- Project to construct a northbound left turn lane.

Recommendation 8.1 –***Texas Street & Domestic Avenue (#4)*** – The following improvement is necessary to accommodate site access:

- Project to install a stop control on the northbound and southbound approaches, converting the intersection to an all-way stop control. Given the proximity to the adjacent Citrus Valley High School and the adjacent residential developments (including the proposed Project), an all-way stop control will provide better visibility for pedestrian crossings as vehicles would be required to stop before the crosswalk.

Recommendation 9.1 – Domestic Avenue is an east-west oriented roadway located along the Project's southern boundary and off-site connecting to Texas Street. Project to construct Domestic Avenue at its ultimate half-section on the north side of the roadway as a collector (64-foot right-of-way) and on the south side as a local street (60-foot right-of-way with 20-feet of pavement) from the Project's western boundary to Texas Street, consistent with the City's standards. The Project will construct the cul-de-sac at the western terminus of Domestic Avenue consistent with the City's standards.

Recommendation 10.1 – Street N is an east-west oriented roadway located along the Project's northern boundary and off-site connecting to Texas Street. Project to construct Street N at its ultimate half-section width as a collector (64-foot right-of-way) plus one 12-foot lane on the north side from the Project's western boundary to Texas Street, consistent with the City's standards.

Recommendation 11.1 – Texas Street is a north-south oriented roadway located off-site, east of the Project site. Project to construct Texas Street as a collector (66-foot right-of-way) from Street N to the existing terminus north of Domestic Avenue, consistent with the City's standards. The Project is to accommodate 20-32-feet of pavement on the east side (varies) and a minimum of 14-feet of pavement on the west side.

On-site traffic signing and striping should be implemented agreeable with the provisions of the California Manual on Uniform Traffic Control Devices (CA MUTCD) and in conjunction with detailed construction plans for the Project site.

Sight distance at each project access point should be reviewed with respect to standard Caltrans and City of Redlands sight distance standards at the time of preparation of final grading, landscape, and street improvement plans.

1.7.2 QUEUING ANALYSIS AT THE PROJECT DRIVEWAYS

A queuing analysis was conducted for the Project driveways along Domestic Avenue and the future Street N roadway. The analysis was conducted for the weekday AM, mid-day, and PM peak hours. The 95th percentile queues for the site adjacent intersections can be found in Appendix 1.2.

The traffic modeling and signal timing optimization software package Synchro/SimTraffic has been utilized to assess queues at the Project driveways and site adjacent intersections. The 95th percentile queue has been utilized for purposes of determining the necessary turn pocket storage lengths and represents the maximum back of queue with 95th percentile traffic volumes during the peak hour. The 95th percentile queue is not necessarily ever observed; it is simply based on statistical calculations. However, many jurisdictions utilize the 95th percentile queues for design purposes. The results of the queuing analysis were used to confirm turn pocket storage lengths (where applicable) and to determine if there would be spillback between Project driveway intersections along public roadways. These recommendations have been presented on Exhibit 1-4.

1.7.3 MULTI-WAY STOP WARRANT

A multi-way stop control warrant has been evaluated based on the future Project volumes at the intersections of Street L & Domestic Avenue (intersection leading up to the soccer and baseball fields) and Texas Street & Domestic Avenue. Based on the future Project volumes, the intersection of Street L & Domestic Avenue is not anticipated to meet a multi-way stop control warrant. However, according to the CA MUTCD, the application of a multi-way stop control may also include the need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes. Since the intersection is proposed to provide pedestrian access from the adjacent Citrus Valley High School to the proposed ball fields, an all-way stop control is recommended at this location. Vehicles will be forced to stop at the intersection, which will provide better visibility in the event pedestrians use the crosswalk. In addition, the CA MUTCD also indicates that an all-way stop control may be applicable at an intersection of two residential neighborhood collector streets of similar design and operating characteristics if it would improve traffic operational characteristics of the intersection. The intersection of Texas Street and Domestic Avenue is anticipated to meet a multi-way stop warrant with future Project traffic volumes. The multi-way stop warrants are provided in Appendix 1.3 of this report.

1.7.4 Traffic Calming Measures

The ITE defines traffic calming as the combination of measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non-motorized street users. (6) Pursuant to discussions with the City of Redlands, potential safety and traffic calming measures have been provided since the Project site is located adjacent to Citrus Valley High School. The Project streets are all public and some traffic calming measures such as speed humps, bulb outs, chokers, etc. are typically implemented on private streets. As such, the proposed Project intends to improve the roadway pavement sections to accommodate parallel on-street parking on the public streets.

On-Street Parking provides either parallel or angled parking spaces along either side of the roadway. According to the ITE, on-street parking can reduce vehicle speeds along the roadway. Parallel parking is recommended over angled parking to maximize speed reduction. According to the City of Redlands General Plan, Domestic Avenue is classified as a Collector Street, which provides 8-feet of on-street parking on both sides of the roadway. Street L and internal streets will also accommodate parallel on-street parking on both sides of the street. Street N will accommodate parallel on-street parking on the south side only. It should be noted, on-street parking as a traffic calming measure depends on parking demand. In other words, maximum speed reduction occurs with maximum on-street parking demand.

1.7.5 Off-site Recommendations

The recommended improvements needed to address the cumulative deficiencies identified under Existing (2020), E+P, Opening Year Cumulative (2025), and Horizon Year (2040) traffic conditions are shown in Table 1-2. For those improvements listed in Table 1-2 and not constructed as part of the Project, the Project Applicant's responsibility for the Project's contributions towards deficient intersections is fulfilled through payment of fees or fair share that would be assigned to construction of the identified recommended improvements.

Table 1-2 also summarizes the applicable cost associated with each of the recommended improvements based on the preliminary construction cost estimates found in Appendix G of the San Bernardino County CMP in conjunction with a cost escalation factor of 1.568 to reflect current (2020) costs. A rough order of magnitude cost has been prepared to determine the appropriate contribution value based upon the Project's fair share of traffic as part of the project approval process. These estimates are a rough order of magnitude only as they are intended only for disclosure purposes and do not imply any legal responsibility or formula for contributions or mitigation.

Recommendation 12.1 – Prior to the issuance of building permits, the Project Applicant shall pay the Project's fair share amount of $548,215 for the improvements identified in Table 1-2 at intersections located within the City of Redlands, or as agreed to by the City and Project Applicant, in conjunction with all other applicable transportation fees (including but not limited to the City's DIF fees).

Table 1-2

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Summary of Improvements and Rough Order of Magnitude Costs for Intersections

#	Intersection Location	Jurisdiction	E+P	2024 With Project	2040 With Project	Improvements in City DIF?[1]	Project Responsibility[2]	Total Cost[3,4]	Fair Share %[5]	Fair Share Cost[6]
1	I-210 SB Ramps/Citrus Plaza Dr. & San Bernardino Av.	Caltrans	None	2nd WB through lane	Same	Yes	Fees	$0	--	$0
					2nd WB through lane	Yes	Fees	$0		$0
					3rd EB through lane	Yes	Fees	$0		$0
								Total $0		**$0**
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.	Caltrans	2nd EB through lane	Same	Same	Yes	Fees	$0	9.9%	$0
			2nd WB through lane	Same	Same	Yes	Fees	$0		$0
				3rd EB through lane	Same	Yes	Fees	$0		$0
					2nd SB left turn lane	Yes	Fair Share	$78,400		$7,762
					3rd WB through lane	Yes	Fees	$0		$0
								Total $78,400		**$7,762**
3	Tennessee St. & San Bernardino Av.	Redlands	SB right turn lane	Same	Same	No	Fair Share	$78,400	11.1%	$8,699
			Install a traffic signal	Same	Same	No	Fair Share	$600,000		$66,574
			EB left turn lane	Same	Same	No	Fair Share	$78,400		$8,699
			2nd WB through lane	Same	Same	Yes	Fees	$0		$0
				2nd EB through lane	Same	Yes	Fees	$0		$0
					3rd EB through lane	Yes	Fees	$0		$0
					3rd WB through lane	Yes	Fees	$0		$0
								Total $756,800		**$83,972**
5	Texas St. & Pioneer Av.	Redlands	None	EB right turn lane	Not Applicable[7]	No	Fair Share	$78,400	33.1%	$25,946
					2nd NB through lane	No	Fair Share	$282,240		$93,405
					2nd EB through lane	No	Fair Share	$282,240		$93,405
					EB left turn lane	No	Fair Share	$78,400		$25,946
					WB left turn lane	No	Fair Share	$78,400		$25,946
					2nd WB through lane	Yes	Fees	$0		$0
								Total $799,680		**$264,647**

Table 1-2

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Summary of Improvements and Rough Order of Magnitude Costs for Intersections

#	Intersection Location	Jurisdiction	E+P	2024 With Project	2040 With Project	Improvements in City DIF?[1]	Project Responsibility[2]	Total Cost[3,4]	Fair Share %[5]	Fair Share Cost[6]
6	Texas St. & San Bernardino Av.	Redlands	None	NB left turn lane	Same	No	Fair Share	$78,400	15.6%	$12,245
				SB left turn lane	Same	No	Fair Share	$78,400		$12,245
				SB right turn lane	Same	No	Fair Share	$78,400		$12,245
				2nd EB through lane	Same	Yes	Fees	$0		$0
				2nd WB through lane	Same	No	Fair Share	$282,240		$44,082
					2nd NB through lane	No	Fair Share	$282,240		$44,082
					3rd EB through lane	Yes	Fees	$0		$0
					3rd WB through lane	No	Fair Share	$282,240		$44,082
					2nd EB left turn lane	No	Fair Share	$78,400		$12,245
					Modify traffic signal to implement overlap phasing on the SB right turn lane	No	Fair Share	$117,600		$18,368
								Total $1,277,920		**$199,595**
							Total Costs for Horizon Year (2040) Improvements	**$2,912,800**		**$555,977**
							Total Project Fair Share Contribution to the City of Redlands[8,10]	**$548,215**		
							Total Project Fair Share Contribution to Caltrans[9,10]	**$7,762**		

[1] Improvements included in City of Redlands DIF program for local, regional and specific plan components.
[2] Identifies the Project's responsibility to construct an improvement or contribute fair share or fee payment towards the implementation of the improvement shown.
[3] Costs have been estimated using the data provided in Appendix "G" of the CMP (2016 Update) for preliminary construction costs.
[4] Appendix "G" costs escalated by a factor of 1.568 except Traffic Signals to reflect current costs.
[5] Program improvements constructed by project may be eligible for fee credit, at discretion of City. See Table 8-1 for Fair Share Calculations.
[6] Rough order of magnitude cost estimate.
[7] Improvement is no longer needed as the right turn lane will be restriped to a through lane in the future when Pioneer Avenue is widened to the east with an additional receiving lane.
[8] Total project fair share contribution consists of the improvements which are not already included in the City-wide DIF for those intersections wholly or partially within the City of Redlands.
[9] Total project fair share contribution consists of the improvements which are not already included in a fee program for those intersections wholly or partially within Caltrans' jurisdiction. Caltrans may not provide a mechanism in which to receive fair share contributions.
[10] Contribution cost shall be adjusted per appropriate construction cost index using July 2020 as a base value.

Recommendation 13.1 – Prior to the issuance of building permits, the Project Applicant shall pay the Project's fair share amount of $7,762 for the improvements identified in Table 1-2 at intersections located within Caltrans' jurisdiction, or as agreed to by Caltrans and Project Applicant.

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2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are generally consistent with City of Redlands, San Bernardino County CMP, and Caltrans traffic study guidelines. (1) (3)

2.1 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.

2.2 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 6th Edition Highway Capacity Manual (HCM) methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (7) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

City of Redlands, County of San Bernardino

The City of Redlands and County of San Bernardino require signalized intersection operations analysis based on the methodology described in the HCM. (7) Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections LOS is directly related to the average control delay per vehicle and is correlated to a LOS designation as described in Table 2-1.

TABLE 2-1: SIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A	F
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B	F
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C	F

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D	F
Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.01 to 80.00	E	F
Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths	80.01 and up	F	F

Source: HCM 6th Edition

Consistent with Appendix B of the San Bernardino County CMP, the following saturation flow rates, in vehicles per hour green per lane (vphgpl), will be utilized in the traffic analysis for signalized intersections:

Existing and Opening Year Cumulative Traffic Conditions:

- Exclusive through: 1800 vphgpl
- Exclusive left: 1700 vphgpl
- Exclusive right: 1800 vphgpl
- Exclusive dual left: 1600 vphgpl
- Exclusive triple left: 1500 vphgpl

Horizon Year (2040) Traffic Conditions:

- Exclusive through: 1900 vphgpl
- Exclusive left: 1800 vphgpl
- Exclusive dual left: 1700 vphgpl
- Exclusive right: 1900 vphgpl
- Exclusive dual right: 1800 vphgpl
- Exclusive triple left: 1600 vphgpl or less

The traffic modeling and signal timing optimization software package Synchro (Version 10) has been utilized to analyze signalized intersections within the City of Redlands and County of San Bernardino. 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 peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15-minute volumes. Common practice for LOS analysis is to use a peak 15-minute rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g. PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis scenarios. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (7)

California Department of Transportation (Caltrans)

Per the Caltrans Guide for the Preparation of Traffic Impact Studies, the traffic modeling and signal timing optimization software package Synchro (Version 10) has also been utilized to analyze signalized intersections under Caltrans' jurisdiction, which include interchange to arterial ramps (i.e., I-210 Freeway ramps at San Bernardino Avenue, etc.). (3) Signal timing for the freeway arterial-to-ramp intersections have been obtained from Caltrans District 8 and were utilized for the purposes of this analysis.

2.2.2 UNSIGNALIZED INTERSECTIONS

City of Redlands, County of San Bernardino

The City of Redlands and County of San Bernardino require the operations of unsignalized intersections be evaluated using the methodology described in the HCM. (7) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2).

TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

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

Source: HCM 6th Edition

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. Per HCM, delay for the worst side-street movement is report for two-way/side-street stop-controlled intersections. For all-way stop controlled intersections, LOS is computed for the intersection as a whole.

2.3 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 ascertain 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). (8)

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. (8) Specifically, this TA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions. Warrant 3 is appropriate to use for this TA because it provides specialized warrant criteria for intersections with rural characteristics (e.g. located in communities with populations of less than 10,000 persons or with adjacent major streets operating above 40 miles per hour). 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.

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.

TABLE 2-3: TRAFFIC SIGNAL WARRANT ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction
3	Tennessee Street & San Bernardino Avenue	Redlands
4	Texas Street & Domestic Avenue	Redlands

The Existing conditions traffic signal warrant analysis is presented in the subsequent section, Section 3 *Area Conditions* of this report. The traffic signal warrant analyses for future conditions are presented in Section 5 *E+P Traffic Conditions,* Section 6 *Opening Year Cumulative (2025) Traffic Conditions,* and Section 7 *Horizon Year (2040) Traffic Conditions* 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.

2.4 FREEWAY OFF-RAMP QUEUING ANALYSIS

The study area for this TA includes freeway-to-arterial interchanges at the I-210 Freeway at San Bernardino Avenue. Consistent with Caltrans requirements, the 95th percentile queuing of vehicles has been assessed at the off-ramps to determine potential queuing deficiencies at the freeway ramp intersections at the interchanges identified above. Specifically, the queuing analysis is utilized to identify any potential queuing and "spill back" onto the I-210 Freeway mainline from the off-ramps.

The traffic progression analysis tool and HCM intersection analysis program, Synchro, has been used to assess the potential deficiencies/needs of the intersections with traffic added from the proposed Project. Storage (turn-pocket) length recommendations at the ramps have been based upon the 95th percentile queue resulting from the Synchro progression analysis. There are two footnotes which appear on the Synchro outputs. One footnote indicates if the 95th percentile cycle exceeds capacity. Traffic is simulated for two complete cycles of the 95th percentile traffic in Synchro in order to account for the effects of spillover between cycles. In practice, the 95th percentile queue shown will rarely be exceeded and the queues shown with the footnote are acceptable for the design of storage bays. The other footnote indicates whether or not the volume for the 95th percentile queue is metered by an upstream signal. If the upstream intersection is at or near capacity, the 50th percentile queue represents the maximum queue experienced.

A vehicle is considered queued whenever it is traveling at less than 10 feet/second. A vehicle will only become queued when it is either at the stop bar or behind another queued vehicle. The 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes during the peak hour and is derived from the average (50th percentile) queue plus 1.65 standard deviations. The queue length reported is for the lane with the highest queue in the lane group. The 95th percentile queue is not necessarily ever observed it is simply based on statistical calculations.

2.5 MINIMUM ACCEPTABLE LEVELS OF SERVICE (LOS)

Minimum Acceptable LOS and associated definitions of intersection deficiencies has been obtained from each of the applicable surrounding jurisdictions.

2.5.1 CITY OF REDLANDS

The City of Redlands has established specific performance criteria for intersection operations. These performance criteria include standards related to determining the significance of project impacts on the roadway system. The City of Redlands has established LOS C as the minimum level of service for its intersections. Therefore, any intersection operating at LOS D or worse will be considered deficient for the purposes of this analysis. Additionally, General Plan Policy 5.20c from the Redlands General Plan states that: Where the current level of service at a location within the City of Redlands is below the LOS C standard, no development project shall be approved that cannot be mitigated so that it does not reduce the existing level of service at that location (i.e. intersections in Redlands that are deficient to start out with are acceptable as long as they do not further degrade LOS) except as provided in Section 5.20b.

2.5.2 CALTRANS

Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on SHS facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less than this target LOS, the existing LOS should be maintained. In general, the region-wide goal for an acceptable LOS on all freeways, roadway segments, and intersections is LOS D.

2.5.3 MEASURE "U"

General Plan Policy 5.20b of Measure U (see General Plan Figure 5-1):

> *The purpose and intent of this initiative measure is to establish comprehensive and inviolable principles of managed development for the City of Redlands that will preserve, enhance, and maintain the special quality of life valued by this community. The principles of managed development established by this initiative measure assure that future development within the City of Redlands occurs in a way that promotes the social and economic well-being of the entire community.*

In order to be in compliance with Measure U, the Project is required to maintain a minimum LOS C or better at all intersections presently at LOS C or better.

2.6 DEFICIENCY CRITERIA

This section outlines the methodology used in this analysis related to identifying circulation system deficiencies.

2.6.1 CITY OF REDLANDS INTERSECTIONS

To determine whether the addition of project traffic at a study intersection would result in a traffic deficiency, the following will be utilized:

- A traffic deficiency occurs at a study intersection if the addition of project-generated trips reduces the peak hour level of service of the study intersection to change from acceptable operation (e.g., LOS A, B or C) to deficient operation (e.g., LOS D, E or F) and, if applicable, also causes an unsignalized intersection to satisfy a Caltrans traffic signal warrant; or
- A traffic deficiency occurs at a study intersection if the addition of project-generated trips worsens the pre-project level of service grade at a deficiently operating (e.g., LOS D, E or F) intersection and, if applicable, also causes an unsignalized intersection to satisfy a Caltrans traffic signal warrant.

If the addition of project-related traffic under Opening Year Cumulative traffic conditions results in a new deficiency as compared to pre-project traffic conditions, then improvements will be identified to improve the intersection's LOS back to acceptable levels. For LOS deficiencies identified under Horizon Year (2040) traffic conditions, the Project shall contribute fair share toward the improvements needed to improve the peak hour operations back to acceptable LOS. However, if the intersection is included in the City's DIF then the project would contribute through payment of fees and no fair share would be required.

2.6.2 MEASURE "U"

Per 5.20c of Measure U, where the current LOS at a location within the City of Redlands is below the LOS C standard, no development project shall be approved that cannot be mitigated so that it does not reduce the existing LOS at that location except as provided in Section 5.20b.

2.7 PROJECT FAIR SHARE CALCULATION METHODOLOGY

In cases where this TA identifies that the Project would contribute additional traffic volumes to traffic deficiencies, Project fair share costs of improvements necessary to address deficiencies have been identified. The Project's fair share cost of improvements is determined based on the following equation, which is the ratio of Project traffic to new traffic, and new traffic is total future (Horizon Year) traffic less existing baseline traffic:

Project Fair Share % = Project (2040) AM/MD/PM Traffic / (2040 With Project AM/MD/PM Total Traffic – Existing AM/MD/PM Traffic)

The Project fair share percentage has been calculated for the weekday AM, mid-day, and PM peak hours and the highest of the three has been selected for the purposes of this analysis. The Project fair share contribution calculations are presented in Section 8 *Local and Regional Funding Mechanisms* of this TA. The cost of implementing the improvements shown in Table 1-2 have been estimated based on the preliminary construction cost estimates found in Appendix G of the San Bernardino County CMP in conjunction with a total cost escalation factor of 1.568 to more closely approximate current (2020) costs. These cost estimates have been utilized in conjunction with the Project fair share percentages to determine the Project's fair share cost of the recommended improvements (see Table 8-1). These estimates are a rough order of magnitude only as they are intended only for discussion purposes and do not imply any legal responsibility or formula for contributions or physical improvements.

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3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the City of Redlands General Plan Circulation Network, and a review of existing peak hour intersection operations, traffic signal warrant, and off-ramp queuing analyses.

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the Traffic Study Scoping Agreement (Appendix 1.1) and discussion with City of Redlands staff, the study area includes a total of six existing as shown previously on Exhibit 1-2. Exhibit 3-1 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.

3.2 GENERAL PLAN AND EAST VALLEY CORRIDOR SPECIFIC PLAN CIRCULATION ELEMENTS

As previously noted, the Project site is located within the City of Redlands. Exhibit 3-2 shows the City of Redlands General Plan Circulation Element. Exhibit 3-3 shows the City of Redlands General Plan roadway cross-sections. The City of Redlands *East Valley Corridor Specific Plan*, approved on January 3, 1989 and as amended, Circulation Element and roadway cross-sections are as shown on Exhibits 3-4 and 3-5, respectively.

The City of Redlands is located within the County of San Bernardino. The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the City of Redlands in the vicinity of the proposed Project as identified on the City's General Plan Circulation Element or in the East Valley Corridor Specific Plan are described subsequently.

Texas Street is a two-lane undivided roadway in the study area. Texas Street is designated as a Collector north of Pioneer Avenue and as a Minor Arterial south of Pioneer Avenue on the City of Redlands General Plan. The roadway cross-section for a Secondary Highway consists of two travel lanes in each direction and 8-foot shoulders.

Pioneer Avenue is a two-lane undivided roadway west of Texas Street and a two-lane undivided roadway east of Texas Street, with curb and gutter improvements in place along the north side of the road between Tennessee Street and Texas Street. Consistent with the East Valley Corridor Specific Plan, Pioneer Avenue is designated as a Collector (66-foot right-of-way) between Alabama Street and Texas Street and 95-foot right-of-way east of Texas Street. Pioneer Avenue is designated as a collector on the City of Redlands General Plan.

EXHIBIT 3-1: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS

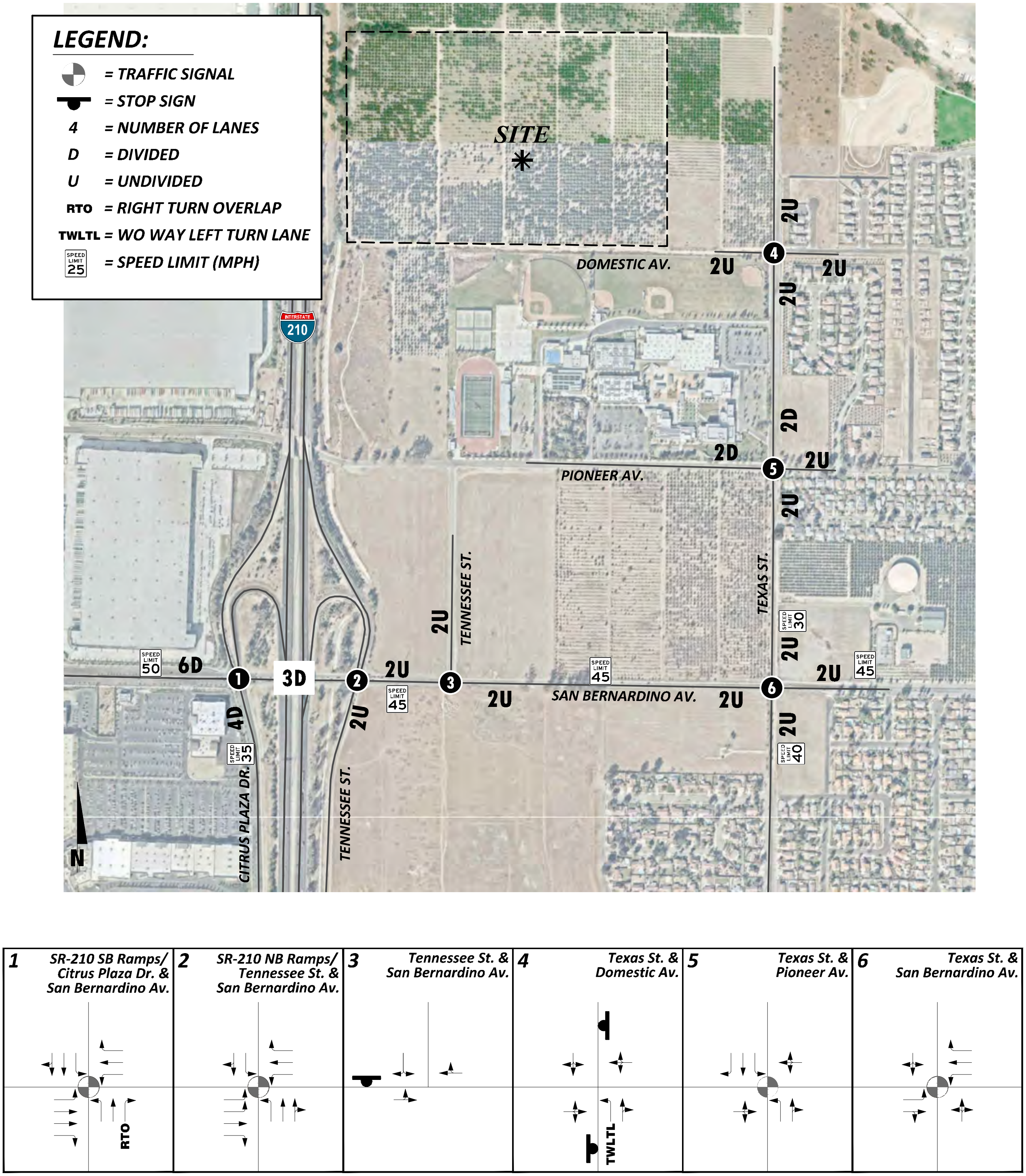
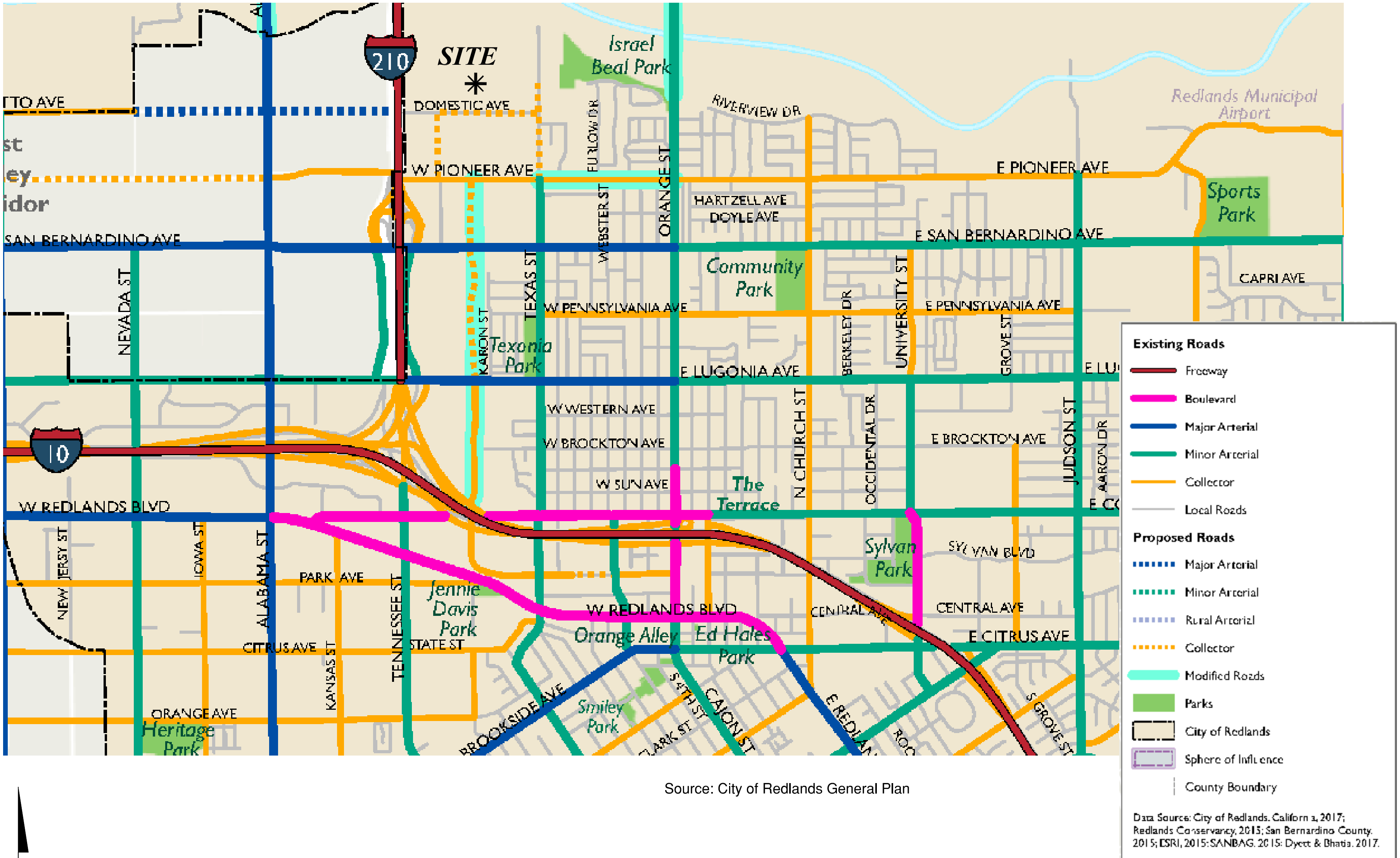


EXHIBIT 3-2: CITY OF REDLANDS GENERAL PLAN ROADWAY CLASSIFICATION



Source: City of Redlands General Plan

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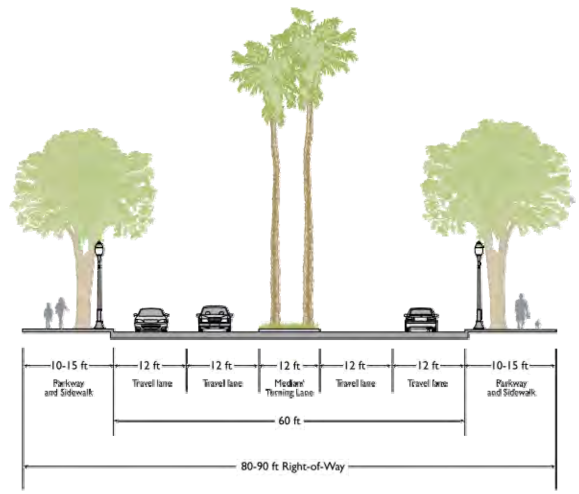
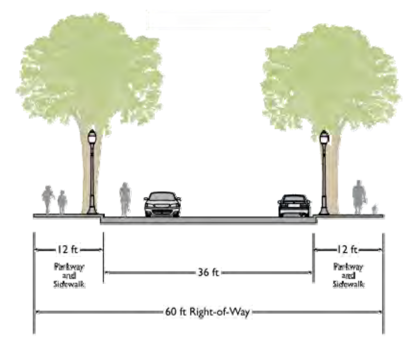
URBAN CROSSROADS

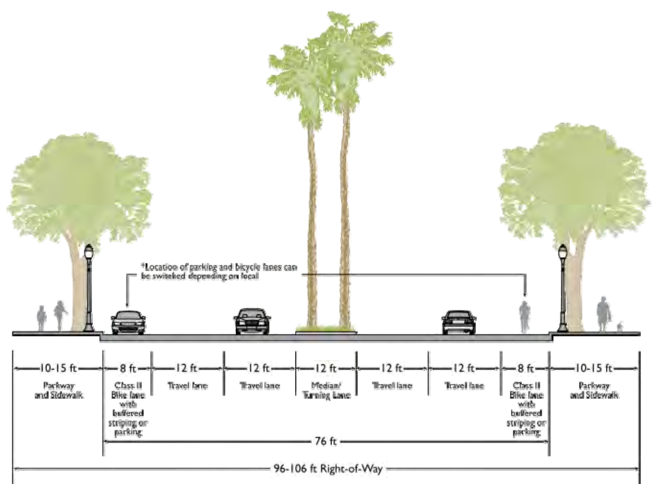
EXHIBIT 3-3 (1OF4): CITY OF REDLANDS GENERAL PLAN ROADWAY CROSS-SECTIONS



a. Boulevard (Standard)



c. Local Street (Standard)

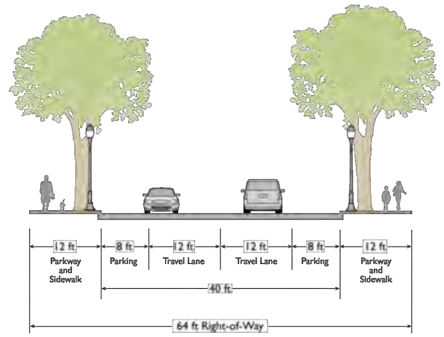


b. Boulevard (Complete Streets)

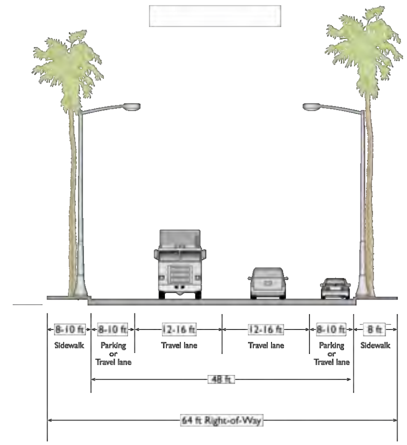
Notes:

1. Street sections are illustrative. Minor variations and deviations from dimensions are permitted, and would not require a General Plan Amendment.
2. Bicycle facilities are based on dimensions included in the Bicycle Facility Design Guidelines for the Bicycle Master Plan (2015).

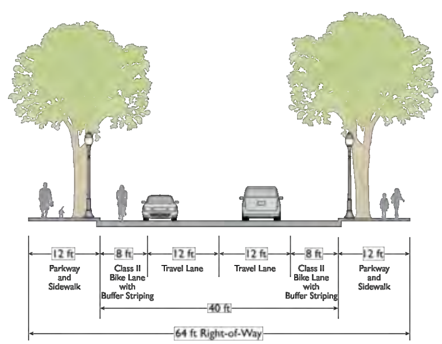
EXHIBIT 3-3 (2OF4): CITY OF REDLANDS GENERAL PLAN ROADWAY CROSS-SECTIONS



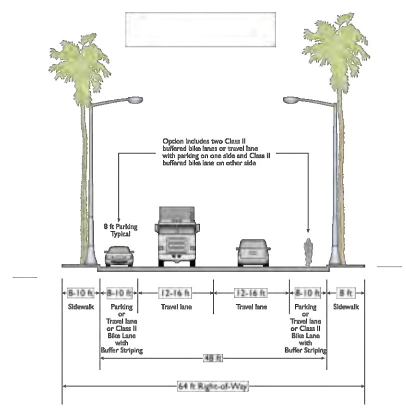
d. Collector – Residential (Standard)



f. Collector – Industrial (Standard)

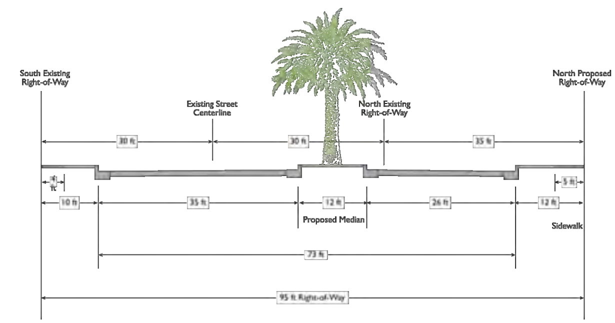


e. Collector – Residential (Complete Streets)

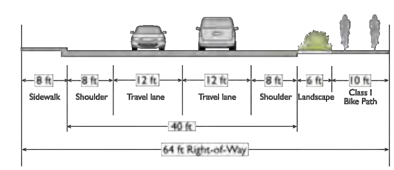


g. Collector – Industrial (Complete Streets)

PIONEER AVENUE
PROPOSED STREET SECTION EAST OF TEXAS STREET



x. Pioneer Avenue

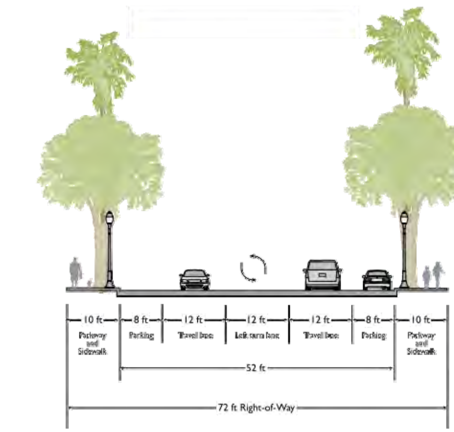


h. Alternative Collector

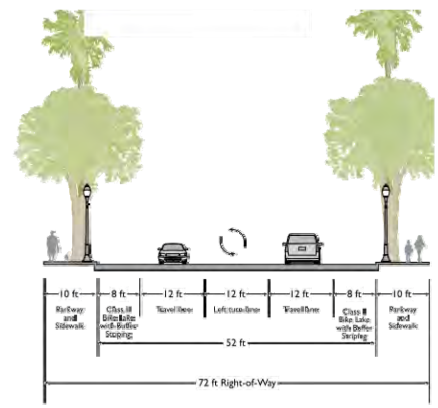
Notes:

1. Street sections are illustrative. Minor variations and deviations from dimensions are permitted, and would not require a General Plan Amendment.
2. Bicycle facilities are based on dimensions included in the Bicycle Facility Design Guidelines for the Bicycle Master Plan (2015).

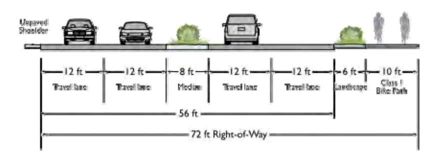
EXHIBIT 3-3 (3OF4): CITY OF REDLANDS GENERAL PLAN ROADWAY CROSS-SECTIONS



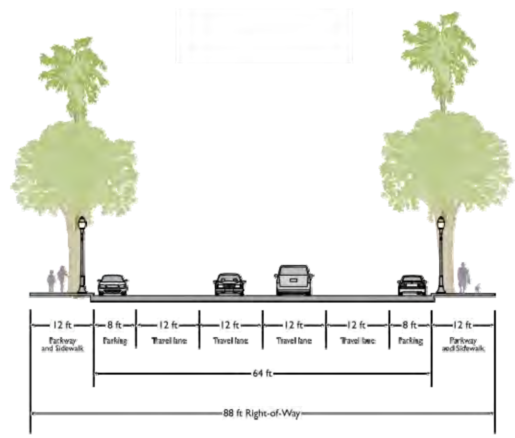
i. Minor Arterial – 2 Lanes Plus Left Turn Lane (Standard)



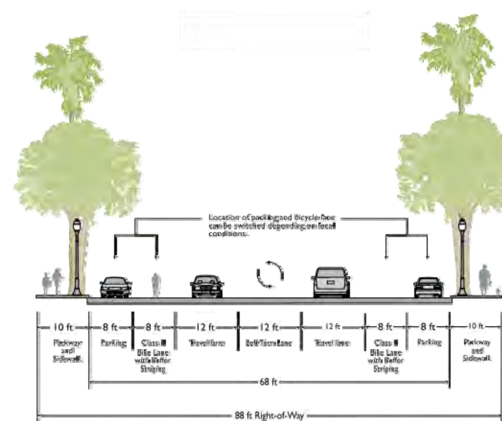
k. Minor Arterial – 2 Lanes Plus Left Turn Lane (Complete Streets)



m. Rural Arterial



j. Minor Arterial – 4 Lanes Undivided (Standard)

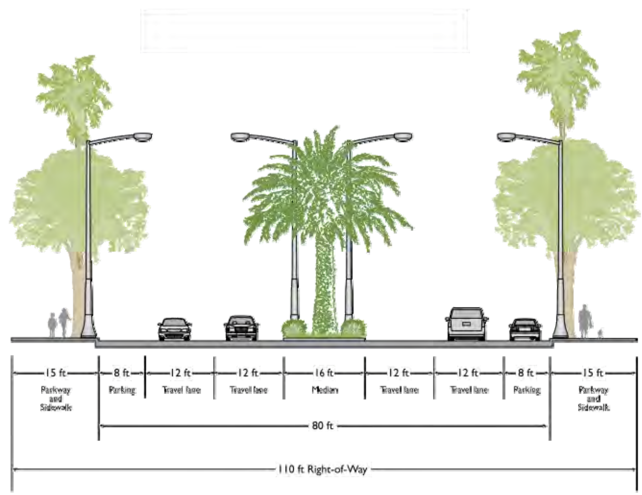


l. Minor Arterial – 2 Lanes Plus Left Turn Lane, Bicycle Lanes, and Parking (Complete Streets)

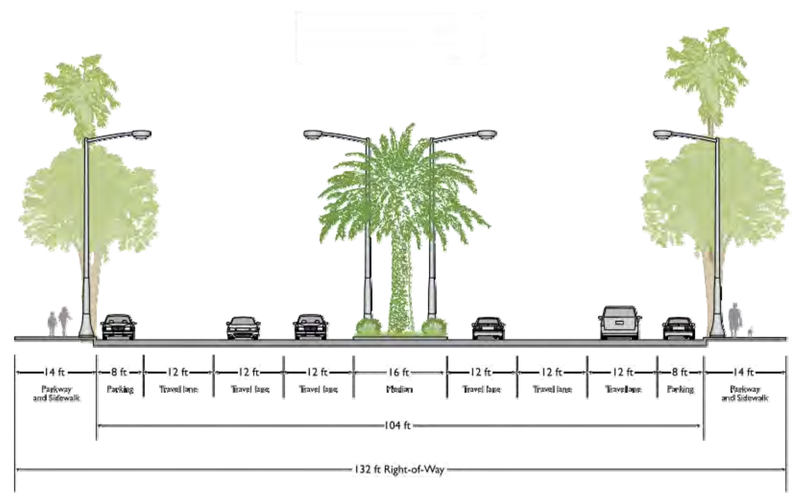
Notes:

1. Street sections are illustrative. Minor variations and deviations from dimensions are permitted, and would not require a General Plan Amendment.
2. Bicycle facilities are based on dimensions included in the Bicycle Facility Design Guidelines for the Bicycle Master Plan (2015).

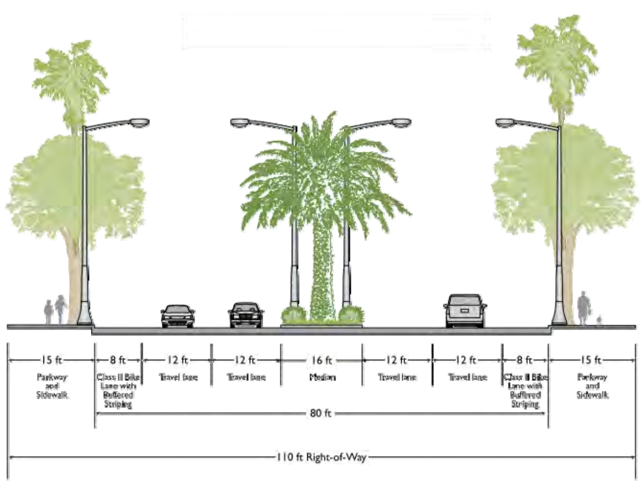
EXHIBIT 3-3 (4OF4): CITY OF REDLANDS GENERAL PLAN ROADWAY CROSS-SECTIONS



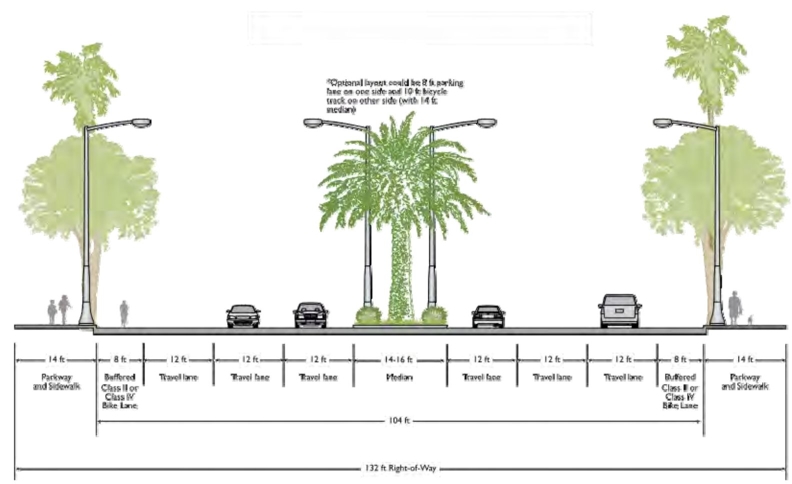
n. Major Arterial – 4 Lanes Divided(Standard)



p. Major Arterial – 6 Lanes Divided (Standard)



o. Major Arterial – 4 Lanes Divided (Complete Streets)

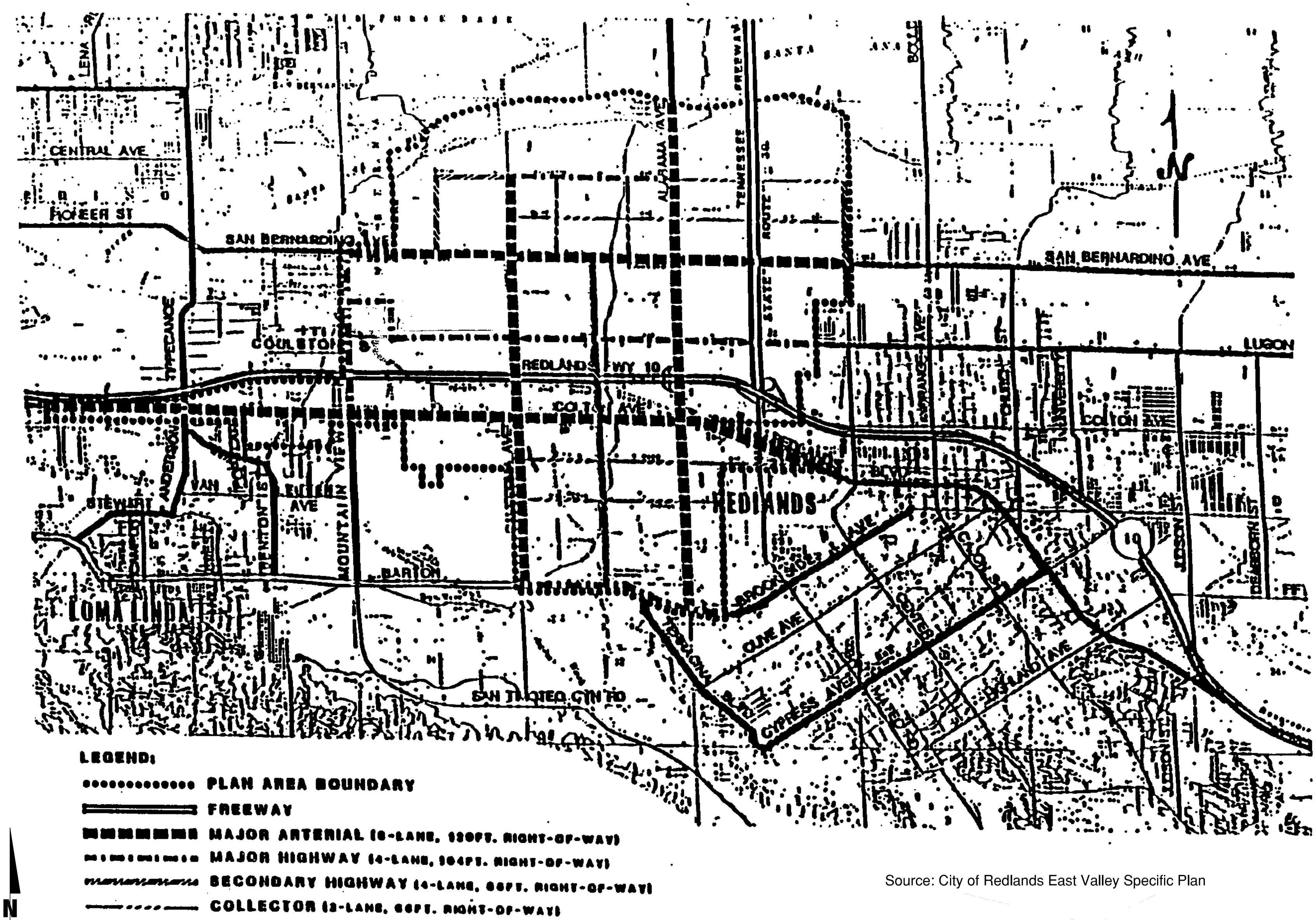


q. Major Arterial – 6 Lanes Divided (Complete Streets)

Notes:

1. Street sections are illustrative. Minor variations and deviations from dimensions are permitted, and would not require a General Plan Amendment.
2. Bicycle facilities are based on dimensions included in the Bicycle Facility Design Guidelines for the Bicycle Master Plan (2015).

EXHIBIT 3-4: EAST VALLEY CORRIDOR SPECIFIC PLAN CIRCULATION ELEMENT



Source: City of Redlands East Valley Specific Plan

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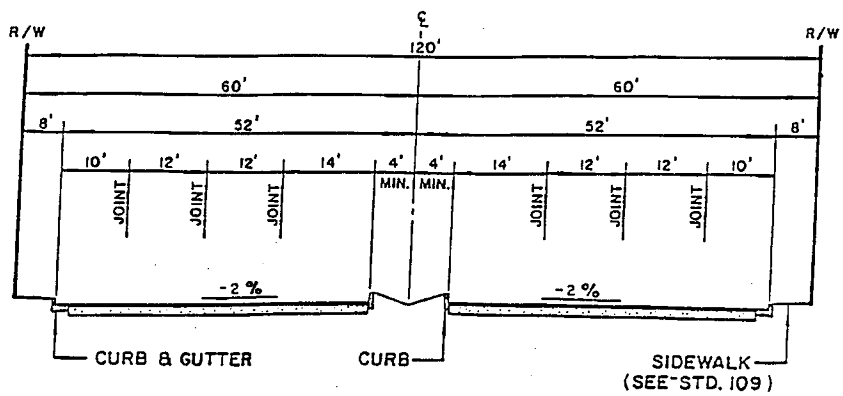
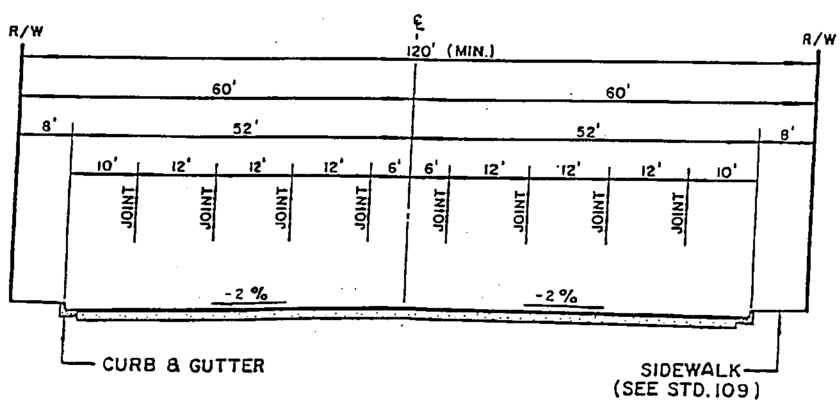
EXHIBIT 3-5 (1OF5): EAST VALLEY SPECIFIC PLAN ROADWAY CROSS-SECTION

COMMUNITY DESIGN
Circulation

City of Redlands
as amended July 2, 1996



TYPICAL SECTION
WITH RAISED MEDIAN



TYPICAL SECTION
WITH CONTINUOUS LEFT TURN LANE

NOTES:

1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. DRAINAGE FACILITIES SHALL BE PROVIDED TO DEWATER RAISED MEDIAN AREAS.
3. 10' SHOULDER AREAS MAY BE DESIGNATED AS A BIKE LANE AND EMERGENCY PARKING ONLY.

FIGURE 4-2

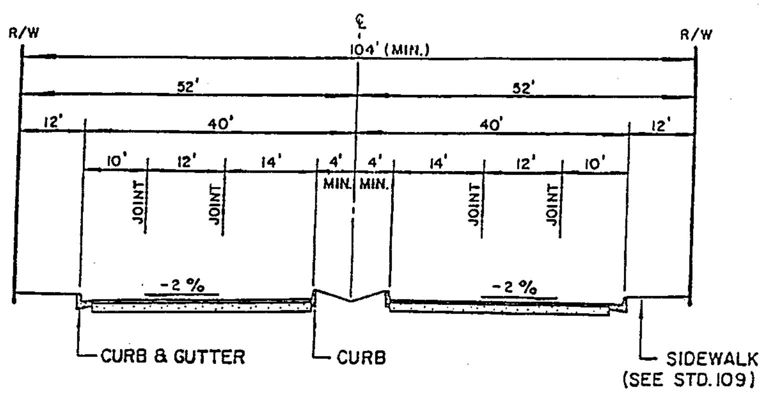
MAJOR ARTERIAL

D4-6

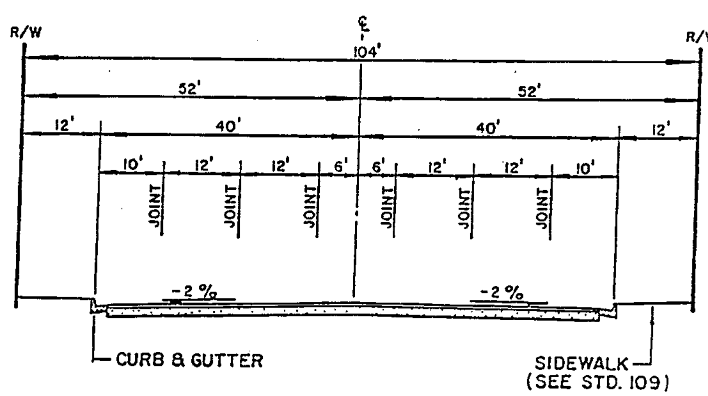
EXHIBIT 3-5 (2OF5): EAST VALLEY SPECIFIC PLAN ROADWAY CROSS-SECTION

COMMUNITY DESIGN
Circulation

City of Redlands
as amended July 2, 1996



TYPICAL SECTION
WITH RAISED MEDIAN



TYPICAL SECTION
WITH CONTINUOUS LEFT TURN LANE

NOTES:

1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. DRAINAGE FACILITIES SHALL BE PROVIDED TO DEWATER RAISED MEDIAN AREAS.
3. 10' SHOULDER AREAS MAY BE DESIGNATED AS A BIKE LANE AND EMERGENCY PARKING ONLY.

FIGURE 4-3

MAJOR HIGHWAY

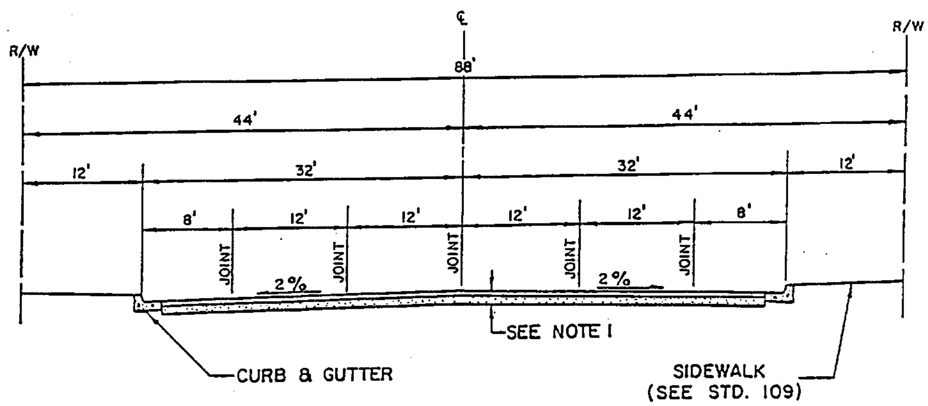
D4-7

N

EXHIBIT 3-5 (3OF5): EAST VALLEY SPECIFIC PLAN ROADWAY CROSS-SECTION

COMMUNITY DESIGN
Circulation

City of Redlands
as amended July 2, 1996



TYPICAL SECTION

NOTES:

1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. 8' SHOULDER AREAS MAY BE DESIGNATED AS A BIKE LANE AND EMERGENCY PARKING ONLY.

FIGURE 4-4

SECONDARY HIGHWAY

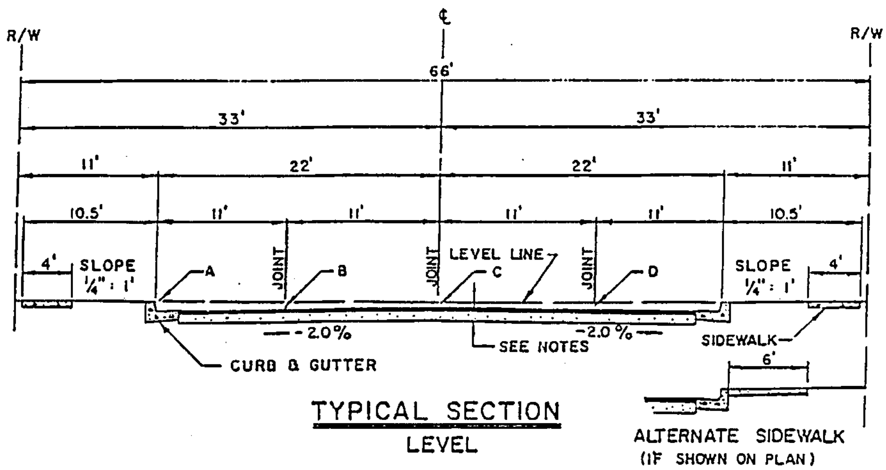
D4-8

N

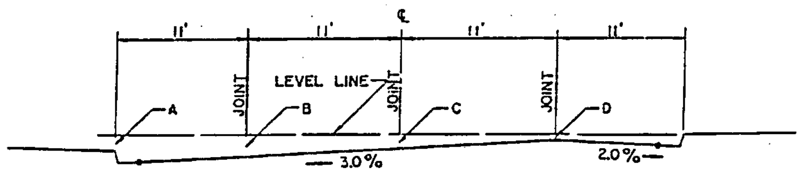
EXHIBIT 3-5 (4OF5): EAST VALLEY SPECIFIC PLAN ROADWAY CROSS-SECTION

COMMUNITY DESIGN
Circulation

City of Redlands
as amended July 2, 1996



TYPICAL SECTION
LEVEL



TYPICAL SECTION
TILT

		A	B	C	D
8" CURB	LEVEL	0.00'	0.36'	0.14'	0.36'
	TILT	0.76'	1.02'	0.69'	0.36'
6" CURB	LEVEL	0.00'	0.19'	(0.03)	0.19'
	TILT	0.76'	0.85'	0.52'	0.19'

( ) INDICATES ABOVE LEVEL LINE

NOTE
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. MINIMUM DESIGN PAVING THICKNESS SHALL BE 0.20' ASPHALT CONCRETE.
3. CONSTRUCTION OUTSIDE R/W WILL REQUIRE SLOPE EASEMENTS.

FIGURE 4-5

COLLECTOR STREET

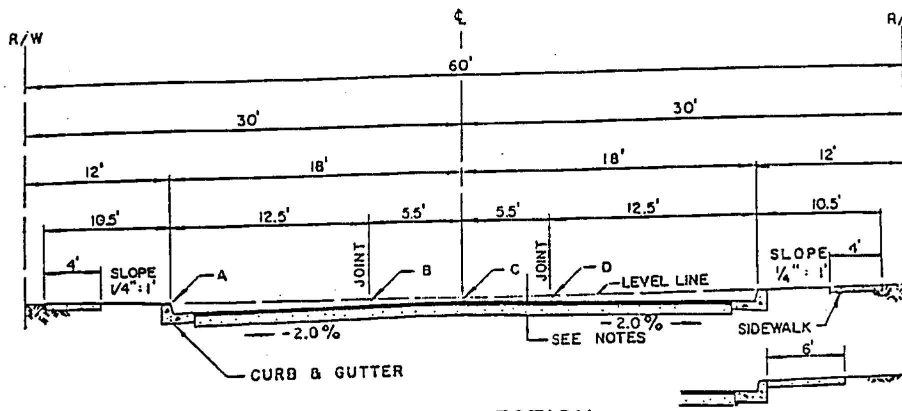
D4-9

N

EXHIBIT 3-5 (5OF5): EAST VALLEY SPECIFIC PLAN ROADWAY CROSS-SECTION

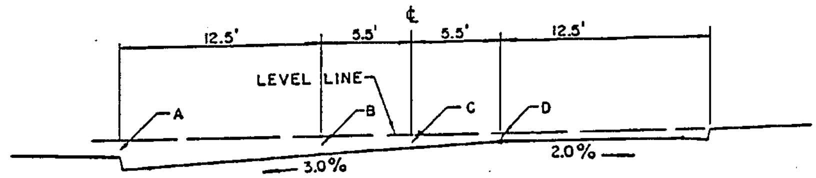
COMMUNITY DESIGN
Circulation

City of Redlands
as amended July 2, 1996



TYPICAL SECTION
LEVEL

ALTERNATE SIDEWALK
(IF SHOWN ON PLAN)



TYPICAL SECTION
TILT

		A	B	C	D
8" CURB	LEVEL	0.00'	0.33'	0.22'	0.33'
	TILT	0.44'	0.66'	0.50'	0.33'
6" CURB	LEVEL	0.00	0.16'	0.05'	0.16'
	TILT	0.44'	0.49'	0.33'	0.16'

NOTE
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. MINIMUM DESIGN PAVING THICKNESS SHALL BE 0.20' ASPHALT CONCRETE.
3. CONSTRUCTION OUTSIDE R/W WILL REQUIRE SLOPE EASEMENTS
4. WHEN PREPARING SUBGRADE FOR PAVING, CENTERLINE CROWN ON THE "LEVEL SECTION" SHALL BE RELOCATED EITHER LEFT OR RIGHT 0.50' TO MATCH CROWN BREAK IN PAVING MACHINE.

FIGURE 4-6

LOCAL STREET

D4-10

N

Tennessee Street is a two-lane undivided roadway north of Lugonia Avenue and widens to a four-lane undivided roadway south of Lugonia Avenue. There are no curb and gutter improvements north of Lugonia Avenue and only on the right side of the street between Lugonia Avenue and Colton Avenue. South of Colton Avenue, both sides of the street have curb and gutter improvements. Tennessee Street is designated as a Minor Arterial (88-foot right-of-way) on the City of Redlands General Plan, with two travel lanes in each direction and 8-foot shoulders.

San Bernardino Avenue, west of Orange Street, is designated as a major arterial (6 lanes; 120-foot right-of-way) in the East Valley Corridor Specific Plan. The roadway cross-section for a major arterial consists of three travel lanes in each direction. San Bernardino Avenue is designated as a major arterial (132-foot right-of-way) between Texas Street and Orange Street with three travel lanes in each direction, and as a minor arterial (88-foot right-of-way) east of Orange Street with two lanes in each direction on the City of Redlands General Plan.

Lugonia Avenue, west of Karon Street, is designated as a major highway (4 lanes; 104-foot right-of-way) in the East Valley Corridor Specific Plan. The roadway cross-section for a major highway consists of two travel lanes in each direction with a continuous two-way left-turn lane.

3.3 BICYCLE AND PEDESTRIAN FACILITIES

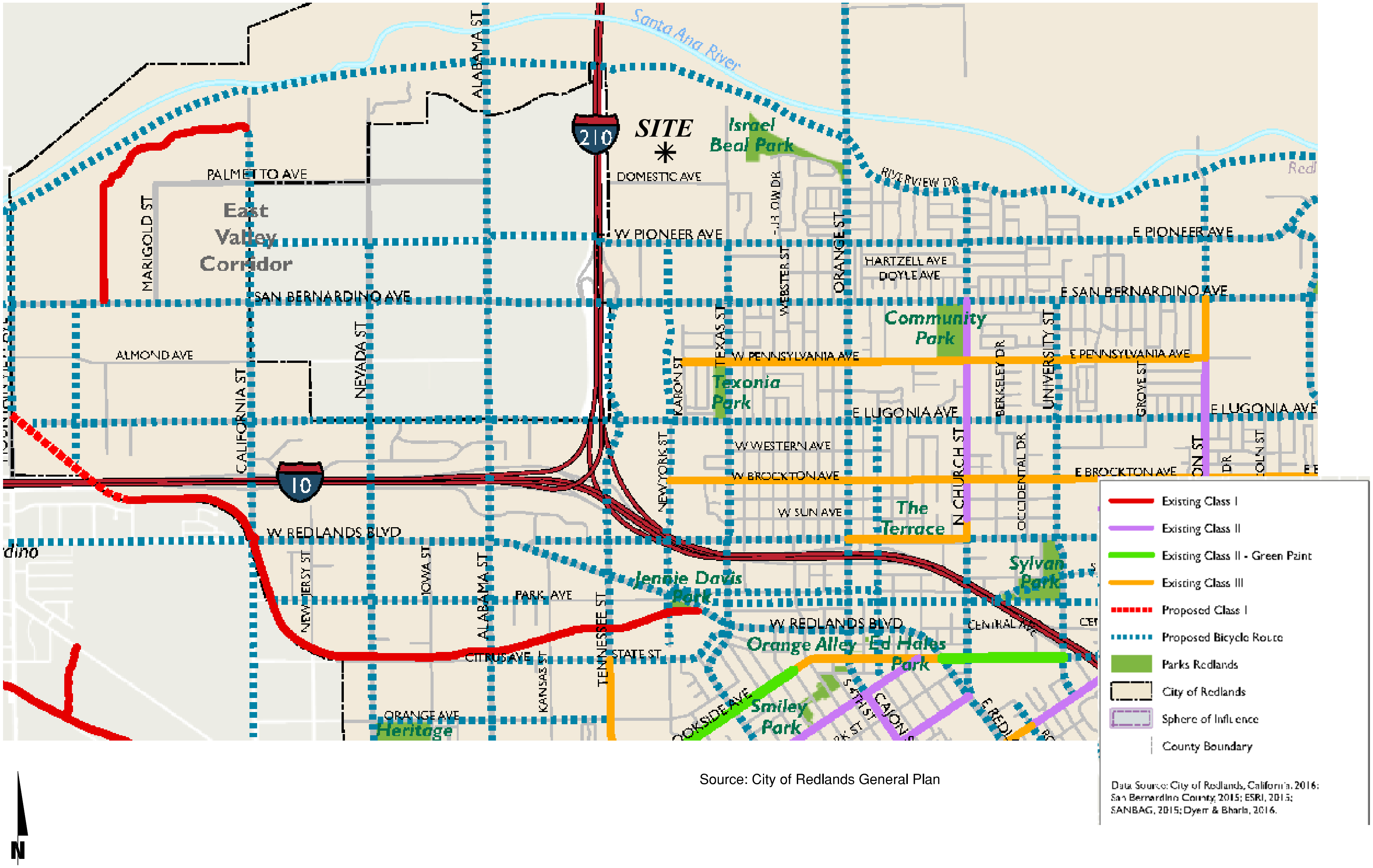
The existing pedestrian facilities within the study area are shown on Exhibit 3-6. Existing bus stop locations, crosswalks, sidewalks, and bike lanes are shown. Since many of the roadways are not fully constructed as designated in the City of Redlands Circulation Element, limited pedestrian facilities exist in the vicinity of the Project. Exhibits 3-7 and 3-8 illustrates the planned trails and bikeways in the vicinity of the Project as included on the City of Redlands General Plan Bicycle Facilities and Multi-Use Trails.

3.4 TRANSIT SERVICE

The study area is currently served by Omnitrans, a public transit agency serving the County of San Bernardino and the City of Redlands, with bus service in the study area along San Bernardino Avenue and Lugonia Avenue via Route 15, as illustrated on Exhibit 3-9. Transit service is reviewed and updated by Omnitrans 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.

EXHIBIT 3-6: EXISTING PEDESTRIAN FACILITIES

EXHIBIT 3-7: CITY OF REDLANDS GENERAL PLAN BICYCLE FACILITIES



Source: City of Redlands General Plan

EXHIBIT 3-8: CITY OF REDLANDS GENERAL PLAN MULTI-USE TRAILS

Source: City of Redlands General Plan

EXHIBIT 3-9: EXISTING TRANSIT ROUTES

3.5 EXISTING (2020) TRAFFIC COUNTS

In light of the currently on-going COVID-19 pandemic, traffic counts could not be conducted as the closures of businesses/schools, current economic state, and other social distancing practices in effect would result in understated traffic volumes. As such, the intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in November 2018. The 2018 traffic counts have been modified to reflect Existing (2020) traffic conditions through the application of a 2% per year growth adjustment (total of 4.04%). The following peak hours were selected for analysis:

- Weekday AM Peak Hour (peak hour between 7:00 AM and 9:00 AM)
- Weekday Mid-Day Peak Hour (peak hour between 2:00 PM and 4:00 PM)
- Weekday PM Peak Hour (peak hour between 4:00 PM and 6:00 PM)

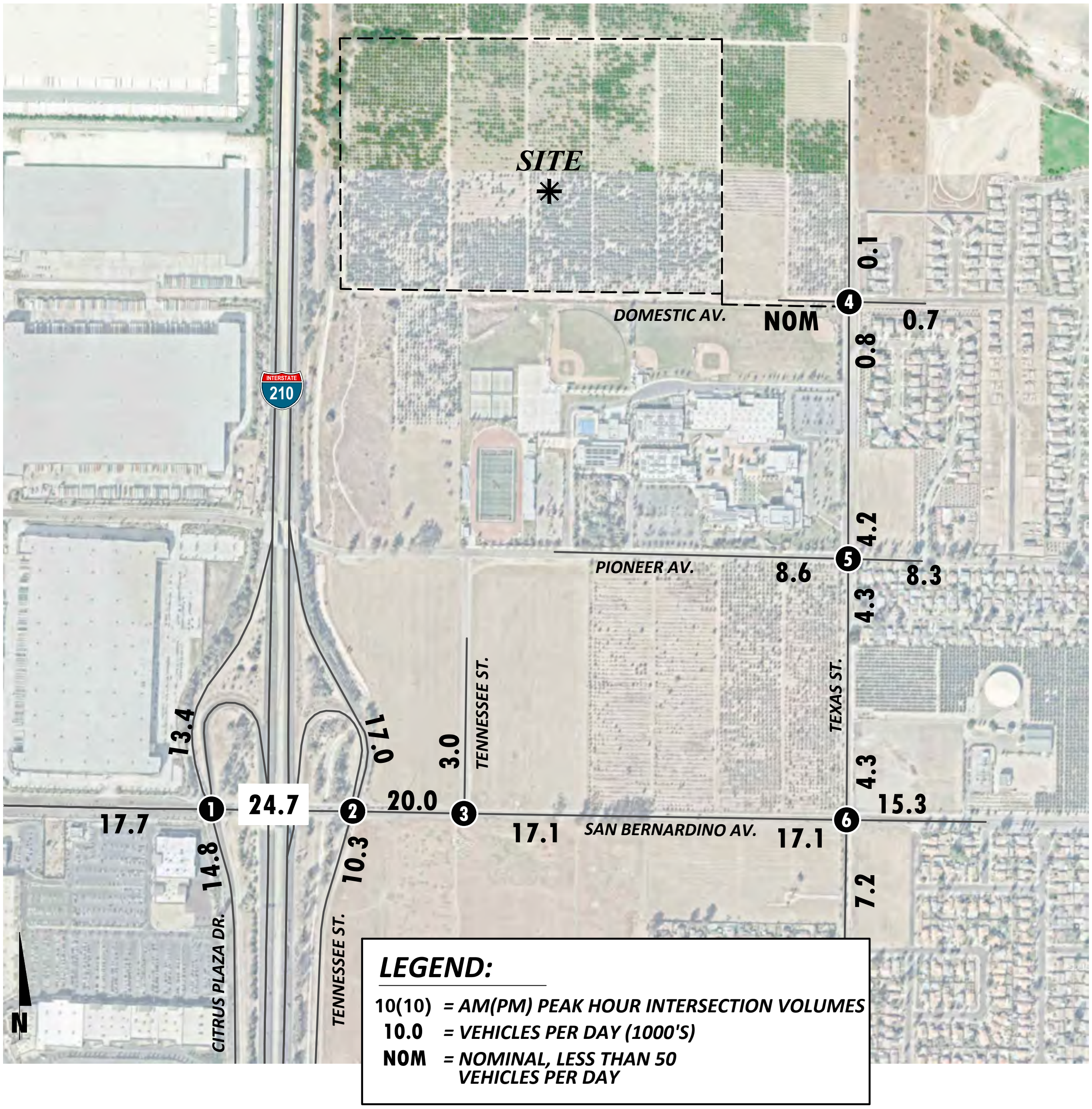
The study area intersections were evaluated during the weekday mid-day peak hour to determine the operational effects of the near-by high school on the study area intersections during the afternoon pick-up timeframe. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1. These raw turning volumes have been flow conserved between intersections with limited access, no access and where there are currently no uses generating traffic (e.g., between ramp-to-arterial intersections, etc.).

Existing weekday average daily traffic (ADT) volumes on arterial highways throughout the study area are shown on Exhibit 3-10. Existing ADT volumes are based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

Weekday PM Peak Hour (Approach Volume + Exit Volume) x 11.13 = Leg Volume

A comparison of the PM peak hour and daily traffic volumes of various roadway segments within the study area indicated that the peak-to-daily relationship is 8.98 percent. As such, the above equation utilizing a factor of 11.13 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 8.98 percent (i.e., 1/0.0898 = 11.13) and was assumed to sufficiently estimate average daily traffic (ADT) volumes for planning-level analyses. Existing weekday AM and weekday PM peak hour intersection volumes are also shown on Exhibit 3-10. Existing weekday mid-day peak hour intersection volumes are shown on Exhibit 3-11.

EXHIBIT 3-10: EXISTING (2020) TRAFFIC VOLUMES



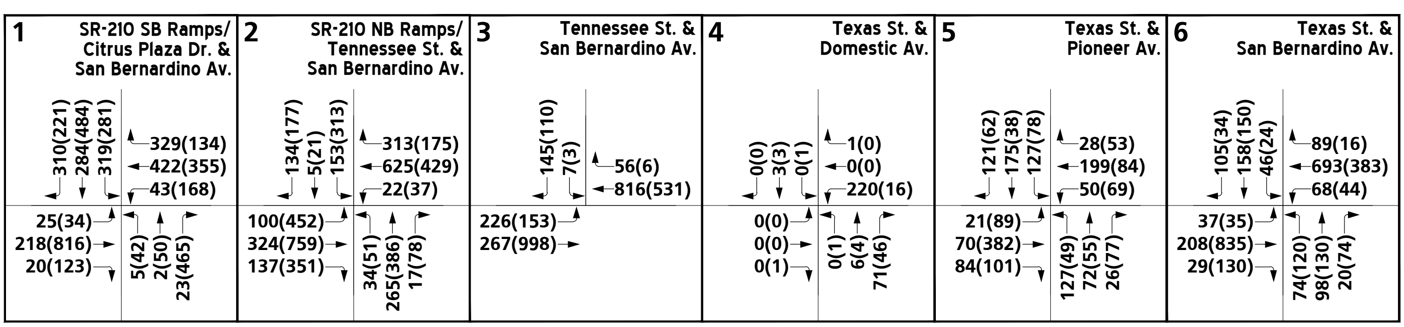
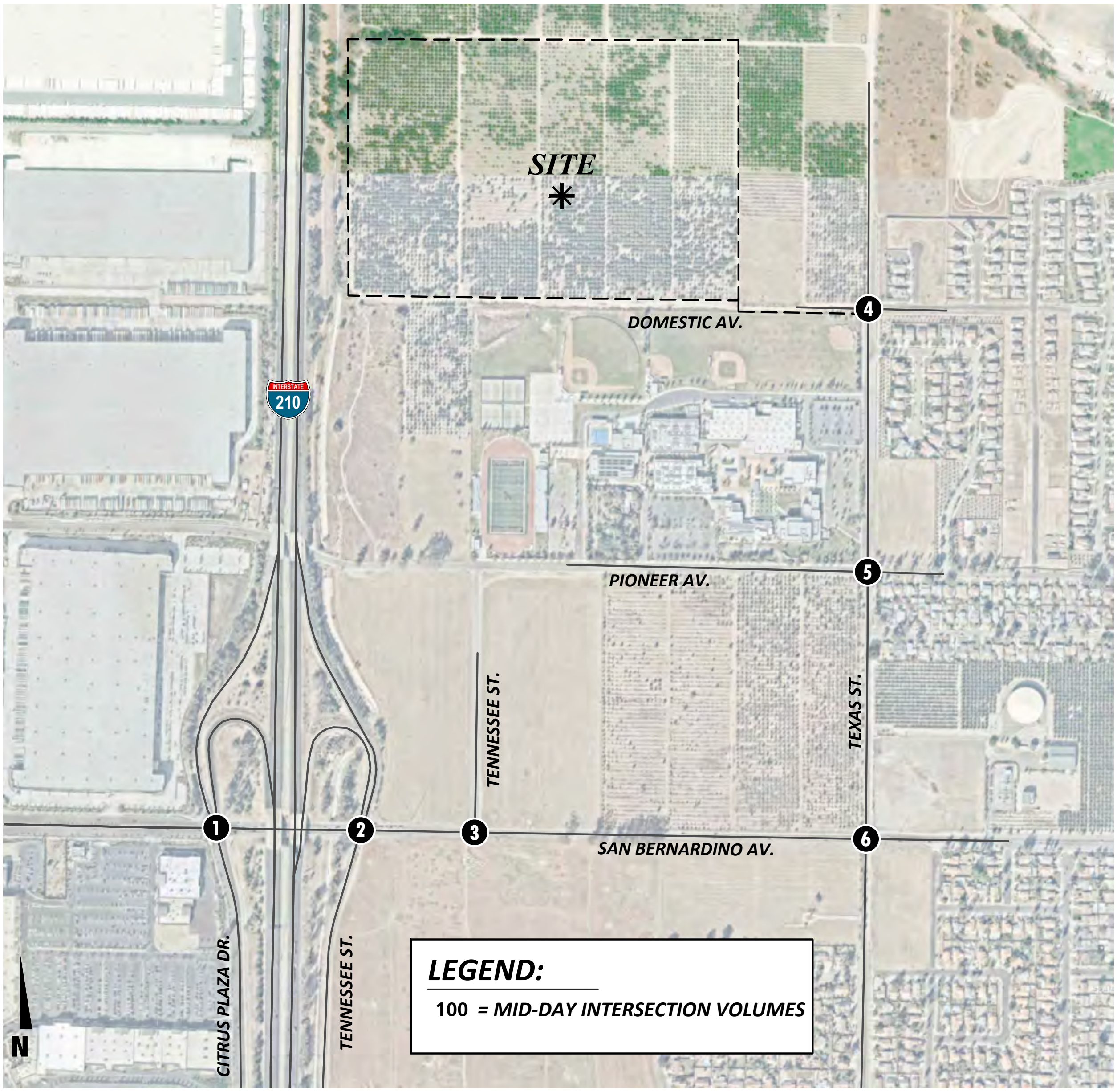
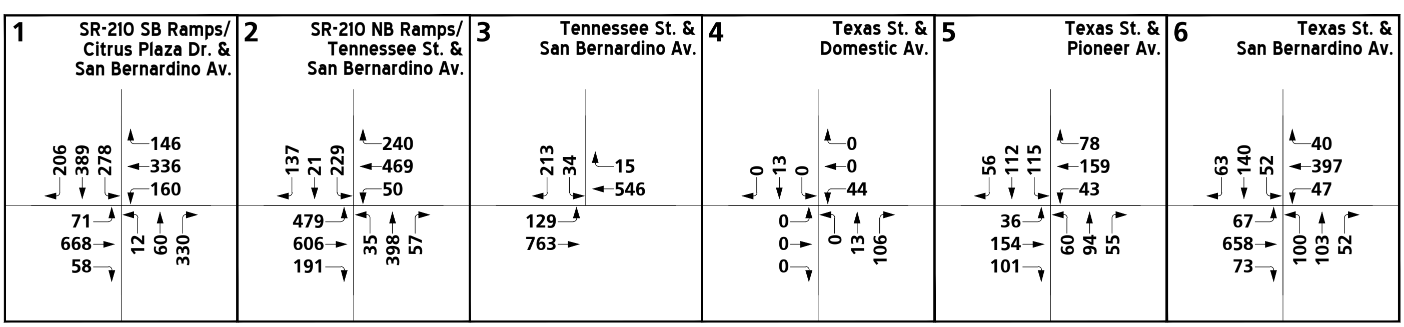


EXHIBIT 3-11: EXISTING (2020) MID-DAY TRAFFIC VOLUMES





3.6 INTERSECTION OPERATIONS ANALYSIS

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized in Table 3-1 which indicates that the following existing study area intersections are currently operating at an unacceptable LOS during the peak hours:

- I-210 NB Ramps/Tennessee St. & San Bernardino Av. (#2) – LOS E mid-day and PM peak hours
- Tennessee St. & San Bernardino Av. (#3) – LOS F AM, mid-day, and PM peak hours

Consistent with Table 3-1, a summary of the peak hour intersection LOS for Existing conditions are shown on Exhibit 3-12. The intersection operations analysis worksheets are included in Appendix 3.2 of this report.

3.7 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. The following study area intersection currently warrants a traffic signal for Existing traffic conditions:

- Tennessee Street & San Bernardino Avenue (#3)

Existing conditions traffic signal warrant analysis worksheets are provided in Appendix 3.3.

3.8 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the study area intersections along the I-210 Freeway to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-210 Freeway mainlines. Queuing analysis findings are presented in Table 3-2. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline. As shown in Table 3-2, there are no movements that are currently experiencing queuing issues during the weekday AM, mid-day, or PM peak 95^{th} percentile traffic flows. Worksheets for Existing traffic conditions off-ramp queuing analysis are provided in Appendix 3.4.

Table 3-1

Intersection Analysis for Existing (2020) Conditions

			Intersection Approach Lanes[1]												Delay[2] (secs.)			Level of Service			
		Traffic	Northbound			Southbound			Eastbound			Westbound									Acceptable
#	Intersection	Control[3]	L	T	R	L	T	R	L	T	R	L	T	R	AM	MD	PM	AM	MD	PM	LOS
1	I-210 SB Ramps/Citrus Plaza Dr. & San Bernardino Av.	TS	1	1	1>	1	2	0	1	2	1	1	1	1	36.7	37.4	41.4	D	D	D	D
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.	TS	1	2	0	1	1	0	2	1	1	1	1	1	30.1	**58.3**	**71.7**	C	**E**	**E**	D
3	Tennessee St. & San Bernardino Av.	CSS	0	0	0	0	1	0	0	1	0	0	1	0	**73.5**	**>100.0**	**>100.0**	**F**	**F**	**F**	C
4	Texas St. & Domestic Av.	CSS	1	1	0	0	1	0	0	1	0	0	1	0	14.8	10.2	8.8	B	B	A	C
5	Texas St. & Pioneer Av.	TS	1	1	0	1	1	1	0	1	0	0	1	0	20.7	21.1	16.0	C	C	B	C
6	Texas St. & San Bernardino Av.	TS	0	1	0	0	1	0	1	1	0	1	1	1	13.3	13.3	28.7	B	B	C	C

* **BOLD** = Level of Service (LOS) does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

1 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; > = Right-Turn Overlap Phasing

2 Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

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

Table 3-2

Peak Hour Freeway Off-Ramp Queuing Summary for Existing (2020) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet)			Acceptable?[1]		
			AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM
I-210 SB Ramps & San Bernardino Av.	SBL	50	410 [2,3]	300 [3]	307 [3]	Yes	Yes	Yes
	SBT/R	1,530	140	188	345	Yes	Yes	Yes
I-210 NB Ramps & San Bernardino Av.	SBL	105	197 [3]	331 [2,3]	495 [2,3]	Yes	Yes	Yes
	SBT/R	1,245	51	63	70	Yes	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

[3] Although 95th percentile queue is anticipated to exceed the available storage for the turn lane, the adjacent through lane has sufficient storage to accommodate any spillover without spilling back and affecting the I-210 Freeway mainline.

EXHIBIT 3-12: EXISTING (2020) SUMMARY OF LOS

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4 PROJECTED FUTURE TRAFFIC

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. The Project is located west of Texas Street and north of Domestic Avenue in the City of Redlands. The Project is proposed to consist of 317 single family residential dwelling units and ball fields (6 small soccer fields and 1 ball field). It is anticipated that the Project would be developed in a single phase with an anticipated Opening Year of 2025. The Project is proposed to take access via Domestic Avenue and the future extension of Texas Street to the north (via new Street N roadway connection).

4.1 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. The trip generation rates used for this analysis are based upon information collected by the ITE as provided in their Trip Generation Manual, 10th Edition, 2017. (4) For purposes of this analysis, the following ITE land use codes have been utilized:

- ITE land use code 210 (Single Family Residential Detached)
- ITE land use code 488 (Soccer Complex)

Baseball field land use is not readily available in the 10th Edition Trip General Manual. (5) As such, the San Diego Municipal Code Land Development Code Trip Generation Manual, May 2003 has been utilized to determine the trip generation rates for the following land use:

- Park (Baseball Field)

Project trip generation rates and the trip generation summary are shown in Table 4-1. As shown in Table 4-1, the proposed Project is anticipated to generate a total of 3,254 vehicle trip-ends per day with 239 AM peak hour trips and 368 PM peak hour trips. In an effort to conduct a conservative analysis, the mid-day peak hour operations analysis utilizes the PM peak hour Project trip generation estimates.

4.2 PROJECT TRIP DISTRIBUTION

Trip distribution is the process of identifying the probable destinations, directions or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute. The Project trip distribution was developed based on anticipated travel patterns to and from the Project site has been developed based on an understanding of existing travel patterns in the area, the geographical location of the site, the site's proximity to the Citrus Valley High School and regional arterial and state highway system. Exhibit 4-1 illustrates the distribution patterns for the proposed Project.

Table 4-1

Project Trip Generation Summary

Land Use	ITE LU Code	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Project Trip Generation Rates:[1]									
Single Family Detached Residential	210	DU	0.19	0.55	0.74	0.62	0.37	0.99	9.44
Soccer Complex	488	Fields	0.60	0.39	0.99	10.84	5.59	16.43	71.33
Park (Developed)	--[4]	AC	1.00	1.00	2.00	2.00	2.00	4.00	50.00

Land Use	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Project Trip Generation Summary:									
Single Family Detached Residential	317	DU	60	174	234	197	117	314	2,994
Soccer Complex[3]	3	Fields	2	1	3	33	17	50	214
Park (Baseball Field)	0.89	AC	1	1	2	2	2	4	46
		Total	**63**	**176**	**239**	**232**	**136**	**368**	**3,254**

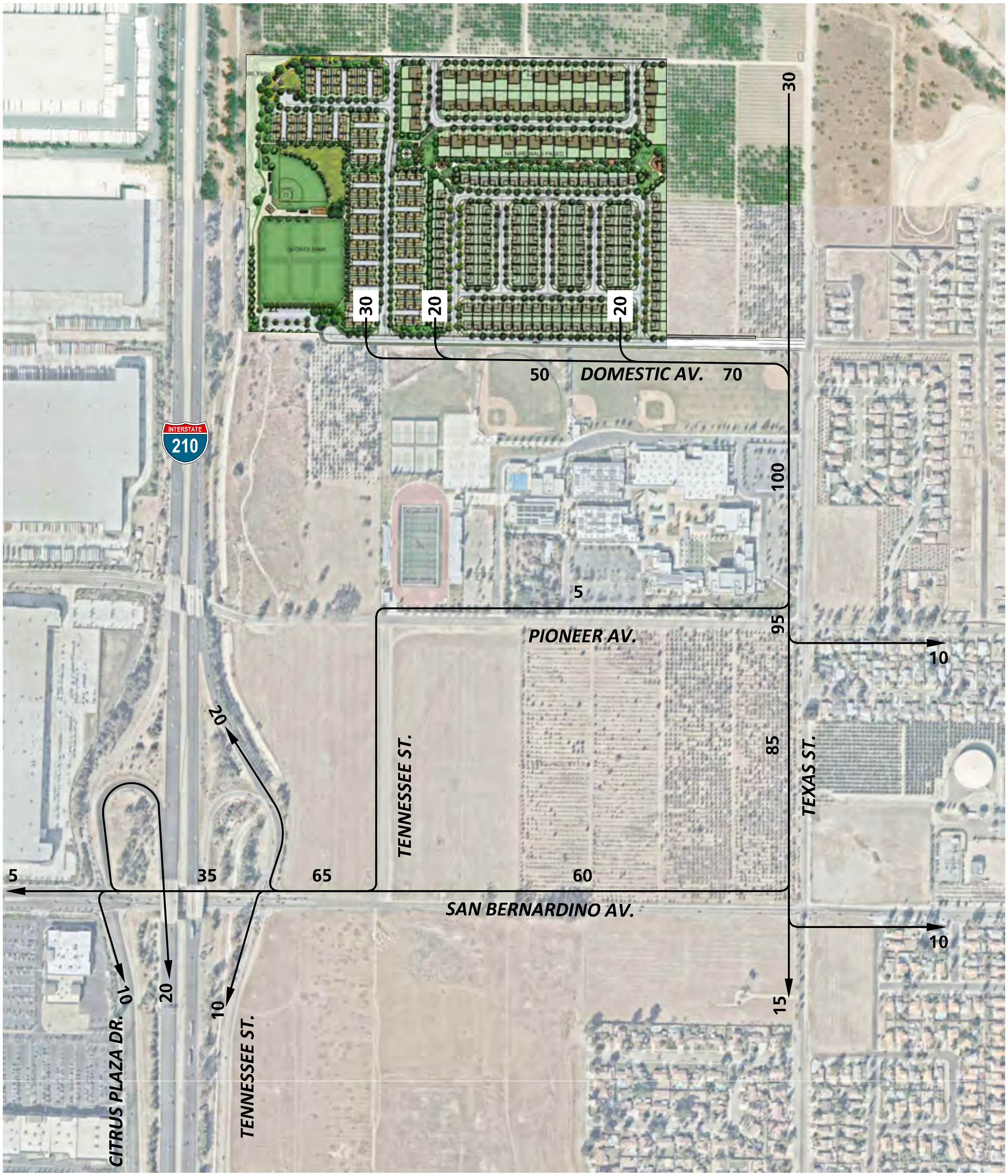
[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition (2017).

[2] DU = Dwelling Units; AC = Acres

[3] Although the plan shows 6 smaller fields, they can be combined to form 3 regular sized soccer fields.

[4] Trip Generation Source: San Diego Municipal Code Land Development Code Trip Generation Manual, May 2003.

EXHIBIT 4-1: PROJECT TRIP DISTRIBUTION



LEGEND:

10 = PERCENT TO/FROM PROJECT

N

4.3 MODAL SPLIT

Although the use of public transit, walking, and/or bicycling have the potential to reduce Project-related traffic, such reductions have not been taken into considerations in this traffic study in order to provide a conservative analysis of the Project's potential to result in traffic deficiencies.

4.4 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 ADT, AM, and PM peak hour volumes for the weekday are shown on Exhibit 4-2. Project mid-day peak hour volumes are shown on Exhibit 4-3.

4.5 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon background (ambient) growth at 2% per year for 2025 traffic conditions. The total ambient growth is 10.41% for 2025 traffic conditions (compounded growth of 2 percent per year over 5 years or $1.02^{5\ \text{years}}$). The ambient growth factor is intended to approximate regional traffic growth. This ambient growth rate is added to existing traffic volumes to account for area-wide growth not reflected by cumulative development projects. Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to 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.

Opening Year Cumulative (2025) traffic volumes are provided in Section 6 of this report. The traffic generated by the proposed Project was then manually added to the base volume to determine Opening Year Cumulative "With Project" forecasts for each applicable phase.

4.5.2 HORIZON YEAR (2040) CONDITIONS

The adopted Southern California Association of Governments (SCAG) 2020 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) (May 2020) growth forecasts for the City of Redlands identifies projected growth in population of 69,500 in 2016 to 80,800 in 2045, or a 16.3% increase over the 29-year period. (9) The change in population equates to roughly a 0.52% growth rate, compounded annually. Similarly, growth over the same 28-year period in households is projected to increase by 32.1%, or a 0.81% annual growth rate. Finally, growth in employment over the same 28-year period is projected to increase by 32.1%, or a 0.76% annual growth rate.

EXHIBIT 4-2: PROJECT ONLY TRAFFIC VOLUMES

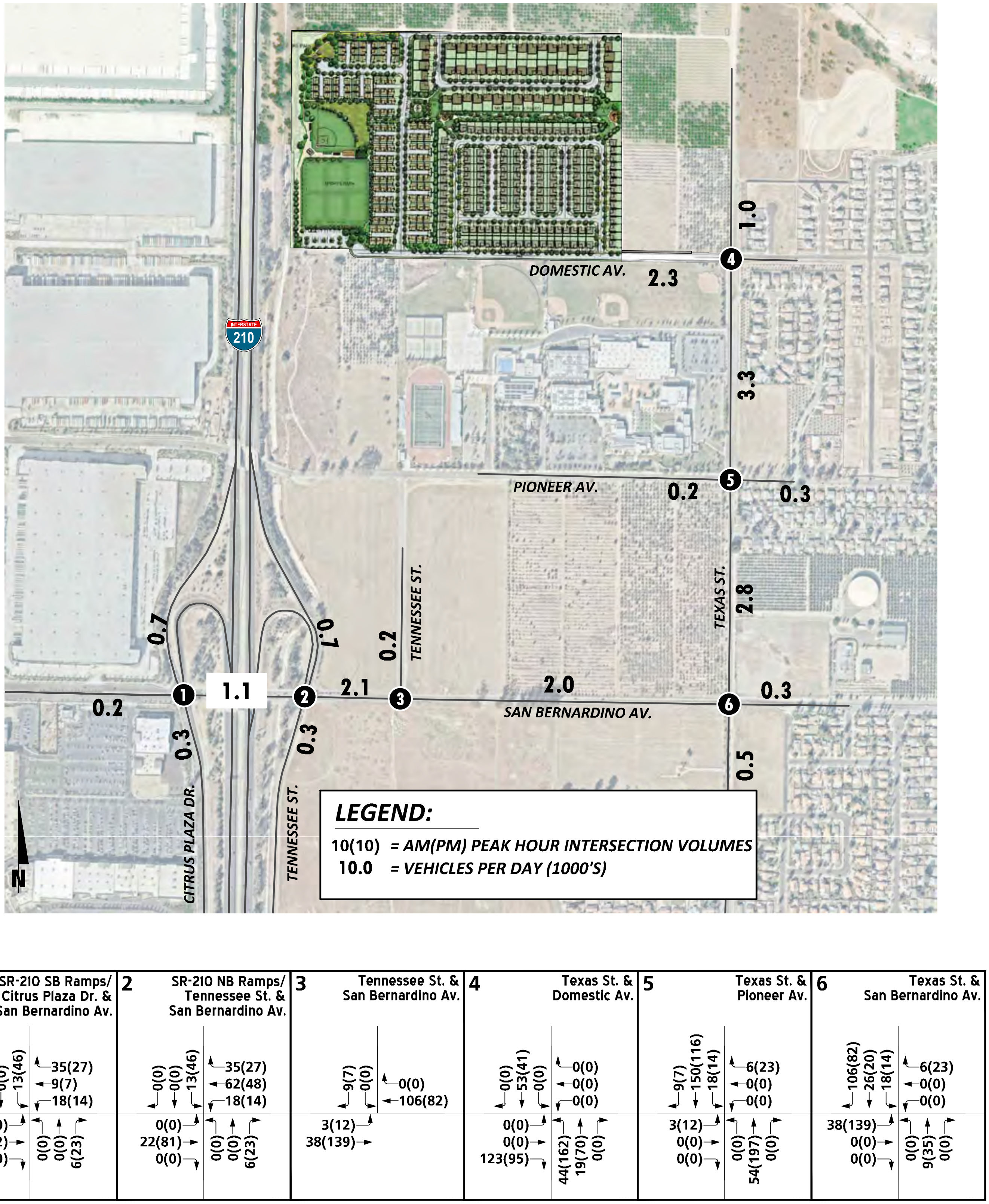
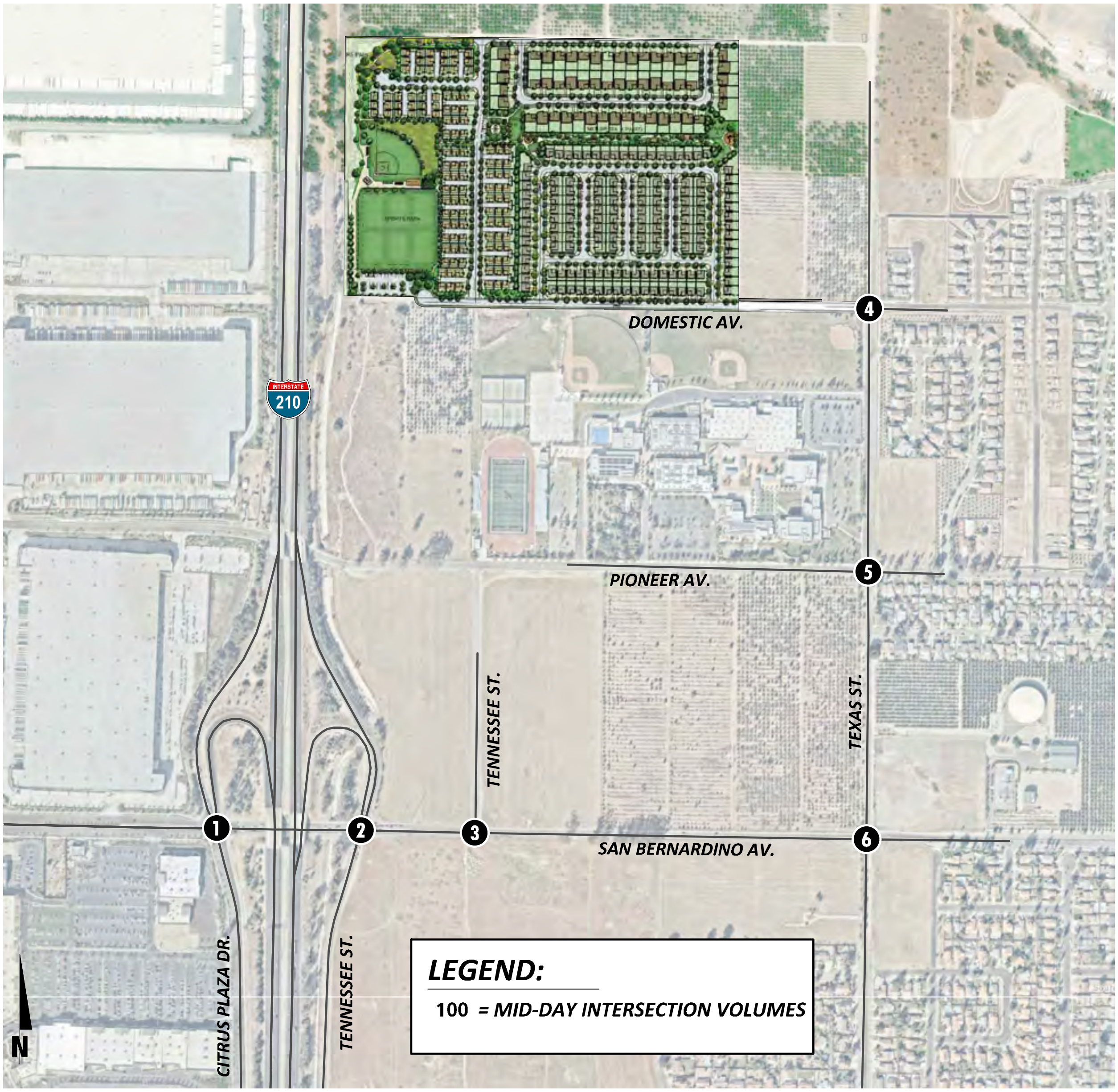
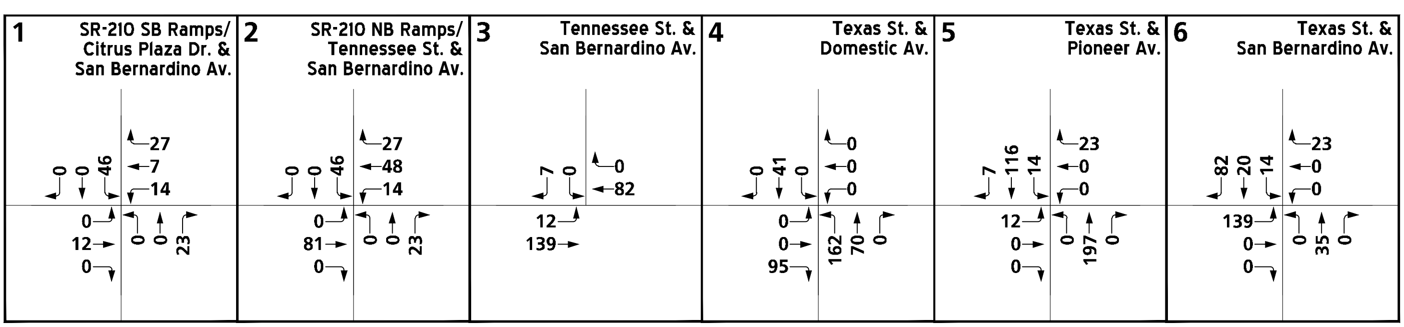


EXHIBIT 4-3: PROJECT MID-DAY TRAFFIC VOLUMES





Based on a comparison of Existing (2020) traffic volumes to the Horizon Year (2040) forecasts, the average growth rate is estimated at approximately 3.39%, compounded annually between Existing (2020) and 2040 traffic conditions. The annual growth rate at each individual intersection is not lower than 2.26% compounded annually to as high as 4.61% compounded annually over the same time period. Therefore, the annual growth rate utilized for the purposes of this analysis would appear to conservatively approximate the anticipated regional growth in traffic volumes in the City of Redlands for Opening Year Cumulative and Horizon Year (2040) traffic conditions, especially when considered along with the addition of project-related traffic, which would tend to overstate as opposed to understate the potential deficiencies to traffic and circulation.

4.6 CUMULATIVE DEVELOPMENT TRAFFIC

A cumulative project list was developed for the purposes of this analysis based on other studies performed in the area and as provided by City of Redlands staff. Cumulative projects that have been built and would be generating traffic have also been removed. Exhibit 4-4 illustrates the cumulative development location map. Cumulative development ADT, AM and PM peak hour volumes for the weekday are shown on Exhibit 4-5. Cumulative development mid-day peak hour volumes are shown on Exhibit 4-6. A summary of the cumulative development projects and their respective land uses are provided in Table 4-2.

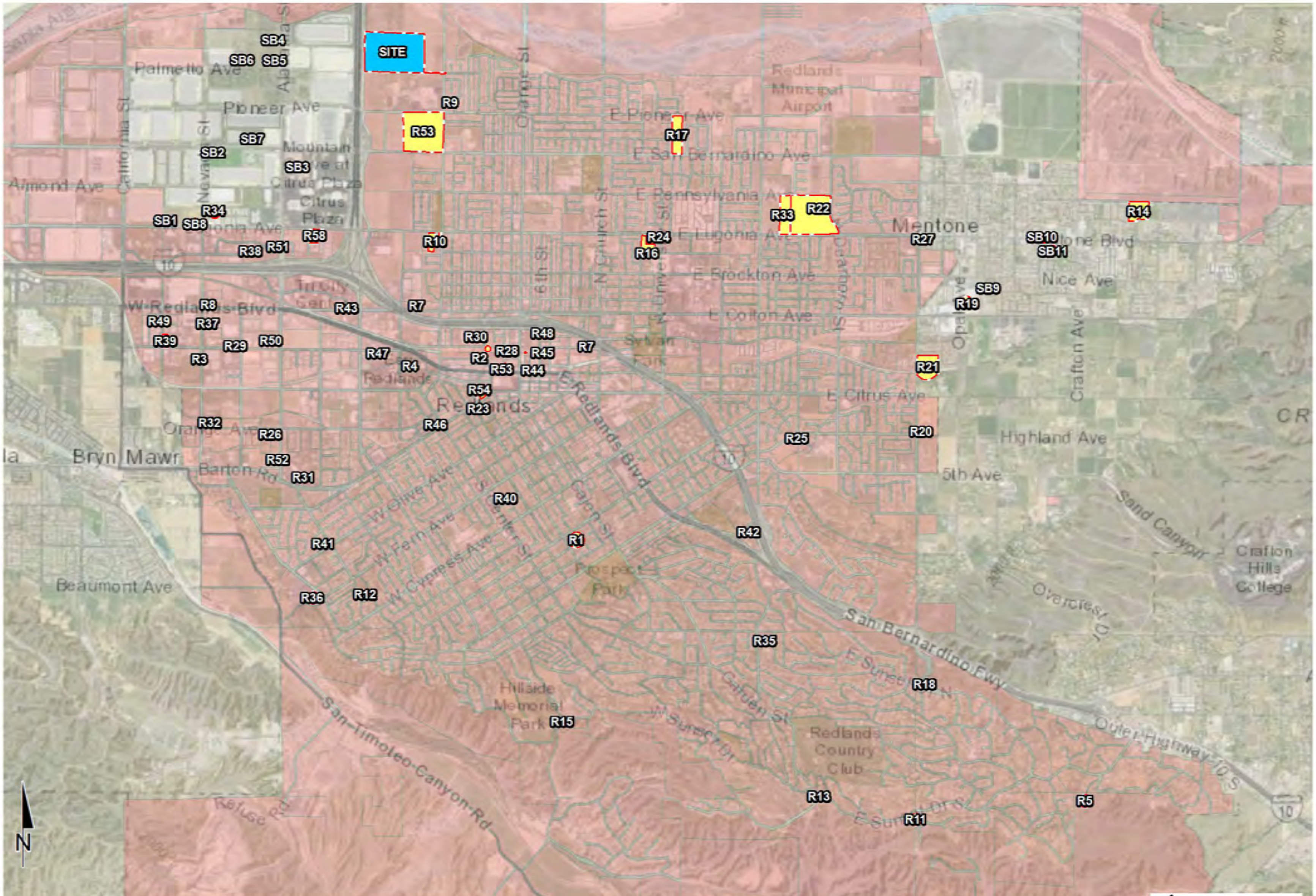
4.7 OPENING YEAR CUMULATIVE (2025) CONDITIONS

The “buildup” approach combines existing traffic counts with a background ambient growth factor to forecast the near-term 2025 traffic conditions. An ambient growth factor of 10.41% accounts for background (area-wide) traffic increases that occur over time up to the year 2025 from the year 2020 (compounded two percent per year growth over a five-year period). Traffic volumes generated by the Project are then added to assess the Opening Year cumulative (2025) With Project traffic conditions. The 2025 roadway network is similar to the existing conditions roadway network with the exception of Driveways proposed to be developed by the Project and cumulative developments are assumed.

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

- Opening Year Cumulative (2025) Without Project
    - Existing counts
    - Ambient growth traffic (10.41%)
    - Cumulative Development Project traffic
- Opening Year (2025) With Project
    - Existing counts
    - Ambient growth traffic (10.41%)
    - Cumulative Development Project traffic
    - Project traffic

EXHIBIT 4-4: CUMULATIVE DEVELOPMENT LOCATION MAP



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URBAN CROSSROADS

EXHIBIT 4-5: CUMULATIVE ONLY TRAFFIC VOLUMES

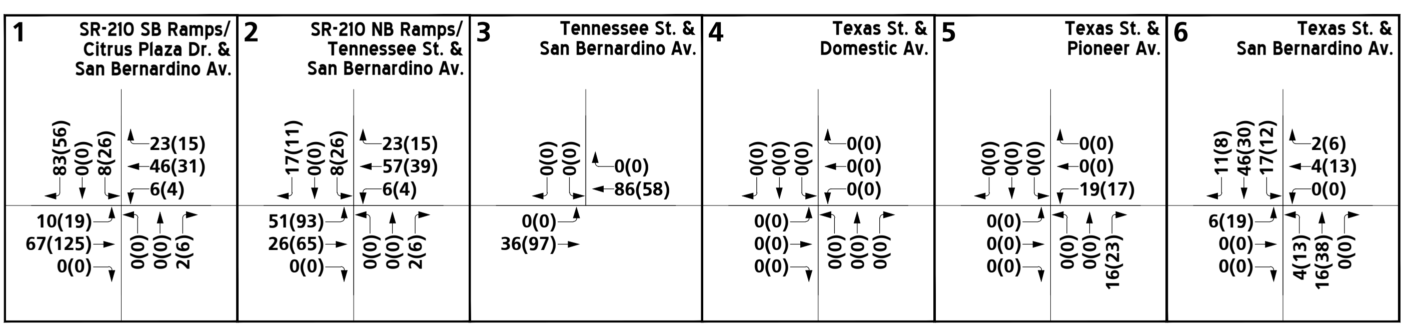
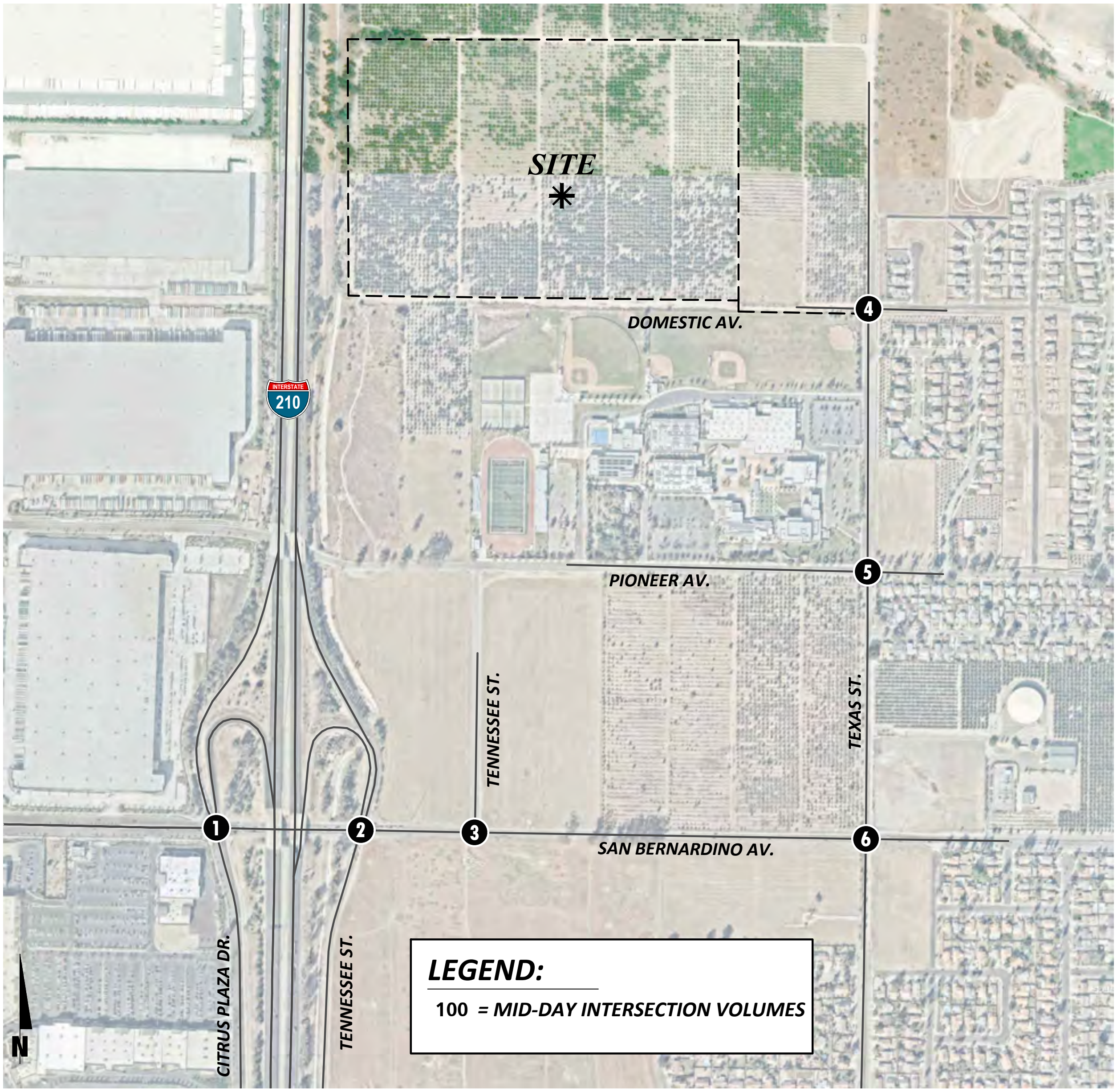


EXHIBIT 4-6: CUMULATIVE ONLY MID-DAY TRAFFIC VOLUMES



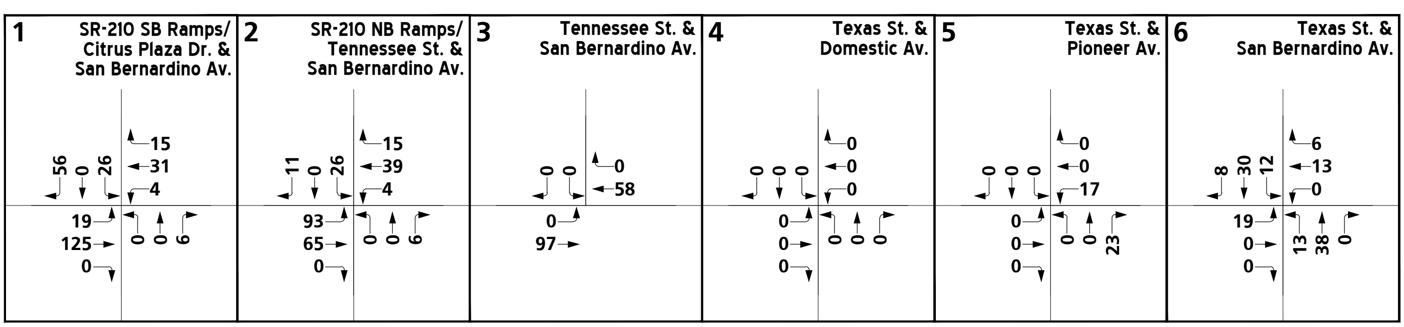


Table 4-2

Cumulative Development Land Use Summary

#	Name/Location	Land Use[1]	Quantity	Units[2]
		City of Redlands		
R1	TTM 20305, CUP 1134	SFDR	30	DU
R2	CUP 1130	Restaurant	4.730	TSF
R3	CRA 923	Warehouse	85.430	TSF
R4	CRA tbd - ESRI Office Building	Office	105.000	TSF
R5	Tract 18845	SFDR	24	DU
R6	CRA 908	Self-Storage	62.458	TSF
R7	CUP 1113	Warehouse	9.969	TSF
R8	CRA 909	Medical Office	16.714	TSF
R9	Tract 17022	SFDR	12	DU
R10	CUP 1045	MFH	80	DU
R11	Tract 17265	SFDR	24	DU
R12	Tract 17675	SFDR	20	DU
R13	Parcel Map 17548	SFDR	3	DU
R14	Tract 16402	SFDR	26	DU
R15	Tract 16816	SFDR	10	DU
R16	Tract 16287	SFDR	12	DU
R17	Tract 18182	SFDR	27	DU
R18	Tract 17080	SFDR	8	DU
R19	Tract 18952	SFDR	131	DU
R20	Tract 19956	SFDR	40	DU
R21	Tract 19942	SFDR	34	DU
R22	Tract 20126	SFDR	105	DU
R23	CRA 893	MFH	8	DU
R24	CUP 1096	MFH	120	DU
R25	Tract 20065	SFDR	29	DU
R26	CUP 1108, GPA 140, SPA 45 & 46	MFH	412	DU
R27	CUP 1139	Fast-food w/ Drive-Through	3.000	TSF
R28	CRA 916	Office/Retail	38.825	TSF
R29	CRA 907	Office/Retail	7.198	TSF
R30	CUP 905 (Revision 3) - Packing House District	Shopping Center	88.075	TSF
R31	CUP 1124, VAR 800	Retail/Restaurant	4.052	TSF
R32	CUP 616 Revision 2 - Addition to Private School	School	1.952	TSF
R33	CUP 1136	Elementary School	101.597	TSF
		Church	60.207	TSF
R34	CRA 889 - Springhill Suites	Hotel	88.000	RMS

Table 4-2

Cumulative Development Land Use Summary

#	Name/Location	Land Use[1]	Quantity	Units[2]
R35	CUP 114 (Revision 3) - Expansion of Existing Church/Preschool	Church	4.300	TSF
R36	CUP 335 (Revision 14) Redlands Community Hospital	Hospital	8.530	TSF
R37	CRA 891 - Industrial Building	Light Industrial	16.676	TSF
R38	CUP 1076 - WoodSpring Suites	Hotel	123.000	RMS
R39	Planned Development No. 4	Warehouse	420.000	TSF
R40	CRA 918	Senior Care	28	BEDS
R41	CUP 343 Revision 1 - Addition to Private School	School	1.800	TSF
R42	CUP 1061, CRA 889	Retail/Restaurant	5,000.000	TSF
		Daycare	23.490	TSF
R43	CUP 1056 - Hilton Home	Hotel	77.000	RMS
R44	CUP - MOD Packinghouse	Fast Casual Restaurant	14.000	TSF
R45	CRA 898 - Krikorian Retail Center	Retail Center/Bank	15.200	TSF
R46	CUP 1103 - Museum of Redlands	Museum	20.658	TSF
R47	CRA 901 - ESRI Office Building	Office	100.800	TSF
R48	CUP 1104	Gasoline Station w/ Convenience Market	3.000	TSF
		Automatic Car Wash	1.300	TSF
		Fast-food w/o Drive-Through	1.326	TSF
R49	CRA 921	Medical Clinic	5.588	TSF
R50	CRA 900 - Industrial Buildings	Warehouse	139.000	TSF
R51	CRA 902 - Car Wash self-serve drive-thru	Automatic Car Wash	8.000	TSF
R52	CUP 606, Revision No. 1	School	11.960	TSF
R53	CRA911 - The Grand Apartments	Multifamily Housing	149	DU
R54	CUP 1138, VAR 809, LLA 645	Multifamily Housing w/ first floor retail	138	DU
County of San Bernardino				
SB1	P201100550	Warehouse	426.000	TSF
SB2	Alabama Venture P201300529	General Light Industrial	94.600	TSF
SB3	Mountain Grove - SE corner of San Bernardino Av. & Alabama St.	Shopping Center	1.850	TSF
		Apartments	281	DU
		Hotel	200	RMS
		Theatre	4	SEATS
SB4	North of Palmetto Av., west of Alabama St.	High-Cube Warehouse	230.000	TSF
SB5	Nevada St. & Palmetto Ave. (Newcastle)	High-Cube Warehouse	590.000	TSF
SB6	Oakmont - North of Palmetto Av., between Nevada St. & Alabama St.	High-Cube Warehouse	561.000	TSF
SB7	P201700142	Warehouse	191.036	TSF
SB8	P201700245	MFH	360	DU
SB9	P201700273	Warehouse	205.953	TSF
SB10	P201700339	Shopping Center	9.100	TSF
SB11	P201800149	Carwash	--	

[1] SFDR = Single Family Detached Residential; MFH = Multifamily Housing

[2] TSF = Thousand Square Feet; DU = Dwelling Units; RMS = Rooms

4.8 HORIZON YEAR (2040) CONDITIONS

Traffic projections for Horizon Year (2040) without Project conditions were derived from the SBTAM using accepted procedures for model forecast refinement and smoothing for study area intersections located within the County of San Bernardino. The current version of the SBTAM (Version 2.20, March 2019) reflects the local input in the adopted 2016 SCAG RTP within the County of San Bernardino.

The traffic forecasts reflect the area-wide growth anticipated between Existing (2020) conditions and Horizon Year (2040) traffic conditions. In most instances the traffic model zone structure is not designed to provide accurate turning movements along arterial roadways unless refinement and reasonableness checking is performed. Therefore, the Horizon Year (2040) peak hour forecasts were refined using the model derived long range forecasts, base (validation) year model forecasts, along with existing peak hour traffic count data collected at each analysis location in November 2018. The SBTAM has a base (validation) year of 2012 and a horizon (future forecast) year of 2040. The difference in model volumes (2040-2012) defines the growth in traffic over the 28-year period

The refined future peak hour approach and departure volumes obtained from the model output data are then entered into a spreadsheet program consistent with the National Cooperative Highway Research Program (NCHRP Report 255), along with initial estimates of turning movement proportions. A linear programming algorithm is used to calculate individual turning movements which match the known directional roadway segment forecast volumes computed in the previous step. This program computes a likely set of intersection turning movements from intersection approach counts and the initial turning proportions from each approach leg.

The SBTAM uses an AM peak period-to-peak hour factor of 0.35 and a PM peak period-to-peak hour factor of 0.27. These factors represent the relationship of the highest single AM peak hour to the modeled 3 hour AM peak period (an even distribution would result in a factor of 0.33) and the highest single PM peak hour to the modeled 4 hour PM peak period (an even distribution would result in a factor of 0.25).

The SBTAM traffic model does not provide mid-day data. As such, the Horizon Year (2040) mid-day traffic forecasts were determined by identifying the total growth between Existing and Horizon Year (2040) for the PM peak hour and the same growth was then applied to the Existing mid-day peak hour volumes. This comparison and application of growth was done movement-by-movement and not for the overall intersection. As such, growth at each location varies.

Typically, the model growth is prorated and is subsequently added to the existing (base validation) traffic volumes to represent Horizon Year traffic conditions. In an effort to conduct a conservative analysis, reductions to traffic forecasts from either Existing or Opening Year Cumulative traffic conditions were not assumed as part of this analysis. As such, in conjunction with the addition of cumulative projects that are not consistent with the General Plan, additional growth has also been applied on a movement-by-movement basis, where applicable, to estimate reasonable Horizon Year (2040) forecasts. Horizon Year (2040) turning volumes were compared to Opening Year Cumulative (2025) volumes in order to ensure a minimum growth as a part of the refinement process. The minimum growth includes any additional growth between Opening Year Cumulative (2025) and Horizon Year (2040) traffic conditions that is not accounted for by the traffic generated by cumulative development projects and ambient growth rates assumed between Existing (2020) and Opening Year Cumulative (2025) conditions. Adjustments have not been made to study area intersections that may be affected by new future roadway connections where travel patterns would likely get affected and forecasts may potentially decrease from the Opening Year Cumulative conditions. Future estimated peak hour traffic data was used for new intersections and intersections with an anticipated change in travel patterns to further refine the Horizon Year (2040) peak hour forecasts.

The future Horizon Year (2040) Without Project peak hour turning movements were then reviewed by Urban Crossroads, Inc. for reasonableness, and in some cases, were adjusted to achieve flow conservation, reasonable growth, and reasonable diversion between parallel routes. Flow conservation checks ensure that traffic flow between two closely spaced intersections, such as two adjacent driveway locations, is verified in order to make certain that vehicles leaving one intersection are entering the adjacent intersection and that there is no unexplained loss of vehicles. The result of this traffic forecasting procedure is a series of traffic volumes which are suitable for traffic operations analysis.

Post-processing worksheets for Horizon Year (2040) Without Project traffic conditions are provided in Appendix 4.1.

5 EXISTING PLUS PROJECT TRAFFIC CONDITIONS

This section discusses the traffic forecasts for Existing plus Project (E+P) conditions and the resulting intersection operations, traffic signal warrant, and off-ramp queuing analyses.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for E+P traffic conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for E+P conditions only (e.g., intersection and roadway improvements at the Project's frontage and driveways).

5.2 EXISTING PLUS PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus Project traffic. Exhibit 5-1 shows the ADT, AM and PM peak hour volumes which can be expected for E+P traffic conditions. The mid-day peak hour volumes for E+P traffic are shown on Exhibit 5-2.

5.3 INTERSECTION OPERATIONS ANALYSIS

E+P peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this report. The intersection analysis results are summarized in Table 5-1, which indicates that there are no additional study area intersections that are anticipated to operate at an unacceptable LOS, in addition to the intersections previously identified under Existing (2020) traffic conditions. A summary of the peak hour intersection LOS for E+P conditions are shown on Exhibit 5-3. The intersection operations analysis worksheets for E+P traffic conditions are included in Appendix 5.1 of this report.

5.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no additional study area intersections that are anticipated to meet a traffic signal warrant under E+P conditions, in addition to the intersection already warranted under Existing (2020) conditions. Traffic signal warrant worksheets for E+P traffic conditions are included in Appendix 5.2 of this report.

5.5 OFF-RAMP QUEUING ANALYSIS

Queuing analysis findings for E+P are presented in Table 5-2. As shown in Table 5-2, there are no movements that are anticipated to experience queuing issues during the weekday AM, mid-day, or PM peak 95th percentile traffic flows with the addition of Project traffic, consistent with Existing (2020) traffic conditions. Worksheets for E+P traffic conditions off-ramp queuing analysis are provided in Appendix 5.3.

EXHIBIT 5-1: E+P TRAFFIC VOLUMES

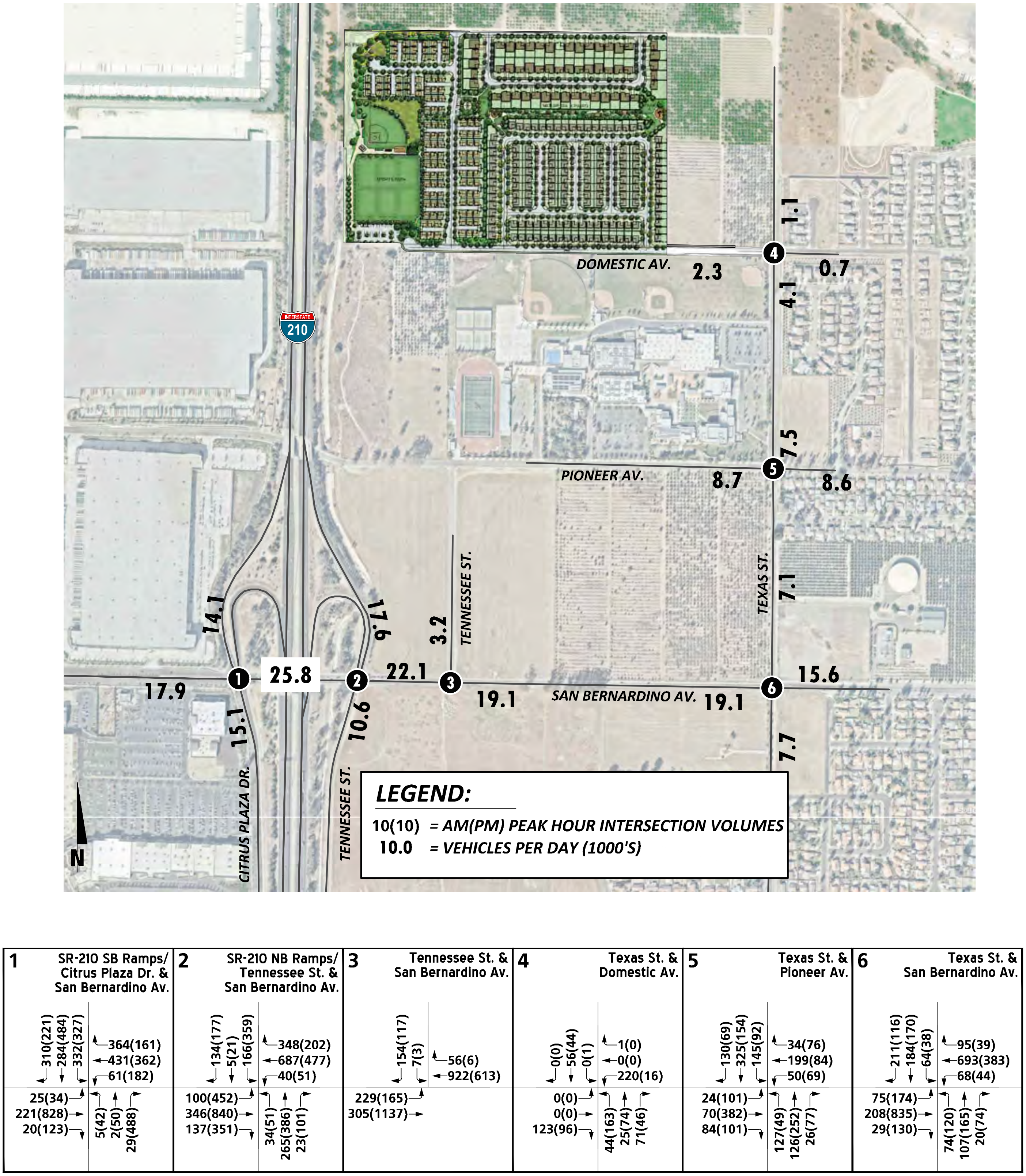
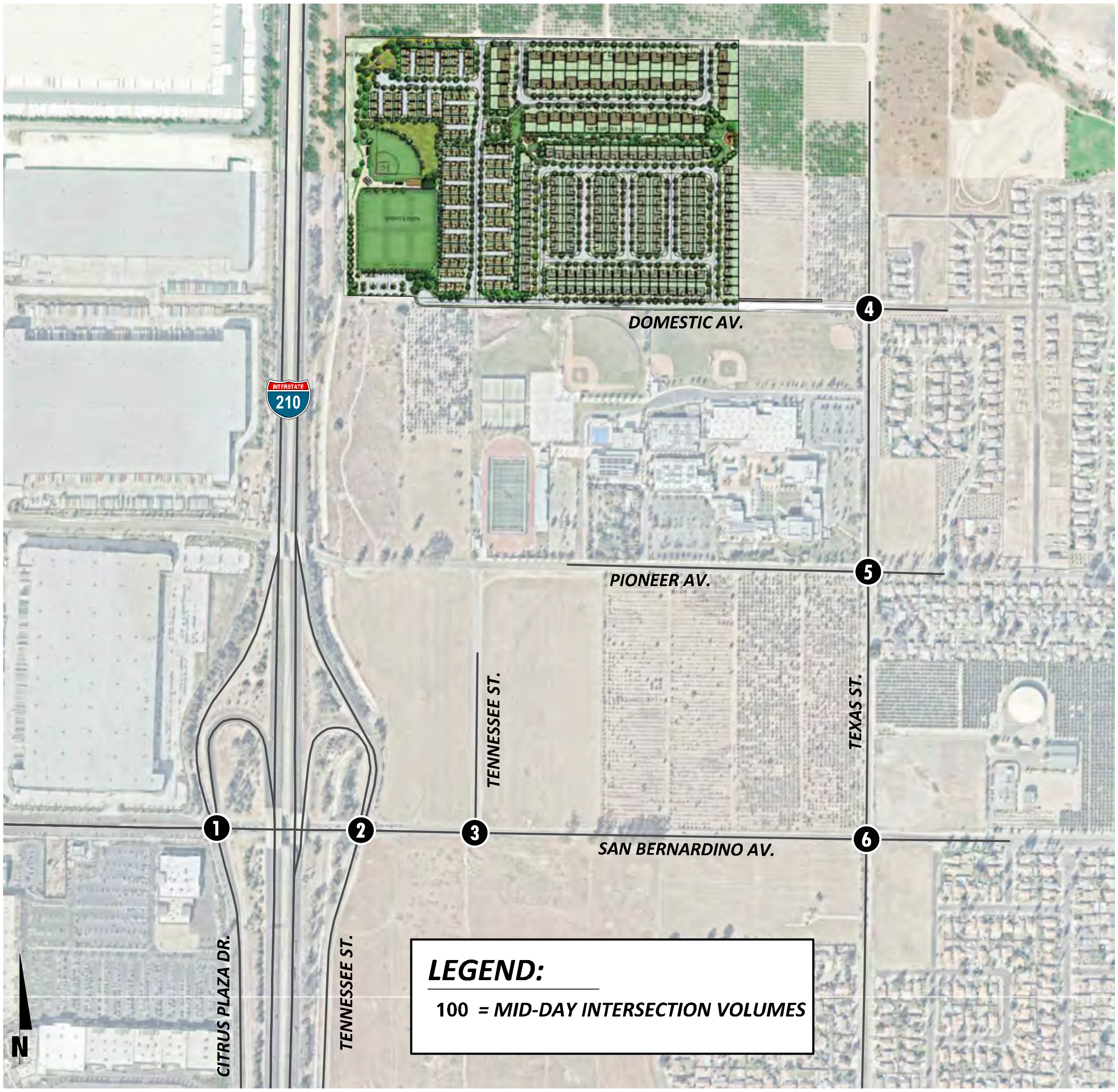


EXHIBIT 5-2: E+P MID-DAY TRAFFIC VOLUMES



1 SR-210 SB Ramps/ Citrus Plaza Dr. & San Bernardino Av.	2 SR-210 NB Ramps/ Tennessee St. & San Bernardino Av.	3 Tennessee St. & San Bernardino Av.	4 Texas St. & Domestic Av.	5 Texas St. & Pioneer Av.	6 Texas St. & San Bernardino Av.
206 389 324	137 21 275	220 34	0 54 0	63 228 129	145 160 66
173 343 174	267 517 64	15 628	0 0 44	101 159 43	63 397 47
71 680 58	479 687 191	141 902	0 0 95	48 154 101	206 658 73
12 60 353	35 398 80		162 83 106	60 291 55	100 138 52

EXHIBIT 5-3: E+P SUMMARY OF LOS

Table 5-1

Intersection Analysis for E+P Conditions

#	Intersection	Traffic Control[2]	Existing (2020) Delay[1] (secs.) AM	Existing (2020) Delay[1] (secs.) MD	Existing (2020) Delay[1] (secs.) PM	Existing (2020) Level of Service AM	Existing (2020) Level of Service MD	Existing (2020) Level of Service PM	E+P Delay[1] (secs.) AM	E+P Delay[1] (secs.) MD	E+P Delay[1] (secs.) PM	E+P Level of Service AM	E+P Level of Service MD	E+P Level of Service PM	Acceptable LOS
1	I-210 SB Ramps/Citrus Plaza Dr. & San Bernardino Av.	TS	36.7	37.4	41.4	D	D	D	36.9	39.3	42.4	D	D	D	D
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.	TS	30.1	**58.3**	**71.7**	C	**E**	**E**	31.5	**70.5**	**90.7**	C	**E**	**F**	D
3	Tennessee St. & San Bernardino Av.	CSS	**73.5**	**>100.0**	**>100.0**	**F**	**F**	**F**	**>100.0**	**73.8**	**>100.0**	**F**	**F**	**F**	C
4	Texas St. & Domestic Av.	CSS/**AWS**[3]	14.8	10.2	8.8	B	B	A	12.2	10.7	9.5	B	B	A	C
5	Texas St. & Pioneer Av.	TS	20.7	21.1	16.0	C	C	B	21.9	22.7	20.4	C	C	C	C
6	Texas St. & San Bernardino Av.	TS	13.3	13.3	28.7	B	B	C	23.1	17.2	33.9	C	B	C	C

* **BOLD** = Level of Service (LOS) does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

1 Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

2 CSS = Cross-street Stop; TS = Traffic Signal; AWS = All-way Stop; **AWS** = Improvement

3 The Project will convert the intersection to an all-way stop control as part of the Project design features.

Table 5-2

Peak Hour Freeway Off-Ramp Queuing Summary for E+P Conditions

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2020) Conditions						E+P Conditions					
			95th Percentile Queue (Feet)			Acceptable? [1]			95th Percentile Queue (Feet)			Acceptable? [1]		
			AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM	AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM
I-210 SB Ramps & San Bernardino Av.	SBL	50	410 [2,3]	300 [3]	307 [3]	Yes	Yes	Yes	434 [2,3]	389 [2,3]	399 [2,3]	Yes	Yes	Yes
	SBT/R	1,530	140	188	345	Yes	Yes	Yes	140	188	245	Yes	Yes	Yes
I-210 NB Ramps & San Bernardino Av.	SBL	105	197 [3]	331 [2,3]	495 [2,3]	Yes	Yes	Yes	223 [2,3]	418 [2,3]	579 [2,3]	Yes	Yes	Yes
	SBT/R	1,245	51	63	70	Yes	Yes	Yes	51	63	70	Yes	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

[3] Although 95th percentile queue is anticipated to exceed the available storage for the turn lane, the adjacent through lane has sufficient storage to accommodate any spillover without spilling back and affecting the I-210 Freeway mainline.

5.6 PROJECT DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

This section provides a summary of Project deficiencies and recommended improvements. Based on the City of Redlands deficiency criteria discussed in Section 2.6 *Deficiency Criteria*, the following intersections were found to be deficient. Improvements necessary to improve project-related traffic deficiencies are also discussed below.

5.6.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

The effectiveness of the proposed recommended improvements is presented in Table 5-3 for E+P traffic conditions. It should be noted that the recommended improvements are consistent with those needed to address existing deficiencies. The intersection operations analysis worksheets for E+P traffic conditions, with improvements, are included in Appendix 5.4 of this report.

I-210 Westbound Ramps/Tennessee Street & San Bernardino Avenue (#2) – This intersection was found to operate at an unacceptable LOS (LOS E or worse) during the peak hours under Existing traffic conditions, and is anticipated to continue to operate at an unacceptable LOS during the one or more peak hours with the addition of Project traffic resulting in a deficiency. The following improvements are necessary to improve the peak hour deficiency:

- Add a 2nd eastbound through lane.
- Add a 2nd westbound through lane.

Tennessee Street & San Bernardino Avenue (#3) – This intersection was found to operate at an unacceptable LOS (LOS D or worse) during the peak hours under Existing traffic conditions, and is anticipated to continue to operate at an unacceptable LOS during the one or more peak hours with the addition of Project traffic resulting in a deficiency. The following improvements are necessary to improve the peak hour deficiency:

- Install a traffic signal.
- Add a southbound right turn lane.
- Add an eastbound left turn lane.
- Add a 2nd westbound through lane.

5.6.2 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON OFF-RAMP QUEUES

As shown previously in Table 5-2, there are no peak hour queuing issues at the study area interchanges for E+P traffic conditions. As such, no improvements have been recommended.

Table 5-3

Intersection Analysis for E+P Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)			Level of Service		
			Northbound			Southbound			Eastbound			Westbound								
			L	T	R	L	T	R	L	T	R	L	T	R	AM	MD	PM	AM	MD	PM
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.																			
	- Without Improvements	TS	1	2	0	1	1	0	2	1	1	1	1	1	31.5	**70.5**	**90.7**	C	**E**	**F**
	- With Improvements	TS	1	2	0	1	1	0	2	**2**	1	1	**2**	1	26.5	46.9	45.8	C	D	D
3	Tennessee St. & San Bernardino Av.																			
	- Without Improvements	CSS	0	0	0	0	1	0	0	1	0	0	1	0	**>100.0**	**73.8**	**>100.0**	**F**	**F**	**F**
	- With Improvements	**TS**	0	0	0	**1**	**0**	**1**	**1**	1	0	0	**2**	0	16.4	25.5	13.2	B	C	B

1 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** = Improvement

2 Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

3 CSS = Cross-street Stop; TS = Traffic Signal; **TS** = Improvement

6 OPENING YEAR CUMULATIVE (2025) TRAFFIC CONDITIONS

This section discusses the methods used to develop Opening Year Cumulative (2025) Without and With Project traffic forecasts and the resulting intersection operations, traffic signal warrant, and off-ramp queuing analyses.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative (2025) Without and With Project conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements along the Project's frontage and driveways). This includes the implementation of Project design features at the intersection of Texas Street & Domestic Avenue.
- Driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for Opening Year Cumulative conditions only.

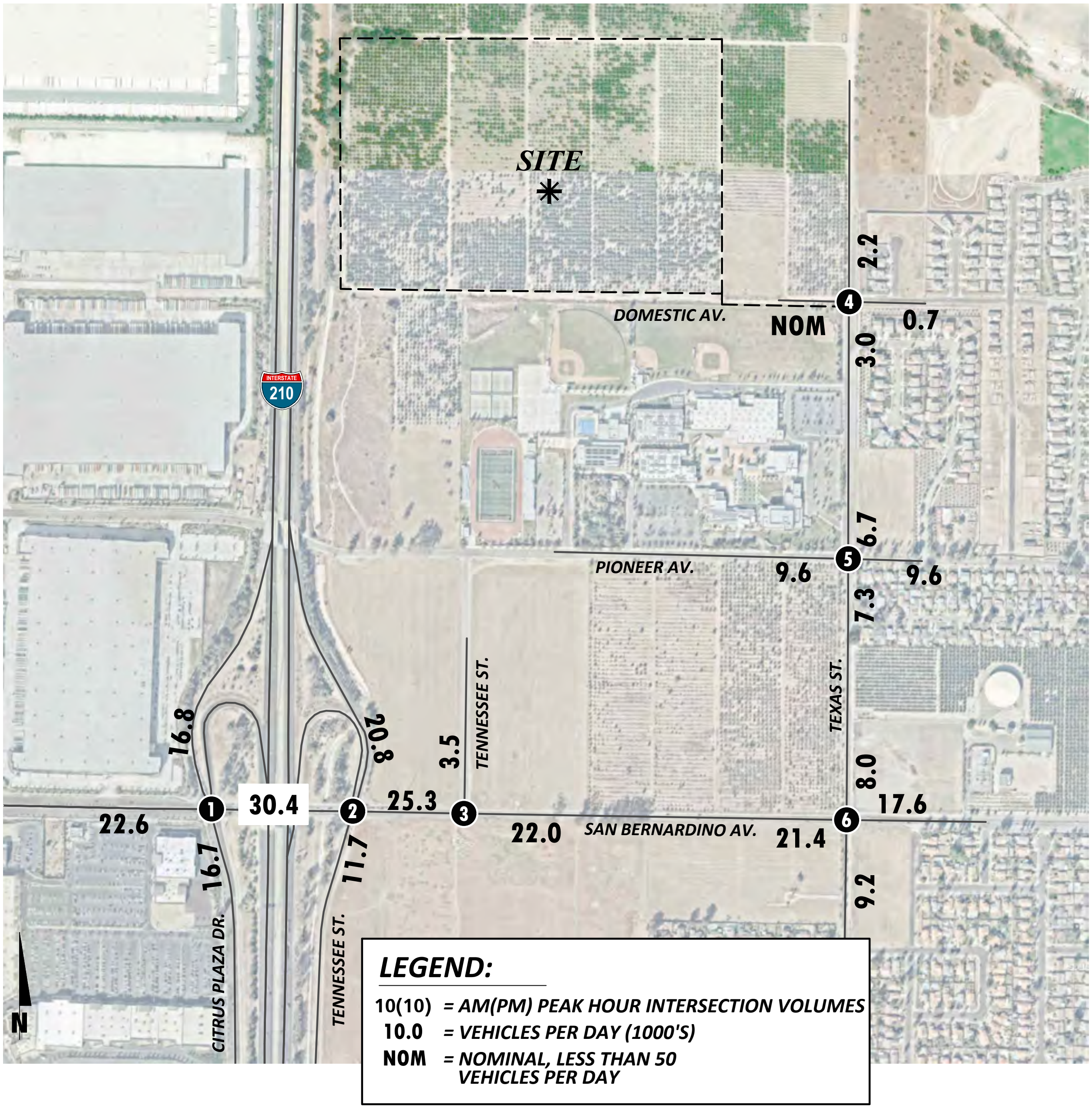
6.2 OPENING YEAR CUMULATIVE (2025) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes, an ambient growth factor of 10.41% and traffic from pending and approved but not yet constructed known development projects in the area. The weekday ADT, AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2025) Without Project traffic conditions are shown on Exhibit 6-1. Opening Year Cumulative (2025) Without Project mid-day peak traffic volumes are shown on Exhibit 6-2.

6.3 OPENING YEAR CUMULATIVE (2025) WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes, an ambient growth factor of 10.41%, traffic from pending and approved but not yet constructed known development projects in the area and the addition of Project traffic. The ADT, AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2025) With Project traffic conditions are shown on Exhibit 6-3. Opening Year (2025) With Project mid-day peak traffic volumes are shown on Exhibit 6-4.

EXHIBIT 6-1: OPENING YEAR CUMULATIVE (2025) WITHOUT PROJECT TRAFFIC VOLUMES



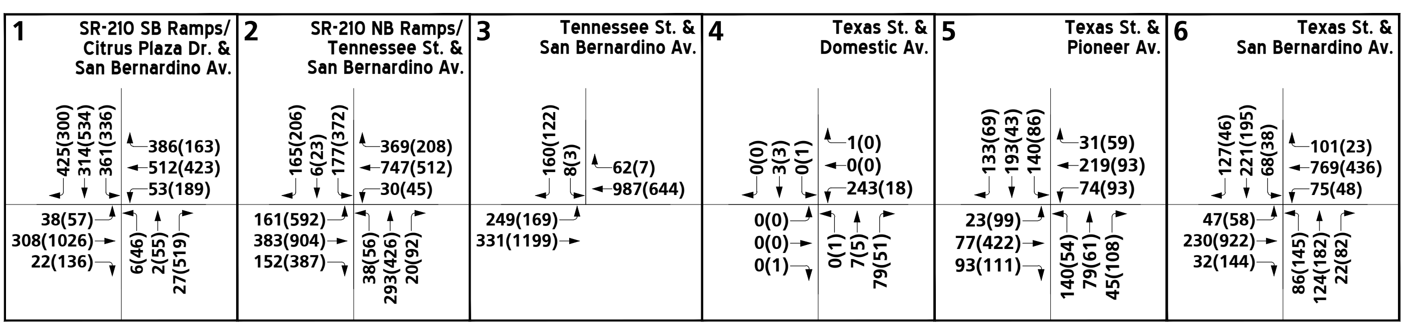
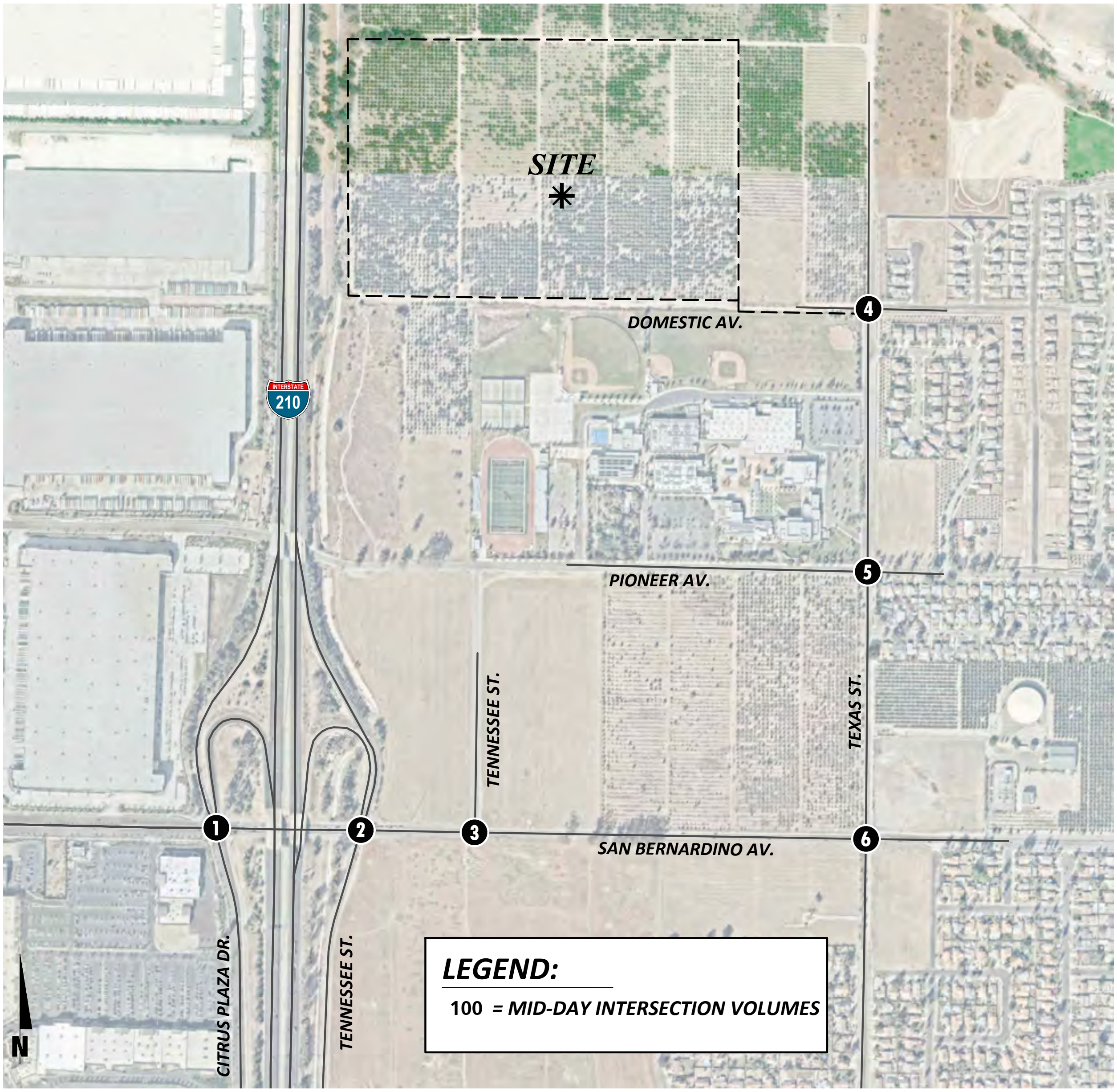


Exhibit 6-2: Opening Year Cumulative (2025) Without Project Mid-Day Traffic Volumes



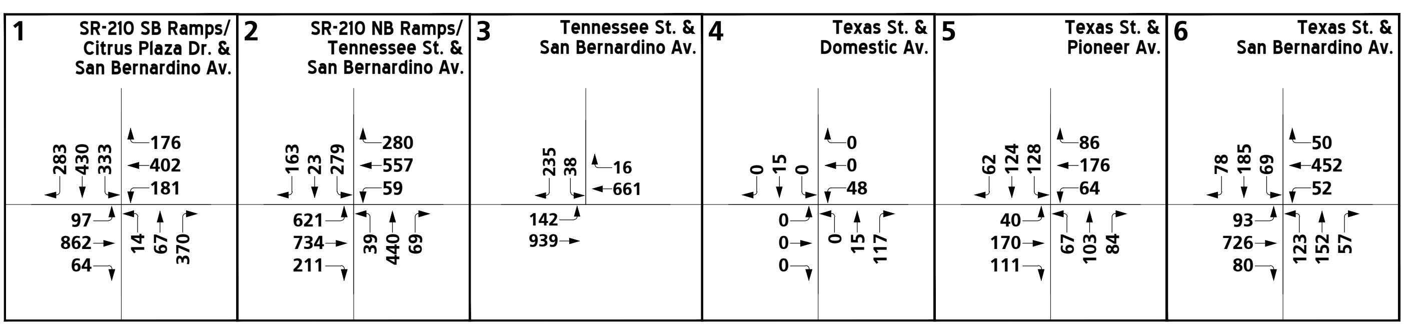
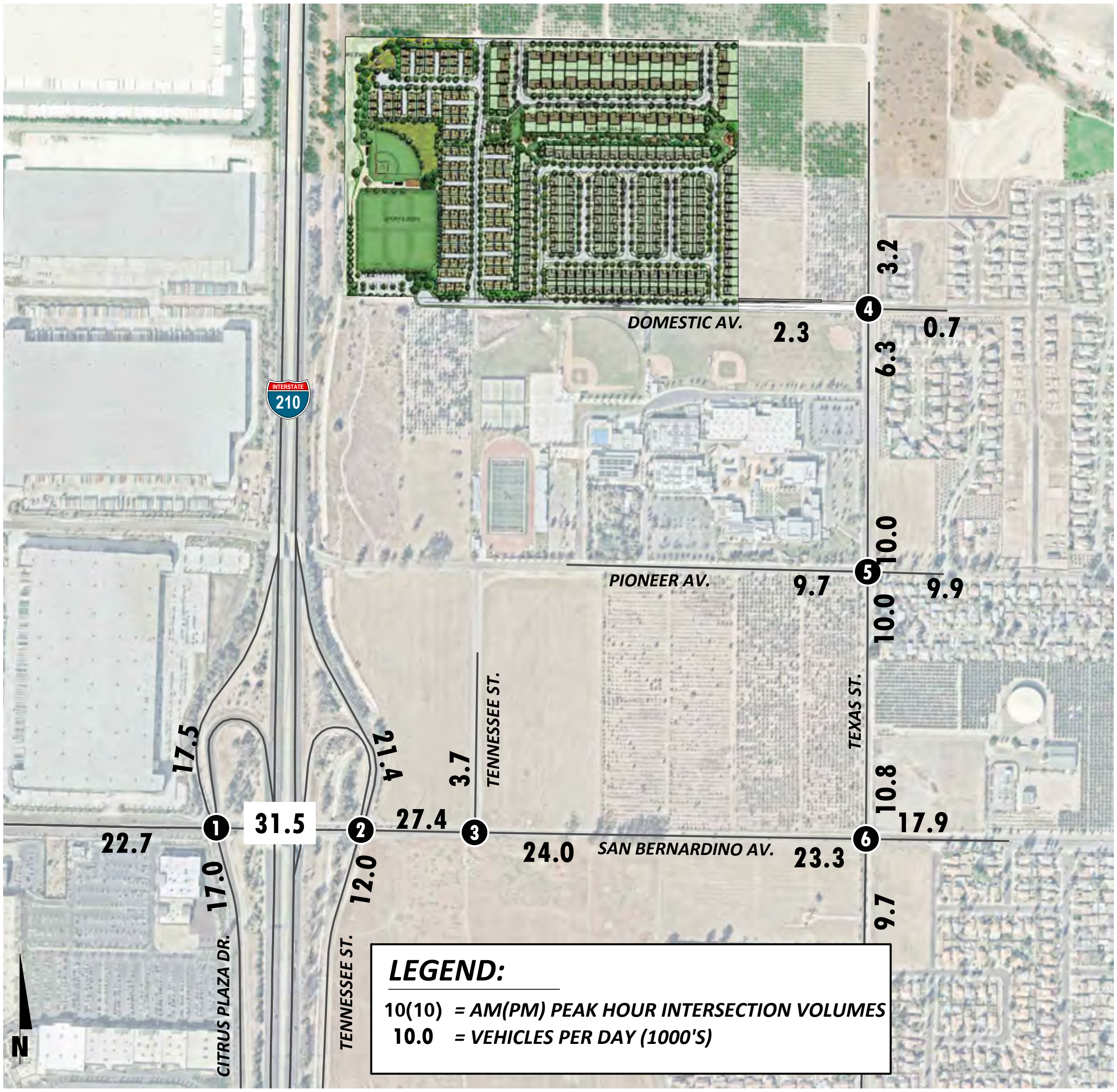


EXHIBIT 6-3: OPENING YEAR CUMULATIVE (2025) WITH PROJECT TRAFFIC VOLUMES



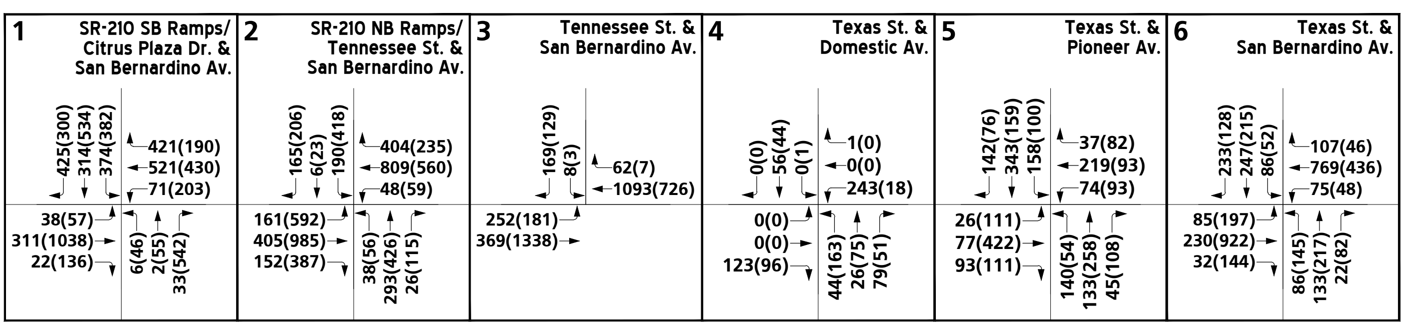
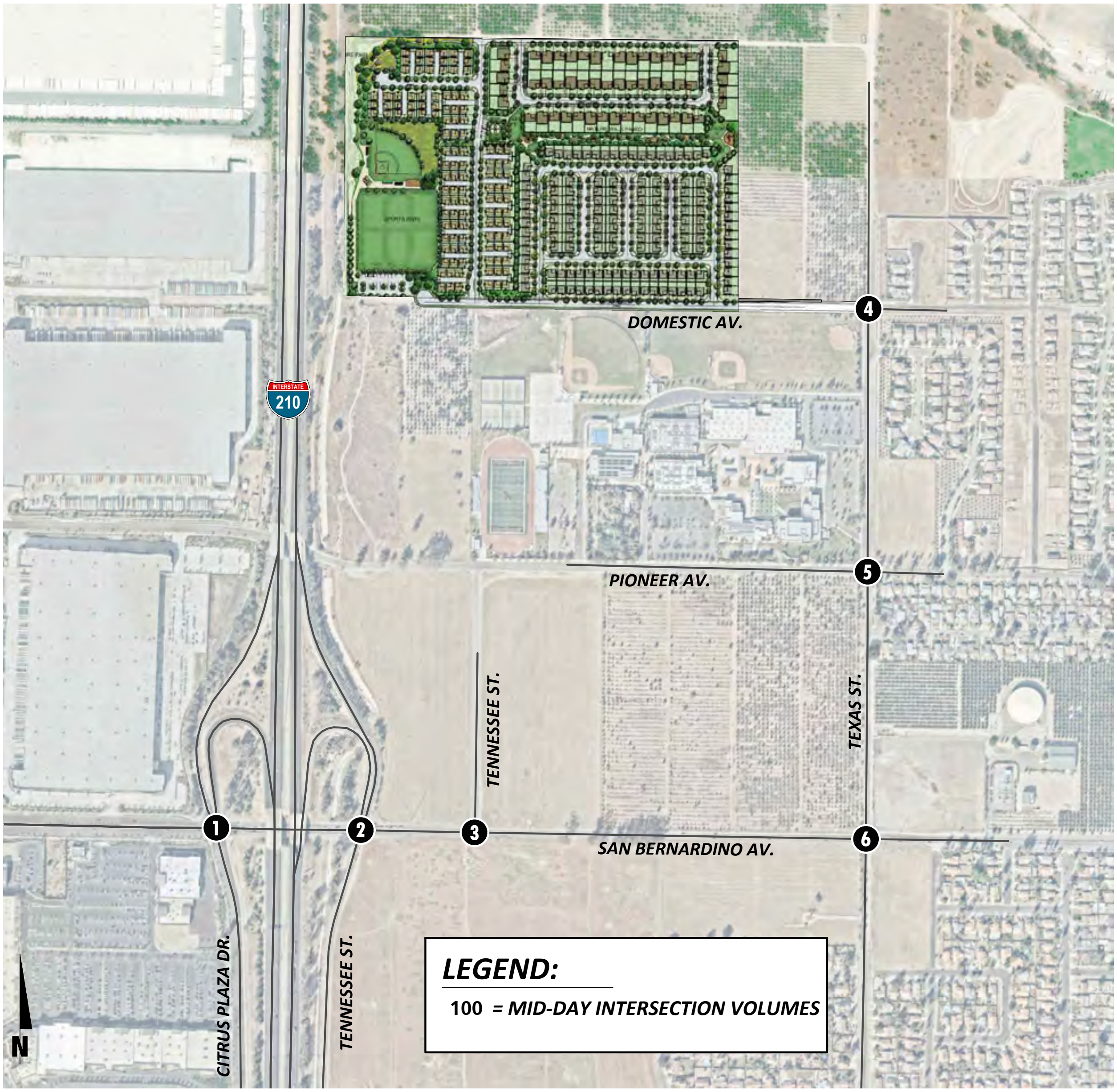
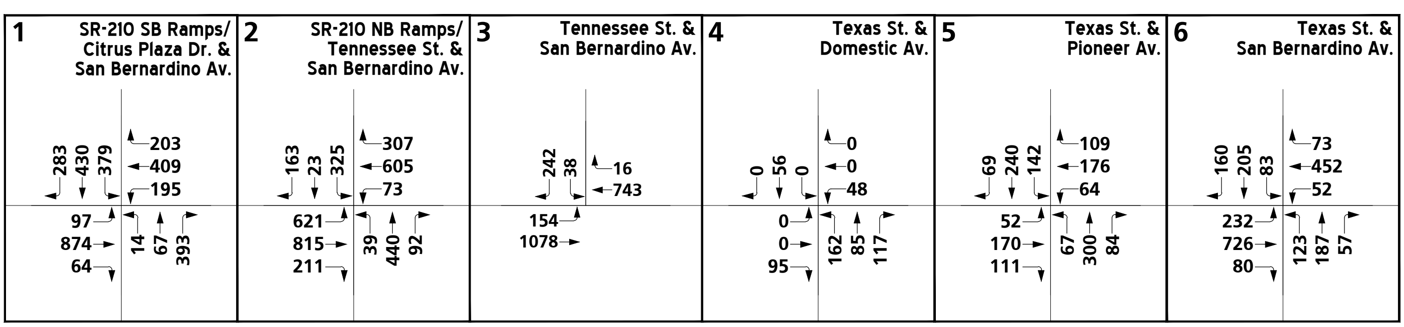


EXHIBIT 6-4: OPENING YEAR CUMULATIVE (2025) WITH PROJECT MID-DAY TRAFFIC VOLUMES





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6.4 INTERSECTION OPERATIONS ANALYSIS

LOS calculations were conducted for the study intersections to evaluate their operations under Opening Year Cumulative (2025) Without Project conditions with the roadway and intersection geometrics consistent with Section 6.1 *Roadway Improvements*. As shown in Table 6-1, the following study area intersections are anticipated to operate at an unacceptable LOS under Opening Year Cumulative (2025) Without Project traffic conditions:

- I-210 SB Ramps/Citrus Plaza Drive & San Bernardino Avenue (#1) – LOS E PM peak hour only
- I-210 NB Ramps/Tennessee Street & San Bernardino Avenue (#2) – LOS F mid-day and PM peak hours
- Tennessee Street & San Bernardino Avenue (#3) – LOS F AM, mid-day, and PM peak hours
- Texas Street & Domestic Avenue (#4) – LOS F AM peak hour only
- Texas Street & Pioneer Avenue (#5) – LOS D mid-day peak hour only
- Texas Street & San Bernardino Avenue (#6) – LOS D AM and mid-day peak hours; LOS F PM peak hour

A summary of the peak hour intersection LOS for Opening Year Cumulative (2025) Without Project conditions is shown on Exhibit 6-5. The intersection operations analysis worksheets for Opening Year Cumulative (2025) Without Project traffic conditions are included in Appendix 6.1 of this report.

6.4.2 OPENING YEAR CUMULATIVE (2025) WITH PROJECT TRAFFIC CONDITIONS

As shown in Table 6-1 and illustrated on Exhibit 6-6, there are no additional study area intersections that are anticipated to operate at a deficient LOS during one or both peak hours for Opening Year Cumulative (2025) With Project traffic conditions, in addition to the locations identified above for Opening Year Cumulative (2025) Without Project traffic conditions. It should be noted with the implementation of the Project design features as discussed in Section 1.7 *Recommendations* the intersection of Texas Street & Domestic Avenue (#4) is anticipated to operate at an acceptable LOS during the peak hours. The intersection operations analysis worksheets for Opening Year Cumulative (2025) With Project traffic conditions are included in Appendix 6.2 of this report.

6.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no additional study area intersections that are anticipated to meet a traffic signal warrant under Opening Year Cumulative (2025) Without Project and With Project conditions, in addition to the intersection already warranted under Existing (2020) conditions. Traffic signal warrant worksheets for Opening Year Cumulative (2025) Without Project and With Project traffic conditions are included in Appendices 6.3 and 6.4 of this report.

Table 6-1

Intersection Analysis for Opening Year Cumulative (2025) Conditions

#	Intersection	Traffic Control[2]	2025 Without Project						2025 With Project						Acceptable LOS
			Delay[1] (secs.)			Level of Service			Delay[1] (secs.)			Level of Service			
			AM	MD	PM	AM	MD	PM	AM	MD	PM	AM	MD	PM	
1	I-210 SB Ramps/Citrus Plaza Dr. & San Bernardino Av.	TS	37.7	41.4	**55.2**	D	D	**E**	38.5	42.3	**76.2**	D	D	**E**	D
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.	TS	34.6	**104.2**	**126.6**	C	**F**	**F**	39.4	**116.4**	**153.2**	D	**F**	**F**	D
3	Tennessee St. & San Bernardino Av.	CSS	**>100.0**	**>100.0**	**>100.0**	**F**	**F**	**F**	**>100.0**	**>100.0**	**>100.0**	**F**	**F**	**F**	C
4	Texas St. & Domestic Av.	CSS/**AWS**[3]	16.8	10.4	8.9	C	B	A	11.2	10.1	9.0	B	B	A	C
5	Texas St. & Pioneer Av.	TS	22.0	**37.7**	17.2	C	**D**	B	24.3	**38.9**	28.3	C	**D**	C	C
6	Texas St. & San Bernardino Av.	TS	22.9	27.1	**63.4**	C	C	**E**	**60.2**	**49.5**	**85.4**	**E**	**D**	**F**	C

* **BOLD** = Level of Service (LOS) does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

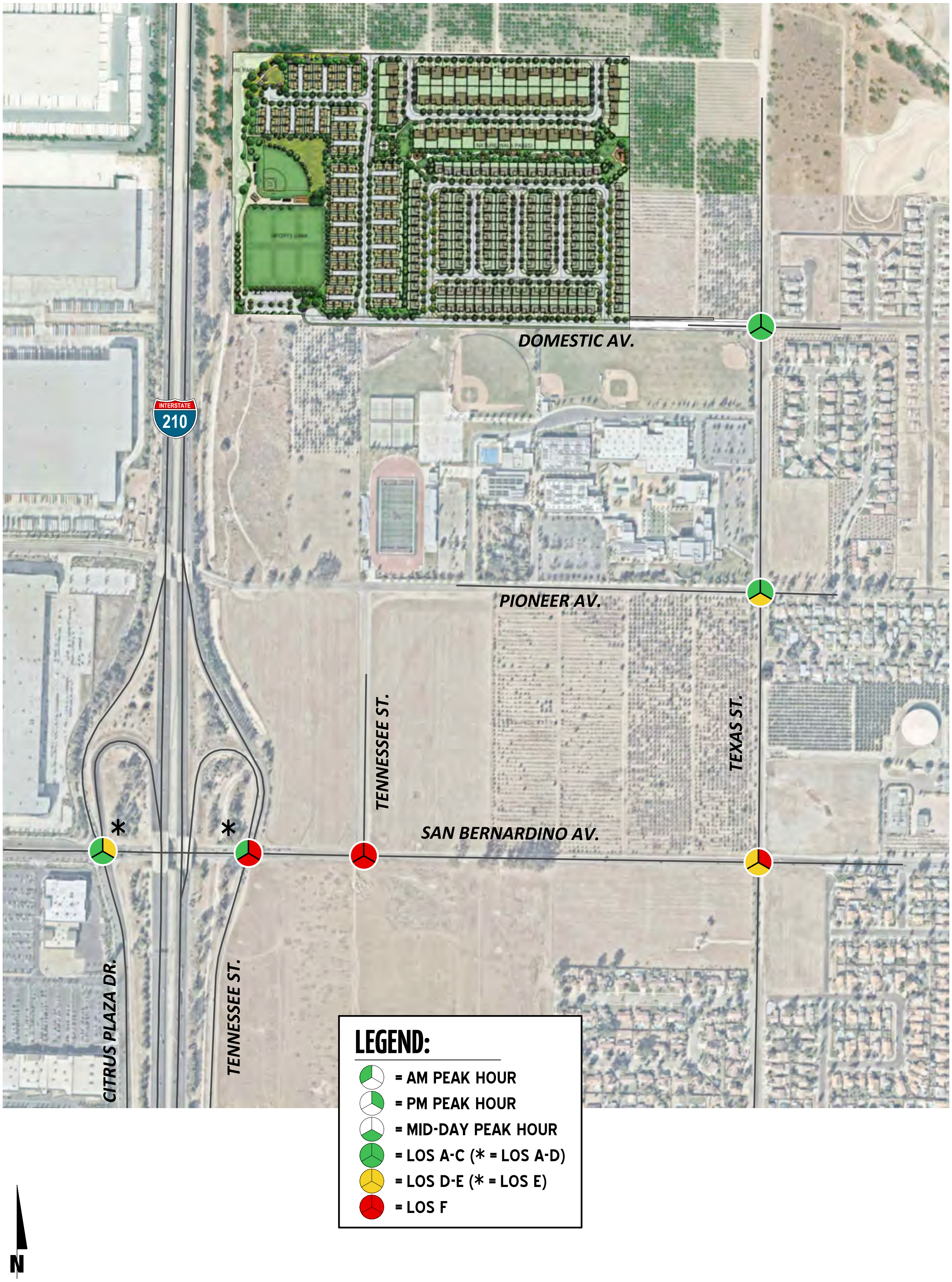
1 Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

2 CSS = Cross-street Stop; TS = Traffic Signal; AWS = All-way Stop; **AWS** = Improvement

3 The Project will convert the intersection to an all-way stop control as part of the Project design features.

EXHIBIT 6-5: OPENING YEAR CUMULATIVE (2025) WITHOUT PROJECT SUMMARY OF LOS

EXHIBIT 6-6: OPENING YEAR CUMULATIVE (2025) WITH PROJECT SUMMARY OF LOS



6.6 OFF-RAMP QUEUING ANALYSIS

Queuing analysis findings for Opening Year Cumulative (2025) Without Project and With Project conditions are presented in Table 6-2. As shown in Table 6-2, there are no movements that are anticipated to experience queuing issues during the weekday AM, mid-day, or PM peak 95th percentile traffic flows with the addition of Project traffic, consistent with Existing (2020) traffic conditions. Worksheets for Opening Year Cumulative (2025) Without Project and With Project traffic conditions off-ramp queuing analysis are provided in Appendices 6.5 and 6.6, respectively.

6.7 RECOMMENDED IMPROVEMENTS

This section provides a summary of Project deficiencies and recommended improvements. Based on the City of Redlands deficiency criteria discussed in Section 2.6 *Deficiency Criteria*, the following intersections were found to be deficient.

6.7.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

The effectiveness of the recommended improvement strategies to address Opening Year Cumulative (2025) traffic deficiencies are presented in Table 6-3. If not constructed by the Project, the Project Applicant shall contribute to these improvements through payment of City DIF fees or fair share contribution as identified in Table 1-2. Worksheets for Opening Year Cumulative (2025) With Project conditions, with improvements, HCM calculation worksheets are provided in Appendix 6.7.

6.7.2 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON OFF-RAMP QUEUES

As shown previously in Table 6-2, there are no movements that are anticipated to experience queuing issues during the weekday AM, weekday mid-day, or weekday PM peak 95th percentile traffic flows for Opening Year Cumulative (2025) traffic conditions. As such, no improvements have been recommended.

Table 6-2

Peak Hour Freeway Off-Ramp Queuing Summary for Opening Year Cumulative (2025) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	2025 Without Project						2025 With Project					
			95th Percentile Queue (Feet)			Acceptable?[1]			95th Percentile Queue (Feet)			Acceptable?[1]		
			AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM	AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM
I-210 SB Ramps & San Bernardino Av.	SBL	50	491 [2,3]	404 [2,3]	417 [2,3]	Yes	Yes	Yes	517 [2,3]	542 [2,3]	489 [2,3]	Yes	Yes	Yes
	SBT/R	1,530	197	218	295	Yes	Yes	Yes	198	218	218	Yes	Yes	Yes
I-210 NB Ramps & San Bernardino Av.	SBL	105	247 [2,3]	424 [2,3]	605 [2,3]	Yes	Yes	Yes	274 [2,3]	564 [2,3]	509 [2,3]	Yes	Yes	Yes
	SBT/R	1,245	57	69	76	Yes	Yes	Yes	57	69	69	Yes	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

[3] Although 95th percentile queue is anticipated to exceed the available storage for the turn lane, the adjacent through lane has sufficient storage to accommodate any spillover without spilling back and affecting the I-210 Freeway mainline.

Table 6-3

Intersection Analysis for Opening Year Cumulative (2025) Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)			Level of Service		
			Northbound			Southbound			Eastbound			Westbound								
			L	T	R	L	T	R	L	T	R	L	T	R	AM	MD	PM	AM	MD	PM
1	I-210 SB Ramps/Citrus Plaza Dr. & San Bernardino Av.																			
	- Without Improvements	TS	1	1	1>	1	2	0	1	2	1	1	1	1	38.5	42.3	**76.2**	D	D	**E**
	- With Improvements	TS	1	1	1>	1	2	0	1	2	1	1	**2**	1	38.1	48.3	49.3	D	D	D
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.																			
	- Without Improvements	TS	1	2	0	1	1	0	2	1	1	1	1	1	39.4	**116.4**	**153.2**	D	**F**	**F**
	- With Improvements	TS	1	2	0	1	1	0	2	**3**	1	1	**2**	1	28.6	52.1	51.5	C	D	D
3	Tennessee St. & San Bernardino Av.																			
	- Without Improvements	CSS	0	0	0	0	1	0	0	1	0	0	1	0	**>100.0**	**>100.0**	**>100.0**	**F**	**F**	**F**
	- With Improvements	**TS**	0	0	0	**1**	**0**	**1**	**1**	**2**	0	0	**2**	0	20.4	12.7	10.0	C	B	B
5	Texas St. & Pioneer Av.																			
	- Without Improvements	TS	1	1	0	1	1	1	0	1	0	0	1	0	**24.3**	**38.9**	**28.3**	**C**	**D**	**C**
	- With Improvements	TS	1	1	0	1	1	1	0	1	**1**	0	1	0	23.8	22.7	19.3	C	C	B
6	Texas St. & San Bernardino Av.																			
	- Without Improvements	TS	0	1	0	0	1	0	1	1	0	1	1	1	**60.2**	**49.5**	**85.4**	**E**	**D**	**F**
	- With Improvements	TS	**1**	1	0	**1**	1	**1**	1	**2**	0	1	**2**	**0**	12.1	17.9	14.0	B	B	B

[1] 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; > = Right-Turn Overlap Phasing; **1** = Improvement

[2] Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; TS = Traffic Signal; **TS** = Improvement

7 HORIZON YEAR (2040) TRAFFIC CONDITIONS

This section discusses the methods used to develop Horizon Year (2040) Without and With Project traffic forecasts and the resulting intersection operations, traffic signal warrants, and off-ramp queuing analyses.

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Horizon Year (2040) Without and With Project conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for Horizon Year conditions only (e.g., intersection and roadway improvements along the Project's frontage and driveways). This includes the implementation of Project design features at the intersection of Texas Street & Domestic Avenue.
- Driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for Horizon Year conditions only (e.g., intersection and roadway improvements along the cumulative development's frontages and driveways).
- Other parallel facilities, that although not evaluated for the purposes of this analysis, are anticipated to be in place for Horizon Year traffic conditions and would affect the travel patterns within the study area.

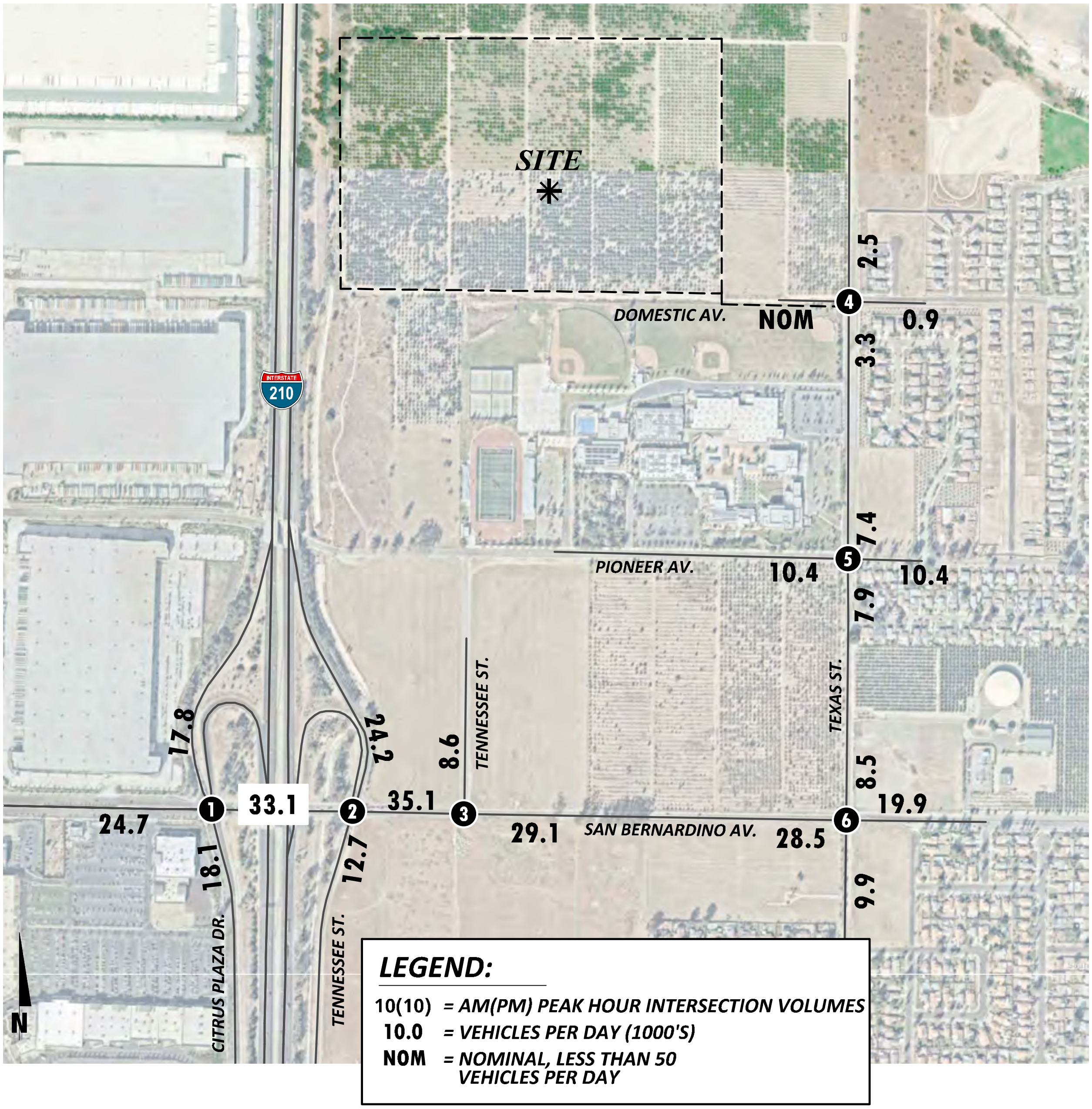
7.2 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-processed volumes obtained from the SBTAM (see Section 4.8 *Horizon Year (2040) Conditions* of this report for a detailed discussion on the post-processing methodology). The weekday ADT, AM and PM peak hour volumes which can be expected for Horizon Year (2040) Without Project traffic conditions are shown on Exhibit 7-1. Horizon Year (2040) Without Project mid-day peak traffic volumes are shown on Exhibit 7-2.

7.3 HORIZON YEAR (2040) WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-processed volumes obtained from the SBTAM, plus the traffic generated by the proposed Project (see Section 4.8 *Horizon Year (2040) Conditions* of this report for a detailed discussion on the post-processing methodology). The ADT, AM and PM peak hour volumes which can be expected for Horizon Year (2040) With Project traffic conditions are shown on Exhibit 7-3. Horizon Year (2040) With Project mid-day peak traffic volumes are shown on Exhibit 7-4.

EXHIBIT 7-1: HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC VOLUMES



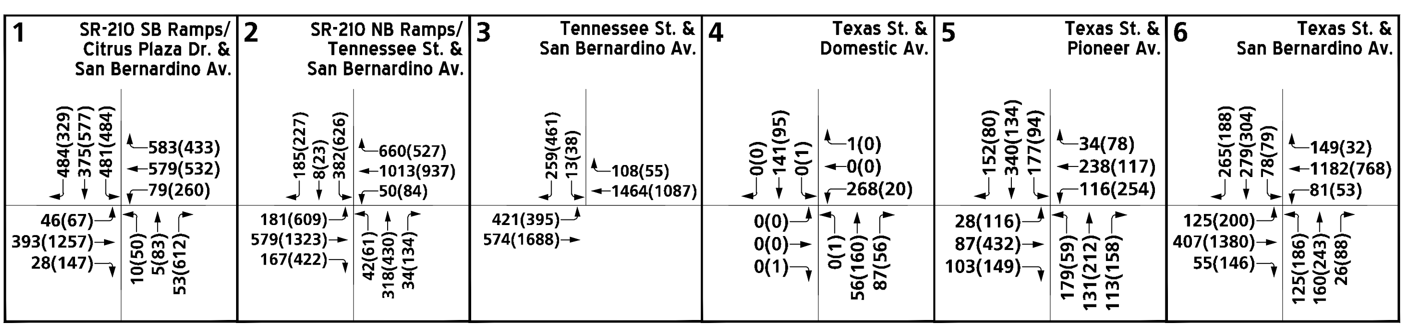
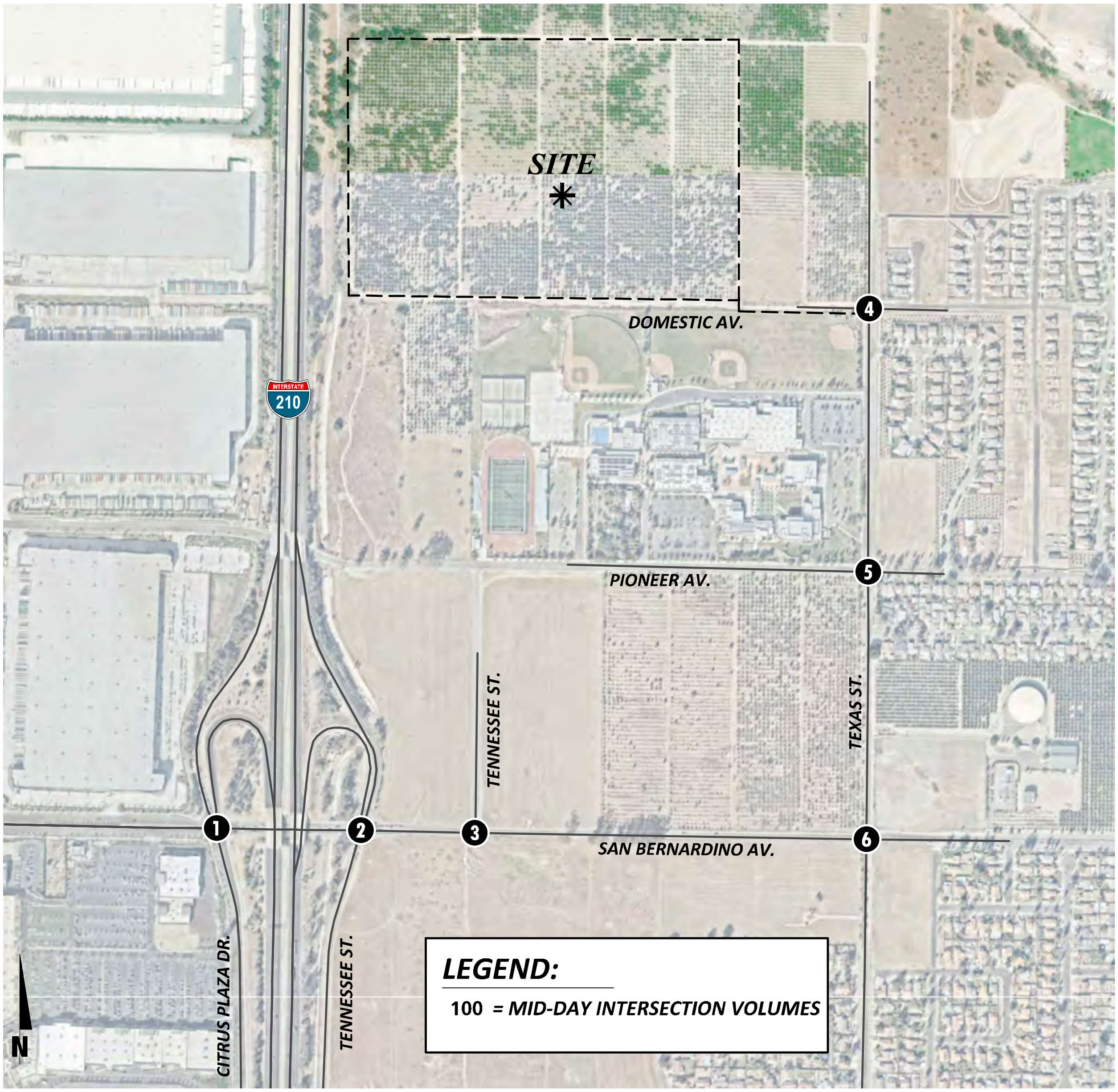


EXHIBIT 7-2: HORIZON YEAR (2040) WITHOUT PROJECT MID-DAY TRAFFIC VOLUMES



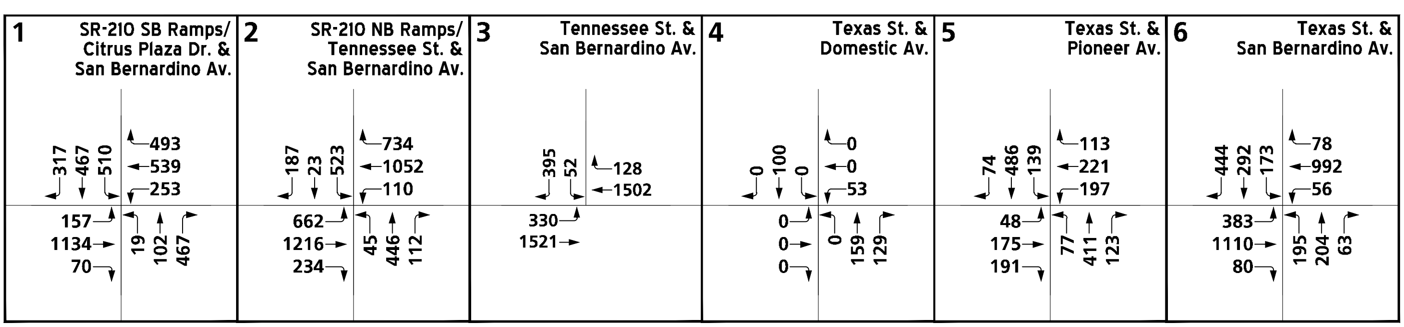
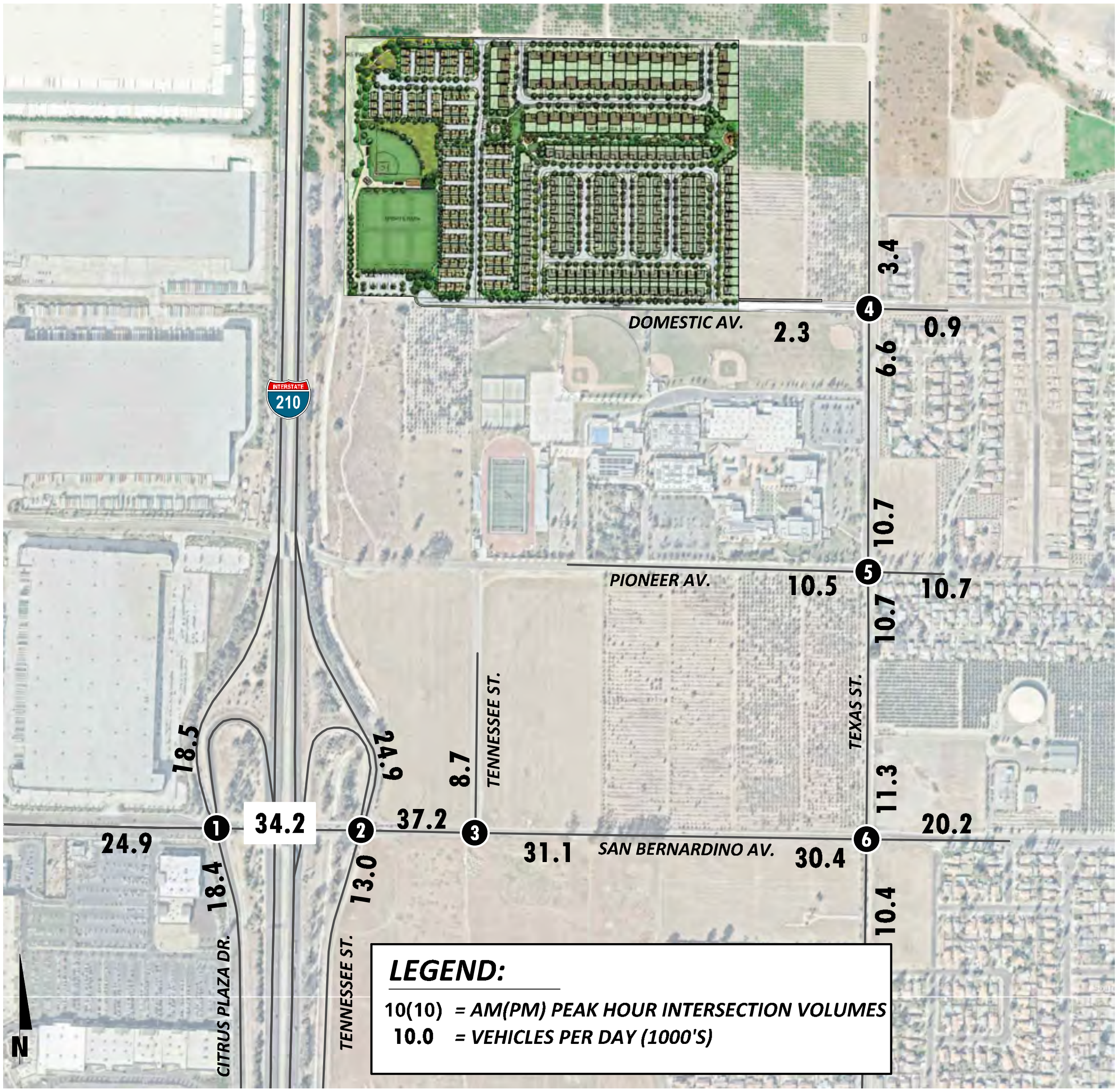


EXHIBIT 7-3: HORIZON YEAR (2040) WITH PROJECT TRAFFIC VOLUMES



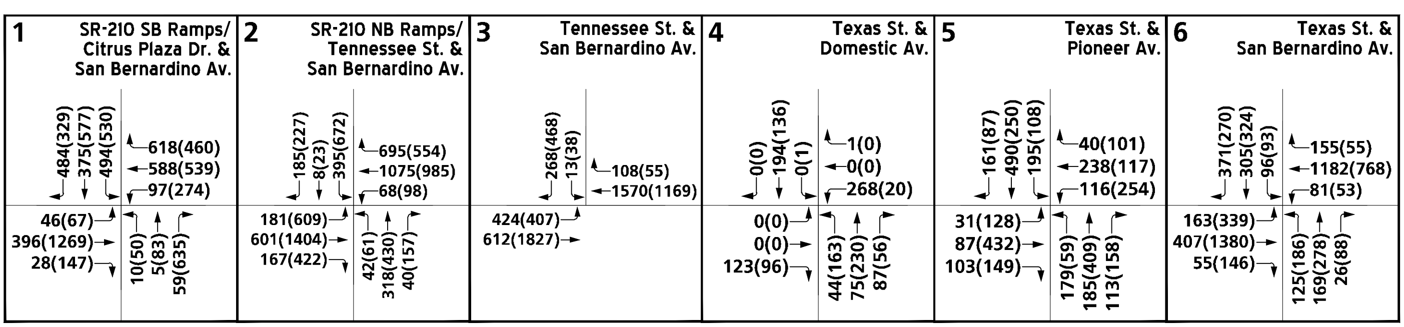
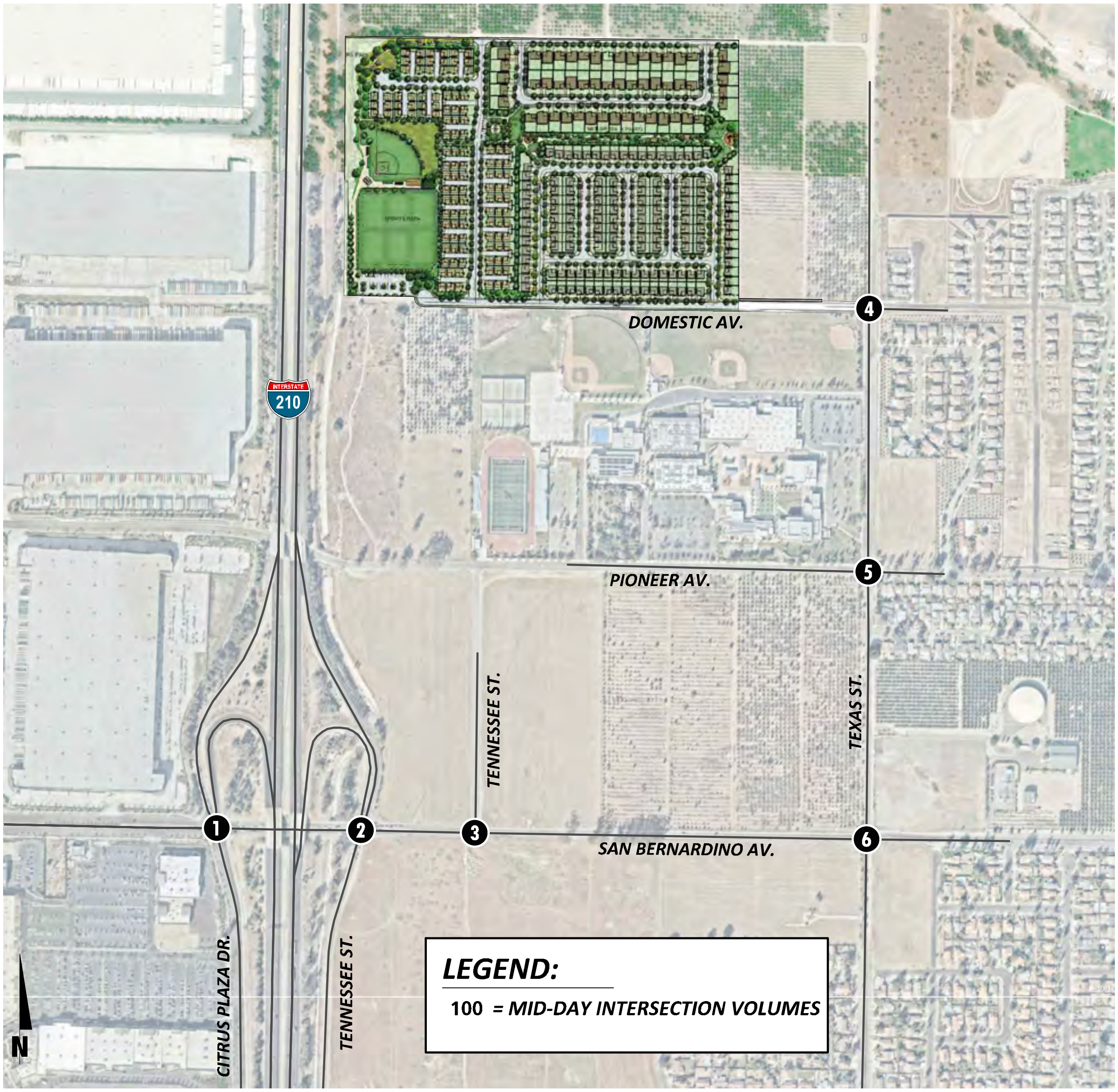
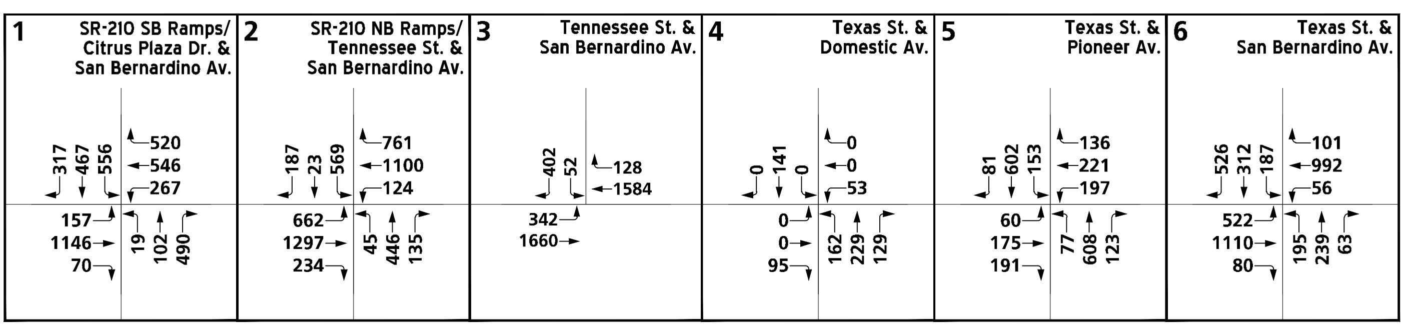


EXHIBIT 7-4: HORIZON YEAR (2040) WITH PROJECT MID-DAY TRAFFIC VOLUMES





7.4 INTERSECTION OPERATIONS ANALYSIS

7.4.1 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC CONDITIONS

LOS calculations were conducted for the study intersections to evaluate their operations under Horizon Year (2040) Without Project conditions with roadway and intersection geometrics consistent with Section 7.1 *Roadway Improvements*. As shown in Table 7-1, the following study area intersections are anticipated to operate at an unacceptable LOS under Horizon Year (2040) Without Project traffic conditions:

- I-210 SB Ramps/Citrus Plaza Drive & San Bernardino Avenue (#1) – LOS E AM and mid-day peak hours; LOS F PM peak hour
- I-210 NB Ramps/Tennessee Street & San Bernardino Avenue (#2) – LOS F AM, mid-day, and PM peak hours
- Tennessee Street & San Bernardino Avenue (#3) – LOS F AM, mid-day, and PM peak hours
- Texas Street & Pioneer Avenue (#5) – LOS E mid-day peak hour; LOS D PM peak hour
- Texas Street & San Bernardino Avenue (#6) – LOS F AM, mid-day, and PM peak hours

A summary of the peak hour intersection LOS for Horizon Year (2040) Without Project conditions is shown on Exhibit 7-5. The intersection operations analysis worksheets for Horizon Year (2040) Without Project traffic conditions are included in Appendix 7.1 of this TA.

7.4.2 HORIZON YEAR (2040) WITH PROJECT TRAFFIC CONDITIONS

As shown in Table 7-1 and illustrated on Exhibit 7-4, there are no additional study area intersections anticipated to operate at a deficient LOS during one or both peak hours for Horizon Year (2040) With Project traffic conditions, in addition to the locations identified above for Horizon Year (2040) Without Project traffic conditions. The intersection operations analysis worksheets for Horizon Year (2040) With Project traffic conditions are included in Appendix 7.2 of this report.

7.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no additional study area intersections that are anticipated to meet a traffic signal warrant under Horizon Year (2040) Without Project and With Project conditions, in addition to the intersection already warranted under Existing (2020) conditions. Traffic signal warrant worksheets for Horizon Year (2040) Without Project and With Project traffic conditions are included in Appendices 7.3 and 7.4 of this report.

Table 7-1

Intersection Analysis for Horizon Year (2040) Conditions

#	Intersection	Traffic Control[2]	2040 Without Project Delay[1] (secs.)			2040 Without Project Level of Service			2040 With Project Delay[1] (secs.)			2040 With Project Level of Service			Acceptable LOS
			AM	MD	PM	AM	MD	PM	AM	MD	PM	AM	MD	PM	
1	I-210 SB Ramps/Citrus Plaza Dr. & San Bernardino Av.	TS	**61.7**	**66.4**	**93.0**	**E**	**E**	**F**	**70.4**	**74.2**	**96.5**	**E**	**E**	**F**	D
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.	TS	**95.1**	**>200.0**	**>200**	**F**	**F**	**F**	**108.1**	**>200.0**	**>200.0**	**F**	**F**	**F**	D
3	Tennessee St. & San Bernardino Av.	CSS	**>100.0**	**>100.0**	**>100**	**F**	**F**	**F**	**>100.0**	**>100.0**	**>100.0**	**F**	**F**	**F**	C
4	Texas St. & Domestic Av.	CSS/**AWS**[3]	14.0	11.6	10.8	B	B	B	13.1	12.1	10.7	B	B	B	C
5	Texas St. & Pioneer Av.	TS	22.0	**69.1**	**50.2**	C	**E**	**D**	25.4	**126.3**	**110.9**	C	**F**	**F**	C
6	Texas St. & San Bernardino Av.	TS	**130.3**	**>200.0**	**>200.0**	**F**	**F**	**F**	**185.1**	**>200.0**	**>200.0**	**F**	**F**	**F**	C

* **BOLD** = Level of Service (LOS) does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

1 Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

2 CSS = Cross-street Stop; TS = Traffic Signal; AWS = All-way Stop; **AWS** = Improvement

3 The Project will convert the intersection to an all-way stop control as part of the Project design features.

URBAN CROSSROADS

7.6 OFF-RAMP QUEUING ANALYSIS

Queuing analysis findings for Horizon Year (2040) Without and With Project traffic conditions are shown in Table 7-2. As shown in Table 7-2, there are no movements that are anticipated to experience queuing issues during the weekday AM, weekday mid-day, or weekday PM peak 95th percentile traffic flows under Horizon Year (2040) Without Project and With Project. Worksheets for Horizon Year (2040) Without and With Project traffic conditions off-ramp queuing analysis are provided in Appendices 7.5 and 7.6, respectively.

7.7 RECOMMENDED IMPROVEMENTS

This section provides a summary of Project deficiencies and recommended improvements. Based on the City of Redlands deficiency criteria discussed in Section 2.6 *Deficiency Criteria*, the following intersections were found to be deficient.

7.7.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

The effectiveness of the recommended improvement strategies to address Horizon Year (2040) traffic deficiencies are presented in Table 7-3. If not constructed by the Project, the Project Applicant shall contribute to these improvements through payment of City DIF fees or fair share contribution as identified in Table 1-2. Worksheets for Horizon Year (2040) Without and With Project conditions, with improvements, HCM calculation worksheets are provided in Appendix 7.7.

7.7.2 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON OFF-RAMP QUEUES

As shown previously in Table 7-2, there are no movements that are anticipated to experience queuing issues during the weekday AM, weekday mid-day, or weekday PM peak 95th percentile traffic flows for Horizon Year (2040) traffic conditions. As such, no improvements have been recommended.

EXHIBIT 7-5: HORIZON YEAR (2040) WITHOUT PROJECT SUMMARY OF LOS

EXHIBIT 7-6: HORIZON YEAR (2040) WITH PROJECT SUMMARY OF LOS

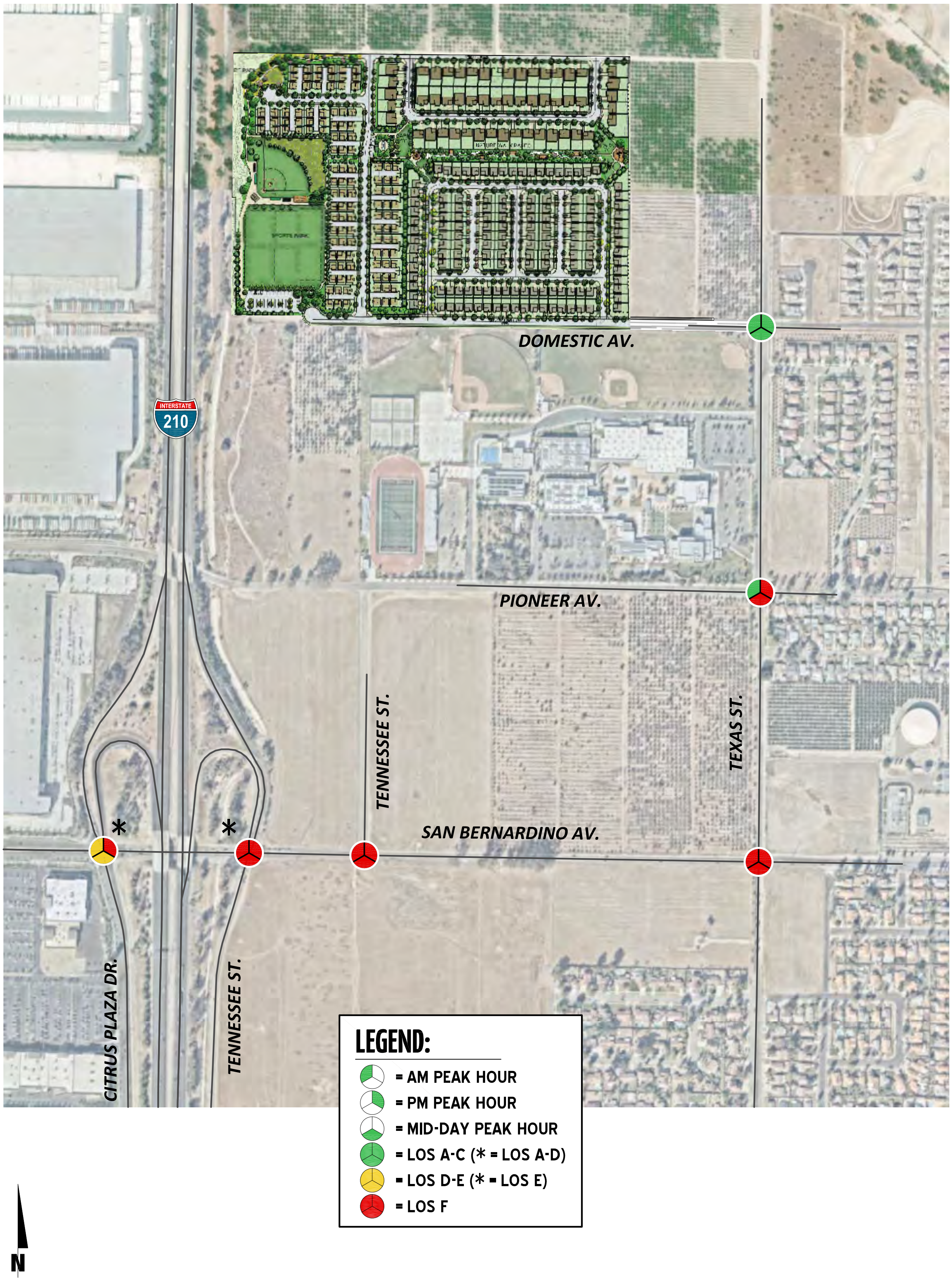


Table 7-2

Peak Hour Freeway Off-Ramp Queuing Summary for Horizon Year (2040) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	2040 Without Project						2040 With Project					
			95th Percentile Queue (Feet)			Acceptable?[1]			95th Percentile Queue (Feet)			Acceptable?[1]		
			AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM	AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM
I-210 SB Ramps & San Bernardino Av.	SBL	50	699 [2,3]	704 [2,3]	667 [2,3]	Yes	Yes	Yes	723 [2,3]	786 [2,3]	749 [2,3]	Yes	Yes	Yes
	SBT/R	1,530	263	241	323	Yes	Yes	Yes	264	241	332	Yes	Yes	Yes
I-210 NB Ramps & San Bernardino Av.	SBL	105	641 [2,3]	867 [2,3]	1,047 [2,3]	Yes	Yes	Yes	665 [2,3]	959 [2,3]	1,127 [2,3]	Yes	Yes	Yes
	SBT/R	1,245	61	72	78	Yes	Yes	Yes	61	72	78	Yes	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

[3] Although 95th percentile queue is anticipated to exceed the available storage for the turn lane, the adjacent through lane has sufficient storage to accommodate any spillover without spilling back and affecting the I-210 Freeway mainline.

Table 7-3

Intersection Analysis for Horizon Year (2040) Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1] Northbound L	T	R	Southbound L	T	R	Eastbound L	T	R	Westbound L	T	R	Delay[2] (secs.) AM	MD	PM	Level of Service AM	MD	PM
1	I-210 SB Ramps/Citrus Plaza Dr. & San Bernardino Av.																			
	- Without Improvements	TS	1	1	1>	1	2	0	1	2	1	1	1	1	**70.4**	**74.2**	**96.5**	**E**	**E**	**F**
	- With Improvements	TS	1	1	1>	1	2	0	1	**3**	1	1	**3**	1	52.8	53.9	54.9	D	D	D
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.																			
	- Without Improvements	TS	1	2	0	1	1	0	2	1	1	1	1	1	**108.1**	**>200.0**	**>200.0**	**F**	**F**	**F**
	- With Improvements	TS	1	2	0	**2**	1	0	2	**3**	1	1	**3**	1	27.8	52.5	54.0	C	D	D
3	Tennessee St. & San Bernardino Av.																			
	- Without Improvements	CSS	0	0	0	0	1	0	0	1	0	0	1	0	**>100.0**	**>100.0**	**>100.0**	**F**	**F**	**F**
	- With Improvements	**TS**	0	0	0	**1**	**0**	**1**	**1**	**3**	0	0	**3**	0	28.2	29.9	21.0	C	C	C
5	Texas St. & Pioneer Av.																			
	- Without Improvements	TS	1	1	0	1	1	1	0	1	0	0	1	0	**25.4**	**126.3**	**110.9**	**C**	**F**	**F**
	- With Improvements	TS	1	**2**	0	1	**2**	**0**	**1**	**2**	0	**1**	**2**	0	20.6	23.1	21.4	C	C	C
6	Texas St. & San Bernardino Av.																			
	- Without Improvements	TS	0	1	0	0	1	0	1	1	0	1	1	1	**185.1**	**>200.0**	**>200.0**	**F**	**F**	**F**
	- With Improvements	TS	**1**	**2**	0	**1**	1	**1>**	**2**	**3**	0	1	**3**	**0**	23.7	30.1	29.4	C	C	C

[1] 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; > = Right-Turn Overlap Phasing; **1** = Improvement

[2] Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; TS = Traffic Signal; **TS** = Improvement

8 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements within the City of Redlands are funded through a combination of project mitigation, development impact fee programs or fair share contributions, such as the City of Redlands DIF program. Identification and timing of needed improvements is generally determined through local jurisdictions based upon a variety of factors.

8.1 CITY OF REDLANDS DEVELOPMENT IMPACT FEE PROGRAM

The City of Redlands adopted the latest update to their DIF program in 2017. Fees from new residential, commercial, and industrial development are collected to fund Measure "I" compliant regional facilities as well as local facilities. Under the City's DIF program, the City may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program.

After the City's DIF fees are collected, they are placed in a separate restricted use account pursuant to the requirements of Government Code sections 66000 *et seq*. The timing to use the DIF fees is established through periodic capital improvement programs which are overseen by the City's Municipal Utilities and Engineering Department. Periodic traffic counts, review of traffic accidents, and a review of traffic trends throughout the City are also periodically performed by City staff and consultants. The City uses this data to determine the timing of the improvements listed in its facilities list. The City also uses this data to ensure that the improvements listed on the facilities list are constructed before the LOS falls below the LOS performance standards adopted by the City. In this way, the improvements are constructed before the LOS falls below the City's LOS performance thresholds. The City's DIF program establishes a timeline to fund, design, and build the improvements.

8.2 MEASURE "I" FUNDS

In 2004, the voters of San Bernardino County approved the 30-year extension of Measure "I", a one-half of one percent sales tax on retail transactions, through the year 2040, for transportation projects including, but not limited to, infrastructure improvements, commuter rail, public transit, and other identified improvements. The Measure "I" extension requires that a regional traffic impact fee be created to ensure development is paying its fair share. A regional Nexus study was prepared by the SBCTA and concluded that each jurisdiction should include a regional fee component in their local programs in order to meet the Measure "I" requirement. The regional component assigns specific facilities and cost sharing formulas to each jurisdiction and was most recently updated in November 2011. Revenues collected through these programs are used in tandem with Measure "I" funds to deliver projects identified in the Nexus Study. While Measure "I" is a self-executing sales tax administered by SBCTA, it bears discussion here because the funds raised through Measure "I" have funded in the past and will continue to fund new transportation facilities in San Bernardino County.

8.3 MEASURE "U"

As stated by Measure "U,"

> *The purpose and intent of this initiative measure is to establish comprehensive and inviolable principles of managed development for the City of Redlands that will preserve, enhance, and maintain the special quality of life valued by this community. The principles of managed development established by this initiative measure assure that future development within the City of Redlands occurs in a way that promotes the social and economic well-being of the entire community.*

In order to be in compliance with Measure "U", the Project is required to maintain a minimum LOS C or better at all intersections presently at LOS C or better. Where the current level of service at a location within the City of Redlands is below the LOS C standard, no development project shall be approved that cannot be mitigated so that it does not reduce the existing level of service at that location (i.e. intersections in Redlands that are deficient to start out with are acceptable as long as they do not further degrade LOS). A LOS D standard is acceptable on a case by case basis upon approval by a four-fifths (4/5ths) vote of the total authorized members of the City Council.

8.4 FAIR SHARE CONTRIBUTION

Project mitigation may include a combination of fee payments to established programs, construction of specific improvements, payment of a fair share contribution toward future improvements or a combination of these approaches. Improvements constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate (to be determined at the City's discretion).

When off-site improvements are identified with a minor share of responsibility assigned to proposed development, the approving jurisdiction may elect to collect a fair share contribution or require the development to construct improvements. Detailed fair share calculations, for each peak hour, has been provided in Table 8-1 for the applicable deficient study area intersections.

Table 8-1

Project Fair Share Calculations for Intersections

#	Intersection	Existing	Project	2040 With Project Volume	Total New Traffic	Project % of New Traffic
2	I-210 NB Ramps/Tennessee St. & San Bernardino Av.					
	AM:	2,130	156	3,776	1,646	9.5%
	MD:	2,913	239	5,584	2,671	8.9%
	PM:	3,228	239	5,642	2,414	**9.9%**
3	Tennessee St. & San Bernardino Av.					
	AM:	1,517	156	2,995	1,478	10.6%
	MD:	1,700	240	4,168	2,468	9.7%
	PM:	1,801	240	3,964	2,163	**11.1%**
5	Texas St. & Pioneer Av.					
	AM:	1,099	240	1,938	839	28.6%
	MD:	1,064	369	2,623	1,559	23.7%
	PM:	1,138	369	2,253	1,115	**33.1%**
6	Texas St. & San Bernardino Av.					
	AM:	1,625	203	3,134	1,509	13.5%
	MD:	1,792	313	4,384	2,592	12.1%
	PM:	1,975	313	3,979	2,004	**15.6%**

BOLD = Denotes highest fair share percentage.

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9 REFERENCES

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