Slover and Cactus Warehouse

TRAFFIC IMPACT ANALYSIS

COUNTY OF SAN BERNARDINO

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
CA MUTCD	California Manual on Uniform Transportation 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
HOV	High Occupancy Vehicle
ITE	Institute of Transportation Engineers
LOS	Level of Service
NCHRP	National Cooperative Highway Research Program
PeMS	Performance Measurement System
PCE	Passenger Car Equivalent
PHF	Peak Hour Factor
Project	Slover and Cactus Warehouse
RTP	Regional Transportation Plan
SBCTA	San Bernardino County Transportation Authority
SBTAM	San Bernardino Transportation Analysis Model
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
sf	Square Feet
SHS	State Highway System
TIA	Traffic Impact Analysis
tsf	Thousand Square Feet
vphgpl	Vehicles Per Hour of Green Per Lane

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1 INTRODUCTION

This report presents the results of the traffic impact analysis (TIA) for the proposed Slover and Cactus Warehouse development ("Project") located on the southwest corner of Cactus Avenue and Slover Avenue in unincorporated County of San Bernardino, as shown on Exhibit 1-1.

The purpose of this traffic impact analysis is to evaluate the potential impacts to traffic and circulation associated with the development of the proposed Project, and to recommend improvements to mitigate impacts considered significant in comparison to established regulatory thresholds. Based on discussions with County staff, the scope of this study is consistent with other recently completed TIAs in the area and follows the County of San Bernardino's Congestion Management Program (CMP) traffic study guidelines and the California Department of Transportation (Caltrans) traffic study requirements. (1) (2)

1.1 PROJECT OVERVIEW

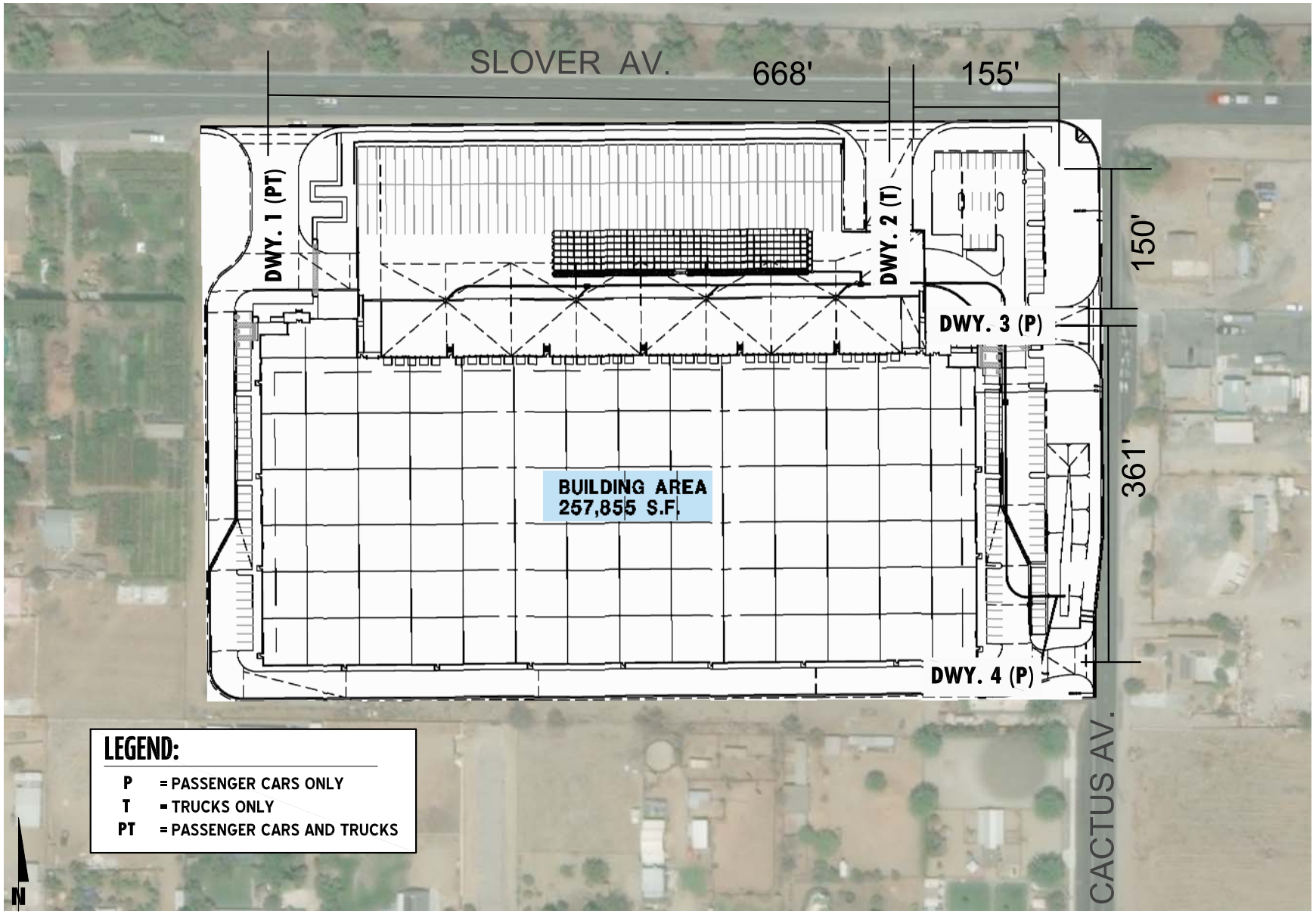
Exhibit 1-1 illustrates the preliminary site plan for the Project. As indicated on Exhibit 1-1, the development is proposed to consist of up to 257,855 square feet (sf) of warehouse use. The Project is proposed to be developed within a single phase with an anticipated Opening Year of 2020. Passenger car and truck traffic access will be provided via the following driveways (see Exhibit 1-1):

- Driveway 1 on Slover Avenue – Full access driveway providing access to passenger cars and trucks.
- Driveway 2 on Slover Avenue – Full access driveways providing access to trucks only.
- Driveway 3 on Cactus Avenue – Full access driveway providing access to passenger cars only.
- Driveway 4 on Cactus Avenue – Full access driveway providing access to passenger cars only.

The trip generation rates used for this analysis are based upon data collected by the Institute of Transportation Engineers (ITE) and presented in ITE's most recent edition of Trip Generation Manual, (10th Edition, 2017). (3) The ITE Trip Generation Manual (10th Edition) is a nationally recognized source for estimating site specific trip generation. The Trip Generation Manual is based on more than 4,800 trip generation studies submitted to ITE by public agencies, consulting firms, universities/colleges, developers, associations and local sections/districts/student chapters of ITE.

The proposed Project is anticipated to generate a net total of 587 passenger car equivalent (PCE) trip-ends per day, 57 PCE AM peak hour trips and 64 PCE PM peak hour trips. In comparison, the proposed Project is anticipated to generate a net total of 449 actual vehicle trip-ends per day with 44 AM peak hour trips and 49 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.

EXHIBIT 1-1: PRELIMINARY SITE PLAN



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URBAN CROSSROADS

1.2 ANALYSIS SCENARIOS

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

- Existing (2019) (1 scenario)
- Existing plus Project (1 scenario)
- Opening Year Cumulative (2020), Without and With Project (2 scenarios)
- Horizon Year (2040), Without and With Project (2 scenarios)

1.2.1 EXISTING (2019) CONDITIONS

Information for Existing (2019) conditions is disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared.

1.2.2 EXISTING PLUS PROJECT CONDITIONS

The Existing Plus Project (E+P) analysis determines significant traffic impacts that would occur on the existing roadway system with the addition of Project traffic. The E+P analysis is intended to identify the Project-specific impacts associated solely with the development of the proposed Project based on a comparison of the E+P traffic conditions to Existing conditions.

1.2.3 OPENING YEAR CUMULATIVE (2020) CONDITIONS

The Opening Year Cumulative (2020) conditions analysis determines the near-term cumulative traffic impacts based on a comparison of the With Project traffic scenarios to the Without Project traffic scenario. The Opening Year Cumulative (2020) conditions analyses uniquely identifies the specific traffic impacts associated with the proposed Project. To account for background traffic growth, traffic associated with other known cumulative development projects in conjunction with an ambient growth of 2.0 percent per year from Existing conditions is included for Opening Year Cumulative (2020) traffic conditions (total of 4.04 percent).

1.2.4 HORIZON YEAR (2040) CONDITIONS

Traffic projections for Horizon Year (2040) Without Project conditions were derived from the San Bernardino County Transportation Analysis Model (SBTAM), the sub-regional model for San Bernardino County for the study area intersections located within the County of San Bernardino. The initial estimate of the future Horizon Year (2040) Without Project peak hour turning movements were then reviewed by Urban Crossroads for reasonableness, and in some cases, were adjusted to achieve flow conservation, reasonable growth, and reasonable diversion between parallel routes. Project traffic was then added to determine Horizon Year (2040) With Project traffic forecasts.

The Horizon Year (2040) conditions analysis will be utilized to determine if improvements funded through regional transportation mitigation fee programs, such as the County'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 County of San

Bernardino (lead agency). It should be noted that the County of San Bernardino 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 cumulative mitigation. Other improvements needed beyond the "funded" improvements (such as localized improvements to non-DIF facilities) are identified as such.

1.3 STUDY AREA

1.3.1 INTERSECTIONS

The 13 study area intersection locations shown on Exhibit 1-2 and listed in Table 1-1 were selected for this TIA based on the County of San Bernardino's traffic study requirements that require analysis of intersection locations in which a proposed Project is anticipated to contribute 50 or more peak-hour trips, and in consultation with County of San Bernardino and City of Rialto staff.

The rationale for evaluating intersections where a Project would contribute 50 or more peak-hour trips is standard industry practice and supported by substantial evidence. Furthermore, the potential impact threshold of 50 peak hour trips is identified in the San Bernardino County CMP Traffic Study Guidelines. (1) It should also be noted that the 50 peak hour trip threshold is used by several other lead agencies throughout southern California including Caltrans, County of San Bernardino, County of Riverside, and the County of Orange.

In effect, acting as the lead agency, these jurisdictions have established 50 project trips as the threshold of significance for when to analyze signalized intersections. Therefore, a project trip contribution of less than 50 trips is considered less than significant and is typically not evaluated.

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 impacts, and improve air quality.

EXHIBIT 1-2: LOCATION MAP

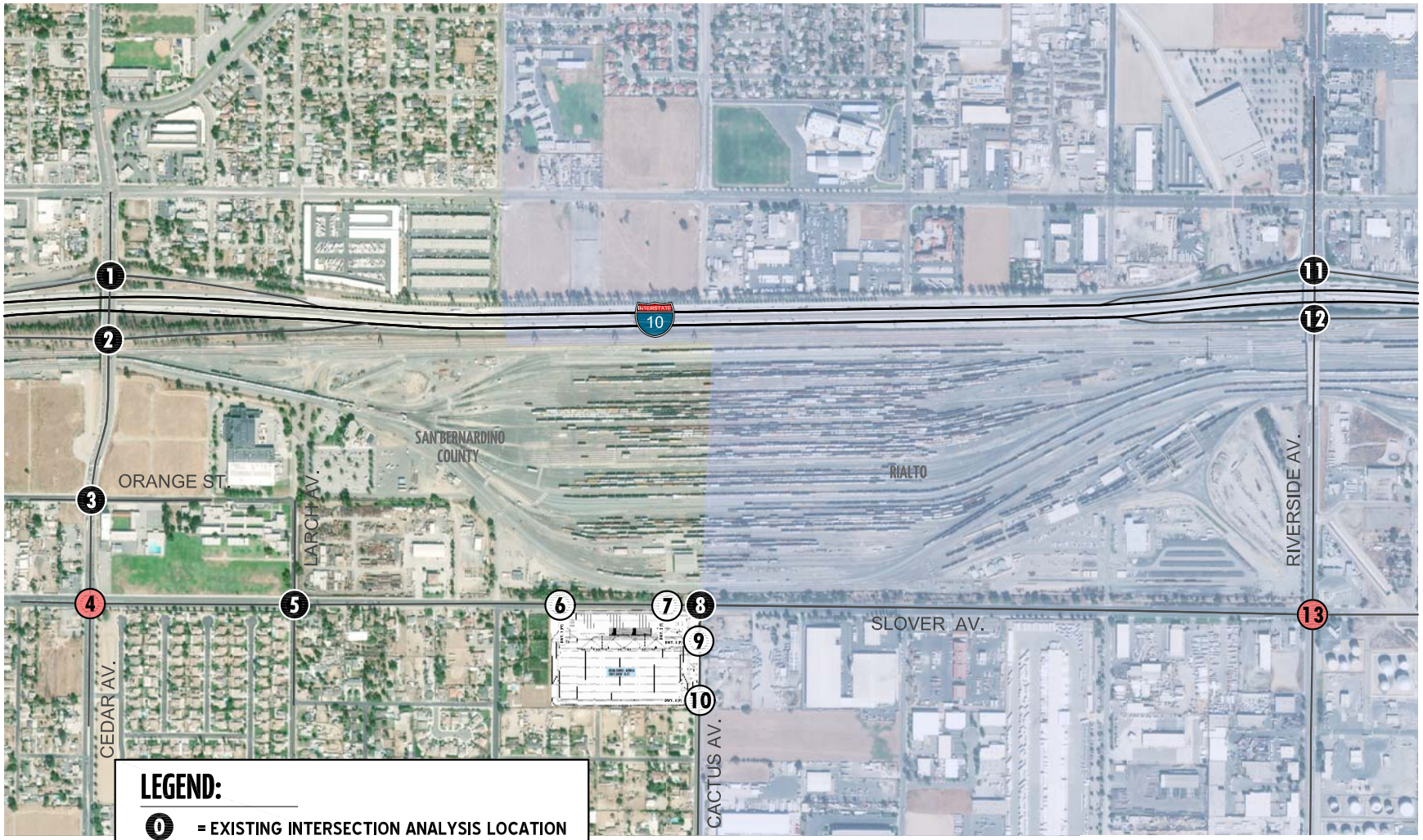


TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction	CMP?
1	Cedar Av. & I-10 Westbound Ramps	Caltrans, SB County	No
2	Cedar Av. & I-10 Eastbound Ramps	Caltrans, SB County	No
3	Cedar Av. & Orange St.	SB County	No
4	Cedar Av. & Slover Av.	SB County	Yes
5	Larch Av. & Slover Av.	SB County	No
6	Driveway 1 & Slover Av. – Future Intersection	SB County	No
7	Driveway 2 & Slover Av. – Future Intersection	SB County	No
8	Cactus Av. & Slover Av.	SB County, Rialto	No
9	Cactus Av. & Driveway 3 – Future Intersection	SB County, Rialto	No
10	Cactus Av. & Driveway 4 – Future Intersection	SB County, Rialto	No
11	Riverside Av. & I-10 Westbound Ramps	Rialto, Caltrans	No
12	Riverside Av. & I-10 Eastbound Ramps	Rialto, Caltrans	No
13	Riverside Av. & Slover Av.	Rialto	Yes

Counties within California have developed CMPs with varying methods and strategies to meet the intent of the CMP legislation. The County of San Bernardino CMP became effective with the passage of Proposition 111 in 1990 and updated most recently in 2016. The San Bernardino County Transportation Authority (SBCTA) adopted the 2016 CMP for the County of San Bernardino in June 2016. (1) There are 2 study area intersections identified as CMP facilities.

1.3.2 FREEWAY MAINLINE ANALYSIS

The San Bernardino County CMP traffic study guidelines require that freeway mainline analysis locations include the segments where the proposed Project is anticipated to contribute 100 or more two-way peak hour trips. However, this study evaluated the following freeway segments even though the Project is anticipated to contribute less than 50 one-way peak hour trips on the freeway mainline (see Table 1-2).

TABLE 1-2: FREEWAY MAINLINE SEGMENT ANALYSIS LOCATIONS

ID	Freeway Mainline Segments
1	I-10 Freeway – Westbound, West of Cedar Avenue
2	I-10 Freeway – Westbound, East of Cedar Avenue
3	I-10 Freeway – Westbound, East of Riverside Avenue
4	I-10 Freeway – Eastbound, West of Cedar Avenue
5	I-10 Freeway – Eastbound, East of Cedar Avenue
6	I-10 Freeway – Eastbound, East of Riverside Avenue

1.3.3 FREEWAY RAMP JUNCTION (MERGE/DIVERGE) ANALYSIS

Although the Project is anticipated to contribute less than 50 one-way peak hour trips to the freeway mainline, the following study area freeway merge/diverge ramp junction locations shown on Table 1-3 were evaluated for the purposes of this analysis:

TABLE 1-3: FREEWAY MERGE/DIVERGE RAMP JUNCTION ANALYSIS LOCATIONS

ID	Freeway Merge/Diverge Ramp Junctions
1	I-10 Freeway – Westbound, On-ramp at Cedar Avenue (Merge)
2	I-10 Freeway – Westbound, Off-ramp at Cedar Avenue (Diverge)
3	I-10 Freeway – Westbound, Off-ramp at Riverside Avenue (Diverge)
4	I-10 Freeway – Eastbound, Off-ramp at Cedar Avenue (Diverge)
5	I-10 Freeway – Eastbound, On-ramp at Cedar Avenue (Merge)
6	I-10 Freeway – Eastbound, On-ramp at Riverside Avenue (Merge)

1.4 SUMMARY OF FINDINGS

This section provides a summary of the analysis results for Existing (2019), E+P, Opening Year Cumulative (2020), and Horizon Year (2040) traffic conditions. Table 1-4 includes a summary of the delay and LOS for all study area intersection by analysis scenario.

1.4.1 EXISTING (2019) CONDITIONS

Intersection Operations

For Existing traffic conditions, all study area intersections are anticipated to operate at an acceptable LOS (see Exhibit 1-3). There are no movements that are currently experiencing off-ramp queuing issues during the weekday AM or PM peak hours based on the existing 95th percentile traffic flows at the Cedar Avenue or Riverside Avenue and I-10 Freeway interchanges.

Freeway Facilities

The following freeway segments are currently operating at an unacceptable LOS under Existing traffic conditions:

- I-10 Freeway – Westbound, West of Cedar Avenue (#1) – LOS E PM peak hour only
- I-10 Freeway – Westbound, East of Riverside Avenue (#3) – LOS E PM peak hour only

The I-10 Freeway merge and diverge ramp junction areas are currently operating at an acceptable LOS under Existing (2019) traffic conditions during the peak hours.

Table 1-4

Summary of LOS by Analysis Scenario

#	Intersection	Existing (2019)				E+P				2020 Without Project				2020 With Project				2040 Without Project				2040 With Project			
		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Cedar Av. & I-10 Westbound Ramps	30.3	19.4	C	B	30.6	19.8	C	B	51.4	28.2	D	C	52.3	30.2	D	C	**72.4**	45.3	**E**	D	**73.2**	47.9	**F**	D
2	Cedar Av. & I-10 Eastbound Ramps	35.1	48.7	D	D	35.6	48.9	D	D	48.1	**73.8**	D	**E**	49.5	**74.7**	D	**E**	**70.6**	**119.5**	**E**	**F**	**72.1**	**121.6**	**E**	**F**
3	Cedar Av. & Orange St.	17.8	15.8	B	B	17.9	16	B	B	24.9	24.6	C	C	25.1	24.9	C	C	34.9	30.8	C	C	35.4	31.4	D	C
4	Cedar Av. & Slover Av.	30.9	32.2	C	C	32	33.7	C	C	**57.3**	**70.9**	**E**	**E**	**57.8**	**73.6**	**E**	**E**	**66.9**	**83.9**	**E**	**F**	**71.5**	**88.5**	**E**	**F**
5	Larch Av. & Slover Av.	12.1	16.9	B	B	12.2	17.1	B	B	12.2	17.6	B	B	12.3	17.8	B	B	11.9	22.0	B	C	12.1	22.3	B	C
6	Driveway 1 & Slover Av.	Future Intersection				10.1	12.2	B	B	Future Intersection				10.4	12.5	B	B	Future Intersection				10.9	15.0	B	C
7	Driveway 2 & Slover Av.	Future Intersection				9.6	11.6	A	B	Future Intersection				9.8	12.0	A	B	Future Intersection				10.2	13.9	B	B
8	Cactus Av. & Slover Av.	11.5	15.0	B	C	11.8	15.9	B	C	13.0	18.4	B	C	13.0	18.8	B	C	13.3	**63.6**	B	**F**	13.7	**79.9**	B	**F**
9	Cactus Av. & Driveway 3	Future Intersection				9.8	10.5	A	B	Future Intersection				10.3	11.1	B	B	Future Intersection				11.0	12.1	B	B
10	Cactus Av. & Driveway 4	Future Intersection				9.7	10.1	A	B	Future Intersection				10.2	10.6	B	B	Future Intersection				10.9	11.4	B	B
11	Riverside Av. & I-10 WB Ramps	21.2	17.6	C	B	21.4	17.7	C	B	31.6	27.0	C	C	32.0	27.1	C	C	41.3	38.6	D	D	41.7	38.8	D	D
12	Riverside Av. & I-10 EB Ramps	24.7	29.1	C	C	25	29.4	C	C	46.7	**67.6**	D	**E**	47.2	**69.2**	D	**E**	**71.0**	**129.9**	**E**	**F**	**71.6**	**131.6**	**E**	**F**
13	Riverside Av. & Slover Av.	43.0	41.3	D	D	45.3	42.3	D	D	**131.9**	**112.7**	**F**	**F**	**135.1**	**113.9**	**F**	**F**	**168.3**	**167.8**	**F**	**F**	**171.4**	**169.3**	**F**	**F**

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e.,

[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.

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

#	Intersection	Existing (2019)	E+P	Opening Year (2020) Without Project	Opening Year (2020) With Project	Horizon Year (2040) Without Project	Horizon Year (2040) With Project
1	Cedar Av. & I-10 WB Ramps						
2	Cedar Av. & I-10 EB Ramps						
3	Cedar Av. & Orange St.						
4	Cedar Av. & Slover Av.						
5	Larch Av. & Slover Av.						
6	Dwy. 1 & Slover Av.	NA		NA		NA	
7	Dwy. 2 & Slover Av.	NA		NA		NA	
8	Cactus Av. & Slover Av.						
9	Cactus Av. & Dwy. 3	NA		NA		NA	
10	Cactus Av. & Dwy. 4	NA		NA		NA	
11	Riverside Av. & I-10 WB Ramps						
12	Riverside Av. & I-10 EB Ramps						
13	Riverside Av. & Slover Av.						

LEGEND:

- = AM PEAK HOUR
- = PM PEAK HOUR
- = ACCEPTABLE LOS A-D
- = DEFICIENT LOS E
- = DEFICIENT LOS F
- NA = NOT AN ANALYSIS LOCATION FOR THIS SCENARIO

1.4.2 E+P CONDITIONS

Intersection Operations

Consistent with Existing (2019) traffic conditions, the study area intersections are anticipated to continue to operate at an acceptable LOS under E+P traffic conditions (see Exhibit 1-3). There are no movements that are anticipated to experience off-ramp queuing issues during the weekday AM or PM peak hours based on the E+P 95th percentile traffic flows at the Cedar Avenue or Riverside Avenue and I-10 Freeway interchanges.

Freeway Facilities

There are no additional freeway segments anticipated to operate at an unacceptable LOS under E+P traffic conditions during the peak hours, in addition to the locations previously identified under Existing (2019) traffic conditions.

Consistent with Existing (2019) traffic conditions, there are no merge and diverge ramp junction areas anticipated to operate at an unacceptable LOS under E+P traffic conditions.

Impacts and Mitigation Measures

The addition of Project traffic is not anticipated to result in any deficient peak hour operations at the study area intersections. As such, there are no direct impacts and mitigation measures have not been recommended.

1.4.3 OPENING YEAR CUMULATIVE (2020) CONDITIONS

Intersection Operations

As shown on Exhibit 1-3, there are 4 study area intersections that are anticipated to operate at an unacceptable LOS under Opening Year Cumulative (2020) traffic conditions during one or both peak hours.

With the addition of Project traffic, there are no additional study area intersections anticipated to operate at a deficient LOS. There are no movements that are anticipated to experience off-ramp queuing issues during the weekday AM or PM peak hours based on the Opening Year Cumulative (2020) 95th percentile traffic flows at the Cedar Avenue or Riverside Avenue and I-10 Freeway interchanges.

Freeway Facilities

There are no additional freeway segments anticipated to operate at an unacceptable LOS under Opening Year Cumulative (2020) traffic conditions during the peak hours, in addition to the locations previously identified under Existing (2019) and E+P traffic conditions.

Consistent with Existing (2019) traffic conditions, there are no merge and diverge ramp junction areas anticipated to operate at an unacceptable LOS under Opening Year Cumulative (2020) traffic conditions.

Impacts and Mitigation Measures

Cumulative traffic impacts are deficiencies that are not directly caused by the Project but occur as a result of regional growth combined with that or other nearby cumulative development projects or if the project is anticipated to contribute traffic to a deficient intersection under pre-project conditions. The Project's contribution to a particular cumulative transportation deficiency is deemed cumulatively considerable if the Project adds significant traffic to the forecasted deficiency.

Mitigation Measure 1.1 – Cedar Avenue & I-10 Eastbound Ramps (#2) – The following improvement would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Contribute fair share towards the addition of an eastbound right turn lane.

Mitigation Measure 2.1 – Cedar Avenue & Slover Avenue (#4) – The following improvement would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Contribute fair share towards restriping the eastbound approach to accommodate a 2nd eastbound left turn lane and eliminating the defacto right turn lane.

Mitigation Measure 3.1 – Riverside Avenue & I-10 Eastbound Ramps (#12) – The following improvement would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Contribute fair share towards the addition of a northbound right turn lane.

Mitigation Measure 4.1 – Riverside Avenue & Slover Avenue (#13) – The following improvements would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Contribute fair share towards the addition of southbound right turn lane.
- Contribute fair share towards the addition of a 2nd eastbound left turn lane.
- Contribute fair share towards modifying the traffic signal to protect the eastbound and westbound left turns.

1.4.4 HORIZON YEAR (2040) CONDITIONS

Intersection Operations

As shown on Exhibit 1-3, there are 6 study area intersections that are anticipated to operate at an unacceptable LOS under Horizon Year (2040) traffic conditions during one or both peak hours.

With the addition of Project traffic, there are no additional study area intersections anticipated to operate at a deficient LOS. There are no movements that are anticipated to experience off-ramp queuing issues during the weekday AM or PM peak hours based on the Horizon Year (2040) 95th percentile traffic flows at the Cedar Avenue and Riverside Avenue and I-10 Freeway interchanges.

Freeway Facilities

the following additional freeway segments are anticipated to operate at an unacceptable LOS under Horizon Year (2040) traffic conditions during one or more peak hours in addition to the location previously identified under Existing (2019), E+P, and Opening Year Cumulative traffic conditions:

- I-10 Freeway – Eastbound, East of Cedar Avenue (#5) – LOS E AM peak hour only
- I-10 Freeway – Eastbound, East of Riverside Avenue (#6) – LOS E AM and PM peak hours

In addition, the following I-10 Freeway ramp junction areas are anticipated to operate at a deficient LOS during the peak hours for Horizon Year (2040) traffic conditions:

- I-10 Freeway – Westbound, On-Ramp at Cedar Avenue (#1) – LOS E AM peak hour only
- I-10 Freeway – Eastbound, On-Ramp at Cedar Avenue (#5) – LOS F AM and PM peak hours
- I-10 Freeway – Eastbound, On-Ramp at Riverside Avenue (#6) – LOS E AM peak hour only

Impacts and Mitigation Measures

Cumulative traffic impacts are deficiencies that are not directly caused by the Project but occur as a result of regional growth combined with that or other nearby cumulative development projects or if the project is anticipated to contribute traffic to a deficient intersection under pre-project conditions. The Project's contribution to a particular cumulative transportation deficiency is deemed cumulatively considerable if the Project adds significant traffic to the forecasted deficiency.

Mitigation Measure 3.1 – Cedar Avenue & I-10 Westbound Ramps (#1) – The following improvement would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Contribute fair share towards the addition of a 2nd northbound left turn lane.

Mitigation Measure 1.2 – Cedar Avenue & I-10 Eastbound Ramps (#2) – The following improvements would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Same improvement identified previously by Mitigation Measure 1.1; and
- Contribute fair share towards the addition of a 2nd southbound left turn lane.

Mitigation Measure 2.2 – Cedar Avenue & Slover Avenue (#4) – The following improvements would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Same improvement identified previously by Mitigation Measure 2.1; and
- Contribute fair share towards the addition of a southbound right turn lane and westbound right turn lane.

Mitigation Measure 5.1 – Cactus Avenue & Slover Avenue (#8) – The following improvement would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Contribute fair share towards signalization and the addition of a westbound left turn lane.

Mitigation Measure 3.1 – Riverside Avenue & I-10 Eastbound Ramps (#12) – The following improvement would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Contribute fair share towards the addition of a northbound right turn lane.

Mitigation Measure 4.2 – Riverside Avenue & Slover Avenue (#13) – The following improvements would be necessary to improve the intersection's peak hour operations to acceptable levels, thus reducing the cumulative impact to less than significant:

- Same improvement identified previously by Mitigation Measure 4.1; and
- Contribute fair share towards the addition of a 3rd northbound through lane.

1.5 LOCAL AND REGIONAL FUNDING MECHANISMS

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

1.5.1 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 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 2013. 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, including within the County of San Bernardino.

1.5.2 COUNTY OF SAN BERNARDINO DEVELOPMENT IMPACT FEE (DIF)

The County of San Bernardino adopted the latest update to their DIF program in September 2014. Fees from new residential, commercial and industrial development are collected to fund Measure "I" compliant regional facilities as well as local facilities. Under the County's DIF program, the County 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 County'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 County's Public Works Department. Periodic traffic counts, review of traffic accidents, and a review of traffic trends throughout the County are also periodically performed by County staff and consultants. The County uses this data to determine the timing of the improvements listed in its facilities list. The County 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 County. In this way, the improvements are constructed before the LOS falls below the County's LOS performance thresholds. The County's DIF program establishes a timeline to fund, design, and build the improvements.

1.5.3 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. Table 1-4 lists the incremental improvements that are required by the Horizon Year traffic conditions to mitigate the long-range cumulative impacts. After review of the local and regional transportation impact fee programs as compared to the recommended improvements for each impacted facility, if it is found that the impacted facilities which require improvements include improvements beyond those already identified within one of the City's fee programs, the Project may be required to contribute to the associated intersection or roadway fair-share percentage toward the costs of the recommended improvements.

The improvements listed in Table 1-5 are comprised of lane additions and signal modifications. Table 1-5 shows the total recommended improvements to mitigate potential long-range cumulative impacts. 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 analysis peak hour, has been provided on Table 1-6 for each of the cumulatively impacted intersections. Improvements included in a defined program and constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate. The fair-share calculations, also presented in Table 1-6, indicate that the Project contributes between 0.60% and 12.80% of new vehicle trips to the cumulatively impacted intersections throughout the study area.

For improvements that do not appear to be in DIF, a fair share contribution based on the Project's percentage contribution may be imposed in order to mitigate the Project's share of impacts in lieu of construction. These fees are collected as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected vehicle trip increases. Alternatively, minor fair share responsibilities may be waived when collection is infeasible or where other mitigation assignments substantially exceed the Project's demonstrated impacts.

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. Table 1-5 also summarizes the applicable cost associated with each of the recommended improvements based on the preliminary construction cost estimates for the County of San Bernardino. The total cost of needed study area intersection improvements is $19,802,800. Based on the project fair share percentages shown on Table 1-5 and through consultation with City of Rialto staff, the project's fair share cost is estimated at $215,915. 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 mitigation.

1.6 CUMULATIVE IMPACTS

A summary of the cumulatively impacted study area intersections and recommended mitigation measures to address cumulatively significant impacts are described in detail within Section 6.0 *Opening Year Cumulative (2020) Traffic Conditions* and Section 7.0 *Horizon Year (2040) Traffic Conditions*. Cumulative impacts are deficiencies that would not be directly caused by the Project. The Project would, however, contribute traffic to these deficient facilities along with other cumulative development projects, resulting in a cumulatively considerable impact.

The following mitigation measures are based on the improvements needed under Horizon Year (2040) traffic conditions. The improvements needed to address Opening Year Cumulative deficiencies would be a sub-set of those improvements recommended under Horizon Year (2040) traffic conditions.

1.6.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

A summary of off-site improvements needed to address cumulative traffic impacts for Horizon Year (2040) traffic conditions was included in Table 1-5. Improvements found to be included in County of San Bernardino (lead agency) DIF program have been identified as such. For improvements that do not appear to be in the County's DIF program, a fair share financial contribution based on the Project's fair share impact shall be imposed (for County of San Bernardino facilities) and may be imposed by other jurisdictions in order to mitigate the Project's share of impacts in lieu of construction. These fees (both to the County of San Bernardino, and as determined, to surrounding agencies as fair-share contributions) are collected as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected vehicle trip increases.

Table 1-5

Summary of Improvements and Rough Order of Magnitude Costs

#	Intersection Location	Jurisdiction	Existing (2019)	E+P	2020 Without Project	2020 With Project	2040 Without Project	2040 With Project	Project Responsibility[6]	Improvements in County DIF?[1]	Total Cost[2]	Fair Share %[2]	Fair Share Cost[4]
1	Cedar Av. & I-10 Westbound Ramps	County of San Bernardino, Caltrans	None	None	None	None	Add 2nd NB left turn lane	Same	Fair Share	No	$858,000	1.79%	$15,345
										Total	**$858,000**		**$15,345**
2	Cedar Av. & I-10 Eastbound Ramps	County of San Bernardino, Caltrans	None	None	Add EB right turn lane	Same	Same	Same	Fair Share	No	$350,000	2.04%	$7,148
							Add 2nd SB left turn lane	Same		No	$858,000		$17,522
										Total	**$1,208,000**		**$24,670**
4	Cedar Av. & Slover Av.	County of San Bernardino	None	None	Restripe to add 2nd EB left turn lane	Same	Same	Same	Fair Share	No	$50,000	2.96%	$1,480
							Add SB right turn lane	Same		No	$50,000		$1,480
							Add WB right turn lane	Same		No	$50,000		$1,480
										Total	**$150,000**		**$4,440**
8	Cactus Av. & Slover Av.	County of San Bernardino, City of Rialto	None	None	None	None	Install a traffic signal	Same	Fair Share	No	$600,000	12.80%	$76,817
							Add WB left turn lane			No	$50,000		$6,401
										Total	**$650,000**		**$83,218**
12	Riverside Av. & I-10 EB Ramps	City of Rialto, Caltrans	None	None	Add NB right turn lane	Same	Same	Same	Fair Share	No	--	--	$86,532
										Total[7,8]	**$16,936,800**		**$86,532**
13	Riverside Av. & Slover Av.	City of Rialto	None	None	Add SB right turn lane	Same	Same	Same	Fair Share	No	--	--	$1,710
					Add 2nd EB left turn lane	Same	Same	Same	Fair Share	No	--		--
					Modify the traffic signal to protect the eastbound and westbound left turns and run the eastbound and westbound left turns as lead-lag, with the westbound left turn running as lag	Same	Same	Same	Fair Share	No	--		--
							Add 3rd NB through lane	Same	Fair Share	No	--		--
										Total[8]	**$334,800**		**$1,710**
Total Costs for Horizon Year (2040) Improvements											**$19,802,800**		**$215,915**
Total Project Fair Share Contribution to the County of San Bernardino[3]											**$62,856**		
Total Project Fair Share Contribution to the City of Rialto[4]											**$89,786**		
Total Project Fair Share Contribution to Caltrans[5]											**$63,274**		

[1] Improvements included in County of San Bernardino DIF program for local, regional and specific plan components.

[2] Program improvements constructed by the Project may be eligible for fee credit, at discretion of County. See Table 1-6 for Fair Share Calculations.

[3] Total project fair share contribution consists of the improvements for those intersections wholly or partially within unincorporated County of San Bernardino.

[4] Total project fair share contribution consists of the improvements for those intersections wholly or partially within the City of Rialto.

[5] Total project fair share contribution consists of the improvements for those intersections wholly or partially within Caltrans' jurisdiction.

[6] Identifies the Project's responsibility to construct an improvement or contribute fair share towards the implementation of the improvement shown.

[7] Cost for Riverside Avenue & I-10 EB Ramps is provided by the City of Rialto, which includes overpass widening.

[8] Fair share costs are based on the City of Rialto's DIF study, which estimates the cost at $375.50 per PCE trip. Fair share is proportionally split between the interchange ramp and the intersection of Riverside Avenue & Slover Avenue.

Table 1-6

Project Fair Share Calculations for Intersections

#	Intersection		Existing	Project	2040 With Project Volume	Total New Traffic	Project Fair Share
1	Cedar Av. & I-10 Westbound Ramps						
		AM:	4,490	7	5,666	1,176	0.60%
		PM:	4,239	23	5,525	1,286	**1.79%**
2	Cedar Av. & I-10 Eastbound Ramps						
		AM:	4,138	27	5,495	1,357	1.99%
		PM:	3,976	30	5,445	1,469	**2.04%**
4	Cedar Av. & Slover Av.						
		AM:	2,761	32	3,842	1,081	**2.96%**
		PM:	3,151	36	4,474	1,323	2.72%
8	Cactus Av. & Slover Av.						
		AM:	553	37	842	289	**12.80%**
		PM:	1,002	40	1,570	568	7.04%

BOLD = Denotes highest fair share percentage.

1.6.2 CUMULATIVE MITIGATION MEASURES

Mitigation Measure 5.1 – Prior to the issuance of building permits, the Project applicant shall participate in the County's DIF program by paying the requisite DIF fee at the time of building permit; and in addition, shall pay the Project's fair share amount of $62,856 for the improvements identified in Table 1-5 that are consistent with the improvements shown on Table 7-5, or as agreed to by the County and Project Applicant.

Mitigation Measure 6.1 – Table 1-5 of the TIA includes intersections that either share a mutual border with the City of Rialto or are wholly located within the City of Rialto's jurisdiction that have recommended improvements which are not covered by DIF. Because the County of San Bernardino does not have plenary control over intersections that lie within the City of Rialto's jurisdiction, the County cannot guarantee that such improvements will be constructed. Thus, the following additional mitigation measure is required: The County of San Bernardino shall participate in a multi-jurisdictional effort with the City of Rialto to develop a study to identify fair share contribution funding sources attributable to and paid from private and public development to supplement other regional and State funding sources necessary to implement the improvements identified in Table 1-5 of the TIA, that are located in the City of Rialto. The study shall include fair-share contributions related to private and or public development based on nexus requirements contained in the Mitigation Fee Act (Govt. Code § 66000 et seq.) and 14 Cal. Code of Regs. § 15126.4(a)(4) and, to this end, the study shall recognize that impacts attributable to Caltrans facilities that are not attributable to development located within the County of San Bernardino are not paying in excess of such developments' fair share obligations. The fee study shall also be compliant with Government Code § 66001(g) and any other applicable provisions of law. The study shall set forth a timeline and other agreed-upon relevant criteria for implementation of the recommendations contained within the study to the extent the other agencies agree to participate in the fee study program. Because the County of San Bernardino and the City of Rialto are responsible to implement this mitigation measure, Developer shall have no compliance obligations with respect to this Mitigation Measure.

Mitigation Measure 6.2 – The Developer's fair-share amount for the intersections that either share a mutual border with the City of Rialto or are wholly located within the City of Rialto's jurisdiction that have recommended improvements for Project Buildout which are not covered by DIF equals $89,786. Developer shall be required to pay this $89,786 amount to the County of San Bernardino prior to the issuance of the Project's final certificate of occupancy. The County of San Bernardino shall hold Developer's Fair Share contribution in trust and shall apply Developer's Fair Share Contribution to any fee program adopted or agreed upon by the County of San Bernardino and the City of Rialto as a result of implementation of Mitigation Measure 6.1. If, within five years of the date of collection of Developer's Fair Share Contribution, the County of San Bernardino and the City of Rialto do not comply with Mitigation Measure 6.1, then Developer's Fair Share Contribution shall be returned to the Developer.

Mitigation Measure 7.1 – Table 1-5 of the TIA includes intersections that either share a mutual border with Caltrans or are wholly located within Caltrans' jurisdiction that have recommended improvements which are not covered by DIF. Because the County of San Bernardino does not

have plenary control over intersections that lie within Caltrans' jurisdiction, the County cannot guarantee that such improvements will be constructed. Thus, the following additional mitigation measure is required: The County of San Bernardino shall participate in a multi-jurisdictional effort with Caltrans to develop a study to identify fair share contribution funding sources attributable to and paid from private and public development to supplement other regional and State funding sources necessary to implement the improvements identified in Table 1-5 of the TIA, that are located in Caltrans. The study shall include fair-share contributions related to private and or public development based on nexus requirements contained in the Mitigation Fee Act (Govt. Code § 66000 et seq.) and 14 Cal. Code of Regs. § 15126.4(a)(4) and, to this end, the study shall recognize that impacts attributable to Caltrans facilities that are not attributable to development located within the County of San Bernardino are not paying in excess of such developments' fair share obligations. The fee study shall also be compliant with Government Code § 66001(g) and any other applicable provisions of law. The study shall set forth a timeline and other agreed-upon relevant criteria for implementation of the recommendations contained within the study to the extent the other agencies agree to participate in the fee study program. Because the County of San Bernardino and Caltrans are responsible to implement this mitigation measure, Developer shall have no compliance obligations with respect to this Mitigation Measure.

Mitigation Measure 7.2 – The Developer's fair-share amount for the intersections that either share a mutual border with Caltrans or are wholly located within Caltrans' jurisdiction that have recommended improvements for Project Buildout which are not covered by DIF equals $63,274. Developer shall be required to pay this $63,274 amount to the County of San Bernardino prior to the issuance of the Project's final certificate of occupancy. The County of San Bernardino shall hold Developer's Fair Share contribution in trust and shall apply Developer's Fair Share Contribution to any fee program adopted or agreed upon by the County of San Bernardino and Caltrans as a result of implementation of Mitigation Measure 7.1. If, within five years of the date of collection of Developer's Fair Share Contribution, the County of San Bernardino and Caltrans do not comply with Mitigation Measure 7.1, then Developer's Fair Share Contribution shall be returned to the Developer.

1.7 ON-SITE ROADWAY AND SITE ACCESS IMPROVEMENTS

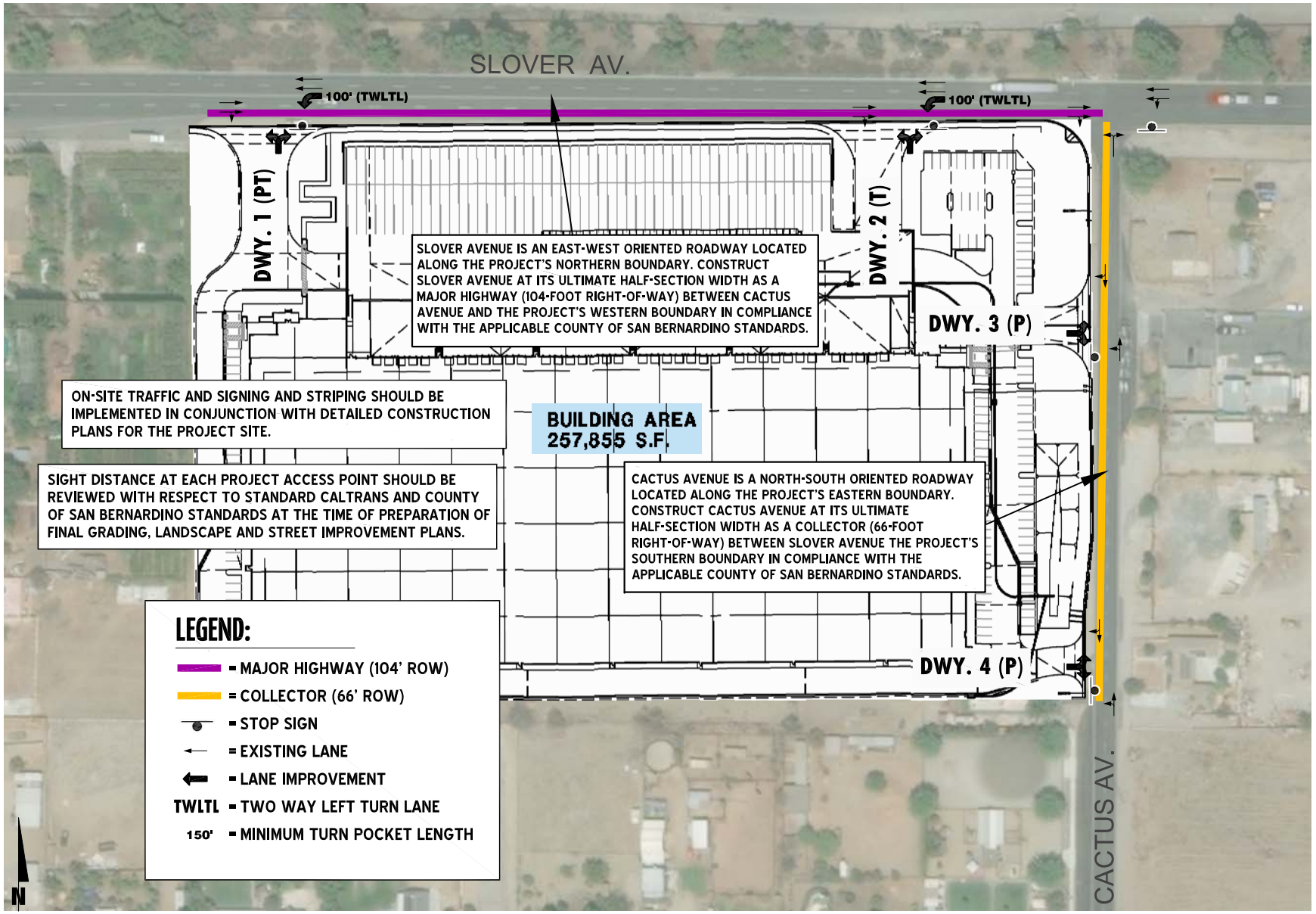
Roadway improvements necessary to provide site access and on-site circulation are assumed to be constructed in conjunction with site development and are described below. These improvements should be in place prior to occupancy.

1.7.1 SITE ADJACENT ROADWAY IMPROVEMENTS

The recommended site-adjacent roadway improvements for the Project are shown on Exhibit 1-4. Construction of on-site and site adjacent improvements shall occur in conjunction with adjacent Project development activity or as needed for Project access purposes.

On-site traffic signing and striping should be implemented in conjunction with detailed construction plans for the Project site.

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



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

1.7.2 SITE ACCESS IMPROVEMENTS

The recommended site access driveway improvements for the Project are shown on Exhibit 1-4. Construction of on-site and site adjacent improvements shall occur in conjunction with adjacent Project development activity or as needed for Project access purposes.

1.7.3 QUEUING ANALYSIS AT THE PROJECT DRIVEWAYS

A queuing analysis was conducted for the Project driveways along Slover Avenue and Cactus Avenue to determine the turn pocket lengths necessary to accommodate long-range 95th percentile queues for Horizon Year (2040) traffic conditions. The analysis was conducted for the AM and PM peak hours. The 95th percentile queues for the site adjacent intersections can be found in Appendix 1.2.

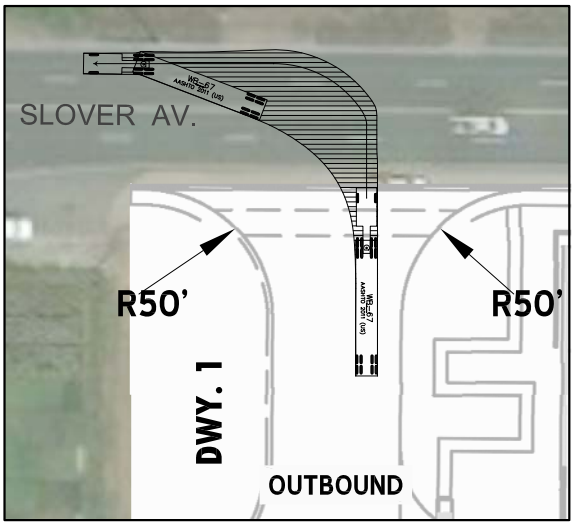
The traffic modeling and signal timing optimization software package Synchro/SimTraffic has been utilized to assess queues at the Project driveways and site adjacent intersections. The 95th percentile queue has been utilized for purposes of determining the necessary turn pocket storage lengths and represents 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 storage length recommendations for the turning movements at the Project driveways and site adjacent intersections were shown previously on Exhibit 1-4.

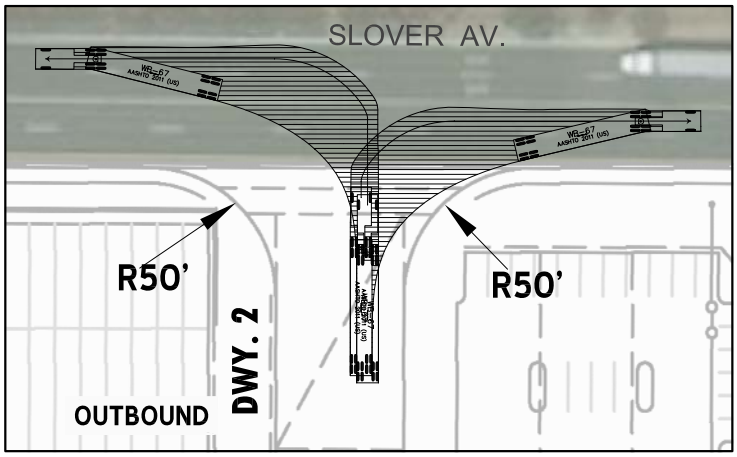
1.8 TRUCK ACCESS AND CIRCULATION

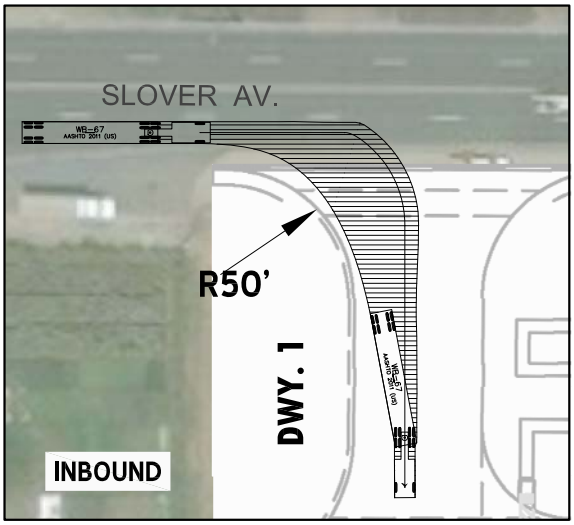
A truck turning template has been overlaid on the site plan at Driveways 1 and 2 on Slover Avenue, which are anticipated to be utilized by heavy trucks, in order to determine the appropriate curb radii and to verify that trucks will have sufficient space to execute turning maneuvers. For the purposes of this evaluation, the WB-67 class truck template has been utilized. WB-67 class trucks are approximately 73.5 feet in length.

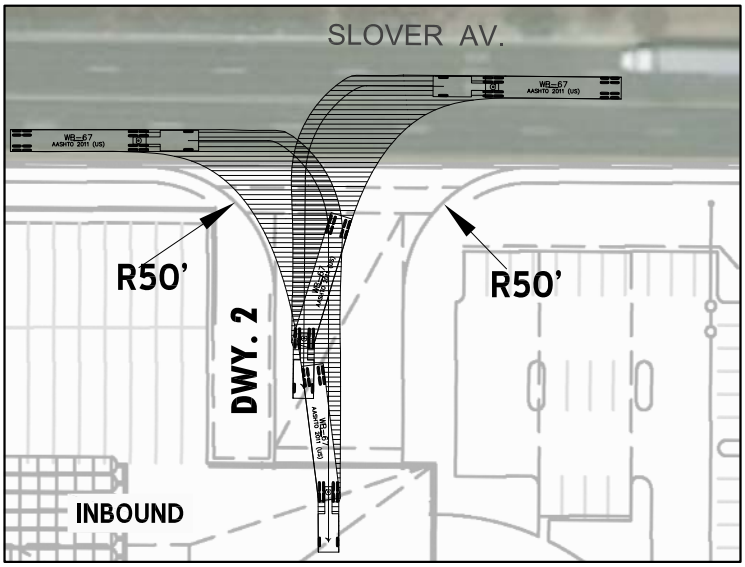
Exhibit 1-5 illustrates the proposed truck access for the site and circulation for the applicable driveways. As shown on Exhibit 1-5, Driveways 1 and 2 on Slover Avenue are anticipated to accommodate the ingress and egress of heavy trucks as currently designed.

EXHIBIT 1-5: TRUCK ACCESS

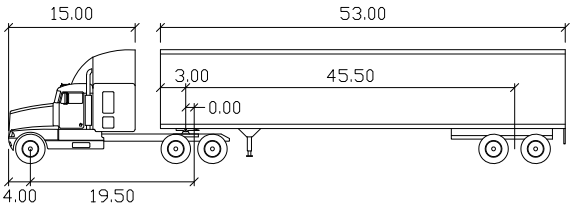








LEGEND:



WB-67	feet		
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 75.0
Trailer Track	: 8.50		

GRAPHIC SCALE
0 75 150
1"=75'

2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with County of San Bernardino, San Bernardino County Congestion Management Program (CMP) and Caltrans traffic study guidelines. (1) (2)

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 Highway Capacity Manual (HCM) 6th Edition methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (5) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

The County of San Bernardino, City of Rialto, and Caltrans require signalized intersection operations analysis based on the methodology described in the HCM. (5)

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

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 average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C	F
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

The traffic modeling and signal timing optimization software package Synchro (Version 10) has been utilized to analyze signalized intersections within the study area. Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the HCM. (5) 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 LOS and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

The LOS analysis for signalized intersections has been performed using existing signal timing for Existing, E+P traffic, Opening Year Cumulative (2020), and Horizon Year (2040) traffic conditions. Signal timing has been obtained from Caltrans and SBCTA for the coordinated signals within the study area. Appropriate time for pedestrian crossings has also been considered in the signalized intersection analysis.

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 6th Edition, 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. (5)

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

2.2.2 UNSIGNALIZED INTERSECTIONS

The County of San Bernardino and City of Rialto require the operations of unsignalized intersections be evaluated using the methodology described in the HCM. (5) 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. For all-way stop controlled intersections, LOS is computed for the intersection as a whole.

2.3 FREEWAY OFF-RAMP QUEUING ANALYSIS

The study area for this TIA includes the freeway-to-arterial interchanges of the I-10 Freeway at Cedar Avenue and Riverside Avenue off-ramps. Consistent with Caltrans requirements, the 95th

percentile queuing of vehicles has been assessed at the off-ramps to determine potential queuing impacts at the freeway ramp intersections on Cedar Avenue and Riverside Avenue. Specifically, the queuing analysis is utilized to identify any potential queuing and "spill back" onto the I-10 Freeway mainline from the off-ramps.

The traffic progression analysis tool and HCM intersection analysis program, Synchro, has been used to assess the potential impacts/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. The 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes. The queue length reported is for the lane with the highest queue in the lane group.

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 second footnote indicates whether or not the volume for the 95th percentile queue is metered by an upstream signal. In many cases, the 95th percentile queue will not be experienced and may potentially be less than the 50th percentile queue due to upstream metering. 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. Although only the 95th percentile queue has been reported in the tables, the 50th percentile queue can be found in the appendix alongside the 95th percentile queue for each ramp location. The 50th percentile maximum queue is the maximum back of queue on a typical cycle during the peak hour, while the 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes during the peak hour. The 50th percentile or average queue represents the typical queue length for peak hour traffic conditions, while the 95th percentile queue is derived from the average queue plus 1.65 standard deviations. The 95th percentile queue is not necessarily ever observed; it is simply based on statistical calculations.

2.4 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 TIA uses the signal warrant criteria presented in the latest edition of the Caltrans California Manual on Uniform Traffic Control Devices (CA MUTCD) for all unsignalized study area intersections. (7)

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 indicate that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (7) Specifically, this TIA 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 TIA because it provides specialized warrant criteria for intersections with urban characteristics (e.g. located in communities with populations of more than 10,000 persons or with adjacent major streets operating below 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 unsignalized intersections, that currently do not 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.

As shown on Table 2-3, traffic signal warrant analyses were performed for the following unsignalized study area intersections during the peak weekday conditions wherein the Project is anticipated to contribute the highest trips:

TABLE 2-3: TRAFFIC SIGNAL WARRANT ANALYSIS LOCATIONS

- Driveway 1 & Slover Avenue (#6)
- Driveway 2 & Slover Avenue (#7)
- Cactus Avenue & Slover Avenue (#8)
- Cactus Avenue & Driveway 3 (#9)
- Cactus Avenue & Driveway 4 (#10)

Traffic Signal warrant analyses have not been prepared for intersections with restricted access. 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 (2020) 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.

2.5 FREEWAY MAINLINE SEGMENT ANALYSIS METHODOLOGY

Consistent with recent Caltrans guidance and because impacts to freeway segments dissipate with distance from the point of State Highway System (SHS) entry, quantitative study of freeway segments beyond those immediately adjacent to the point of entry is not required. As such, the traffic study has evaluated the freeway segments along the I-10 Freeway where the Project is anticipated to contribute 50 or more one-way peak hour trips. Because impacts to freeway segments dissipate with distance from the point of SHS entry, quantitative evaluation of freeway segments with less than 50 peak hour trips are not necessary.

The freeway system in the study area has been broken into segments defined by the freeway-to-arterial interchange locations. The freeway segments have been evaluated in this TIA based upon peak hour directional volumes. The freeway segment analysis is based on the methodology described in the HCM and performed using HCS7 software. The performance measure preferred by Caltrans to calculate LOS is density. Density is expressed in terms of passenger cars per mile per lane. Table 2-4 illustrates the freeway segment LOS descriptions for each density range utilized for this analysis.

The number of lanes for existing baseline conditions has been obtained from field observations conducted by Urban Crossroads in April 2018. These existing freeway geometrics have been utilized for Existing, E+P, Opening Year Cumulative (2020) Without and With Project, and Horizon Year Without and With Project conditions.

The I-10 Freeway mainline volume data was obtained from the Caltrans Performance Measurement System (PeMS) website for the segment of the I-10 Freeway between the Cedar Avenue ramps. The data was obtained for March 27-29, 2018. In an effort to conduct a conservative analysis, the maximum value observed within the three-day period was utilized for the morning (AM) and evening (PM) peak hours. In addition, truck traffic, represented as a percentage of total traffic, has been utilized for the purposes of this analysis in an effort to not overstate traffic volumes and peak hour deficiencies. As such, actual vehicles (as opposed to passenger-car-equivalent volumes) have been utilized for the purposes of the basic freeway segment analysis. (8)

TABLE 2-4: DESCRIPTION OF FREEWAY MAINLINE LOS

Level of Service	Description	Density Range (pc/mi/ln)[1]
A	Free-flow operations in which vehicles are relatively unimpeded in their ability to maneuver within the traffic stream. Effects of incidents are easily absorbed.	0.0 – 11.0
B	Relative free-flow operations in which vehicle maneuvers within the traffic stream are slightly restricted. Effects of minor incidents are easily absorbed.	11.1 – 18.0
C	Travel is still at relative free-flow speeds, but freedom to maneuver within the traffic stream is noticeably restricted. Minor incidents may be absorbed, but local deterioration in service will be substantial. Queues begin to form behind significant blockages.	18.1 – 26.0
D	Speeds begin to decline slightly and flows and densities begin to increase more quickly. Freedom to maneuver is noticeably limited. Minor incidents can be expected to create queuing as the traffic stream has little space to absorb disruptions.	26.1 – 35.0
E	Operation at capacity. Vehicles are closely spaced with little room to maneuver. Any disruption in the traffic stream can establish a disruption wave that propagates throughout the upstream traffic flow. Any incident can be expected to produce a serious disruption in traffic flow and extensive queuing.	35.1 – 45.0
F	Breakdown in vehicle flow.	>45.0

[1] pc/mi/ln = passenger cars per mile per lane. Source: HCM 6th Edition

2.6 FREEWAY MERGE/DIVERGE RAMP JUNCTION ANALYSIS

The freeway system in the study area has been broken into segments defined by freeway-to-arterial interchange locations resulting in two existing on and off ramp locations. Although the HCM indicates the influence area for a merge/diverge junction is 1,500 feet, the analysis presented in this traffic study has been performed at all ramp locations with respect to the nearest on or off ramp at each interchange in an effort to be consistent with Caltrans guidance/comments on other projects Urban Crossroads has worked on in the region.

The merge/diverge analysis is based on the HCM Ramps and Ramp Junctions analysis method and performed using HCS7 software. The measure of effectiveness (reported in passenger car/mile/lane) are calculated based on the existing number of travel lanes, number of lanes at the on and off ramps both at the analysis junction and at upstream and downstream locations (if applicable) and acceleration/deceleration lengths at each merge/diverge point. Table 2-5 presents the merge/diverge area level of service descriptions for each density range utilized for this analysis.

TABLE 2-5: DESCRIPTION OF FREEWAY MERGE AND DIVERGE LOS

Level of Service	Density Range (pc/mi/ln)[1]
A	≤10.0
B	10.0 – 20.0
C	20.0 – 28.0
D	28.0 – 35.0
E	>35.0
F	Demand Exceeds Capacity

[1] pc/mi/ln = passenger cars per mile per lane. Source: HCM

Similar to the basic freeway segment analysis, the I-10 Freeway mainline volume data was obtained from the Caltrans PeMS website for the segments of the I-10 Freeway interchange at Cedar Avenue. The ramp data (per the count data presented in Appendix 3.1) was then utilized to flow conserve the mainline volumes to determine the remaining I-10 Freeway mainline segment volumes. Flow conservation checks ensure that traffic flows from east to west and north to south (and vice versa) of the interchange area with no unexplained loss of vehicles. The data was obtained for March 27-29, 2018. In an effort to conduct a conservative analysis, the maximum value observed within the three-day period was utilized for the morning (AM) and evening (PM) peak hours. In addition, truck traffic, represented as a percentage of total traffic, has been utilized for the purposes of this analysis in an effort to not overstate traffic volumes and peak hour deficiencies. (8) As such, actual vehicles (as opposed to passenger-car-equivalent volumes) have been utilized for the purposes of the freeway ramp junction (merge/diverge) analysis.

2.7 MINIMUM LEVEL OF SERVICE (LOS)

The definition of an intersection deficiency has been obtained from each of the applicable jurisdictions.

2.7.1 COUNTY OF SAN BERNARDINO

The definition of an intersection deficiency in the County of San Bernardino is based on the County's General Plan Circulation Element. The County of San Bernardino's General Plan states that target LOS D be maintained at County intersections and roadway segments wherever possible within the Valley region.

2.7.2 CITY OF RIALTO

Based on the City's General Plan Policy 4-1.20, the City desires to "design City streets so that signalized intersections operate at LOS D or better during the morning and evening peak hours and require new development to mitigate traffic impacts that degrade LOS below that level. The one exception will be Riverside Avenue, south of the Metrolink tracks all the way to the City's southern border, which can operate at LOS E." Additionally, based on the City's General Plan Policy 4-1.21, the City desires to "design City streets so that unsignalized intersections operate with no vehicular movement having an average delay greater than 120 seconds during the morning and evening peak hours, and require new development to mitigate traffic impacts that increase delay above that level."

2.7.3 SAN BERNARDINO COUNTY CMP

The CMP definition of deficiency is based on maintaining a level of service standard of LOS E or better, where feasible, except where an existing LOS F condition is identified in the CMP document. However, for the purposes of this analysis, LOS D has been utilized for all study area intersections.

2.7.4 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. LOS D will be used as the target LOS for freeway ramps, freeway segments, and freeway merge/diverge ramp junctions.

2.8 THRESHOLDS OF SIGNIFICANCE

This section outlines the methodology used in this analysis related to identifying circulation system deficiencies. For purposes of analyzing California Environmental Quality Act (CEQA) impacts, the E+P scenario will be used to establish direct project impacts.

2.8.1 INTERSECTIONS

County of San Bernardino:

To determine whether the addition of project traffic at a signalized study intersection results in a significant project-related impact, the following thresholds of significance will be utilized:

- Any study intersection that is operating at a LOS A, B, C or D for any study scenario without project traffic in which the addition of project traffic causes the intersection to degrade to a LOS E or F shall mitigate the impact to bring the intersection back to at least LOS D.
- Any study intersection that is operating at a LOS E or F for any study scenario without project traffic shall mitigate any impacts so as to bring the intersection back to the overall level of delay established prior to project traffic being added.
- For scenarios which include the addition of Cumulative Project Traffic (i.e. shared impacts), study intersections shall be mitigated to LOS 'D' or better in the Valley and Mountain regions and LOS C or better in the Desert regions of the County.

To determine whether the addition of project traffic at an unsignalized study intersection results in a significant project-related impact, the following thresholds of significance will be utilized:

- The addition of project related traffic causes the intersection to move from a LOS D or better to a LOS E or worse

  OR

- The project contributes additional traffic to an intersection that is already projected to operate at an LOS E or F with background traffic (per Section 10.5.2 b))

  AND

- One or both of the following conditions are met:
  - The project adds ten (10) or more trips to any approach
  - The intersection meets the peak hour traffic signal warrant after the addition of project traffic (per Section 10.5.2 c)).

The proposed significance thresholds will be applied at study area intersections for the purposes of determining project-related impacts.

City of Rialto:

For the intersections that lie within the City of Rialto, determination of significant impacts will be based on a comparison of without and with project levels of service for each analysis year. A Significant Impact occurs if project traffic increases the average delay at an intersection by more than the thresholds identified on Table 2-6.

TABLE 2-6: THRESHOLDS OF SIGNIFICANT IMPACT

Pre-Project LOS	Significant Impact Threshold[1]
A/B	10.0 Seconds
C	8.0 Seconds
D	5.0 Seconds
E	2.0 Seconds
F	1.0 Second

[1] Increase in delay

*Source: City of Rialto Traffic Impact Analysis Report Guidelines and Requirements, 2014

Cumulative Impacts:

Cumulative traffic impacts are deficiencies that are not directly caused by the Project but occur as a result of regional growth combined with that or other nearby cumulative development projects. The Project's contribution to a particular cumulative transportation deficiency is deemed cumulatively considerable if the addition of Project traffic results in LOS or delay change as noted above for the County of San Bernardino and City of Rialto. A Project's contribution to a cumulatively considerable impact can be reduced to less than significant if the Project is required to implement or fund its fair share of improvements designed to alleviate the potential cumulative impact. If full funding of future cumulative improvements is not reasonably assured, a temporary unmitigated cumulative impact may occur until the needed improvement is fully funded and constructed.

2.8.2 CALTRANS FACILITIES

To determine whether the addition of project traffic to the SHS freeway segments would result in a deficiency, the following will be utilized:

- The traffic study finds that the LOS of a segment will degrade from D or better to E or F.
- The traffic study finds that the project will exacerbate an already deficient condition by contributing 50 or more one-way peak hour trips. A segment that is operating at or near capacity is deemed to be deficient.

2.9 PROJECT FAIR SHARE CALCULATION METHODOLOGY

In cases where this TIA identifies that the proposed Project would have a significant cumulative impact to a roadway facility, and the recommended mitigation measure is a fair share monetary contribution, the following methodology was applied to determine the fair share contribution. A project's fair share contribution at an off-site study area intersection is determined based on the following equation, which is the ratio of Project traffic to new traffic, and new traffic is total future traffic subtracts existing baseline traffic:

Project Fair Share % = Project Traffic / (2040 Total Traffic – Existing Baseline Traffic)

The Project fair share contribution calculations are presented in Section 1.5 *Local and Regional Funding Mechanisms* of this TIA.

3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the County of San Bernardino General Plan Circulation Network, and a review of existing peak hour intersection operations, traffic signal warrant, and freeway mainline analyses.

3.1 EXISTING CIRCULATION NETWORK

Pursuant to discussion with County of San Bernardino staff, the study area includes a total of 10 existing and future intersections as shown previously on Exhibit 1-2. Of these 10 intersections, the existing study area circulation network includes 6 while 4 intersections in the study area are future planned intersections that do not currently exist (Project driveways).

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 COUNTY OF SAN BERNARDINO CIRCULATION MASTER PLAN

The study area contains two intersections that exist within the County of San Bernardino. Exhibit 3-2 shows the County of San Bernardino General Plan Circulation Element, and Exhibit 3-3 illustrates the County of San Bernardino General Plan Roadway Cross-Sections. The study area roadways that lie within the unincorporated areas of the County of San Bernardino are described below.

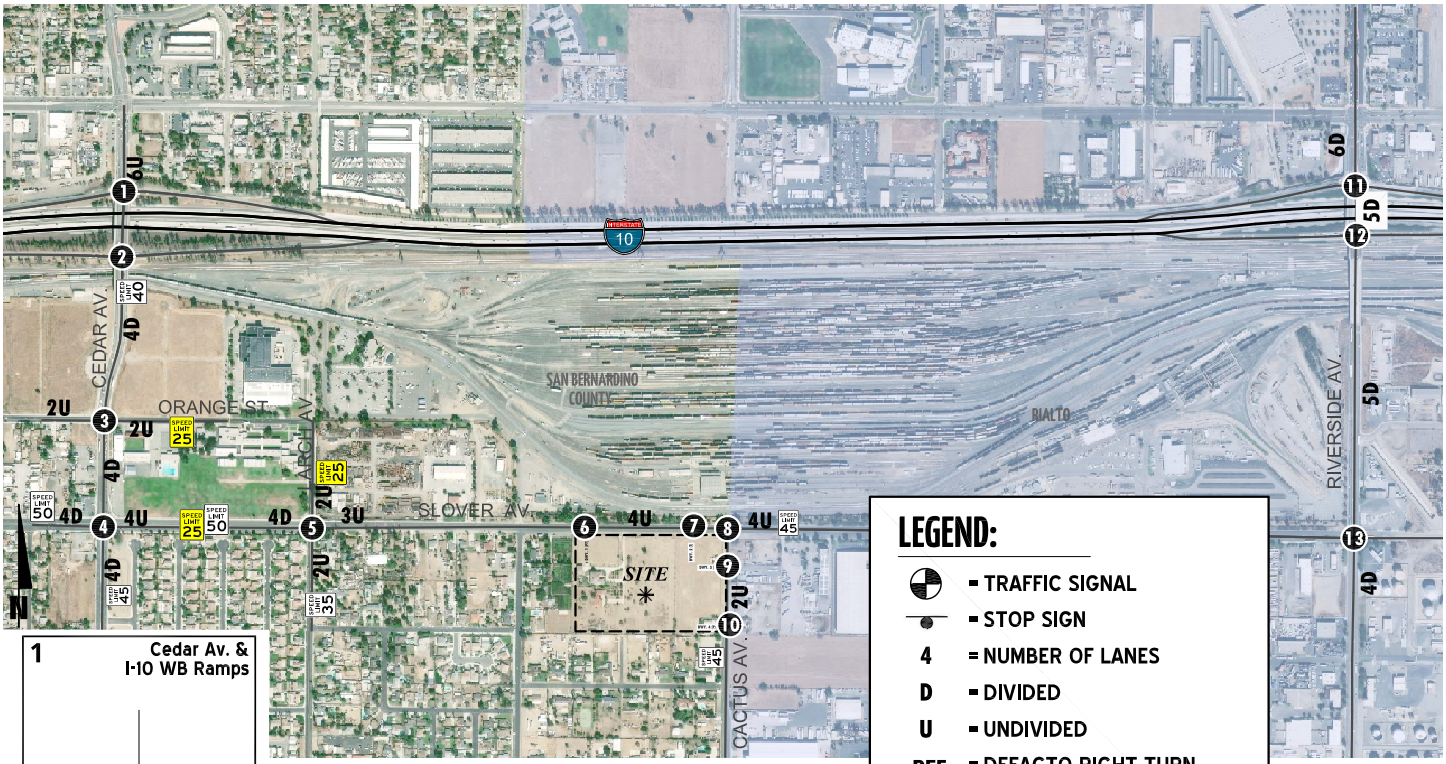
Major Highways are designed to accommodate four travel lanes with a median, within a typical 104-foot to 120-foot right of way, carry high traffic volumes and provide limited access. Their primary function is to link the major arterial highways to the secondary arterials, as well as to carry vehicles entering and exiting the City from neighboring areas. Driveway access is also typically limited on these facilities, where feasible. The following study area roadways within the County of San Bernardino are classified as Major Highways:

- Slover Avenue
- Cedar Avenue

Controlled/Limited Access Collector Streets are typically two-lane streets that connect the local streets with the secondary highways allowing local traffic to access the regional transportation facilities. Collector streets have a 66-foot wide right of way. The following study area roadway within the County of San Bernardino is classified as Collector Street:

- Cactus Avenue

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

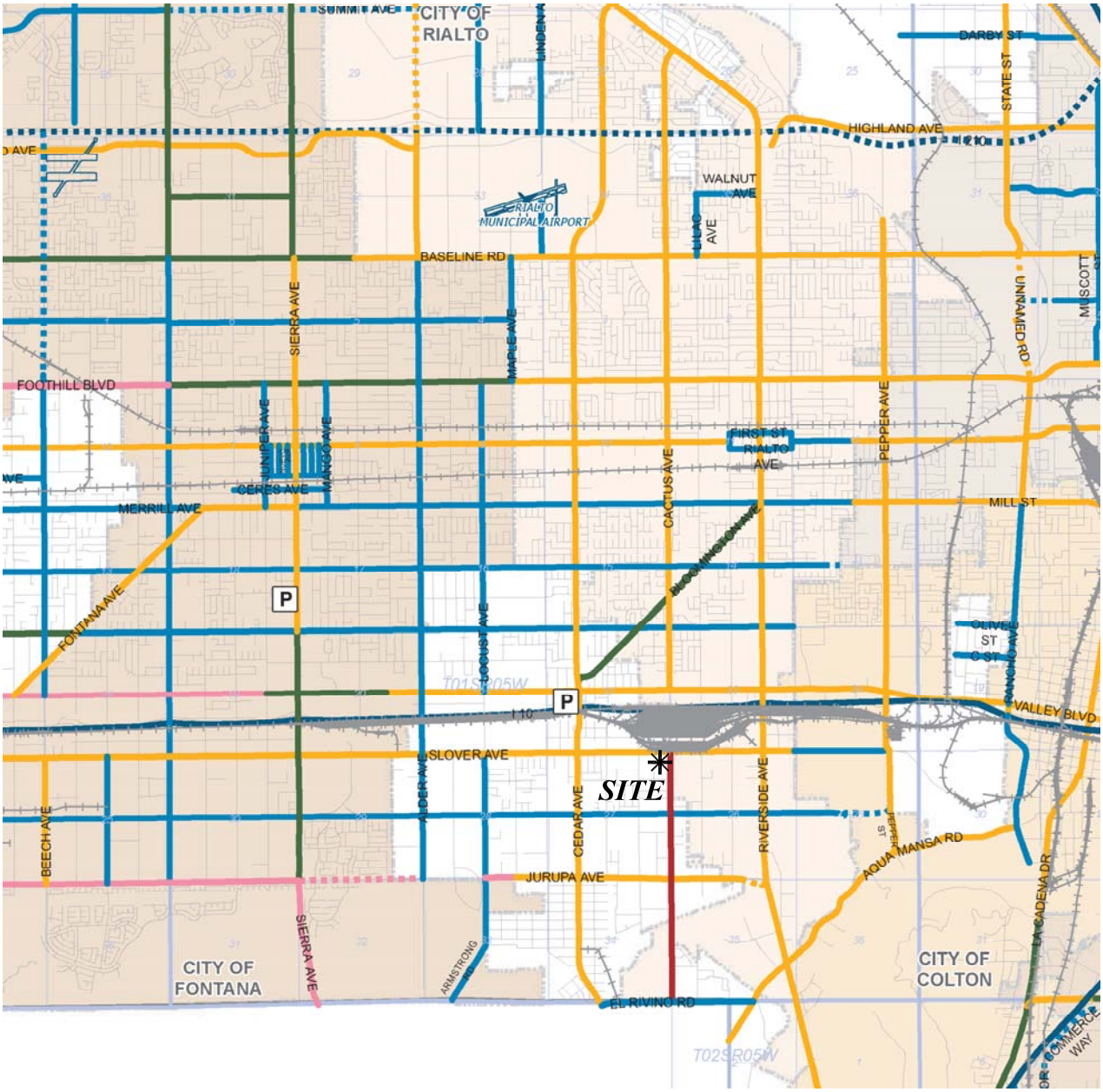


LEGEND:

- = TRAFFIC SIGNAL
- = STOP SIGN
- 4 = NUMBER OF LANES
- D = DIVIDED
- U = UNDIVIDED
- DEF = DEFACTO RIGHT TURN
- = SPEED LIMIT (MPH)
- = SCHOOL SPEED LIMIT (MPH)

1 Cedar Av. & I-10 WB Ramps	2 Cedar Av. & I-10 EB Ramps	3 Cedar Av. & Orange St.	4 Cedar Av. & Slover Av.	5 Larch Av. & Slover Av.	6 Dwy. 1 & Slover Av.	7 Dwy. 2 & Slover Av.
			DEF		Future Intersection	Future Intersection
8 Cactus Av. & Slover Av.	9 Cactus Av. & Dwy. 3	10 Cactus Av. & Dwy. 4	11 Riverside Av. & I-10 WB Ramps	12 Riverside Av. & I-10 EB Ramps	13 Riverside Av. & Slover Av.	
	Future Intersection	Future Intersection				

EXHIBIT 3-2: COUNTY OF SAN BERNARDINO GENERAL PLAN CIRCULATION ELEMENT



Legend

Existing	Proposed	
		Freeway
		Major Divided Highway
		Major Arterial Highway
		Major Highway
		Secondary Highway
		Controlled/Limited Access Collector
		Mountain Major Highway
		Mountain Secondary Highway
		State Highway (Special Standards or Conditions)

P Park & Ride — Railroad — Airport / Airfield

N

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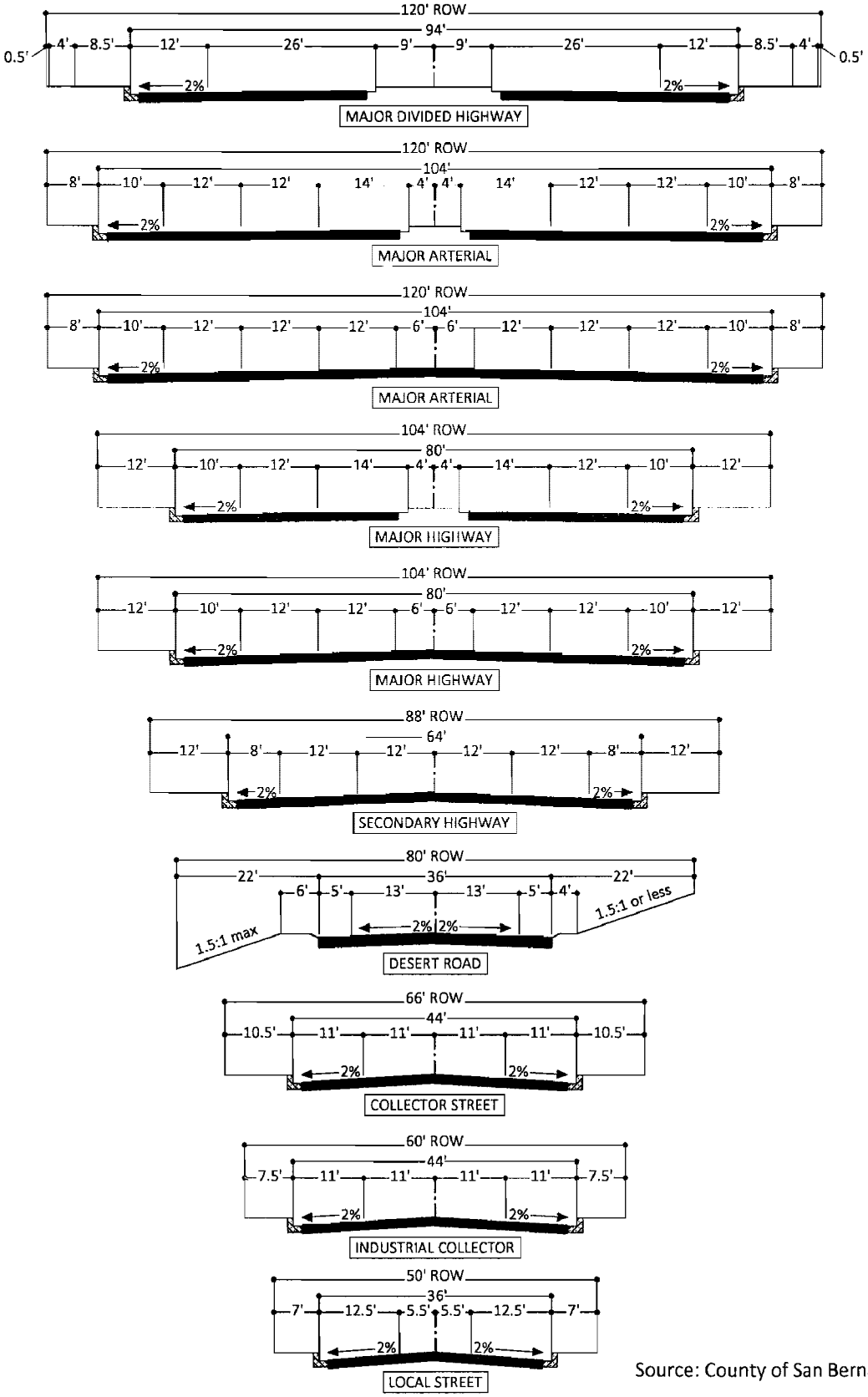
EXHIBIT 3-3 : COUNTY OF SAN BERNARDINO GENERAL PLAN ROADWAY CROSS-SECTIONS



Source: County of San Bernardino

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3.3 CITY OF RIALTO GENERAL PLAN CIRCULATION ELEMENT

The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the study area, as identified on the City of Rialto's Circulation Master Plan, are described subsequently. Exhibit 3-4 shows the City of Rialto General Plan Circulation Element, and Exhibit 3-5 illustrates the City of Rialto General Plan Roadway Cross-Sections.

Major Arterials are designed to accommodate four travel lanes with a median, within a typical 120-foot right of way, carry high traffic volumes and provide limited access. Their primary function is to link the major arterial highways to the secondary arterials, as well as to carry vehicles entering and exiting the City from neighboring areas. Driveway access is also typically limited on these facilities, where feasible. The following study area roadways within the City of Rialto are classified as Major Highways:

- Slover Avenue
- Cedar Avenue

Secondary Arterials are typically four-lane streets, providing two lanes in each direction. These highways carry traffic along the perimeters of major developments, provide support to the major and primary highways, and are through streets enabling traffic to travel uninterrupted for longer distances through the City. Secondary highways have an 88-foot wide right of way, which includes sidewalks. The following study area roadway within the City of Rialto is classified as Secondary Highway:

- Cactus Avenue

Collector Streets are typically two-lane streets that connect the local streets with the secondary highways allowing local traffic to access the regional transportation facilities. Collector streets have a 64-foot wide right of way. The following study area roadway within the City of Rialto is classified as Collector Street:

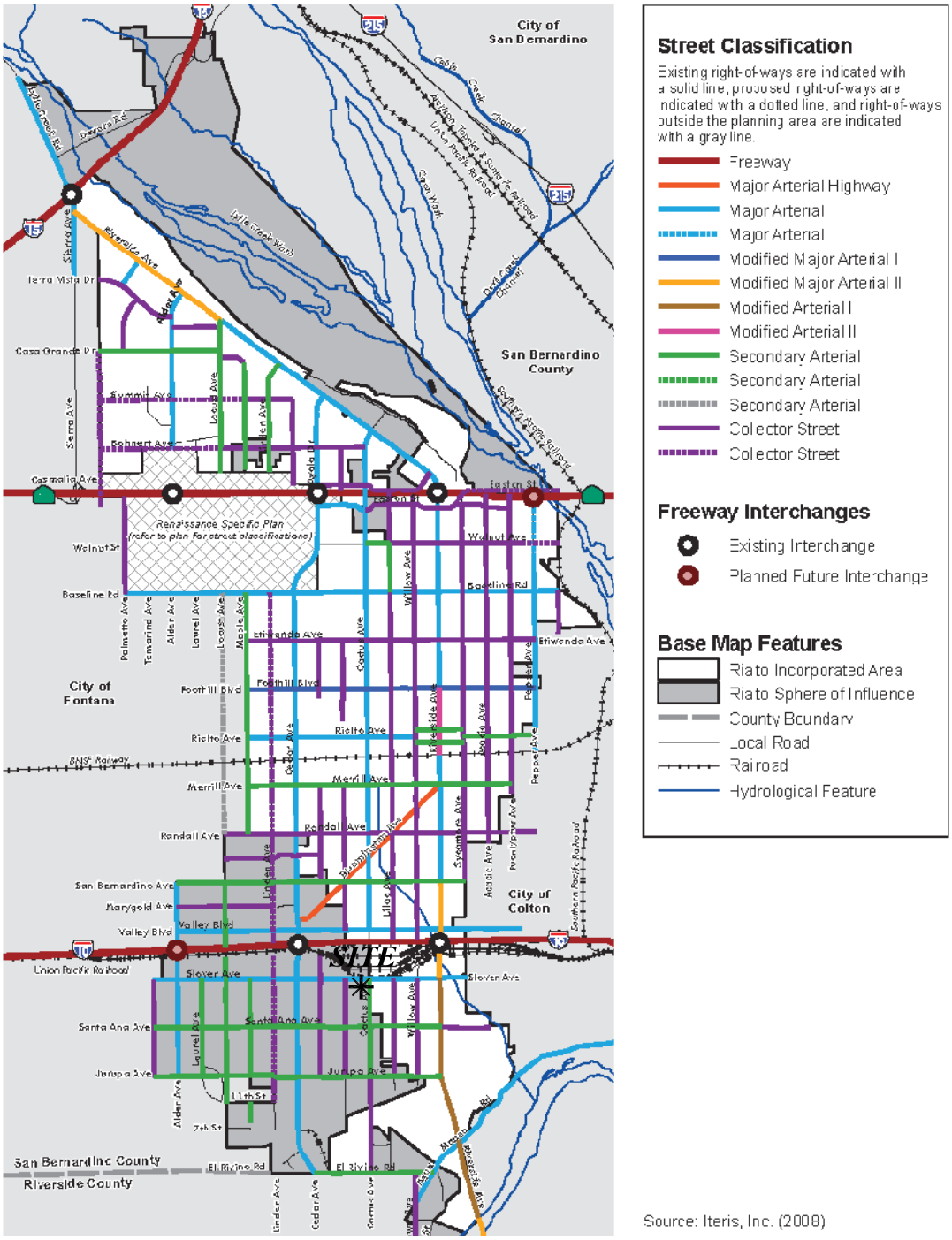
- Larch Avenue

3.4 BICYCLE & PEDESTRIAN FACILITIES

The City of Rialto General Plan Bikeways and Trails are shown on Exhibit 3-6. As shown on Exhibit 3-6, there are no existing or proposed bike routes within the vicinity of the study area. Existing pedestrian facilities within the study area are shown on Exhibit 3-7. Field observations indicate nominal pedestrian and bicycle activity within the study area. As shown on Exhibit 3-7, the pedestrian facilities are built out along Cedar Avenue and Slover Avenue, from Cedar Avenue to Spruce Avenue. However, there are limited pedestrian facilities within close proximity to the Project site on Cactus Avenue and on Slover Avenue east of Spruce Avenue.

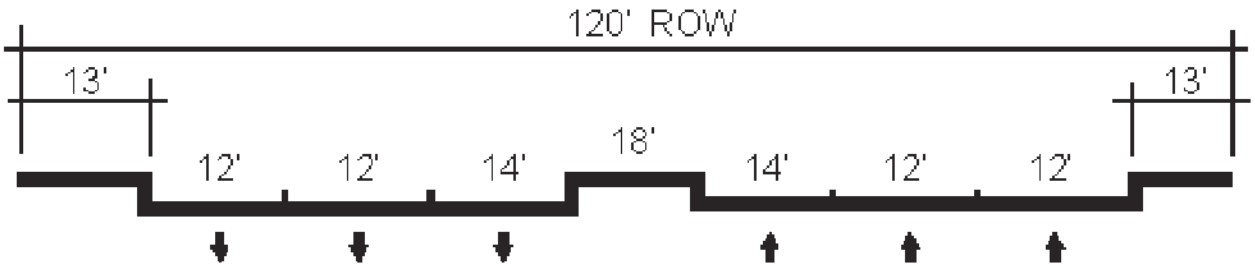
The County of San Bernardino does not have an exhibit showing bikeways and trails.

EXHIBIT 3-4: CITY OF RIALTO GENERAL PLAN CIRCULATION ELEMENT

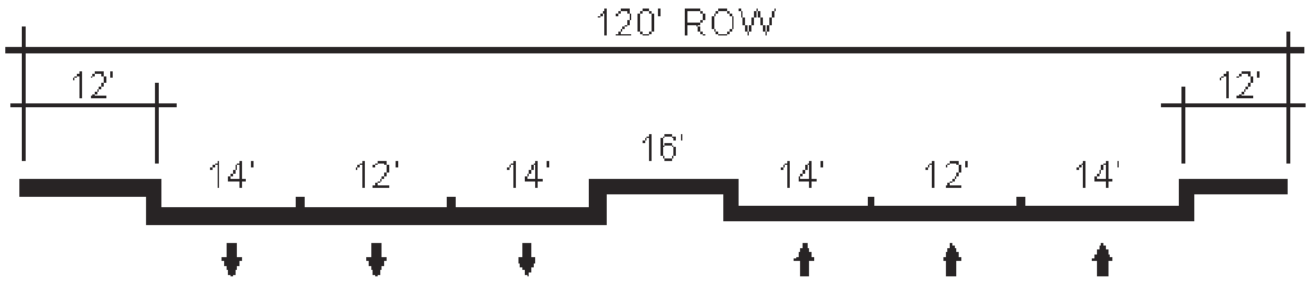


Source: Iteris, Inc. (2008)

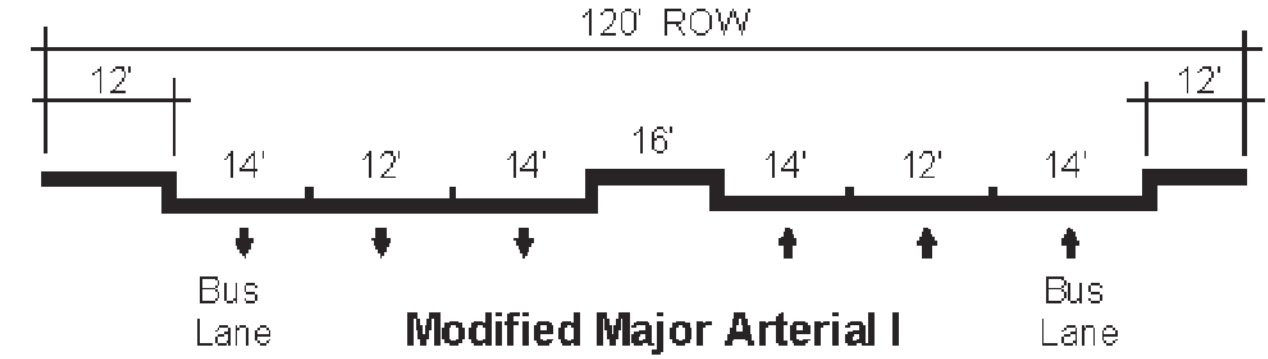
EXHIBIT 3-5 (1OF2): CITY OF RIALTO GENERAL PLAN ROADWAY CROSS-SECTIONS



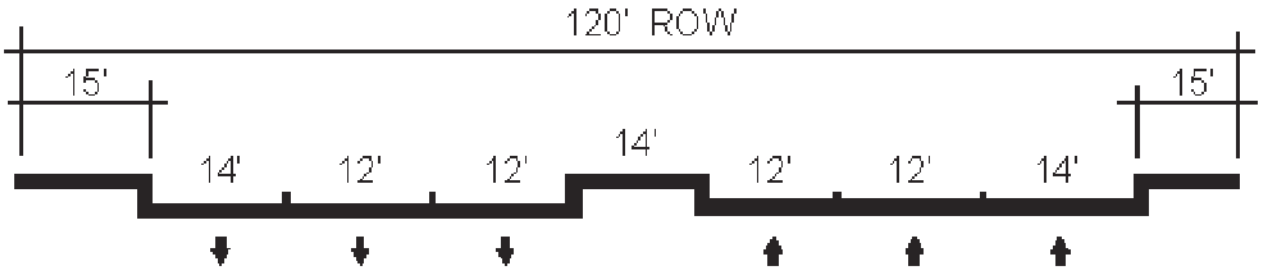
Major Arterial Highway



Major Arterial

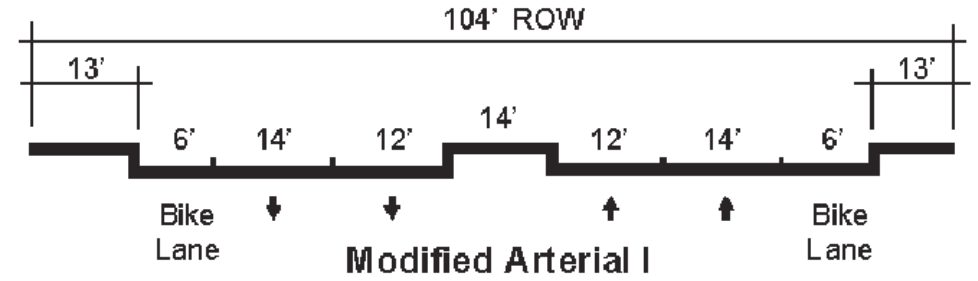


Modified Major Arterial I

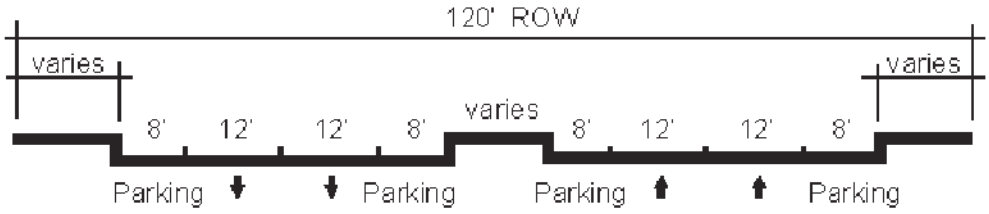


Modified Major Arterial II

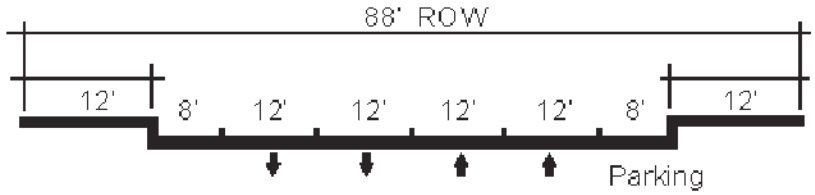
EXHIBIT 3-5 (2OF2): CITY OF RIALTO GENERAL PLAN ROADWAY CROSS-SECTIONS



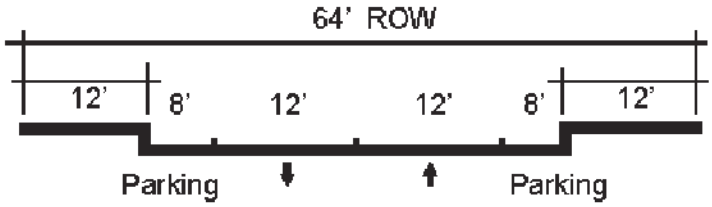
Modified Arterial I



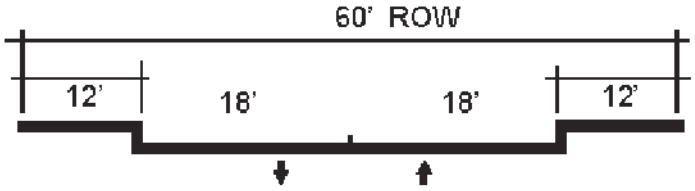
Modified Arterial II



Secondary Arterial



Collector



Local

EXHIBIT 3-6: CITY OF RIALTO BICYCLE ROUTES

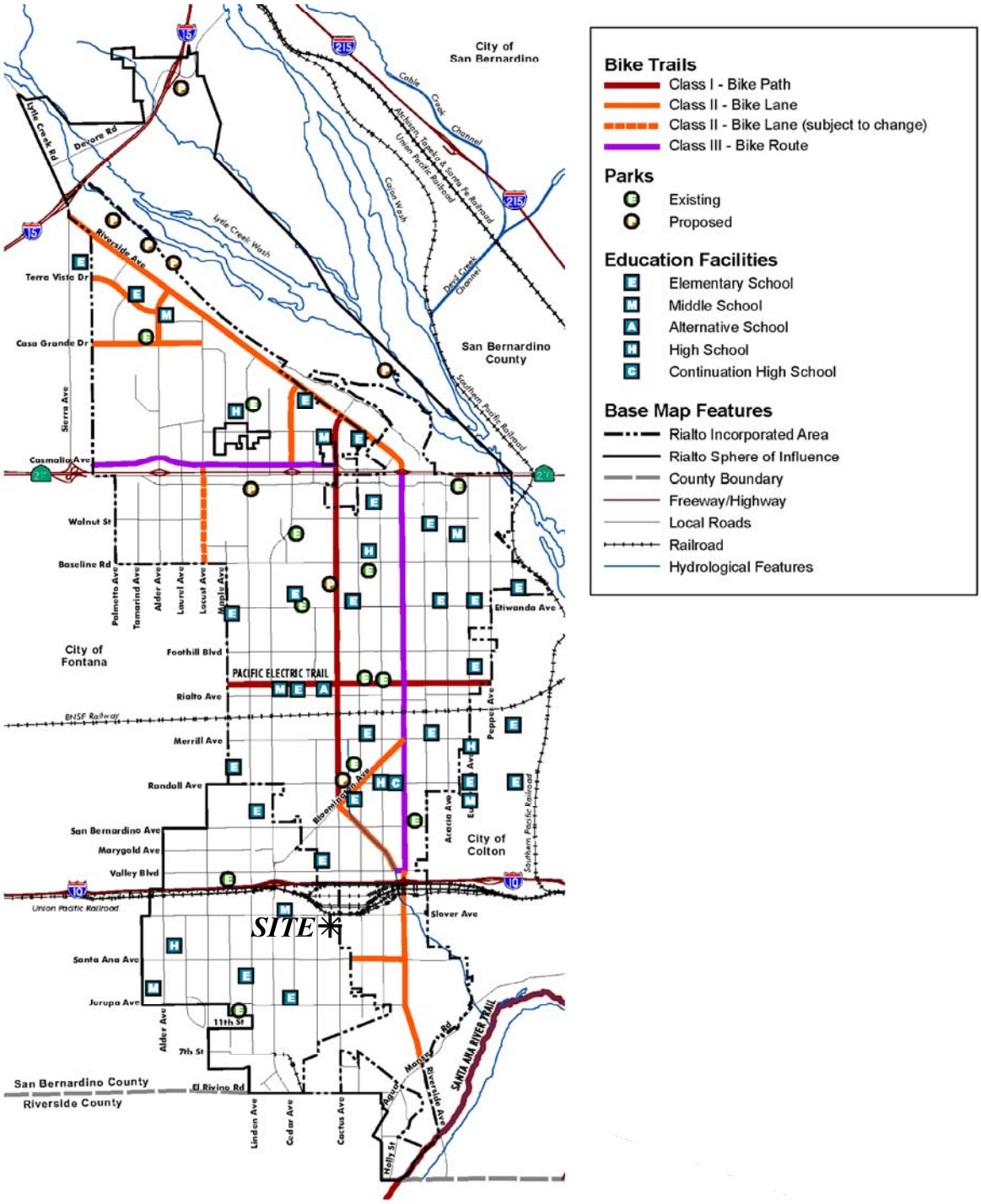


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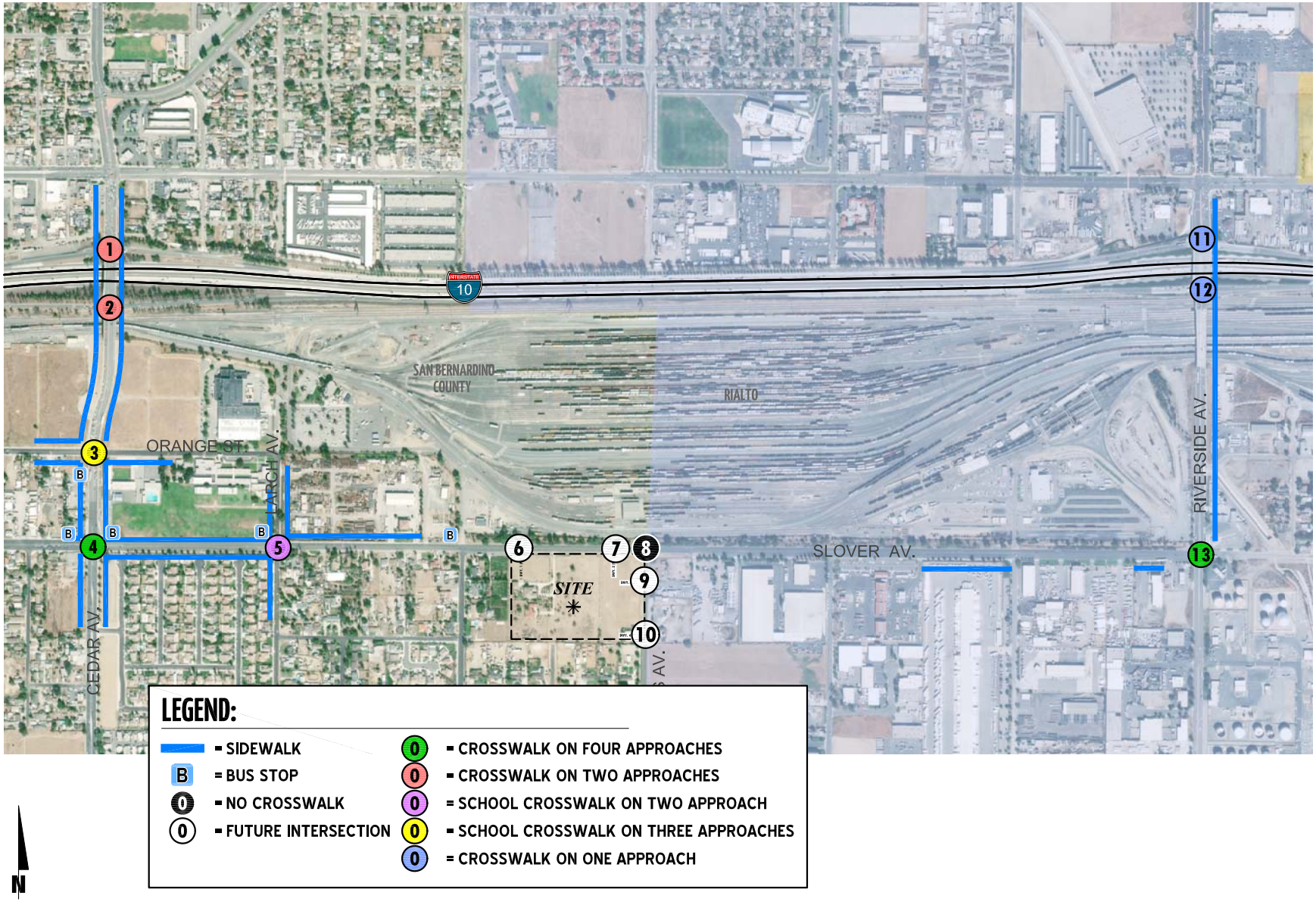
EXHIBIT 3-7: EXISTING PEDESTRIAN FACILITIES



3.5 TRUCK ROUTES

The designated truck route network for the City of Rialto is shown on Exhibit 3-8. Slover Avenue, Cedar Avenue, and Riverside Avenue are the designated truck routes within the study area. The designated truck route maps have been utilized to route truck traffic from both the proposed Project and future cumulative development projects throughout the study area. The County of San Bernardino does not have a truck route map.

3.6 TRANSIT SERVICE

The study area is currently served by Omnitrans, a public transit agency serving various jurisdictions within San Bernardino County, with bus service along Cedar Avenue and Slover Avenue via Routes 29 and 290 and along Riverside Avenue and Valley Boulevard via Route 22. The existing Omnitrans Route 29 would likely serve the Project as it provides service along Cedar Avenue north of Slover Avenue, Slover Avenue, west of Spruce Avenue, and south on Spruce Avenue. The existing transit routes within the area by Omnitrans is shown 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.

3.7 EXISTING TRAFFIC COUNTS

Manual AM and PM peak hour turning movement counts were conducted in March and April 2018 and May 2019. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1. Traffic counts were conducted under normal traffic conditions when local schools were in session and operating at normal bell schedules. Traffic counts were factored to reflect 2019 traffic conditions. The traffic counts collected include the following vehicle classifications: Passenger Cars, 2-Axle Trucks, 3-Axle Trucks, and 4 or More Axle Trucks. To represent the impact large trucks, buses and recreational vehicles have on traffic flow; all trucks were converted into PCE. By their size alone, these vehicles occupy the same space as two or more passenger cars. In addition, the time it takes for them to accelerate and slowdown is much longer than for passenger cars and varies depending on the type of vehicle and number of axles. For the purpose of this analysis, a PCE factor of 1.5 has been applied to 2-axle trucks, 2.0 for 3-axle trucks, and 3.0 for 4+-axle trucks to estimate each turning movement.

Existing average daily traffic (ADT) volumes on arterial highways throughout the study area 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 13.0146 = Leg Volume

EXHIBIT 3-8: CITY OF RIALTO EXISTING TRUCK ROUTES

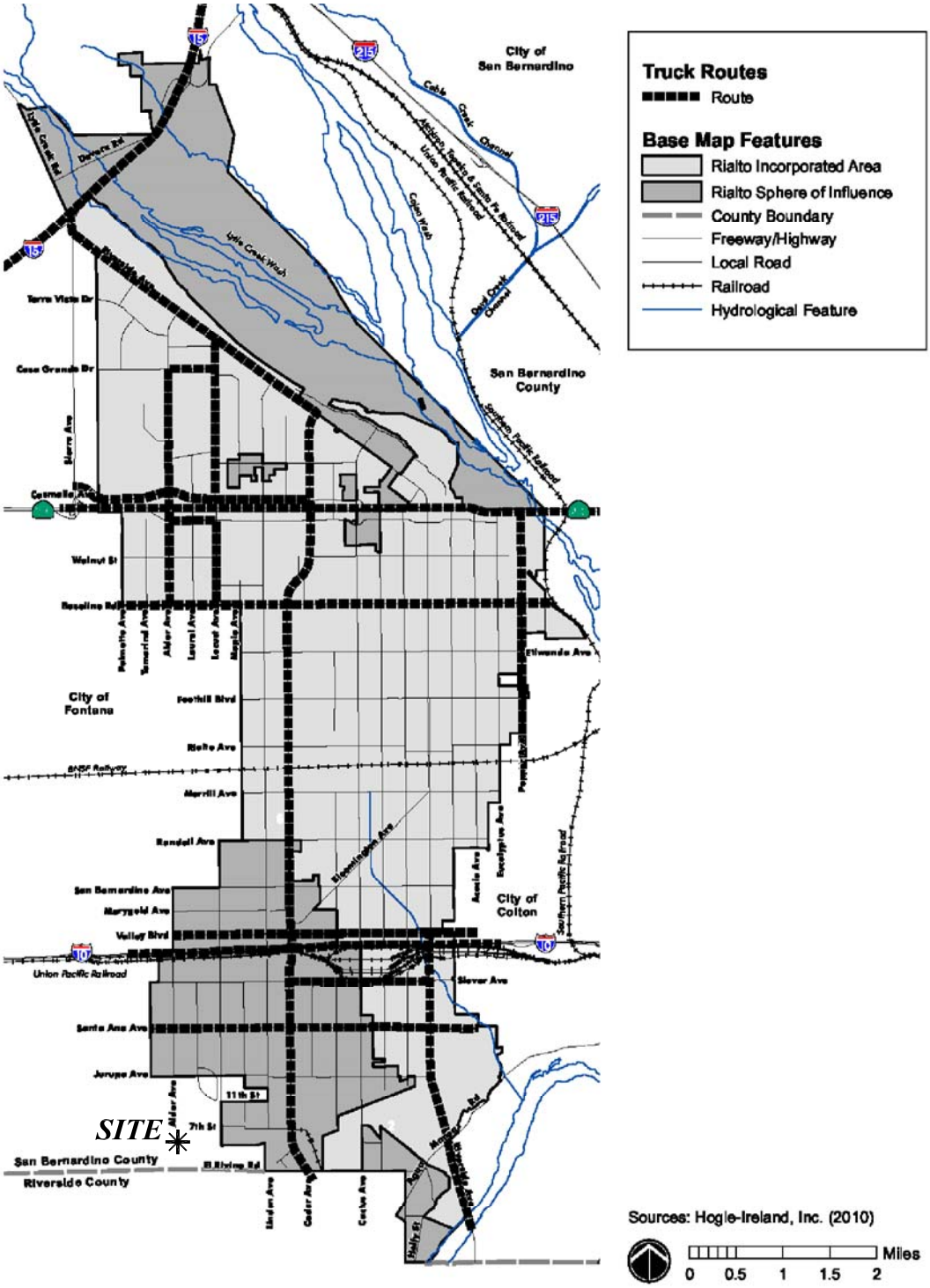
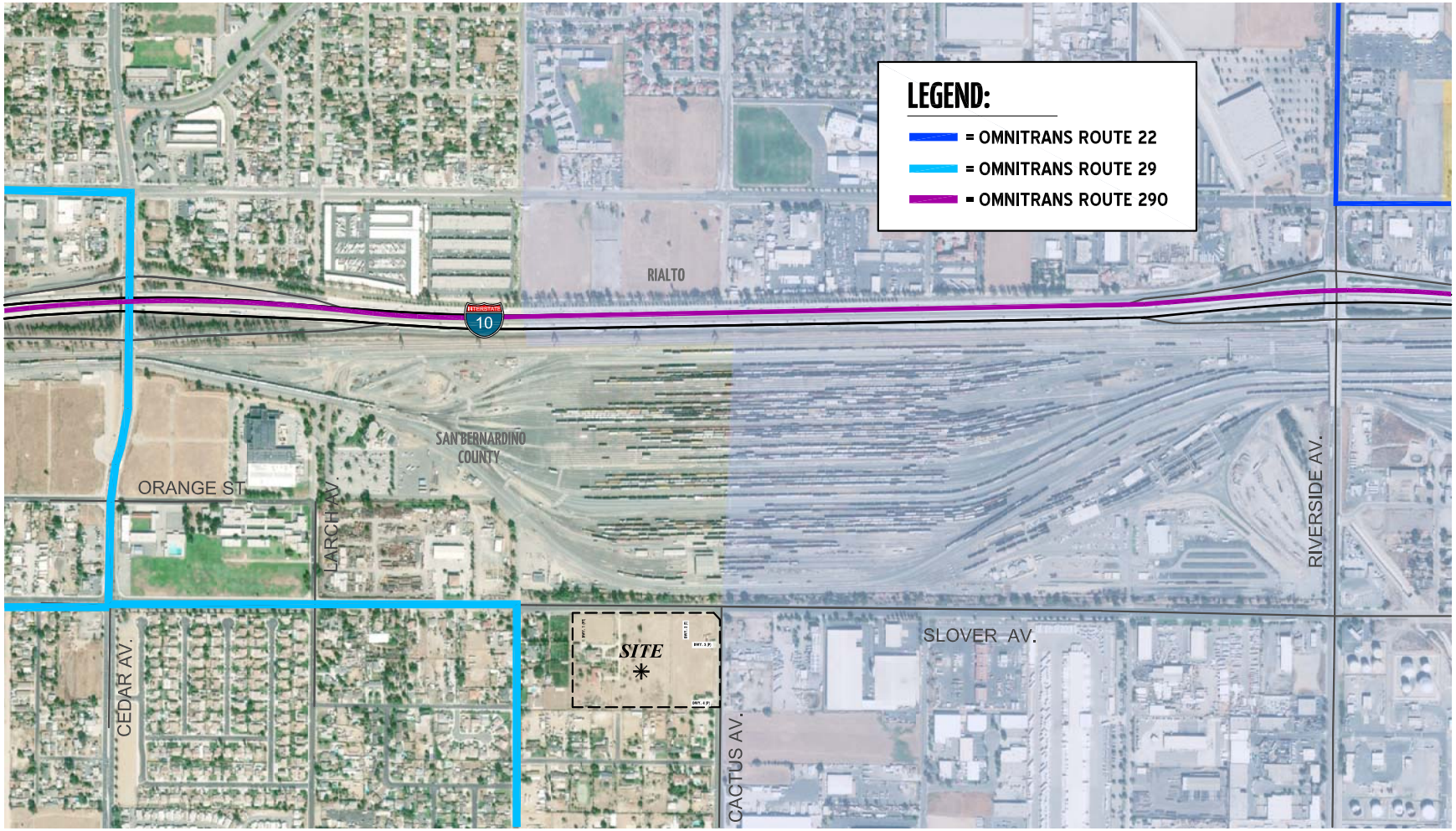


EXHIBIT 3-9: EXISTING TRANSIT ROUTES



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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 approximately 7.68 percent. As such, the above equation utilizing a factor of 13.0146 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 7.68 percent (i.e., 1/0.0768 = 13.0146) and was assumed to sufficiently estimate ADT volumes for planning-level analyses. Existing weekday AM and PM peak hour intersection and ADT volumes are shown on Exhibit 3-10.

3.8 EXISTING CONDITIONS INTERSECTION OPERATIONS ANALYSIS

Existing (2019) 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 Existing study area intersections are all currently operating at acceptable LOS during the peak hours.

Consistent with Table 3-1, a summary of the peak hour intersection LOS for Existing conditions are shown on Exhibit 3-11. The intersection operations analysis worksheets are included in Appendix 3.2 of this TIA.

It is important to recognize that the intersection operations analysis reflects the existing constrained traffic count conditions. These constraints in the form of vehicle queues at closely spaced intersections significantly limit the number of vehicles that can physically be accommodated during peak hour conditions. While the traffic counts identify all the vehicles using an intersection during peak hours, they may not fully account for the unconstrained demand at a particular location. Intersections along Cedar Avenue and the I-10 Ramp locations at the Cedar Avenue interchange experience vehicle delays that are not reflected in the intersection LOS analysis due to the constrained conditions. As such, based on the constrained traffic count data the intersections appear to operate at acceptable LOS. Notwithstanding, field observations indicate that intersections proximate to the I-10 Freeway experience queues that periodically affect intersection operations during the peak hours. Fieldwork observations also indicate the intersection of Riverside Avenue and Slover Avenue experiences queues for the eastbound left turn movement, which periodically affects intersection operations.

3.9 EXISTING CONDITIONS TRAFFIC SIGNAL WARRANTS ANALYSIS

The traffic signal warrant analysis for Existing traffic conditions are based on existing peak hour intersection turning volumes. For Existing traffic conditions, a peak hour traffic signal warrant was met during one or more peak hours at the following intersection:

- Cactus Avenue & Slover Avenue (#8)

EXHIBIT 3-10: EXISTING (2019) TRAFFIC VOLUMES (IN PCE)

EXHIBIT 3-11: EXISTING (2019) SUMMARY OF LOS

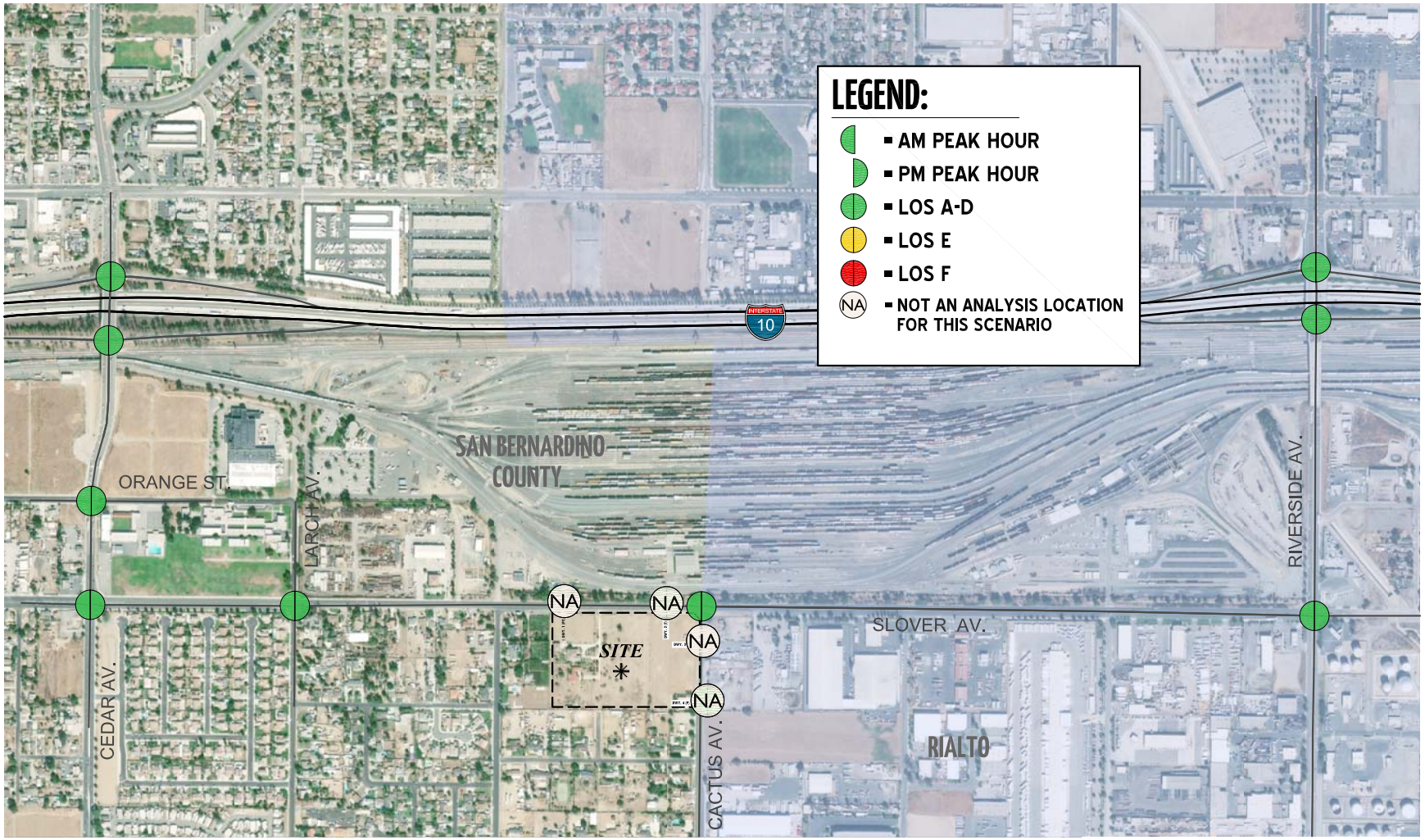

Table 3-1

Intersection Analysis for Existing (2019) Conditions

#	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	PM	AM	PM
1	Cedar Av. & I-10 Westbound Ramps	TS	1	2	0	0	3	1	0	0	0	0	1	1	30.3	19.4	C	B
2	Cedar Av. & I-10 Eastbound Ramps	TS	0	3	1	1	2	0	1	1	0	0	0	0	35.1	48.7	D	D
3	Cedar Av. & Orange St.	TS	1	2	0	1	2	1	1	1	0	0	1	0	17.8	15.8	B	B
4	Cedar Av. & Slover Av.	TS	1	2	0	1	2	0	1	2	d	1	2	0	30.9	32.2	C	C
5	Larch Av. & Slover Av.	TS	0	1	0	0	1	0	1	1	1	1	2	0	12.1	16.9	B	B
6	Driveway 1 & Slover Av.		Future Intersection															
7	Driveway 2 & Slover Av.		Future Intersection															
8	Cactus Av. & Slover Av.	CSS	0	1	0	0	0	0	0	2	0	0	2	0	11.5	15.0	B	C
9	Cactus Av. & Driveway 3		Future Intersection															
10	Cactus Av. & Driveway 4		Future Intersection															
11	Riverside Av. & I-10 WB Ramps	TS	2	3	0	0	4	1	0	0	0	1	1	1	21.2	17.6	C	B
12	Riverside Av. & I-10 EB Ramps	TS	0	3	0	2	2	0	1	1	1	0	0	0	24.7	29.1	C	C
13	Riverside Av. & Slover Av.	TS	1	2	0	1	2	0	1	2	0	1	2	0	43.0	41.3	D	D

[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; d = Defacto Right Turn Lane

[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] TS = Traffic Signal; CSS = Cross-Street Stop

As noted previously, meeting a traffic signal warrant is only a minimum condition of determining whether a traffic signal should be installed. Although the intersection mentioned above meets the traffic signal warrant, a traffic signal may not be necessary as the intersection currently operates at acceptable LOS during the peak hours with its current intersection control. Installation of a traffic signal is dependent upon several factors, such as pedestrian traffic and other traffic warrants. As such, this intersection should be monitored, and a traffic signal should be installed at the County Traffic Engineer's discretion. The traffic signal warrant analysis worksheets are included in Appendix 3.3 of this TIA.

3.10 EXISTING CONDITIONS OFF-RAMP QUEUING ANALYSIS

A queueing analysis was performed for westbound and eastbound off-ramps of the I-10 freeway at Cedar Avenue and Riverside Avenue to assess vehicle queues for the off-ramps that may potentially impact peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-10 Freeway. 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 on Table 3-2, there are no existing queuing issues at the Cedar Avenue or Riverside Avenue and I-10 Freeway off-ramps. Worksheets for Existing conditions off-ramp queuing analysis are provided in Appendix 3.4.

3.11 EXISTING CONDITIONS BASIC FREEWAY SEGMENT ANALYSIS

Existing mainline directional volumes for the AM and PM peak hours are provided on Exhibit 3-12. As shown on Table 3-3, the I-10 Freeway segments analyzed for this study were found to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours, with the exception of the following freeway segments:

- I-10 Freeway – Westbound, West of Cedar Avenue (#1) – LOS E PM peak hour only
- I-10 Freeway – Westbound, East of Riverside Avenue (#3) – LOS E PM peak hour only

Existing basic freeway segment analysis worksheets are provided in Appendix 3.5.

3.12 EXISTING CONDITIONS FREEWAY MERGE/DIVERGE ANALYSIS

Ramp merge and diverge operations were also evaluated for Existing conditions and the results of this analysis are presented in Table 3-4. As shown in Table 3-4, the I-10 Freeway ramp merge and diverge junction areas along Cedar Avenue and Riverside Avenue are all operating at an acceptable LOS during the AM and PM peak hours. Existing freeway ramp junction operations analysis worksheets are provided in Appendix 3.6.

Table 3-2

I-10 Freeway Off-Ramp Peak Hour Queuing Summary for Existing (2019) Conditions

Intersection	Movement	Existing (2018)				
		Available Stacking Distance (Feet)	95th Percentile Queue (Feet)		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM
Cedar Av. & I-10 Westbound Off-Ramp	WBR	480	222	234	Yes	Yes
	WBL/T/R	1,270	457 [2]	281 [2]	Yes	Yes
Cedar Av. & I-10 Eastbound Off-Ramp	EBL	340	411 [2]	511 [2]	Yes[3]	Yes[3]
	EBL/T/R	1,900	401 [2]	433 [2]	Yes	Yes
Riverside Av. & I-10 Westbound Off-Ramp	WBL	360	280	289	Yes	Yes
	WBL/T/R	1,190	230	283	Yes	Yes
	WBR	360	168	215	Yes	Yes
Riverside Av. & I-10 Eastbound Off-Ramp	EBL	1,190	238	366 [2]	Yes	Yes
	EBL/T/R	1,190	181	382 [2]	Yes	Yes
	EBR	350	167	237 [2]	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided.

[2] 95th percentile volume exceeds capacity, queue may be longer.

[3] Although the 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-10 Freeway mainline.

Table 3-3

Basic Freeway Segment Analysis for Existing (2019) Conditions

Freeway	Direction[1]	Mainline Segment	Lanes[2]	Existing (2019)			
				Density[3]		LOS[4]	
				AM	PM	AM	PM
I-10	WB	West of Cedar Av.	4	34.4	**36.0**	D	**E**
		East of Cedar Av.	5	23.0	24.8	C	C
		East of Riverside Av.	4	31.1	**35.5**	D	**E**
	EB	West of Cedar Av.	5	21.2	21.2	C	C
		East of Cedar Av.	4	28.6	27.1	D	D
		East of Riverside Av.	4	30.7	27.5	D	D

* **BOLD** = Unacceptable Level of Service

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and are based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

Table 3-4

Freeway Ramp Junction Merge/Diverge Analysis for Existing (2019) Conditions

Freeway	Direction[1]	Ramp or Segment	Lanes on Freeway[2]	Existing (2019)			
				AM Peak Hour		PM Peak Hour	
				Density[3]	LOS[4]	Density[3]	LOS[4]
I-10	WB	On-Ramp at Cedar Av.	4	30.2	D	29.3	D
		Off-Ramp at Cedar Av.	5	17.9	B	19.3	B
		Off-Ramp at Riverside Av.	4	22.1	C	24.2	C
	EB	Off-Ramp at Cedar Av.	5	15.7	B	16.1	B
		On-Ramp at Cedar Av.	4	27.5	C	26.9	C
		On-Ramp at Riverside Av.	4	27.3	C	25.6	C

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and is based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

EXHIBIT 3-12: EXISTING (2019) FREEWAY MAINLINE VOLUMES

LEGEND:

⟵ 100/200 = AM/PM PEAK HOUR VOLUMES

NOTE: VOLUMES IN ACTUAL VEHICLES (NOT PCE)

N

URBAN CROSSROADS

3.13 RECOMMENDED IMPROVEMENTS

If applicable, improvement strategies have been recommended at intersections and freeway segments that have been identified as impacted under Existing (2019) traffic conditions in an effort to achieve an acceptable LOS.

3.13.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

All of the intersections are currently operating at an acceptable LOS during both peak hours, as such, no improvements have been recommended at the study area intersections for Existing (2019) traffic conditions.

3.13.2 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON OFF-RAMP QUEUES

As shown previously on Table 3-2, there are no peak hour queuing issues at the I-10 Freeway interchange on Cedar Avenue. As such, no improvements have been recommended.

3.13.3 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON FREEWAY FACILITIES

At this time, Caltrans has no fee programs or other improvement programs in place to address the deficiencies caused by development projects in the County of San Bernardino (or other neighboring jurisdictions) on SHS roadway segments. As such, no improvements have been recommended to address the Existing (2019) deficiencies on the SHS, because there is no feasible mitigation available.

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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 consists of the development of up to 257,855 sf of warehouse use. The Project is proposed to be developed within a single phase with an anticipated Opening Year of 2020. Vehicular and truck traffic access will be provided via the following driveways (see Exhibit 1-1):

- Driveway 1 on Slover Avenue – Full access driveway providing access to passenger cars and trucks.
- Driveway 2 on Slover Avenue – Full access driveways providing access to trucks only.
- Driveway 3 on Cactus Avenue – Full access driveway providing access to passenger cars only.
- Driveway 4 on Cactus Avenue – Full access driveway providing access to passenger cars only.

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.

A summary of the trip generation rates and resulting Project trip generation (based on PCE) is shown in Table 4-1 while the trip generation based on actual vehicles is shown on Table 4-2 for informational purposes. The trip generation rates used for this analysis are based upon information collected by the Institute of Transportation Engineers (ITE) as provided in their Trip Generation Manual, 10th Edition, 2017. (3)

For purposes of this analysis, ITE land use code 150 (Warehousing) has been used to derive site specific trip generation estimates. The Warehousing (ITE 150) is based on 29 to 47 sites surveyed, the majority of those sites are less than 500,000 square feet (the average being around 378,000 square feet). In comparison, the High-Cube Fulfillment Center Warehouse use (ITE 155) is based on 1 or 2 sites surveyed, all of which are greater than 500,000 square feet in size (the average being around 1,250,000 square feet). Furthermore, the High-Cube Fulfillment Center Warehouse use (ITE 155) has a high percentage and trip generation for passenger vehicles (employees) and generally require more parking in comparison to a typical warehouse use, such as ITE 150. ITE 155 is not a suitable land use for the Project as currently designed.

Total vehicle mix percentages were obtained from the ITE Trip Generation Handbook in conjunction with the South Coast Air Quality Management District's (SCAQMD) recommended truck mix, by axle type. (9) (10) The SCAQMD is currently recommending the use of the ITE Trip Generation Handbook in conjunction with their truck mix by axle-type to better quantify trip rates associated with local warehouse and distribution projects, as truck emission represent more than 90 percent of air quality impacts from these projects. This recommended procedure has been utilized for the purposes of this analysis in effort to be consistent with other technical studies being prepared for the Project.

Table 4-1

Project Trip Generation Summary (PCE)

Land Use	Units[2]	ITE LU Code	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Project Trip Generation Rates (PCE)[1]									
Warehouse[3,4]	TSF	150	0.131	0.039	0.170	0.051	0.139	0.190	1.740
Passenger Cars (80.00%)			0.105	0.031	0.136	0.041	0.111	0.152	1.392
2-Axle Trucks (3.34%) (PCE = 1.5)[5]			0.006	0.002	0.008	0.003	0.008	0.011	0.087
3-Axle Trucks (4.14%) (PCE = 2.0)[5]			0.010	0.004	0.014	0.004	0.012	0.016	0.144
4-Axle+ Trucks (12.52%) (PCE = 3.0)[5]			0.048	0.015	0.063	0.018	0.051	0.069	0.654

Project	Quantity	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Project Trip Generation Summary (PCE)									
Slover & Cactus Warehouse	257.855	TSF							
Passenger Cars:			27	8	35	11	29	39	359
Truck Trips:									
2-axle:			2	0	2	1	2	3	22
3-axle:			3	1	4	1	3	4	37
4+-axle:			12	4	16	5	13	18	169
- Net Truck Trips (PCE)			*17*	*5*	*22*	*6*	*18*	*25*	*228*
TOTAL NET TRIPS (PCE)[6]			***44***	***13***	***57***	***17***	***47***	***64***	***587***

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

[2] TSF = thousand square feet

[3] Vehicle Mix Source: Institute of Transportation Engineers (ITE), Trip Generation Handbook, Third Edition (September 2017).

[4] Truck Mix Source: SCAQMD Warehouse Truck Trip Study Data Results and Usage (2014).

Normalized % - Without Cold Storage: 16.7% 2-Axle trucks, 20.7% 3-Axle trucks, 62.6% 4-Axle trucks

[5] PCE rates are per San Bernardino County Transportation Authority (SBCTA).

[6] TOTAL NET TRIPS (PCE) = Passenger Cars + Net Truck Trips (PCE).

Table 4-2

Project Trip Generation Summary (Actual Vehicles)

Land Use	Units[2]	ITE LU Code	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Project Trip Generation Rates (Actual Vehicles)[1]									
Warehouse[3,4]	TSF	150	0.131	0.039	0.170	0.051	0.139	0.190	1.740
Passenger Cars (80.00%)			0.105	0.031	0.136	0.041	0.111	0.152	1.392
2-Axle Trucks (3.34%)			0.004	0.001	0.005	0.002	0.005	0.007	0.058
3-Axle Trucks (4.14%)			0.005	0.002	0.007	0.002	0.006	0.008	0.072
4-Axle+ Trucks (12.52%)			0.016	0.005	0.021	0.006	0.017	0.023	0.218

Project	Quantity	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Project Trip Generation Summary (Actual Vehicles)									
Slover & Cactus Warehouse	257.855	TSF							
Passenger Cars:			27	8	35	11	29	39	359
Truck Trips:									
2-axle:			*1*	*0*	*1*	*1*	*1*	*2*	*15*
3-axle:			*1*	*1*	*2*	*1*	*2*	*2*	*19*
4+-axle:			*4*	*1*	*5*	*2*	*4*	*6*	*56*
- Net Truck Trips (Actual Vehicles)			*6*	*2*	*9*	*3*	*7*	*10*	*90*
TOTAL NET TRIPS (Actual Vehicles)[5]			***34***	***10***	***44***	***13***	***36***	***49***	***449***

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

[2] TSF = thousand square feet

[3] Vehicle Mix Source: Institute of Transportation Engineers (ITE), Trip Generation Handbook, Third Edition (September 2017).

[4] Truck Mix Source: SCAQMD Warehouse Truck Trip Study Data Results and Usage (2014).

Normalized % - Without Cold Storage: 16.7% 2-Axle trucks, 20.7% 3-Axle trucks, 62.6% 4-Axle trucks

[5] TOTAL NET TRIPS (Actual Vehicles) = Passenger Cars + Net Truck Trips (Actual Vehicles).

Lastly, PCE factors were applied to the trip generation rates for heavy trucks (large 2-axles, 3-axles, 4+-axles). PCEs allow the typical "real-world" mix of vehicle types to be represented as a single, standardized unit, such as the passenger car, to be used for the purposes of capacity and level of service analyses. The PCE factors are consistent with the recommended PCE factors in City's traffic study guidelines. Trip generation rates for actual vehicles and with PCE factors are shown on Table 4-1 and Table 4-2.

The proposed Project is anticipated to generate a net total of 587 PCE trip-ends per day, 57 PCE AM peak hour trips and 64 PCE PM peak hour trips. In comparison, the proposed Project is anticipated to generate a net total of 449 actual vehicle trip-ends per day with 44 AM peak hour trips and 49 PM peak hour trips.

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 trip distribution pattern of passenger cars is heavily influenced by the geographical location of the site, the location of surrounding uses, and the proximity to the regional freeway system. The trip distribution pattern for truck traffic is also influenced by the local truck routes approved by the City and other surrounding agencies. Given these differences, separate trip distributions were generated for both passenger cars and truck trips. Exhibit 4-1 shows the passenger car trip distribution patterns for the Project. Exhibit 4-2 shows the outbound and inbound trip distribution patterns for heavy trucks.

4.3 MODAL SPLIT

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

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 AM and PM peak hour traffic volumes and ADTs are shown on Exhibit 4-3.

EXHIBIT 4-1: PROJECT (PASSENGER CARS) TRIP DISTRIBUTION

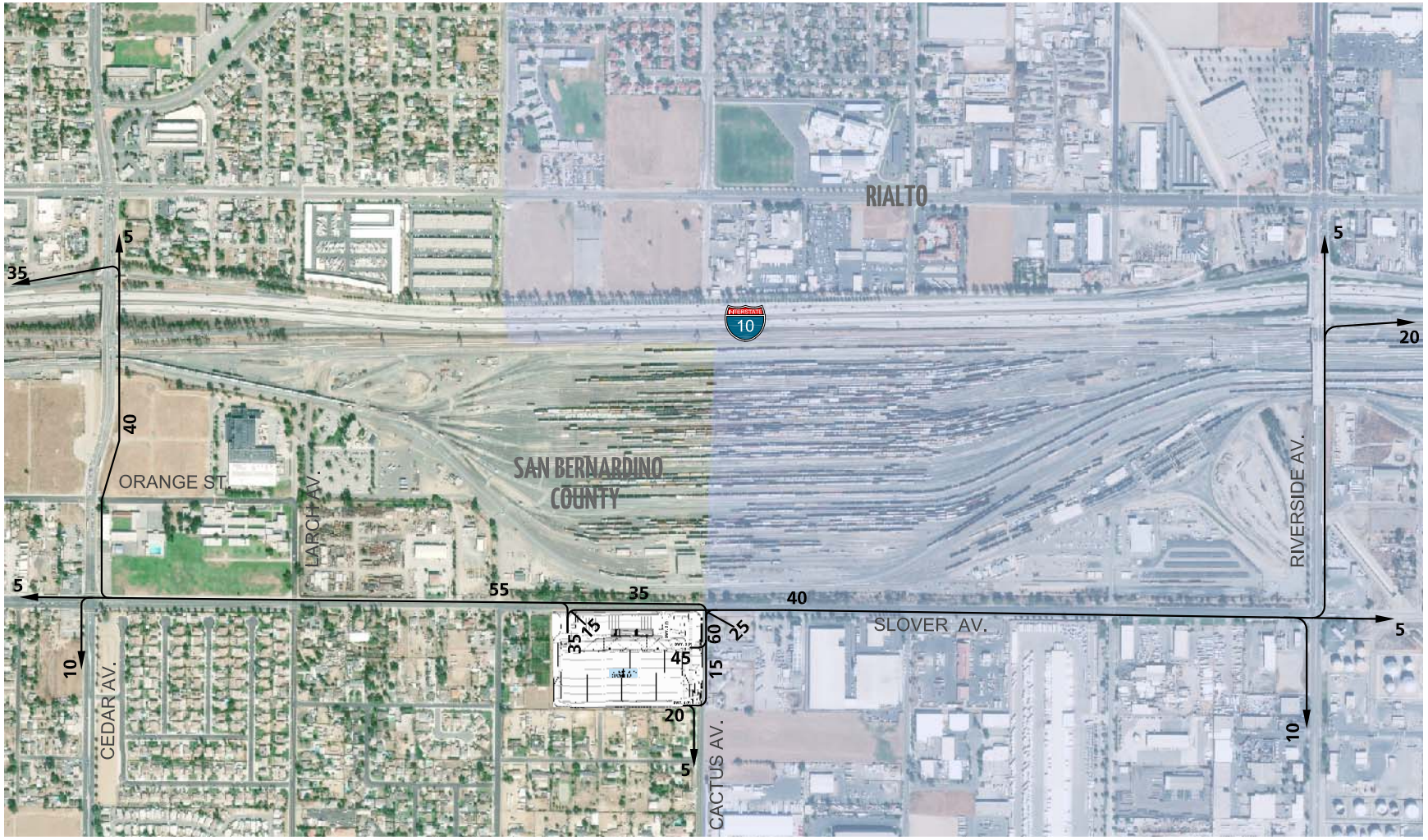


EXHIBIT 4-2: PROJECT (TRUCKS) TRIP DISTRIBUTION

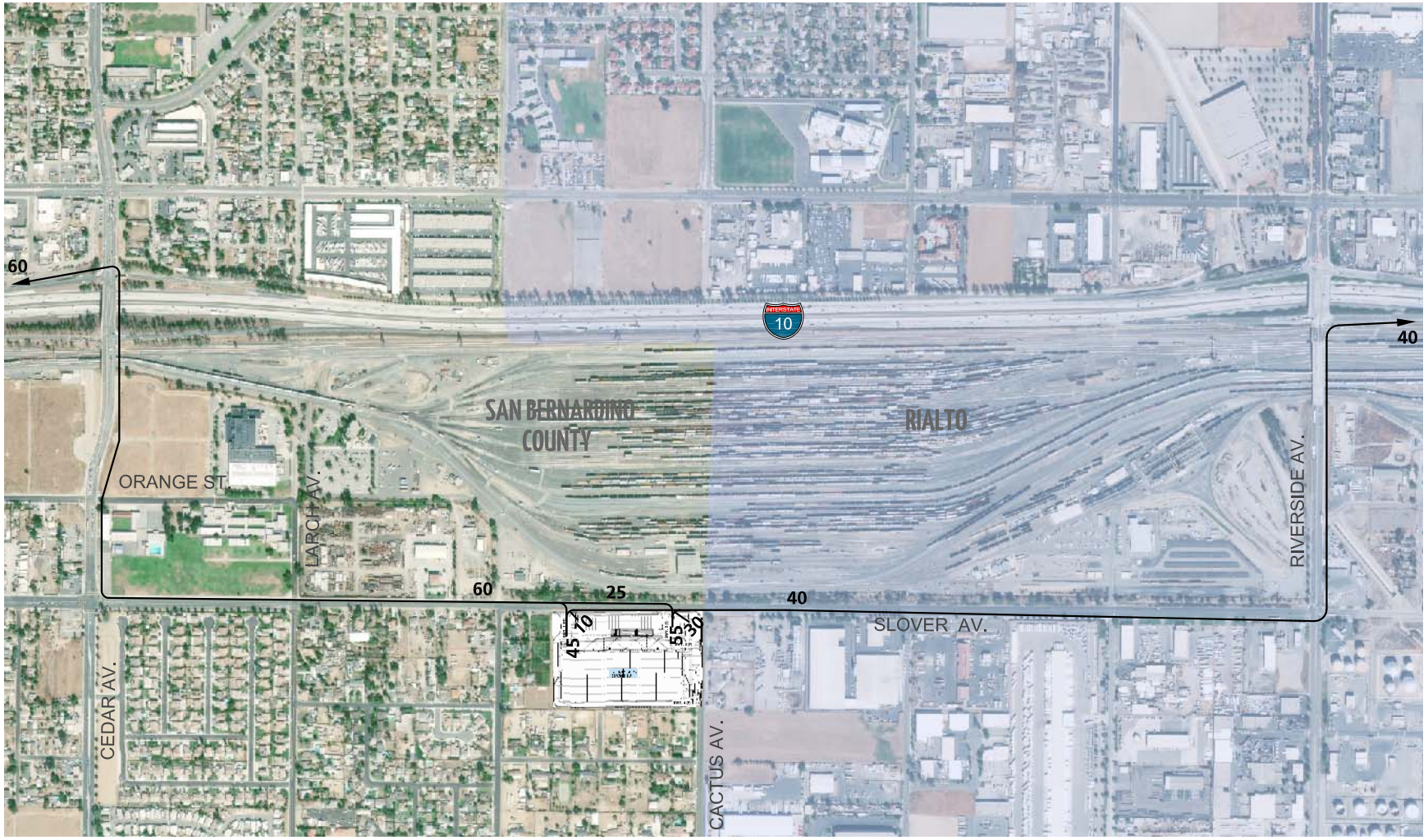
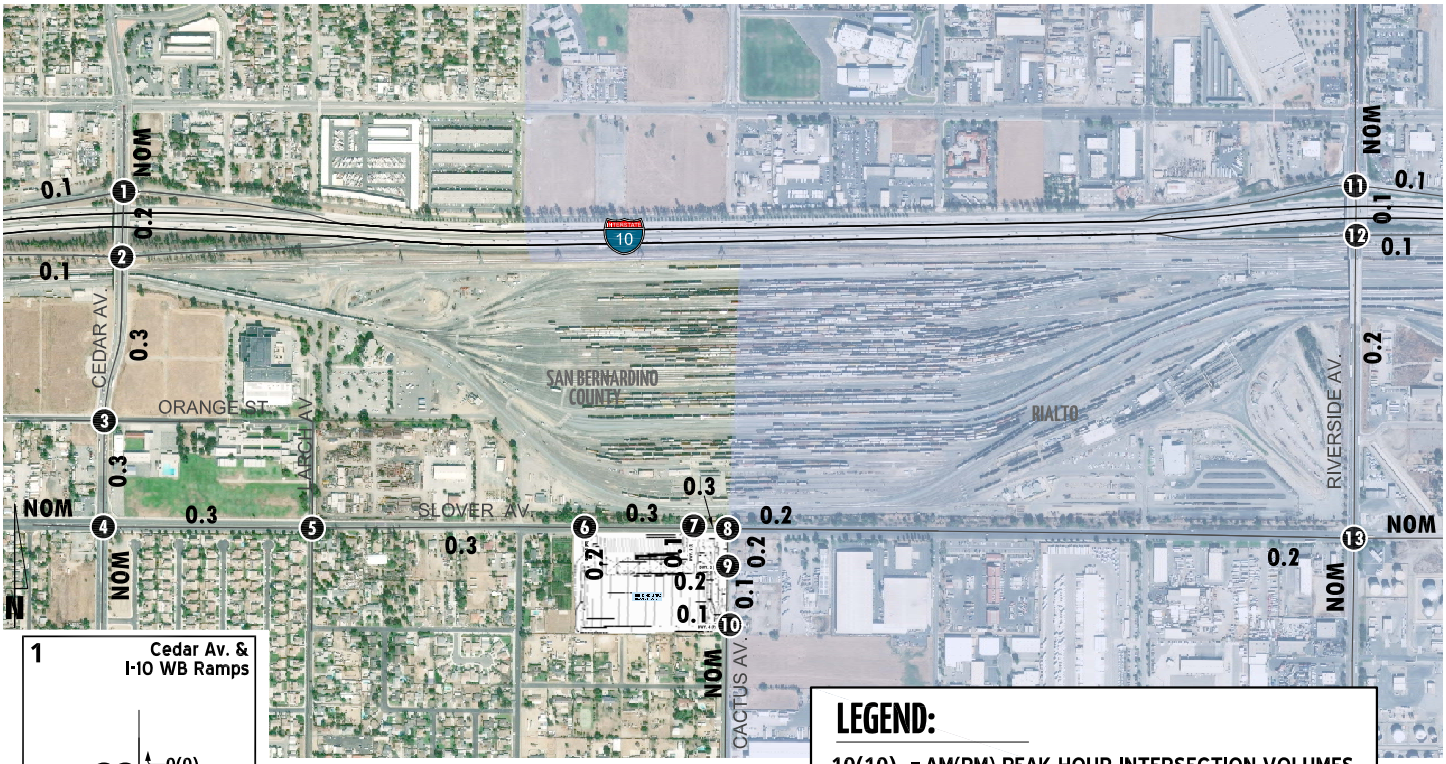


EXHIBIT 4-3: PROJECT ONLY TRAFFIC VOLUMES (IN PCE)



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES
10.0 = VEHICLES PER DAY (1000'S)
NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY

1 Cedar Av. & I-10 WB Ramps

0(0) 1(1) 0(0) ←0(0) ←0(0)
6(21) 0(1)

2 Cedar Av. & I-10 EB Ramps

1(1) 0(0)
0(0) 0(0) 20(7) 6(22) 0(0)

3 Cedar Av. & Orange St.

0(0) 21(8) 0(0) 0(0) ←0(0) ←0(0)
0(0) 0(0) 0(0) 0(0) 6(22) 0(0)

4 Cedar Av. & Slover Av.

0(0) 0(0) 21(8) 6(22) ←0(1) ←1(3)
0(0) 1(1) 0(0) 0(0) 0(0) 3(1)

5 Larch Av. & Slover Av.

0(0) 0(0) 0(0) 0(0) ←7(27) ←0(0)
0(0) 25(10) 0(0) 0(0) 0(0) 0(0)

6 Dwy. 1 & Slover Av.

←4(15) ←6(2)
14(5) 11(4) 3(12) 2(6)

7 Dwy. 2 & Slover Av.

←8(12) ←5(2)
11(10) 4(2) 1(5) 2(5)

8 Cactus Av. & Slover Av.

←11(4) ←7(3)
3(11) 9(4) 3(10) 2(7)

9 Cactus Av. & Dwy. 3

12(5) 4(2) 4(13) 0(0) 0(0) 1(4)

10 Cactus Av. & Dwy. 4

4(2) 0(0) 1(4) 0(1) 1(1) 0(0)

11 Riverside Av. & I-10 WB Ramps

0(0) 1(1) 0(0) ←0(0) ←12(5)
0(0) 0(1)

12 Riverside Av. & I-10 EB Ramps

14(5) 0(0) 0(0) 0(0) 0(0) 0(1) 4(13)

13 Riverside Av. & Slover Av.

14(5) 0(0) 0(0) 0(0) ←1(1) ←0(0)
4(14) 0(1) 1(3) 3(1) 0(0) 0(0)

4.5 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon background (ambient) growth at 2% per year, compounded annually, for 2020 traffic conditions. 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.

The currently adopted Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) (April 2016) growth forecasts for the County of San Bernardino identifies projected growth in population of 295,600 in 2012 to 344,100 in 2040, or a 16.41 percent increase over the 28-year period. (11) The change in population equates to roughly a 0.54 percent growth rate compounded annually. Similarly, growth over the same 28-year period in households is projected to increase by 58.7 percent, or 1.66 percent growth rate, compounded annually. Finally, growth in employment over the same 28-year period is projected to increase by 18.15 percent, or a 0.59 percent annual growth rate. The average annual growth rate between population, households, and employment is 0.93 percent per year and is in excess of the annual growth rate utilized for the purposes of this analysis (at 2.0 percent per year).

Based on a comparison of Existing (2019) traffic volumes to the Horizon Year (2040) forecasts, the average growth rate is estimated at approximately 1.41 percent per year, compounded annually between Existing (2019) and Horizon Year (2040) traffic conditions. The annual growth rate at each individual intersection is not lower than 1.26 percent per year to as high as 1.53 percent per year, 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 County of San Bernardino for Opening Year Cumulative (2020) and Horizon Year (2040) traffic conditions, especially when considered along with the addition of project-related traffic. As such, the growth in traffic volumes assumed in this traffic impact analysis would tend to overstate as opposed to understate the potential impacts to traffic and circulation.

4.6 CUMULATIVE DEVELOPMENT TRAFFIC

The California Environmental Quality Act (CEQA) guidelines require that other reasonably foreseeable development projects which are either approved or being processed concurrently in the study area also be included as part of a cumulative analysis scenario. A cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the County of San Bernardino. The cumulative project list includes known and foreseeable projects that are anticipated to contribute traffic to the study area intersections. Cumulative projects anticipated to contribute measurable traffic (i.e. 50 or more peak hour trips) to study area intersections. Any additional traffic generated by other projects not on the

cumulative projects list is accounted for through background ambient growth factors that have been applied to the peak hour volumes at study area intersections as discussed in Section 4.5 *Background Traffic*.

Lastly, the cumulative projects list in this study is also consistent with other traffic studies for recently approved projects in the County of San Bernardino, and also includes additional cumulative projects from the City of Rialto, City of Fontana, City of Jurupa Valley, City of Riverside, and County of Riverside in the vicinity of the study area. Exhibit 4-4 illustrates the cumulative development location map. A summary of cumulative development projects and their proposed land uses are shown on Table 4-3. If applicable, the traffic generated by cumulative projects was manually added to both the Opening Year Cumulative (2020) Conditions to ensure that traffic generated by the listed cumulative development projects in Table 4-3 are reflected as part of the background traffic. Cumulative only ADT and peak hour traffic volumes are provided on Exhibit 4-5. Cumulative project trip generation estimates are included in Appendix 4.2 of this TIA.

4.7 HORIZON YEAR (2040) VOLUME DEVELOPMENT

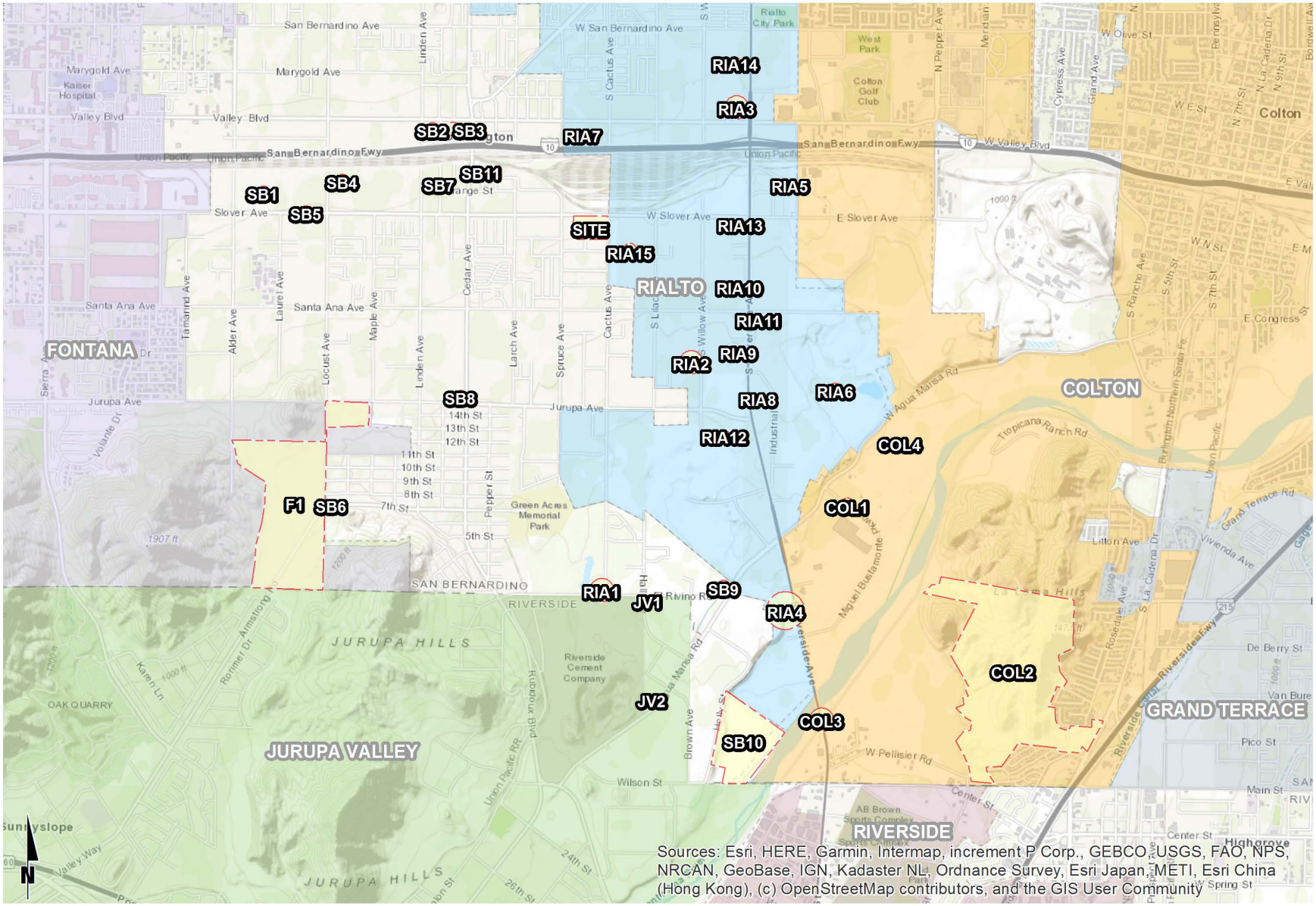
Traffic projections for Horizon Year (2040) without Project conditions were derived from the San Bernardino Transportation Analysis Model (SBTAM) using accepted procedures for model forecast refinement and smoothing for study area intersections located within the County of San Bernardino and unincorporated areas of the County of San Bernardino.

The traffic forecasts reflect the area-wide growth anticipated between Existing (2019) 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 March/April 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.

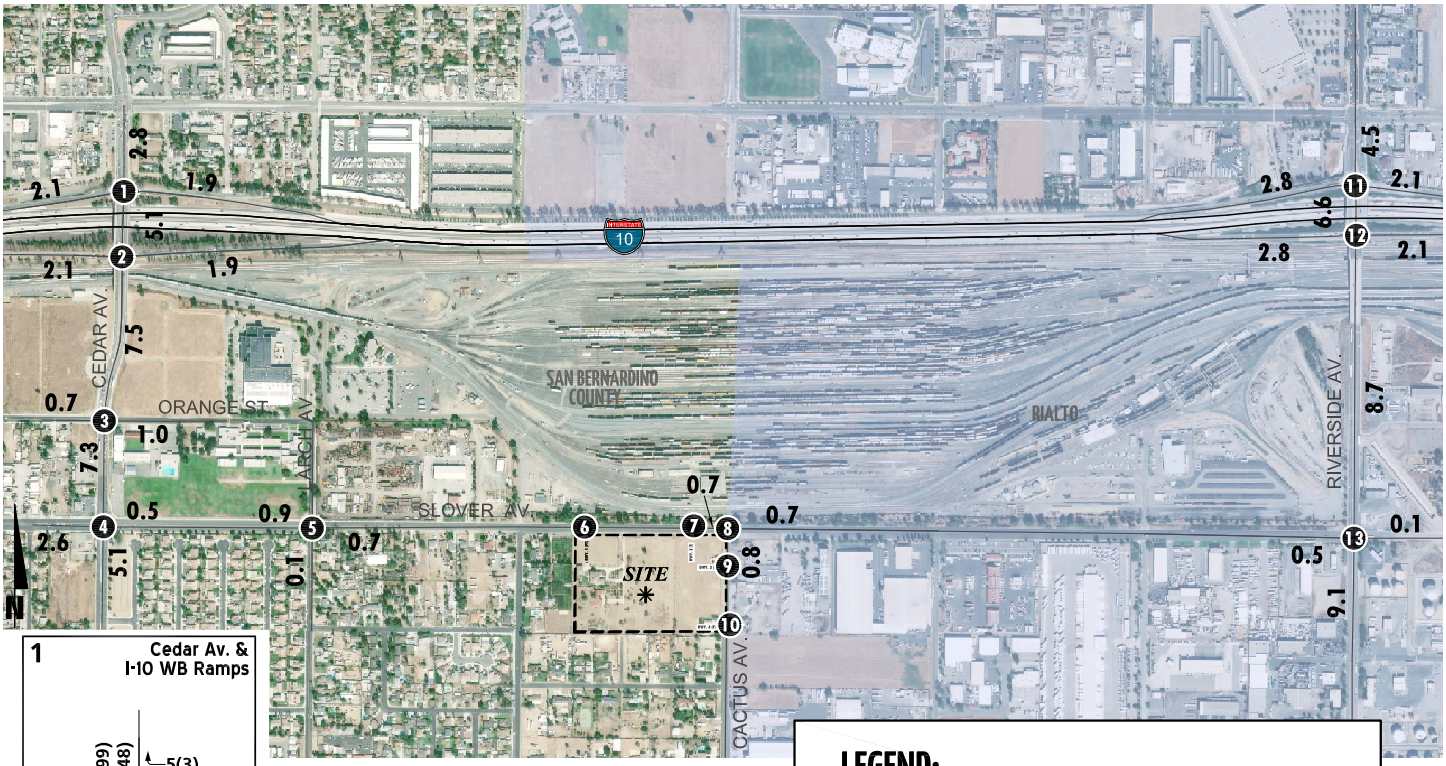
The SBTAM uses an AM peak period-to-peak hour factor of 0.35 and a PM peak period-to-peak hour factor of 0.27. These factors represent the relationship of the highest single AM peak hour to the modeled 3 hour AM peak period (an even distribution would result in a factor of 0.33) and the highest single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

EXHIBIT 4-4: CUMULATIVE DEVELOPMENT LOCATION MAP



URBAN CROSSROADS

EXHIBIT 4-5: CUMULATIVE ONLY TRAFFIC VOLUMES (IN PCE)



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES
10.0 = VEHICLES PER DAY (1000'S)

1 Cedar Av. & I-10 WB Ramps 29(99) 56(48) → 5(3) ← 0(0) ← 127(155) 84(132) ↑ 137(94) ↑	**2** Cedar Av. & I-10 EB Ramps 179(197) ↓ 3(4) ↓ 100(34) → 0(0) → 129(84) → 120(191) ↑ 141(178) ↑	**3** Cedar Av. & Orange St. 31(10) 220(261) 58(10) ↓ → 17(31) ← 0(0) ← 9(34) 8(31) → 0(0) → 4(16) → 16(5) ↑ 237(308) ↑ 38(11) ↑	**4** Cedar Av. & Slover Av. 92(63) 127(231) 16(18) ↓ → 23(17) ← 38(11) ← 3(7) 48(113) → 41(11) → 8(9) → 9(8) ↑ 220(194) ↑ 6(5) ↑	**5** Larch Av. & Slover Av. 0(0) 0(0) 0(0) ↓ → 0(0) ← 60(31) ← 0(0) 0(0) → 60(30) → 4(4) → 5(4) ↑ 0(0) ↑ 0(0) ↑	**6** Dwy. 1 & Slover Av. Future Intersection	**7** Dwy. 2 & Slover Av. Future Intersection
8 Cactus Av. & Slover Av. ← 39(15) ← 14(15) 45(14) → 15(16) → 21(16) ↑ 21(15) ↑	**9** Cactus Av. & Dwy. 3 Future Intersection	**10** Cactus Av. & Dwy. 4 Future Intersection	**11** Riverside Av. & I-10 WB Ramps 33(112) 73(115) ↓ → 74(27) ← 0(0) ← 233(144) 142(245) ↑ 156(85) ↑	**12** Riverside Av. & I-10 EB Ramps 284(184) 22(75) ↓ 110(41) → 0(0) → 265(139) → 187(290) ↑ 153(219) ↑	**13** Riverside Av. & Slover Av. 27(30) 511(290) 11(4) ↓ → 3(10) ← 0(0) ← 0(0) 35(29) → 0(0) → 31(23) → 26(28) ↑ 302(470) ↑ 0(0) ↑	

Table 4-3

Cumulative Development Land Use Summary

ID	Project Name	Land Use[1]	Quantity	Units[2]
County of San Bernardino				
SB1	NWC of Slover Av. and Locust Av.	Fast Food Restaurant With Drive-Thru	3.265	TSF
		Retail Store	7.200	TSF
		Warehouse	20.750	TSF
SB2	SEC of Linden Av. and Valley Bl.	Fast Food Restaurant	1.500	TSF
SB3	Valley Bl., West of Linden Av.	Office Building	0.250	AC
SB4	Linden Av., north of Slover Av.	Tire Store	3.000	TSF
SB5	Slover Av. between Locust Av. and Laurel Av.	High-Cube Warehouse	344.000	TSF
SB6	Locust Av. and 7th St.	SFDR	198	DU
SB7	NEC and NWC of Cedar Av. and Orange St.	Warehouse	395.000	TSF
SB8	NWC of Cedar Av. and Jurupa Av.	High-Cube Warehouse	677.000	TSF
SB9	West of Agua Mansa Rd. and North of El Rivino Rd.	High-Cube Warehouse	476.000	TSF
		Warehouse	30.000	TSF
SB10	Holly Street Truck Terminal	Truck Terminal	450.000	TSF
SB11	Cedar Avenue Technology Center	Warehouse	184.770	TSF
City of Fontana				
F1	West Valley Logistics Center	High-Cube Transload & Short-Term Storage	3183.100	TSF
		Warehouse	290.590	TSF
City of Rialto				
RIA1	Panattoni I-10 (Cactus Av. & El Rivino Rd.)	Warehouse	2,475.745	TSF
RIA2	CapRock III	Warehouse	582.000	TSF
RIA3	Newmark Merrill Companies	Discount Super Store	198.000	TSF
		Tire Store	9.861	TSF
		Retail	25.436	TSF
		Fast Food w/ Drive-Thru	5.484	TSF
RIA4	Kore Infrastructure	Biosolids Facility	288	TPD
RIA5	NEC of Sycamore Av. and Cameron Wy.	Trucking	--[3]	--
RIA6	South of Santa Ana Av., East of Riverside Av.	Warehouse	370.000	TSF
RIA7	South of Valley Bl., West of Cactus Av.	Warehouse	--[3]	--
RIA8	SEC of Riverside Av. and Industrial Dr.	Trucking	--[3]	--
RIA9	NWC of Riversid Av. and Industrial Dr.	Truck Drop	--[3]	--
RIA10	NWC of Riverside Av. and Santa Ana Av.	Warehouse	527.900	TSF
RIA11	SEC of Riverside Av. and Santa Ana Av.	Super Convenience Market/Gas Station	16	VFP
		Diesel Station	2	VFP
RIA12	South of Jurupa Av., West of Riverside Av.	FedEx	--[3]	--
RIA13	SWC of Riverside Av. & Slover Av.	Speciality Retail & Fast Food w/ Drive-Thru	8.510	TSF
RIA14	North of Valley Bl., West of Riverside Av.	Warehouse	--[3]	--
RIA15	South of Slover Av., East of Cactus Av.	Wheeler Trucking	--[3]	--
City of Colton				
COL1	2036 Miguel Bustamante Pkwy.	Warehouse	124.588	TSF
	2053 Miguel Bustamante Pkwy.	Warehouse	174.996	TSF
COL2	Roquet Ranch	SFDR	754	DU
		Condo/Townhomes	244	DU
		Active Adult - Attached	52	DU
		Shopping Center	6.500	TSF
		Coffee Shop with Drive Thru	1.500	TSF
		Fast Food with Drive Thru	4.000	TSF
		Active Park	11.1	AC
		Passive Park	8.4	AC
COL3	2163 Riverside Av.	High Cube Warehouse	447.330	TSF
COL4	North of Agua Mansa Rd., East of Hopkins Rd.	Warehouse	808.500	TSF
City of Jurupa Valley				
JV1	Inland Empire Cold Storage	Cold Storage Facility	40.800	TSF
JV2	Agua Mansa Commerce Park Specific Plan	High-Cube Warehouse	4277.000	TSF
		General Light Industrial	150.000	TSF
		Commercial Retail	25.000	TSF

[1] SFDR = Single Family Detached Residential

[2] DU = Dwelling Units; TSF = Thousand Square Feet; STU = Students; AC = Acres; TPD = Tons Per Day; VFP = Vehicle Fueling Positions

[3] Quantity and land use unknown. City of Rialto provided estimated trips and PCE AM and PM.

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 (2020) 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 (2020) 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 (2019) and Opening Year Cumulative (2020) 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.

The SBTAM has truck data that is unusually low. As such, in an effort to conduct a conservative analysis, the presence of trucks has been accounted for based on the manual volume adjustments made to demonstrate growth above Opening Year Cumulative (2020) traffic forecasts, which are presented and evaluated in PCE (see Section 3.7 *Existing Traffic Counts* for discussion on PCE). As such, the Horizon Year (2040) forecasts are also assumed to be in PCE for the purposes of this analysis. Post-processing worksheets for Horizon Year (2040) Without Project traffic conditions are provided in Appendix 4.1.

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5 E+P TRAFFIC CONDITIONS

In an effort to satisfy the CEQA Guideline section 15125(a), an analysis of existing traffic volumes plus traffic generated by the proposed Project (E+P) has been included in this analysis. This section discusses the traffic forecasts for E+P conditions and the resulting intersection operations, traffic signal warrant, and freeway mainline analyses. Project impacts to baseline traffic conditions (i.e., existing conditions) have been identified along with mitigation measures necessary to reduce project-related impacts to less than significant.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for E+P conditions are consistent with those shown previously on Exhibit 3-1, with the exception of 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. In other words, no other off-site improvements are assumed beyond those that currently exist with the exception of the intersections and roadways that would be improved by the Project for access.

5.2 E+P TRAFFIC VOLUME FORECASTS

This scenario includes Existing (2019) traffic volumes plus Project traffic. The ADT volumes and AM and PM peak hour intersection turning movement volumes are shown on Exhibit 5-1.

5.3 INTERSECTION OPERATIONS ANALYSIS

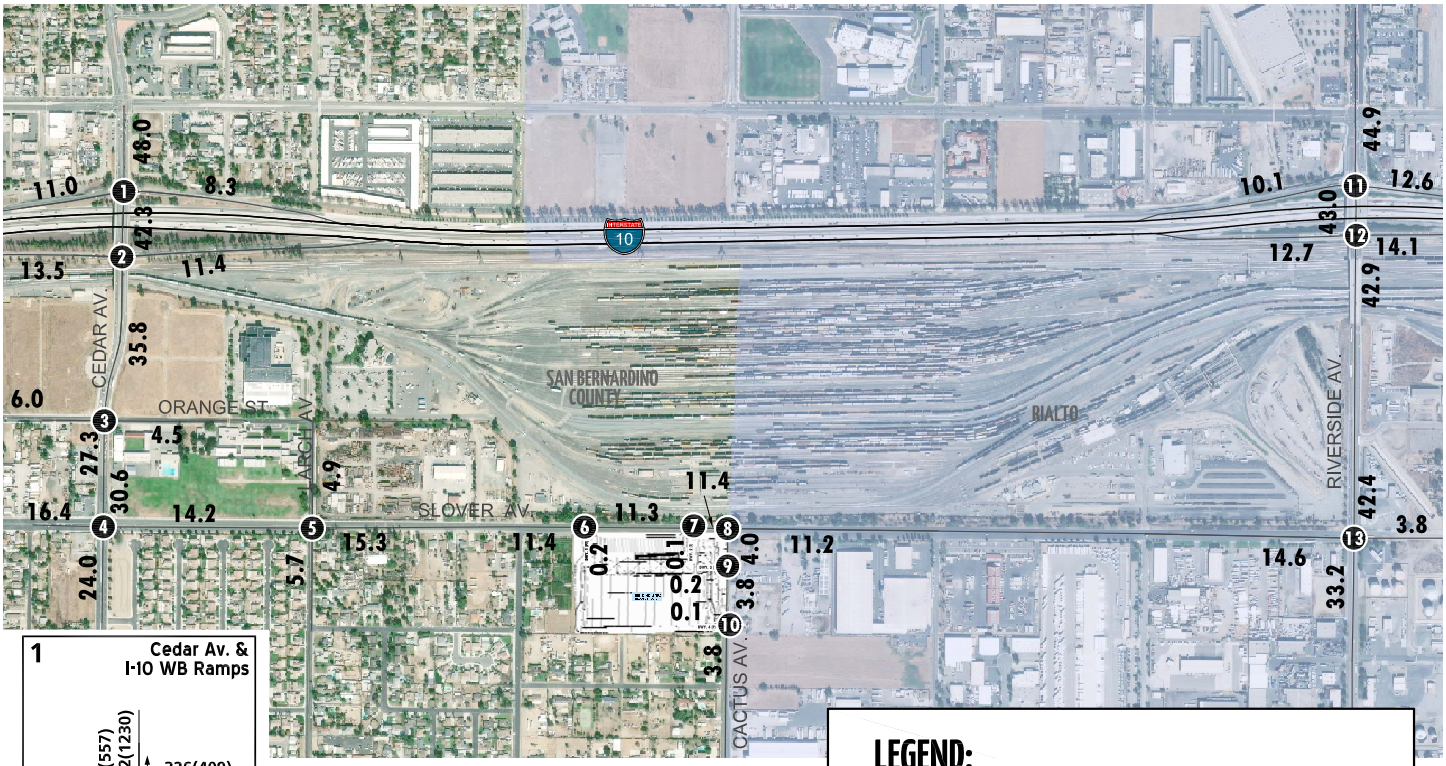
E+P peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 5-1, which indicates that all study area intersections are anticipated to continue to operate at an acceptable LOS during E+P traffic conditions consistent with Existing (2019) traffic conditions.

A summary of the peak hour intersection LOS for E+P conditions are shown on Exhibit 5-2. The intersection operations analysis worksheets for E+P traffic conditions are included in Appendix 5.1 of this TIA.

5.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic Signal warrants for E+P traffic conditions are based on existing peak hour intersection turning volumes and the addition of Project traffic. For E+P traffic conditions, no additional study area intersections (i.e., Project driveways) are anticipated to meet the planning level daily volume warrant under E+P conditions (see Appendix 5.2).

EXHIBIT 5-1: E+P TRAFFIC VOLUMES (IN PCE)



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES
10.0 = VEHICLES PER DAY (1000'S)

1 Cedar Av. & I-10 WB Ramps

812(557) → 1432(1230) ←
326(409) ← 13(4) ← 365(232)
343(302) → 1206(1528) ↑

2 Cedar Av. & I-10 EB Ramps

1354(1008) ← 443(454) ←
453(763) → 4(1) → 382(283) →
1095(1068) ↑ 434(430) ↑

3 Cedar Av. & Orange St.

456(240) → 1172(1004) → 109(46) →
91(245) ← 1(2) ← 1(3) ←
294(158) → 6(49) → 21(10) →
1(8) ↑ 1144(1095) ↑ 7(2) ↑

4 Cedar Av. & Slover Av.

110(94) → 955(784) → 129(139) →
134(125) ← 156(264) ← 15(38) ←
189(225) → 128(473) → 39(130) →
74(86) ↑ 829(756) ↑ 35(72) ↑

5 Larch Av. & Slover Av.

4(29) → 34(44) → 39(52) →
32(70) ← 255(345) ← 39(61) ←
5(37) → 240(593) → 47(54) →
45(54) ↑ 54(149) ↑ 24(79) ↑

6 Dwy. 1 & Slover Av.

225(392) ←
6(2) ←
246(489) → 11(4) →
3(12) ↑ 2(6) ↑

7 Dwy. 2 & Slover Av.

229(389) ←
5(2) ←
243(494) → 4(2) →
1(5) ↑ 2(5) ↑

8 Cactus Av. & Slover Av.

178(289) ←
78(75) ←
185(437) → 59(62) →
57(102) ↑ 31(76) ↑

9 Cactus Av. & Dwy. 3

12(5) → 125(132) →
4(13) → 0(0) →
0(0) ↑ 84(165) ↑

10 Cactus Av. & Dwy. 4

4(2) → 121(130) →
1(4) → 0(1) →
1(1) ↑ 83(161) ↑

11 Riverside Av. & I-10 WB Ramps

583(430) → 1243(1052) →
353(522) ← 0(2) ← 606(454) ←
400(355) ↑ 823(1479) ↑

12 Riverside Av. & I-10 EB Ramps

1324(1083) → 527(421) →
313(624) → 0(3) → 429(362) →
910(1210) ↑ 591(680) ↑

13 Riverside Av. & Slover Av.

374(342) → 1362(1078) → 20(26) →
44(82) ← 17(10) ← 23(35) ←
328(493) → 35(127) → 87(147) →
81(26) ↑ 1160(1276) ↑ 26(17) ↑

EXHIBIT 5-2: E+P SUMMARY OF LOS

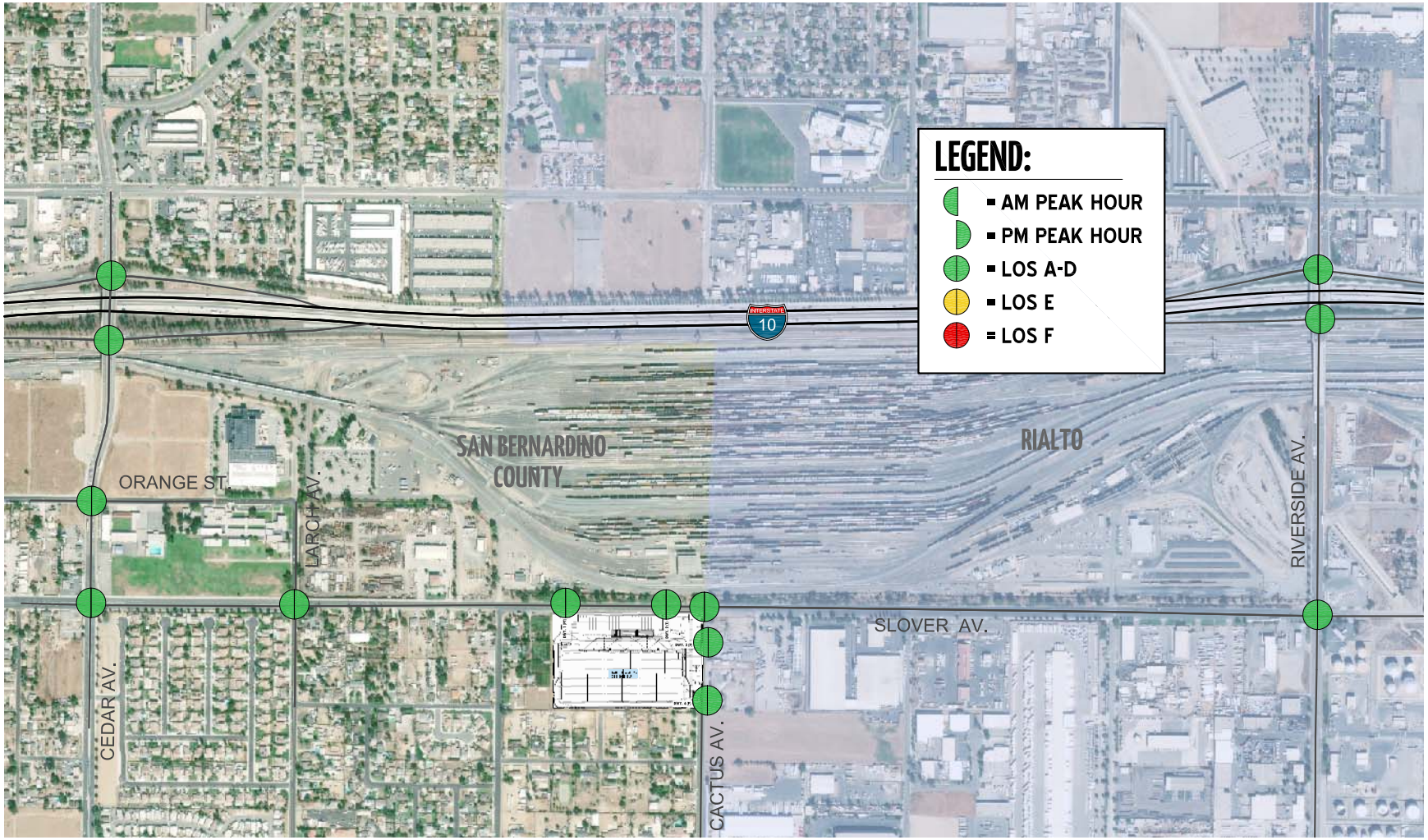


Table 5-1

Intersection Analysis for E+P Conditions

#	Intersection	Traffic Control[2]	Existing (2019)				E+P			
			Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Cedar Av. & I-10 Westbound Ramps	TS	30.3	19.4	C	B	30.6	19.8	C	B
2	Cedar Av. & I-10 Eastbound Ramps	TS	35.1	48.7	D	D	35.6	48.9	D	D
3	Cedar Av. & Orange St.	TS	17.8	15.8	B	B	17.9	16.0	B	B
4	Cedar Av. & Slover Av.	TS	30.9	32.2	C	C	32.0	33.7	C	C
5	Larch Av. & Slover Av.	TS	12.1	16.9	B	B	12.2	17.1	B	B
6	Driveway 1 & Slover Av.	**CSS**	Future Intersection				10.1	12.2	B	B
7	Driveway 2 & Slover Av.	**CSS**	Future Intersection				9.6	11.6	A	B
8	Cactus Av. & Slover Av.	CSS	11.5	15.0	B	C	11.8	15.9	B	C
9	Cactus Av. & Driveway 3	**CSS**	Future Intersection				9.8	10.5	A	B
10	Cactus Av. & Driveway 4	**CSS**	Future Intersection				9.7	10.1	A	B
11	Riverside Av. & I-10 WB Ramps	TS	21.2	17.6	C	B	21.4	17.7	C	B
12	Riverside Av. & I-10 EB Ramps	TS	24.7	29.1	C	C	25.0	29.4	C	C
13	Riverside Av. & Slover Av.	TS	43.0	41.3	D	D	45.3	42.3	D	D

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

5.5 OFF-RAMP QUEUING ANALYSIS

A queueing analysis was performed for eastbound and westbound off-ramps of the I-10 Freeway at Cedar Avenue and Riverside Avenue to assess vehicle queues for the off ramps that may potentially impact peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-10 Freeway. Queuing analysis findings are presented in Table 5-2. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline. As shown on Table 5-2, there are no movements that are anticipated to experience queuing issues during the weekday AM or PM peak hours based on the E+P 95th percentile traffic flows. Worksheets for E+P conditions off-ramp queuing analysis are provided in Appendix 5.3.

5.6 BASIC FREEWAY SEGMENT ANALYSIS

E+P mainline directional volumes for the AM and PM peak hours are provided on Exhibit 5-3. As shown on Table 5-3, there are no additional basic freeway mainline segments anticipated to operate at an unacceptable LOS under E+P traffic conditions during the peak hours, in addition to the location previously identified under Existing (2019) traffic conditions. E+P basic freeway segment analysis worksheets are provided in Appendix 5.4.

5.7 FREEWAY MERGE/DIVERGE ANALYSIS

Ramp merge and diverge operations were also evaluated for Existing conditions and the results of this analysis are presented in Table 5-4. All ramp junctions are anticipated to continue to operate at an acceptable LOS under E+P traffic conditions consistent with Existing (2019) traffic conditions. E+P freeway ramp junction operations analysis worksheets are provided in Appendix 5.5.

5.8 IMPACTS AND MITIGATION MEASURES

If applicable, improvement strategies have been recommended at intersections and freeway segments that have been identified as impacted under E+P traffic conditions in an effort to achieve an acceptable LOS.

5.8.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

All study area intersections are anticipated to continue to operate at an acceptable LOS under E+P Conditions, as such, no improvements are necessary.

5.8.2 RECOMMENDED IMPROVEMENTS TO ADDRESS OFF-RAMP QUEUES

As shown previously on Table 5-2, there are no peak hour queuing issues anticipated at the I-10 Freeway at Cedar Avenue interchange for E+P traffic conditions. As such, no improvements are necessary.

Table 5-2

I-10 Freeway Off-Ramp Peak Hour Queuing Summary for E+P Conditions

Intersection	Movement	Existing (2019)					E+P			
		Available Stacking Distance (Feet)	95th Percentile Queue (Feet)		Acceptable? [1]		95th Percentile Queue (Feet)		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
Cedar Av. & I-10 Westbound Off-Ramp	WBR	480	222	234	Yes	Yes	222	234	Yes	Yes
	WBL/T/R	1,270	457 [2]	281 [2]	Yes	Yes	457 [2]	281 [2]	Yes	Yes
Cedar Av. & I-10 Eastbound Off-Ramp	EBL	340	411 [2]	511 [2]	Yes[3]	Yes[3]	411 [2]	523 [2]	Yes[3]	Yes[3]
	EBL/T/R	1,900	401 [2]	433 [2]	Yes	Yes	431 [2]	429 [2]	Yes	Yes
Riverside Av. & I-10 Westbound Off-Ramp	WBL	360	280	289	Yes	Yes	285	293	Yes	Yes
	WBL/T/R	1,190	230	283	Yes	Yes	236	285	Yes	Yes
	WBR	360	168	215	Yes	Yes	168	215	Yes	Yes
Riverside Av. & I-10 Eastbound Off-Ramp	EBL	1,190	238	366 [2]	Yes	Yes	238	366 [2]	Yes	Yes
	EBL/T/R	1,190	181	382 [2]	Yes	Yes	181	382 [2]	Yes	Yes
	EBR	350	167	237 [2]	Yes	Yes	167	238 [2]	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided.

[2] 95th percentile volume exceeds capacity, queue may be longer.

[3] Although the 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-10 Freeway mainline.

Table 5-3

Basic Freeway Segment Analysis for E+P Conditions

Freeway	Direction[1]	Mainline Segment	Lanes[2]	Existing (2019)				E+P			
				Density[3]		LOS[4]		Density[3]		LOS[4]	
				AM	PM	AM	PM	AM	PM	AM	PM
I-10	WB	West of Cedar Av.	4	34.4	**36.0**	D	**E**	34.5	**36.2**	D	**E**
		East of Cedar Av.	5	23.0	24.8	C	C	23.0	24.8	C	C
		East of Riverside Av.	4	31.1	**35.5**	D	**E**	31.1	**35.6**	D	**E**
	EB	West of Cedar Av.	5	21.2	21.2	C	C	21.3	21.2	C	C
		East of Cedar Av.	4	28.6	27.1	D	D	28.6	27.1	D	D
		East of Riverside Av.	4	30.7	27.5	D	D	30.7	27.7	D	D

* **BOLD** = Unacceptable Level of Service

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and are based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

Table 5-4

Freeway Ramp Junction Merge/Diverge Analysis for E+P Conditions

Freeway	Direction[1]	Ramp or Segment	Lanes on Freeway[2]	Existing (2019)				E+P			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[3]	LOS[4]	Density[3]	LOS[4]	Density[3]	LOS[4]	Density[3]	LOS[4]
I-10	WB	On-Ramp at Cedar Av.	4	30.2	D	29.3	D	30.2	D	29.5	D
		Off-Ramp at Cedar Av.	5	17.9	B	19.3	B	17.9	B	19.3	B
		Off-Ramp at Riverside Av.	4	22.1	C	24.2	C	22.2	C	24.3	C
	EB	Off-Ramp at Cedar Av.	5	15.7	B	16.1	B	17.3	B	18.2	B
		On-Ramp at Cedar Av.	4	27.5	C	26.9	C	27.6	C	26.9	C
		On-Ramp at Riverside Av.	4	27.3	C	25.6	C	27.3	C	25.8	C

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and is based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

EXHIBIT 5-3: E+P FREEWAY MAINLINE VOLUMES

5.8.3 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON FREEWAY FACILITIES

At this time, Caltrans has no fee programs or other improvement programs in place to address the deficiencies caused by development projects in the County of San Bernardino (or other neighboring jurisdictions) on SHS roadway segments. As such, no improvements have been recommended to address the E+P deficiencies on the SHS, because there is no feasible mitigation available.

6 OPENING YEAR CUMULATIVE (2020) TRAFFIC CONDITIONS

This section discusses the methods used to develop Opening Year Cumulative (2020) Without and With Project traffic forecasts, and the resulting intersection operations, traffic signal warrant, and freeway mainline analyses.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative (2020) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of Project driveways and those facilities assumed to be constructed by the Project and cumulative developments to provide site access are also assumed to be in place for Opening Year Cumulative (2020) traffic conditions.

6.2 OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

Forecasts for Opening Year Cumulative (2020) Without Project traffic conditions include the application of a 4.04 percent (for 2018 counts) or a 1.02 percent (for 2019 counts) ambient growth plus cumulative development projects. The weekday ADT and AM and PM peak hour traffic volumes which can be expected for Opening Year Cumulative (2020) Without Project traffic conditions are shown on Exhibit 6-1.

6.3 OPENING YEAR CUMULATIVE (2020) WITH PROJECT TRAFFIC VOLUME FORECASTS

Forecasts for Opening Year Cumulative (2020) With Project traffic conditions include the addition of Project traffic to the Opening Year Cumulative (2020) Without Project forecasts. The weekday ADT and AM and PM peak hour traffic volumes which can be expected for Opening Year Cumulative (2020) With Project traffic conditions are shown on Exhibit 6-2.

6.4 INTERSECTION OPERATIONS ANALYSIS

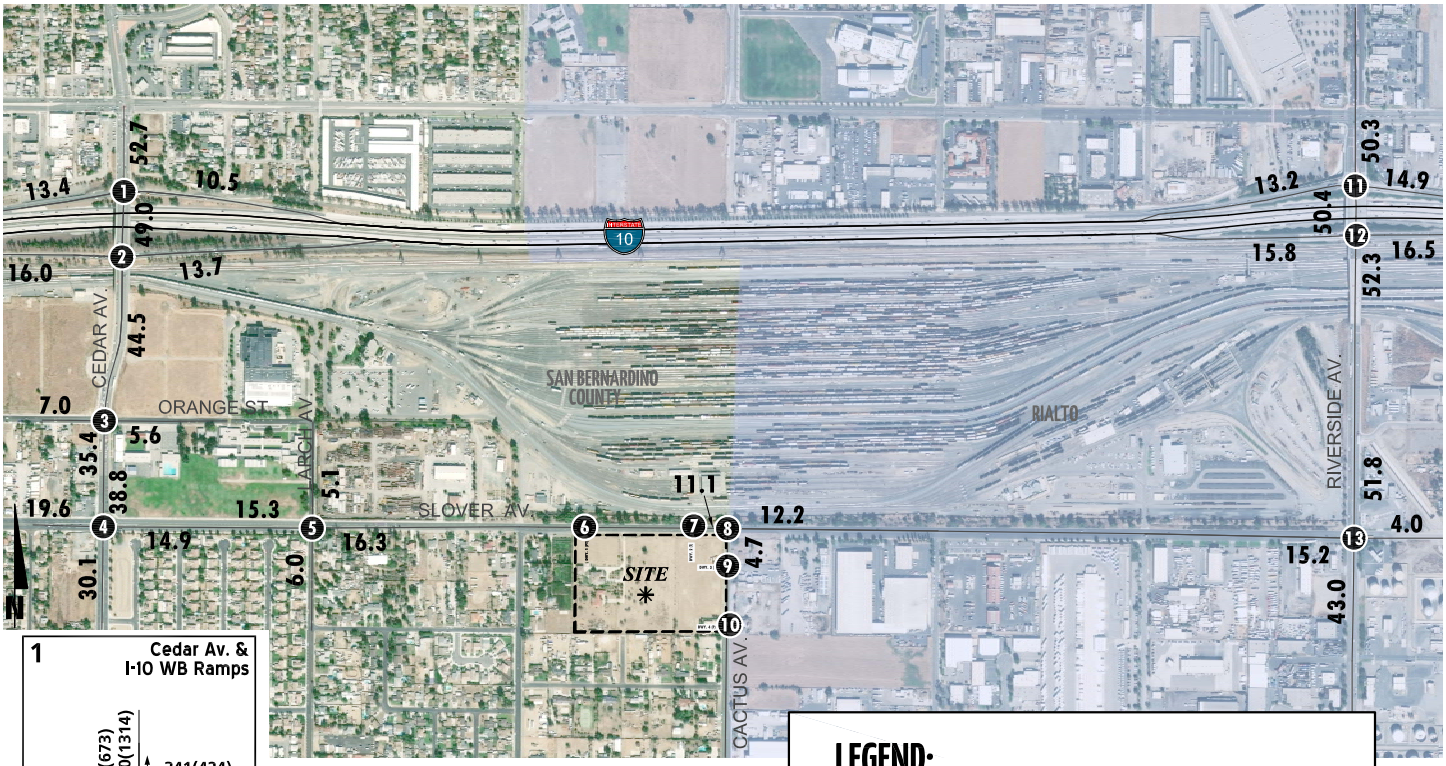
6.4.1 OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT TRAFFIC CONDITIONS

LOS calculations were conducted for the study intersections to evaluate their operations under Opening Year Cumulative (2020) Without Project conditions with roadway and intersection geometrics consistent with Section 6.1 *Roadway Improvements*. As shown in Table 6-1, the following intersections were found to operate at a deficient LOS:

- Cedar Avenue & I-10 Freeway Eastbound Ramps (#2) – LOS E PM peak hour only
- Cedar Avenue & Slover Avenue (#4) – LOS E AM and PM peak hours
- Riverside Avenue & I-10 EB Ramps (#12) – LOS E PM peak hour only
- Riverside Avenue & Slover Avenue (#13) – LOS F AM and PM peak hours

A summary of the peak hour intersection LOS for Opening Year Cumulative (2020) Without Project conditions are shown on Exhibit 6-3. The intersection operations analysis worksheets for Opening Year Cumulative (2020) Without Project traffic conditions are included in Appendix 6.1 of this TIA.

EXHIBIT 6-1: OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT TRAFFIC VOLUMES (IN PCE)



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES
10.0 = VEHICLES PER DAY (1000'S)

1 Cedar Av. & I-10 WB Ramps

865(673) → 1530(1314) →
← 341(424)
← 14(4)
← 503(394)
431(422) →
← 1379(1667)

2 Cedar Av. & I-10 EB Ramps

← 1234(1234)
← 471(471)
820(820) →
1(1) →
368(368) →
1268(1268) →
621(621) ←

3 Cedar Av. & Orange St.

500(258) →
1405(1287) →
143(57) →
← 102(284)
← 1(2)
← 9(37)
311(193) →
6(50) →
25(26) →
17(13) →
1410(1413) →
41(13) ←

4 Cedar Av. & Slover Av.

204(160) →
1110(1039) →
127(153) →
← 155(123)
← 172(282)
← 18(43)
241(344) →
141(497) →
49(143) →
85(97) →
1072(972) →
39(78) ←

5 Larch Av. & Slover Av.

4(30) →
35(45) →
41(54) →
← 33(72)
← 289(359)
← 41(62)
5(38) →
250(630) →
53(59) →
52(60) →
56(153) →
24(81) ←

6 Dwy. 1 & Slover Av.

Future Intersection

7 Dwy. 2 & Slover Av.

Future Intersection

8 Cactus Av. & Slover Av.

← 185(308)
← 87(89)
202(453) →
66(76) →
77(111) →
51(86) ←

9 Cactus Av. & Dwy. 3

Future Intersection

10 Cactus Av. & Dwy. 4

Future Intersection

11 Riverside Av. & I-10 WB Ramps

627(551) →
1340(1187) →
← 434(559)
← 0(2)
← 839(601)
549(607) →
995(1592) ←

12 Riverside Av. & I-10 EB Ramps

1620(1284) →
559(504) →
429(677) →
0(3) →
703(508) →
1115(1523) ←
751(899) ←

13 Riverside Av. & Slover Av.

394(373) →
1900(1390) →
31(31) →
← 48(93)
← 16(9)
← 23(35)
365(517) →
36(128) →
119(169) →
105(54) →
1485(1772) ←
26(17) ←

EXHIBIT 6-2: OPENING YEAR CUMULATIVE (2020) WITH PROJECT TRAFFIC VOLUMES (IN PCE)

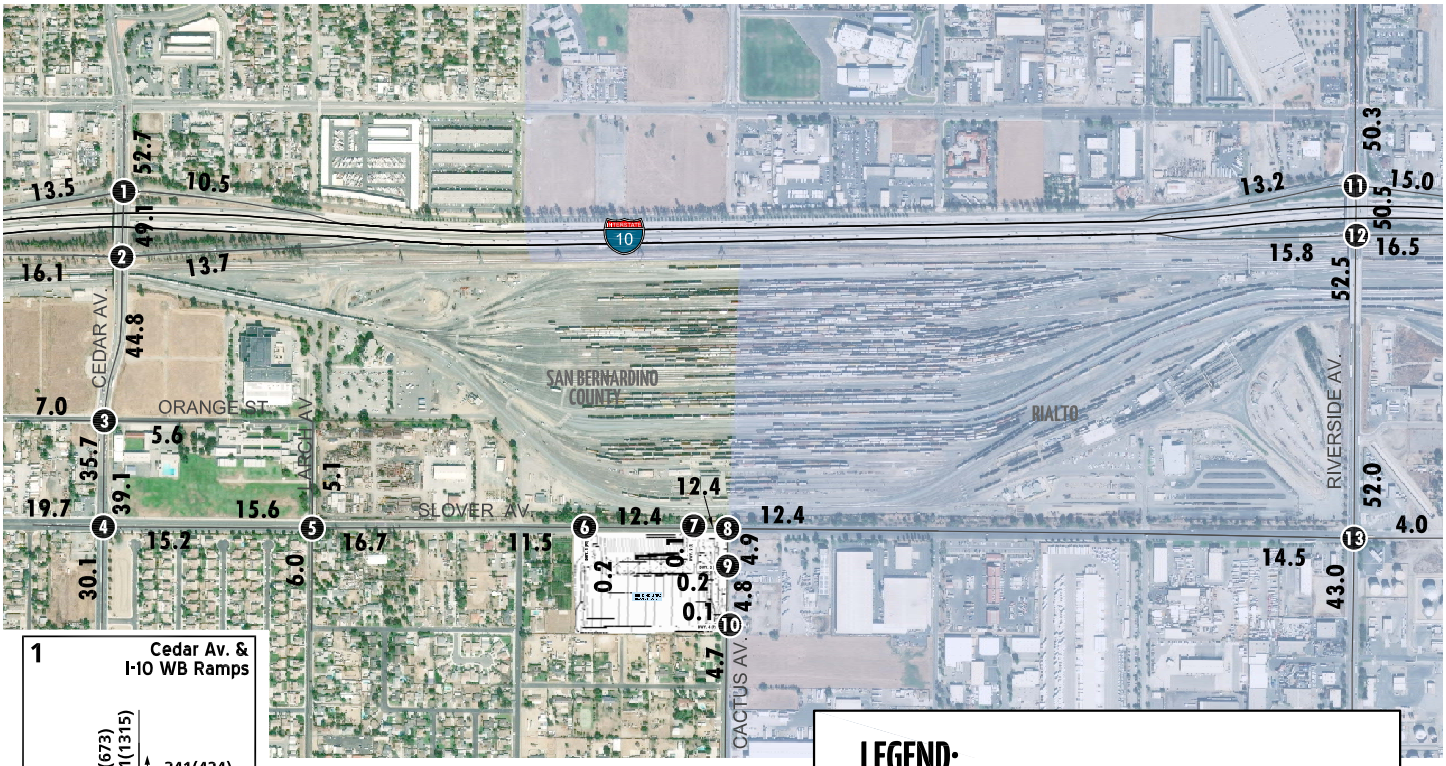


EXHIBIT 6-3: OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT SUMMARY OF LOS

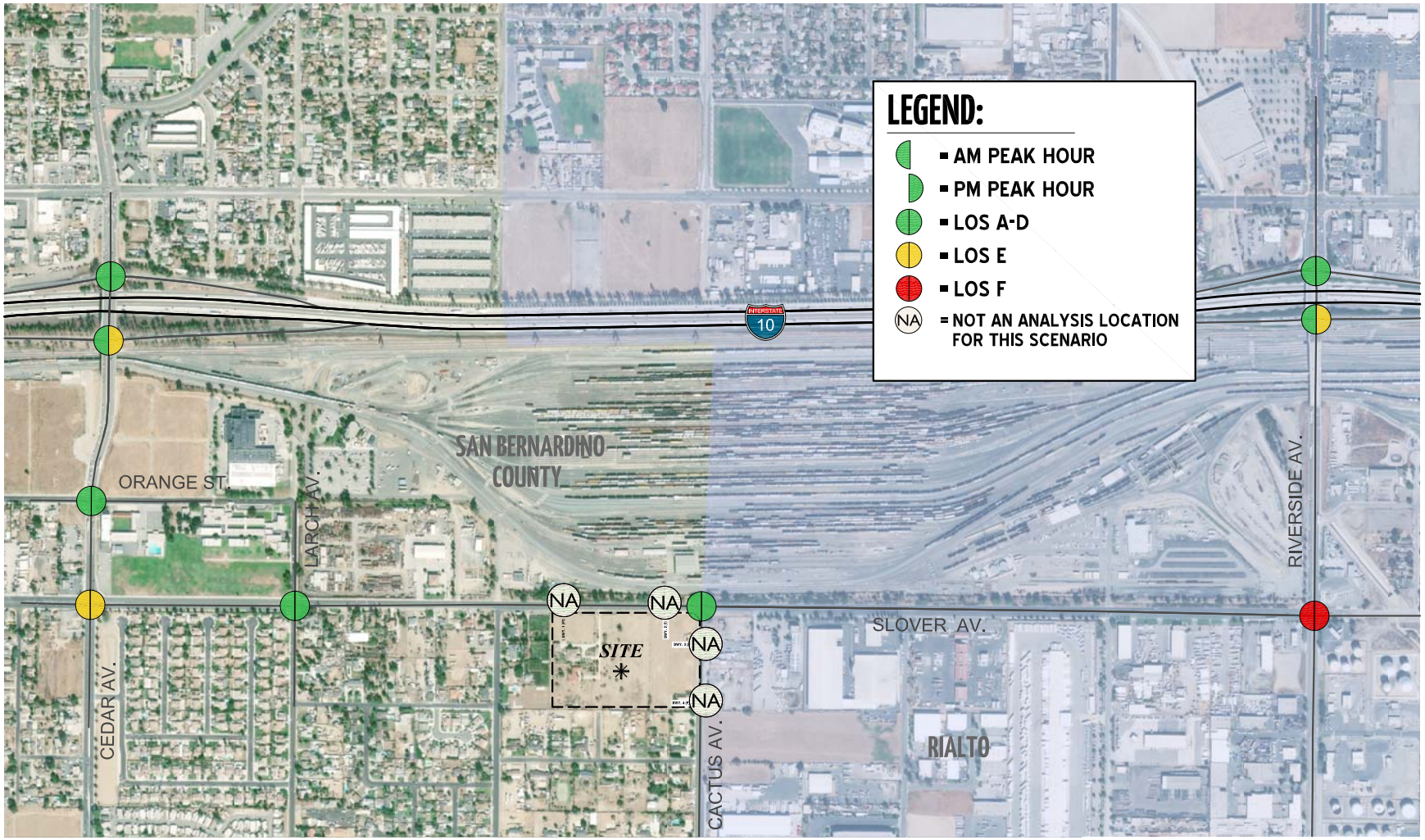


Table 6-1

Intersection Analysis for Opening Year Cumulative (2020) Conditions

#	Intersection	Traffic Control[2]	2020 Without Project				2020 With Project			
			Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Cedar Av. & I-10 Westbound Ramps	TS	51.4	28.2	D	C	52.3	30.2	D	C
2	Cedar Av. & I-10 Eastbound Ramps	TS	48.1	**73.8**	D	**E**	49.5	**74.7**	D	**E**
3	Cedar Av. & Orange St.	TS	24.9	24.6	C	C	25.1	24.9	C	C
4	Cedar Av. & Slover Av.	TS	**57.3**	**70.9**	**E**	**E**	**57.8**	**73.6**	**E**	**E**
5	Larch Av. & Slover Av.	TS	12.2	17.6	B	B	12.3	17.8	B	B
6	Driveway 1 & Slover Av.	**CSS**	Future Intersection				10.4	12.5	B	B
7	Driveway 2 & Slover Av.	**CSS**	Future Intersection				9.8	12.0	A	B
8	Cactus Av. & Slover Av.	CSS	13.0	18.4	B	C	13.0	18.8	B	C
9	Cactus Av. & Driveway 3	**CSS**	Future Intersection				10.3	11.1	B	B
10	Cactus Av. & Driveway 4	**CSS**	Future Intersection				10.2	10.6	B	B
11	Riverside Av. & I-10 WB Ramps	TS	31.6	27.0	C	C	32.0	27.1	C	C
12	Riverside Av. & I-10 EB Ramps	TS	46.7	**67.6**	D	**E**	47.2	**69.2**	D	**E**
13	Riverside Av. & Slover Av.	TS	**131.9**	**112.7**	**F**	**F**	**135.1**	**113.9**	**F**	**F**

BOLD = 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] TS = Traffic Signal; CSS = Cross-Street Stop; **CSS** = Improvement

6.4.2 OPENING YEAR CUMULATIVE (2020) WITH PROJECT TRAFFIC CONDITIONS

As shown on Table 6-1 and illustrated on Exhibit 6-4, the addition of Project traffic is not anticipated to result in new deficiencies, in addition to those previously identified under Opening Year Cumulative (2020) Without Project conditions. The intersection operations analysis worksheets for Opening Year Cumulative (2020) With Project conditions are included in Appendix 6.2 of this TIA. Measures to address deficiencies for Opening Year Cumulative (2020) traffic conditions are discussed in Section 6.9 *Opening Year Cumulative (2020) Impacts and Recommended Improvements*.

6.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants were not evaluated for Opening Year Cumulative (2020) Without Project traffic conditions as the intersection of Cactus Avenue and Slover Avenue is currently warranted under Existing (2019) traffic conditions and all other locations are currently signalized. The traffic signal warrant analysis for Opening Year Cumulative (2020) With Project traffic conditions is based on existing peak hour intersection turning volumes, ambient growth, and the addition of both Project and cumulative development traffic. There are no traffic signals warranted based on the planning level (ADT volume-based) warrant for Opening Year Cumulative (2020) With Project traffic conditions, in addition to the location previously warranted under Existing traffic conditions. The traffic signal warrant analysis worksheets are included in Appendix 6.3 of this TIA.

6.6 OFF-RAMP QUEUING ANALYSIS

6.6.1 OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT TRAFFIC CONDITIONS

A queueing analysis was performed for eastbound and westbound off-ramp of the I-10 Freeway and Cedar Avenue and Riverside Avenue interchanges to assess vehicle queues for the off ramps that may potentially impact peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-10 Freeway. Queuing analysis findings are presented in Table 6-2. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline. As shown on Table 6-2, there are no movements that are anticipated to experience queuing issues during the weekday AM or PM peak hours based on the Opening Year Cumulative (2020) Without Project 95th percentile traffic flows. Worksheets for Opening Year Cumulative (2020) Without Project conditions off-ramp queuing analysis are provided in Appendix 6.4.

6.6.2 OPENING YEAR CUMULATIVE (2020) WITH PROJECT TRAFFIC CONDITIONS

As shown on Table 6-2, there are no queuing issues anticipated with the addition of Project traffic for Opening Year Cumulative (2020) With Project traffic conditions at the I-10 Freeway and Cedar Avenue or Riverside Avenue interchanges. Worksheets for Opening Year Cumulative (2018) With Project conditions off-ramp queuing analysis are provided in Appendix 6.5.

EXHIBIT 6-4: OPENING YEAR CUMULATIVE (2020) WITH PROJECT SUMMARY OF LOS

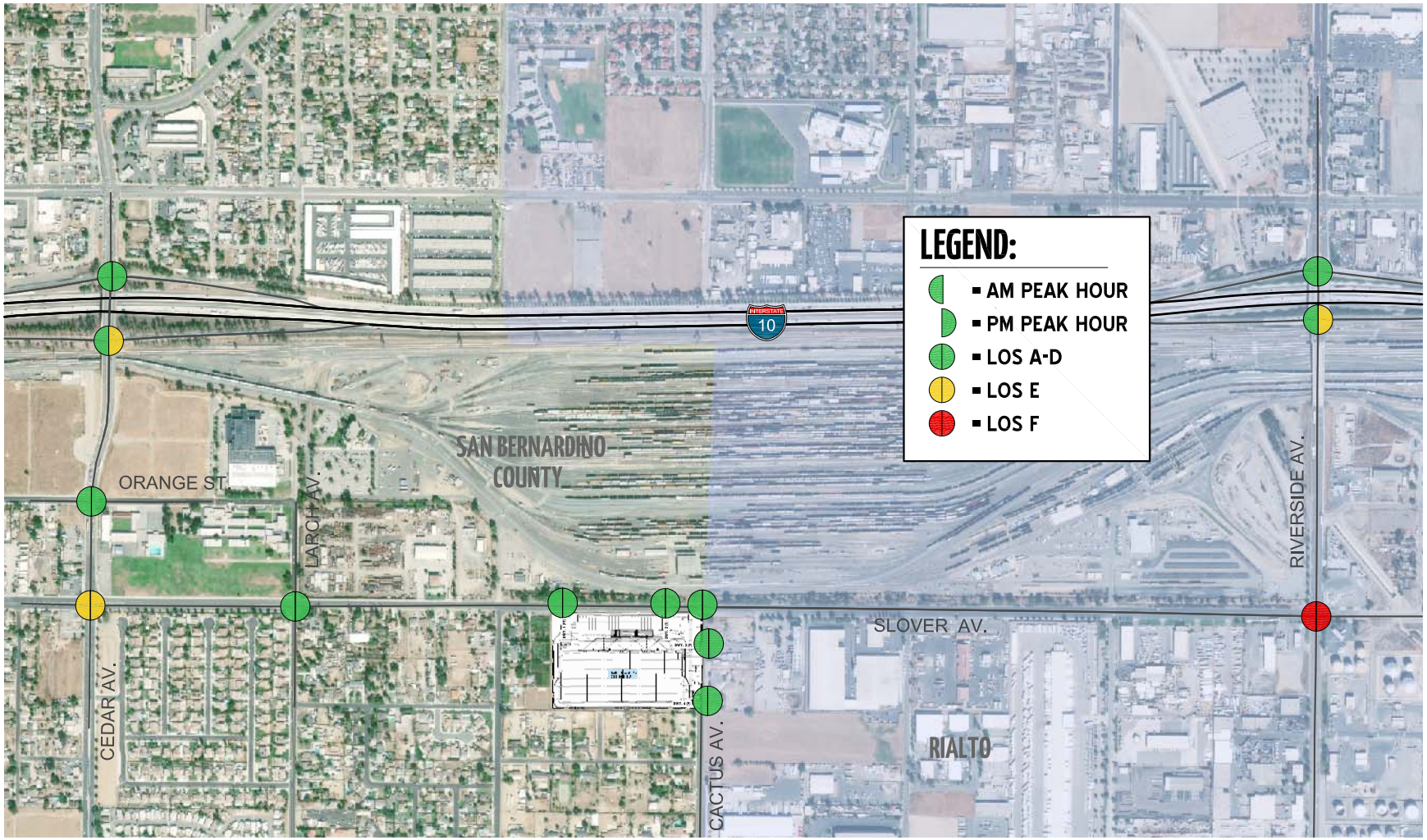


Table 6-2

I-10 Freeway Off-Ramp Peak Hour Queuing Summary for Opening Year Cumulative (2020) Conditions

Intersection	Movement	2020 Without Project					2020 With Project			
		Available Stacking Distance (Feet)	95th Percentile Queue (Feet)		Acceptable? [1]		95th Percentile Queue (Feet)		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
Cedar Av. & I-10 Westbound Off-Ramp	WBR	480	277 [2]	349 [2]	Yes	Yes	277 [2]	349 [2]	Yes	Yes
	WBL/T/R	1,270	667 [2]	466 [2]	Yes	Yes	667 [2]	466 [2]	Yes	Yes
Cedar Av. & I-10 Eastbound Off-Ramp	EBL	340	563 [2]	674 [2]	Yes[3]	Yes[3]	563 [2]	687 [2]	Yes[3]	Yes[3]
	EBL/T/R	1,900	622 [2]	596 [2]	Yes	Yes	653 [2]	595 [2]	Yes	Yes
Riverside Av. & I-10 Westbound Off-Ramp	WBL	360	469 [2]	406 [2]	Yes[3]	Yes[3]	476 [2]	411 [2]	Yes[3]	Yes[3]
	WBL/T/R	1,190	407 [2]	421 [2]	Yes	Yes	415 [2]	425 [2]	Yes	Yes
	WBR	360	338 [2]	306 [2]	Yes	Yes	338 [2]	306 [2]	Yes	Yes
Riverside Av. & I-10 Eastbound Off-Ramp	EBL	1,190	452 [2]	484 [2]	Yes	Yes	452 [2]	484 [2]	Yes	Yes
	EBL/T/R	1,190	394 [2]	487 [2]	Yes	Yes	394 [2]	487 [2]	Yes	Yes
	EBR	350	368 [2]	355 [2]	Yes[3]	Yes[3]	368 [2]	355 [2]	Yes[3]	Yes[3]

* **BOLD** = Queue length exceeds available stacking distance.

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided.

[2] 95th percentile volume exceeds capacity, queue may be longer.

[3] Although the 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-10 Freeway mainline.

6.7 BASIC FREEWAY SEGMENT ANALYSIS

6.7.1 OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT TRAFFIC CONDITIONS

Opening Year Cumulative (2020) Without Project mainline directional volumes for the AM and PM peak hours are provided on Exhibit 6-5. As shown on Table 6-3, there are no additional basic freeway mainline segments anticipated to operate at an unacceptable LOS under Opening Year Cumulative (2020) Without Project traffic conditions during the peak hours, in addition to the location previously identified under Existing (2019) traffic conditions. Opening Year Cumulative (2020) Without Project basic freeway segment analysis worksheets are provided in Appendix 6.6.

6.7.2 OPENING YEAR CUMULATIVE (2020) WITH PROJECT TRAFFIC CONDITIONS

Opening Year Cumulative (2020) With Project mainline directional volumes for the AM and PM peak hours are provided on Exhibit 6-6. As shown on Table 6-3, there are no additional freeway mainline segments anticipated to operate at an unacceptable LOS with the addition of Project traffic from those previously identified for Opening Year Cumulative (2020) Without Project traffic conditions. Opening Year Cumulative (2020) With Project basic freeway segment analysis worksheets are provided in Appendix 6.7.

6.8 FREEWAY MERGE/DIVERGE ANALYSIS

6.8.1 OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT TRAFFIC CONDITIONS

Freeway ramp junction merge and diverge operations were also evaluated for Opening Year Cumulative (2020) Without Project conditions and the results are presented in Table 6-4. As shown in Table 6-4, all ramp junctions are anticipated to continue to operate at an acceptable LOS under E+P traffic conditions consistent with Existing (2019) traffic conditions. Opening Year Cumulative (2020) Without Project freeway ramp junction operations analysis worksheets are provided in Appendix 6.8.

6.8.2 OPENING YEAR CUMULATIVE (2020) WITH PROJECT TRAFFIC CONDITIONS

Freeway ramp junction merge and diverge operations were also evaluated for Opening Year Cumulative (2020) With Project conditions and the results are presented in Table 6-4. The addition of Project traffic is not anticipated to result in any deficiencies. Opening Year Cumulative (2020) With Project freeway ramp junction operations analysis worksheets are provided in Appendix 6.9.

EXHIBIT 6-5: OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT FREEWAY MAINLINE VOLUMES

LEGEND:

⟵ 100/200 = AM/PM PEAK HOUR VOLUMES

NOTE: VOLUMES IN ACTUAL VEHICLES (NOT PCE)

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EXHIBIT 6-6: OPENING YEAR CUMULATIVE (2020) WITH PROJECT FREEWAY MAINLINE VOLUMES

Table 6-3

Basic Freeway Segment Analysis for Opening Year Cumulative (2020) Conditions

Freeway	Direction[1]	Mainline Segment	Lanes[2]	2020 Without Project				2020 With Project			
				Density[3]		LOS[4]		Density[3]		LOS[4]	
				AM	PM	AM	PM	AM	PM	AM	PM
I-10	WB	West of Cedar Av.	4	**37.3**	**39.6**	**E**	**E**	**37.3**	**36.9**	**E**	**E**
		East of Cedar Av.	5	24.4	26.3	C	D	24.4	26.3	C	D
		East of Riverside Av.	4	34.0	**38.4**	D	**E**	34.1	**38.5**	D	**E**
	EB	West of Cedar Av.	5	22.8	22.3	C	C	22.9	22.4	C	C
		East of Cedar Av.	4	30.8	29.3	D	D	30.8	29.3	D	D
		East of Riverside Av.	4	33.0	30.2	D	D	33.0	30.3	D	D

* **BOLD** = Unacceptable Level of Service

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and are based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

Table 6-4

Freeway Ramp Junction Merge/Diverge Analysis for Opening Year Cumulative (2020) Conditions

Freeway	Direction[1]	Ramp or Segment	Lanes on Freeway[2]	2020 Without Project				2020 With Project			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[3]	LOS[4]	Density[3]	LOS[4]	Density[3]	LOS[4]	Density[3]	LOS[4]
I-10	WB	On-Ramp at Cedar Av.	4	32.0	D	32.1	D	32.0	D	32.2	D
		Off-Ramp at Cedar Av.	5	19.8	B	21.3	C	19.8	B	21.3	C
		Off-Ramp at Riverside Av.	4	25.2	C	26.4	C	25.2	C	26.4	C
	EB	Off-Ramp at Cedar Av.	5	19.8	B	19.8	B	19.9	B	19.8	B
		On-Ramp at Cedar Av.	4	29.5	D	29.2	D	29.5	D	29.2	D
		On-Ramp at Riverside Av.	4	29.3	D	28.6	D	29.3	D	28.7	D

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and is based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

6.9 OPENING YEAR CUMULATIVE (2020) IMPACTS AND RECOMMENDED IMPROVEMENTS

If applicable, improvement strategies have been recommended at intersections and freeway segments that have been identified as impacted under Opening Year Cumulative (2020) traffic conditions in an effort to achieve an acceptable LOS.

6.9.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

The effectiveness of the recommended improvements to address Opening Year Cumulative (2020) traffic impacts are presented in Table 6-5. Improvement strategies identified in Table 6-5 have been recommended at intersections that have been identified as cumulatively impacted to reduce each location's peak hour delay to acceptable levels. The intersection operations analysis worksheets for Opening Year Cumulative (2020) Without and With Project traffic conditions, with improvements, are included in Appendix 6.10 and 6.11 of this TIA.

6.9.2 RECOMMENDED IMPROVEMENTS TO ADDRESS OFF-RAMP QUEUES

As shown previously on Table 6-2, there are no peak hour queuing issues anticipated at the I-10 Freeway at Cedar Avenue interchange for Opening Year Cumulative (2020) Without and With Project traffic conditions. As such, no improvements are necessary. However, queues are anticipated to improve from those shown in Table 6-2 with the implementation of the intersection improvements shown on Table 6-5 for the I-10 Freeway Eastbound Ramps at Cedar Avenue.

6.9.3 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON FREEWAY FACILITIES

At this time, Caltrans has no fee programs or other improvement programs in place to address the deficiencies caused by development projects in the County of San Bernardino (or other neighboring jurisdictions) on SHS roadway segments. As such, no improvements have been recommended to address the Opening Year Cumulative (2020) Without and With Project deficiencies on the SHS, because there is no feasible mitigation available.

Table 6-5

Intersection Analysis for Opening Year Cumulative (2020) 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	PM	AM	PM
2	Cedar Av. & I-10 Eastbound Ramps																	
	- Without Project	TS	0	3	1	1	2	0	1	1	**1**	0	0	0	24.9	44.2	C	D
	- With Project	TS	0	3	1	1	2	0	1	1	**1**	0	0	0	25.3	44.4	C	D
4	Cedar Av. & Slover Av.																	
	- Without Project	TS	1	2	0	1	2	0	**2**	2	**0**	1	2	0	36.1	42.1	D	D
	- With Project	TS	1	2	0	1	2	0	**2**	2	**0**	1	2	0	38.7	44.8	D	D
12	Riverside Av. & I-10 EB Ramps																	
	- Without Project	TS	0	3	**1**	2	2	0	1	1	1	0	0	0	35.2	35.5	D	D
	- With Project	TS	0	3	**1**	2	2	0	1	1	1	0	0	0	35.5	35.6	D	D
13	Riverside Av. & Slover Av.																	
	- Without Project[4]	TS	1	2	0	1	2	**1**	**2**	2	0	1	2	0	44.4	41.1	D	D
	- With Project[4]	TS	1	2	0	1	2	**1**	**2**	2	0	1	2	0	45.1	42.2	D	D

[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 sto 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] TS = Traffic Signal; **TS** = Improvement

[4] Improvement includes modifying the traffic signal to protect the eastbound and westbound left turns and running the eastbound and westbound left turns as lead-lag, with the westbound left turn running as lag.

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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 warrant, and freeway mainline analyses.

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Horizon Year (2040) 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).
- 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).

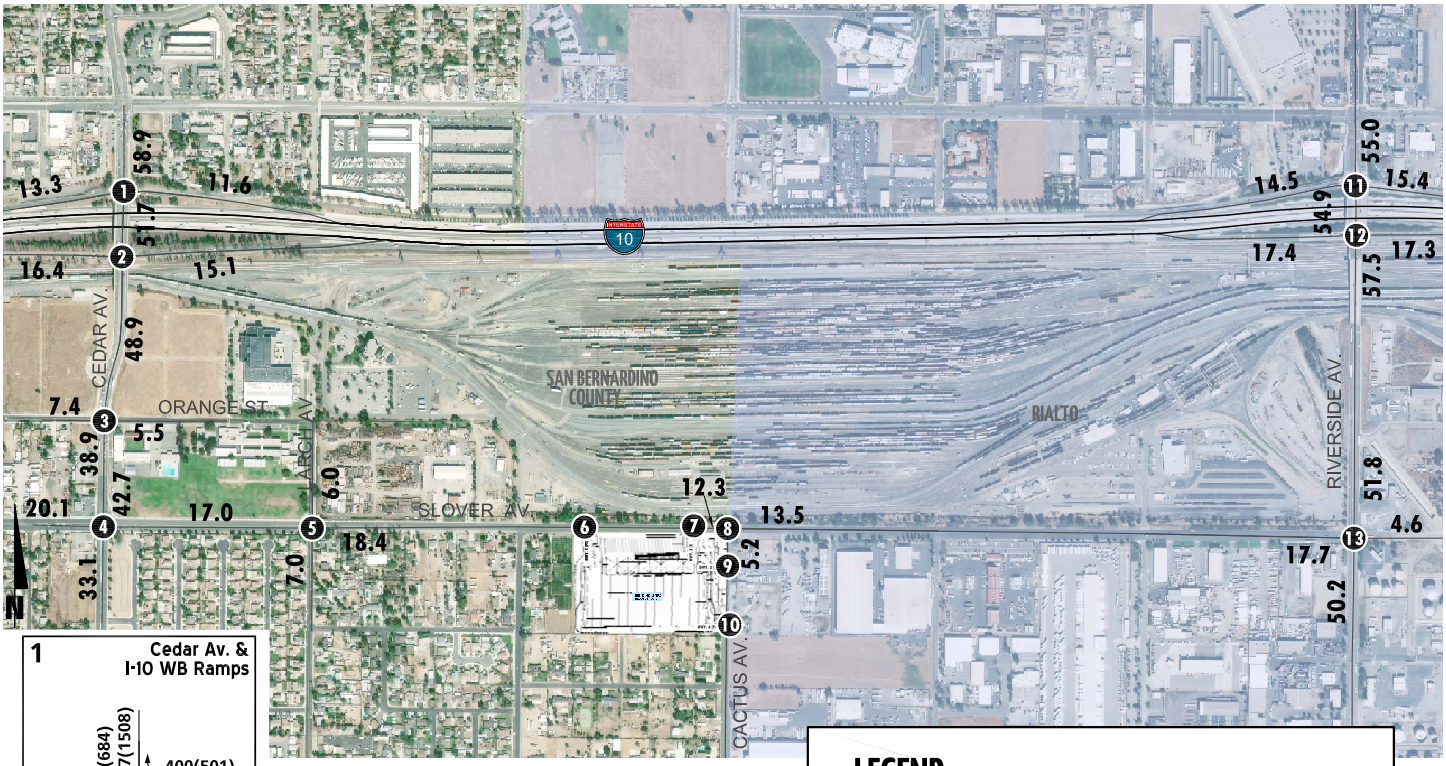
7.2 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-process volumes obtained from the SBTAM (see Section 4.7 *Horizon Year (2040) Volume Development* of this TIA for a detailed discussion on the post-processing methodology). The ADT and AM and PM peak hour volumes for Horizon Year (2040) Without Project traffic conditions are shown on Exhibit 7-1.

7.3 HORIZON YEAR (2040) WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-process volumes obtained from the SBTAM, plus the traffic generated by the proposed Project (see Section 4.7 *Horizon Year (2040) Volume Development* of this TIA for a detailed discussion on the post-processing methodology). The ADT and AM and PM peak hour volumes for Horizon Year (2040) With Project traffic conditions are shown on Exhibit 7-2.

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



1 Cedar Av. & I-10 WB Ramps

997(684) → 1757(1508) ↑ | ← 400(501) ← 16(5) ← 553(433)

474(496) → 1480(1874) ↑

2 Cedar Av. & I-10 EB Ramps

1731(1356) ↓ 566(586) →

556(936) → 4(1) → 530(418) →

1392(1435) ↑ 688(683) ←

3 Cedar Av. & Orange St.

559(295) → 1546(1416) ↓ 157(63) →

361(217) → 7(60) → 29(31) →

19(17) ↑ 1607(1597) ↑ 46(16) ←

112(305) ← 1(2) ← 10(43) ←

4 Cedar Av. & Slover Av.

164(115) → 1172(1055) ↓ 248(320) →

265(259) → 156(579) → 53(160) →

90(106) ↑ 1176(1061) ↑ 43(102) ↑

231(310) ← 191(323) ← 19(48) ←

5 Larch Av. & Slover Av.

7(52) → 42(54) ↓ 48(64) →

9(56) → 359(865) → 79(80) →

67(90) ↑ 66(183) ↑ 29(97) ↑

40(86) ← 367(538) ← 48(74) ←

6 Dwy. 1 & Slover Av.

Future Intersection

7 Dwy. 2 & Slover Av.

Future Intersection

8 Cactus Av. & Slover Av.

← 205(367) ← 96(98) ←

224(682) → 141(71) →

84(203) ↑ 56(108) ↑

9 Cactus Av. & Dwy. 3

Future Intersection

10 Cactus Av. & Dwy. 4

Future Intersection

11 Riverside Av. & I-10 WB Ramps

715(606) → 1784(1573) ↓ | ← 477(640) ← 0(2) ← 865(662) ←

604(709) ↑ 1094(2015) ↑

12 Riverside Av. & I-10 EB Ramps

1991(1644) ↓ 671(601) →

479(765) → 0(4) → 773(559) →

1241(1967) ↑ 826(989) ↑

13 Riverside Av. & Slover Av.

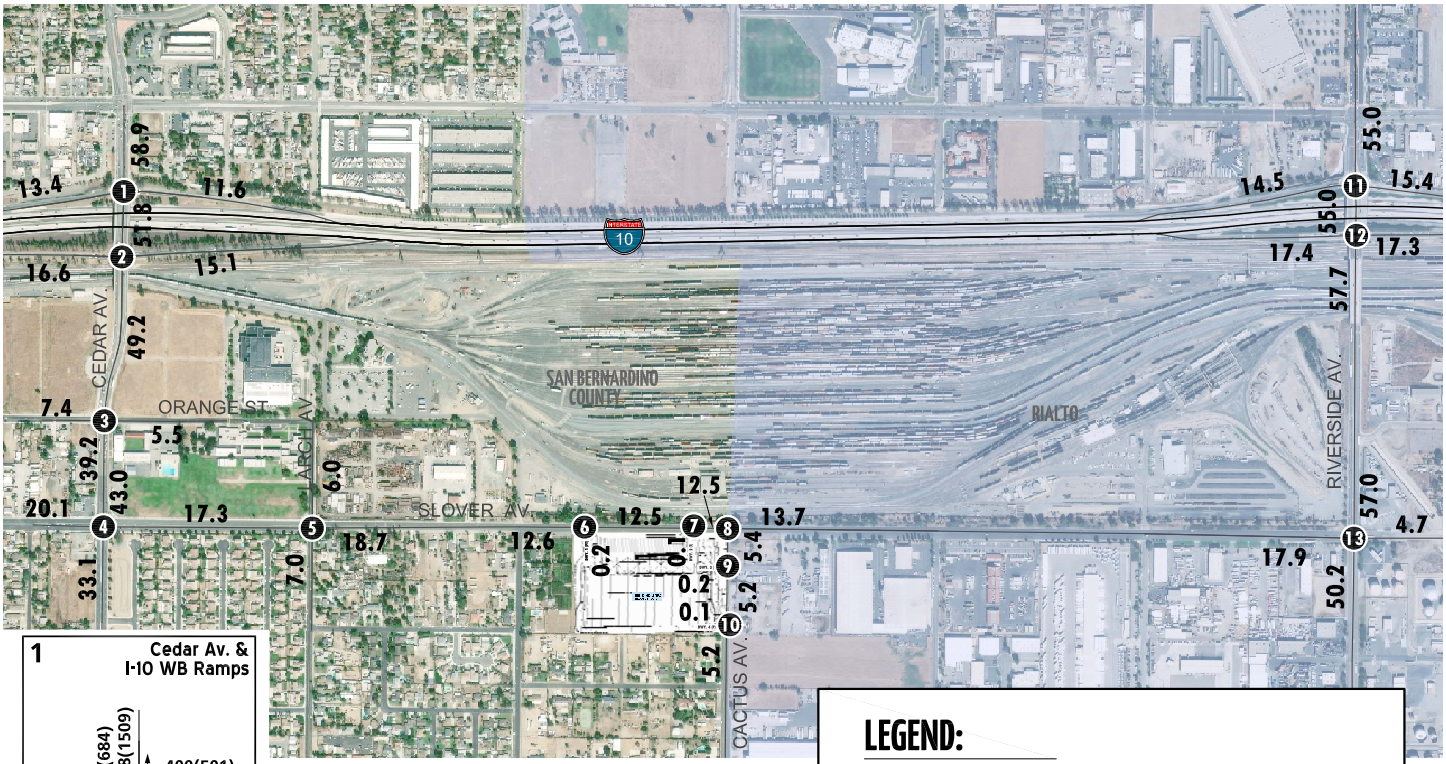
442(413) → 2062(1529) ↓ 35(40) →

99(100) ← 33(10) ← 77(57) ←

398(587) → 43(302) → 131(293) →

116(62) ↑ 1634(2012) ↑ 36(68) ↑

EXHIBIT 7-2: HORIZON YEAR (2040) WITH PROJECT TRAFFIC VOLUMES (IN PCE)



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 intersections are anticipated to operate at an unacceptable LOS during the peak hours under Horizon Year (2040) Without Project conditions:

- Cedar Avenue & I-10 Freeway Westbound Ramps (#1) – LOS E AM peak hour only
- Cedar Avenue & I-10 Freeway Eastbound Ramps (#2) – LOS E AM peak hour; LOS F PM peak hour
- Cedar Avenue & Slover Avenue (#4) – LOS E AM peak hour; LOS F PM peak hour
- Cactus Avenue & Slover Avenue (#8) – LOS F PM peak hour only
- Riverside Avenue & I-10 Eastbound Ramps (#12) – LOS E AM peak hour; LOS F PM peak hour
- Riverside Avenue & Slover Avenue (#13) – LOS F AM and PM peak hours

A summary of the peak hour intersection LOS for Horizon Year (2040) Without Project conditions are shown on Exhibit 7-3. The intersection operations analysis worksheets for Horizon Year (2040) Without Project traffic conditions are included in Appendix 7.1 of this TIA.

7.4.2 HORIZON YEAR (2040) WITH PROJECT TRAFFIC CONDITIONS

As shown on Table 7-1 and illustrated on Exhibit 7-4, the addition of Project traffic is not anticipated to result in the any additional peak hour intersection deficiencies, in addition to those previously identified under Horizon Year (2040) Without Project conditions. The intersection operations analysis worksheets for Horizon Year (2040) With Project conditions are included in Appendix 7.2 of this TIA. Measures to address deficiencies for Horizon Year (2040) traffic conditions are discussed in Section 7.9 *Horizon Year (2040) Impacts and Recommended Improvements*.

7.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants were not evaluated for Horizon Year (2040) Without Project traffic conditions as the intersection of Cactus Avenue and Slover Avenue is currently warranted under Existing (2019) traffic conditions and all other locations are currently signalized. There are no traffic signals warranted based on the planning level (ADT volume-based) warrant for Horizon Year (2040) With Project traffic conditions, in addition to the location previously warranted under Existing traffic conditions. The traffic signal warrant analysis worksheets are included in Appendix 7.3 of this TIA.

Table 7-1

Intersection Analysis for Horizon Year (2040) Conditions

#	Intersection	Traffic Control[2]	2040 Without Project				2040 With Project			
			Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Cedar Av. & I-10 Westbound Ramps	TS	**72.4**	45.3	**E**	D	**73.2**	47.9	**F**	D
2	Cedar Av. & I-10 Eastbound Ramps	TS	**70.6**	**119.5**	**E**	**F**	**72.1**	**121.6**	**E**	**F**
3	Cedar Av. & Orange St.	TS	34.9	30.8	C	C	35.4	31.4	D	C
4	Cedar Av. & Slover Av.	TS	**66.9**	**83.9**	**E**	**F**	**71.5**	**88.5**	**E**	**F**
5	Larch Av. & Slover Av.	TS	11.9	22.0	B	C	12.1	22.3	B	C
6	Driveway 1 & Slover Av.	**CSS**	Future Intersection				10.9	15.0	B	C
7	Driveway 2 & Slover Av.	**CSS**	Future Intersection				10.2	13.9	B	B
8	Cactus Av. & Slover Av.	CSS	13.3	**63.6**	B	**F**	13.7	**79.9**	B	**F**
9	Cactus Av. & Driveway 3	**CSS**	Future Intersection				11.0	12.1	B	B
10	Cactus Av. & Driveway 4	**CSS**	Future Intersection				10.9	11.4	B	B
11	Riverside Av. & I-10 WB Ramps	TS	41.3	38.6	D	D	41.7	38.8	D	D
12	Riverside Av. & I-10 EB Ramps	TS	**71.0**	**129.9**	**E**	**F**	**71.6**	**131.6**	**E**	**F**
13	Riverside Av. & Slover Av.	TS	**168.3**	**167.8**	**F**	**F**	**171.4**	**169.3**	**F**	**F**

BOLD = 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] TS = Traffic Signal; CSS = Cross-Street Stop; **CSS** = Improvement

EXHIBIT 7-3: HORIZON YEAR (2040) WITHOUT PROJECT SUMMARY OF LOS

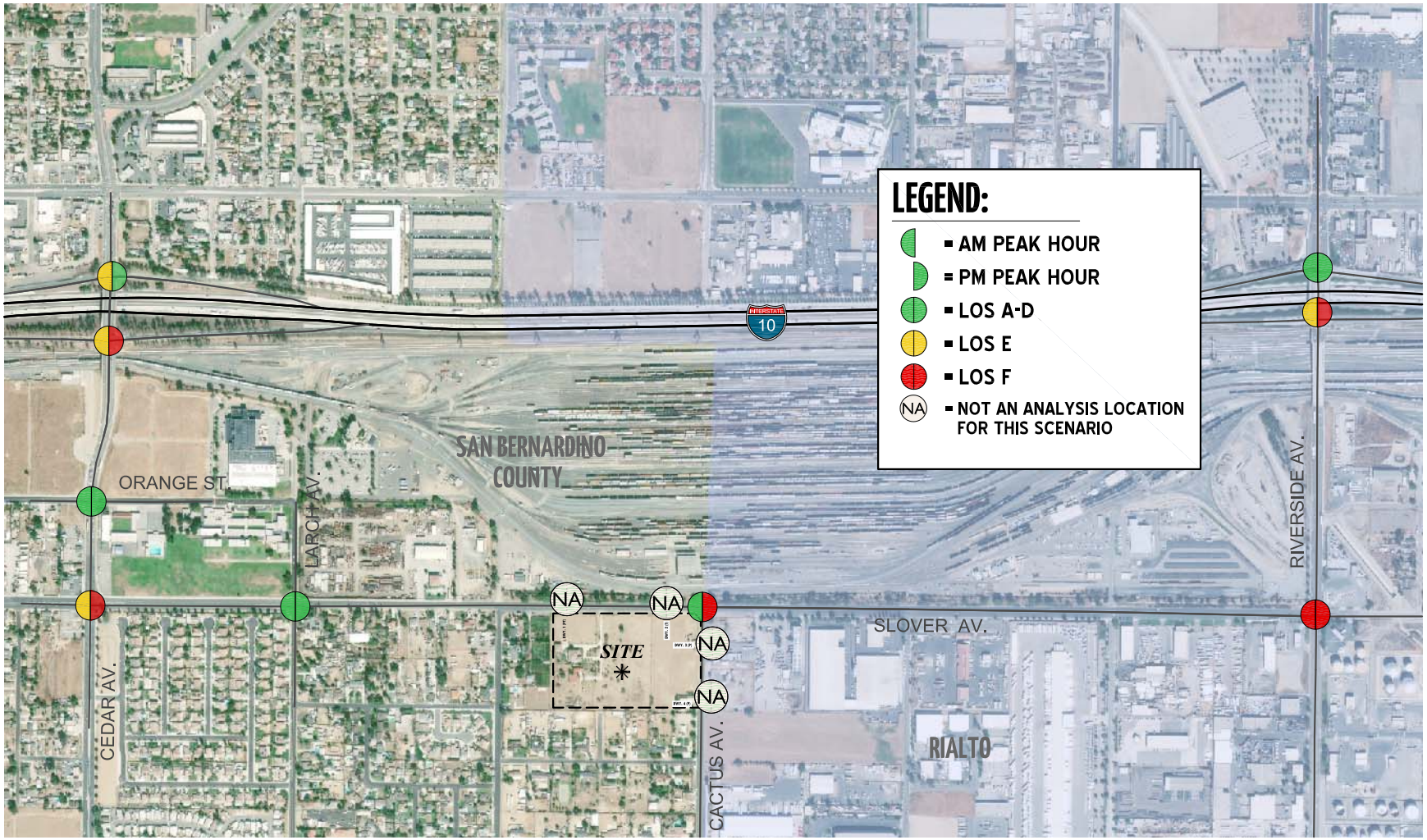


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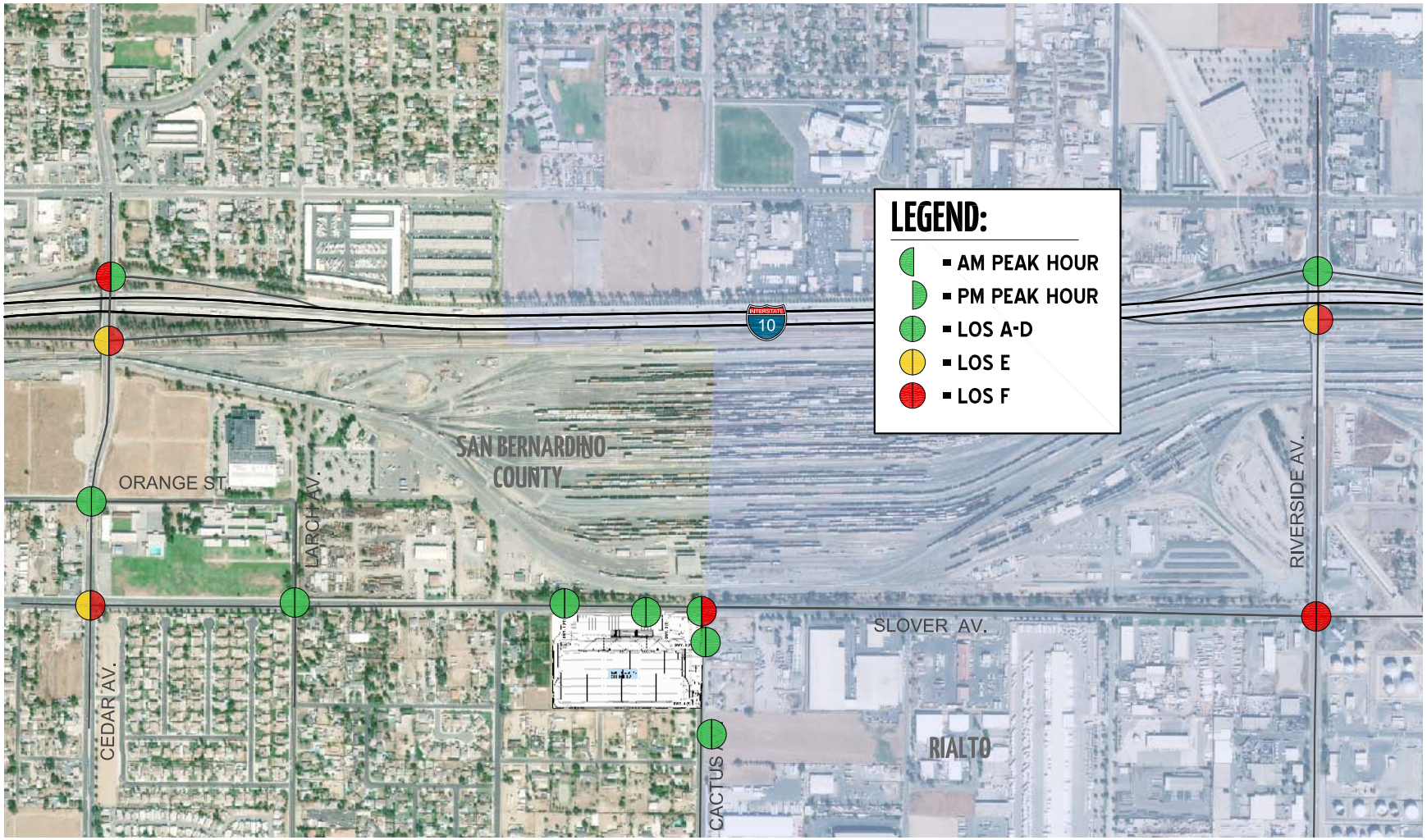
EXHIBIT 7-4: HORIZON YEAR (2040) WITH PROJECT SUMMARY OF LOS



7.6 OFF-RAMP QUEUING ANALYSIS

7.6.1 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC CONDITIONS

A queuing analysis was performed for the eastbound and westbound off-ramp of the I-10 Freeway and Cedar Avenue and Riverside Avenue interchanges to assess vehicle queues for the off ramps that may potentially impact peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-10 Freeway. Queuing analysis findings are presented in Table 7-2. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline. As shown on Table 7-2, there are no movements that are anticipated to experience queuing issues during the weekday AM or PM peak hours based on the Horizon Year (2040) Without Project 95th percentile traffic flows. Worksheets for Horizon Year (2040) Without Project conditions off-ramp queuing analysis are provided in Appendix 7.4 of this TIA.

7.6.2 HORIZON YEAR (2040) WITH PROJECT TRAFFIC CONDITIONS

As shown on Table 7-2, there are no queuing issues anticipated with the addition of Project traffic for Horizon Year (2040) With Project traffic conditions at the I-10 Freeway and Cedar Avenue or Riverside Avenue interchanges. Worksheets for Horizon Year (2040) With Project conditions off-ramp queuing analysis are provided in Appendix 7.5.

7.7 BASIC FREEWAY SEGMENT ANALYSIS

7.7.1 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC CONDITIONS

Horizon Year (2040) Without Project mainline directional volumes for the AM and PM peak hours are provided on Exhibit 7-5. As shown on Table 7-3, the following additional freeway segments are anticipated to operate at an unacceptable LOS under Horizon Year (2040) traffic conditions during one or more peak hours in addition to the location previously identified under Existing (2019), E+P, and Opening Year Cumulative traffic conditions:

- I-10 Freeway – Eastbound, East of Cedar Avenue (#5) – LOS E AM peak hour only
- I-10 Freeway – Eastbound, East of Riverside Avenue (#6) – LOS E AM and PM peak hours

Horizon Year (2040) Without Project basic freeway segment analysis worksheets are provided in Appendix 7.6.

7.7.2 HORIZON YEAR (2040) WITH PROJECT TRAFFIC CONDITIONS

Horizon Year (2040) With Project mainline directional volumes for the AM and PM peak hours are provided on Exhibit 7-6. As shown on Table 7-3, there are no additional freeway mainline segments anticipated to operate at an unacceptable LOS with the addition of Project traffic in addition to those previously identified for Horizon Year (2040) Without Project traffic conditions. Horizon Year (2040) With Project basic freeway segment analysis worksheets are provided in Appendix 7.7.

Table 7-2

I-10 Freeway Off-Ramp Peak Hour Queuing Summary for Horizon Year (2040) Conditions

Intersection	Movement	2040 Without Project					2040 With Project			
		Available Stacking Distance (Feet)	95th Percentile Queue (Feet)		Acceptable?[1]		95th Percentile Queue (Feet)		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
Cedar Av. & I-10 Westbound Off-Ramp	WBR	480	361 [2]	460 [2]	Yes	Yes	361 [2]	460 [2]	Yes	Yes
	WBL/T/R	1,270	750 [2]	557 [2]	Yes	Yes	750 [2]	557 [2]	Yes	Yes
Cedar Av. & I-10 Eastbound Off-Ramp	EBL	340	554 [2]	809 [2]	Yes[3]	Yes[3]	554 [2]	809 [2]	Yes[3]	Yes[3]
	EBL/T/R	1,900	705 [2]	736 [2]	Yes	Yes	735 [2]	745 [2]	Yes	Yes
Riverside Av. & I-10 Westbound Off-Ramp	WBL	360	502 [2]	476 [2]	Yes[3]	Yes[3]	511 [2]	483 [2]	Yes[3]	Yes[3]
	WBL/T/R	1,190	445 [2]	502 [2]	Yes	Yes	446 [2]	506 [2]	Yes	Yes
	WBR	360	376 [2]	367 [2]	Yes[3]	Yes[3]	385 [2]	367 [2]	Yes[3]	Yes[3]
Riverside Av. & I-10 Eastbound Off-Ramp	EBL	1,190	523 [2]	551	Yes	Yes	523 [2]	551 [2]	Yes	Yes
	EBL/T/R	1,190	454 [2]	549	Yes	Yes	454 [2]	550 [2]	Yes	Yes
	EBR	350	427 [2]	422 [2]	Yes[3]	Yes[3]	427 [2]	422 [2]	Yes[3]	Yes[3]

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided.

[2] 95th percentile volume exceeds capacity, queue may be longer.

[3] Although the 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-10 Freeway mainline.

Table 7-3

Basic Freeway Segment Analysis for Horizon Year (2040) Conditions

Freeway	Direction[1]	Mainline Segment	Lanes[2]	2040 Without Project				2040 With Project			
				Density[3]		LOS[4]		Density[3]		LOS[4]	
				AM	PM	AM	PM	AM	PM	AM	PM
I-10	WB	West of Cedar Av.	4	**41.8**	**43.3**	**E**	**E**	**41.8**	**43.5**	**E**	**E**
		East of Cedar Av.	5	25.9	27.9	C	D	25.9	27.9	C	D
		East of Riverside Av.	4	**36.1**	**41.0**	**E**	**E**	**36.2**	**41.1**	**E**	**E**
	EB	West of Cedar Av.	5	26.4	25.0	D	C	26.5	25.0	D	C
		East of Cedar Av.	4	**38.4**	33.6	**E**	D	**38.4**	33.6	**E**	D
		East of Riverside Av.	4	**41.5**	**35.7**	**E**	**E**	**41.6**	**35.8**	**E**	**E**

* **BOLD** = Unacceptable Level of Service

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and are based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

EXHIBIT 7-5: HORIZON YEAR (2040) WITHOUT PROJECT FREEWAY MAINLINE VOLUMES

EXHIBIT 7-6: HORIZON YEAR (2040) WITH PROJECT FREEWAY MAINLINE VOLUMES

URBAN CROSSROADS

7.8 FREEWAY MERGE/DIVERGE ANALYSIS

7.8.1 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC CONDITIONS

Freeway ramp junction merge and diverge operations were also evaluated for Horizon Year (2040) Without Project conditions and the results are presented in Table 7-4. As shown in Table 7-4, the following merge and diverge ramp junction areas are anticipated to operate at an unacceptable LOS under Horizon Year (2040) traffic conditions during one or more peak hours for Horizon Year (2040) Without Project traffic conditions:

- I-10 Freeway – Eastbound, On-Ramp at Cedar Avenue (#5) – LOS F AM and PM peak hours
- I-10 Freeway – Eastbound, On-Ramp at Riverside Avenue (#6) – LOS E AM peak hour only

Horizon Year (2040) Without Project freeway ramp junction operations analysis worksheets are provided in Appendix 7.8.

7.8.2 HORIZON YEAR (2040) WITH PROJECT TRAFFIC CONDITIONS

Freeway ramp junction merge and diverge operations were also evaluated for Horizon Year (2040) With Project conditions and the results are presented in Table 7-4. The addition of Project traffic is anticipated to result in the following additional deficiency, in addition to those previously identified under Horizon Year (2040) Without Project traffic conditions:

- I-10 Freeway – Westbound, On-Ramp at Cedar Avenue (#1) – LOS E AM peak hour only

Horizon Year (2040) With Project freeway ramp junction operations analysis worksheets are provided in Appendix 7.9.

7.9 HORIZON YEAR (2040) CUMULATIVE IMPACTS AND RECOMMENDED IMPROVEMENTS

Improvement strategies have been recommended at intersections and freeway segments that have been identified as impacted under Horizon Year (2040) traffic conditions in an effort to achieve an acceptable LOS.

7.9.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

The effectiveness of the recommended improvements to address Horizon Year (2040) traffic impacts are presented in Table 7-5. Improvement strategies identified in Table 7-5 have been recommended at intersections that have been identified as cumulatively impacted to reduce each location's peak hour delay to acceptable levels. The intersection operations analysis worksheets for Horizon Year (2040) Without and With Project traffic conditions, with improvements, are included in Appendix 7.10 and 7.11 of this TIA.

Table 7-4

Freeway Ramp Junction Merge/Diverge Analysis for Horizon Year (2040) Conditions

Freeway	Direction[1]	Ramp or Segment	Lanes on Freeway[2]	2040 Without Project				With Project			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[3]	LOS[4]	Density[3]	LOS[4]	Density[3]	LOS[4]	Density[3]	LOS[4]
I-10	WB	On-Ramp at Cedar Av.	4	35.0	D	33.8	D	**35.1**	**E**	34.0	D
		Off-Ramp at Cedar Av.	5	22.2	C	23.4	C	22.2	C	23.4	C
		Off-Ramp at Riverside Av.	4	27.5	C	29.0	D	27.6	C	29.0	D
	EB	Off-Ramp at Cedar Av.	5	19.4	B	20.4	C	19.5	B	20.4	C
		On-Ramp at Cedar Av.	4	**39.2**	**F**	**36.9**	**F**	**39.2**	**F**	**36.9**	**F**
		On-Ramp at Riverside Av.	4	**35.1**	**E**	32.8	D	**35.1**	**E**	33.0	D

* **BOLD** = Unacceptable Level of Service

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and is based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

Table 7-5

Intersection Analysis for Horizon Year (2040) 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	PM	AM	PM
1	Cedar Av. & I-10 Westbound Ramps																	
	- Without Project[4]	TS	**2**	2	0	0	3	1	0	0	0	0	1	1	44.7	31.3	D	C
	- With Project[4]	TS	**2**	2	0	0	3	1	0	0	0	0	1	1	45.1	31.8	D	C
2	Cedar Av. & I-10 Eastbound Ramps																	
	- Without Project[4]	TS	0	3	1	**2**	2	0	1	1	**1**	0	0	0	24.4	34.9	C	C
	- With Project[4]	TS	0	3	1	**2**	2	0	1	1	**1**	0	0	0	24.6	35.1	C	D
4	Cedar Av. & Slover Av.																	
	- Without Project	TS	1	2	0	1	2	**1**	**2**	2	**0**	1	2	**1**	43.8	54.1	D	D
	- With Project	TS	1	2	0	1	2	**1**	**2**	2	**0**	1	2	**1**	45.9	54.8	D	D
8	Cactus Av. & Slover Av.																	
	- Without Project	**TS**	0	1	0	0	0	0	0	2	0	**1**	2	0	12.2	14.5	B	B
	- With Project	**TS**	0	1	0	0	0	0	0	2	0	**1**	2	0	20.1	15.2	C	B
12	Riverside Av. & I-10 EB Ramps																	
	- Without Project	TS	0	3	**1**	2	2	0	1	1	1	0	0	0	50.0	52.6	D	D
	- With Project	TS	0	3	**1**	2	2	0	1	1	1	0	0	0	50.2	53.2	D	D
13	Riverside Av. & Slover Av.																	
	- Without Project	TS	1	**3**	0	1	2	**1**	**2**	2	0	1	2	0	53.4	49.7	D	D
	- With Project	TS	1	**3**	0	1	2	**1**	**2**	2	0	1	2	0	54.0	52.1	D	D

[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] AWS = All-Way Stop; TS = Traffic Signal; **TS** = Improvement

[4] Modify traffic signal timing to accommodate a 120-second cycle length during the AM and PM peak hours. Modifications include adjusting the cycle length at all other intersections within the SBCTA coordinated system.

The Project Applicant shall participate in the funding of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of County of San Bernardino DIF fees or on a fair share basis (if the improvements are not included in the DIF fee program). These fees shall be collected by the County of San Bernardino, with the proceeds solely used as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected population increases.

7.9.2 Recommended Improvements to Address Off-Ramp Queues

As shown previously on Table 7-2, there are no peak hour queuing issues anticipated at the I-10 Freeway at Cedar Avenue and Riverside Avenue interchanges for Horizon Year (2040) Without and With Project traffic conditions. As such, no improvements are necessary. However, queues are anticipated to improve from those shown in Table 7-2 with the implementation of the intersection improvements shown on Table 7-5 for the I-10 Freeway Ramps on Cedar Avenue and Riverside Avenue.

7.9.3 Recommended Improvements to Address Deficiencies on Freeway Facilities

There are 3 alternatives being considered by SBCTA for the I-10 Project: Alternative 1 is no build; Alternative 2 is the addition of a carpool or high occupancy vehicle (HOV) lane; and Alternative 3 includes 2 tolled express lanes in each direction of travel on the I-10 Freeway between Haven Avenue in the City of Ontario and Ford Street in the City of Redlands. (12) According to the website, the I-10 Project is a longer term project and is not anticipated for completion until Year 2024.

For the purposes of this analysis, Alternative 2 has been evaluated. Caltrans typically assumes a reduction of 14 percent to the freeway mainline through volumes in this region to account for vehicles utilizing the HOV lanes. The reduction to the I-10 Freeway mainline volumes has been applied to account for the proposed HOV lanes. The analysis has been performed assuming same on and off-ramp configurations as existing baseline conditions at the I-10 Freeway Cedar Avenue interchange.

As shown on Table 7-6, the I-10 Freeway mainline segment operations are anticipated to improve and operate at an acceptable LOS with the improvements discussed above during the peak hours. Worksheets for Horizon Year (2040) With Project conditions freeway mainline level of service analysis, with improvements, are provided in Appendix 7.12.

Similarly, Table 7-7 shows that the I-10 Freeway Eastbound on-ramp at Cedar Avenue is anticipated to improve in density but would continue to operate at an unacceptable LOS during the AM peak hour for Horizon Year (2040) traffic conditions with the implementation of the improvements discussed above. All other ramp junctions are anticipated to operate at an acceptable LOS. Horizon Year (2040) With Project freeway ramp junction level of service analysis worksheets, with improvements, are provided in Appendix 7.13.

The Project is anticipated to contribute less than 50 one-way peak hour trips to the I-10 Freeway. As such, the Project is anticipated to have a less than significant traffic impact to the I-10 Freeway mainline segments and merge/diverge ramp junctions evaluated as part of this TIA.

Table 7-6

Basic Freeway Segment Analysis for Horizon Year (2040) Conditions With Improvements

Freeway	Direction[1]	Mainline Segment	Lanes[2]	2040 With Project With Improvements			
				Density[3]		LOS[4]	
				AM	PM	AM	PM
I-10	WB	West of Cedar Av.	4	32.3	33.3	D	D
		East of Cedar Av.	5	21.7	23.3	C	C
		East of Riverside Av.	4	28.7	32.0	D	D
	EB	West of Cedar Av.	5	22.2	21.2	C	C
		East of Cedar Av.	4	30.3	27.0	D	D
		East of Riverside Av.	4	32.6	28.7	D	D

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and are based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

Table 7-7

Freeway Ramp Junction Merge/Diverge Analysis for Horizon Year (2040) Conditions With Improvements

Freeway	Direction[1]	Ramp or Segment	Lanes on Freeway[2]	With Project With Improvements			
				AM Peak Hour		PM Peak Hour	
				Density[3]	LOS[4]	Density[3]	LOS[4]
I-10	WB	On-Ramp at Cedar Av.	4	31.4	D	30.4	D
		Off-Ramp at Cedar Av.	5	18.7	B	19.9	B
		Off-Ramp at Riverside Av.	4	24.2	C	25.4	C
	EB	Off-Ramp at Cedar Av.	5	17.4	B	16.7	B
		On-Ramp at Cedar Av.	4	**35.6**	**E**	33.5	D
		On-Ramp at Riverside Av.	4	31.5	D	29.5	D

* **BOLD** = Unacceptable Level of Service

[1] EB = Eastbound; WB = Westbound

[2] Number of lanes are in the specified direction and is based on existing conditions.

[3] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[4] LOS = Level of Service

8 REFERENCES

1. **San Bernardino Associated Governments.** *Congestion Management Program for County of San Bernardino.* County of San Bernardino : s.n., Updated June 2016.
2. **California Department of Transportation.** *Guide for the Preparation of Traffic Impact Studies.* December 2002.
3. **Institute of Transportation Engineers.** *Trip Generation.* 10th Edition. 2017.
4. **Transportation Research Board.** *Highway Capacity Manual (HCM).* 6th Edition. Washington, D.C. : National Academy of Sciences, 2016. 978-0-309-16077-3.
5. **California Department of Transportation.** Manual on Uniform Traffic Control Devices (MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CAMUTCD).* 2014.
6. —. *Freeway Performance Measurement (PeMS).* [Online] [Cited: April 4, 2018.] http://pems.dot.ca.gov/.
7. **Institute of Transportation Engineers.** *Trip Generation Handbook.* 3rd Edition. September 2017.
8. **South Coast Air Quality Managment District (SCAQMD).** *Warehouse Truck Trip Study Data Results and Usage.* June 2014.
9. **Southern California Association of Governments.** *2016 Regional Transportation Plan.* April 2016.
10. **San Bernardino Associated Governments.** I-10 Corridor Project. *The I-10 & I-15 Corridor Projects.* [Online] www.1015projects.com.

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