URBAN CROSSROADS

Ridge San Bernardino One

TRAFFIC IMPACT ANALYSIS

CITY OF SAN BERNARDINO

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CCI	Construction Cost Index
CMP	Congestion Management Program
DIF	Development Impact Fee
EA	Existing Plus Ambient Growth
EAC	Existing Plus Ambient Growth Plus Cumulative
EAP	Existing Plus Ambient Growth Plus Project
EAPC	Existing Plus Ambient Growth Plus Project Plus Cumulative
E+P	Existing Plus Project
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NP	No Project (or Without Project)
PCE	Passenger Car Equivalents
PHF	Peak Hour Factor
Project	Ridge San Bernardino One
RTP	Regional Transportation Plan
SANBAG	San Bernardino Association of Governments
SBTAM	San Bernardino Transportation Analysis Model
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
SHS	State Highway System
sf	Square Feet
TIA	Traffic Impact Analysis
Vphgph	Vehicles Per Hour Green Per Lane
v/c	Volume to Capacity
WP	With Project

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1 INTRODUCTION

This report presents the results of the traffic impact analysis (TIA) for the proposed Ridge San Bernardino One (referred to as "Project") located on the southeast corner of Institution Road and Cajon Boulevard in the City of San Bernardino as shown on Exhibit 1-1.

The purpose of this traffic impact analysis is to evaluate the potential circulation system deficiencies that may result from the development of the proposed Project, and to recommend improvements to achieve acceptable circulation system operational conditions. As directed by City of San Bernardino staff, this traffic study has been prepared in accordance with the City of San Bernardino Traffic Impact Study Guidelines (June 2015), and also where appropriate addresses requirements as identified by the San Bernardino County Congestion Management Program (CMP) *Guidelines for CMP Traffic Impact Analysis Reports* (Appendix C, 2005 Update), the California Department of Transportation (Caltrans) *Guide for the Preparation of Traffic Impact Studies* (December 2002), and consultation with City staff during the scoping process. (1) (2) (3) The approved Project Traffic Study Scoping agreement is provided in Appendix 1.1 of this TIA.

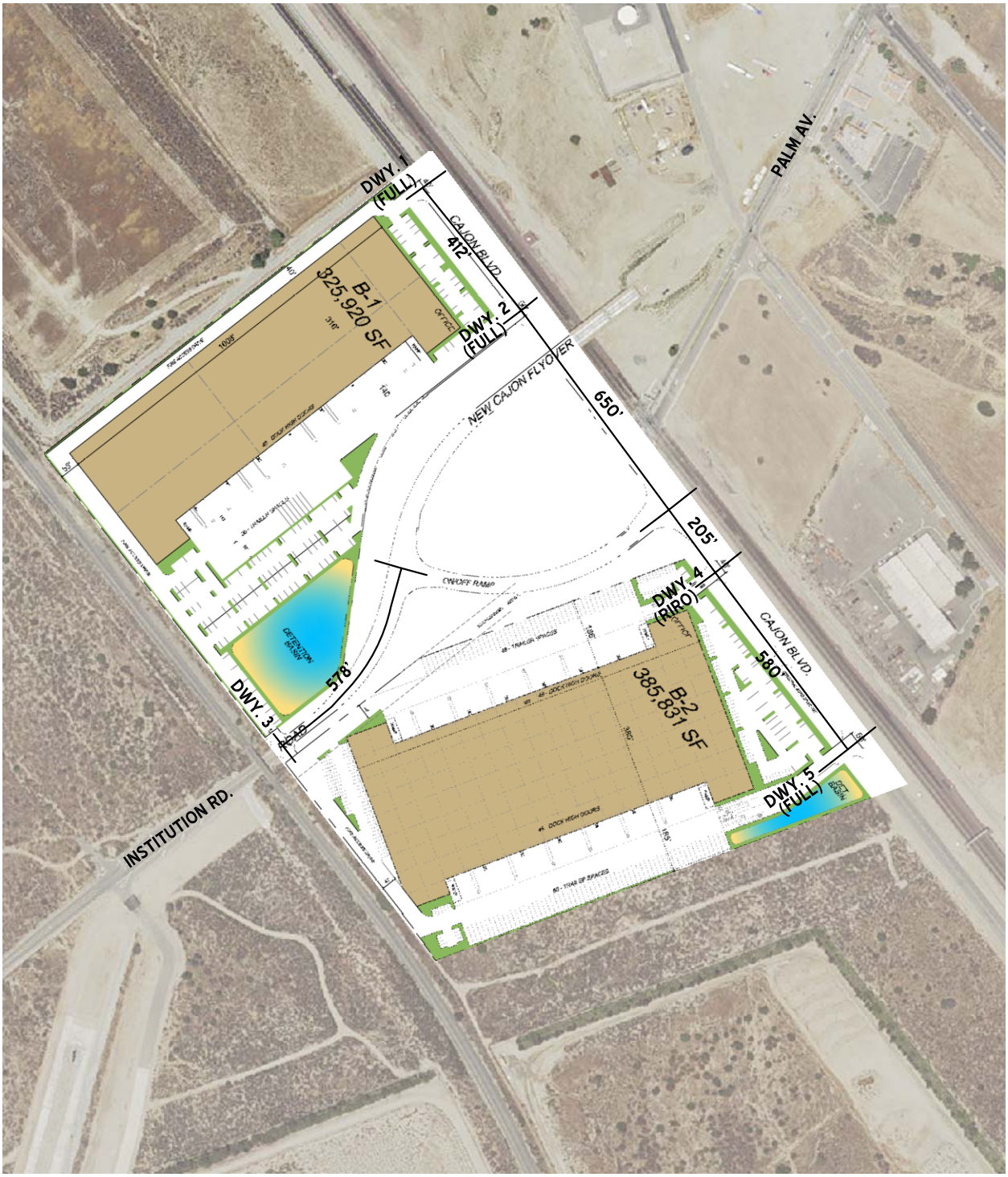
1.1 PROJECT OVERVIEW

The Project is proposed to consist of a total of 711,751 square feet (sf) of high-cube warehouse/distribution center use. For the purposes of this traffic study, the Project anticipated to be developed in a single phase with an anticipated opening year of 2018.

The Project is proposed to have access on Cajon Boulevard via four future driveways and via a future driveway on Palm Avenue, south of Institution Road. All Project access points are assumed to allow for full-access, with the exception of Driveway 3 on Cajon Boulevard. Driveway 3 on Cajon Boulevard is proposed to have right-in/right-out access only due to its proximity to Institution Road. Heavy trucks and passenger cars are anticipated to utilize all access points. Regional access to the Project site will be provided by the I-215 Freeway via Palm Avenue.

Trips generated by the Project's proposed land uses have been estimated based on trip generation rates collected by the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition, 2012. (4) The Project is estimated to generate a net total of 1,966 passenger-car-equivalent (PCE) trip-ends per day on a typical weekday with approximately 114 net AM PCE peak hour trips and 134 net PM PCE 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



LEGEND:

(FULL) = FULL ACCESS

(RIRO) = RIGHT-IN, RIGHT OUT ONLY

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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 (2016) Conditions
- Existing plus Project (E+P) Conditions
- Existing plus Ambient Growth (EA) (2018) Conditions
- Existing plus Ambient Growth plus Project (EAP) (2018) Conditions
- Existing plus Ambient Growth plus Cumulative (EAC) (2018) Conditions
- Existing plus Ambient Growth plus Project plus Cumulative (EAPC) (2018) Conditions
- Horizon Year (2040) Without Project Conditions
- Horizon Year (2040) With Project Conditions

1.2.1 EXISTING (2016) CONDITIONS

Information for Existing (2016) 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 circulation system deficiencies that would occur on the existing roadway system in the scenario of the Project being placed upon Existing conditions. The E+P analysis is intended to identify the project-specific traffic impacts associated solely with the development of the proposed Project based on a comparison of the E+P traffic conditions to Existing (2016) conditions.

1.2.3 EXISTING PLUS AMBIENT GROWTH (EA) AND EXISTING PLUS AMBIENT GROWTH PLUS PROJECT (EAP) CONDITIONS

The EA (2018) and EAP (2018) traffic conditions analyses determine potential cumulative traffic impacts based on a comparison of the EAP traffic conditions to EA conditions. To account for background traffic growth, an ambient growth factor from Existing conditions of 6.09% (3 percent per year over 2 years, compounded annually) has been included for 2018 conditions.

1.2.4 EXISTING PLUS AMBIENT GROWTH PLUS CUMULATIVE (EAC) AND EXISTING PLUS AMBIENT GROWTH PLUS PROJECT PLUS CUMULATIVE (EAP) CONDITIONS

The EAC (2018) and EAPC (2018) conditions analysis determines the potential near-term cumulative circulation system deficiencies. To account for background traffic growth, traffic associated with other known cumulative development projects in conjunction with an ambient growth factor from Existing conditions of 6.09% (3 percent per year over 2 years, compounded annually) has been included for 2018 conditions. This comprehensive list was compiled from information from a recent traffic study in the City of San Bernardino and consultation with City staff.

1.2.5 HORIZON YEAR (2040) CONDITIONS

The Horizon Year (2040) conditions analysis will be utilized to determine if improvements funded through local and regional transportation mitigation fee programs, such as the City of San Bernardino Development Impact Fee (DIF) program, or other approved funding mechanism can accommodate the cumulative traffic at the target Level of Service (LOS) identified by the City of San Bernardino. If the planned and funded improvements can provide the necessary improvements in delay, then the Project's payment into these established fee programs will be considered as long-range cumulative mitigation. Other improvements needed beyond the "funded" improvements (such as localized improvements to non-funded facilities) are identified as such and would be subject to fair share or as identified by City staff. Traffic projections for Horizon Year conditions were derived from the San Bernardino County Transportation Analysis Model (SBTAM) using accepted procedures for model forecast refinement and smoothing.

The currently adopted Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan (RTP) / Sustainable Communities Strategy (SCS) (April 2016) growth forecasts for the City of San Bernardino identifies projected growth in population of 211,900 in 2012 to 257,400 in 2040, or a 21.47 percent increase over the 28-year period. (5) The change in population equates to roughly a 0.70 percent annual growth rate, compounded annually. Similarly, growth over the same 28-year period in households is projected to increase by 30.02 percent, or a 0.94 percent annual growth rate. Finally, growth in employment over the same 28-year period is projected to increase by 44.99 percent, or a 1.34 percent annual growth rate.

Based on a comparison of Existing traffic volumes to the Horizon Year (2040) forecasts, the average growth rate is estimated at approximately 2.97 percent compounded annually between Existing and Horizon Year (2040) traffic conditions. The annual growth rate at each individual intersection is not lower than 1.63 percent to as high as 4.44 percent compounded annually over the same time period. Therefore, the annual growth rate utilized for the purposes of this analysis would appear to conservatively approximate the anticipated regional growth in traffic volumes in the City of San Bernardino for near term and long range traffic conditions, especially when considered along with the addition of cumulative development project traffic and 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.

1.3 STUDY AREA

To ensure that this TIA satisfies the City of San Bernardino's traffic study requirements, Urban Crossroads, Inc. prepared a project traffic study scoping package for review by City staff prior to the preparation of this report. The Agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology. The Agreement approved by the City is included in Appendix 1.1.

The following 11 study area intersections listed in Table 1-1 and shown on Exhibit 1-2 were selected for this TIA based on consultation with City of San Bernardino staff. In general, the study area includes intersections where the Project is anticipated to contribute 50 or more peak hour trips, with the exception of the intersections denoted with an asterisk below, which were either

included at the request of the City of San Bernardino or since the intersection provides access to the Project.

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction	CMP?
1	Driveway 1 / Cajon Bl. – Future Intersection	City of San Bernardino	No
2	Driveway 2 / Cajon Bl. – Future Intersection	City of San Bernardino	No
3	Palm Av. / W. Little League Dr./Kendall Dr.	City of San Bernardino	No
4	Palm Av. / I-215 Northbound Ramps	Caltrans	No
5	Palm Av. / I-215 Southbound Ramps/Kendall Dr.	Caltrans	No
6	Palm Av. / Industrial Pkwy.	City of San Bernardino	No
7	Palm Av. / Institution Rd.	City of San Bernardino	No
8	Palm Av. / Driveway 3 – Future Intersection	City of San Bernardino	No
9	Institution Rd. / Cajon Rd.	City of San Bernardino	No
10	Driveway 4 / Cajon Rd. – Future Intersection	City of San Bernardino	No
11	Driveway 5 / Cajon Rd. – Future Intersection	City of San Bernardino	No

(*) = Fewer than 50 peak hour trips

The "50 peak hour trip" criterion utilized by the City of San Bernardino is consistent with the methodology employed by the County of San Bernardino, and generally represents a minimum number of trips at which a typical intersection would have the potential to be substantively impacted by a given development proposal. Although each intersection may have unique operating characteristics, this traffic engineering rule of thumb is a widely utilized tool for estimating a potential area of impact (i.e., study area).

1.4 ANALYSIS FINDINGS

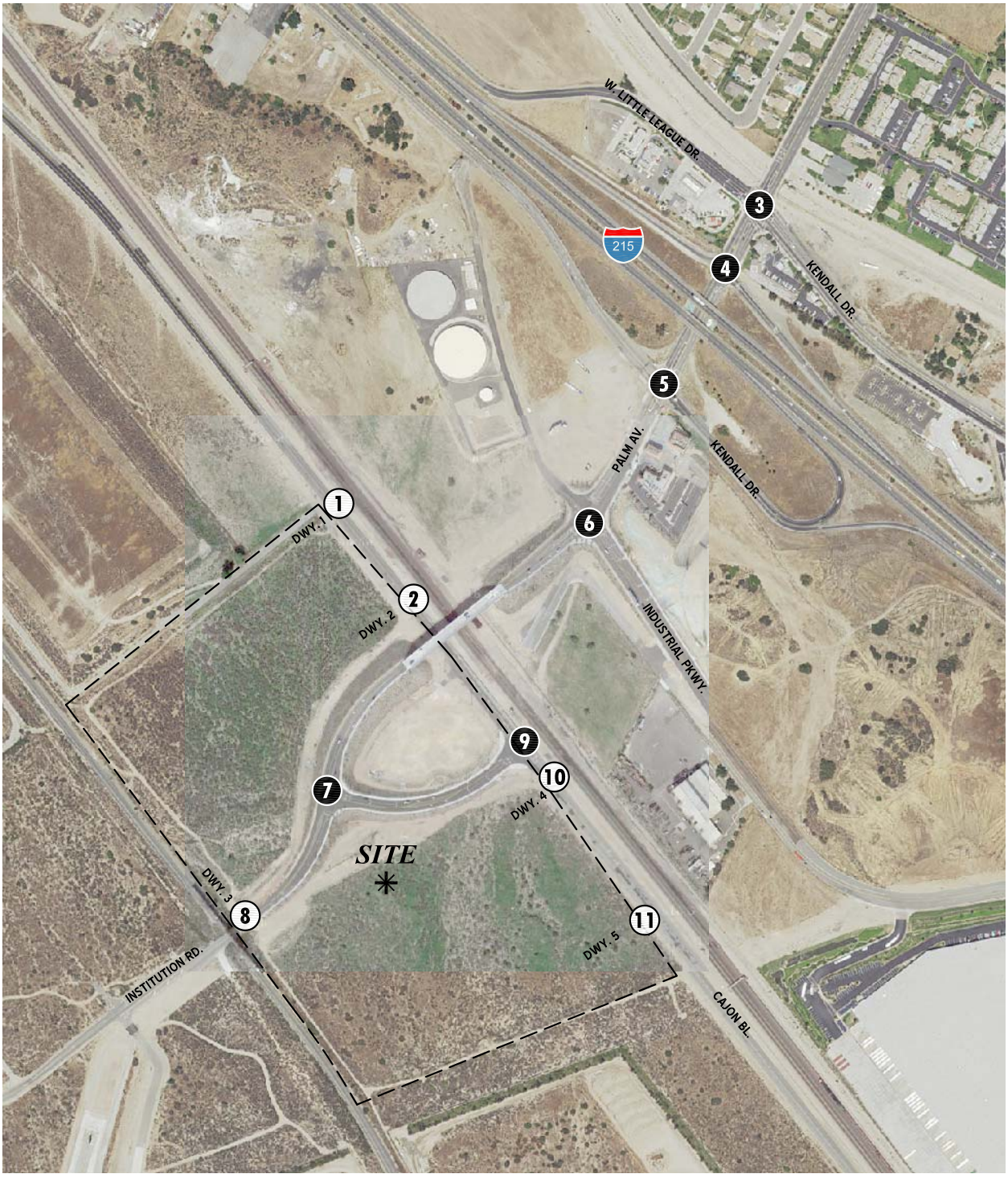
This section provides a summary of the analysis results for Existing (2016), E+P, EA (2018), EAP (2018), EAC (2018), EAPC (2018), and Horizon Year (2040) traffic conditions.

1.4.1 INTERSECTIONS

Existing (2016) Conditions

There are no study area intersections that are anticipated to operate at an unacceptable LOS during the peak hours under Existing (2016) conditions.

EXHIBIT 1-2: LOCATION MAP



LEGEND:

- (0) = EXISTING INTERSECTION ANALYSIS LOCATION
- (0) = FUTURE INTERSECTION ANALYSIS LOCATION

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E+P Conditions

The intersection analysis results indicate that the addition of Project traffic is not anticipated to result in any additional LOS deficiencies. As shown below, volume to capacity (v/c) ratios were calculated at intersections anticipated to operate at an LOS C or worse, consistent with the City of San Bernardino TIA guidelines:

		Existing (2016)				E+P				Δ v/c Difference		
		LOS		Average v/c		LOS		Average v/c				Significant
#	Intersection	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	Impact?
3	Palm Av. / W. Little League Dr./Kendall Dr.	D	C	0.72	0.62	D	C	0.73	0.62	0.01	0.00	No
4	Palm Av. / I-215 NB Ramps	B	C	0.57	0.70	B	C	0.60	0.74	--	0.04	No
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	D	C	0.89	0.49	D	C	0.94	0.60	**0.05**	**0.11**	**Yes**

Although the study area intersections are anticipated to continue to operate at acceptable LOS for E+P traffic conditions, the addition of Project traffic is anticipated to result in a significant impact based on the City's significance threshold at the following intersection:

- Palm Av. / I-215 SB Ramps/Kendall Dr. (#5)

Section 2.6 *Thresholds of Significance* includes the detailed methodology used in this analysis related to the significance thresholds for the City of San Bernardino.

EA (2018) Conditions

Consistent with Existing (2016) traffic conditions, there are no study area intersections that are anticipated to operate at an unacceptable LOS during the peak hours under EA (2018) conditions.

EAP (2018) Conditions

The intersection analysis results indicate that the addition of Project traffic is not anticipated to result in any additional LOS deficiencies for EAP (2018) conditions. As shown below, v/c ratios were calculated at intersections anticipated to operate at an LOS C or worse, consistent with the City of San Bernardino TIA guidelines:

		EA (2018)				EAP (2018)				Δ v/c Difference		
		LOS		Average v/c		LOS		Average v/c				Significant
#	Intersection	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	Impact?
3	Palm Av. / W. Little League Dr./Kendall Dr.	D	C	0.76	0.65	D	C	0.77	0.65	0.01	0.00	No
4	Palm Av. / I-215 NB Ramps	B	C	0.61	0.78	B	C	0.63	0.78	--	0.00	No
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	D	C	0.95	0.53	D	D	0.99	0.63	**0.04**	**0.10**	**Yes**

Although the study area intersections are anticipated to continue to operate at acceptable LOS for EAP (2018) traffic conditions, the addition of Project traffic is anticipated to result in a significant impact based on the City's significance threshold at the following intersection:

- Palm Av. / I-215 SB Ramps/Kendall Dr. (#5)

Section 2.6 *Thresholds of Significance* includes the detailed methodology used in this analysis related to the significance thresholds for the City of San Bernardino.

EAC (2018) Conditions

The following study area intersections are anticipated to operate at an unacceptable LOS during the peak hours for EAC (2018) conditions:

- Palm Av. / W. Little League Dr./Kendall Dr. (#3) – LOS E AM peak hour only
- Palm Av. / I-215 SB Ramps/Kendall Dr. (#5) – LOS E AM peak hour only

EAPC (2018) Conditions

The intersection analysis results indicate that the addition of Project traffic is not anticipated to result in any additional LOS deficiencies for EAPC (2018) conditions. As shown below, v/c ratios were calculated at intersections anticipated to operate at an LOS C or worse, consistent with the City of San Bernardino TIA guidelines:

		EAC (2018)				EAPC (2018)				Δ v/c		
		LOS		Average v/c		LOS		Average v/c		Difference		Significant
#	Intersection	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	Impact?
3	Palm Av. / W. Little League Dr./Kendall Dr.	**E**	D	0.87	0.78	**E**	D	0.88	0.79	0.01	0.01	No
4	Palm Av. / I-215 NB Ramps	B	C	0.68	1.03	B	D	0.70	1.07	--	0.04	No
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	**E**	C	1.15	0.77	**F**	D	1.20	0.84	**0.05**	**0.07**	**Yes**
6	Palm Av. / Industrial Pkwy.	B	C	0.58	0.72	C	D	0.65	0.94	--	**0.23**	**Yes**

The addition of Project traffic is anticipated to result in a significant cumulative impact at the intersections of Palm Avenue at I-215 Southbound Ramps/Kendall Drive and Palm Avenue at Industrial Parkway based on the City's significance threshold. Section 2.6 *Thresholds of Significance* includes the detailed methodology used in this analysis related to the significance thresholds for the City of San Bernardino.

Horizon Year (2040) Without Project Conditions

The following study area intersections are anticipated to operate at an unacceptable LOS during the peak hours under Horizon Year (2040) Without Project conditions, in addition to those previously identified under EAC (2018) and EAPC (2018) traffic conditions:

- Palm Av. / I-215 NB Ramps (#4) – LOS E PM peak hour only
- Palm Av. / Industrial Pkwy. (#6) – LOSF PM peak hour only

Horizon Year (2040) With Project Conditions

The intersection analysis results indicate that the addition of Project traffic is not anticipated to result in any additional LOS deficiencies under Horizon Year (2040) With Project traffic conditions. As shown below, v/c ratios were calculated at intersections anticipated to operate at an LOS C or worse, consistent with the City of San Bernardino TIA guidelines:

#	Intersection	2040 Without Project				2040 With Project				Δ v/c Difference		Significant Impact?
		LOS		Average v/c		LOS		Average v/c				
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
3	Palm Av. / W. Little League Dr./Kendall Dr.	**F**	**E**	0.99	0.89	**F**	**E**	0.99	0.90	0.00	0.01	No
4	Palm Av. / I-215 NB Ramps	C	**E**	0.87	1.22	D	**F**	0.90	1.24	0.03	**0.02**	**Yes**
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	**F**	D	1.32	0.94	**F**	D	1.37	1.02	**0.05**	**0.08**	**Yes**
6	Palm Av. / Industrial Pkwy.	C	**F**	0.73	0.49	D	**F**	0.89	1.64	**0.16**	**1.15**	**Yes**
7	Palm Av. / Institution Rd.	B	C	0.43	0.72	B	D	0.53	0.89	--	**0.17**	**Yes**

As shown above, the addition of Project traffic is anticipated to result in a significant cumulative impact based on the City's significance threshold at the following intersections:

- Palm Av. / I-215 NB Ramps (#4)
- Palm Av. / I-215 SB Ramps/Kendall Dr. (#5)
- Palm Av. / Industrial Pkwy. (#6)
- Palm Av. / Institution Rd. (#7)

Section 2.8 *Thresholds of Significance* includes the detailed methodology used in this analysis related to the significance thresholds for the City of San Bernardino.

1.5 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements within the City of San Bernardino are funded through a combination of direct project mitigation, development impact fee programs or fair share contributions, such as the City of San Bernardino Development Impact Fee (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 San Bernardino Association of Governments (SANBAG) 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 SANBAG, 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 City of San Bernardino.

1.5.2 CITY OF SAN BERNARDINO DEVELOPMENT IMPACT FEE (DIF) PROGRAM

The City of San Bernardino has created its own local Development Impact Fee (DIF) program to impose and collect fees from new residential, commercial and industrial development for the purpose of funding roadways and intersections necessary to accommodate City growth as identified in the City's General Plan Circulation Element. The City's DIF includes a Regional Circulation System Fee to comply with Measure "I" and a Local Circulation System Fee to address transportation improvements which are locally significant. The fee schedule was recently updated in June 2014 and is adjusted annually based upon changes in the construction cost index (CCI). Under the City's DIF program, the City may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program. The City may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program.

The timing to use the DIF fees is established through periodic capital improvement programs which are overseen by the City's Public Works Department. Periodic traffic counts, review of traffic accidents, and a review of traffic trends throughout the City are also periodically performed by City staff and consultants. The City uses this data to determine the timing of implementing the improvements listed in its facilities list. The City also uses this data to ensure that the improvements listed on the facilities list are constructed before the LOS falls below the LOS performance standards adopted by the City. In this way, the improvements are constructed before the LOS falls below the City's LOS performance thresholds.

The Project applicant will be subject to the City's DIF fee program, and will pay the requisite City DIF fees at the rates then in effect. The Project Applicant's payment of the requisite DIF fees at the rates then in effect pursuant to the DIF Program will mitigate its impacts to DIF-funded facilities. After the City's DIF fees are collected, they are placed in a separate interest bearing account pursuant to the requirements of Government Code § 66000 *et seq*. The timing to use the DIF fees is established through periodic capital improvement programs which are overseen by the City's Public Works Department.

1.5.3 FAIR SHARE CONTRIBUTION

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

When off-site improvements are identified with a minor share of responsibility assigned to proposed development, the approving jurisdiction may elect to collect a fair share contribution or require the development to construct improvements. Detailed fair share calculations, for each peak hour, has been provided on Table 1-2 for the applicable deficient intersections shown on Table 1-3.

Table 1-2

Project Fair Share Calculations for Intersections

#	Intersection		Existing	Project	2040 WP[1]	Total New Traffic	Project % of New Traffic
4	Palm Av. / I-215 NB Ramps						
		AM:	2,037	56	3,109	1,072	5.2%
		PM:	2,128	63	3,316	1,188	**5.3%**
5	Palm Av. / I-215 SB Ramps/Kendall Dr.						
		AM:	1,719	98	2,781	1,062	9.2%
		PM:	1,492	117	2,737	1,245	**9.4%**
6	Palm Av. / Industrial Pkwy.						
		AM:	592	103	1,201	609	**16.9%**
		PM:	576	123	1,362	786	15.6%
7	Palm Av. / Institution Rd.						
		AM:	398	103	796	398	**25.9%**
		PM:	386	124	947	561	22.1%

* Highest percentage represented in **BOLD** and shown on Table 1-3.

[1] Project fair share based on net new trips between Existing and Horizon Year (2040) traffic conditions.

Table 1-3

Summary of Cumulative Impacts and Recommended Improvements

#	Intersection Location	Jurisdiction	E+P	EA (2018)	EAP (2018)	EAC (2018)	EAPC (2018)	2040 Without Project	2040 With Project	Improvements in DIF Fee Program?[1]	Total Cost[2]	Fair Share %[3]	Fair Share Cost[4]
4	Palm Av. / I-215 NB Ramps	City of San Bernardino, Caltrans	None	None	None	None	None	2nd NB left turn lane	Same	No	$74,200	5.3%	$3,935
								WB left turn lane and restripe WB shared left-through lane as a shared through-right turn lane	Same	No	$519,400		$27,544
										Total	**$593,600**		**$31,479**
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	City of San Bernardino, Caltrans	2nd SB left turn lane	Same	Same	Same	Same	Same	Same	No	$74,200	9.4%	$6,973
										Total	**$74,200**		**$6,973**
6	Palm Av. / Industrial Pkwy.	City of San Bernardino	None	None	None	Traffic Signal	Same	Same	Same	No	$250,000	16.9%	$42,282
										Total	**$250,000**		**$42,282**
7	Palm Av. / Institution Rd.	City of San Bernardino	None	None	None	None	None	Traffic Signal	Same	No	$250,000	25.9%	$64,698
										Total	**$250,000**		**$64,698**
										Total Costs for City of San Bernardino[5]	**$648,400**		**$117,889**
										Total Costs for Caltrans[6]	**$519,400**		**$27,544**

[1] Improvements included in City of San Bernardino DIF program for local and regional components.

[2] Costs have been estimated using the data provided in Appendix "G" of the CMP (2003 Update) for preliminary construction costs. Appendix "G" costs escalated by a factor of 1.484, except Traffic Signals, to reflect 2016 costs.

[3] Program improvements constructed by project may be eligible for fee credit, at discretion of City. See Table 1-2 for Fair Share Calculations.

[4] Rough order of magnitude cost estimate.

[5] Total project fair share contribution consists of the improvements which are not already included in a fee program for those intersections wholly or partially within the City of San Bernardino.

[6] Total project fair share contribution consists of the improvements which are not already included in a fee program for those intersections wholly or partially within Caltrans' jurisdiction.

1.6 ON-SITE ROADWAY AND SITE ACCESS IMPROVEMENTS

This section summarizes Project site access and on-site circulation recommendations.

The Project is proposed to have access on Cajon Boulevard via four future driveways and via a future driveway on Palm Avenue, south of Institution Road. All Project access points are assumed to allow for full-access, with the exception of Driveway 3 on Cajon Boulevard. Driveway 3 on Cajon Boulevard is proposed to have right-in/right-out access only due to its proximity to Institution Road. Heavy trucks and passenger cars are anticipated to utilize all access points. Regional access to the Project site will be provided by the I-215 Freeway via Palm Avenue.

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 are required to be in place prior to occupancy.

1.6.1 SITE ADJACENT ROADWAY AND SITE ACCESS IMPROVEMENTS

The recommended site-adjacent roadway improvements for the Project are described below. These improvements need to be incorporated into the project description prior to Project approval or imposed as conditions of approval as part of the Project approval. Exhibit 1-3 illustrates the site-adjacent roadway improvement recommendations.

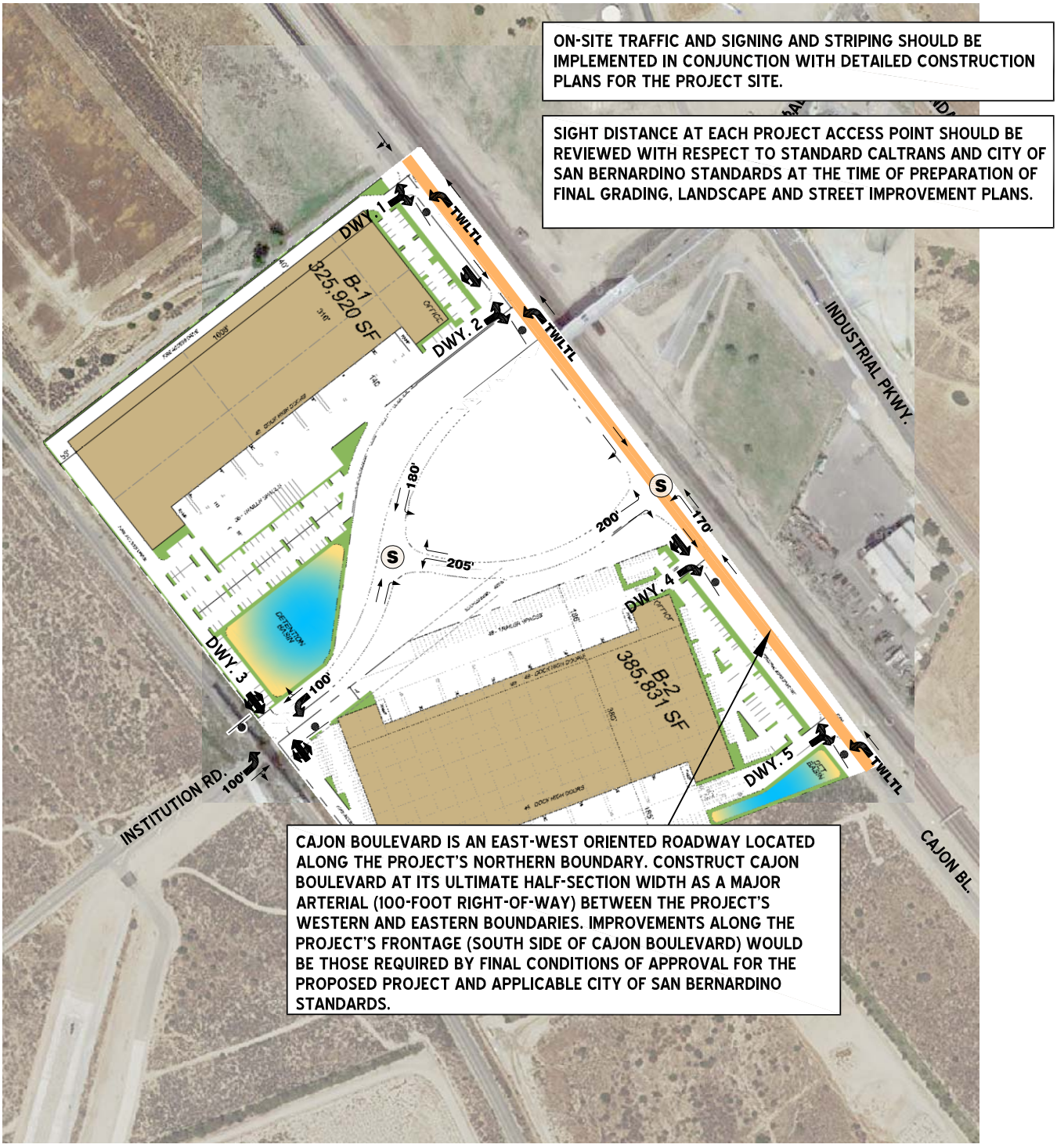
Exhibit 1-3 also illustrates the on-site and site adjacent recommended roadway lane improvements. Construction of on-site and site adjacent improvements are recommended to occur in conjunction with adjacent Project development activity or as needed for Project access purposes.

Cajon Boulevard – Cajon Boulevard is an east-west oriented roadway located along the Project's northern boundary. Construct Cajon Boulevard at its ultimate half-section width as a Major Arterial (100-foot right-of-way) between the Project's western and eastern boundaries in compliance with the applicable City of San Bernardino standards.

Palm Avenue between the Cajon Boulevard overcrossing and the southern Project boundary appears to be constructed to its ultimate General Plan cross-section. Similarly, Institution Road between Cajon Boulevard and Palm Avenue also appears to have been recently constructed to its ultimate General Plan cross-section.

Wherever necessary, roadways adjacent to the Project, site access points and site-adjacent intersections will be constructed to be consistent with the identified roadway classifications and respective cross-sections in the City of San Bernardino General Plan Circulation Element.

EXHIBIT 1-3: SITE ACCESS AND SITE ADJACENT ROADWAY RECOMMENDATIONS



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

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

1.6.2 QUEUING ANALYSIS AT THE PROJECT DRIVEWAYS

A queuing analysis was conducted along the site adjacent roadways of Cajon Boulevard and Palm Avenue for Horizon Year (2040) traffic conditions to determine the turn pocket lengths necessary to accommodate long-range 95th percentile queues. The analysis was conducted for the weekday AM and weekday PM peak hours. The results have been provided in Appendix 1.2.

SimTraffic is designed to model networks of signalized and unsignalized intersections, with the primary purpose of checking and fine tuning signal operations. SimTraffic uses the input parameters from Synchro to generate random simulations. 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 (or Average Queue plus 1.65 standard deviations). However, the average queue is the average of all the two-minute maximum queues observed by SimTraffic. The maximum back of queue observed for every two-minute period is recorded by SimTraffic. Many agencies utilize the 95th percentile queues for design purposes.

SimTraffic has been utilized to assess peak hour queuing at the site access driveways for Horizon Year With Project traffic conditions. The random simulations generated by SimTraffic have been utilized to determine the 50th and 95th percentile queue lengths observed for each turn lane. A SimTraffic simulation has been recorded five (5) times, during the weekday AM and weekday PM peak hours, and has been seeded for 30-minute periods with 60-minute recording intervals.

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 utilized for purposes of determining the necessary turn pocket storage lengths, the 50th percentile queues are also reported and can be found in Appendix 1.2. The 50th percentile 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. In other words, if traffic were observed for 100 cycles, the 95th percentile queue would be the queue experienced with the 95th busiest cycle (or 5% of the time).

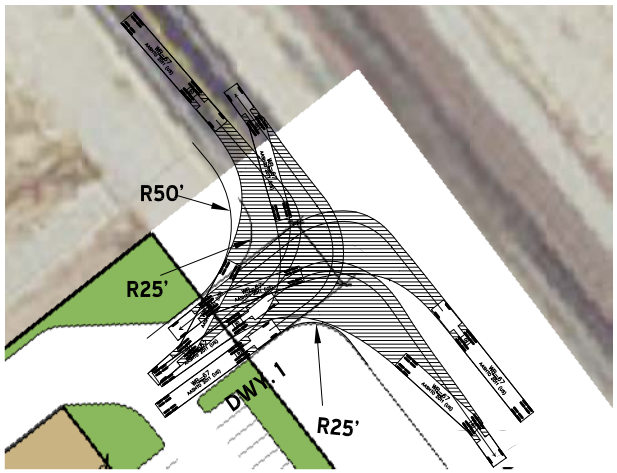
The existing and proposed storage lengths for the turning movements at the Project driveways and site adjacent intersections can accommodate the 95th percentile queues.

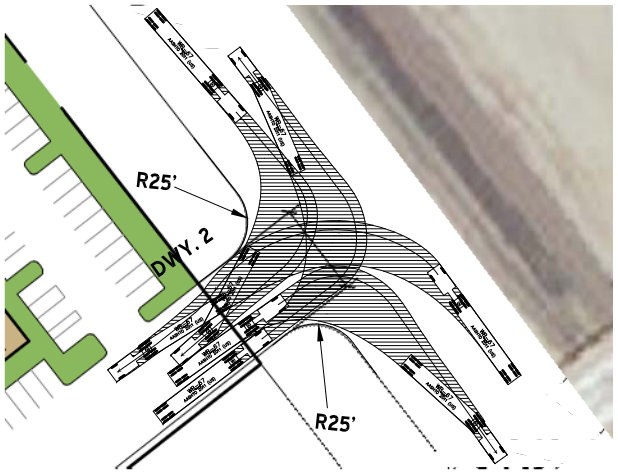
1.7 TRUCK ACCESS AND CIRCULATION

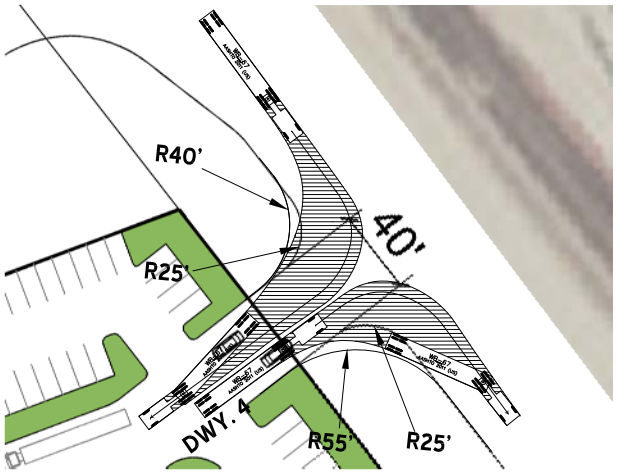
Due to the typical wide turning radius of large trucks, a truck turning template has been overlaid on the site plan at each applicable Project driveway anticipated to be utilized by heavy trucks in order to determine appropriate curb radii and to verify that trucks will have sufficient space to execute turning maneuvers. The truck turning templates prepared for the Project are shown on Exhibit 1-4.

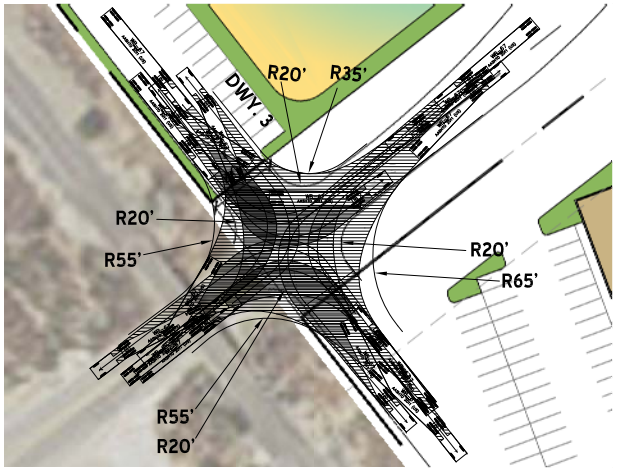
The southwest corner of Driveway 1 and Cajon Boulevard should be modified to provide a 50-foot curb radius to accommodate heavy trucks (WB-67 with 53-foot trailer) making an eastbound right turn into Driveway 1. The northwest corner of Palm Avenue and Driveway 3 should be modified to provide a 35-foot curb radius, 65-foot curb radius on the northeast corner, and 55-foot curb radius on both the southwest and southeast corners to accommodate a WB-67 truck. The southwest corner of Driveway 4 and Cajon Boulevard should be modified to provide a 40-foot curb radius and the southeast corner should be modified to provide a 55-foot curb radius to accommodate a WB-67 truck. The 25-foot curb radius on the southwest and southeast corners of Driveway 2 and Driveway 5 on Cajon Boulevard are sufficient to accommodate the turning radius of a WB-67 truck.

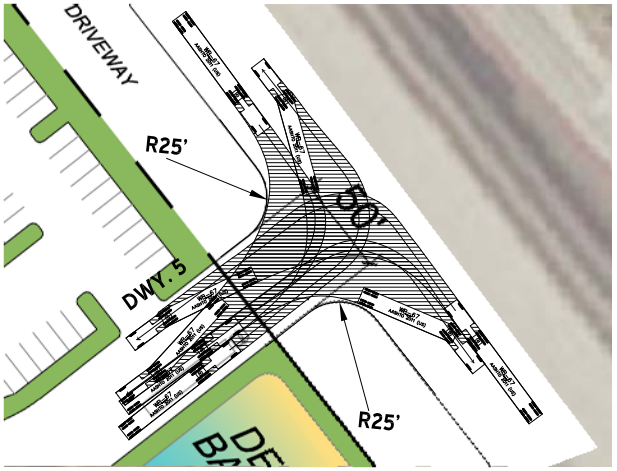
EXHIBIT 1-4: TRUCK ACCESS

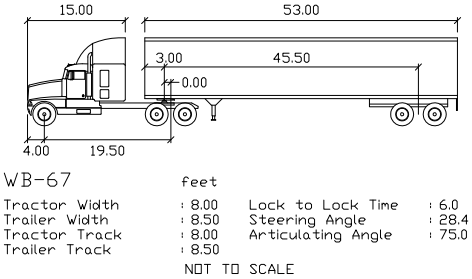












WB-67 feet

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		

NOT TO SCALE

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2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are generally consistent with City of San Bernardino traffic study guidelines.

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) 2010 methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (6) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

The City of San Bernardino requires signalized intersection operations analysis based on the methodology described in the HCM 2010. 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. Study area intersections have been evaluated using the Synchro (Version 9 Build 904) analysis software package.

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 2010

Consistent with Appendix C, Page C-13 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 Near-Term Traffic Conditions:

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

Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15 minute volumes. Common practice for LOS analysis is to use a peak 15-minute rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g. PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis scenarios, with the exception of Long Range traffic conditions. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (6)

California Department of Transportation (Caltrans)

Per the Caltrans *Guide for the Preparation of Traffic Impact Studies*, the traffic modeling and signal timing optimization software package Synchro (Version 9) has been utilized to analyze signalized intersections under Caltrans' jurisdiction, which include interchange to arterial ramps (i.e. I-215 Freeway at Palm Avenue). (3) Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the Chapter 16 of the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network. Signal timing for the freeway arterial-to-ramp intersections have been obtained from Caltrans District 8 and were utilized for the purposes of this analysis.

2.2.2 UNSIGNALIZED INTERSECTIONS

The City of San Bernardino requires the operations of unsignalized intersections be evaluated using the methodology described the HCM 2010. (6) 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 2010

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-215 Freeway at Palm 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 Palm Avenue. Specifically, the queuing analysis is utilized to identify any potential queuing and "spill back" onto the I-215 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 other 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. In other words, if traffic were observed for 100 cycles, the 95th percentile queue would be the queue experienced with the 95th busiest cycle (or 5% of the time). 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 Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*, as amended by *the MUTCD 2014 California Supplement*, for all study area intersections. (8)

The signal warrant criteria for Existing study area intersections are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. Both the FHWA's *MUTCD* and the *MUTCD 2014 California Supplement* indicate that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (8) 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 criteria are basically identical for both the FHWA's *MUTCD* and the *MUTCD 2014 California Supplement*.

Warrant 3 is appropriate to use for this TIA because it provides specialized warrant criteria for intersections with rural characteristics (e.g. located in communities with populations of less than 10,000 persons or with adjacent major streets operating above 40 miles per hour). For the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection.

Future 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 / Cajon Bl. (#1)
- Driveway 2 / Cajon Bl. (#2)
- Palm Av. / Industrial Parkway (#6)
- Palm Av. / Institution Road (#7)
- Palm Av. / Driveway 3 (#8)
- Cajon Boulevard / Institution Road (#9)
- Driveway 4 / Cajon Bl. (#11)

Although Driveway 4 and Cajon Boulevard is an unsignalized intersection, however, traffic signal warrants have not been evaluated at this location as it is proposed to be restricted to right=-in/right-out access only and the installation of a traffic signal is unlikely with the access restriction.

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 Analysis,* Section 6 *EA (2018) and EAP (2018) Traffic Analysis,* Section 7 *EAC (2018) and EAPC (2018) Traffic Analysis,* and Section 8 *Horizon Year (2040) Traffic Analysis* 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 MINIMUM LEVEL OF SERVICE (LOS)

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

2.5.1 CITY OF SAN BERNARDINO

The definition of an intersection deficiency in the City of San Bernardino is based on the City of San Bernardino General Plan Circulation Element. The City of San Bernardino General Plan states that target LOS D be maintained at City intersections wherever possible.

2.5.2 CMP

The CMP definition of deficiency is based on maintaining a level of service standard of LOS E or better, except where an existing LOS F condition is identified in the CMP document.

2.5.3 CALTRANS

Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on State Highway Facilities (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. Consistent with the City of San Bernardino LOS threshold, LOS D will be used as the target LOS for freeway ramp-to-arterial intersections.

2.6 THRESHOLDS OF SIGNIFICANCE

This section outlines the methodology used in this analysis related to identifying circulation system deficiencies. The City of San Bernardino TIA Guidelines identifies a "significant" traffic impact at an intersection when any of the following changes in the volume to capacity (v/c) ratios occur between the "without Project" and the "with Project" conditions:

LOS Without Project	V/C Difference
C	> 0.0400
D	> 0.0200
E, F	> 0.0100

Mitigation measures for direct Project impacts identified under E+P or EAP (2018) conditions would only mitigate the Project's proportional change in delay or v/c ratio to pre-Project conditions or better. Mitigation measures will be identified for intersections that show a significant cumulative impact per the above changes in v/c, and operate at LOS D or worse under EAPC (2018) and Horizon Year (2040) with Project traffic conditions. The LOS with mitigation must be improved to LOS D or better for intersections.

It should be noted that for the purposes of this analysis, HCM 2000 methodology has been utilized to report v/c as Synchro does not report the average v/c using the HCM 2010 methodology.

2.7 PROJECT FAIR SHARE CALCULATION METHODOLOGY

Improvements found to be included in the City of San Bernardino's DIF will be identified as such. For improvements that do not appear to be in a pre-existing fee program, a fair share financial contribution based on the Project's fair share impact may be imposed in order to mitigate the Project's share of impacts in lieu of construction.

The Project's fair share cost of improvements would be determined based on the following equation, which is the ratio of Project traffic to new traffic, where new traffic is total future traffic less existing baseline traffic:

Project Fair Share % = Project Traffic / (Horizon Year Total Traffic – Existing Traffic)

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3 AREA CONDITIONS

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

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the agreement with City of San Bernardino staff (Appendix 1.1), the study area includes a total of 11 existing and future intersections as shown previously on Exhibit 1-2 where the Project is anticipated to contribute 50 or more peak hour trips, or at the request of the City staff. 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 CITY OF SAN BERNARDINO GENERAL PLAN CIRCULATION ELEMENT

As previously noted, the Project site is located within the City of San Bernardino. Exhibit 3-2 shows the City of San Bernardino General Plan Circulation Element, and Exhibit 3-3 illustrates the City of San Bernardino General Plan roadway cross-sections.

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

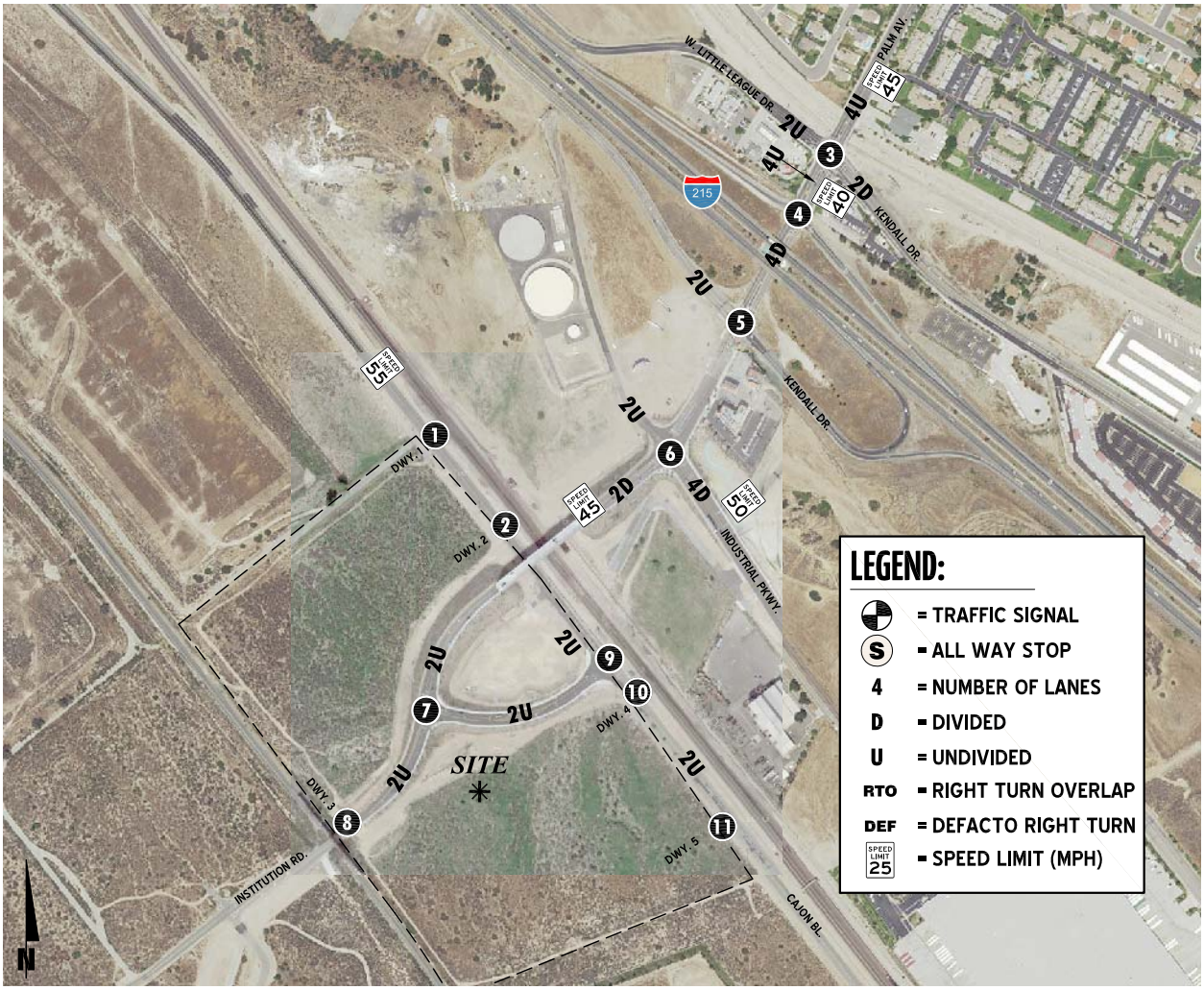
Major Arterials can accommodate six or eight travel lanes and may have raised medians. These facilities typically carry a high volume of traffic and are the primary thoroughfares linking San Bernardino with adjacent cities and the regional highway system. Driveway access to these roadways are typically limited in order to provide efficient high volume traffic flow. Examples of Major Arterials within the study area include:

- Kendall Drive, east of Palm Avenue
- Cajon Road

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 arterials, and are also through streets enabling traffic to travel uninterrupted for longer distances through the City. Examples of Secondary Arterials within the study area include:

- Palm Avenue – north of Cajon Boulevard
- Industrial Parkway

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



1 Dwy. 1 & Cajon Bl. Future Intersection	2 Dwy. 2 & Cajon Bl. Future Intersection	3 Palm Av. & W. Little League Dr./ Kendall Dr. RTO
4 Palm Av. & I-215 NB Ramps DEF	5 Palm Av. & I-215 SB Ramps DEF	6 Palm Av. & Industiral Pkwy S, DEF
7 Palm Av. & Institution Rd. S	8 Palm Av. & Dwy. 3 Future Intersection	9 Institution Rd. & Cajon Bl. S
10 Dwy. 4 & Cajon Bl. Future Intersection	11 Dwy. 5 & Cajon Bl. Future Intersection	

EXHIBIT 3-2: CITY OF SAN BERNADINO GENERAL PLAN CIRCULATION ELEMENT

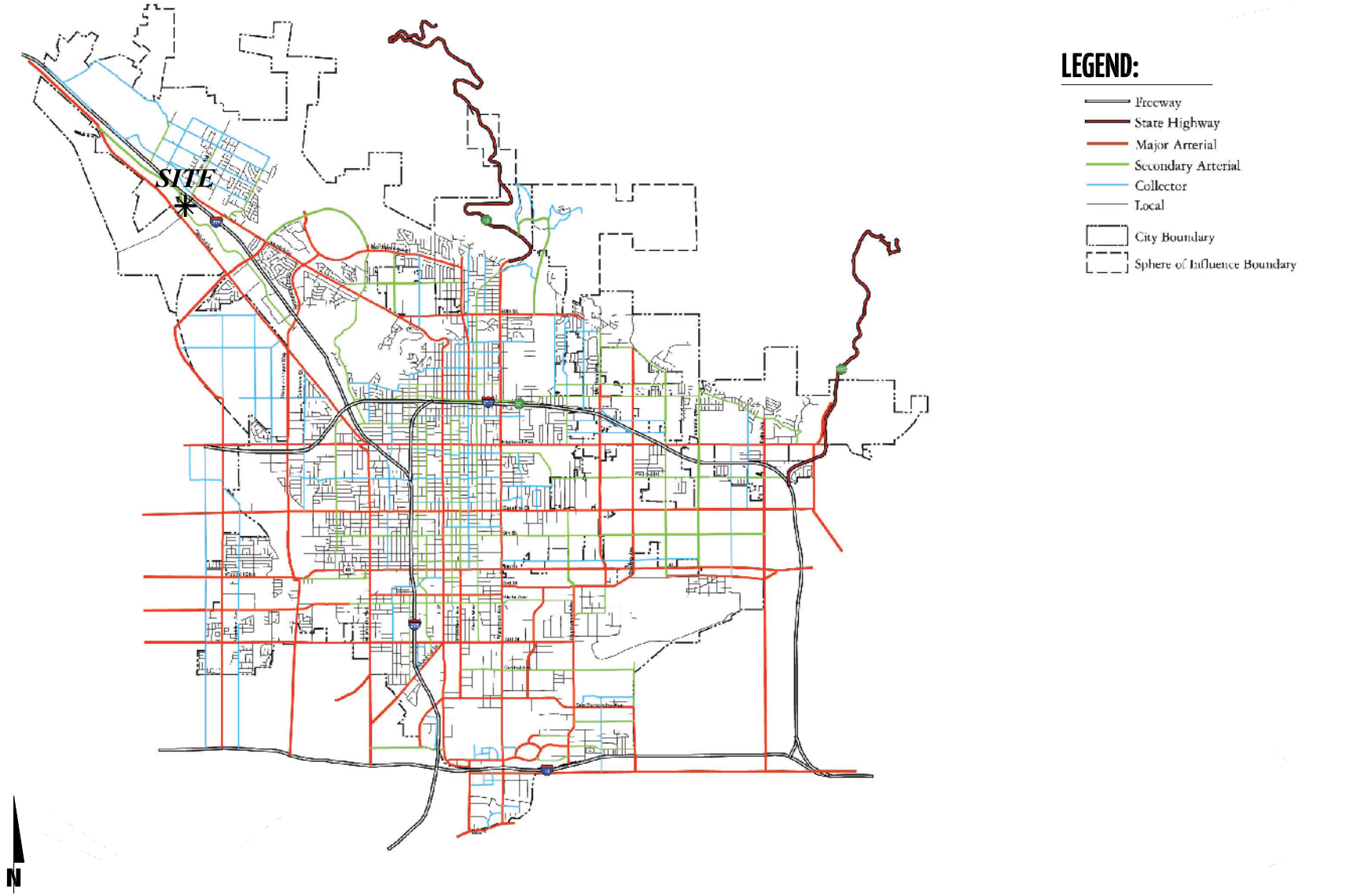
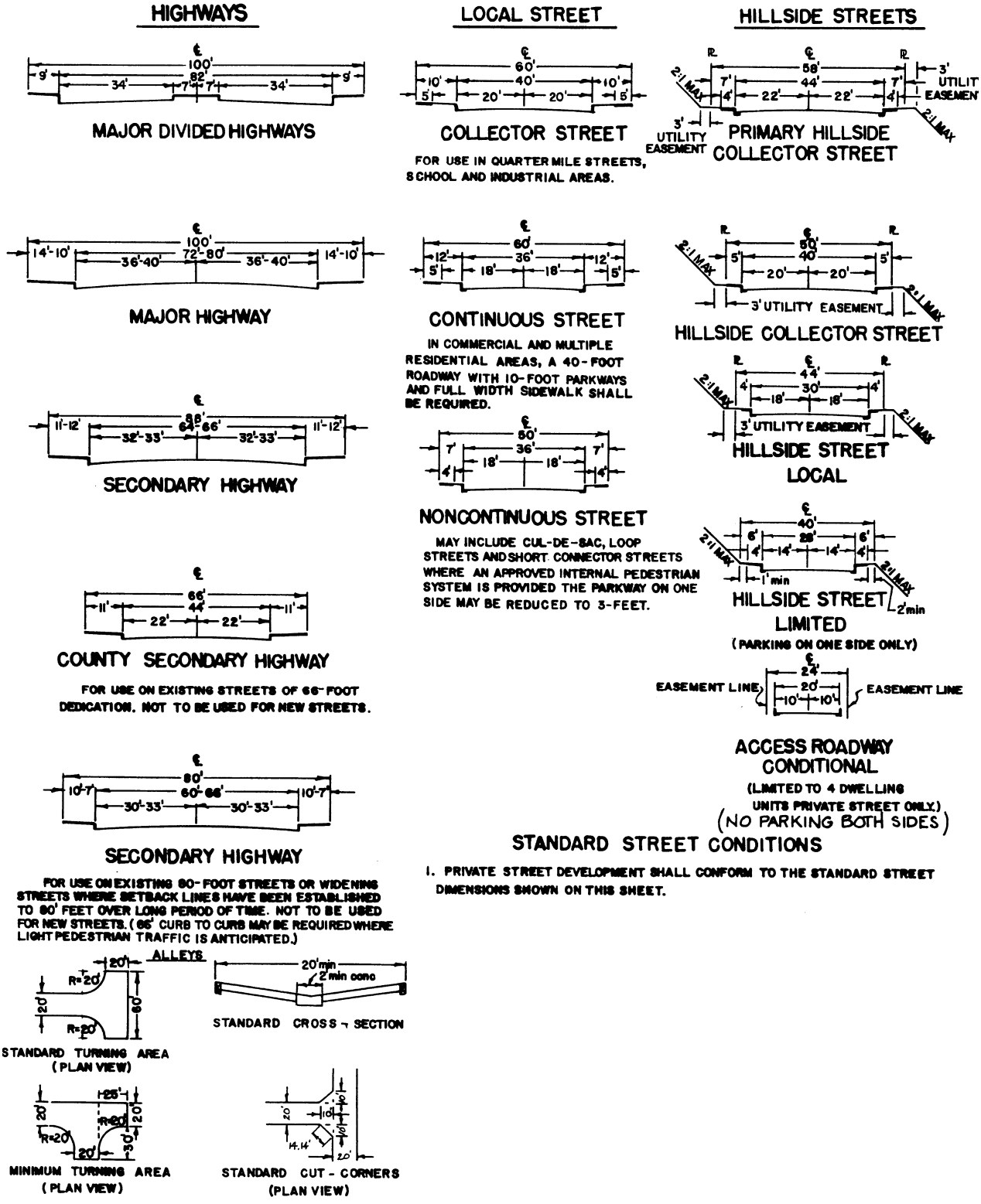


EXHIBIT 3-3: CITY OF SAN BERNARDINO GENERAL PLAN ROADWAY CROSS-SECTIONS



3.3 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 Kendall Drive via Route 2 and the sbX Greenline along Kendall Drive via Route 2. The existing bus routes provided within the area by Omnitrans are shown on Exhibit 3-4. The sbX Greenline is an existing transit line that currently serves the area in the immediate vicinity of the proposed Project. 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. As such, it is recommended that the applicant work in conjunction with Omnitrans to potentially provide bus service to the site.

3.4 BICYCLE & PEDESTRIAN FACILITIES

Field observations conducted in August 2016 indicate nominal pedestrian and bicycle activity within the study area. Existing pedestrian facilities within the study area are shown on Exhibit 3-5. Class II bike lanes are currently accommodated along Kendall Drive, east of Palm Avenue. Palm Avenue and Cajon Boulevard, east of Institution Road are also currently existing Class III bike facilities.

Exhibit 3-6 illustrates the City of San Bernardino conceptual trail system, which includes bicycle routes along Kendall Drive, Palm Avenue and portions of Cajon Boulevard. Future planned bicycle routes are anticipated along Cajon Boulevard, west of Institution Road. There is also a regional multi-purpose trail to the west on Little League Drive

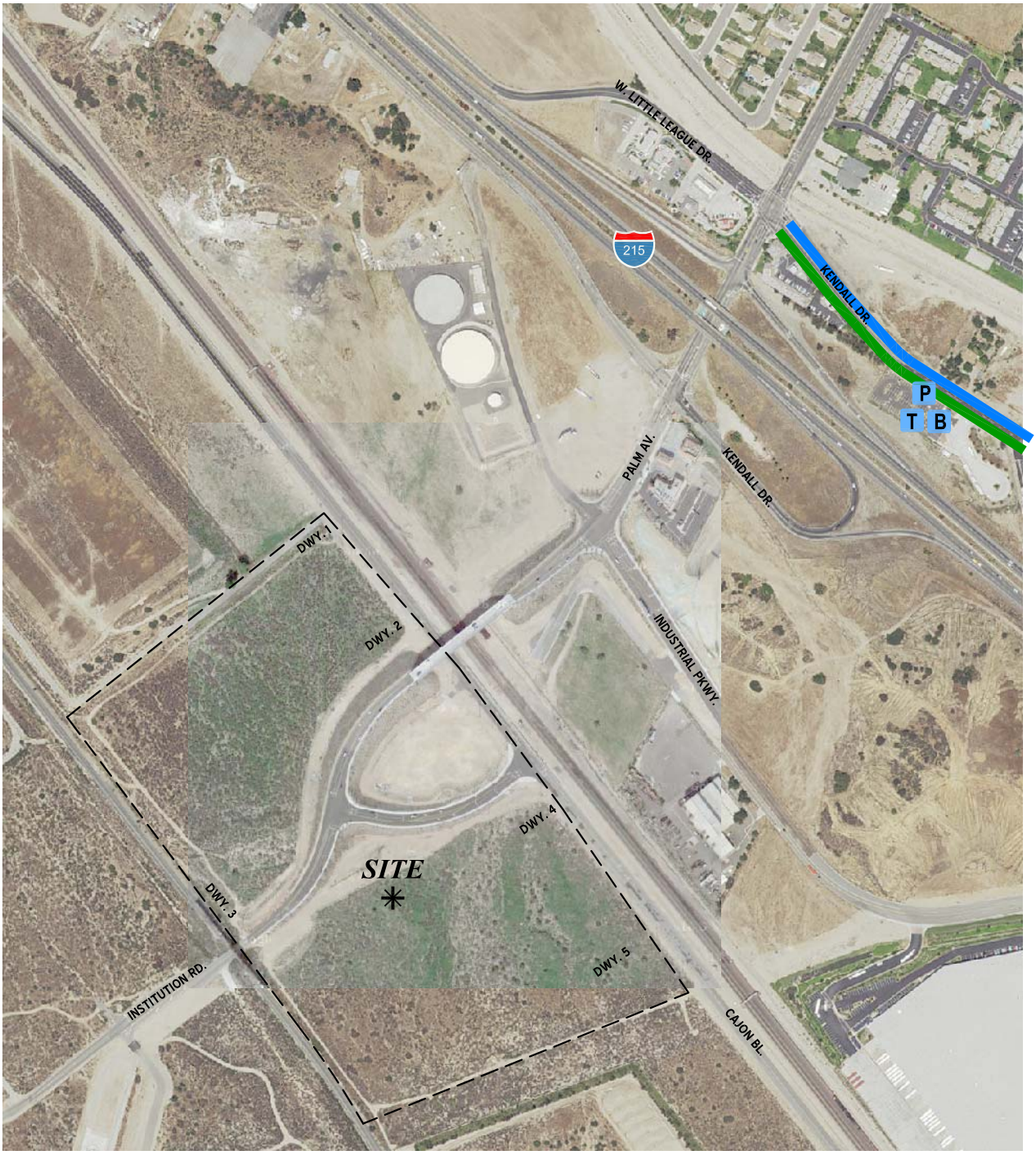
3.5 EXISTING (2016) TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in August 2016. The following peak hours were selected for analysis:

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

The weekday AM and weekday PM peak hour count data is representative of typical weekday peak hour traffic conditions in the study area. There were no observations made in the field that would indicate atypical traffic conditions on the count dates, such as construction activity or detour routes and near-by schools were in session and operating on normal schedules.

EXHIBIT 3-4: CITY OF SAN BERNADINO TRANSIT SERVICES



LEGEND:

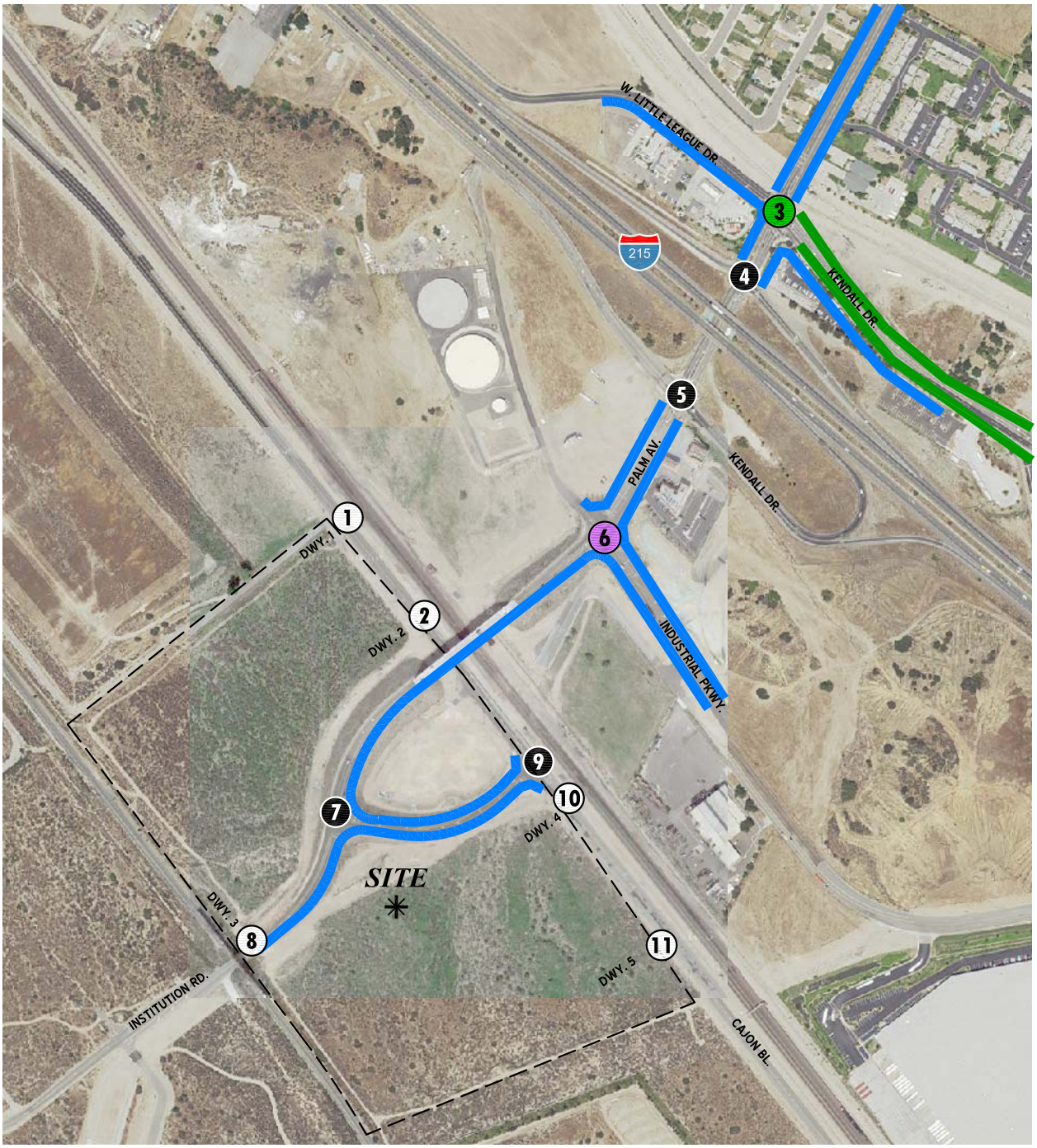
- B = BUS STOP
- P = PARK AND RIDE
- T = TRANSFER POINT
- = SBX
- = OMNITRANS ROUTE 2

N

10442 - transit.dwg

URBAN CROSSROADS

EXHIBIT 3-5: EXISTING PEDESTRIAN FACILITIES



LEGEND:

- = SIDEWALK
- = BIKE LANE
- 0 = NO CROSSWALK
- 0 = FUTURE INTERSECTION
- 0 = CROSSWALK ON ALL APPROACHES
- 0 = CROSSWALK ON ONE APPROACH

N

10442 - peds.dwg

EXHIBIT 3-6: CITY OF SAN BERNARDINO CONCEPTUAL TRAIL SYSTEM

The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1. These raw turning volumes have been flow conserved between intersections with limited access, no access and where there are currently no uses generating traffic (e.g., between ramp-to-arterial intersections, etc.).

The traffic counts collected in August 2016 include the following vehicle classifications: include the vehicle classifications as shown below:

- Passenger Cars
- 2-Axle Trucks
- 3-Axle Trucks
- 4 or More Axle Trucks

To represent the impact large trucks, buses and recreational vehicles have on traffic flow; all trucks were converted into passenger car equivalents (PCEs). 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 slow-down is also 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 2.0 has been applied to 2-axle trucks, 2.5 for 3-axle trucks and 3.0 for 4+-axle trucks to estimate each turning movement. These factors are consistent with the City of San Bernardino Traffic Impact Study Guidelines (1). Existing average daily traffic (ADT) volumes on arterial highways throughout the study area are shown on Exhibit 3-7. Existing ADT volumes are based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

Weekday PM Peak Hour (Approach Volume + Exit Volume) x 12.9964 = Leg Volume

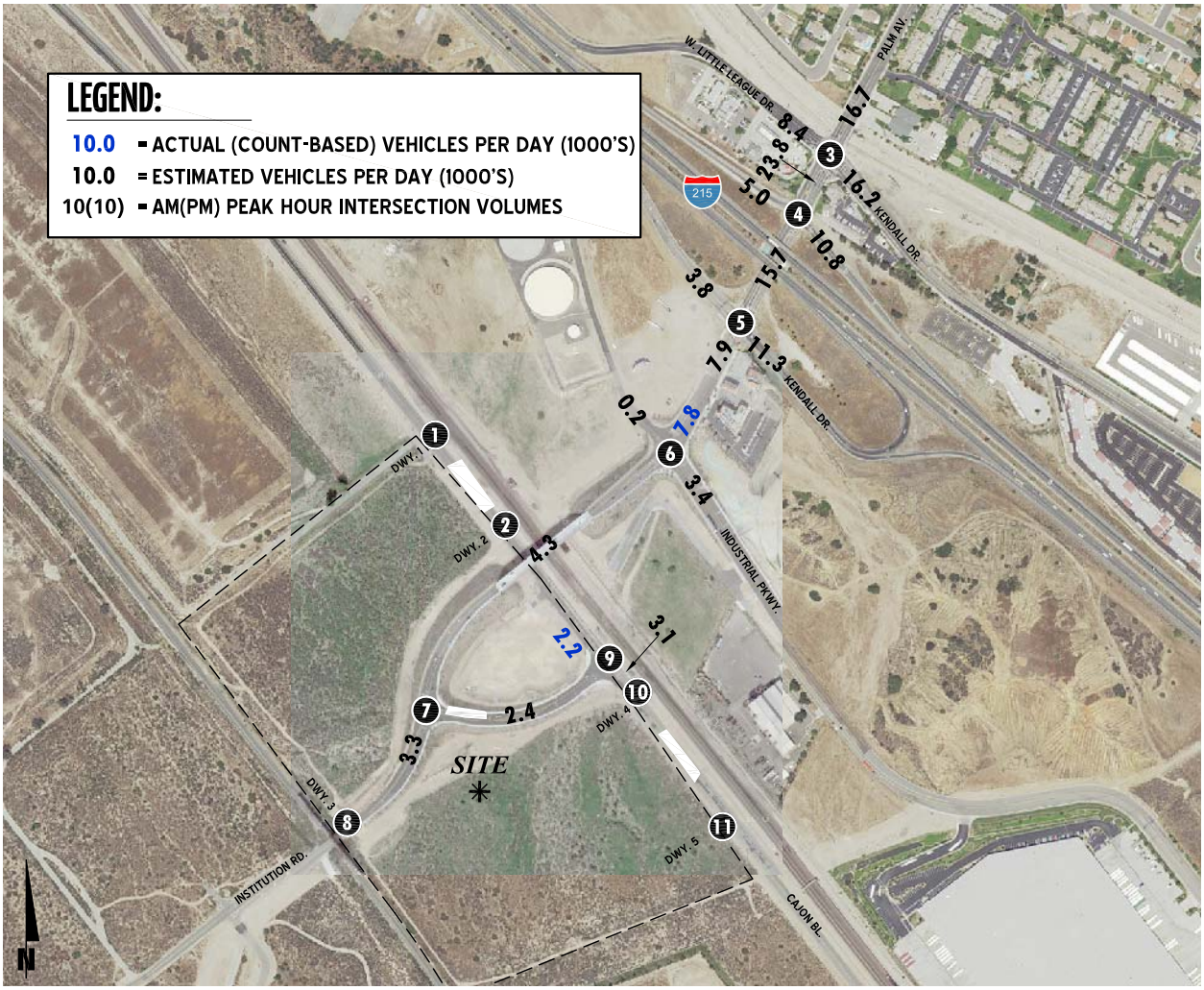
For those roadway segments which have 24-hour tube count data available in close proximity to the study area, a comparison between the PM peak hour and daily traffic volumes indicated that the peak-to-daily relationship of approximately 7.69 percent would sufficiently estimate ADT volumes for planning-level analyses. As such, the above equation utilizing a factor of 12.9964 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 7.69 percent (i.e., 1/0.0769 = 12.9964).

Existing weekday AM and PM peak hour intersection volumes are shown on Exhibit 3-7. It should be noted that the traffic volumes shown on Exhibit 3-7 are represented in PCE as opposed to actual vehicles.

3.6 EXISTING (2016) CONDITIONS INTERSECTION OPERATIONS ANALYSIS

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

EXHIBIT 3-7: EXISTING (2016) TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl. Future Intersection	**2** Dwy. 2 & Cajon Bl. Future Intersection	**3** Palm Av. & W. Little League Dr./ Kendall Dr. 81(50) 746(254) 157(87) → 212(253) ← 83(109) ← 323(340) 20(37) → 55(139) → 138(104) ← 115(211) ← 290(604) ← 206(320)
4 Palm Av. & I-215 NB Ramps 327(280) 880(418) → 321(635) ← 0(2) ← 142(190) 78(103) 290(500)	**5** Palm Av. & I-215 SB Ramps 74(161) 259(107) 689(340) → 201(305) ← 4(6) ← 120(38) 28(20) → 96(52) → 25(21) ← 22(33) ← 139(278) ← 65(132)	**6** Palm Av. & Industiral Pkwy 2(0) 211(79) 147(61) → 79(172) ← 1(10) ← 4(10) 4(0) → 9(1) → 2(0) ← 4(2) ← 120(235) ← 10(6)
7 Palm Av. & Institution Rd. 111(36) 106(53) → 86(77) ← 39(25) 48(166) 8(30)	**8** Palm Av. & Dwy. 3 Future Intersection	**9** Institution Rd. & Cajon Bl. 52(71) ← 92(69) 43(49) → 33(33) ← 22(34) ← 92(49)
10 Dwy. 4 & Cajon Bl. Future Intersection	**11** Dwy. 5 & Cajon Bl. Future Intersection	

Table 3-1

Intersection Analysis for Existing (2016) Conditions

#	Intersection	Traffic Control[4]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service		V/C[4]	
			Northbound			Southbound			Eastbound			Westbound								
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM	AM	PM
1	Driveway 1 / Cajon Bl.		Intersection Does Not Exist												--	--	--	--	--	--
2	Driveway 2 / Cajon Bl.		Intersection Does Not Exist												--	--	--	--	--	--
3	Palm Av. / W. Little League Dr./Kendall Dr.	TS	1	2	1>	1	2	0	1	1	1	2	1	1	37.1	30.0	D	C	0.72	0.62
4	Palm Av. / I-215 NB Ramps	TS	0	2	0	0	2	0	0	0	0	0	1	1	12.2	22.1	B	C	0.57	0.70
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	TS	1	2	0	1	2	0	0	1	d	0	1	0	40.7	31.4	D	C	0.89	0.49
6	Palm Av. / Industrial Pkwy.	AWS	1	1	1	1	1	1	0	1	0	1	1	1	10.3	11.2	B	B	0.37	0.48
7	Palm Av. / Institution Rd.	AWS	0	1	1	1	1	0	0	0	0	1	0	1	8.7	9.1	A	A	0.19	0.31
8	Palm Av. / Driveway 3		Intersection Does Not Exist												--	--	--	--	--	--
9	Institution Rd. / Cajon Rd.	AWS	1	0	1	0	0	0	0	1	1	1	1	0	8.4	8.0	A	A	0.18	0.12
10	Driveway 4 / Cajon Rd.		Intersection Does Not Exist												--	--	--	--	--	--
11	Driveway 5 / Cajon Rd.		Intersection Does Not Exist												--	--	--	--	--	--

[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; > = Right Turn Overlap Phasing

[2] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal

[4] Volume to capacity (v/c) ratio has been reported using the HCM 2000 methodology (as HCM 2010 does not report the overall v/c) for intersections operating at LOS C or worse, consistent with the City of San Bernardino Traffic Impact Study Guidelines.

Consistent with Table 3-1, a summary of the peak hour intersection LOS for Existing conditions are shown on Exhibit 3-8. The intersection operations analysis worksheets are included in Appendix 3.2 of this TIA.

3.7 EXISTING (2016) CONDITIONS OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway at the Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 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 movements that are currently experiencing queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows.

Worksheets for Existing traffic conditions off-ramp queuing analysis are provided in Appendix 3.3.

3.8 EXISTING (2016) CONDITIONS TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. There are currently no study area intersections that warrant a traffic signal. Existing conditions traffic signal warrant analysis worksheets are provided in Appendix 3.4.

EXHIBIT 3-8: EXISTING (2016) SUMMARY OF LOS

LEGEND:

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

N

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Table 3-2

Peak Hour Freeway Off-Ramp Queuing Summary for Existing (2016) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2016)			
			95th Percentile Queue (Feet)		Acceptable? [1]	
			AM Peak	PM Peak	AM	PM
I-215 NB Off-Ramp / Palm Av.	WBL/T	910	173	135	Yes	Yes
	WBR	415	61	463	Yes	Yes
I-215 SB Off-Ramp / Palm Av.	WBL/T/R	1,470	405 [2]	168	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

4 PROJECTED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment onto the study area roadway network. The Project is proposed to consist of a total of 711,751 sf of high-cube warehouse/distribution center use. For the purposes of this traffic study, the Project anticipated to be developed in a single phase with an anticipated opening year of 2018.

The Project is proposed to have access on Cajon Boulevard via four future driveways and via a future driveway on Palm Avenue, south of Institution Road. All Project access points are assumed to allow for full-access, with the exception of Driveway 3 on Cajon Boulevard. Driveway 3 on Cajon Boulevard is proposed to have right-in/right-out access only due to its proximity to Institution Road. Regional access to the Project site will be provided by the I-215 Freeway via Palm Avenue.

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.

Trip generation rates used to estimate Project traffic are shown in Table 4-1 for actual vehicles and Table 4-2 for PCE. The trip generation rates used for this analysis are based upon information collected by the ITE as provided in their *Trip Generation* manual, 9th Edition, 2012. (4) For purposes of this analysis, ITE land use code 152 (High-Cube Warehousing) has been used to derive site specific trip generation estimates. In order to accurately reflect the impact that heavy trucks would have on the street system, Project trips have been further broken down between passenger cars and trucks for each of the peak hours and weekday daily trip generation. As noted on Table 4-1 and 4-2, refinements to the raw trip generation estimates have been made to provide a more detailed breakdown of trips between passenger cars and trucks. The percentage of trucks has been determined from the table shown on page 267 of the ITE *Trip Generation* manual. As shown on page 267, the truck trip generation rate for weekday daily traffic is 0.64 or 38.1% of the total traffic. Similarly, the truck trip generation rate for the weekday AM peak hour is 0.03 (27.3% of the total traffic) and 0.04 (or 33.3% of the total traffic) for the weekday PM peak hour.

Table 4-1

Project Trip Generation Summary (Actual Vehicles)

Land Use	Units[2]	ITE LU Code	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Rates[1]									
High-Cube Warehouse[3]	TSF	152	0.076	0.034	0.110	0.037	0.083	0.120	1.680
Passenger Cars			0.055	0.025	0.080	0.025	0.055	0.080	1.040
2-Axle Trucks			0.005	0.002	0.007	0.003	0.006	0.009	0.141
3-Axle Trucks			0.004	0.002	0.005	0.002	0.005	0.007	0.113
4-Axle+ Trucks			0.012	0.006	0.018	0.007	0.017	0.024	0.386

Land Use	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Summary									
High-Cube Warehouse 1 (B-1)	325.920	TSF							
Passenger Cars:			18	8	26	8	18	26	339
Truck Trips:									
2-axle:			1	1	2	1	2	3	46
3-axle:			1	1	2	1	2	3	37
4+-axle:			4	2	6	2	5	7	126
- Net Truck Trips (Actual Trucks)[4]			*6*	*4*	*10*	*4*	*9*	*13*	*209*
BUILDING 1 TOTAL NET TRIPS (Actual Vehicles)[5]			***24***	***12***	***36***	***12***	***27***	***39***	***548***
High-Cube Warehouse 2 (B-2)	385.831	TSF							
Passenger Cars:			21	10	31	10	21	31	401
Truck Trips:									
2-axle:			2	1	3	1	2	3	54
3-axle:			1	1	2	1	2	3	44
4+-axle:			5	2	7	3	6	9	149
- Net Truck Trips (Actual Trucks)[4]			*8*	*4*	*12*	*5*	*10*	*15*	*247*
BUILDING 2 (Actual Vehicles)[5]			***29***	***14***	***43***	***15***	***31***	***46***	***648***
TOTAL NET TRIPS (Actual Vehicles)[5]			***53***	***26***	***79***	***27***	***58***	***85***	***1,196***

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Ninth Edition (2012).

[2] TSF = thousand square feet

[3] Vehicle Mix Source: Total truck percentage source from ITE Trip Generation manual. Truck mix (by axle type) source from SCAQMD.

AM peak hour = 72.7% passenger cars, 6.01% 2-Axle trucks, 4.83% 3-Axle trucks, 16.46% 4-Axle trucks

PM peak hour = 66.7% passenger cars, 7.33% 2-Axle trucks, 5.89% 3-Axle trucks, 20.08% 4-Axle trucks

ADT = 61.9% passenger cars, 8.38% 2-Axle trucks, 6.74% 3-Axle trucks, 22.98% 4-Axle trucks

[4] Vehicle Mix Source: Total truck percentage source from ITE Trip Generation manual. Truck mix (by axle type) source from SCAQMD for high-cube warehouse use and from the City of Fontana Truck Trip Generation Study for warehousing and general light industrial uses.

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

Table 4-2

Project Trip Generation Summary (PCE)

Land Use	Units[2]	ITE LU Code	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Rates[1]									
High-Cube Warehouse[3,4]	TSF	152	0.076	0.034	0.110	0.037	0.083	0.120	1.680
Passenger Cars			0.055	0.025	0.080	0.025	0.055	0.080	1.040
2-Axle Trucks (PCE = 2.0)			0.009	0.004	0.013	0.005	0.012	0.018	0.282
3-Axle Trucks (PCE = 2.5)			0.009	0.004	0.013	0.005	0.012	0.018	0.283
4-Axle+ Trucks (PCE = 3.0)			0.037	0.017	0.054	0.022	0.050	0.072	1.158

Land Use	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Summary									
High-Cube Warehouse 1 (B-1)	325.920	TSF							
Passenger Cars:			18	8	26	8	18	26	339
Truck Trips:									
2-axle:			3	1	4	2	4	6	92
3-axle:			3	1	4	2	4	6	92
4+-axle:			12	5	17	7	16	23	377
- Net Truck Trips (PCE)[4]			*18*	*7*	*25*	*11*	*24*	*35*	*561*
BUILDING 1 TOTAL NET TRIPS (PCE)[4]			***36***	***15***	***51***	***19***	***42***	***61***	***900***
High-Cube Warehouse 2 (B-2)	385.831	TSF							
Passenger Cars:			21	10	31	10	21	31	401
Truck Trips:									
2-axle:			4	2	6	2	5	7	109
3-axle:			4	2	6	2	5	7	109
4+-axle:			14	6	20	9	19	28	447
- Net Truck Trips (PCE)[4]			*22*	*10*	*32*	*13*	*29*	*42*	*665*
BUILDING 2 NET TRIPS (PCE)[4]			***43***	***20***	***63***	***23***	***50***	***73***	***1,066***
TOTAL NET TRIPS (PCE)[4]			***79***	***35***	***114***	***42***	***92***	***134***	***1,966***

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Ninth Edition (2012).

[2] TSF = thousand square feet

[3] Vehicle Mix Source: Total truck percentage source from ITE Trip Generation manual. Truck mix (by axle type) source from SCAQMD.

AM peak hour = 72.7% passenger cars, 6.01% 2-Axle trucks, 4.83% 3-Axle trucks, 16.46% 4-Axle trucks

PM peak hour = 66.7% passenger cars, 7.33% 2-Axle trucks, 5.89% 3-Axle trucks, 20.08% 4-Axle trucks

ADT = 61.9% passenger cars, 8.38% 2-Axle trucks, 6.74% 3-Axle trucks, 22.98% 4-Axle trucks

[4] PCE rates are per SANBAG.

Trip generation for heavy trucks was further broken down by truck type (or axle type). The total truck percentage is comprised of 3 different truck types: 2-axle, 3-axle, and 4+-axle trucks. For the purposes of this analysis, the percentage of trucks, by axle type, were obtained from the South Coast Air Quality Management District's (SCAQMD) interim recommended truck mix. The SCAQMD has recently performed surveys of existing facilities and compiled the data to provide interim guidance on the mix of heavy trucks for these types of high-cube warehousing / distribution facilities. Based on this interim guidance from the SCAQMD, the following truck fleet mix was utilized for the purposes of estimating the truck trip generation for the site: 22.0% of the total trucks as 2-axle trucks, 17.7% of the total trucks as 3-axle trucks, and 60.3% of the total trucks as 4+-axle trucks. 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 the City of San Bernardino Traffic Impact Study Guidelines, 2015 Update. (1) Trip generation rates for actual vehicles and with PCE factors are shown on Table 4-1 and Table 4-2.

As shown on Table 4-2, the proposed Project is anticipated to generate a net total of 1,966 PCE trip-ends per day with 114 net PCE AM peak hour trips and 134 net PCE PM peak hour trips.

4.2 PROJECT TRIP DISTRIBUTION

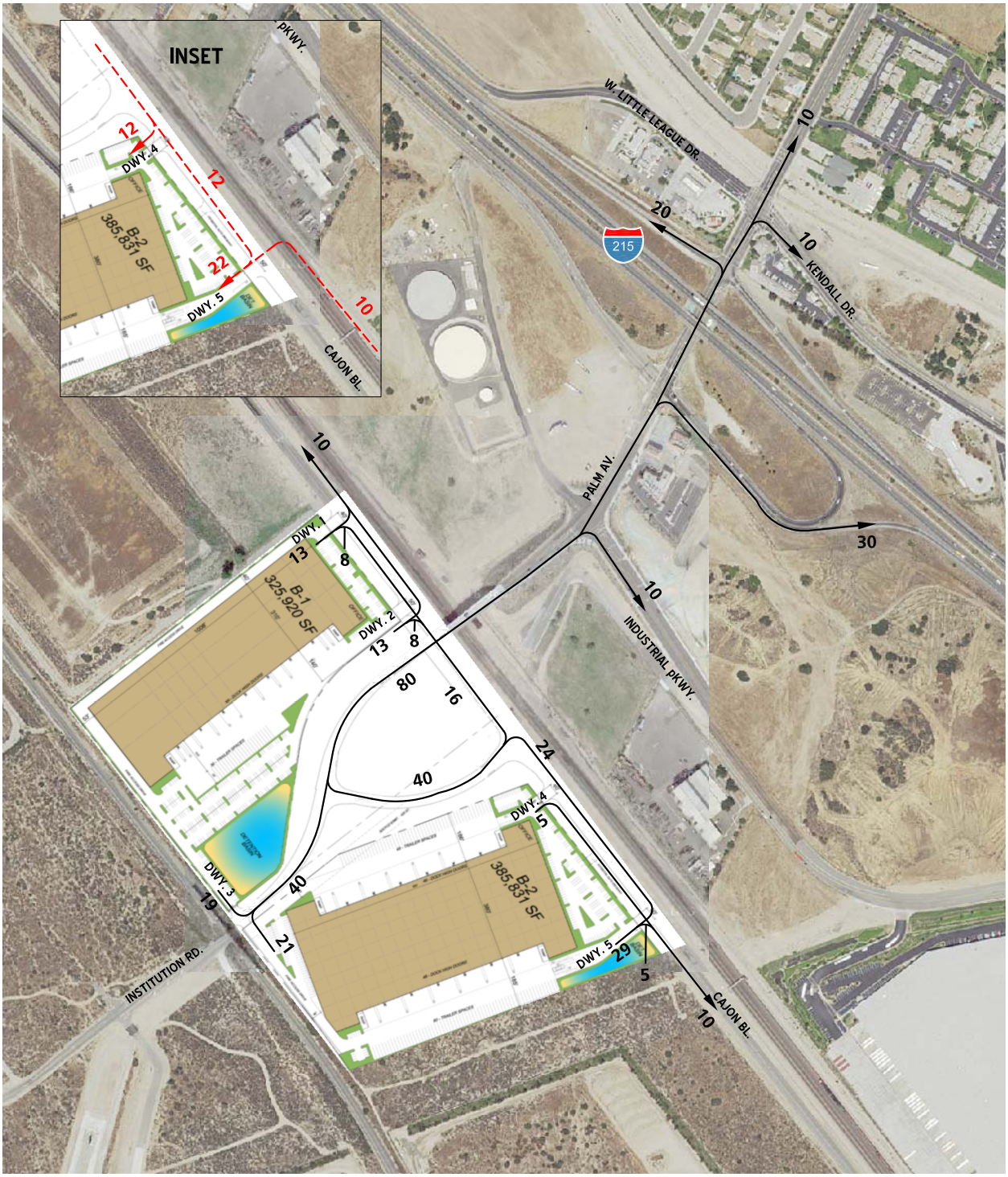
The Project trip distribution and assignment process represents the directional orientation of traffic to and from the Project site. The trip distribution pattern of passenger cars is heavily influenced by the geographical location of the site, the location of surrounding uses, and the proximity to the regional freeway system. Given these differences, separate trip distributions were generated for both passenger cars and truck trips.

Exhibit 4-1 illustrates the passenger car trip distribution patterns. Exhibits 4-2 illustrates the truck trip distribution patterns. Passenger cars and heavy trucks are proposed to have access to all driveways.

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).

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



LEGEND:

10 = PERCENT TO/FROM PROJECT

N

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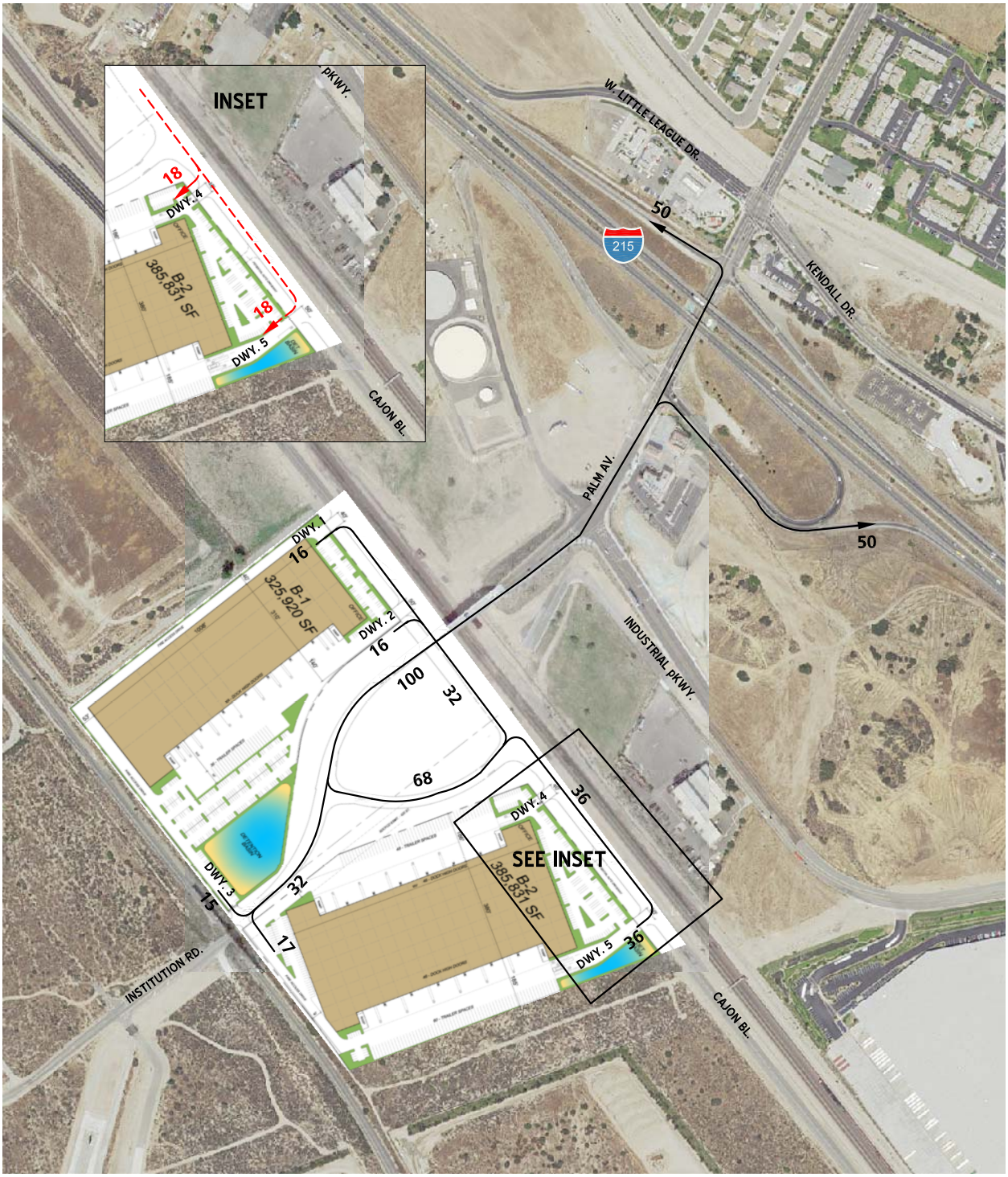
EXHIBIT 4-2: PROJECT (TRUCKS) TRIP DISTRIBUTION



LEGEND:

10 = PERCENT TO/FROM PROJECT

= OUTBOUND

= INBOUND

N

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4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project ADT and peak hour intersection turning movement volumes are shown on Exhibits 4-3.

4.5 CONSTRUCTION TRAFFIC

Project construction activities may potentially result in temporary and transient traffic deficiencies related to:

- Construction employee commutes;
- Import of construction materials and soils; and
- Transport and use of heavy construction equipment.

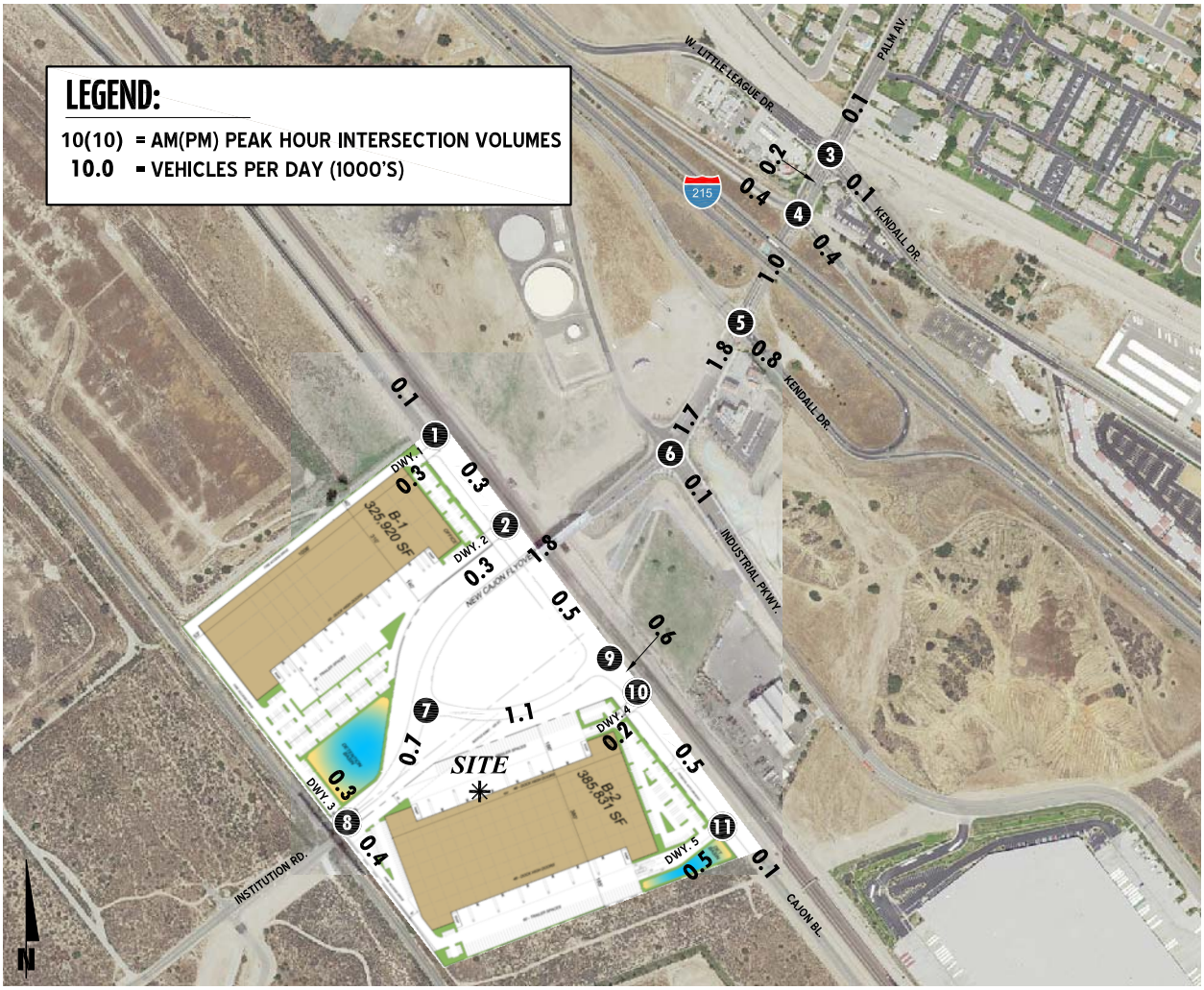
The Applicant would be required to develop and implement a City-approved Construction Traffic Management Plan addressing potential construction-related traffic detours and disruptions. In general, the Construction Traffic Management Plan would ensure that to the extent practical, construction traffic would access the Project site during off-peak hours; and that construction traffic would be routed to avoid travel through, or proximate to, sensitive land uses.

4.6 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon a background (ambient) growth factor of 3% per year. The ambient growth factor is intended to approximate traffic growth. The total ambient growth is 6.09% for 2018 traffic conditions (compounded growth of three percent per year over 2 years). 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.

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.

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



1 Dwy. 1 & Cajon Bl.	2 Dwy. 2 & Cajon Bl.	3 Palm Av. & W. Little League Dr./ Kendall Dr.	4 Palm Av. & I-215 NB Ramps	5 Palm Av. & I-215 SB Ramps	6 Palm Av. & Industrial Pkwy
←1(2) ←10(5)	←10(5) ←10(5)	0(0) 4(2) 0(0) ←0(0) ←0(0) ←4(2)	0(0) 8(4) ←0(0) ←0(0) ←32(17)	0(0) 40(21) 0(0) ←0(0) ←0(0) ←28(16)	0(0) 67(37) 0(0) ←0(0) ←0(0) ←4(2)
2(1)→ 2(1)→ ↑1(2) ↑4(12)	4(12)→ 2(1)→ ↑1(2) ↑4(12)	0(0)→ 0(0)→ 0(0)→ ↑0(0) ↑2(4) ↑2(4)	↑12(34) ↑4(8)	0(0)→ 0(0)→ 0(0)→ ↑0(0) ↑16(42) ↑14(38)	0(0)→ 0(0)→ 0(0)→ ↑0(0) ↑30(80) ↑2(4)

7 Palm Av. & Institution Rd.	8 Palm Av. & Dwy. 3	9 Institution Rd. & Cajon Bl.	10 Dwy. 4 & Cajon Bl.	11 Dwy. 5 & Cajon Bl.
28(15) 43(24) ←19(52) ←0(0)	13(7) 0(0) 15(8) ←7(17) ←0(0) ←0(0)	←0(0) ←10(28)	←10(28)	←0(0) ←4(2)
↑13(33) ↑0(0)	6(15)→ 0(0)→ 0(0)→ ↑0(0) ↑0(0) ↑0(0)	0(0)→ 8(23)→ ↑19(11) ↑24(13)	12(6)→ 12(6)→ ↑1(2)	1(2)→ 12(6)→ ↑10(28) ↑1(2)

The currently adopted Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan (RTP) / Sustainable Communities Strategy (SCS) (April 2016) growth forecasts for the City of San Bernardino identifies projected growth in population of 211,900 in 2012 to 257,400 in 2040, or a 21.47 percent increase over the 28-year period. (5) The change in population equates to roughly a 0.70 percent annual growth rate, compounded annually. Similarly, growth over the same 28-year period in households is projected to increase by 30.02 percent, or a 0.94 percent annual growth rate. Finally, growth in employment over the same 28-year period is projected to increase by 44.99 percent, or a 1.34 percent annual growth rate.

Based on a comparison of Existing traffic volumes to the Horizon Year (2040) forecasts, the average growth rate is estimated at approximately 2.97 percent compounded annually between Existing and Horizon Year (2040) traffic conditions. The annual growth rate at each individual intersection is not lower than 1.63 percent to as high as 4.44 percent compounded annually over the same time period. Therefore, the annual growth rate utilized for the purposes of this analysis would appear to conservatively approximate the anticipated regional growth in traffic volumes in the City of San Bernardino for near term and long range traffic conditions, especially when considered along with the addition of cumulative development project traffic and 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.

4.7 CUMULATIVE DEVELOPMENT TRAFFIC

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 from a recent traffic study in the City of San Bernardino and information provided by City staff (see Appendix 4.1).

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 individual cumulative projects was manually added to the With Cumulative traffic conditions forecasts to ensure that traffic generated by the listed cumulative development projects in Table 4-3 are reflected as part of the background traffic.

Based on the identified cumulative development project traffic generation and trip distribution patterns, cumulative development ADT and AM and PM peak hour volumes are shown on Exhibit 4-5.

EXHIBIT 4-4: CUMULATIVE DEVELOPMENT PROJECTS LOCATION MAP

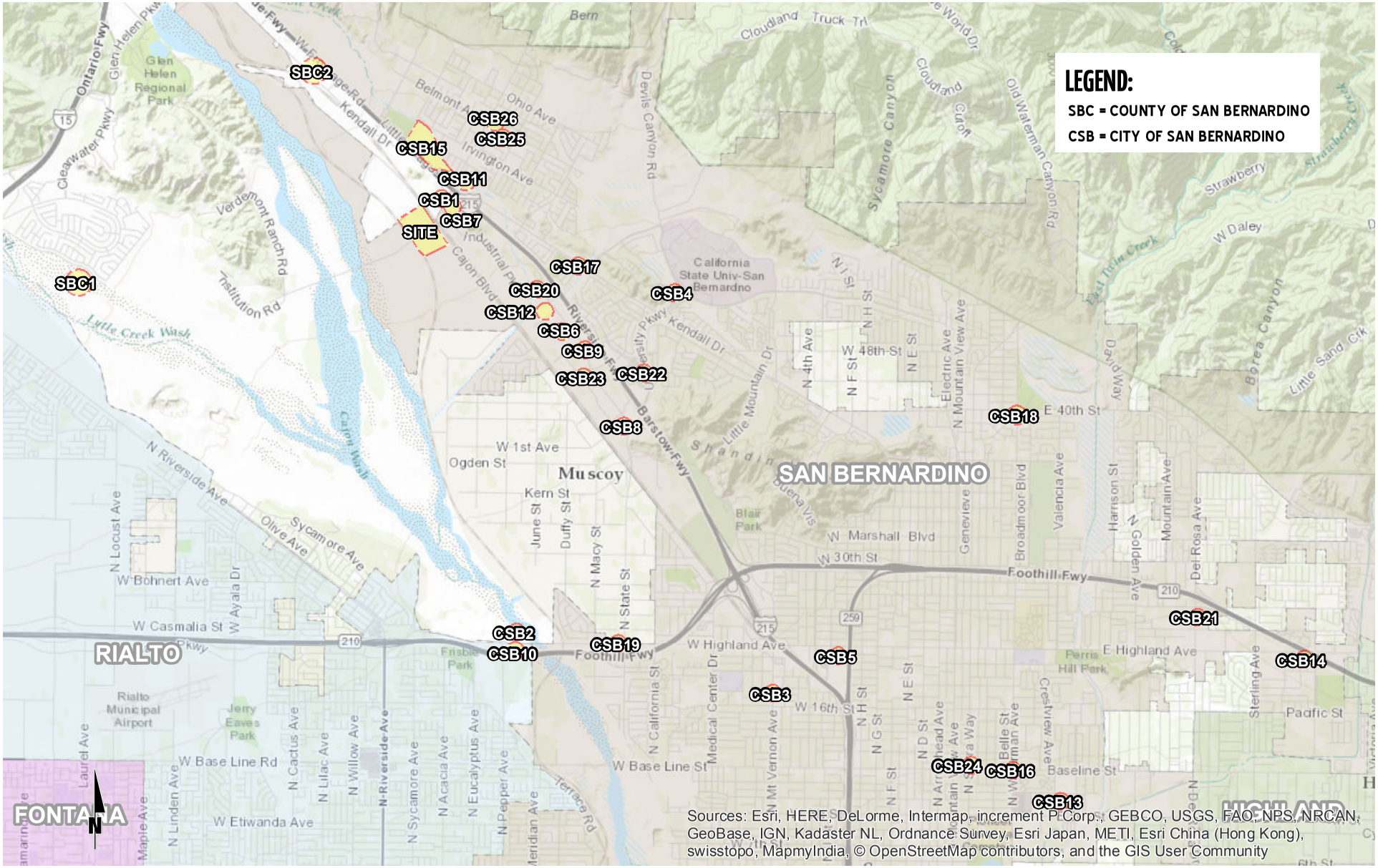


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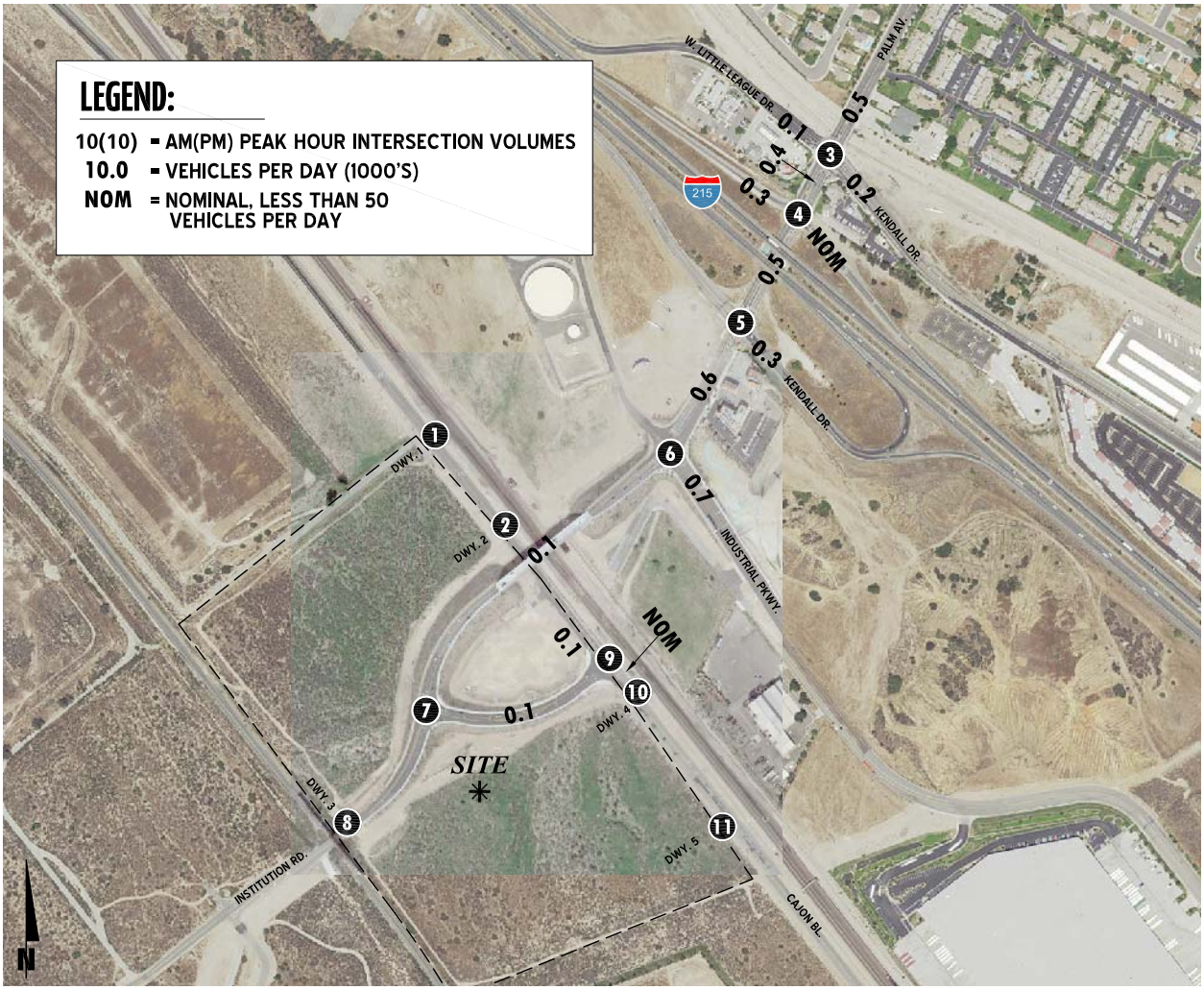
EXHIBIT 4-5: CUMULATIVE PROJECT ONLY TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl. Future Intersection	**2** Dwy. 2 & Cajon Bl. Future Intersection	**3** Palm Av. & W. Little League Dr./ Kendall Dr. 1(1) 33(10) 10(9) → 8(11) ← 5(6) ← 5(6) 0(1) → 6(5) → 0(0) → 0(0) 7(35) 6(5)
4 Palm Av. & I-215 NB Ramps 9(9) 29(8) → 2(5) ← 0(0) ← 0(0) 6(50) 11(36)	**5** Palm Av. & I-215 SB Ramps 0(0) 24(5) 4(3) → 7(10) ← 0(0) ← 47(7) 0(0) → 0(0) → 0(0) 0(0) 10(75) 0(0)	**6** Palm Av. & Industiral Pkwy 0(0) 2(1) 70(11) → 10(73) ← 0(0) ← 1(11) 0(0) → 0(0) → 0(0) 0(0) 1(2) 11(2)
7 Palm Av. & Institution Rd. 0(0) 3(12) → 11(4) ← 0(0) 0(0) 0(0)	**8** Palm Av. & Dwy. 3 Future Intersection	**9** Institution Rd. & Cajon Bl. ← 0(0) ← 0(1) 0(0) → 11(3) → 2(12) 1(1)
10 Dwy. 4 & Cajon Bl. Future Intersection	**11** Dwy. 5 & Cajon Bl. Future Intersection	

Table 4-3

Land Use Summary of Cumulative Development Projects

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
City of San Bernardino				
CSB1	DP206-28	Distribution Center	678.275	TSF
CSB2	ADP15-05	Market	18.000	TSF
CSB3	The Colonies at University Park	SFDR	22	DU
CSB4	The Promenade at University Park	Student Housing	104	DU
CSB5	CUP12-06	Fast Food Restaurant with Drive-Thru	2.300	TSF
CSB6	CUP14-04	Water Treatment Plant	63.000	TSF
CSB7	CUP14-08	Gas Station / Commercial	5.000	TSF
CSB8	CUP14-19	Car Wash	3.650	TSF
CSB9	CUP14-21	Church	121.000	TSF
CSB10	Harbor Flight Tools (DP-D14-18)	Retail	17.541	TSF
CSB11	CUP15-03	Restaurants with Drive-Thru	5.422	TSF
CSB12	DP-D15-02	Warehouse	155.000	TSF
CSB13	DP-P13-07	SFDR	39	DU
CSB14	CUP11-08	Home Improvement	136.090	TSF
		Retail / Restaurant	68.630	TSF
CSB15	Rancho Palma	SFDR	120	DU
CSB16	National Core (CUP14-10)	SFDR	76	DU
CSB17	CUP15-04	Day Care Center	137	DU
CSB18	CUP15-20	Hotel	9.796	TSF
CSB19	CUP16-02	Gas Station / Commercial	6.080	TSF
CSB20	DP-D16-03	General Light Industrial	340.080	TSF
CSB21	DP-D16-06	Retail	44.190	TSF
CSB22	LA Fitness (DP-D16-07)	Health/Fitness Club	32.000	TSF
CSB23	DP-D16-11	General Light Industrial	153.010	TSF
CSB24	DP-P14-06	Retail	5.200	TSF
CSB25	DP-P16-02	SFDR	14	DU
CSB26	DP-P16-03	SFDR	16	DU
County of San Bernardino				
SBC1	Lytle Creek Specific Plan	SFDR	5,254	DU
		Condo/Tonwhomes	1,828	DU
		Apartments	1,325	DU
		Commercial Retail	849.420	TSF
		Elementary School	10.000	AC
		Elementary School/Middle School	14.000	AC
SBC2	P201200390	Truck Terminal	4.298	TSF

[1] SFDR = Single Family Detached Residential

[2] DU = Dwelling Units; TSF = Thousand Square Feet; STU = Students; AC = Acres; MS = Metal Shredder

4.8 NEAR-TERM CONDITIONS

The "buildup" approach combines existing traffic counts with a background ambient growth factor to forecast the EA (2018), EAP (2018), EAC (2018), and EAPC (2018) traffic conditions. An ambient growth factor of 6.09% accounts for background (area-wide) traffic increases that occur over time up to the year 2018 from the year 2016 (compounded three percent per year growth over a 2-year period). Project traffic is added to assess EAP (2018) and EAPC (2018) traffic conditions, respectively. Traffic volumes generated by cumulative development projects are then added to assess the EAC (2018) and EAPC (2018) traffic conditions. The 2018 roadway networks are similar to the existing conditions roadway network with the exception of future roadways and intersections proposed to be developed by the Project.

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

- EA (2018)
    - Existing 2016 PCE volumes
    - Ambient growth traffic (6.09%)
- EAP (2018)
    - Existing 2016 PCE volumes
    - Ambient growth traffic (6.09%)
    - Project Traffic
- EAC (2018)
    - Existing 2016 PCE volumes
    - Ambient growth traffic (6.09%)
    - Cumulative Development Traffic
- EAPC (2018)
    - Existing 2016 PCE volumes
    - Ambient growth traffic (6.09%)
    - Cumulative Development traffic
    - Project Traffic

4.9 HORIZON YEAR (2040) VOLUME DEVELOPMENT

Traffic projections for Horizon Year (2040) Without Project conditions were derived from the SBTAM using accepted procedures for model forecast refinement and smoothing. The traffic forecasts reflect the area-wide growth anticipated between Existing conditions and Horizon Year 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 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. 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 future Horizon Year peak hour turning movements were then reviewed by Urban Crossroads, Inc. for reasonableness, and in some cases, were adjusted to achieve reasonable growth for 2040 traffic conditions. The result of this traffic forecasting procedure is a series of traffic volumes which are suitable for traffic operations analysis.

The Project only traffic forecasts have been generated by applying the trip generation, distribution and traffic assignment calculations. Project traffic volumes were then added to the refined future year volumes to determine Horizon Year (2040) With Project traffic conditions. Flow conservation checks and forecast adjustments were performed as necessary to ensure that all future traffic volume forecasts are reasonable and to ensure the flow of traffic volumes between closely spaced intersections is maintained. In order words, traffic flow between two closely spaced intersections, such as two freeway ramp locations, is verified in order to make certain that vehicles leaving one intersection are entering the adjacent intersection and that there is no unexplained loss of vehicles. The result of this traffic forecasting procedure is a series of traffic volumes which are suitable for traffic operations analysis.

Post-processing worksheets for Horizon Year (2040) with Project traffic conditions are provided in Appendix 4.2.

5 E+P TRAFFIC CONDITIONS

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

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 the Project driveways and those facilities assumed to be in place prior to or constructed by the Project to provide site access are also assumed to be in place for E+P conditions.

5.2 E+P TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus Project traffic. Exhibit 5-1 shows the weekday ADT and weekday peak hour volumes which can be expected for E+P traffic conditions.

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 and shown on Exhibit 5-2, which indicates that there are no study area intersections anticipated to operate at unacceptable LOS for E+P conditions. Although the study area intersections are anticipated to continue to operate at acceptable LOS for E+P traffic conditions, the addition of Project traffic is anticipated to result in a significant impact based on the City's significance threshold at the following intersection:

- Palm Av. / I-215 SB Ramps/Kendall Dr. (#5)

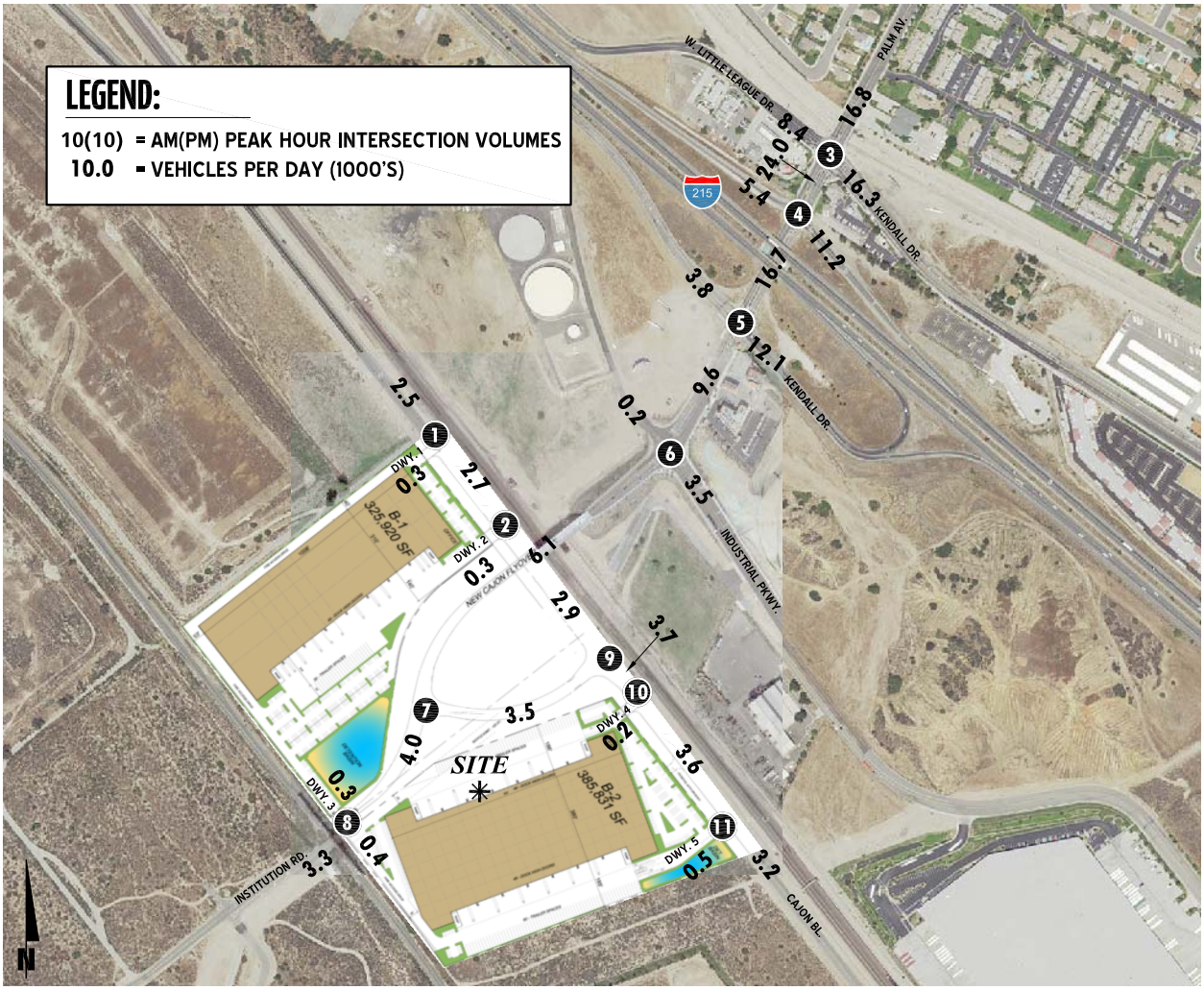
The intersection operations analysis worksheets for E+P traffic conditions are included in Appendix 5.1 of this TIA.

5.4 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway. Queuing analysis findings are presented in Table 5-2 for E+P traffic conditions. 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, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for E+P traffic conditions. Worksheets for E+P traffic conditions off-ramp queuing analysis are provided in Appendix 5.2.

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



1 Dwy. 1 & Cajon Bl. ←75(107) ←10(5) 78(83)→ 2(1)→ 1(2)↑ 4(12)↑	**2** Dwy. 2 & Cajon Bl. ←84(110) ←10(5) 80(94)→ 2(1)→ 1(2)↑ 4(12)↑	**3** Palm Av. & W. Little League Dr./ Kendall Dr. 81(50)↓ 750(256)↓ 157(87)↓ ←212(253) ←83(109) ←327(342) 20(37)→ 55(139)→ 138(104)→ 115(211)↑ 292(608)↑ 208(324)↑	**4** Palm Av. & I-215 NB Ramps 327(280)↓ 888(422)↓ ←321(635) ←0(2) ←174(207) 90(137)↑ 294(508)↑	**5** Palm Av. & I-215 SB Ramps 74(161)↓ 299(128)↓ 689(340)↓ ←201(305) ←4(6) ←148(54) 28(20)→ 96(52)→ 25(21)→ 22(33)↑ 155(320)↑ 79(170)↑	**6** Palm Av. & Industrial Pkwy 2(0)↓ 278(116)↓ 147(61)↓ ←79(172) ←1(10) ←8(12) 4(0)→ 9(1)→ 2(0)→ 4(2)↑ 150(315)↑ 12(10)↑
7 Palm Av. & Institution Rd. 139(51)↓ 149(77)↓ ←105(129) ←39(25) 61(199)↑ 8(30)↑	**8** Palm Av. & Dwy. 3 13(7)↓ 150(60)↓ 15(8)↓ ←7(17) ←0(0) ←0(0) 6(15)→ 0(0)→ 0(0)→ 0(0)↑ 56(196)↑ 0(0)↑	**9** Institution Rd. & Cajon Bl. ←52(71) ←102(97) 43(49)→ 41(56)→ 41(45)↑ 116(62)↑	**10** Dwy. 4 & Cajon Bl. ←154(168) 147(104)→ 12(6)→ 1(2)↑	**11** Dwy. 5 & Cajon Bl. ←144(140) ←4(2) 136(100)→ 12(6)→ 10(28)↑ 1(2)↑	

EXHIBIT 5-2: E+P SUMMARY OF LOS

LEGEND:

- = AM PEAK HOUR ACCEPTABLE LOS
- = AM PEAK HOUR DEFICIENT LOS
- = PM PEAK HOUR ACCEPTABLE LOS
- = PM PEAK HOUR DEFICIENT LOS

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Table 5-1

Intersection Analysis for E+P Conditions

#	Intersection	Traffic Control[2]	Existing (2016)						E+P						Δ v/c Difference		Significant Impact?[3]
			Delay[1] (secs.)		LOS		Average v/c[3,4]		Delay[1] (secs.)		LOS		Average v/c[3,4]				
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
1	Driveway 1 / Cajon Bl.	**CSS**	Does Not Exist				--	--	8.9	8.9	A	A	0.01	0.02	--	--	No
2	Driveway 2 / Cajon Bl.	**CSS**	Does Not Exist				--	--	8.8	8.8	A	A	0.01	0.02	--	--	No
3	Palm Av. / W. Little League Dr./Kendall Dr.	TS	37.1	30.0	D	C	0.72	0.62	37.3	30.0	D	C	0.73	0.62	0.01	0.00	No
4	Palm Av. / I-215 NB Ramps	TS	12.2	22.1	B	C	0.57	0.70	13.1	22.3	B	C	0.60	0.74	--	0.04	No
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	TS	40.7	31.4	D	C	0.89	0.49	48.0	33.8	D	C	0.94	0.60	**0.05**	**0.11**	**Yes**
6	Palm Av. / Industrial Pkwy.	AWS	10.3	11.2	B	B	0.37	0.48	11.8	14.7	B	B	0.51	0.67	--	--	No
7	Palm Av. / Institution Rd.	AWS	8.7	9.1	A	A	0.19	0.31	9.4	10.1	A	B	0.28	0.40	--	--	No
8	Palm Av. / Driveway 3	**CSS**	Does Not Exist				--	--	9.8	10.1	A	B	0.01	0.02	--	--	No
9	Institution Rd. / Cajon Rd.	AWS	8.4	8.0	A	A	0.18	0.12	8.7	8.3	A	A	0.21	0.16	--	--	No
10	Driveway 4 / Cajon Rd.	**CSS**	Does Not Exist				--	--	8.7	8.6	A	A	0.00	0.00	--	--	No
11	Driveway 5 / Cajon Rd.	**CSS**	Does Not Exist				--	--	10.1	10.1	B	B	0.02	0.04	--	--	No

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

[3] Significant impact has been identified if the change in v/c exceeds the applicable thresholds per the City of San Bernardino Traffic Impact Study Guidelines.

[4] Volume to capacity (v/c) ratio has been reported using the HCM 2000 methodology (as HCM 2010 does not report the overall v/c) for intersections operating at LOS C or worse, consistent with the City of San Bernardino Traffic Impact Study Guidelines.

5.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no traffic signals anticipated to meet peak hour volume based or planning level (Caltrans) ADT traffic signal warrants with the addition of Project traffic (see Appendix 5.3).

5.6 RECOMMENDED IMPROVEMENTS

This section provides a summary of Project impacts and recommended improvements.

Improvement strategies have been recommended at the intersection of Palm Avenue and I-215 Southbound Ramps/Kendall Drive, which has been identified as being significantly impacted by the Project, in an effort to reduce the location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the recommended improvement strategies discussed below to address E+P traffic deficiencies is presented in Table 5-3. The intersection operations analysis worksheets for E+P traffic conditions, with improvements, are included in Appendix 5.4 of this TIA.

Table 5-2

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

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2016)				E+P			
			95th Percentile Queue (Feet)		Acceptable?[1]		95th Percentile Queue (Feet)		Acceptable?[1]	
			AM Peak	PM Peak	AM	PM	AM Peak	PM Peak	AM	PM
I-215 NB Off-Ramp / Palm Av.	WBL/T	910	173	135	Yes	Yes	203	153	Yes	Yes
	WBR	415	61	463	Yes	Yes[3]	58	474	Yes	Yes[3]
I-215 SB Off-Ramp / Palm Av.	WBL/T/R	1,470	405 [2]	168	Yes	Yes	475 [2]	246	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-215 Freeway mainline.

Table 5-3

Intersection Analysis for E+P Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
5	Palm Av. / I-215 SB Ramps/Kendall Dr.																	
	- Existing																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	d	0	1	0	40.7	31.4	D	C
	- E+P																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	d	0	1	0	48.0	33.8	D	C
	- With Improvements	TS	1	2	0	**2**	2	0	0	1	d	0	1	0	33.9	28.4	C	C

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

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

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane; > = Right-Turn Overlap Phasing; >> = Free-Right Turn Lane; **1** = Improvement

[2] Per the 2010 Highway Capacity Manual, 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

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6 EA (2018) AND EAP (2018) TRAFFIC CONDITIONS

This section discusses the traffic forecasts for EA (2018) and EAP (2018) conditions and the resulting intersection operations and traffic signal warrant analyses.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for EA (2018) and EAP (2018) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the Project driveways and those facilities assumed to be in place prior to or constructed by the Project to provide site access are also assumed to be in place for EAP (2018) conditions.

6.2 EA (2018) TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 6.09%. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for EA (2018) traffic conditions are shown on Exhibit 6-1.

6.3 EAP (2018) TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 6.09% and the addition of Project traffic. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for EAP (2018) traffic conditions are shown on Exhibit 6-2.

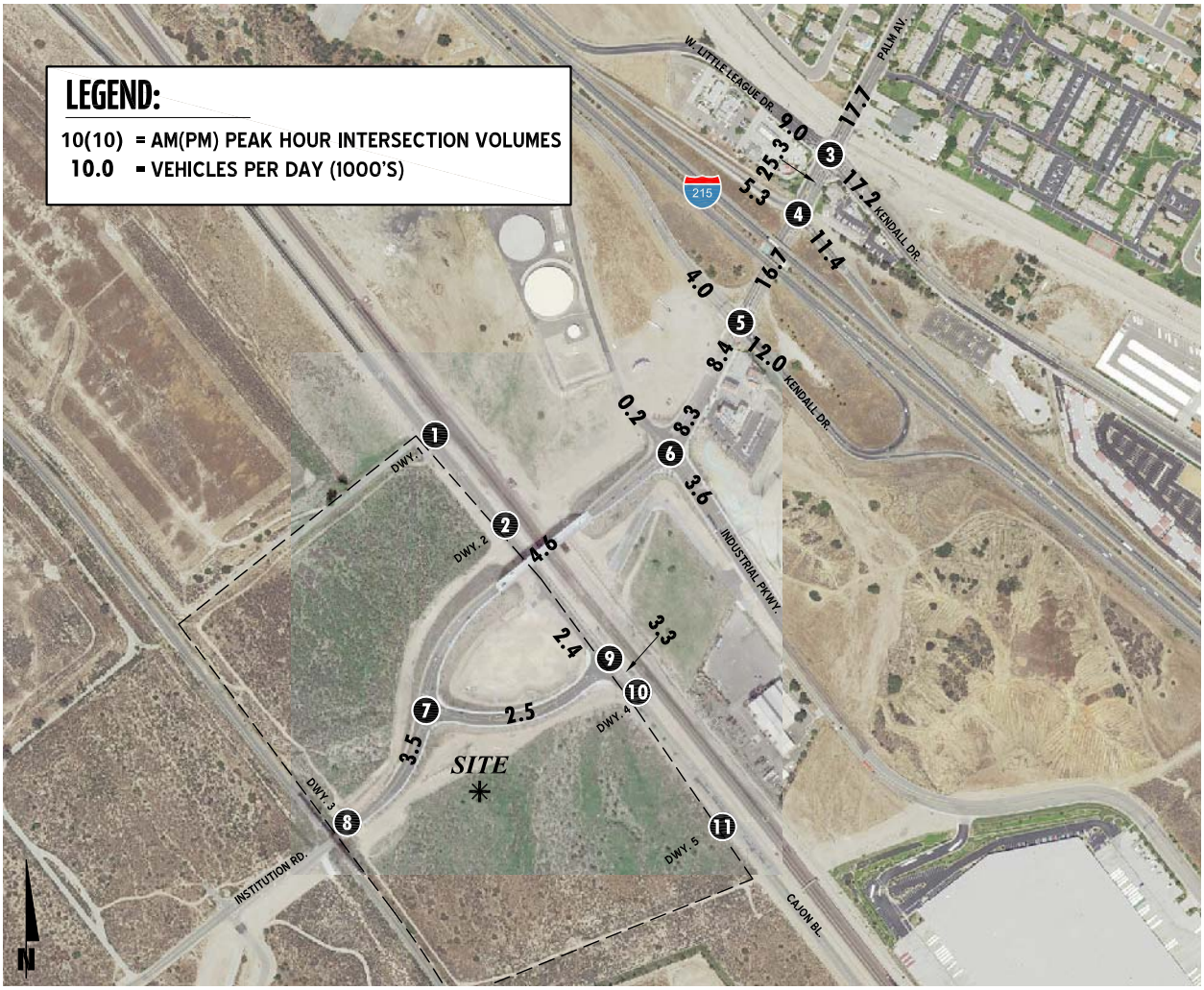
6.4 INTERSECTION OPERATIONS ANALYSIS

EA and EAP (2018) 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 6-1 for both EA and EAP (2018) conditions.

6.4.1 EA (2018) CONDITIONS

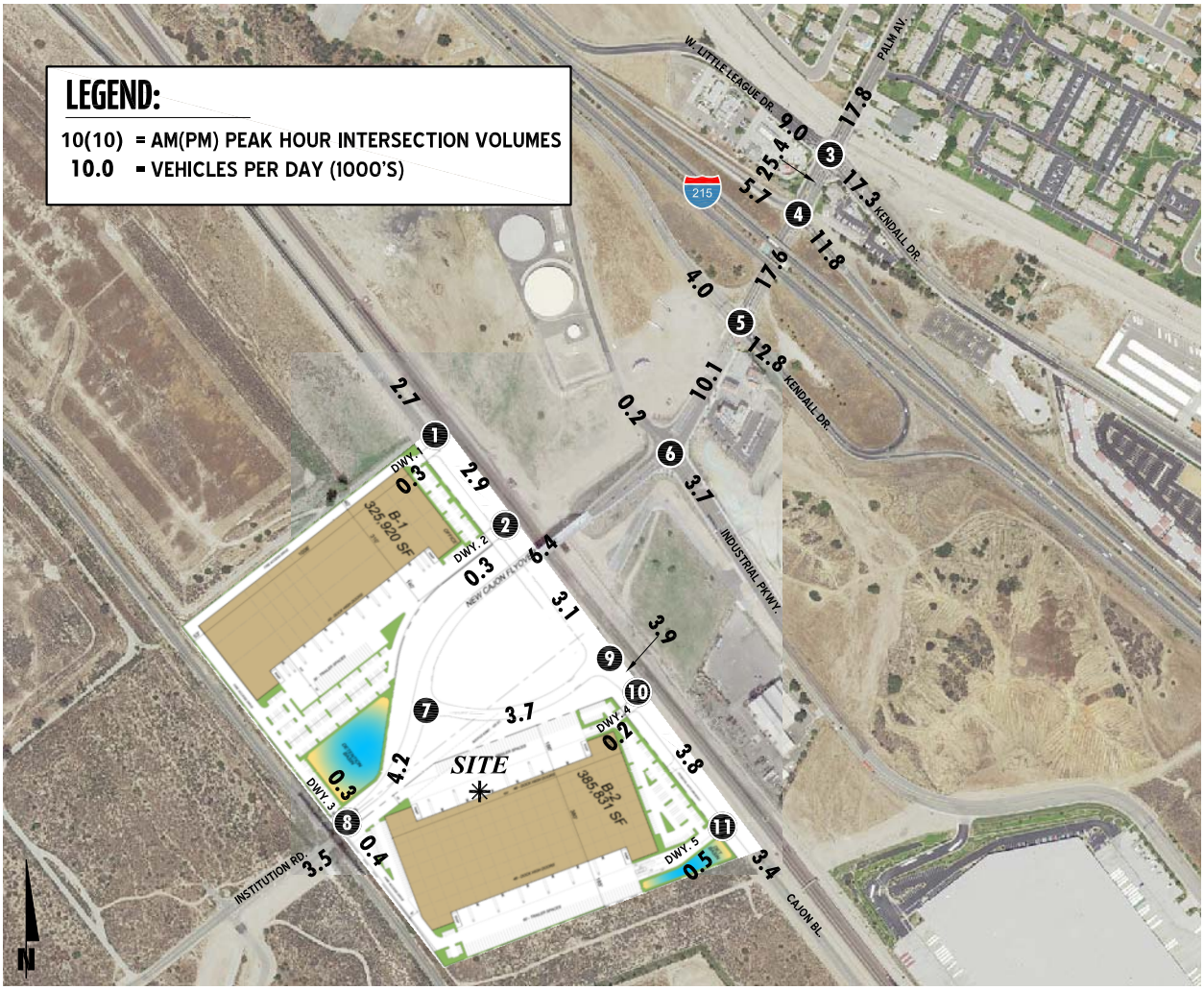
The study area intersections are anticipated to operate at an acceptable LOS during the peak hours under EA (2018) conditions. Consistent with Table 6-1, a summary of the peak hour intersection LOS for EA (2018) conditions are shown on Exhibit 6-3. The intersection operations analysis worksheets for EA (2018) traffic conditions are included in Appendix 6.1 of this TIA.

EXHIBIT 6-1: EA (2018) TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl. Future Intersection	**2** Dwy. 2 & Cajon Bl. Future Intersection	**3** Palm Av. & W. Little League Dr./ Kendall Dr. 86(53) 791(269) 167(92) → 225(268) ← 88(115) ← 342(361) 21(39) → 58(147) → 146(110) ↓ 122(224) ↑ 308(640) ↑ 219(339)	**4** Palm Av. & I-215 NB Ramps 346(297) 933(443) → 341(674) ← 0(2) ← 150(202) 83(109) ↑ 308(530)	**5** Palm Av. & I-215 SB Ramps 79(171) 274(114) 730(361) → 213(324) ← 4(6) ← 127(40) 30(21) → 101(55) → 27(22) ↓ 23(35) ↑ 147(294) ↑ 68(140)	**6** Palm Av. & Industrial Pkwy 2(0) 224(83) 156(65) → 83(182) ← 1(11) ← 4(11) 4(0) → 9(1) → 2(0) ↓ 4(2) ↑ 127(249) ↑ 11(6)
7 Palm Av. & Institution Rd. 118(38) 112(56) → 91(82) ← 41(26) 50(176) ↑ 8(32) ↑	**8** Palm Av. & Dwy. 3 Future Intersection	**9** Institution Rd. & Cajon Bl. ← 55(75) ← 98(73) 46(52) → 35(34) ↓ 23(36) ↑ 98(52)	**10** Dwy. 4 & Cajon Bl. Future Intersection	**11** Dwy. 5 & Cajon Bl. Future Intersection	

EXHIBIT 6-2: EAP (2018) TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl.	2 Dwy. 2 & Cajon Bl.	3 Palm Av. & W. Little League Dr./ Kendall Dr.	4 Palm Av. & I-215 NB Ramps	5 Palm Av. & I-215 SB Ramps	6 Palm Av. & Industiral Pkwy
←80(113) ←10(5)	←89(116) ←10(5)	86(53)→ 795(271)→ 167(92)→ ←225(268) ←88(115) ←346(363)	346(297)→ 941(447)→ ←341(674) ←0(2) ←182(219)	79(171)→ 314(135)→ 730(361)→ ←213(324) ←4(6) ←155(56)	2(0)→ 291(120)→ 156(65)→ ←83(182) ←1(11) ←8(13)
83(87)→ 2(1)→ 1(2)↑ 4(12)↑	85(98)→ 2(1)→ 1(2)↑ 4(12)↑	21(39)→ 58(147)→ 146(110)→ 122(224)↑ 310(644)↑ 221(343)↑	95(143)↑ 312(538)↑	30(21)→ 101(55)→ 27(22)→ 23(35)↑ 163(336)↑ 82(178)↑	4(0)→ 9(1)→ 2(0)→ 4(2)↑ 157(329)↑ 13(10)↑

7 Palm Av. & Institution Rd.	8 Palm Av. & Dwy. 3	9 Institution Rd. & Cajon Bl.	10 Dwy. 4 & Cajon Bl.	11 Dwy. 5 & Cajon Bl.
146(53)→ 155(80)→ ←110(134) ←41(26)	13(7)→ 159(64)→ 15(8)→ ←7(17) ←0(0) ←0(0)	←55(75) ←108(101)	←163(177)	←153(149) ←4(2)
63(209)↑ 8(32)↑	6(15)→ 0(0)→ 0(0)→ 0(0)↑ 59(208)↑ 0(0)↑	46(52)→ 43(57)→ 42(47)↑ 122(65)↑	155(110)→ 12(6)→ 1(2)↑	144(106)→ 12(6)→ 10(28)↑ 1(2)↑

EXHIBIT 6-3: EA (2018) SUMMARY OF LOS

LEGEND:

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

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Table 6-1

Intersection Analysis for EA and EAP (2018) Conditions

#	Intersection	Traffic Control[2]	EA (2018)						EAP (2018)						Δ v/c Difference		Significant Impact?[4]
			Delay[1] (secs.)		LOS		Average v/c[3]		Delay[1] (secs.)		LOS		Average v/c[3]				
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
1	Driveway 1 / Cajon Bl.	**CSS**	Does Not Exist				--	--	8.9	8.9	A	A	0.01	0.01	--	--	No
2	Driveway 2 / Cajon Bl.	**CSS**	Does Not Exist				--	--	8.8	8.8	A	A	0.01	0.01	--	--	No
3	Palm Av. / W. Little League Dr./Kendall Dr.	TS	40.6	32.0	D	C	0.76	0.65	40.9	32.0	D	C	0.77	0.65	0.01	0.00	No
4	Palm Av. / I-215 NB Ramps	TS	12.8	23.4	B	C	0.61	0.78	13.7	25.3	B	C	0.63	0.78	--	0.00	No
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	TS	46.4	32.0	D	C	0.95	0.53	49.4	39.0	D	D	0.99	0.63	**0.04**	**0.10**	**Yes**
6	Palm Av. / Industrial Pkwy.	AWS	10.7	11.7	B	B	0.40	0.52	12.3	15.8	B	C	0.54	0.71	--	--	No
7	Palm Av. / Institution Rd.	AWS	8.8	9.3	A	A	0.21	0.34	9.5	10.3	A	B	0.29	0.42	--	--	No
8	Palm Av. / Driveway 3	**CSS**	Does Not Exist				--	--	9.8	10.2	A	B	0.01	0.02	--	--	No
9	Institution Rd. / Cajon Rd.	AWS	8.5	8.1	A	A	0.19	0.12	8.9	8.4	A	A	0.22	0.17	--	--	No
10	Driveway 4 / Cajon Rd.	**CSS**	Does Not Exist				--	--	8.8	8.6	A	A	0.00	0.00	--	--	No
11	Driveway 5 / Cajon Rd.	**CSS**	Does Not Exist				--	--	10.2	10.1	B	B	0.02	0.04	--	--	No

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

[3] Volume to capacity ratio has been reported using the HCM 2000 methodology (as HCM 2010 does not report the overall v/c) for intersections operating at LOS C or worse, consistent with the City of San Bernardino Traffic Impact Study Guidelines.

[4] Significant impact has been identified if the change in v/c exceeds the applicable thresholds per the City of San Bernardino Traffic Impact Study Guidelines.

6.4.2 EAP (2018) CONDITIONS

Although the study area intersections are anticipated to continue to operate at acceptable LOS for EAP (2018) traffic conditions, the addition of Project traffic is anticipated to result in a significant impact based on the City's significance threshold at the following intersection:

- Palm Av. / I-215 SB Ramps/Kendall Dr. (#5)

Consistent with Table 6-1, a summary of the peak hour intersection LOS for EAP (2018) conditions are shown on Exhibit 6-4. The intersection operations analysis worksheets for EAP (2018) traffic conditions are included in Appendix 6.2 of this TIA.

6.5 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway. Queuing analysis findings are presented in Table 6-2 for EA (2018) and EAP (2018) traffic conditions. 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 weekday PM peak 95th percentile traffic flows for either EA (2018) or EAP (2018) traffic conditions.

Worksheets for EA (2018) conditions off-ramp queuing analysis are provided in Appendix 6.3. Worksheets for EAP (2018) conditions off-ramp queuing analysis are provided in Appendix 6.4.

6.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

No study area intersections are anticipated to meet traffic signal warrants for either EA (2018) or EAP (2018) traffic conditions (see Appendix 6.5 and 6.6).

6.7 RECOMMENDED IMPROVEMENTS

This section provides a summary of cumulative impacts and recommended improvements.

Improvement strategies have been recommended at the intersection of Palm Avenue and I-215 Southbound Ramps/Kendall Drive in an effort to reduce the location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the recommended improvement strategies discussed below to address EA (2018) and EAP (2018) traffic deficiencies are presented in Table 6-3. Table 6-3 shows that the improvement needs are the same for both EA (2018) and EAP (2018) traffic conditions. The intersection operations analysis worksheets for EA (2018) and EAP (2018) traffic conditions, with improvements, are included in Appendix 6.7 and Appendix 6.8 of this TIA, respectively.

EXHIBIT 6-4: EAP (2018) SUMMARY OF LOS

LEGEND:

= AM PEAK HOUR ACCEPTABLE LOS
= AM PEAK HOUR DEFICIENT LOS
= PM PEAK HOUR ACCEPTABLE LOS
= PM PEAK HOUR DEFICIENT LOS

N

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Table 6-2

Peak Hour Freeway Off-Ramp Queuing Summary for EA (2018) and EAP (2018) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	EA (2018)				EAP (2018)			
			95th Percentile Queue (Feet)		Acceptable?[1]		95th Percentile Queue (Feet)		Acceptable?[1]	
			AM Peak	PM Peak	AM	PM	AM Peak	PM Peak	AM	PM
I-215 NB Off-Ramp / Palm Av.	WBL/T	910	181	143	Yes	Yes	210	185	Yes	Yes
	WBR	415	61	548	Yes	Yes[3]	58	628[2]	Yes	Yes[3]
I-215 SB Off-Ramp / Palm Av.	WBL/T/R	1,470	445[2]	185	Yes	Yes	497[2]	263	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

Table 6-3

Intersection Analysis for EA (2018) and EAP (2018) 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
5	Palm Av. / I-215 SB Ramps/Kendall Dr.																	
	- EA (2018)																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	d	0	1	0	46.4	32.0	D	C
	- With Improvements	TS	1	2	0	**2**	2	0	0	1	d	0	1	0	34.1	30.0	C	C
	- EAP (2018)																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	d	0	1	0	49.4	39.0	D	D
	- With Improvements	TS	1	2	0	**2**	2	0	0	1	d	0	1	0	34.5	30.9	C	C

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

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

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane; > = Right-Turn Overlap Phasing; >> = Free-Right Turn Lane; **1** = Improvement

[2] Per the 2010 Highway Capacity Manual, 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

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7 EAC (2018) AND EAPC (2018) TRAFFIC CONDITIONS

This section discusses the traffic forecasts for EAC (2018) and EAPC (2018) conditions and the resulting intersection operations and traffic signal warrant analyses.

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for EAC (2018) and EAPC (2018) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for EAC (2018) and EAPC (2018) (e.g., intersection and roadway improvements along the cumulative development's frontages and driveways).
- Project driveways and those facilities assumed to be in place prior to or constructed by the Project to provide site access are also assumed to be in place for EAPC (2018) conditions.

7.2 EAC (2018) TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 6.09% in conjunction with the addition of cumulative development traffic. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for EAC (2018) traffic conditions are shown on Exhibit 7-1.

7.3 EAPC (2018) TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 6.09% in conjunction with the addition of cumulative project development and the addition of Project traffic. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for EAPC (2018) traffic conditions are shown on Exhibit 7-2.

7.4 INTERSECTION OPERATIONS ANALYSIS

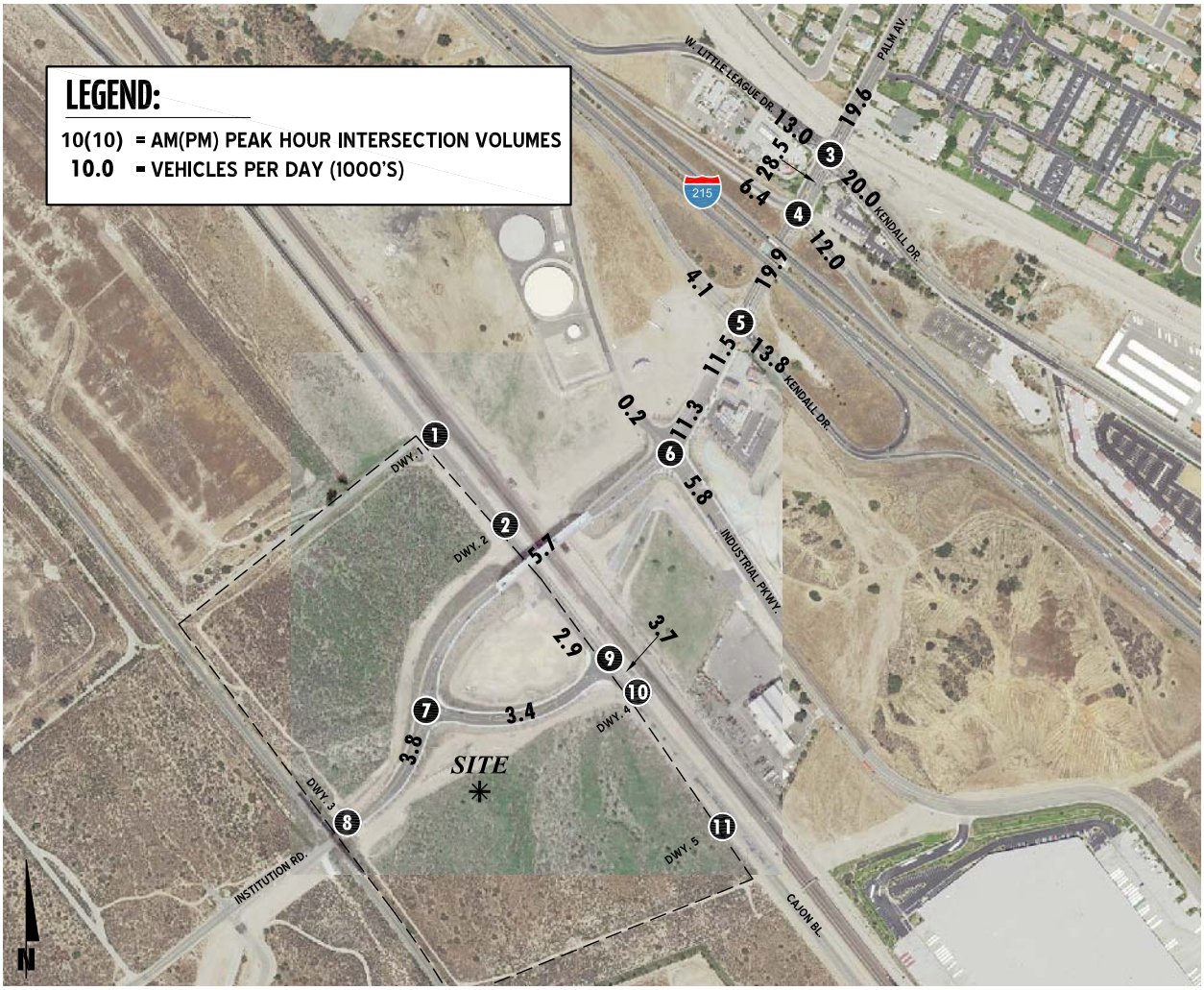
EAC and EAPC (2018) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 7-1 for both EAC and EAPC (2018) conditions.

7.4.1 EAC (2018) CONDITIONS

The following study area intersections are anticipated to operate at an unacceptable LOS during the peak hours under EAC (2018) conditions:

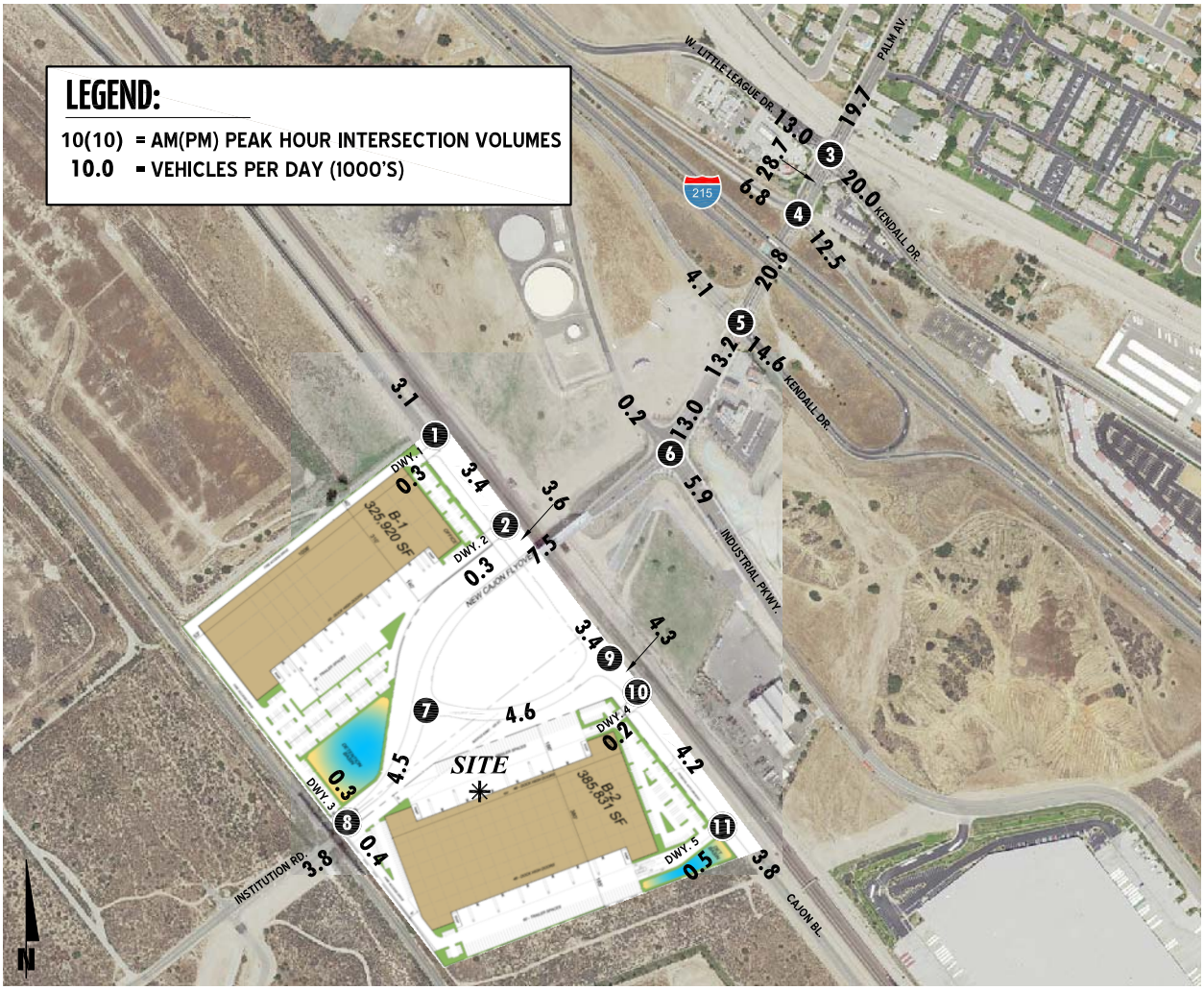
- Palm Av. / W. Little League Dr./Kendall Dr. (#3) – LOS E AM peak hour only
- Palm Av. / I-215 SB Ramps/Kendall Dr. (#5) – LOS E AM peak hour only

EXHIBIT 7-1: EAC (2018) TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl. Future Intersection	**2** Dwy. 2 & Cajon Bl. Future Intersection	**3** Palm Av. & W. Little League Dr./ Kendall Dr. 109(95) 837(289) 186(108) → 241(285) ← 130(183) ← 390(397) 37(82) → 96(215) → 203(180) ↓ 164(301) ↑ 323(689) ↑ 257(387)	**4** Palm Av. & I-215 NB Ramps 393(340) 1037(527) ↓ 365(716) ← 0(2) ← 168(212) 107(196) ↑ 379(663)	**5** Palm Av. & I-215 SB Ramps 82(173) 355(172) 767(395) ↓ 243(378) ← 4(6) ← 209(68) 33(23) → 102(56) → 27(23) ↓ 23(36) ↑ 209(458) ↑ 76(160)	**6** Palm Av. & Industiral Pkwy 2(0) 262(111) 280(119) → 129(317) ← 1(11) ← 8(27) 4(0) → 9(1) → 2(0) ↓ 4(2) ↑ 151(293) ↑ 27(12)
7 Palm Av. & Institution Rd. 118(38) 154(100) ↓ 131(132) ← 44(34) 50(176) ↑ 16(36)	**8** Palm Av. & Dwy. 3 Future Intersection	**9** Institution Rd. & Cajon Bl. ← 55(75) ← 114(101) 46(52) → 62(64) ↓ 49(66) ↑ 122(71)	**10** Dwy. 4 & Cajon Bl. Future Intersection	**11** Dwy. 5 & Cajon Bl. Future Intersection	

EXHIBIT 7-2: EAPC (2018) TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl.	2 Dwy. 2 & Cajon Bl.	3 Palm Av. & W. Little League Dr./ Kendall Dr.	4 Palm Av. & I-215 NB Ramps	5 Palm Av. & I-215 SB Ramps	6 Palm Av. & Industiral Pkwy
←105(143) ←10(5)	←114(146) ←10(5)	109(95) 841(291) 186(108) →241(285) ←130(183) ←394(399)	393(340) 1045(531) →365(716) ←0(2) ←200(229)	82(173) 395(193) 767(395) →243(378) ←4(6) ←237(84)	2(0) 329(148) 280(119) →129(317) ←1(11) ←12(29)
110(117)→ 2(1)→ 1(2) 4(12)	112(128)→ 2(1)→ 1(2) 4(12)	37(82)→ 96(215)→ 203(180)→ 164(301) 325(693) 259(391)	119(230) 383(671)	33(23)→ 102(56)→ 27(23)→ 23(36) 225(500) 90(198)	4(0)→ 9(1)→ 2(0)→ 4(2) 181(373) 29(16)
7 Palm Av. & Institution Rd.	**8 Palm Av. & Dwy. 3**	**9 Institution Rd. & Cajon Bl.**	**10 Dwy. 4 & Cajon Bl.**	**11 Dwy. 5 & Cajon Bl.**	
146(53) 197(124) →150(184) ←44(34)	13(7) 162(72) 15(8) →7(17) ←0(0) ←0(0)	→55(75) ←124(129)	←179(205)	←169(177) ←4(2)	
63(209) 16(36)	6(15)→ 0(0)→ 0(0)→ 0(0) 67(212) 0(0)	46(52)→ 70(87)→ 68(77) 146(84)	180(129)→ 12(6)→ 1(2)	169(125)→ 12(6)→ 10(28) 1(2)	

Table 7-1

Intersection Analysis for EAC and EAPC (2018) Conditions

#	Intersection	Traffic Control[2]	EAC (2018)						EAPC (2018)						Δ v/c Difference		Significant Impact?[4]
			Delay[1] (secs.)		LOS		Average v/c[3]		Delay[1] (secs.)		LOS		Average v/c[3]				
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
1	Driveway 1 / Cajon Bl.	**CSS**	Does Not Exist				--	--	9.1	9.1	A	A	0.01	0.02	--	--	No
2	Driveway 2 / Cajon Bl.	**CSS**	Does Not Exist				--	--	8.9	8.9	A	A	0.01	0.02	--	--	No
3	Palm Av. / W. Little League Dr./Kendall Dr.	TS	**60.3**	45.0	**E**	D	0.87	0.78	**60.9**	45.0	**E**	D	0.88	0.79	0.01	0.01	No
4	Palm Av. / I-215 NB Ramps	TS	13.5	34.0	B	C	0.68	1.03	14.5	37.1	B	D	0.70	1.07	--	0.04	No
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	TS	**77.1**	35.0	**E**	C	1.15	0.77	**85.7**	37.8	**F**	D	1.20	0.84	**0.05**	**0.07**	**Yes**
6	Palm Av. / Industrial Pkwy.	AWS	14.0	16.5	B	C	0.58	0.72	16.2	29.7	C	D	0.65	0.94	--	**0.23**	**Yes**
7	Palm Av. / Institution Rd.	AWS	9.4	9.9	A	A	0.29	0.36	10.2	11.5	B	B	0.38	0.45	--	--	No
8	Palm Av. / Driveway 3	**CSS**	Does Not Exist				--	--	9.9	10.2	A	B	0.01	0.02	--	--	No
9	Institution Rd. / Cajon Rd.	AWS	9.0	8.5	A	A	0.23	0.17	9.4	8.9	A	A	0.26	0.23	--	--	No
10	Driveway 4 / Cajon Rd.	**CSS**	Does Not Exist				--	--	8.8	8.7	A	A	0.00	0.00	--	--	No
11	Driveway 5 / Cajon Rd.	**CSS**	Does Not Exist				--	--	10.4	10.4	B	A	0.02	0.05	--	--	No

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

[3] Volume to capacity ratio has been reported using the HCM 2000 methodology (as HCM 2010 does not report the overall v/c) for intersections operating at LOS C or worse, consistent with the City of San Bernardino Traffic Impact Study Guidelines.

[4] Significant impact has been identified if the change in v/c exceeds the applicable thresholds per the City of San Bernardino Traffic Impact Study Guidelines.

Consistent with Table 7-1, a summary of the peak hour intersection LOS for EAC (2018) conditions are shown on Exhibit 7-3. The intersection operations analysis worksheets for EAC (2018) traffic conditions are included in Appendix 7.1 of this TIA.

7.4.2 EAPC (2018) CONDITIONS

The intersection analysis results indicate that the addition of Project traffic is not anticipated to result in any additional LOS deficiencies for EAPC (2018) conditions. The addition of Project traffic is anticipated to result in a significant cumulative impact at the intersections of Palm Avenue at I-215 Southbound Ramps/Kendall Drive and Palm Avenue at Industrial Parkway based on the City's significance threshold.

Consistent with Table 7-1, a summary of the peak hour intersection LOS for EAPC (2018) conditions are shown on Exhibit 7-4. The intersection operations analysis worksheets for EAPC (2018) traffic conditions are included in Appendix 7.2 of this TIA.

7.5 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway. Queuing analysis findings are presented in Table 7-2 for EAC (2018) and EAPC (2018) traffic conditions. 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 weekday PM peak 95th percentile traffic flows for either EAC (2018) or EAPC (2018) traffic conditions. Worksheets for EAC (2018) and EAPC (2018) conditions off-ramp queuing analysis are provided in Appendix 7.3 and 7.4, respectively.

7.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

The following intersection is anticipated to meet traffic signal warrants for EAC (2018) traffic conditions (see Appendix 7.5):

- Palm Avenue / Industrial Parkway (#6)

No study area intersections are anticipated to meet traffic signal warrants for EAPC (2018) traffic conditions (see Appendix 7.6), in addition to those previously identified under EAC (2018) traffic conditions.

EXHIBIT 7-3: EAC (2018) SUMMARY OF LOS

LEGEND:

- = AM PEAK HOUR ACCEPTABLE LOS
- = AM PEAK HOUR DEFICIENT LOS
- = PM PEAK HOUR ACCEPTABLE LOS
- = PM PEAK HOUR DEFICIENT LOS
- (NA) = NOT AN ANALYSIS LOCATION FOR THIS SCENARIO

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EXHIBIT 7-4: EAPC (2018) SUMMARY OF LOS

LEGEND:

- = AM PEAK HOUR ACCEPTABLE LOS
- = AM PEAK HOUR DEFICIENT LOS
- = PM PEAK HOUR ACCEPTABLE LOS
- = PM PEAK HOUR DEFICIENT LOS

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Table 7-2

Peak Hour Freeway Off-Ramp Queuing Summary for EAC and EAPC (2018) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	EAC (2018)				EAPC (2018)			
			95th Percentile Queue (Feet)		Acceptable?[1]		95th Percentile Queue (Feet)		Acceptable?[1]	
			AM Peak	PM Peak	AM	PM	AM Peak	PM Peak	AM	PM
I-215 NB Off-Ramp / Palm Av.	WBL/T	910	198	150	Yes	Yes	226	162	Yes	Yes
	WBR	415	61	741 [2]	Yes	Yes[3]	59	744 [2]	Yes	Yes[3]
I-215 SB Off-Ramp / Palm Av.	WBL/T/R	1,470	703 [2]	399 [2]	Yes	Yes	766 [2]	476 [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-215 Freeway mainline.

7.7 NEAR TERM DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

This section provides a summary of cumulative impacts and recommended improvements.

Improvement strategies have been recommended at the intersections of Palm Avenue at I-215 Southbound Ramps/Kendall Drive and Palm Avenue at Industrial Parkway in an effort to reduce the location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the recommended improvement strategies discussed below to address EAC (2018) and EAPC (2018) traffic deficiencies are presented in Table 7-3. Table 7-3 shows that the improvement needs are the same for both EAC (2018) and EAPC (2018) traffic conditions. The intersection operations analysis worksheets for EAC (2018) and EAPC (2018) traffic conditions, with improvements, are included in Appendix 7.7 and Appendix 7.8 of this TIA, respectively.

Table 7-3

Intersection Analysis for EAC (2018) and EAPC (2018) 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
5	Palm Av. / I-215 SB Ramps/Kendall Dr.																	
	- EAC (2018)																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	d	0	1	0	46.4	32.0	D	C
	- With Improvements	TS	1	2	0	**2**	2	0	0	1	d	0	1	0	38.5	29.6	D	C
	- EAPC (2018)																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	d	0	1	0	49.4	39.0	D	D
	- With Improvements	TS	1	2	0	**2**	2	0	0	1	d	0	1	0	41.9	30.3	D	C
6	Palm Av. / Industrial Pkwy.																	
	- EAC (2018)																	
	- Without Improvements	AWS	1	1	1	1	1	1	0	1	0	1	1	1	14.0	16.5	B	C
	- With Improvements	**TS**	1	1	1	1	1	1	0	1	0	1	1	1	31.2	19.3	C	B
	- EAPC (2018)																	
	- Without Improvements	AWS	1	1	1	1	1	1	0	1	0	1	1	1	16.2	29.7	C	D
	- With Improvements	**TS**	1	1	1	1	1	1	0	1	0	1	1	1	33.9	21.8	C	C

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

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

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane; > = Right-Turn Overlap Phasing; >> = Free-Right Turn Lane; **1** = Improvement

[2] Per the 2010 Highway Capacity Manual, 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; AWS = All Way Stop

8 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 and traffic signal warrant analyses.

8.1 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 (2040) 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 (2040) conditions only (e.g., intersection and roadway improvements along the cumulative development's frontages and driveways).

8.2 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-processed volumes obtained from the SBTAM. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Horizon Year (2040) Without Project traffic conditions are shown on Exhibit 8-1.

8.3 HORIZON YEAR (2040) WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-processed volumes obtained from the SBTAM, plus Project traffic. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Horizon Year (2040) with Project traffic conditions are shown on Exhibit 8-2.

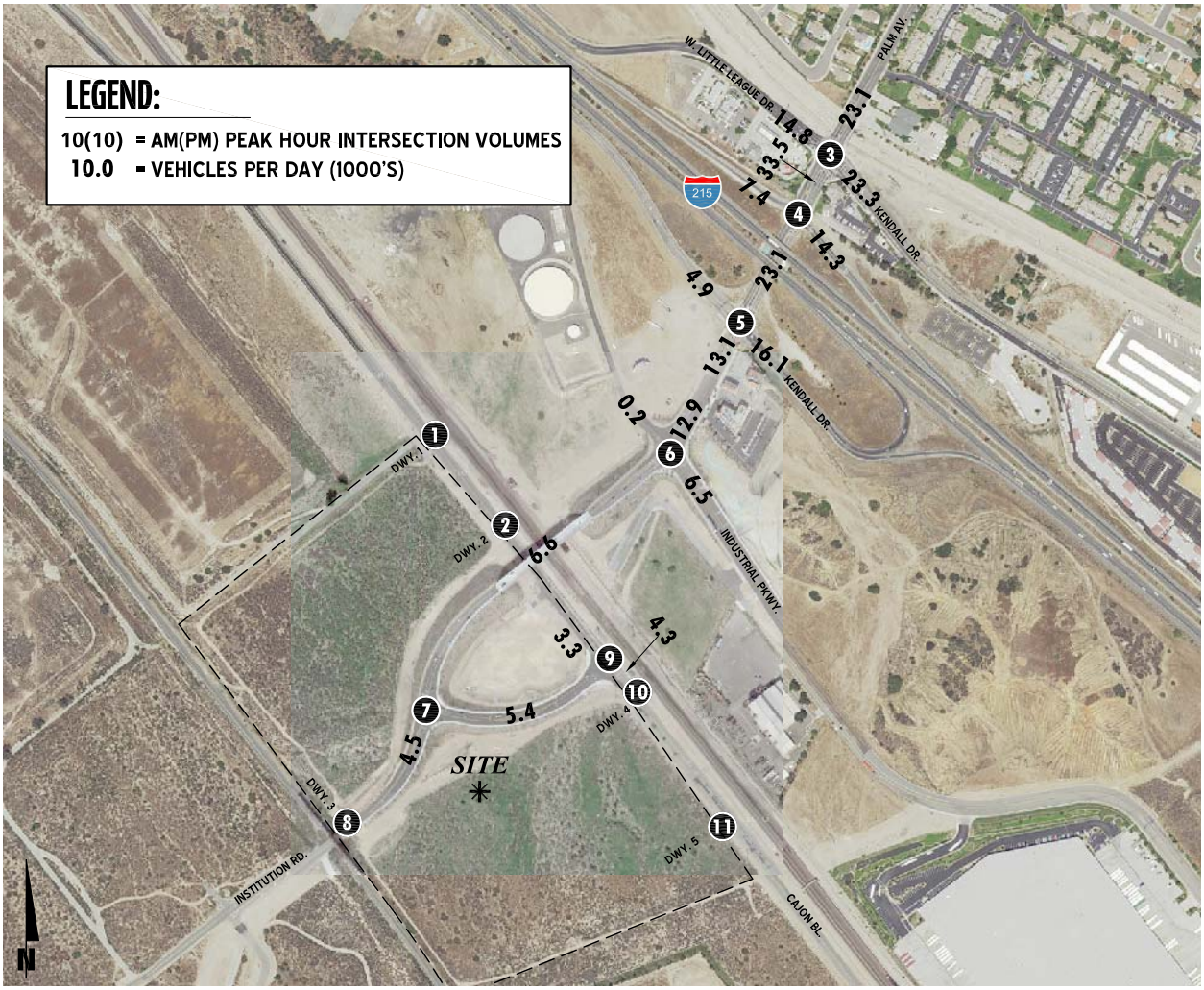
8.4 INTERSECTION OPERATIONS ANALYSIS

8.4.1 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC CONDITIONS

LOS calculations were conducted for the study intersections to evaluate their operations under Horizon Year Without Project conditions with roadway and intersection geometrics consistent with Section 8.1 *Roadway Improvements*. As shown in Table 8-1, the following study area intersections are anticipated to operate at an unacceptable LOS during the peak hours under Horizon Year (2040) Without Project conditions, in addition to those previously identified under EAC (2018) and EAPC (2018) traffic conditions:

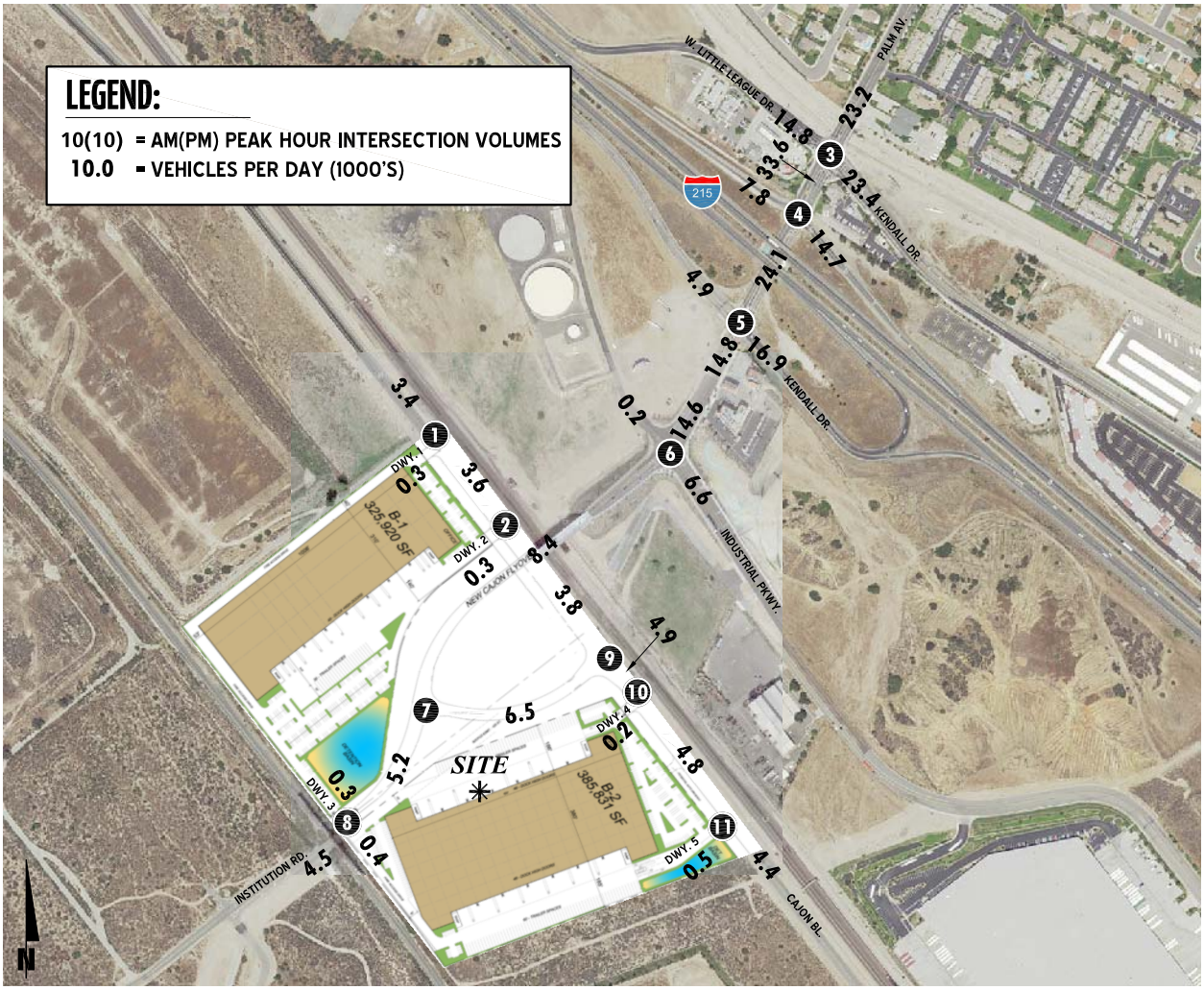
- Palm Av. / I-215 NB Ramps (#4) – LOS E PM peak hour only
- Palm Av. / Industrial Pkwy. (#6) – LOSF PM peak hour only

EXHIBIT 8-1: HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl. Future Intersection	**2** Dwy. 2 & Cajon Bl. Future Intersection	**3** Palm Av. & W. Little League Dr./ Kendall Dr. 126(105) 991(343) 218(126) → 285(337) ← 147(206) ← 457(467) 41(90) → 108(264) → 264(202) → 188(371) 383(814) 299(454) ↑	**4** Palm Av. & I-215 NB Ramps 493(398) ↓ 1219(614) ↓ 431(850) ← 0(3) ← 348(381) 124(218) 439(789) ↑	**5** Palm Av. & I-215 SB Ramps 191(258) 466(252) 910(485) ↓ 285(441) ← 6(8) ← 233(76) 38(50) → 122(155) → 33(74) → 53(67) 239(516) 106(239) ↑	**6** Palm Av. & Industrial Pkwy 3(0) 352(162) 310(131) ↓ 146(353) ← 1(13) ← 9(29) 5(0) → 11(1) → 3(0) → 7(3) 223(532) 29(15) ↑
7 Palm Av. & Institution Rd. 146(48) 218(143) ↓ 163(340) ← 52(39) 95(210) 18(42) ↑	**8** Palm Av. & Dwy. 3 Future Intersection	**9** Institution Rd. & Cajon Bl. 66(90) ← 133(165) 55(62) → 83(214) → 95(89) 141(96) ↑	**10** Dwy. 4 & Cajon Bl. Future Intersection	**11** Dwy. 5 & Cajon Bl. Future Intersection	

EXHIBIT 8-2: HORIZON YEAR (2040) WITH PROJECT TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl.	2 Dwy. 2 & Cajon Bl.	3 Palm Av. & W. Little League Dr./ Kendall Dr.	4 Palm Av. & I-215 NB Ramps	5 Palm Av. & I-215 SB Ramps	6 Palm Av. & Industiral Pkwy
←162(181) ←10(5)	←171(184) ←10(5)	126(105) 995(345) 218(126) ←285(337) ←147(206) ←461(469)	493(398) 1227(618) ←431(850) ←0(3) ←380(398)	191(258) 506(273) 910(485) ←285(441) ←6(8) ←261(92)	3(0) 419(199) 310(131) ←146(353) ←1(13) ←13(31)
139(277)→ 2(1)→ 1(2) 4(12)	141(288)→ 2(1)→ 1(2) 4(12)	41(90)→ 108(264)→ 264(202)→ 188(371) 385(818) 301(458)	136(252) 443(797)	38(50)→ 122(155)→ 33(74)→ 53(67) 255(558) 120(277)	5(0)→ 11(1)→ 3(0)→ 7(3) 253(612) 31(19)

7 Palm Av. & Institution Rd.	8 Palm Av. & Dwy. 3	9 Institution Rd. & Cajon Bl.	10 Dwy. 4 & Cajon Bl.	11 Dwy. 5 & Cajon Bl.
174(63) 261(167) ←182(392) ←52(39)	13(7) 198(87) 15(8) ←7(17) ←0(0) ←0(0)	←66(90) ←143(193)	←209(283)	←199(255) ←4(2)
108(243) 18(42)	6(15)→ 0(0)→ 0(0)→ 0(0) 113(252) 0(0)	55(62)→ 91(237)→ 114(100) 165(109)	208(164)→ 12(6)→ 1(2)	197(160)→ 12(6)→ 10(28) 1(2)

A summary of the peak hour intersection LOS for Horizon Year Without Project conditions are shown on Exhibit 8-3. The intersection operations analysis worksheets for Horizon Year Without Project traffic conditions are included in Appendix 8.1 of this TIA.

8.4.2 HORIZON YEAR (2040) WITH PROJECT TRAFFIC CONDITIONS

As shown on Table 8-1 and illustrated on Exhibit 8-4, the intersection analysis results indicate that the addition of Project traffic is not anticipated to result in any additional LOS deficiencies under Horizon Year (2040) With Project traffic conditions. However, the addition of Project traffic is anticipated to result in a significant cumulative impact based on the City's significance threshold at the following intersections:

- Palm Av. / I-215 NB Ramps (#4)
- Palm Av. / I-215 SB Ramps/Kendall Dr. (#5)
- Palm Av. / Industrial Pkwy. (#6)
- Palm Av. / Institution Rd. (#7)

The intersection operations analysis worksheets for Horizon Year (2040) With Project traffic conditions are included in Appendix 8.2 of this TIA. Measures to address long range deficiencies for Horizon Year traffic conditions are discussed in Section 8.7 *Long Range Deficiencies and Recommended Improvements.*

8.5 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway. Queuing analysis findings are presented in Table 8-2 for Horizon Year (2040) traffic conditions. 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 8-2, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for both Horizon Year (2040) Without and With Project traffic conditions.

Worksheets for Horizon Year (2040) Without and With Project conditions off-ramp queuing analysis are provided in Appendix 8.3 and 8.4, respectively.

Table 8-1

Intersection Analysis for Horizon Year (2040) Conditions

#	Intersection	Traffic Control[2]	2040 Without Project						2040 With Project						Δ v/c Difference		Significant Impact?[4]
			Delay[1] (secs.)		LOS		Average v/c[3]		Delay[1] (secs.)		LOS		Average v/c[3]				
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
1	Driveway 1 / Cajon Bl.	**CSS**	Does Not Exist				--	--	9.3	10.1	A	B	0.01	0.02	--	--	No
2	Driveway 2 / Cajon Bl.	**CSS**	Does Not Exist				--	--	9.1	9.5	A	A	0.01	0.02	--	--	No
3	Palm Av. / W. Little League Dr./Kendall Dr.	TS	**87.6**	**58.3**	**F**	**E**	0.99	0.89	**88.7**	**58.4**	**F**	**E**	0.99	0.90	0.00	0.01	No
4	Palm Av. / I-215 NB Ramps	TS	28.6	**75.6**	C	**E**	0.87	1.22	36.7	**82.4**	D	**F**	0.90	1.24	0.03	**0.02**	**Yes**
5	Palm Av. / I-215 SB Ramps/Kendall Dr.	TS	**104.5**	37.0	**F**	D	1.32	0.94	**112.6**	40.5	**F**	D	1.37	1.02	**0.05**	**0.08**	**Yes**
6	Palm Av. / Industrial Pkwy.	AWS	19.8	**>100.0**	C	**F**	0.73	0.49	27.4	**>100.0**	D	**F**	0.89	1.64	**0.16**	**1.15**	**Yes**
7	Palm Av. / Institution Rd.	AWS	10.8	17.1	B	C	0.43	0.72	12.2	27.1	B	D	0.53	0.89	--	**0.17**	**Yes**
8	Palm Av. / Driveway 3	**CSS**	Does Not Exist				--	--	10.3	10.5	B	B	0.01	0.02	--	--	No
9	Institution Rd. / Cajon Rd.	AWS	9.8	9.9	A	A	0.29	0.32	10.3	10.6	B	B	0.32	0.37	--	--	No
10	Driveway 4 / Cajon Rd.	**CSS**	Does Not Exist				--	--	8.9	8.8	A	A	0.00	0.00	--	--	No
11	Driveway 5 / Cajon Rd.	**CSS**	Does Not Exist				--	--	10.7	11.0	B	B	0.02	0.05	--	--	No

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

[3] Volume to capacity ratio has been reported using the HCM 2000 methodology (as HCM 2010 does not report the overall v/c) for intersections operating at LOS C or worse, consistent with the City of San Bernardino Traffic Impact Study Guidelines.

[4] Significant impact has been identified if the change in v/c exceeds the applicable thresholds per the City of San Bernardino Traffic Impact Study Guidelines.

EXHIBIT 8-3: HORIZON YEAR (2040) WITHOUT PROJECT SUMMARY OF LOS

LEGEND:

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

N

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URBAN CROSSROADS

EXHIBIT 8-4: HORIZON YEAR (2040) WITH PROJECT SUMMARY OF LOS

LEGEND:

- = AM PEAK HOUR ACCEPTABLE LOS
- = AM PEAK HOUR DEFICIENT LOS
- = PM PEAK HOUR ACCEPTABLE LOS
- = PM PEAK HOUR DEFICIENT LOS

N

10442 - los.dwg

URBAN CROSSROADS

8.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

The following intersection is anticipated to meet traffic signal warrant for Horizon Year (2040) Without Project traffic conditions (see Appendix 8.5):

- Palm Avenue / Institution Road (#7)

Similarly, the following intersection is anticipated to meet traffic signal warrant for Horizon Year (2040) With Project traffic conditions (see Appendix 8.6):

- Institution Road / Cajon Road (#9)

8.7 LONG RANGE DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

This section provides a summary of cumulative impacts and recommended improvements. Improvement strategies have been recommended at intersections that have been identified as deficient in an effort to reduce each location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the recommended improvement strategies to address Horizon Year (2040) traffic deficiencies are presented in Table 8-3.

The 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 City of San Bernardino DIF (if the improvements are included in the DIF program), or on a fair share basis (if the improvements are not included in the DIF fee program). These fees shall be collected by the City 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. Each of the improvements discussed above have been identified as being included as part of City DIF fee program or fair share contribution in Section 1.5 *Local and Regional Funding Mechanisms* of this TIA.

Worksheets for Horizon Year (2040) Without and With Project traffic conditions, with improvements, HCM calculation worksheets are provided in Appendix 8.7 and Appendix 8.8, respectively.

Table 8-2

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

Intersection	Movement	Available Stacking Distance (Feet)	2040 Without Project				2040 With Project			
			95th Percentile Queue (Feet)		Acceptable?[1]		95th Percentile Queue (Feet)		Acceptable?[1]	
			AM Peak	PM Peak	AM	PM	AM Peak	PM Peak	AM	PM
I-215 NB Off-Ramp / Palm Av.	WBL/T	910	421[2]	279	Yes	Yes	484[2]	293	Yes	Yes
	WBR	415	168	983[2]	Yes	Yes[3]	172	985[2]	Yes	Yes[3]
I-215 SB Off-Ramp / Palm Av.	WBL/T/R	1,470	837[2]	558[2]	Yes	Yes	899[2]	647[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-215 Freeway mainline.

Table 8-3

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
4	Palm Av. / I-215 NB Ramps																	
	- Horizon Year (2040) Without Project																	
	- Without Improvements	TS	0	2	0	0	2	0	0	0	0	0	1	1	28.6	**75.6**	C	**E**
	- With Improvements[4]	TS	**1**	2	0	0	2	0	0	0	0	**1**	1	1	47.9	32.3	D	C
	- Horizon Year (2040) With Project																	
	- Without Improvements	TS	0	2	0	0	2	0	0	0	0	0	1	1	36.7	**82.4**	D	**F**
	- With Improvements[4]	TS	**1**	2	0	0	2	0	0	0	0	**1**	1	1	53.6	33.6	D	C
5	Palm Av. / I-215 SB Ramps/Kendall Dr.																	
	- Horizon Year (2040) Without Project																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	d	0	1	0	**104.5**	37.0	**F**	D
	- With Improvements	TS	1	2	0	**2**	2	0	0	1	d	0	1	0	37.4	34.6	D	C
	- Horizon Year (2040) With Project																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	d	0	1	0	**112.6**	40.5	**F**	D
	- With Improvements	TS	1	2	0	**2**	2	0	0	1	d	0	1	0	41.5	35.1	D	D
6	Palm Av. / Industrial Pkwy.																	
	- Horizon Year (2040) Without Project																	
	- Without Improvements	AWS	1	1	1	1	1	1	0	1	0	1	1	1	19.8	**>100.0**	C	**F**
	- With Improvements	**TS**	1	1	1	1	1	1	0	1	0	1	1	1	37.7	31.5	D	C
	- Horizon Year (2040) With Project																	
	- Without Improvements	AWS	1	1	1	1	1	1	0	1	0	1	1	1	27.4	**>100.0**	D	**F**
	- With Improvements	**TS**	1	1	1	1	1	1	0	1	0	1	1	1	35.8	37.3	D	D
7	Palm Av. / Institution Rd.																	
	- Horizon Year (2040) Without Project																	
	- Without Improvements	AWS	0	1	1	1	1	0	0	0	0	1	0	1	10.8	17.1	B	C
	- With Improvements	**TS**	0	1	1	1	1	0	0	0	0	1	0	1	24.8	21.9	C	C
	- Horizon Year (2040) With Project																	
	- Without Improvements	AWS	0	1	1	1	1	0	0	0	0	1	0	1	12.2	27.1	B	D
	- With Improvements	**TS**	0	1	1	1	1	0	0	0	0	1	0	1	27.3	34.1	C	C

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

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

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane; > = Right-Turn Overlap Phasing; >> = Free-Right Turn Lane; **1** = Improvement

[2] Per the 2010 Highway Capacity Manual, 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; AWS = All Way Stop

[4] Improvement include restriping the westbound shared left-through lane as a shared through-right turn lane.

9 REFERENCES

1. **Department, City of San Bernardino Public Works.** *The City of San Bernardino Traffic Impact Study Guidelines.* City of San Bernardino : s.n., June 3, 2015.

2. **San Bernardino Associated Governments.** *Congestion Management Program for County of San Bernardino.* County of San Bernardino : s.n., Updated December 2007.

3. **California Department of Transportation.** *Guide for the Preparation of Traffic Impact Studies.* December 2002.

4. **Institute of Transportation Engineers.** *Trip Generation.* 9th Edition. 2012.

5. **Southern California Association of Governments.** *2016 Regional Transportation Plan/Sustainable Communities Strategy.* April 2016.

6. **Transportation Research Board.** *Highway Capacity Manual (HCM).* s.l. : National Academy of Sciences, 2010.

7. **Federal Highway Administration.** Manual on Uniform Traffic Control Devices (MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CAMUTCD).* 2014.

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