Cajon Boulevard Warehouse

TRAFFIC IMPACT ANALYSIS

COUNTY OF SAN BERNARDINO

PREPARED BY:

Aric Evatt, PTP
aevatt@urbanxroads.com
(949) 660-1994 x204

Charlene So, PE
cso@urbanxroads.com
(949) 660-1994 x222

Robert Vu, EIT
rvu@urbanxroads.com
(949) 660-1994 x238

MARCH 2, 2018

TABLE OF CONTENTS

APPENDICES

This Page Intentionally Left Blank

LIST OF EXHIBITS

This Page Intentionally Left Blank

LIST OF TABLES

This Page Intentionally Left Blank

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
CA MUTCD	California Manual on Uniform Traffic Control Devices
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CCI	Construction Cost Index
CMP	Congestion Management Program
DIF	Development Impact Fee
E+P	Existing Plus Project
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
NCHRP	National Cooperative Highway Research Program
NP	No Project (or Without Project)
PCE	Passenger Car Equivalents
PHF	Peak Hour Factor
Project	Cajon Boulevard Warehouse
RTP	Regional Transportation Plan
SBCTA	San Bernardino County Transportation Authority
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
sf	Square Feet
TIA	Traffic Impact Analysis
Vphgpl	Vehicles Per Hour Green Per Lane
v/c	Volume to Capacity
WP	With Project

This Page Intentionally Left Blank

1 INTRODUCTION

This report presents the results of the traffic impact analysis (TIA) for the proposed Cajon Boulevard Warehouse development (referred to as "Project"), which is located on Cajon Boulevard between Kendall Drive and Shelter Way in the County 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 County of San Bernardino staff, this traffic study has been prepared in accordance with the San Bernardino County Congestion Management Program (CMP) Guidelines for CMP Traffic Impact Analysis Reports (Appendix B, 2016 Update), the California Department of Transportation (Caltrans) Guide for the Preparation of Traffic Impact Studies (December 2002), and consultation with County staff during the scoping process. (1) (2) The approved Project Traffic Study Scoping agreement is provided in Appendix 1.1 of this TIA.

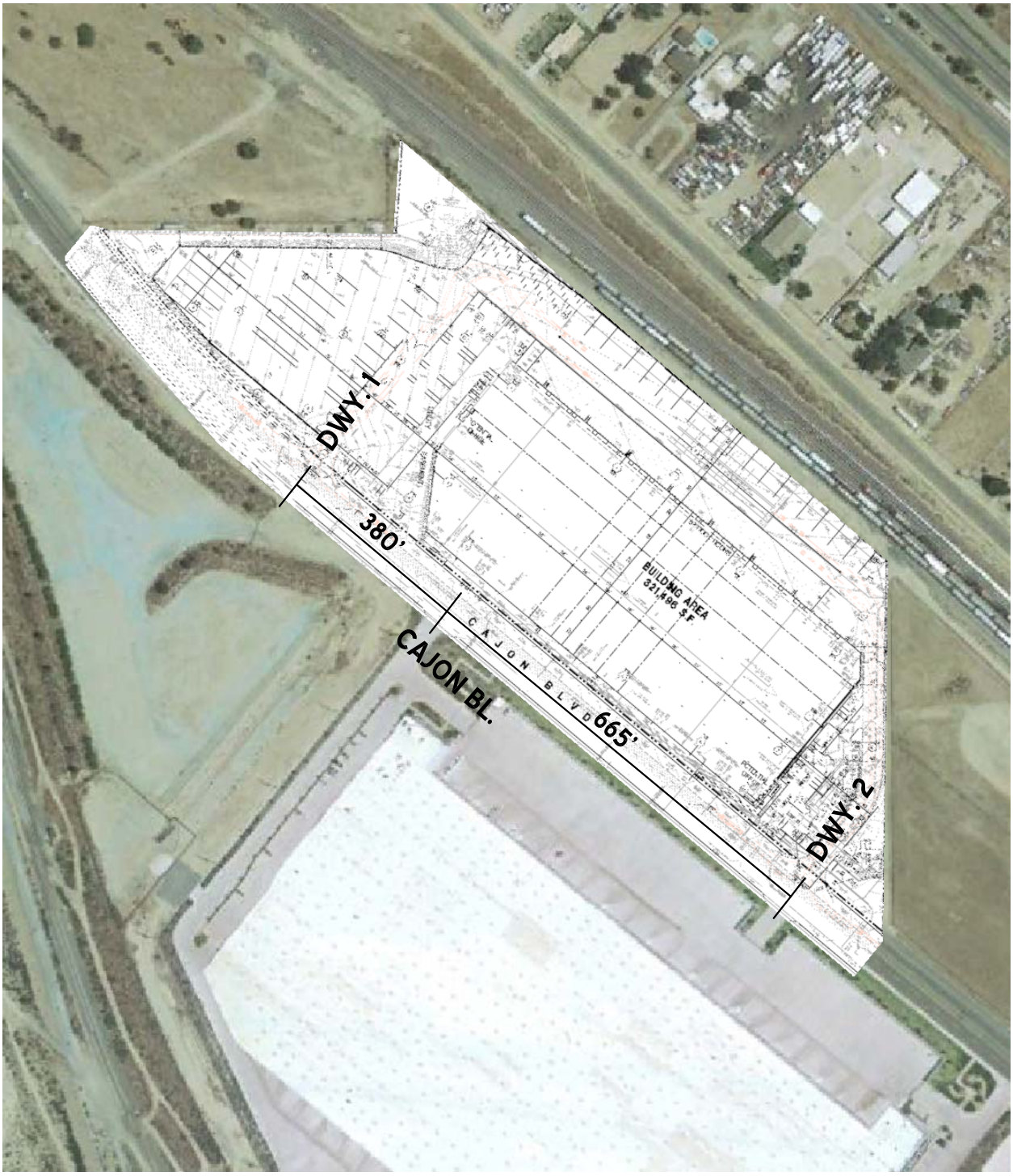
1.1 PROJECT OVERVIEW

Exhibit 1-1 illustrates the preliminary Project site plan. As indicated on Exhibit 1-1, the total development is proposed to include the development of 321,496 square feet (sf) of warehousing use. The Project is anticipated to be developed in a single phase with a projected Opening Year of 2019. Regional access to the Project is provided by the I-215 Freeway via Palm Avenue. Vehicular and truck traffic access will be provided via the following driveways (see Exhibit 1-1):

- Cajon Boulevard via Driveway 1 – full access (passenger cars and trucks)
- Cajon Boulevard via Driveway 2 – full access (passenger cars and trucks)

Trips generated by the Project's proposed land uses have been estimated based on trip generation rates collected by the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, 2017. (3) The proposed Project is anticipated to generate a net total of 732 passenger car equivalent (PCE) trips-ends per day with 70 PCE AM peak hour trips and 79 PCE PM peak hour trips. In comparison, the proposed Project is anticipated to generate a net total of 560 actual vehicle trip-ends per day with 55 AM peak hour trips and 62 PM peak hour trips. The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.1 *Project Trip Generation* of this report.

EXHIBIT 1-1: PRELIMINARY SITE PLAN



N

11245 - siteplan.dwg

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 (2018)
- Existing plus Project (E+P)
- Opening Year Cumulative (2019) Without Project
- Opening Year Cumulative (2019) With Project
- Horizon Year (2040) Without Project
- Horizon Year (2040) With Project

1.2.1 EXISTING (2018) CONDITIONS

Information for Existing (2018) 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 (2018) conditions.

1.2.3 OPENING YEAR CUMULATIVE (2019) CONDITIONS

The Opening Year Cumulative conditions analysis determines the potential near-term cumulative circulation system deficiencies. The Opening Year Cumulative (2019) traffic conditions analyses determine 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 3.0% are included for Opening Year Cumulative (2019) traffic conditions. This comprehensive list was compiled from information provided by the County of San Bernardino and other near-by agencies, such as the City of San Bernardino.

1.2.4 HORIZON YEAR (2040) CONDITIONS

Traffic projections for Horizon Year (2040) with Project conditions were derived from the Southern California Association of Governments (SCAG) transportation model. The Horizon Year (2040) conditions analysis will be utilized to determine if improvements funded through regional transportation mitigation fee programs, such as the County's Development Impact Fee (DIF) program, or other approved funding mechanisms can accommodate the long-range cumulative traffic at the target level of service (LOS) identified by the County of San Bernardino (lead agency). If the planned and funded improvements can provide the target LOS, then the Project's payment into established fee programs will be considered as cumulative mitigation. Other improvements

needed beyond the "funded" improvements (such as localized improvements to non-DIF facilities) are identified as such.

1.3 STUDY AREA

To ensure that this TIA satisfies the County of San Bernardino's traffic study requirements, Urban Crossroads, Inc. prepared a project traffic study scoping package for review by County 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 County is included in Appendix 1.1.

1.3.1 INTERSECTIONS

The following 8 study area intersections listed in Table 1-1 and shown on Exhibit 1-2 were selected for this TIA based on consultation with County of San Bernardino staff. In general, the study area includes intersections where the Project is anticipated to contribute 50 or more peak hour trips (actual trips) for signalized intersections and 10 or more peak hour trips for unsignalized intersections, with the exception of the intersections denoted with an asterisk below, which have been evaluated although the Project is anticipated to contribute fewer than 50 peak hour trips. These intersections have either been included because they are utilized for site access purposes or based on consultation with County staff.

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction	CMP?
1	Driveway 1 & Cajon Boulevard – Future Intersection	County and City of San Bernardino	No
2	Driveway 2 & Cajon Boulevard – Future Intersection*	County and City of San Bernardino	No
3	Institution Road & Cajon Boulevard	City of San Bernardino	No
4	Palm Avenue & Institution Road	City of San Bernardino	No
5	Palm Avenue & Industrial Parkway	City of San Bernardino	No
6	Palm Avenue & I-215 Southbound Ramps*	Caltrans, City of San Bernardino	No
7	Palm Avenue & I-215 Northbound Ramps*	Caltrans, City of San Bernardino	No

The "50 peak hour trip" criterion utilized by the County 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).

The Project is anticipated to contribute less than 25 one-way peak hour trips to nearby Caltrans facilities (e.g., I-215 Freeways). As such, Caltrans facilities were not evaluated in this TIA.

EXHIBIT 1-2: LOCATION MAP

URBAN CROSSROADS

1.3 ANALYSIS FINDINGS

This section provides a summary of the analysis results for Existing (2018), E+P, Opening Year Cumulative (2019), and Horizon Year (2040) traffic conditions.

1.3.1 INTERSECTIONS

Existing (2018) Conditions

The study area intersections are currently operating at an acceptable LOS during the peak hours under Existing (2018) traffic conditions.

E+P Conditions

The intersection analysis results indicate that the study area intersections are anticipated to continue to operate at acceptable LOS during the peak hours, with the exception of the following intersection:

- Palm Avenue & I-215 Southbound Ramps (#6) – LOS E AM peak hour only

However, the Project is anticipated to contribute less than 50 peak hour trips to the intersection of Palm Avenue and I-215 Southbound ramps. As such, the Project's impact to this intersection is less than significant.

Opening Year Cumulative (2019) Without Project Conditions

The following additional study area intersections are anticipated to operate at an unacceptable LOS the peak hours under Opening Year Cumulative (2019) Without Project traffic conditions:

- Palm Avenue & Industrial Parkway (#5) – LOS F PM peak hour only
- Palm Avenue & I-215 Southbound Ramps (#6) – LOS F AM and PM peak hours

Opening Year Cumulative (2019) With Project Conditions

The intersection analysis results indicate that the addition of Project traffic is not anticipated to result in any additional LOS deficiencies from those previously identified under Opening Year Cumulative (2019) Without Project traffic conditions. The addition of Project traffic at the intersections of Palm Avenue and Industrial Parkway is anticipated to result in a significant cumulative impact. However, the Project is anticipated to contribute less than 50 peak hour trips to the intersection of Palm Avenue and I-215 Southbound Ramps, resulting in a less than significant impact.

Horizon Year (2040) Without Project Conditions

The following additional 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 Opening Year Cumulative (2019) Without Project traffic conditions:

- Palm Avenue & Institution Road (#4) – LOS F PM peak hour only
- Palm Avenue & I-215 Northbound Ramps (#7) – LOS F 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, in addition to those previously identified under Horizon Year (2040) Without Project traffic conditions. The addition of Project traffic is anticipated to result in a significant cumulative impact at the following intersections:

- Palm Avenue & Institution Road (#4) – LOS F PM peak hour only
- Palm Avenue & Industrial Parkway (#5) – LOS F PM peak hour only

However, the Project is anticipated to contribute less than 50 peak hour trips to the following intersections, thus resulting in a less than significant impact:

- Palm Avenue & I-215 Southbound Ramps (#6) – LOS F AM and PM peak hours
- Palm Avenue & I-215 Northbound Ramps (#7) – LOS F PM peak hour only

1.4 PROJECT IMPACTS AND MITIGATION MEASURES

There are no direct Project impacts at the study area intersections as determined by a comparison of Existing (2018) and E+P traffic conditions. As such, no mitigation measures have been identified. Cumulative impacts and mitigation measures are discussed subsequently.

1.5 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements within the County of San Bernardino are funded through a combination of direct project mitigation, development impact fee programs or fair share contributions, such as the County of San Bernardino 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 County Transportation Authority (SBCTA) and concluded that each jurisdiction should include a regional fee component in their local programs in order to meet the Measure "I" requirement. The regional component assigns specific facilities and cost sharing formulas to each jurisdiction and was most recently updated in September 2017. Revenues collected through these programs are used in tandem with Measure "I" funds to deliver projects identified in the Nexus Study.

While Measure "I" is a self-executing sales tax administered by SBCTA, it bears discussion here because the funds raised through Measure "I" have funded in the past and will continue to fund new transportation facilities in San Bernardino County.

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

The County 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 County growth as identified in the County's General Plan Circulation Element. The County'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 2016 and is adjusted annually based upon changes in the construction cost index (CCI). Under the County's DIF program, the County may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program. The County may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program.

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

The Project applicant will be subject to the County's DIF fee program and will pay the requisite County 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 County'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 County'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 County 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 cumulatively impacted intersections shown on Table 1-3.

1.6 CUMULATIVE IMPACTS AND MITIGATION MEASURES

A summary of the cumulatively impacted study area intersections and recommended mitigation measures to address cumulatively significant impacts are described in detail within Section 6 *Opening Year Cumulative (2019) Traffic Conditions* and Section 7 *Horizon Year (2040) Traffic Conditions*. Cumulative impacts are deficiencies that would not be directly caused by the Project. The Project would, however, contribute traffic to these deficient facilities along with other cumulative development projects or would contribute to a pre-project deficiency, resulting in a cumulatively considerable impact.

The following mitigation measures are based on the improvements needed under Horizon Year (2040) traffic conditions. The improvements needed to address Opening Year Cumulative deficiencies would be a sub-set of those improvements recommended under Horizon Year (2040) traffic conditions. Improvements found to be included in County of San Bernardino DIF program have been identified as such on Table 1-3. For improvements that do not appear to be in the County's DIF program, a fair share financial contribution based on the Project's fair share impact shall be imposed may be imposed by other jurisdictions in order to mitigate the Project's share of impacts in lieu of construction. These fees are collected as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected vehicle trip increases. Table 1-3 show the Project's fair share contribution associated with Horizon Year (2040) traffic conditions.

1.6.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

A summary of off-site improvements needed to address cumulative traffic impacts for each analysis scenario through Horizon Year (2040) traffic conditions was included in Table 1-3. Improvements found to be included in County of San Bernardino (lead agency) DIF program have been identified as such. For improvements that do not appear to be in the County's DIF program, a fair share financial contribution based on the Project's fair share impact shall be imposed (for County facilities) and may be imposed by other jurisdictions in order to mitigate the Project's share of impacts in lieu of construction. These fees (both to the County, and as determined, to surrounding agencies as fair-share contributions) are collected as part of a funding mechanism

aimed at ensuring that regional highways and arterial expansions keep pace with the projected vehicle trip increases.

A rough order of magnitude cost has been prepared to determine the appropriate contribution value based upon the Project's fair share of traffic as part of the project approval process. Based on the Project fair share percentages, the Project's fair share cost is estimated at $55,160. These estimates are a rough order of magnitude only as they are intended only for discussion purposes and do not imply any legal responsibility or formula for contributions or mitigation.

1.6.2 CUMULATIVE MITIGATION MEASURES

Mitigation Measure 1.1 – Prior to the issuance of building permits, the Project Applicant shall participate in the County's DIF program by paying the requisite DIF fee at the time of building permit; and in addition, shall pay the Project's fair share amount of $15,919 for the improvements identified in Table 1-3 that are consistent with the improvements shown on Table 7-3, or as agreed to by the County of San Bernardino and Project Applicant.

Mitigation Measure 2.1 – Table 1-3 of the TIA includes 2 intersections that either share a mutual border with the City of San Bernardino or are wholly located within the City of San Bernardino that have recommended improvements which are not covered by DIF. Because the County of San Bernardino does not have plenary control over intersections that share a border with the City of San Bernardino, the County cannot guarantee that such improvements will be constructed. Thus, the following additional mitigation measure is required: The County of San Bernardino shall participate in a multi-jurisdictional effort with the City of San Bernardino to develop a study to identify fair share contribution funding sources attributable to and paid from private and public development to supplement other regional and State funding sources necessary to implement the improvements identified in Table 1-3 of the TIA, that are located in the City of San Bernardino. The study shall include fair-share contributions related to private and or public development based on nexus requirements contained in the Mitigation Fee Act (Govt. Code § 66000 et seq.) and 14 Cal. Code of Regs. § 15126.4(a)(4) and, to this end, the study shall recognize that impacts attributable to City of San Bernardino facilities that are not attributable to development located within the County of San Bernardino are not paying in excess of such developments' fair share obligations. The fee study shall also be compliant with Government Code § 66001(g) and any other applicable provisions of law. The study shall set forth a timeline and other agreed-upon relevant criteria for implementation of the recommendations contained within the study to the extent the other agencies agree to participate in the fee study program. Because the County of San Bernardino and the City of San Bernardino are responsible to implement this mitigation measure, Developer shall have no compliance obligations with respect to this Mitigation Measure.

Table 1-2

Project Fair Share Calculations for Intersections

#	Intersection	Existing	Project	2040 WP	Total New Traffic	Project % of New Traffic[1]
4	Palm Av. & Institution Rd.					
	AM:	393	61	872	479	**12.7%**
	PM:	423	69	1,089	666	10.4%
5	Palm Av. & Industrial Pkwy.					
	AM:	609	61	1,308	699	**8.7%**
	PM:	759	69	1,607	848	8.1%

* Highest percentage represented in **BOLD** and shown on Table 1-2.

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

Table 1-3

Summary of Improvements and Rough Order of Magnitude Costs

#	Intersection Location	Jurisdiction	E+P	2019 Without Project	2019 With Project	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. & Institution Rd.	County of San Bernardino, City of San Bernardino	None	None	None	Traffic Signal	Same	No	$250,000	12.7%	$31,837
						Implement overlap phasing on the WB right turn lane	Same	No	$11,827		$1,506
								Total	**$261,827**		**$33,343**
5	Palm Av. & Industrial Pkwy.	City of San Bernardino	None	Traffic Signal	Same	Same	Same	No	$250,000	8.7%	$21,817
								Total	**$250,000**		**$21,817**
Total Costs for County of San Bernardino (non-DIF)									**$125,000**		**$15,919**
Total Costs for City of San Bernardino[5]									**$386,827**		**$39,242**

[1] Improvements included in County 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 1.577, except Traffic Signals, to reflect 2018 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.

Mitigation Measure 2.2 – The Developer's fair-share amount for the intersections that either share a mutual border with the City of San Bernardino or are wholly located within the City of San Bernardino that have recommended improvements for Horizon Year (2040) conditions which are not covered by DIF equals $39,242. Developer shall be required to pay this $39,242 amount to the County of San Bernardino prior to the issuance of the Project's final certificate of occupancy. The County of San Bernardino shall hold Developer's Fair Share contribution in trust and shall apply Developer's Fair Share Contribution to any fee program adopted or agreed upon by the County of San Bernardino and City of San Bernardino as a result of implementation of Mitigation Measure 2.1. If, within five years of the date of collection of Developer's Fair Share Contribution, the County of San Bernardino and City of San Bernardino do not comply with Mitigation Measure 2.1, then Developer's Fair Share Contribution shall be returned to the Developer.

1.7 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 Driveway 1, Driveway 2, and Driveway 3. Driveway 1 is proposed to allow access to trucks only, Driveway 2 is proposed to allow access for passenger cars, and Driveway 3 is proposed to allow access to both passenger cars and trucks. All driveways are proposed to allow for full turning movements.

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.

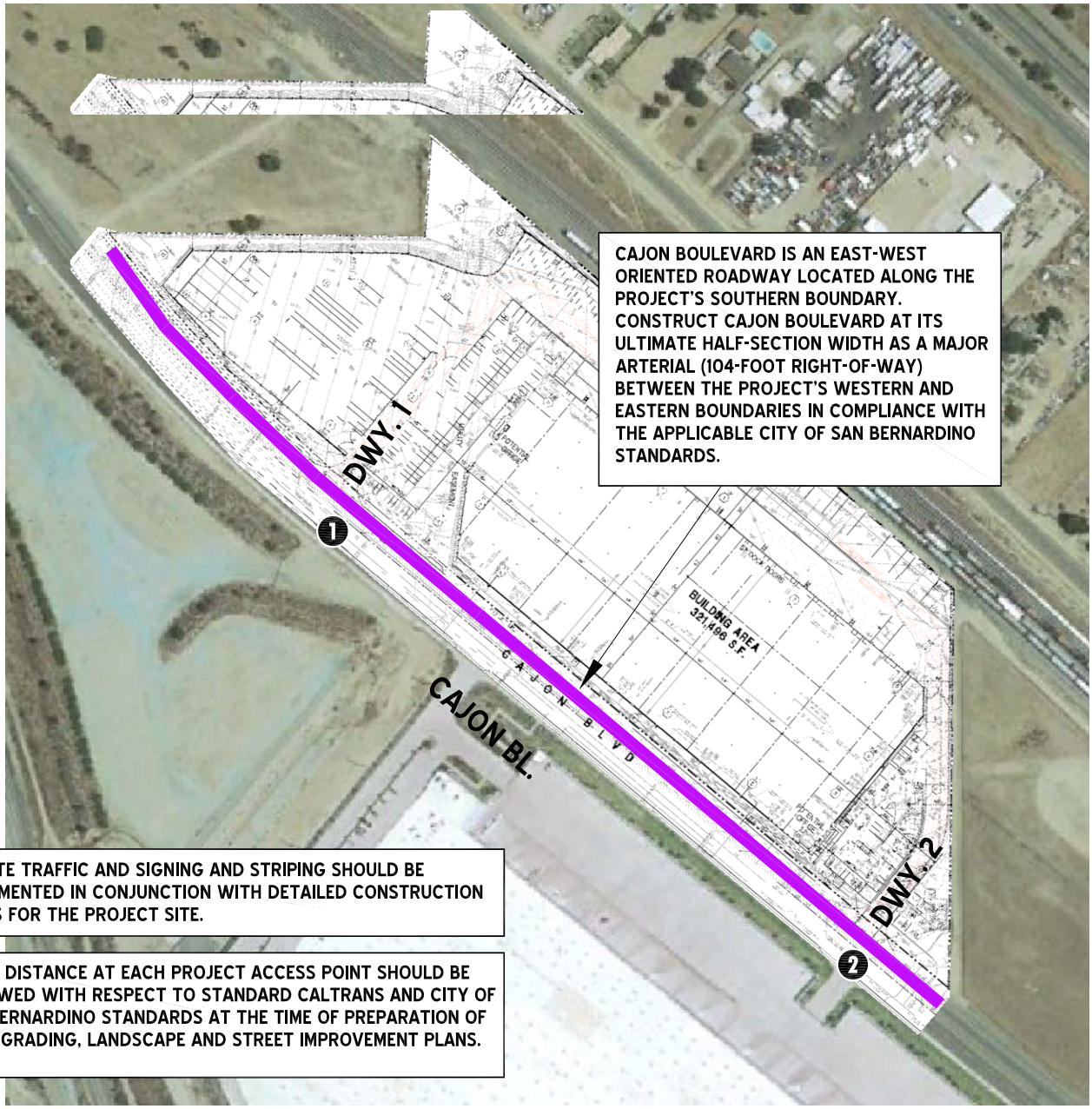
1.7.1 SITE ADJACENT ROADWAY AND SITE ACCESS IMPROVEMENTS

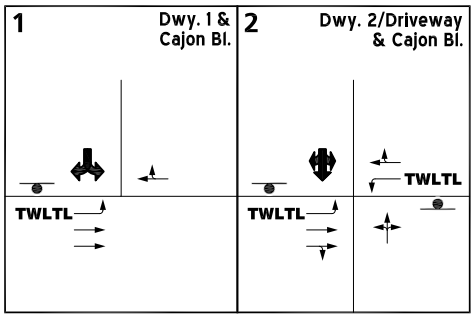
The recommended site-adjacent roadway improvements for the Project are described below. These improvements need to be incorporated into the project description prior to Project approval or imposed as conditions of approval as part of the Project approval. Exhibit 1-3 illustrates the on-site and site 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. On-site traffic signing and striping should be implemented in conjunction with detailed construction plans for the Project site.

Cajon Boulevard – Cajon Boulevard is an east-west oriented roadway located along the Project's southern boundary. Construct Cajon Boulevard at its ultimate half-section width as a Major Arterial (104-foot right-of-way) between the Project's western and eastern boundaries in compliance with the applicable County of San Bernardino standards.

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 County of San Bernardino General Plan Circulation Element.

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





LEGEND:

- = STOP SIGN
- TWLTL = TWO WAY LEFT TURN LANE
- = MAJOR ARTERIAL (104-FOOT R.O.W.)
- = LANE IMPROVEMENTS
- = EXISTING LANE

N

11245 - recs.dwg

URBAN CROSSROADS

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

1.7.2 QUEUING ANALYSIS AT THE PROJECT DRIVEWAYS

A queuing analysis was conducted along the site adjacent roadway of Cajon Boulevard 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). 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). 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. A vehicle is considered queued whenever it is traveling at less than 10 feet/second.

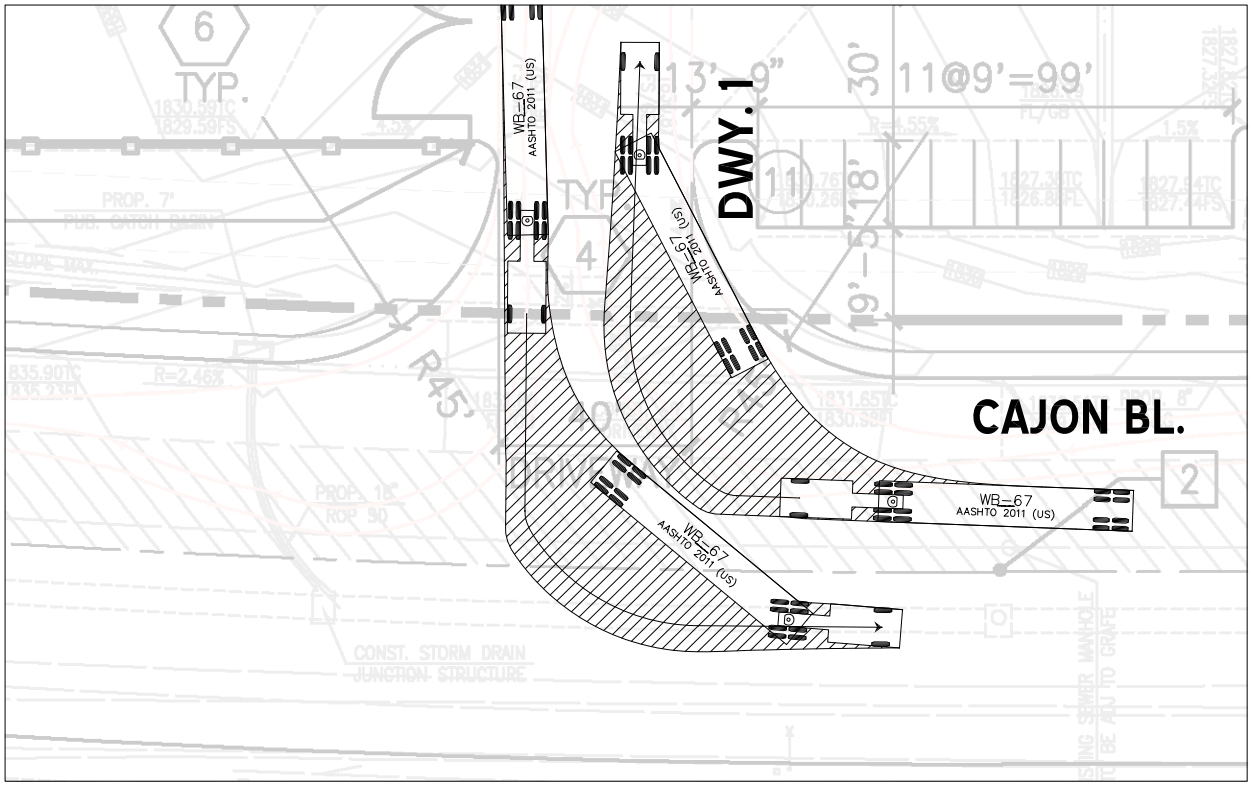
SimTraffic has been utilized to assess peak hour queuing at the site access driveways for Horizon Year With Project traffic conditions. The random simulations generated by SimTraffic have been utilized to determine the 50th and 95th percentile queue lengths observed for each turn lane. A SimTraffic simulation has been recorded five (5) times, during the weekday AM and weekday PM peak hours, and has been seeded for 60-minute periods with 60-minute recording intervals. Applicable storage length recommendations for the turning movement at the Project was shown previously on Exhibit 1-3.

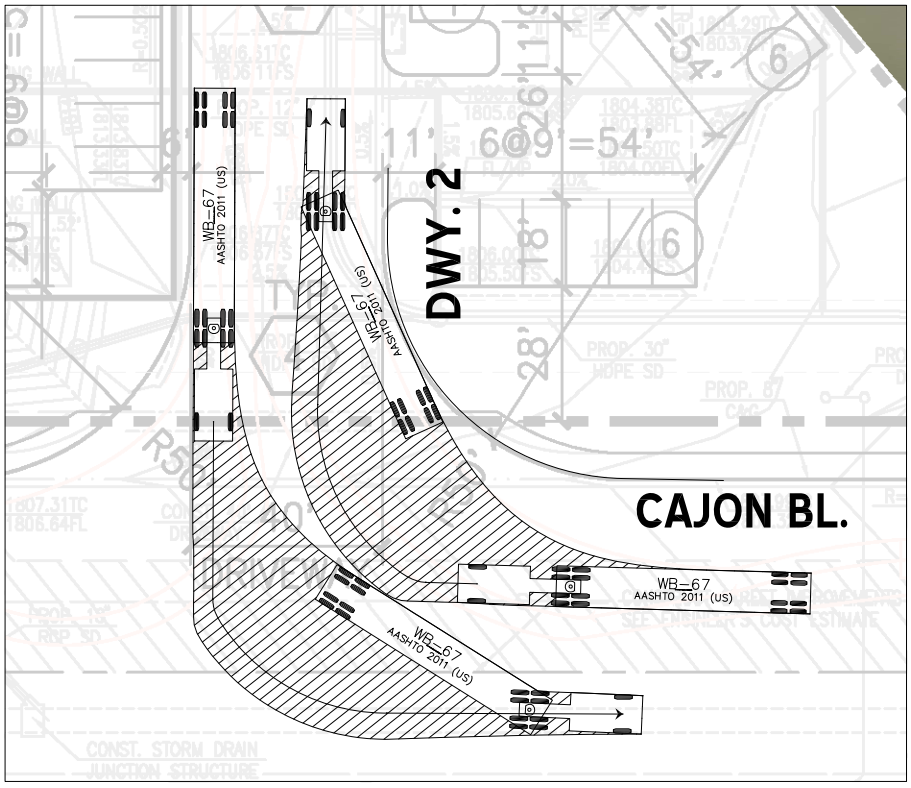
1.8 TRUCK ACCESS AND CIRCULATION

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 driveways are shown on Exhibit 1-4.

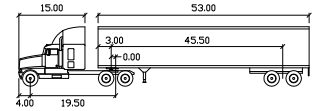
The proposed curb radius at the intersections of Driveway 1 at Cajon Boulevard and Driveway 2 at Cajon Boulevard are anticipated to accommodate the turning radius of a WB-67 (53-foot trailer) truck.

EXHIBIT 1-4: TRUCK ACCESS





LEGEND:



WB-67 feet

Tractor Width	8.00	Lock to Lock Time	6.0
Trailer Width	8.50	Steering Angle	28.4
Tractor Track	8.00	Articulating Angle	75.0
Trailer Track	8.50		

GRAPHIC SCALE
0 40 80
1"=80'

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 County 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) (6th Edition) methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (4) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

The County of San Bernardino requires signalized intersection operations analysis based on the methodology described in the HCM (6th Edition). 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) 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, 6th Edition

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

Existing and Opening Year Cumulative Traffic Conditions:

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

Horizon Year Traffic Conditions:

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

The traffic modeling and signal timing optimization software package Synchro (Version 10) has been utilized to analyze signalized intersections within the County of San Bernardino. Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15-minute volumes. Common practice for LOS analysis is to use a peak 15-minute rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g. PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis

scenarios. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (4)

2.2.2 UNSIGNALIZED INTERSECTIONS

The County of San Bernardino requires the operations of unsignalized intersections be evaluated using the methodology described the HCM (6th Edition). (4) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2).

TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

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

Source: HCM, 6th Edition

At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. For all-way stop controlled intersections, LOS is computed for the intersection as a whole.

2.3 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by Caltrans and other public agencies to quantitatively justify or ascertain the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TIA uses the signal warrant criteria presented in the latest edition of the Caltrans California Manual on Uniform Traffic Control Devices (CA MUTCD) for all unsignalized study area intersections. (5)

The signal warrant criteria for Existing study area intersections are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. The CA MUTCD indicate that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (5) Specifically, this TIA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions. Warrant 3 is appropriate to use for this TIA because it provides specialized warrant criteria for intersections with 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

ID	Intersection Location	Jurisdiction
1	Driveway 1 & Cajon Boulevard	County and City of San Bernardino
2	Driveway 2 & Cajon Boulevard	County and City of San Bernardino
3	Institution Road & Cajon Boulevard	City of San Bernardino
4	Palm Avenue & Institution Road	City of San Bernardino
5	Palm Avenue & Industrial Parkway	City of San Bernardino

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 *Opening Year Cumulative (2019) Traffic Analysis,* and Section 7 *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.

2.4 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 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.

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.

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 COUNTY OF SAN BERNARDINO

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

2.5.2 CITY OF SAN BERNARDINO

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

2.5.3 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 County of San Bernardino LOS threshold, LOS D will be used as the target LOS for freeway ramp-to-arterial intersections.

2.5.4 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. However, there are no CMP intersections within the study area.

2.6 THRESHOLDS OF SIGNIFICANCE

This section outlines the methodology used in this analysis related to identifying circulation system deficiencies. The following thresholds apply to intersections where the Project is anticipated to contribute 50 or more (actual) vehicle trips to a study area intersection. If the Project contributes less than 50 peak hour trips, then the impact is considered less than significant.

2.6.1 COUNTY OF SAN BERNARDINO INTERSECTIONS

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

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

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

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

  OR

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

  AND

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

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

2.6.2 CITY OF SAN BERNARDINO INTERSECTIONS

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 (6th Edition) methodology.

2.6.3 CALTRANS FACILITIES

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

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

2.7 PROJECT FAIR SHARE CALCULATION METHODOLOGY

In cases where this TIA identifies that the Project would contribute additional traffic volumes to cumulative traffic deficiencies, Project fair share costs of improvements necessary to address deficiencies have been identified. The Project's fair share cost of improvements has been determined based on the following equation, which is the ratio of Project traffic to net new traffic:

Project Fair Share % = Project Traffic / (Horizon Year Traffic – Existing Traffic) X 100%

The Project fair share contribution calculations are presented in Section 1.5 *Local and Regional Funding Mechanisms* of this TIA. The cost of implementing the improvements shown on Table 1-3 have been estimated based on the preliminary construction cost estimates provided by County staff. These cost estimates have been utilized in conjunction with the Project fair share percentages to determine the Project's fair share cost of the recommended cumulative improvements (see Table 1-2). These estimates are a rough order of magnitude only as they are intended only for discussion purposes and do not imply any legal responsibility or formula for contributions or mitigation.

This Page Intentionally Left Blank

3 AREA CONDITIONS

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

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the agreement with County of San Bernardino staff (Appendix 1.1), the study area includes a total of 8 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 County 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 COUNTY OF SAN BERNARDINO GENERAL PLAN CIRCULATION ELEMENT

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

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

Major Highways can accommodate four travel lanes, separated by a raised or painted median. These facilities typically provide access between the regional highway system and secondary streets. An example of a Major Highway within the study area includes:

- Cajon Boulevard

Secondary Highways can accommodate four travel lanes. These facilities typically provide access between the regional highway system and collector streets. An example of a Secondary Highway within the study area includes:

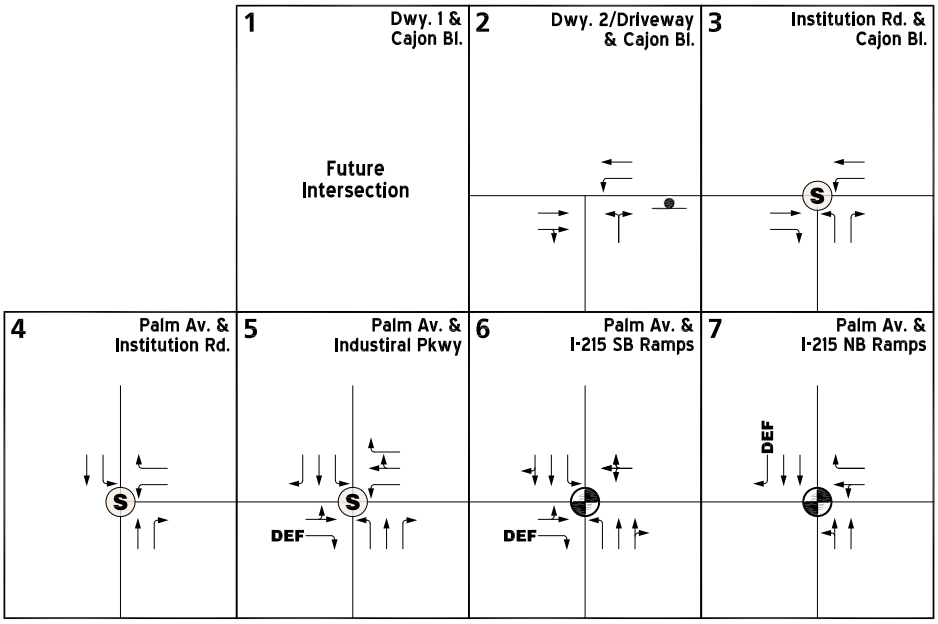
- Kendall Drive

3.3 CITY OF SAN BERNARDINO GENERAL PLAN CIRCULATION ELEMENT

The study area is also located in close proximity to the City of San Bernardino. Exhibit 3-4 shows the City of San Bernardino General Plan Circulation Element, and Exhibit 3-5 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.

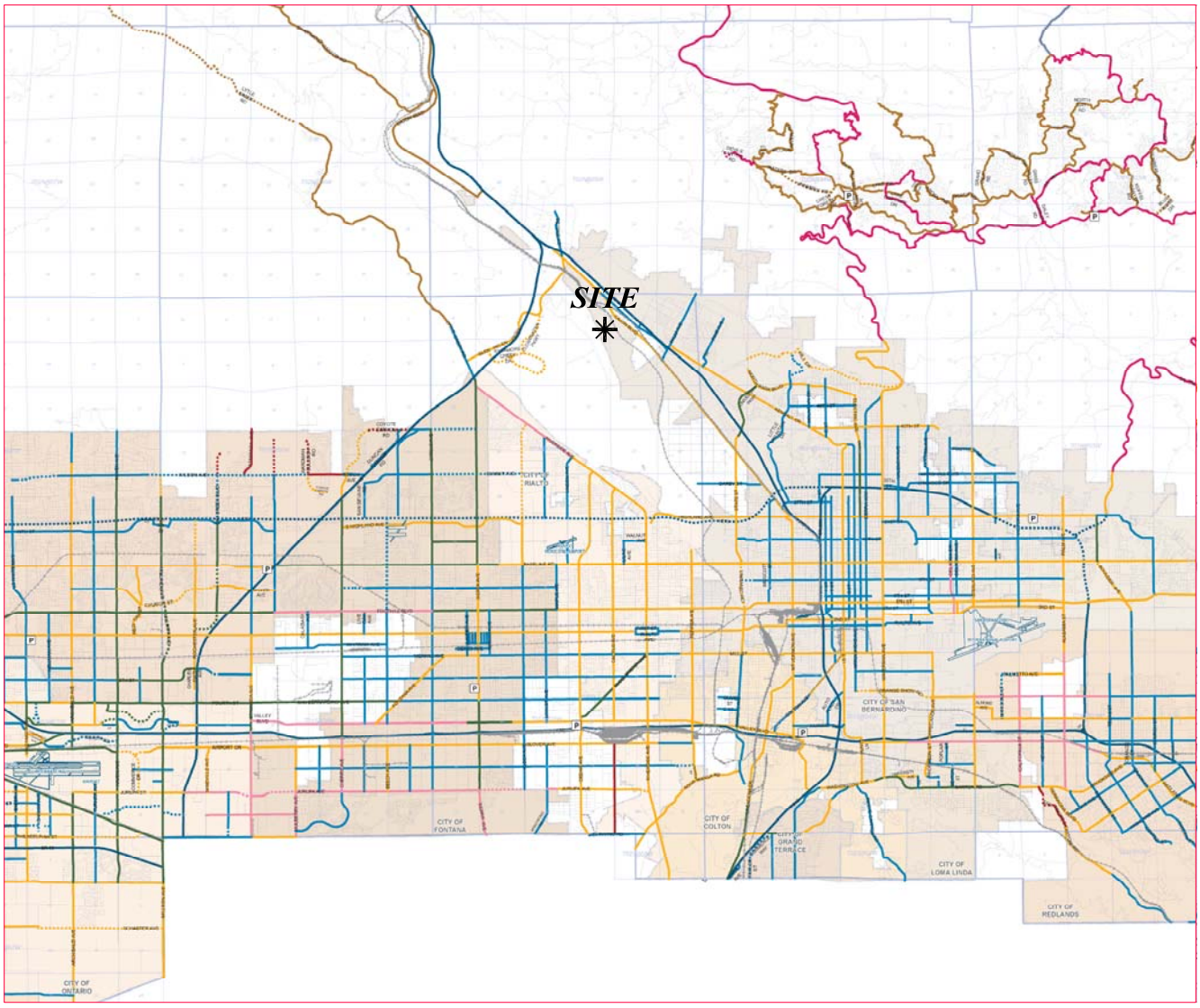
EXHIBIT 3-1: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



LEGEND:

- = TRAFFIC SIGNAL
- S = ALL WAY STOP
- 4 = NUMBER OF LANES
- D = DIVIDED
- U = UNDIVIDED
- DEF = DEFACTO RIGHT TURN
- SPEED LIMIT 25 = SPEED LIMIT (MPH)

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



Circulation and Transportation

EXISTING	PROPOSED	
		Freeway
		Major DMded Highway
		Major Arterial Highway
		Major Highway
		Secondary Highway
		Controlled/Limited Access Collector
		Mountain Major Highway
		Mountain Secondary Highway
		State Highways (Special Standards or Conditions)
		Railroads
P		Ridesharing Facilities Park & Ride
X		Airport / Airfield

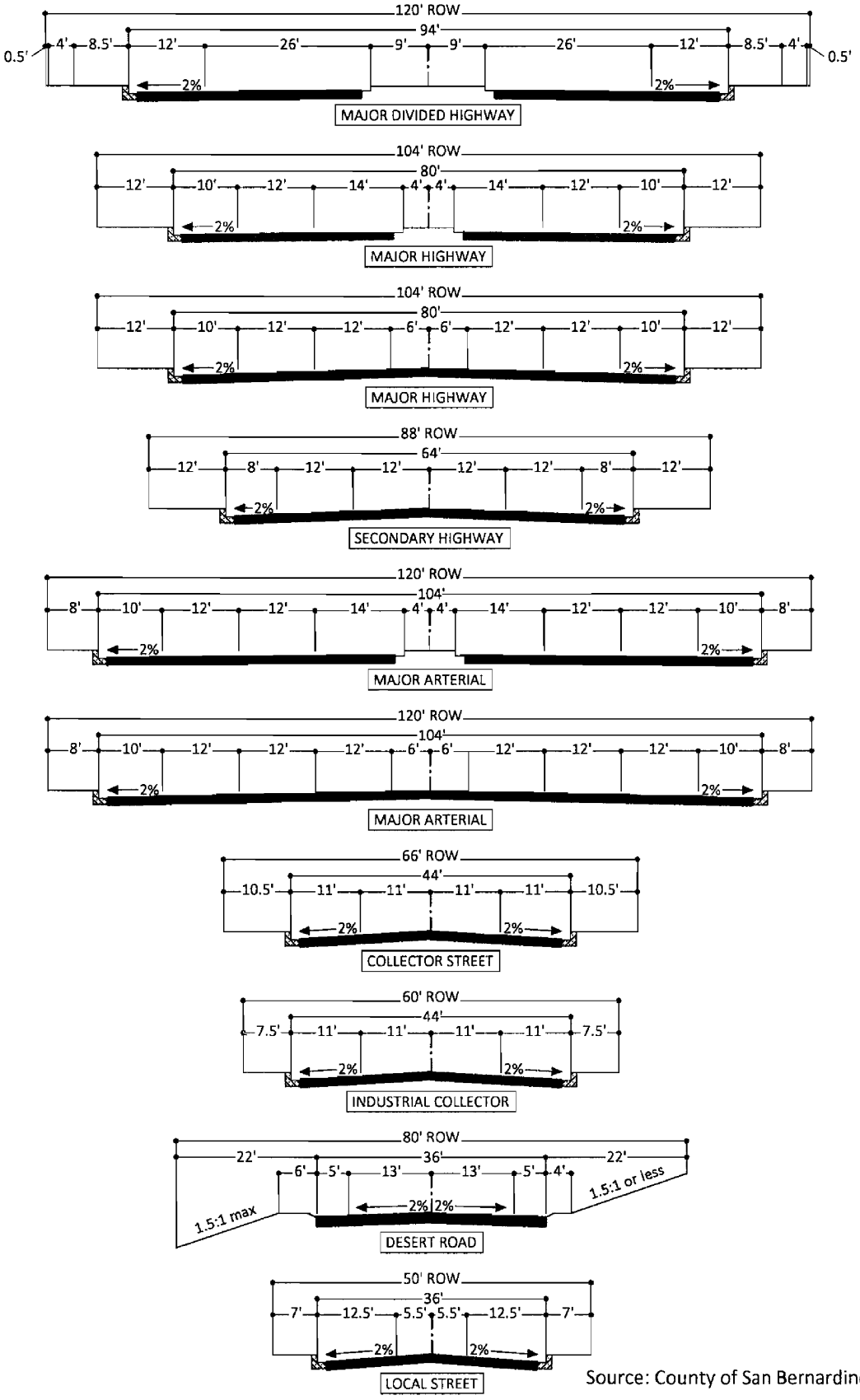
N

SOURCE: SAN BERNARDINO COUNTY
(This map was plotted March 13, 2012)

11245 - county gpce.dwg

URBAN CROSSROADS

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



Source: County of San Bernardino

EXHIBIT 3-4: CITY OF SAN BERNADINO GENERAL PLAN CIRCULATION ELEMENT

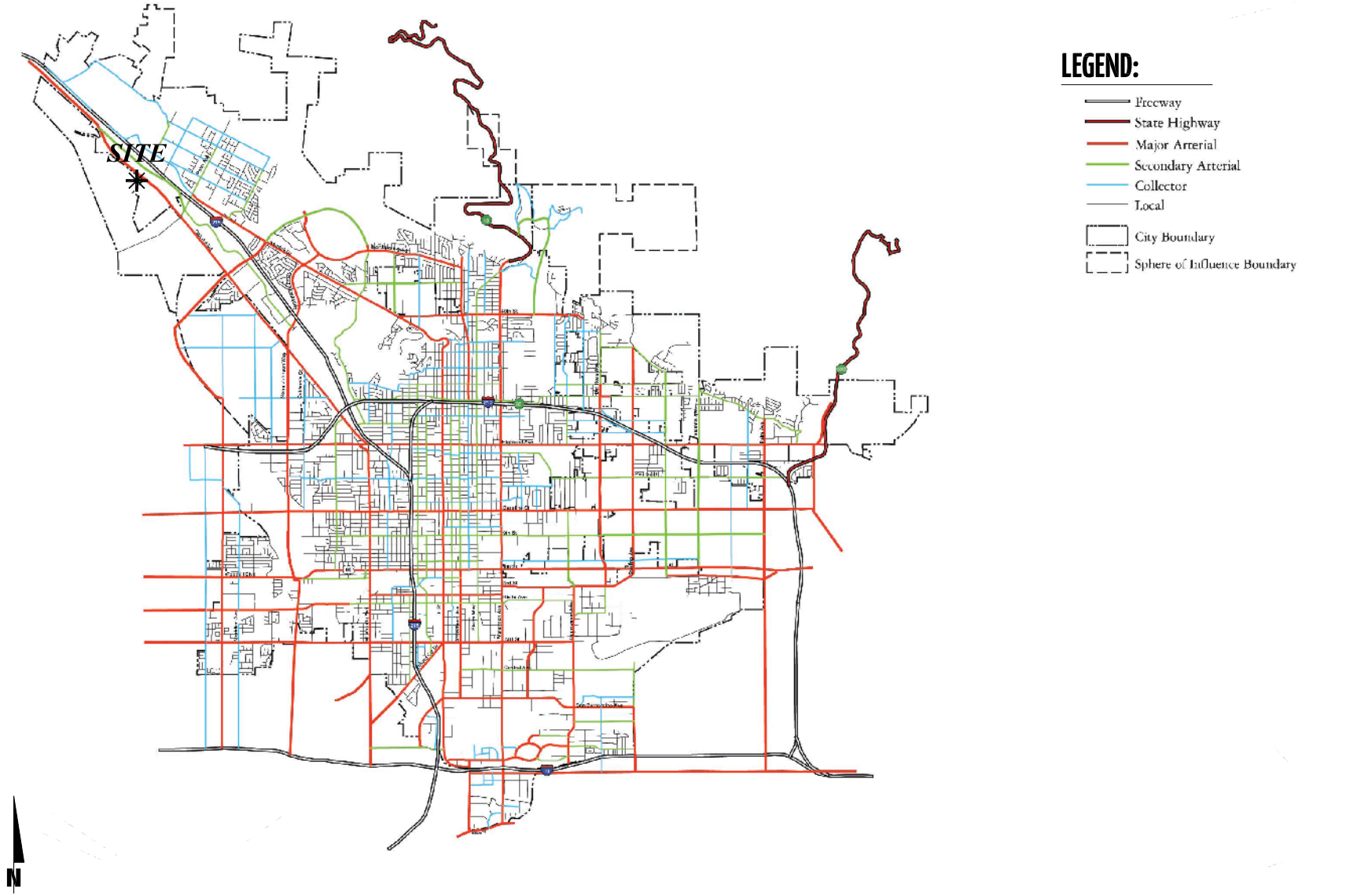
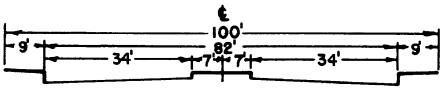
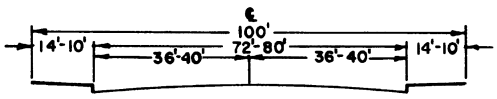


EXHIBIT 3-5: CITY OF SAN BERNARDINO GENERAL PLAN ROADWAY CROSS-SECTIONS

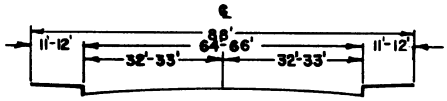
HIGHWAYS



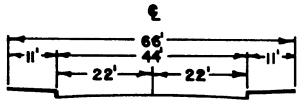
MAJOR DIVIDED HIGHWAYS



MAJOR HIGHWAY

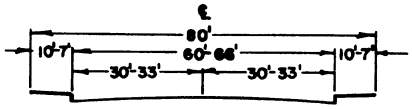


SECONDARY HIGHWAY



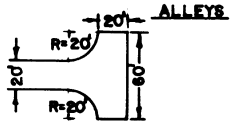
COUNTY SECONDARY HIGHWAY

FOR USE ON EXISTING STREETS OF 66'-FOOT DEDICATION. NOT TO BE USED FOR NEW STREETS.

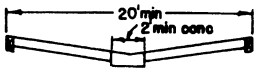


SECONDARY HIGHWAY

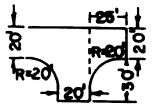
FOR USE ON EXISTING 80-FOOT STREETS OR WIDENING STREETS WHERE SETBACK LINES HAVE BEEN ESTABLISHED TO 80' FEET OVER LONG PERIOD OF TIME. NOT TO BE USED FOR NEW STREETS. (66' CURB TO CURB MAY BE REQUIRED WHERE LIGHT PEDESTRIAN TRAFFIC IS ANTICIPATED.)



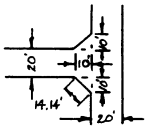
STANDARD TURNING AREA (PLAN VIEW)



STANDARD CROSS - SECTION

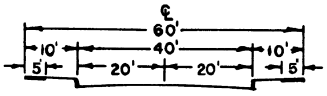


MINIMUM TURNING AREA (PLAN VIEW)



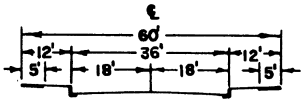
STANDARD CUT - CORNERS (PLAN VIEW)

LOCAL STREET



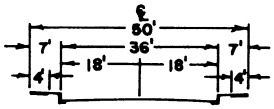
COLLECTOR STREET

FOR USE IN QUARTER MILE STREETS, SCHOOL AND INDUSTRIAL AREAS.



CONTINUOUS STREET

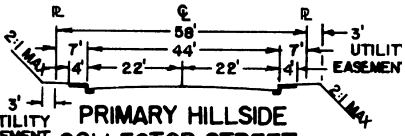
IN COMMERCIAL AND MULTIPLE RESIDENTIAL AREAS, A 40-FOOT ROADWAY WITH 10-FOOT PARKWAYS AND FULL WIDTH SIDEWALK SHALL BE REQUIRED.



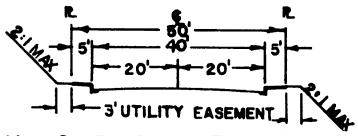
NONCONTINUOUS STREET

MAY INCLUDE CUL-DE-SAC, LOOP STREETS AND SHORT CONNECTOR STREETS WHERE AN APPROVED INTERNAL PEDESTRIAN SYSTEM IS PROVIDED THE PARKWAY ON ONE SIDE MAY BE REDUCED TO 3-FEET.

HILLSIDE STREETS

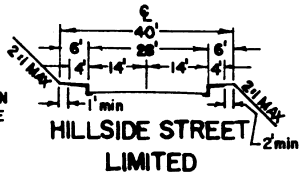


PRIMARY HILLSIDE COLLECTOR STREET



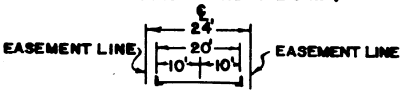
HILLSIDE COLLECTOR STREET

HILLSIDE STREET LOCAL



HILLSIDE STREET LIMITED

(PARKING ON ONE SIDE ONLY)



ACCESS ROADWAY CONDITIONAL

(LIMITED TO 4 DWELLING UNITS PRIVATE STREET ONLY.)

(NO PARKING BOTH SIDES)

STANDARD STREET CONDITIONS

1. PRIVATE STREET DEVELOPMENT SHALL CONFORM TO THE STANDARD STREET DIMENSIONS SHOWN ON THIS SHEET.

Major Arterials can accommodate two to four travel lanes. These facilities typically provide access between the regional highway system and secondary streets. An example of a Major Highway within the study area includes:

- Cajon Boulevard

Secondary Arterials can accommodate four travel lanes. These facilities typically provide access between the minor arterial and local streets. Examples of Secondary Arterials within the study area include:

- Palm Avenue
- Kendall Drive
- Industrial Parkway

3.4 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 3-6. 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.

3.5 BICYCLE & PEDESTRIAN FACILITIES

Exhibit 3-7 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 an existing regional multi-purpose trail to the southwest (Cajon/Lytle Creek Trail). Field observations conducted in November 2017 indicate nominal pedestrian and bicycle activity within the study area. Existing pedestrian facilities within the study area are shown on Exhibit 3-8.

EXHIBIT 3-6: CITY OF SAN BERNARDINO TRANSIT SERVICES

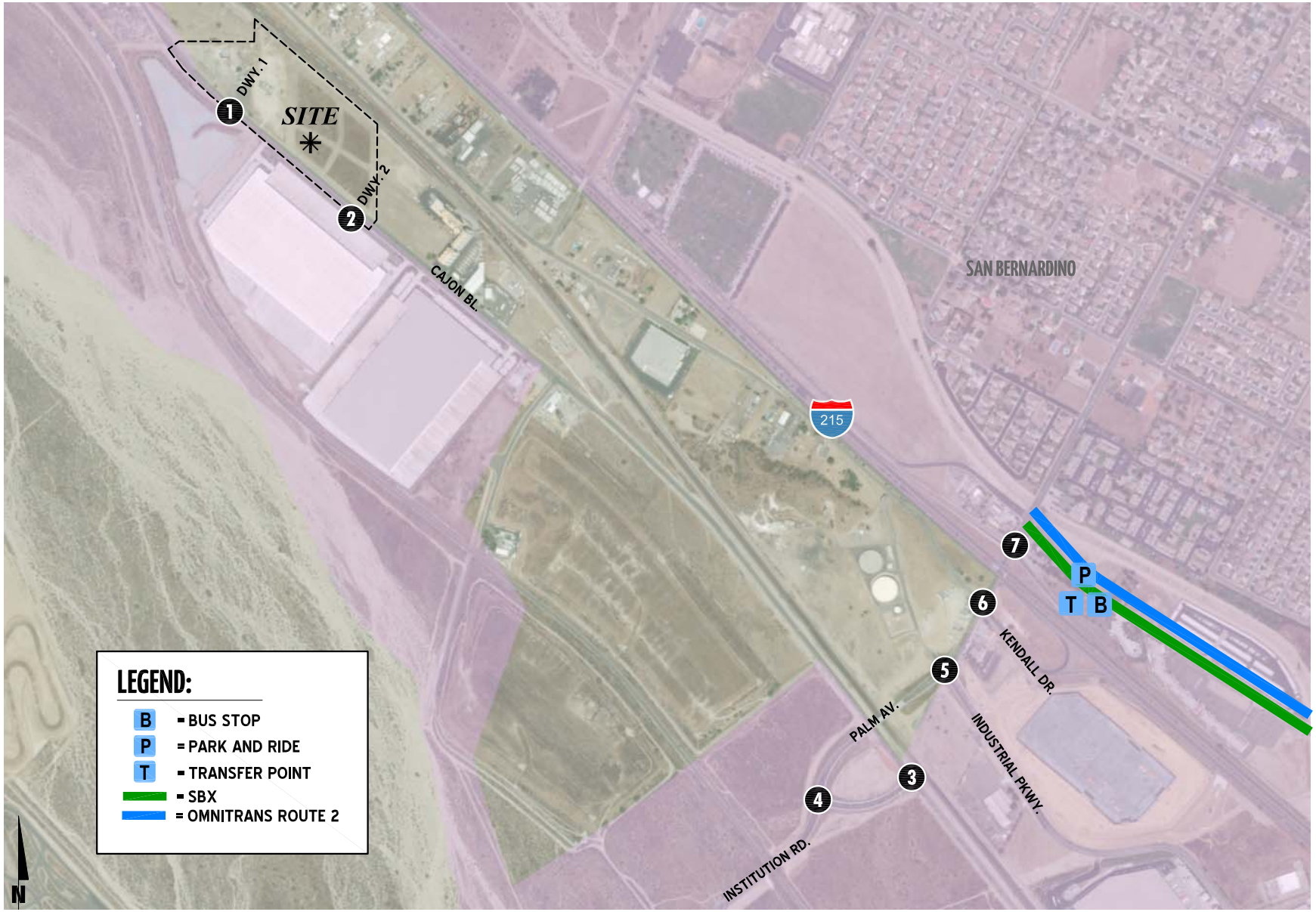


EXHIBIT 3-7: CITY OF SAN BERNARDINO CONCEPTUAL TRAIL SYSTEM

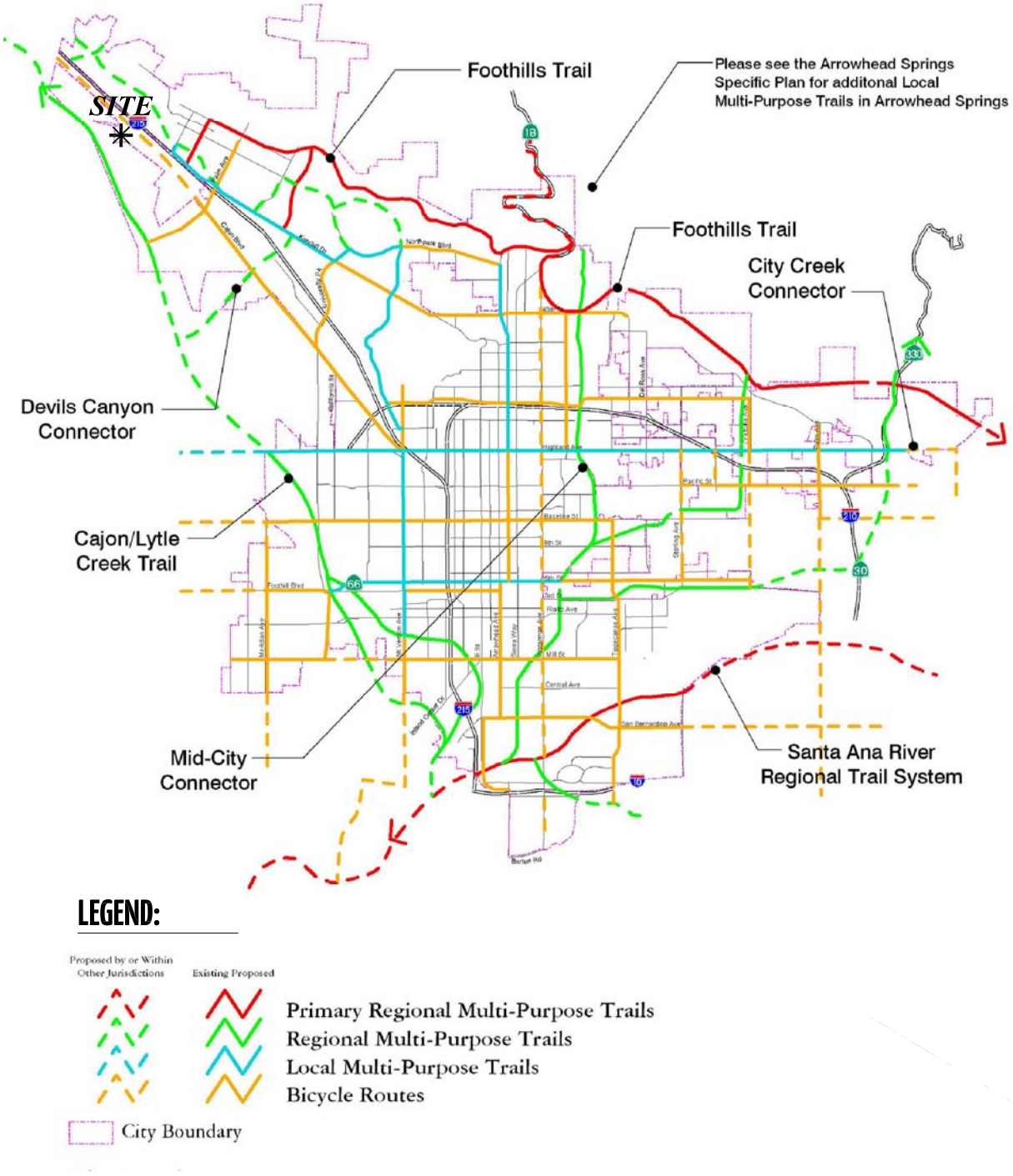
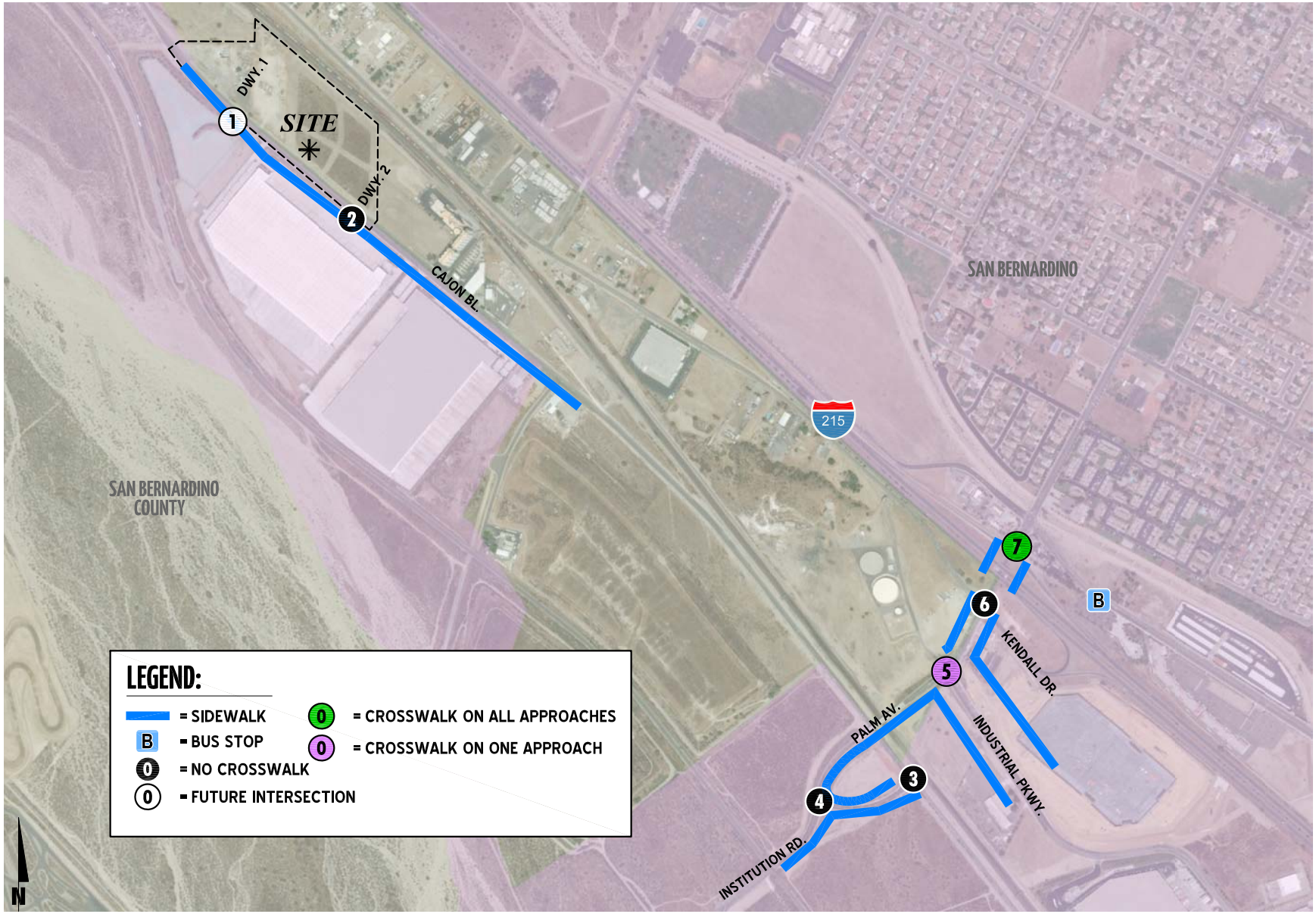


EXHIBIT 3-8: EXISTING PEDESTRIAN FACILITIES



3.6 EXISTING (2018) TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in January 2018. 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 are 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. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1.

The traffic counts collected in January 2018 include the following vehicle classifications: Passenger Cars, 2-Axle Trucks, 2-Axle Trucks, and 4 or More Axle Trucks. To represent the impact large trucks, buses and recreational vehicles have on traffic flow; all trucks were converted into PCE. By their size alone, these vehicles occupy the same space as two or more passenger cars. In addition, the time it takes for them to accelerate and slow-down is much longer than for passenger cars, and varies depending on the type of vehicle and number of axles. For the purpose of this analysis, a PCE factor of 1.5 has been applied to 2-axle trucks, 2.0 for 3-axle trucks, and 3.0 for 4+-axle trucks to estimate each turning movement. These factors are consistent with the values recommended for use in the CMP.

Existing weekday ADT volumes are shown on Exhibit 3-9. Where actual 24-hour tube count data was not available, Existing ADT volumes were based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

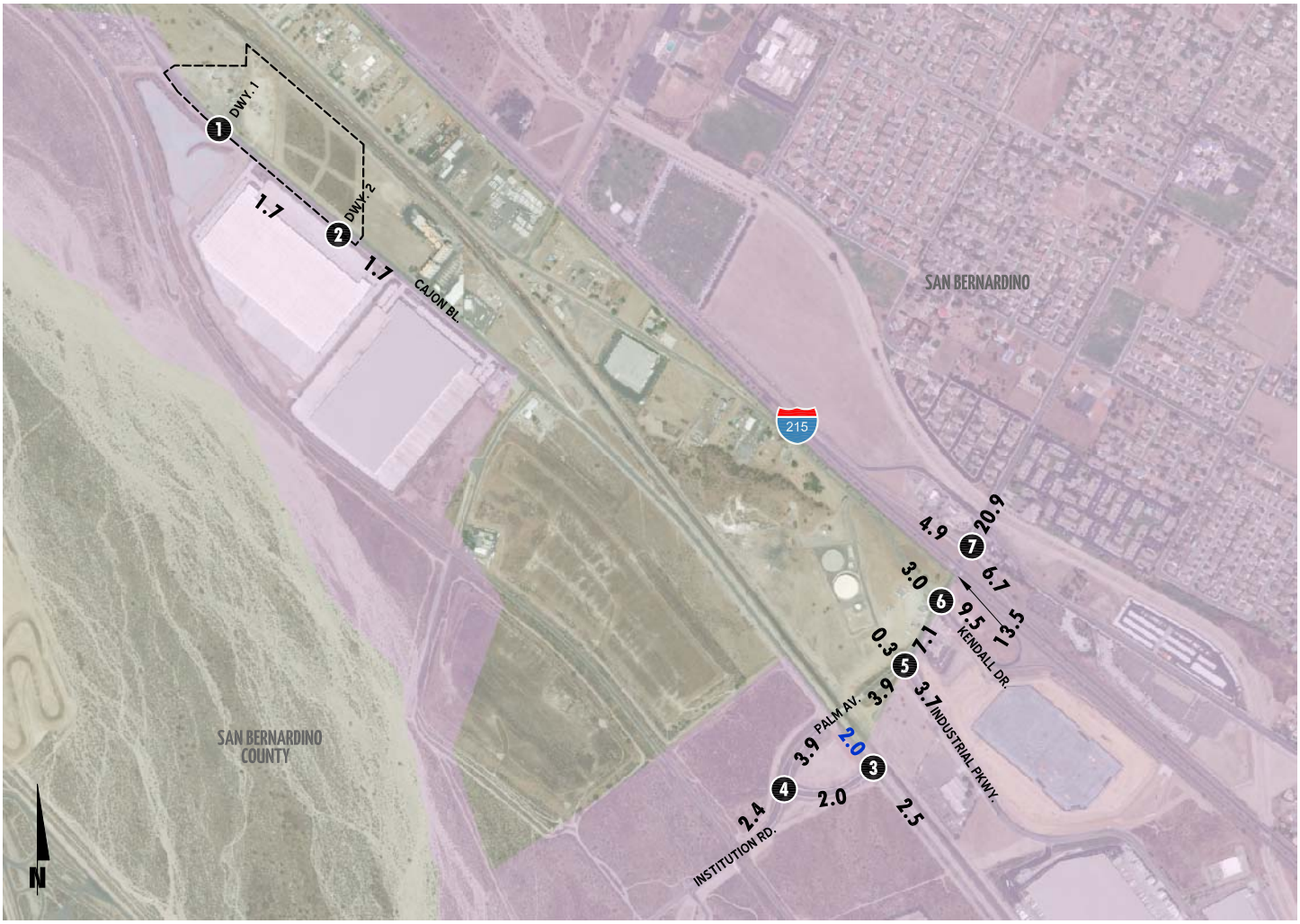
Weekday PM Peak Hour (Approach Volume + Exit Volume) x 9.8992 = Leg Volume

A comparison of the PM peak hour and daily traffic volumes of various roadway segments within the study area indicated that the peak-to-daily relationship is approximately 10.10 percent. As such, the above equation utilizing a factor of 9.8992 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 10.10 percent (i.e., 1/0.1010 = 9.8992) and was assumed to sufficiently estimate average daily traffic (ADT) volumes for planning-level analyses. Existing weekday AM and weekday PM peak hour intersection volumes (in PCE) are also shown on Exhibit 3-9.

3.7 EXISTING (2018) 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 the intersection of Judson Street and Colton Avenue is currently operating at an unacceptable LOS during the AM peak hour only (i.e., LOS D).

EXHIBIT 3-9: EXISTING (2018) TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl.	2 Dwy. 2/Driveway & Cajon Bl.	3 Institution Rd. & Cajon Bl.	4 Palm Av. & Institution Rd.
Future Intersection	←66(113) ←0(0) 103(62)→ 0(0)→ 0(0) 0(0)	←69(69) ←95(66) 65(52)→ 36(39)→ 37(40) 94(61)	82(41)→ 125(78)→ ←125(100) ←27(5) 29(177) 5(23)

5 Palm Av. & Industiral Pkwy	6 Palm Av. & I-215 SB Ramps	7 Palm Av. & I-215 NB Ramps
1(3) 204(106) 130(105) ←78(235) ←6(12) ←3(12) 24(4)→ 10(5)→ 1(1)→ 1(3) 145(266) 9(8)	67(107) 246(156) 720(348) ←356(383) ←3(14) ←60(32) 30(36)→ 79(68)→ 29(26)→ 22(51) 169(338) 56(117)	435(420) 916(475) ←354(538) ←1(3) ←117(135) 48(70) 507(687)

LEGEND:

10.0 = ACTUAL (COUNT-BASED) VEHICLES PER DAY (1000'S)
10.0 = ESTIMATED VEHICLES PER DAY (1000'S)
10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

Table 3-1

Intersection Analysis for Existing (2018) Conditions

#	Intersection	Traffic Control[4]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1	Dwy. 1 & Cajon Bl.		Intersection Does Not Exist															
2	Dwy. 2 & Cajon Bl.	CSS	0	1	0	0	0	0	0	2	0	1	1	0	0.0	0.0	A	A
3	Institution Rd. & Cajon Bl.	AWS	1	0	1	0	0	0	0	1	1	1	1	0	8.3	8.3	A	A
4	Palm Av. & Institution Rd.	AWS	0	1	1	1	1	0	0	0	0	1	0	1	8.8	10.1	A	B
5	Palm Av. & Industrial Pkwy.	AWS	1	1	1	1	1	1	0	1	1	1	1	1	10.1	14.0	B	B
6	Palm Av. & I-215 SB Ramps	TS	1	2	0	1	2	0	0	1	d	0	1	0	51.6	40.6	D	D
7	Palm Av. & I-215 NB Ramps	TS	0	2	0	0	2	d	0	0	0	0	1	1	19.8	21.7	B	C

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

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane

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

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

Consistent with Table 3-1, a summary of the peak hour intersection LOS for Existing conditions are shown on Exhibit 3-10. The intersection operations analysis worksheets are included in Appendix 3.2 of this TIA.

3.8 EXISTING (2018) CONDITIONS TRAFFIC SIGNAL WARRANTS ANALYSIS

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

- Palm Avenue & Industrial Parkway (#5)

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

3.9 EXISTING (2018) 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 3.4.

3.10 RECOMMENDED IMPROVEMENTS

As shown in Table 3-1, the study area intersections are currently operating at an acceptable LOS. As such, no improvements have been recommended.

EXHIBIT 3-10: EXISTING (2018) SUMMARY OF LOS

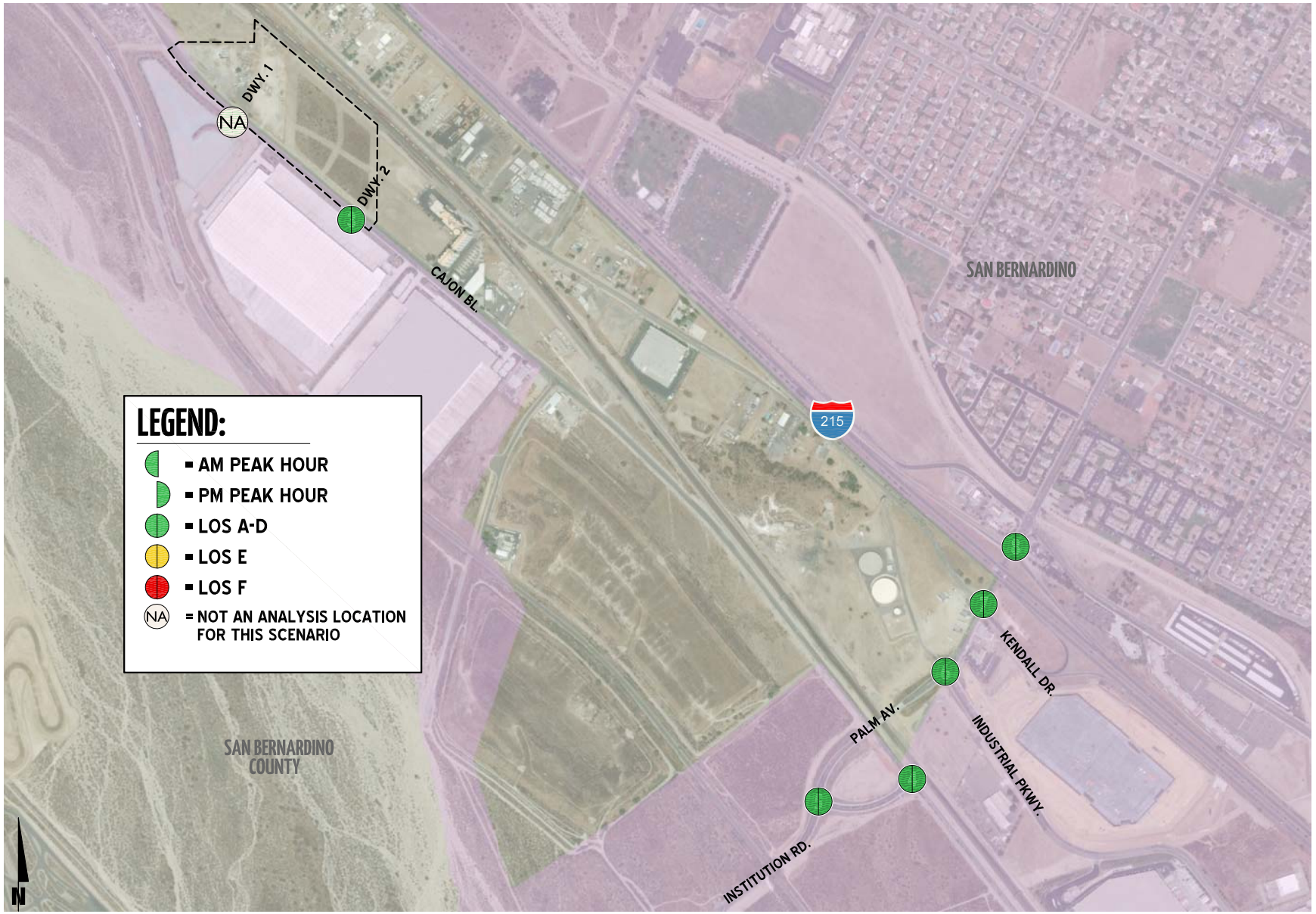


Table 3-2

Peak Hour Freeway Off-Ramp Queuing Summary for Existing (2018) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2018)			
			95th Percentile Queue (Feet)		Acceptable? [1]	
			AM Peak	PM Peak	AM	PM
Palm Av. / I-215 SB Ramps	WBL/T/R	1,510	307	193	Yes	Yes
Palm Av. / I-215 NB Ramps	WBL/T	905	150	100	Yes	Yes
	WBR	455	113	414	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 include the development of 321,496 sf of warehousing use and is anticipated to be developed in a single phase with a projected Project Buildout year of 2019.

Regional access to the project site is provided via the I-15 Freeway and Palm Avenue. Passenger car and heavy truck traffic access will be provided via the following driveways:

- Cajon Boulevard via Driveway 1 – full access (passenger cars and trucks)
- Cajon Boulevard via Driveway 2 – full access (passenger cars and trucks)

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 PCE. The trip generation rates used for this analysis are based upon information collected by the ITE as provided in their Trip Generation Manual, 10th Edition, 2017. (3) For purposes of this analysis, ITE land use code 150 (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, refinements to the raw trip generation estimates have been made to provide a more detailed breakdown of trips between passenger cars and trucks.

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 vehicle mix source is the ITE Trip Generation Handbook (3rd Edition) and the truck mix has been obtained from the South Coast Air Quality Management District (SCAQMD) Warehouse Truck Trip Study Data Results and Usage (2014) for non-cold storage warehouse buildings. (6) (7) 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 Appendix B of the San Bernardino County CMP 2016 Update. Trip generation rates for actual vehicles and with PCE factors are shown on Table 4-1 and Table 4-2, respectively.

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]									
Warehouse[3,4]	TSF	150	0.131	0.039	0.170	0.051	0.139	0.190	1.740
Passenger Cars (80.00%)			0.105	0.031	0.136	0.041	0.111	0.152	1.392
2-Axle Trucks (3.34%)			0.004	0.001	0.005	0.002	0.005	0.007	0.058
3-Axle Trucks (4.14%)			0.005	0.002	0.007	0.002	0.006	0.008	0.072
4-Axle+ Trucks (12.52%)			0.016	0.005	0.021	0.006	0.017	0.023	0.218

Project	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Summary									
Cajon Boulevard Warehouse	321.496	TSF							
Passenger Cars:			34	10	44	13	36	49	448
Truck Trips:									
2-axle:			1	0	1	1	2	3	19
3-axle:			2	1	3	1	2	3	23
4+-axle:			5	2	7	2	5	7	70
- Net Truck Trips (Actual Trucks)			*8*	*3*	*11*	*4*	*9*	*13*	*112*
TOTAL NET TRIPS (Actual Vehicles) [5]			***42***	***13***	***55***	***17***	***45***	***62***	***560***

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

[2] TSF = thousand square feet

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

[4] Truck Mix Source: South Coast Air Quality Management District (SCAQMD) Warehouse Truck Trip Study Data Results and Usage (2014).

Normalized % - Without Cold Storage:

16.7% 2-Axle trucks, 20.7% 3-Axle trucks, 62.6% 4-Axle trucks

[5] TOTAL NET TRIPS (Actual Vehicles) = Passenger Cars + Net Truck Trips (Actual 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]									
Warehouse[3,4]	TSF	150	0.131	0.039	0.170	0.051	0.139	0.190	1.740
Passenger Cars (80.00%)			0.105	0.031	0.136	0.041	0.111	0.152	1.392
2-Axle Trucks (3.34%) (PCE = 1.5)[5]			0.006	0.002	0.008	0.003	0.008	0.011	0.087
3-Axle Trucks (4.14%) (PCE = 2.0)[5]			0.010	0.004	0.014	0.004	0.012	0.016	0.144
4-Axle+ Trucks (12.52%) (PCE = 3.0)[5]			0.048	0.015	0.063	0.018	0.051	0.069	0.654

Project	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Summary									
Cajon Boulevard Warehouse	321.496	TSF							
Passenger Cars:			34	10	44	13	36	49	448
Truck Trips:									
2-axle:			2	0	2	1	2	3	28
3-axle:			3	1	4	1	4	5	46
4+-axle:			15	5	20	6	16	22	210
- Net Truck Trips (PCE)			*20*	*6*	*26*	*8*	*22*	*30*	*284*
TOTAL NET TRIPS (PCE)[6]			***54***	***16***	***70***	***21***	***58***	***79***	***732***

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

[2] TSF = thousand square feet

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

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

Normalized % - Without Cold Storage:

16.7% 2-Axle trucks, 20.7% 3-Axle trucks, 62.6% 4-Axle trucks

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

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

As shown on Table 4-2, the proposed Project is anticipated to generate a net total of 732 PCE trip-ends per day, 70 PCE AM peak hour trips and 79 PCE PM peak hour trips. In comparison, the proposed Project is anticipated to generate a net total of 560 actual vehicle trip-ends per day with 55 AM peak hour trips and 62 PM peak hour trips (see Table 4-1).

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. Exhibit 4-2 illustrates the truck trip distribution patterns.

4.3 MODAL SPLIT

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

4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project ADT and peak hour intersection turning movement volumes (in PCE) are shown on Exhibit 4-3. Exhibit 4-4 shows the Project and peak hour intersection turning movement volumes in actual vehicles. In an effort to conduct a conservative analysis, the PCE trips have been utilized for the operations analyses.

4.5 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon a background (ambient) growth factor of 3.0% per year. The ambient growth factor is intended to approximate traffic growth. The total ambient growth is 3.0% for 2019 traffic conditions (compounded growth of 3 percent per year over 1 year). 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 4-1: PROJECT (PASSENGER CAR) TRIP DISTRIBUTION

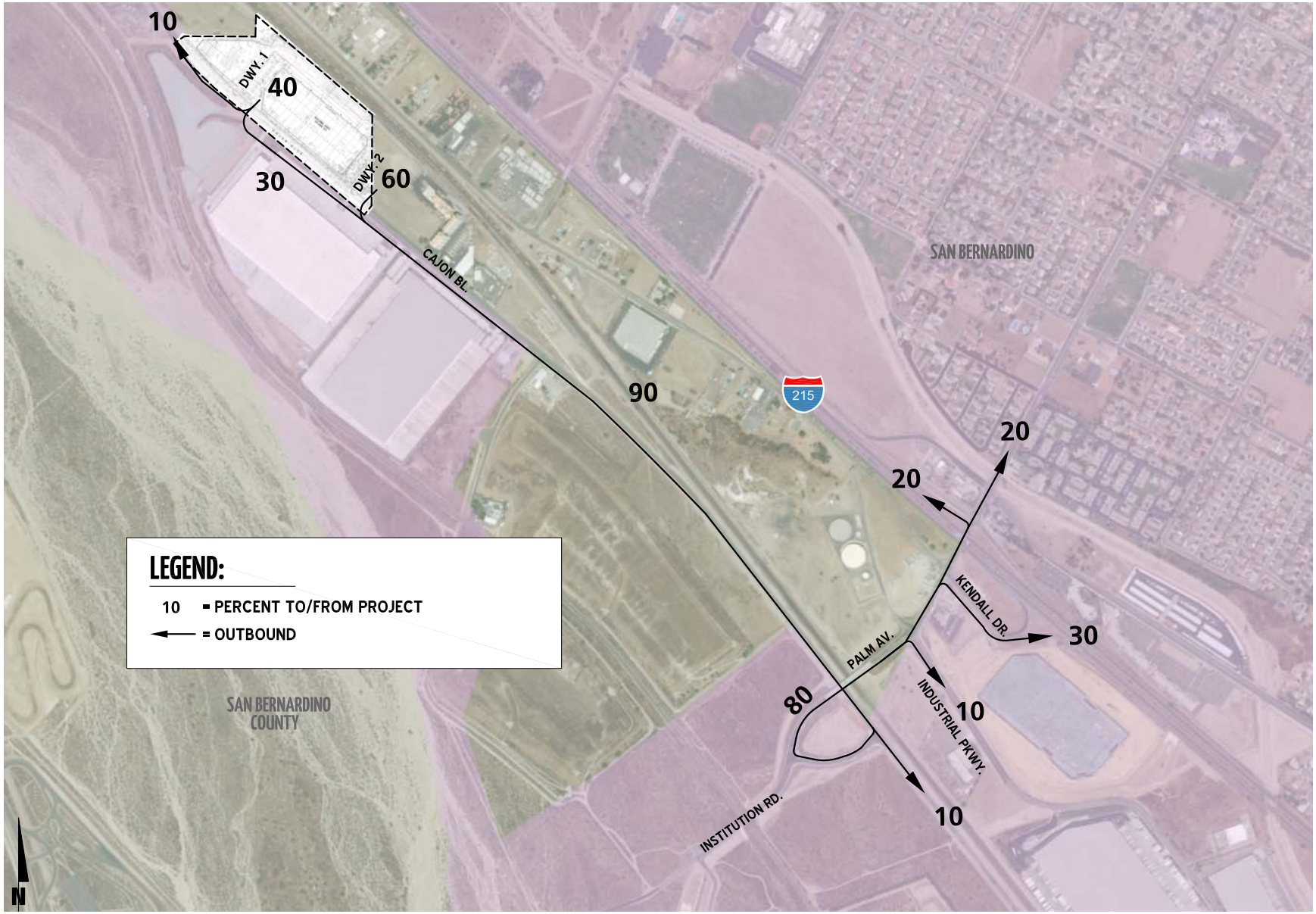
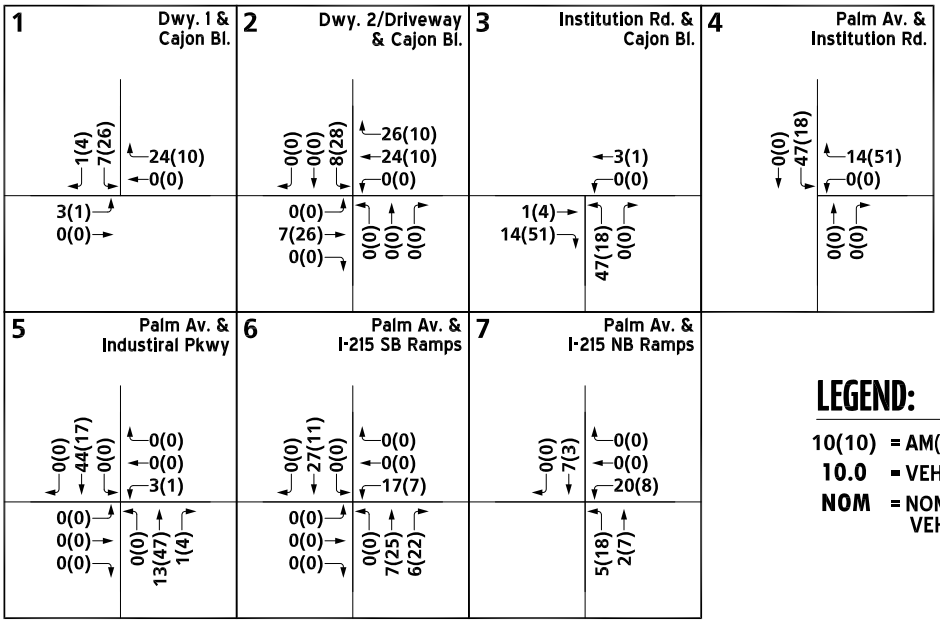


EXHIBIT 4-2: PROJECT (TRUCKS) TRIP DISTRIBUTION

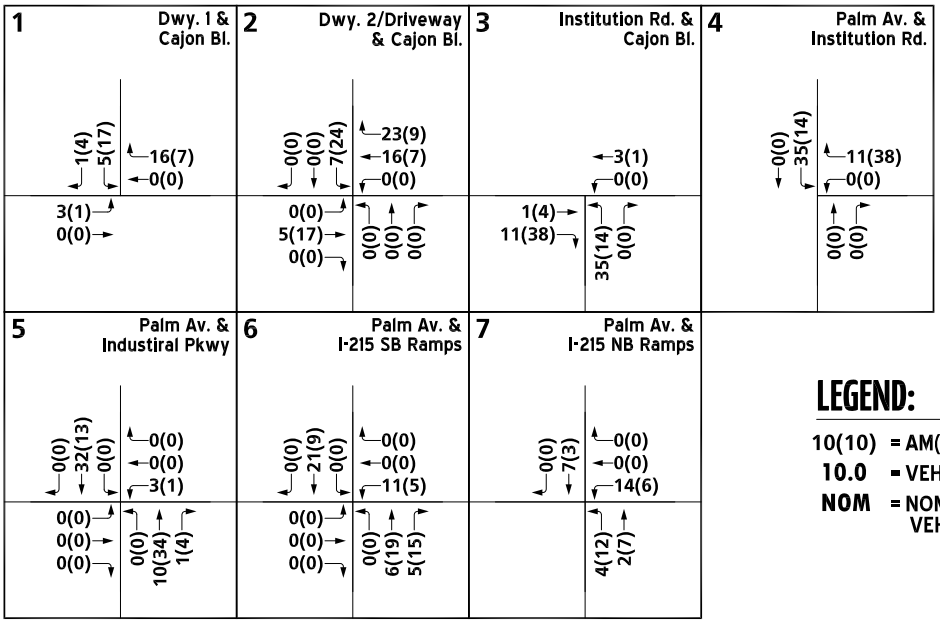
EXHIBIT 4-3: PROJECT TRAFFIC VOLUMES (IN PCE)



LEGEND:

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

EXHIBIT 4-4: PROJECT TRAFFIC VOLUMES (ACTUAL VEHICLES)



LEGEND:

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

11245 - vols.dwg

The currently adopted Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan (RTP) / Sustainable Communities Strategy (SCS) (April 2016) growth forecasts for the unincorporated areas in the County of San Bernardino identifies projected growth in population of 295,600 in 2012 to 344,100 in 2040, or a 16.41 percent increase over the 28-year period. (7) The change in population equates to roughly a 0.54 percent annual growth rate, compounded annually. Similarly, growth over the same 28-year period in households is projected to increase by 18.15 percent, or a 0.60 percent annual growth rate. Finally, growth in employment over the same 28-year period is projected to increase by 58.71 percent, or a 1.66 percent annual growth rate.

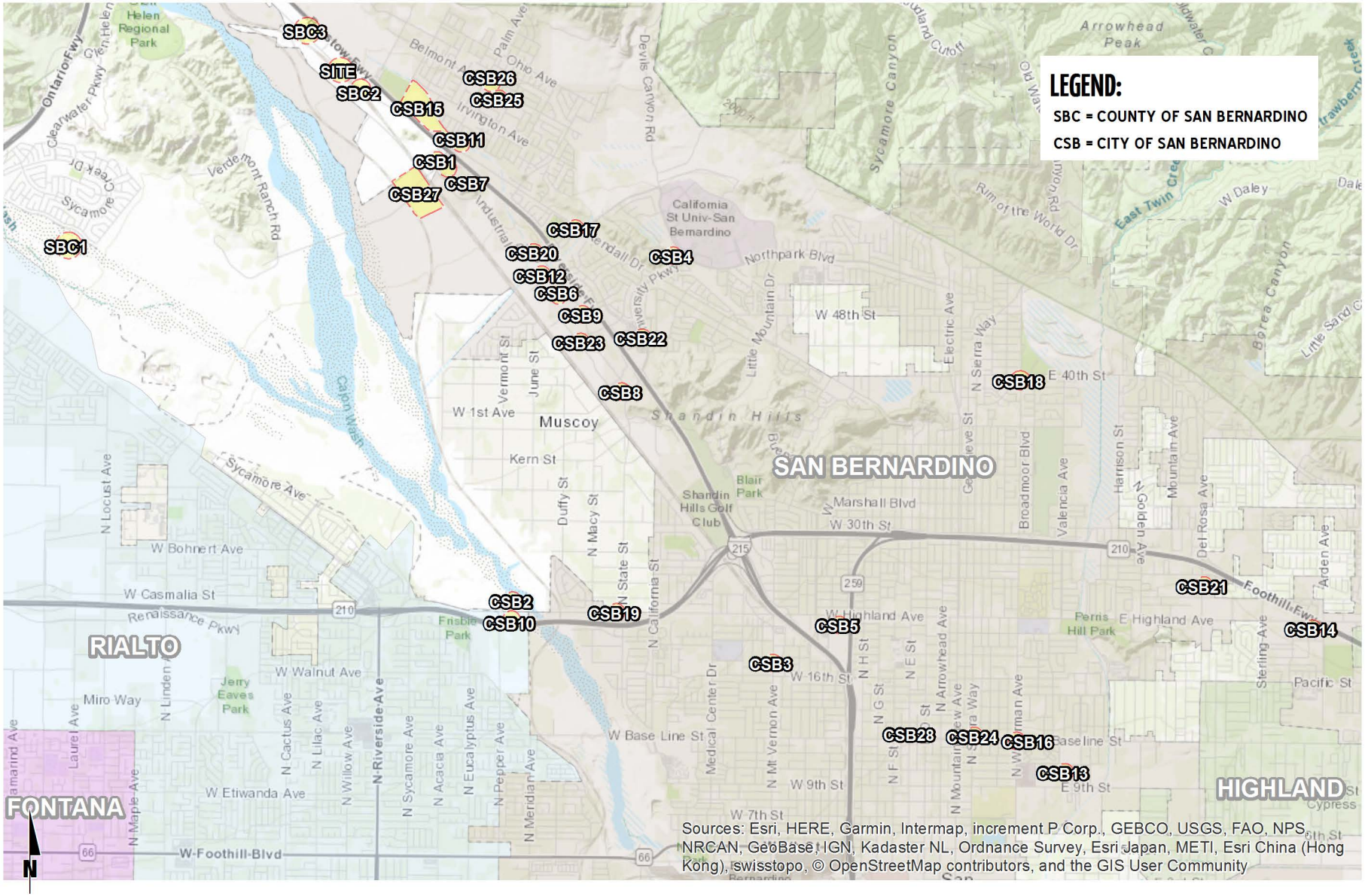
The average growth rate is estimated at approximately 3.27%, compounded annually between Existing (2018) and 2040 traffic conditions. The annual growth rate at each individual intersection is not lower than 1.88% compounded annually to as high as 5.10% compounded annually over the same time period. Therefore, the annual growth rate utilized for the purposes of this analysis would appear to conservatively approximate the anticipated regional growth in traffic volumes in the County of San Bernardino for Opening Year Cumulative and Horizon Year (2040) traffic conditions, especially when considered along with the addition of project-related traffic. As such, the growth in traffic volumes assumed in this traffic impact analysis would tend to overstate as opposed to understate the potential impacts to traffic and circulation.

4.6 CUMULATIVE DEVELOPMENT TRAFFIC

California Environmental Quality Act (CEQA) guidelines require that other reasonably foreseeable development projects which are either approved or being processed concurrently in the study area also be included as part of a cumulative analysis scenario. A cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the County of San Bernardino.

Exhibit 4-5 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 Opening Year Cumulative forecasts to ensure that traffic generated by the listed cumulative development projects in Table 4-3 are reflected as part of the background traffic. Cumulative only ADT and peak hour intersection turning movement volumes (in PCE) are shown on Exhibit 4-6.

EXHIBIT 4-5: CUMULATIVE DEVELOPMENT PROJECTS LOCATION MAP



URBAN CROSSROADS

EXHIBIT 4-6: CUMULATIVE TRAFFIC VOLUMES (IN PCE)

1 Dwy. 1 & Cajon Bl.

Future Intersection

2 Dwy. 2/Driveway & Cajon Bl.

45(41) ← 0(0)

35(53) → 0(0) ↓ 0(0) ↑ 0(0)

3 Institution Rd. & Cajon Bl.

0(0) ← 27(57)

0(0) → 35(53) ↓ 45(41) ↑ 49(33)

4 Palm Av. & Institution Rd.

38(25) ↓ 85(69) ↑ 60(103) ← 3(8)

23(42) ↑ 8(4) ←

5 Palm Av. & Industiral Pkwy

2(2) ↓ 115(77) ↑ 124(55) ← 47(136) ← 0(0) ← 8(18)

2(2) → 0(0) → 0(0) → 0(0) ↓ 65(134) ↑ 18(10) ←

6 Palm Av. & I-215 SB Ramps

8(5) ↓ 133(91) ↑ 40(38) ← 33(57) ← 0(0) ← 110(44)

3(3) → 2(5) → 1(4) → 3(2) ↓ 90(217) ↑ 22(58) ←

7 Palm Av. & I-215 NB Ramps

50(47) ↓ 128(105) ↑ 27(45) ← 0(0) ← 54(29)

36(121) ↑ 90(157) ←

LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

10.0 = VEHICLES PER DAY (1000'S)

11245 - vols.dwg

URBAN CROSSROADS

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	Kendall-Palm Commercial	Fast Food Restaurant with Drive-Thru	3.600	TSF
		Coffee Shop with Drive-Thru	1.885	TSF
		Gas/Service Station with Convenience	12	VFP
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
CSB27	Ridge One	High-Cube Warehouse	711.751	TSF
CSB28	CUP 17-25	Automobile Care Center	--	TSF
County of San Bernardino				
SBC1	Lytle Creek Specific Plan	SFDR	5,254	DU
		Condo/Townhomes	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
SBC3	P201600586	Manufacturing	40.000	TSF

[1] SFDR = Single Family Detached Residential

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

4.7 NEAR-TERM CONDITIONS

The "buildup" approach combines existing traffic counts with a background ambient growth factor to forecast the Opening Year Cumulative (2019) traffic conditions. An ambient growth factor of 3.0% accounts for background (area-wide) traffic increases that occur over time up to the year 2019 from the year 2018 (compounded three percent per year growth over a 1-year period). Project traffic is added to assess Opening Year Cumulative (2019) With Project traffic conditions. Traffic volumes generated by cumulative development projects are also included in the Opening Year Cumulative (2019) traffic conditions. The 2019 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:

- Opening Year Cumulative (2019)
    - Existing 2018 PCE volumes
    - Ambient growth traffic (3.0%)
    - Cumulative Development Traffic

- Opening Year Cumulative (2019)
    - Existing 2018 PCE volumes
    - Ambient growth traffic (3.0%)
    - Cumulative Development traffic
    - Project Traffic

4.8 HORIZON YEAR (2040) VOLUME DEVELOPMENT

Traffic projections for Horizon Year (2040) Without Project conditions were derived from the SCAG traffic model 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 SCAG traffic model 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 4.1.

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 following:

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

5.2 E+P TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus Project traffic. The ADT volumes which can be expected for E+P traffic conditions are shown on Exhibit 5-1. E+P weekday AM and PM peak hour intersection turning movement volumes are also shown on Exhibit 5-1.

5.3 INTERSECTION OPERATIONS ANALYSIS

E+P peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 5-1, which indicates that the following study area intersection is anticipated to operate at an unacceptable LOS during one or more peak hours:

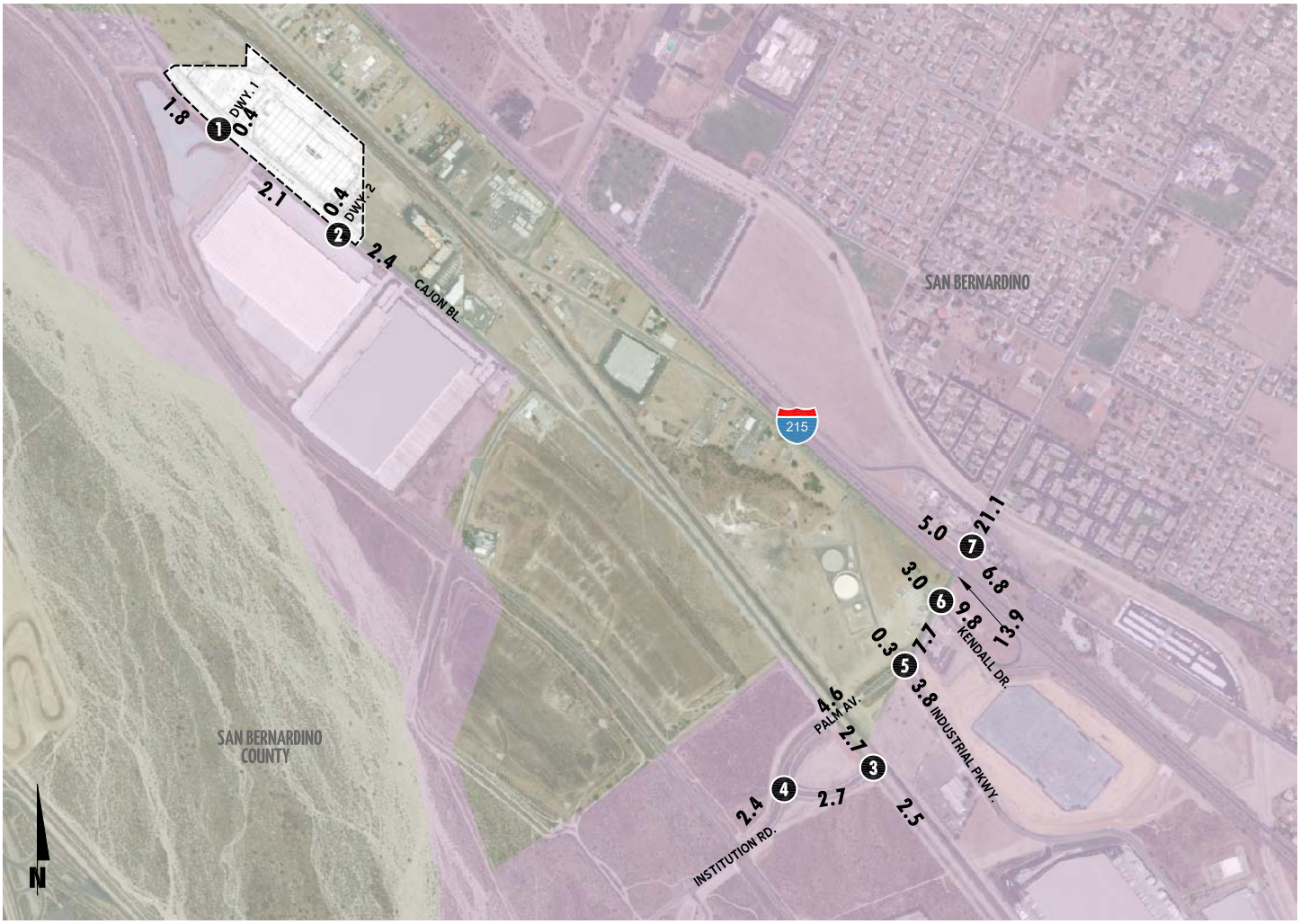
- Palm Avenue & I-215 Southbound Ramps (#6) – LOS E AM peak hour only

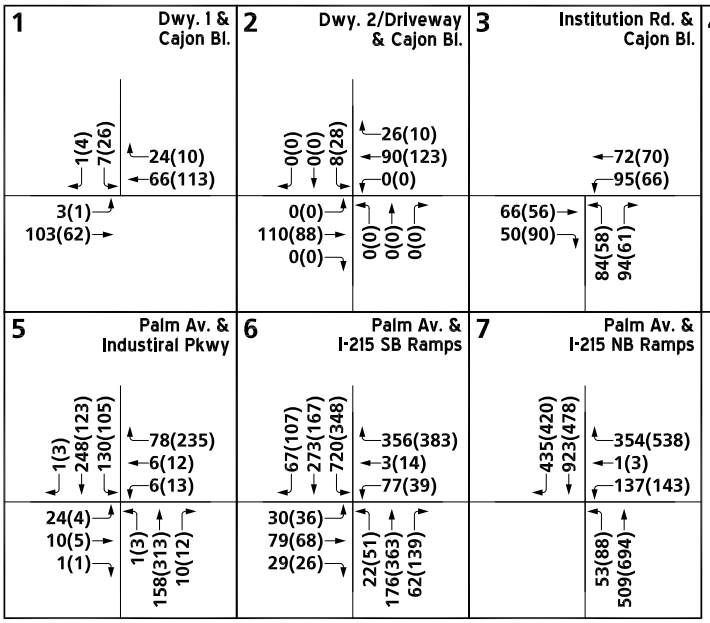
Consistent with Table 5-1, a summary of the peak hour intersection LOS for E+P conditions is shown on Exhibit 5-2. The intersection operations analysis worksheets for E+P traffic conditions are included in Appendix 5.1 of this TIA.

5.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no additional traffic signals anticipated to meet either peak hour volume based or planning level (Caltrans) ADT traffic signal warrants with the addition of Project traffic, in addition to those previously mentioned under Existing (2018) traffic conditions (see Appendix 5.2).

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



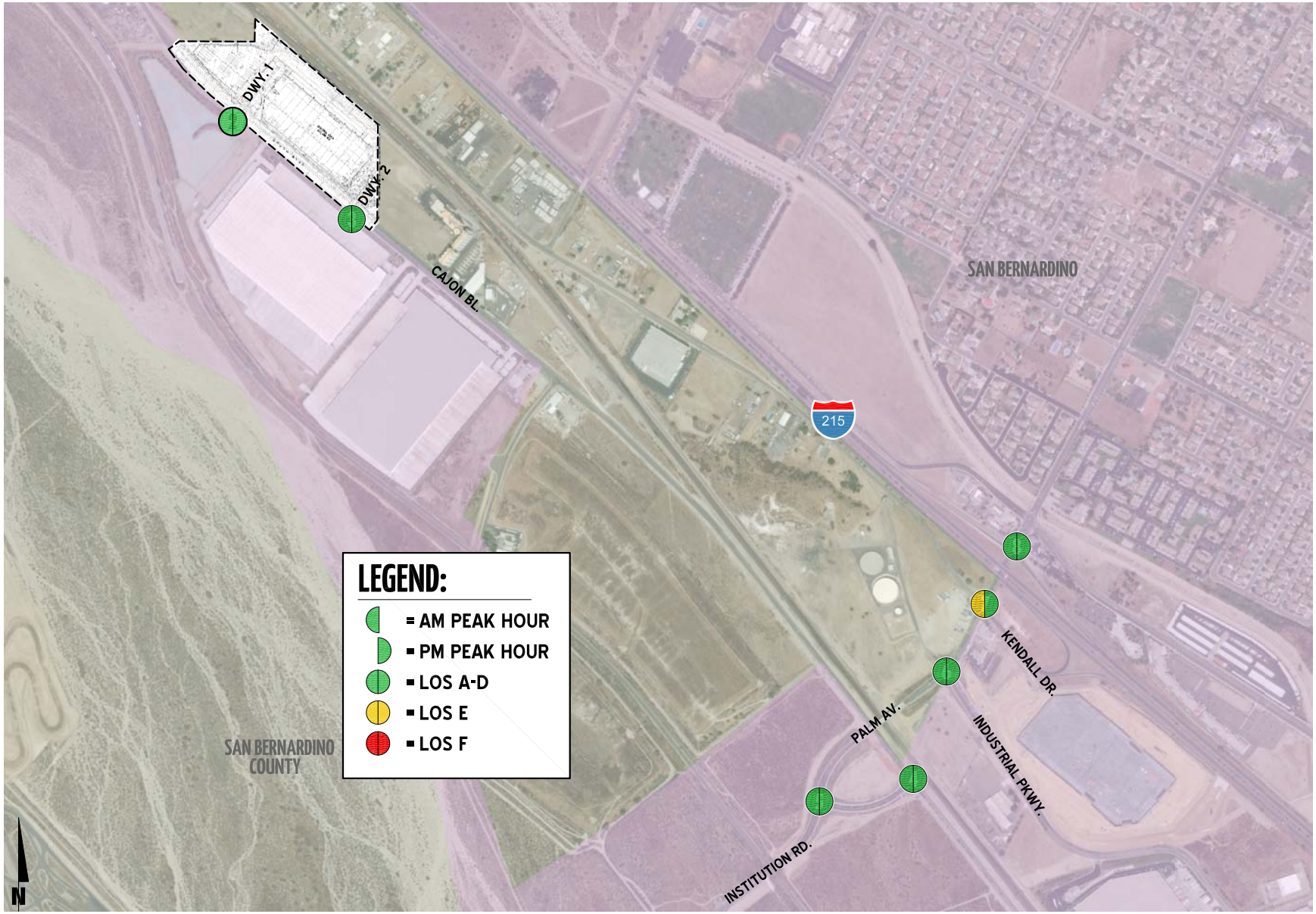


LEGEND:

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

11245 - vols.dwg

EXHIBIT 5-2: E+P SUMMARY OF LOS



URBAN CROSSROADS

Table 5-1

Intersection Analysis for E+P Conditions

#	Intersection	Traffic Control[2]	Existing (2018)						E+P						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	Dwy. 1 & Cajon Bl.	--/**CSS**	Does Not Exist				--	--	9.4	9.6	A	A	--	--	--	--	No
2	Dwy. 2 & Cajon Bl.	CSS	0.0	0.0	A	A	--	--	9.9	10.1	A	B	--	--	--	--	No
3	Institution Rd. & Cajon Bl.	AWS	8.3	8.3	A	A	--	--	8.6	8.4	A	A	--	--	--	--	No
4	Palm Av. & Institution Rd.	AWS	8.8	10.1	A	B	--	--	9.3	10.9	A	B	--	--	--	--	No
5	Palm Av. & Industrial Pkwy.	AWS	10.1	14.0	B	B	--	--	10.8	17.1	B	C	--	--	--	--	No
6	Palm Av. & I-215 SB Ramps	TS	51.6	40.6	D	D	0.87	0.58	**61.3**	41.3	**E**	D	0.93	0.59	**0.06**	0.01	No[5]
7	Palm Av. & I-215 NB Ramps	TS	19.8	21.7	B	C	--	0.67	19.9	21.8	B	C	--	0.70	--	0.03	No

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

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

[3] Volume to capacity ratio has been reported using the HCM 2000 methodology (as HCM 6th Edition 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 for each agency.

[5] Project is anticipated to contribute less than 50 peak hour trips to the study area intersection. As such, the impact is less than significant.

5.5 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 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, and 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 5.3.

5.6 RECOMMENDED IMPROVEMENTS

Although the intersection of Palm Avenue and the I-215 Southbound Ramps is anticipated to operate at a deficient LOS with the addition of Project traffic, the Project is anticipated to contribute less than 50 peak hour trips to the intersection of Palm Avenue and I-215 Southbound ramps. The Project's impact to this intersection is less than significant. As such, no improvements have been recommended for the intersection of Palm Avenue and the I-215 Southbound Ramps.

Table 5-2

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

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2018)				E+P			
			95th Percentile Queue (Feet)		Acceptable? [1]		95th Percentile Queue (Feet)		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
Palm Av. / I-215 SB Ramps	WBL/T/R	1,510	307	193	Yes	Yes	432 [2]	233	Yes	Yes
Palm Av. / I-215 NB Ramps	WBL/T	905	150	100	Yes	Yes	170	105	Yes	Yes
	WBR	455	113	414	Yes	Yes	112	416	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

6 OPENING YEAR CUMULATIVE (2019) TRAFFIC CONDITIONS

This section discusses the traffic forecasts for Opening Year Cumulative (2019) 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 Opening Year Cumulative (2019) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements along the Project's frontage and driveways).
- Driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements along the cumulative development's frontages).

6.2 OPENING YEAR CUMULATIVE (2019) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 3.0% plus traffic from pending and approved but not yet constructed known development projects in the area. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2019) Without Project traffic conditions are shown on Exhibit 6-1.

6.3 OPENING YEAR CUMULATIVE (2019) WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Opening Year Cumulative (2019) Without Project traffic in conjunction with the addition of Project traffic. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2019) With Project traffic conditions are shown on Exhibit 6-2.

6.4 INTERSECTION OPERATIONS ANALYSIS

6.4.1 OPENING YEAR CUMULATIVE (2019) WITHOUT PROJECT TRAFFIC CONDITIONS

LOS calculations were conducted for the study intersections to evaluate their operations under Opening Year Cumulative (2019) Without Project conditions with roadway and intersection geometrics consistent with Section 6.1 *Roadway Improvements*. As shown in Table 6-1, the following study area intersections are anticipated to operate at an unacceptable LOS under Opening Year Cumulative (2019) Without Project traffic conditions:

- Palm Avenue & Industrial Parkway (#5) – LOS F PM peak hour only
- Palm Avenue & I-215 Southbound Ramps (#6) – LOS F AM and PM peak hours

EXHIBIT 6-1: OPENING YEAR CUMULATIVE (2019) WITHOUT PROJECT TRAFFIC VOLUMES (IN PCE)

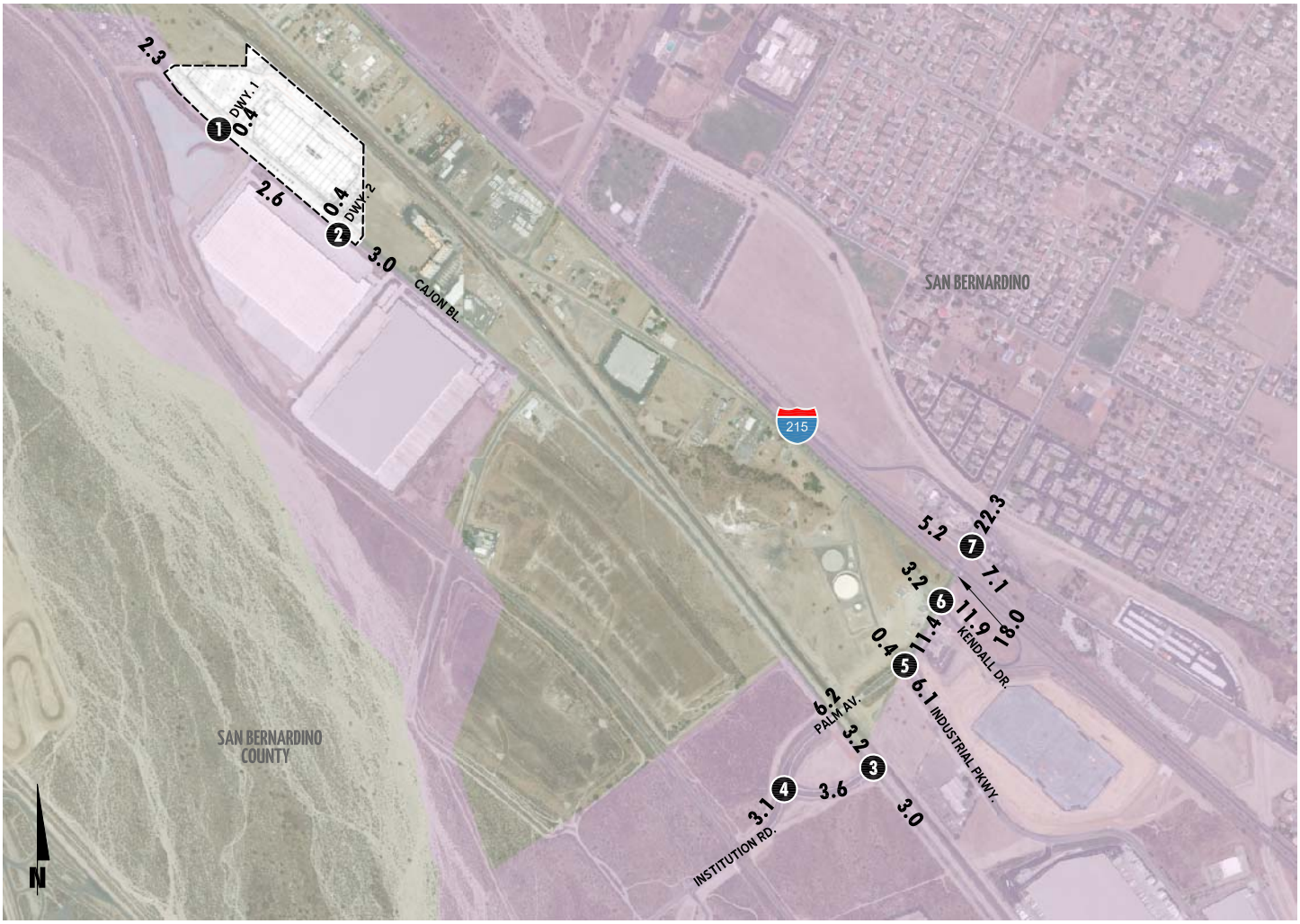
1 Dwy. 1 & Cajon Bl.	2 Dwy. 2/Driveway & Cajon Bl.	3 Institution Rd. & Cajon Bl.	4 Palm Av. & Institution Rd.
Future Intersection	←112(157) ←0(0) 141(117)→ 0(0)→ 0(0) 0(0)	←71(71) ←125(125) 67(54)→ 72(93)→ 82(82) 145(96)	122(67)→ 214(149)→ ←189(206) ←31(13) 53(224) 13(28)

5 Palm Av. & Industiral Pkwy	6 Palm Av. & I-215 SB Ramps	7 Palm Av. & I-215 NB Ramps
3(5) 325(186) 257(163) ←127(378) ←6(12) ←11(30) 27(6)→ 10(5)→ 1(1)→ 1(3) 214(408) 27(18)	77(115) 386(251) 782(396) ←399(451) ←3(14) ←172(76) 34(40)→ 83(75)→ 30(31)→ 25(55) 264(565) 80(178)	498(479) 1071(594) ←391(599) ←1(3) ←175(168) 85(193) 612(864)

LEGEND:

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

EXHIBIT 6-2: OPENING YEAR CUMULATIVE (2019) WITH PROJECT TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Cajon Bl.	2 Dwy. 2/Driveway & Cajon Bl.	3 Institution Rd. & Cajon Bl.	4 Palm Av. & Institution Rd.
1(4) 7(26) 24(10) 112(157)	0(0) 0(0) 8(28) 26(10) 136(167) 0(0)	74(72) 125(125)	122(67) 261(167) 203(257) 31(13)
3(1) 141(117)	0(0) 148(143) 0(0) 0(0) 0(0) 0(0)	68(58) 86(144) 129(100) 145(96)	53(224) 13(28)

5 Palm Av. & Industiral Pkwy	6 Palm Av. & I-215 SB Ramps	7 Palm Av. & I-215 NB Ramps
3(5) 369(203) 257(163) 127(378) 6(12) 14(31)	77(115) 413(262) 782(396) 399(451) 3(14) 189(83)	498(479) 1078(597) 391(599) 1(3) 195(176)
27(6) 10(5) 1(1) 1(3) 227(455) 28(22)	34(40) 83(75) 30(31) 25(55) 271(590) 86(200)	90(211) 614(871)

LEGEND:

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

Table 6-1

Intersection Analysis for Opening Year Cumulative (2019) Conditions

#	Intersection	Traffic Control[2]	2019 NP						2019 WP						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	Dwy. 1 & Cajon Bl.	--/**CSS**	Does Not Exist				--	--	9.7	9.9	A	A	--	--	--	--	No
2	Dwy. 2 & Cajon Bl.	CSS	0.0	0.0	A	A	--	--	10.4	10.5	B	B	--	--	--	--	No
3	Institution Rd. & Cajon Bl.	AWS	8.9	9.3	A	A	--	--	9.3	9.7	A	A	--	--	--	--	No
4	Palm Av. & Institution Rd.	AWS	10.4	15.0	B	B	--	--	11.3	18.2	B	C	--	--	--	--	No
5	Palm Av. & Industrial Pkwy.	AWS	14.9	**55.5**	B	**F**	--	--	16.7	**76.8**	C	**F**	--	--	--	--	**Yes**
6	Palm Av. & I-215 SB Ramps	TS	**126.7**	**81.6**	**F**	**F**	1.25	0.87	**133.5**	**85.4**	**F**	**F**	1.28	0.90	0.03	0.03	No[5]
7	Palm Av. & I-215 NB Ramps	TS	23.6	43.7	C	D	0.50	0.98	23.8	47.8	C	D	0.52	1.00	0.02	0.02	No

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

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

3 Volume to capacity ratio has been reported using the HCM 2000 methodology (as HCM 6th Edition 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 for each agency.

5 Project is anticipated to contribute less than 50 peak hour trips to the study area intersection. As such, the impact is less than significant.

A summary of the peak hour intersection LOS for Opening Year Cumulative (2019) Without Project conditions is shown on Exhibit 6-3. The intersection operations analysis worksheets for Opening Year Cumulative (2019) Without Project traffic conditions are included in Appendix 6.1 of this TIA.

6.4.2 OPENING YEAR CUMULATIVE (2019) WITH PROJECT CONDITIONS

As shown on Table 6-1 and illustrated on Exhibit 6-4, there are no additional study area intersections anticipated to experience unacceptable LOS during the peak hours with the addition of Project traffic, in addition to the location previously identified under Opening Year Cumulative (2019) Without Project traffic conditions. The intersection operations analysis worksheets for Opening Year Cumulative (2019) With Project traffic conditions are included in Appendix 6.2 of this TIA.

6.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no additional study area intersections anticipated to meet traffic signal warrants for Opening Year Cumulative (2019) Without Project traffic conditions. However, the intersection of Palm Avenue and Institution Road is anticipated to meet a peak hour volume-based traffic signal warrant under Opening Year Cumulative (2019) With Project traffic conditions. Worksheets for Opening Year Cumulative (2019) Without and With Project traffic conditions signal warrants are provided in Appendix 6.3 and Appendix 6.4.

6.6 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 Opening Year Cumulative (2019) 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 Opening Year Cumulative (2019) Without and With Project traffic conditions. Worksheets for Opening Year Cumulative (2019) Without and With Project traffic conditions off-ramp queuing analysis are provided in Appendix 6.5 and 6.6, respectively.

EXHIBIT 6-3: OPENING YEAR CUMULATIVE (2019) WITHOUT PROJECT SUMMARY OF LOS

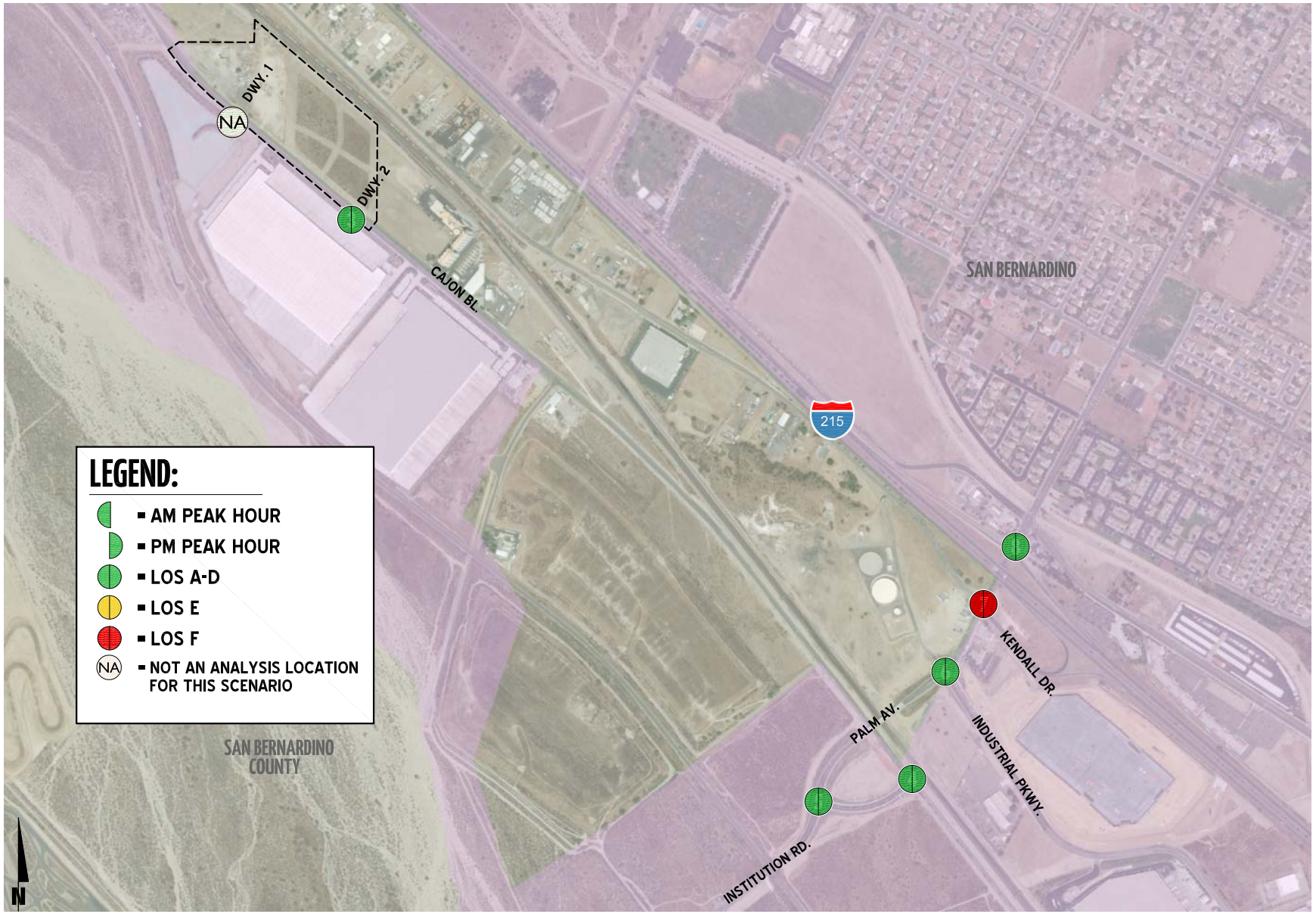


EXHIBIT 6-4: OPENING YEAR CUMULATIVE (2019) WITH PROJECT SUMMARY OF LOS

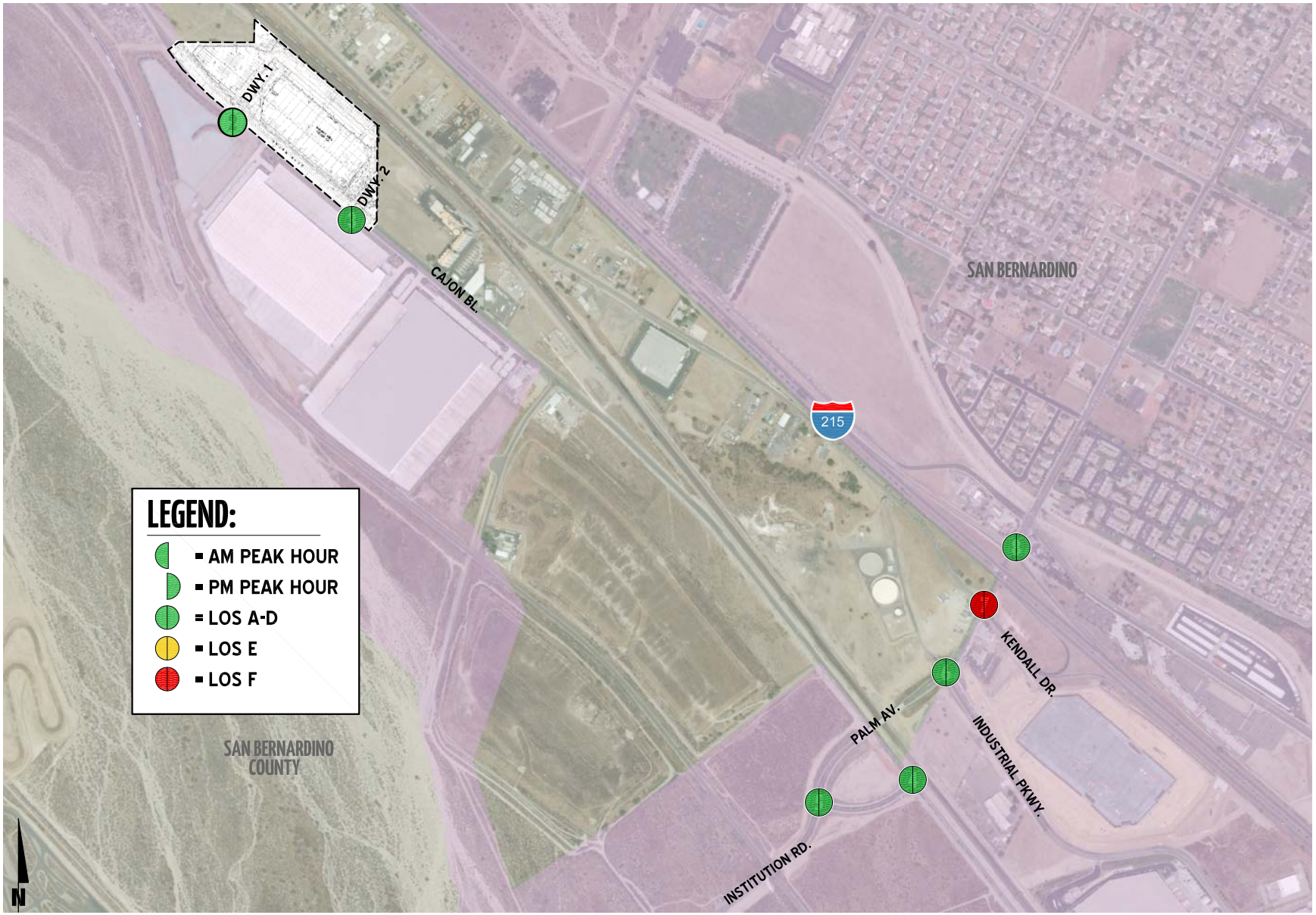


Table 6-2

Peak Hour Freeway Off-Ramp Queuing Summary for Opening Year Cumulative (2019) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	2019 NP				2019 WP			
			95th Percentile Queue (Feet)		Acceptable? [1]		95th Percentile Queue (Feet)		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
Palm Av. / I-215 SB Ramps	WBL/T/R	1,510	843 [2]	541 [2]	Yes	Yes	890 [2]	571 [2]	Yes	Yes
Palm Av. / I-215 NB Ramps	WBL/T	905	194	122	Yes	Yes	216	127	Yes	Yes
	WBR	455	214	546	Yes	Yes[3]	216	547	Yes	Yes[3]

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

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

[3] Although the 95th percentile queue is anticipated to exceed the available storage for the turn lane, the adjacent through lane has sufficient storage to accommodate any spillover without spilling back and affecting the I-215 Freeway mainline.

6.7 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 discussed below to address Opening Year Cumulative (2019) traffic deficiencies is presented in Table 6-3.

The intersection analysis results indicate that the addition of Project traffic is not anticipated to result in any additional LOS deficiencies from those previously identified under Opening Year Cumulative (2019) Without Project traffic conditions. The addition of Project traffic at the intersections of Palm Avenue and Industrial Parkway is anticipated to result in a significant cumulative impact. However, the Project is anticipated to contribute less than 50 peak hour trips to the intersection of Palm Avenue and I-215 Southbound Ramps, resulting in a less than significant impact. As such, improvement recommendations for the intersection of Palm Avenue and Industrial Parkway is shown on Table 6-3.

Worksheets for Opening Year Cumulative (2019) Without and With Project conditions, with improvements, HCM calculation worksheets are provided in Appendix 6.7 and Appendix 6.8, respectively.

Table 6-3

Intersection Analysis for Opening Year Cumulative (2019) 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. & Industrial Pkwy.																	
	- 2019 Without Project																	
	- Without Improvements	AWS	1	1	1	1	1	1	0	1	0	1	1	1	14.9	**55.5**	B	**F**
	- With Improvements	**TS**	1	1	1	1	1	1	0	1	0	1	1	1	15.4	22.9	B	C
	- 2019 With Project																	
	- Without Improvements	AWS	1	1	1	1	1	1	0	1	0	1	1	1	16.7	**76.8**	C	**F**
	- With Improvements	**TS**	1	1	1	1	1	1	0	1	0	1	1	1	15.4	26.1	B	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;**1** = Improvement

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

[3] TS = Traffic Signal; AWS = All Way Stop

7 HORIZON YEAR (2040) TRAFFIC CONDITIONS

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

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Horizon Year (2040) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

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

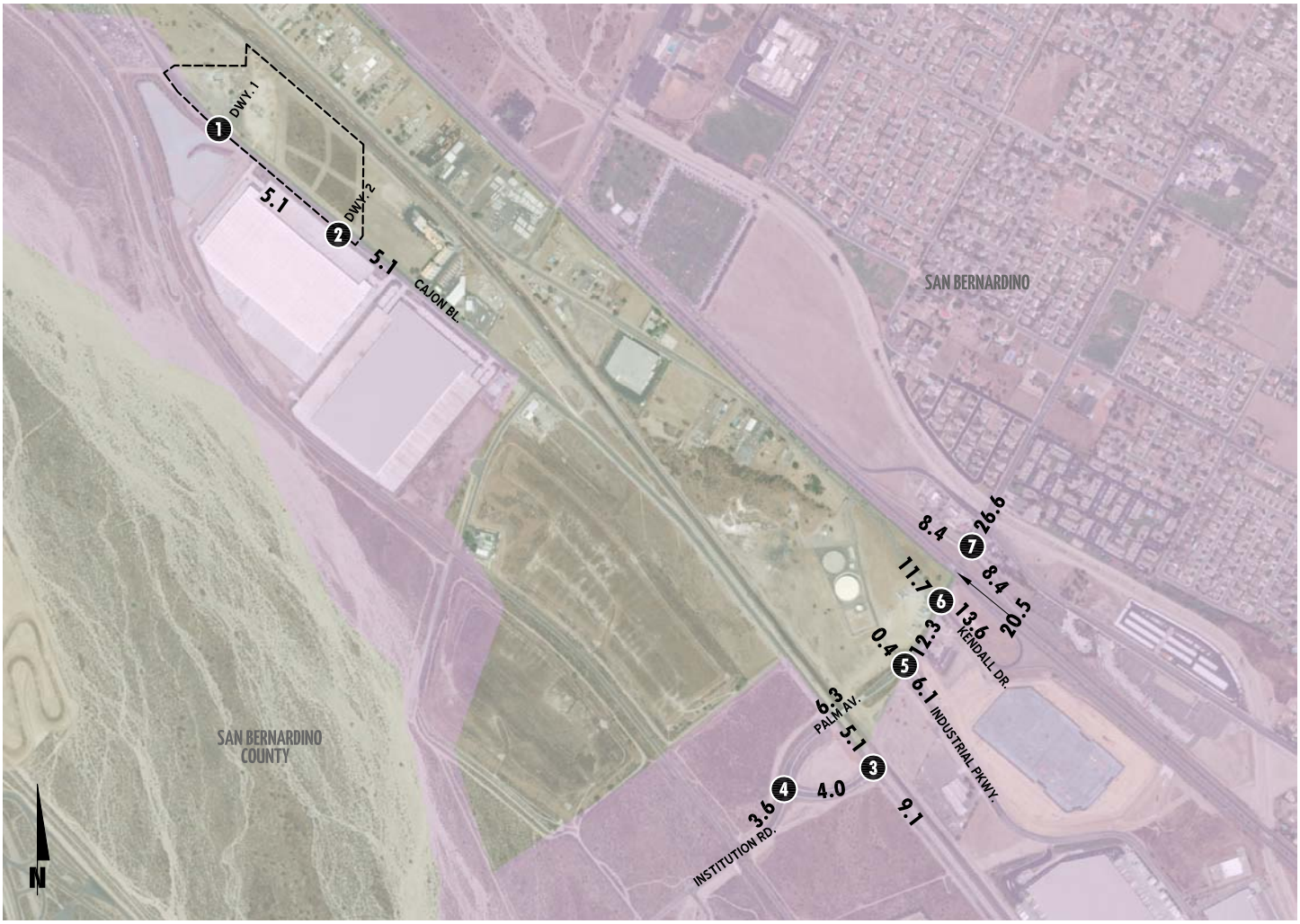
7.2 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-process volumes obtained from the SCAG traffic model (see Section 4.8 *Horizon Year (2040) Volume Development* of this TIA for a detailed discussion on the post-processing methodology). 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 7-1.

7.3 HORIZON YEAR (2040) WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-process volumes obtained from the SCAG traffic model, plus the traffic generated by the proposed Project (see Section 4.8 *Horizon Year (2040) Volume Development* of this TIA for a detailed discussion on the post-processing methodology). 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 7-2.

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



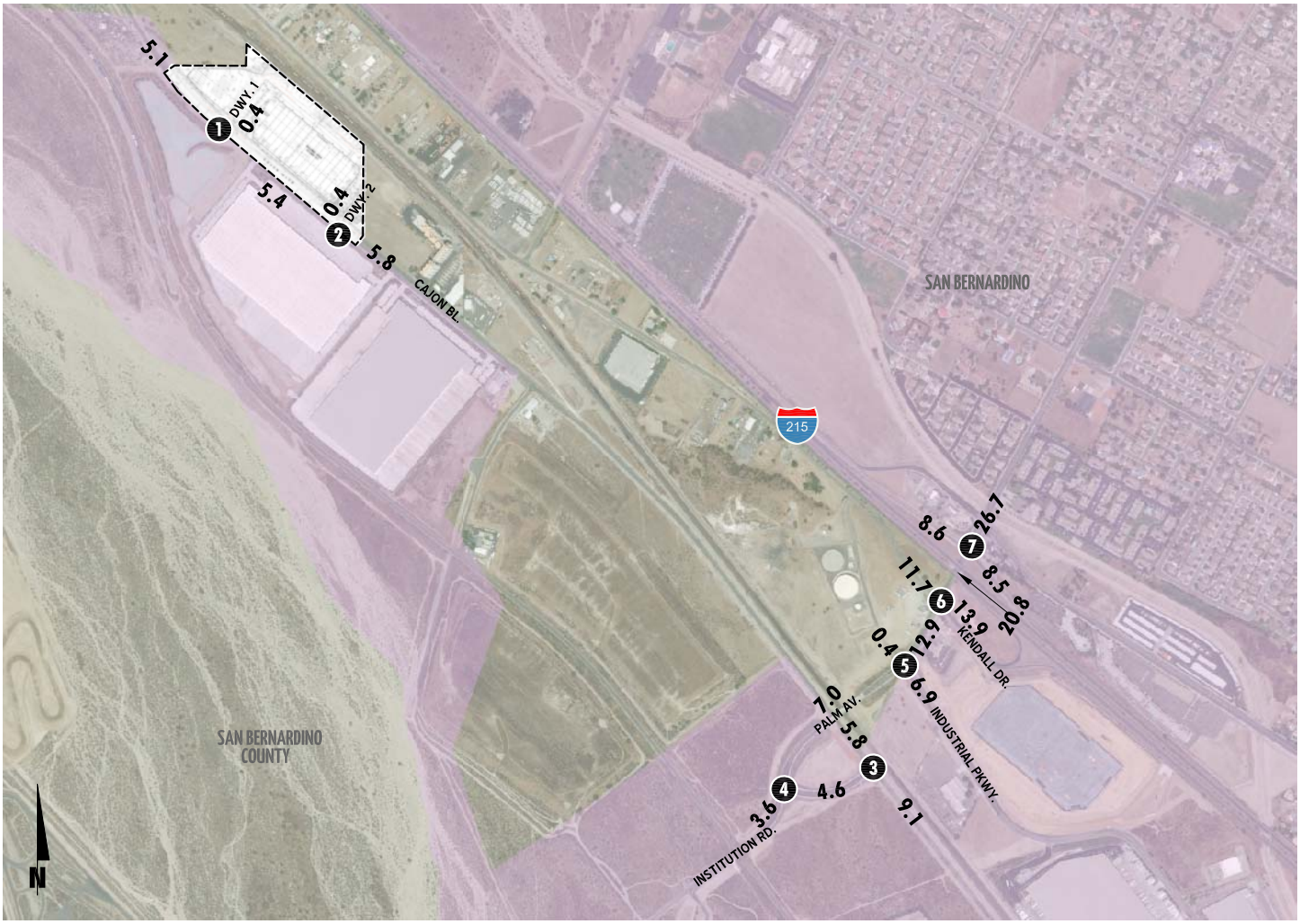
1 Dwy. 1 & Cajon Bl.	2 Dwy. 2/Driveway & Cajon Bl.	3 Institution Rd. & Cajon Bl.	4 Palm Av. & Institution Rd.
Future Intersection	←126(180) ←0(0) 162(140)→ 0(0)→ 0(0) 0(0)	←85(137) ←149(163) 109(120)→ 79(237)→ 91(101) 225(141)	143(88)→ 300(209)→ ←235(392) ←52(14) 65(282) 16(35)

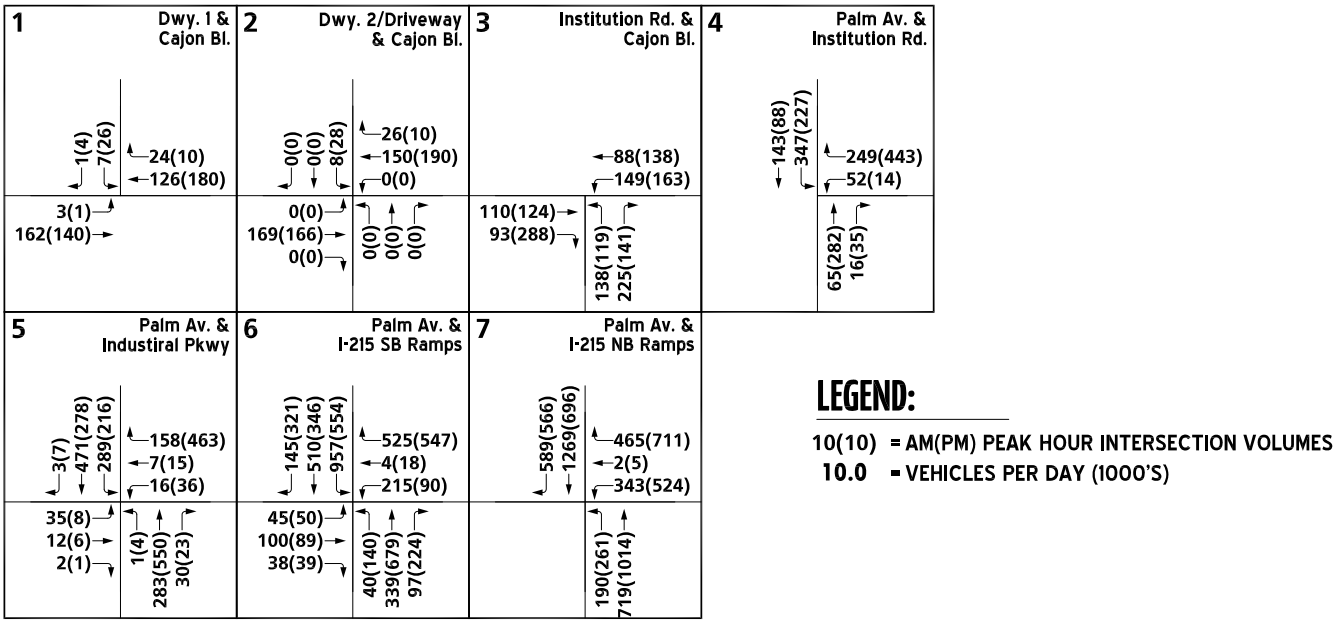
5 Palm Av. & Industiral Pkwy	6 Palm Av. & I-215 SB Ramps	7 Palm Av. & I-215 NB Ramps
3(7) 427(261) 289(216)→ ←158(463) ←7(15) ←13(35) 35(8)→ 12(6)→ 2(1)→ 1(4) 270(503) 29(19)	145(321) 483(335) 957(554)→ ←525(547) ←4(18) ←198(83) 45(50)→ 100(89)→ 38(39)→ 40(140) 332(654) 91(202)	589(566) 1262(693)→ ←465(711) ←2(5) ←323(516) 185(243) 717(1007)

LEGEND:

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

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





LEGEND:

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

7.4 INTERSECTION OPERATIONS ANALYSIS

7.4.1 HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC CONDITIONS

LOS calculations were conducted for the study intersections to evaluate their operations under Horizon Year Without Project conditions with roadway and intersection geometrics consistent with Section 7.1 *Roadway Improvements*. As shown in Table 7-1, the following study area intersections are anticipated to operate at an unacceptable LOS during the peak hours under Horizon Year (2040) Without Project conditions, in addition to those previously identified under Opening Year Cumulative (2019) Without Project traffic conditions:

- Palm Avenue & Institution Road (#4) – LOS F PM peak hour only
- Palm Avenue & I-215 Northbound Ramps (#7) – LOS F PM peak hour only

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

7.4.2 HORIZON YEAR (2040) WITH PROJECT TRAFFIC CONDITIONS

As shown on Table 7-1 and illustrated on Exhibit 7-4, the 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, in addition to those previously identified under Horizon Year (2040) Without Project traffic conditions.

The intersection operations analysis worksheets for Horizon Year (2040) With Project traffic conditions are included in Appendix 7.2 of this TIA. Measures to address long range deficiencies for Horizon Year traffic conditions are discussed in Section 7.7 *Horizon Year (2040) Deficiencies and Recommended Improvements.*

7.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

The following study area intersection is anticipated to meet traffic signal warrants for Horizon Year (2040) Without Project traffic conditions, in addition to those previously mentioned under Opening Year Cumulative (2019) traffic conditions (see Appendix 7.3):

- Institution Road & Cajon Boulevard (#4)

There are no additional intersections anticipated to meet either peak hour or ADT volume-based traffic signal warrants for Horizon Year (2040) With Project traffic conditions, in addition to those previously warranted under Horizon Year (2040) Without Project traffic conditions (see Appendix 7.4).

Table 7-1

Intersection Analysis for Horizon Year (2040) Conditions

#	Intersection	Traffic Control[2]	2040 NP						2040 WP						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	Dwy. 1 & Cajon Bl.	--/**CSS**	Does Not Exist				--	--	9.8	10.1	A	B	--	--	--	--	No
2	Dwy. 2 & Cajon Bl.	CSS	0.0	0.0	A	A	--	--	10.6	10.8	B	B	--	--	--	--	No
3	Institution Rd. & Cajon Bl.	AWS	9.8	12.1	A	B	--	--	10.3	13.2	B	B	--	--	--	--	No
4	Palm Av. & Institution Rd.	AWS	13.1	**67.1**	B	**F**	--	--	15.2	**98.5**	C	**F**	--	--	--	--	**Yes**
5	Palm Av. & Industrial Pkwy.	AWS	25.2	**125.5**	D	**F**	--	--	33.4	**157.2**	D	**F**	--	--	--	--	**Yes**
6	Palm Av. & I-215 SB Ramps	TS	**>200.0**	**114.9**	**F**	**F**	1.51	1.05	**>200.0**	**117.7**	**F**	**F**	1.54	1.09	0.03	0.04	No[5]
7	Palm Av. & I-215 NB Ramps	TS	39.0	**103.2**	D	**F**	0.81	1.17	40.6	**110.5**	D	**F**	0.82	1.19	0.01	0.02	No[5]

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

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

3 Volume to capacity ratio has been reported using the HCM 2000 methodology (as HCM 6th Edition 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 for each agency.

5 Project is anticipated to contribute less than 50 peak hour trips to the study area intersection. As such, the impact is less than significant.

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

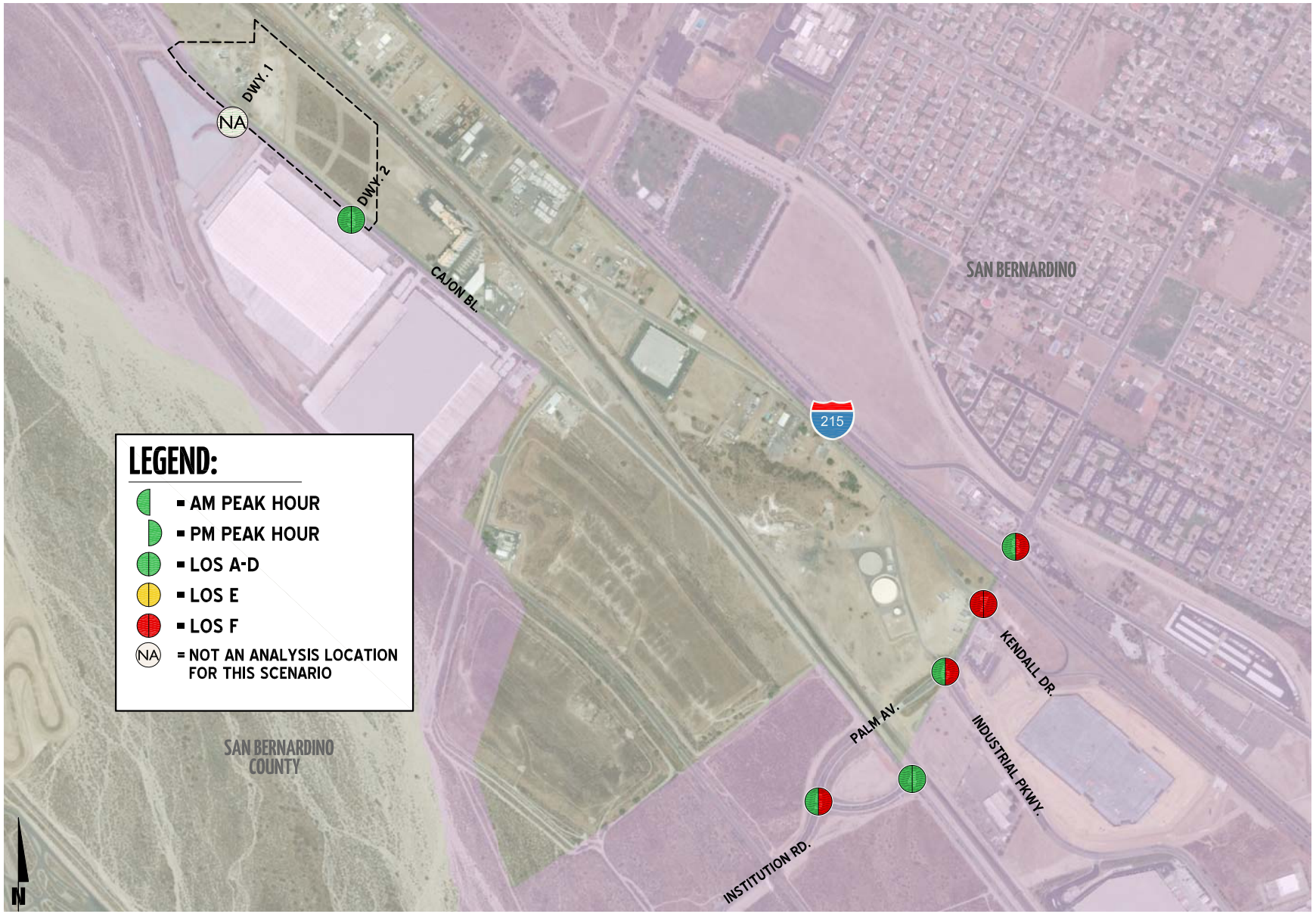
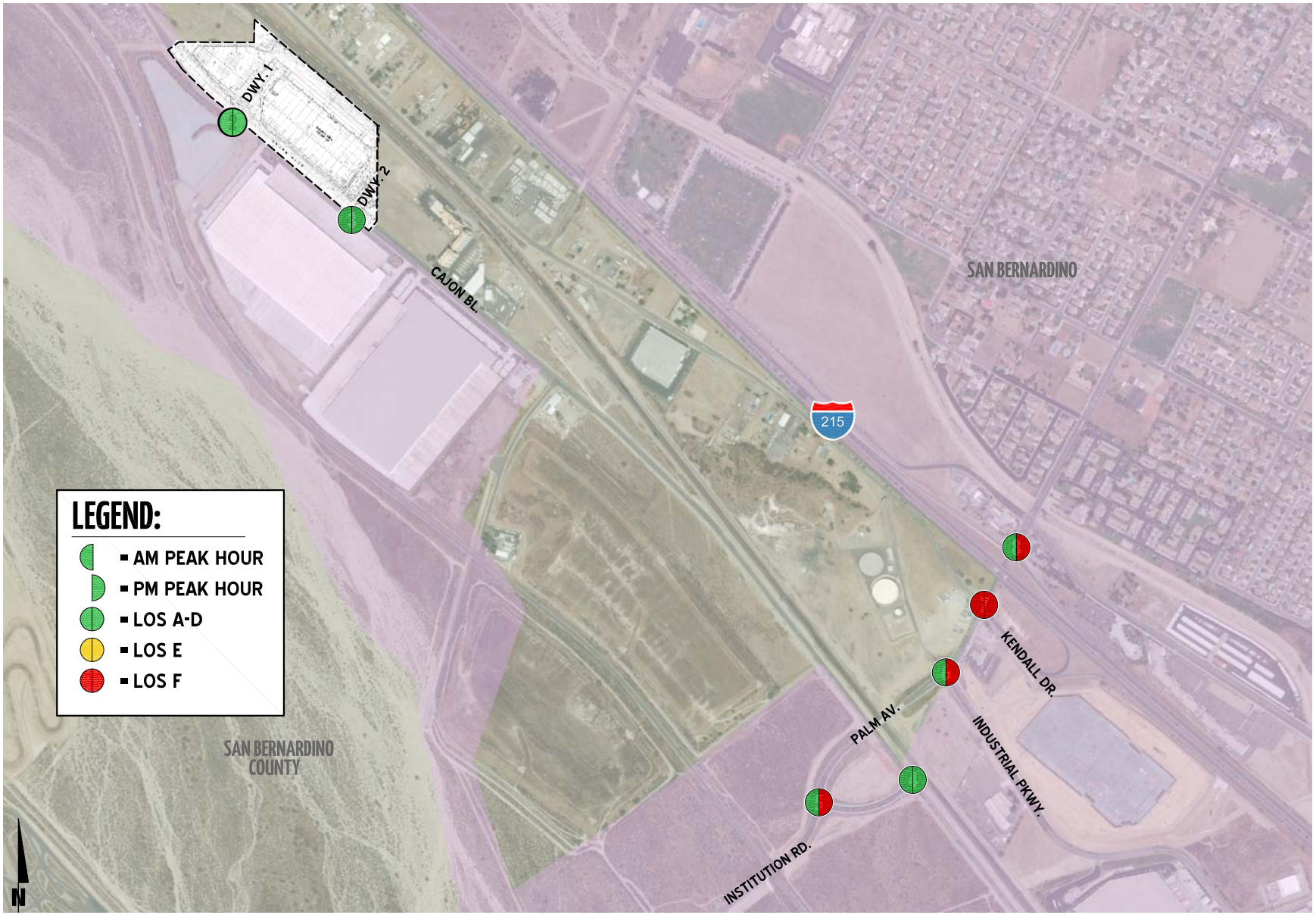


EXHIBIT 7-4: HORIZON YEAR (2040) WITH PROJECT SUMMARY OF LOS



7.6 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 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 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 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 7.5 and 7.6, respectively.

7.7 HORIZON YEAR (2040) DEFICIENCIES 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 discussed below to address Horizon Year (2040) traffic deficiencies is presented in Table 7-3.

The addition of Project traffic is anticipated to result in a significant cumulative impact at the following intersections:

- Palm Avenue & Institution Road (#4) – LOS F PM peak hour only
- Palm Avenue & Industrial Parkway (#5) – LOS F PM peak hour only

However, the Project is anticipated to contribute less than 50 peak hour trips to the following intersections, thus resulting in a less than significant impact:

- Palm Avenue & I-215 Southbound Ramps (#6) – LOS F AM and PM peak hours
- Palm Avenue & I-215 Northbound Ramps (#7) – LOS F PM peak hour only

The Project Applicant shall participate in the funding of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of County of San Bernardino DIF (if the improvements are included in the DIF program) or on a fair share basis (if the improvements are not included in the DIF program). These fees shall be collected by the County of San Bernardino DIF, 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 County 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 conditions, with improvements, HCM calculation worksheets are provided in Appendix 7.7 and Appendix 7.8, respectively.

Table 7-2

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

Intersection	Movement	Available Stacking Distance (Feet)	2040 NP				2040 WP			
			95th Percentile Queue (Feet)		Acceptable? [1]		95th Percentile Queue (Feet)		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
Palm Av. / I-215 SB Ramps	WBL/T/R	1,510	1,126 [2]	693 [2]	Yes	Yes	1,169 [2]	730 [2]	Yes	Yes
Palm Av. / I-215 NB Ramps	WBL/T	905	362	418	Yes	Yes	407 [2]	426	Yes	Yes
	WBR	455	405 [2]	781 [2]	Yes	Yes[3]	406 [2]	781 [2]	Yes	Yes[3]

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

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

[3] Although the 95th percentile queue is anticipated to exceed the available storage for the turn lane, the adjacent through lane has sufficient storage to accommodate any spillover without spilling back and affecting the I-215 Freeway mainline.

Table 7-3

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. & Institution Rd.																	
	- 2040 Without Project																	
	- Without Improvements	AWS	0	1	1	1	1	0	0	0	0	1	0	1	13.1	**67.1**	B	**F**
	- With Improvements	**TS**	0	1	1	1	1	0	0	0	0	1	0	**1>**	12.5	27.6	B	C
	- 2040 With Project																	
	- Without Improvements	AWS	0	1	1	1	1	0	0	0	0	1	0	1	15.2	**98.5**	C	**F**
	- With Improvements	**TS**	0	1	1	1	1	0	0	0	0	1	0	**1>**	12.9	31.3	B	C
5	Palm Av. & Industrial Pkwy.																	
	- 2040 Without Project																	
	- Without Improvements	AWS	1	1	1	1	1	1	0	1	0	1	1	1	25.2	**125.5**	D	**F**
	- With Improvements	**TS**	1	1	1	1	1	1	0	1	0	1	1	1	17.5	34.5	B	C
	- 2040 With Project																	
	- Without Improvements	AWS	1	1	1	1	1	1	0	1	0	1	1	1	33.4	**157.2**	D	**F**
	- With Improvements	**TS**	1	1	1	1	1	1	0	1	0	1	1	1	17.6	39.6	B	D

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; **1** = Improvement

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

[3] TS = Traffic Signal; AWS = All Way Stop

8 REFERENCES

1. **San Bernardino County Transportation Authority.** *Congestion Management Program for County of San Bernardino.* County of San Bernardino : s.n., Updated June 2016.

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

3. **Institute of Transportation Engineers.** *Trip Generation.* 10th Edition. 2017.

4. **Transportation Research Board.** *Highway Capacity Manual (HCM).* 6th Edition. s.l. : National Academy of Sciences, 2016.

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

6. **Institute of Transportation Engineers.** *Trip Generation Handbook.* 3rd Edition. September 2017.

7. **South Coast Air Quality Managment District (SCAQMD).** *Warehouse Truck Trip Study Data Results and Usage.* June 2014.

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

This Page Intentionally Left Blank