Oleander Business Park

TRAFFIC IMPACT ANALYSIS
COUNTY OF RIVERSIDE

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CMP	Congestion Management Program
DIF	Development Impact Fee
E+P	Existing Plus Project
EAP	Existing Plus Ambient Growth Plus Project
EAPC	Existing Plus Ambient Growth Plus Project Plus Cumulative
HCM	Highway Capacity Manual
HOV	High Occupancy Vehicle
ITE	Institute of Transportation Engineers
LOS	Level of Service
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NP	No Project (or Without Project)
PCE	Passenger Car Equivalents
PeMS	Caltrans Performance Measurement System
PHF	Peak Hour Factor
Project	Oleander Business Park
RCTC	Riverside County Transportation Commission
RTA	Riverside Transit Authority
RTP	Regional Transportation Plan
SBCTA	San Bernardino County Transportation Authority
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SHS	State Highway System
sf	Square Feet
TIA	Traffic Impact Analysis
TUMF	Transportation Uniform Mitigation Fee
WP	With Project
WRCOG	Western Riverside Council of Governments

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1 SUMMARY OF FINDINGS

This report presents the results of the traffic impact analysis (TIA) for the proposed Oleander Business Park ("Project") located on the northwest corner of Decker Road and Oleander Avenue in unincorporated County of Riverside 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 Riverside staff, this traffic study has been prepared in accordance with the County of Riverside's *Traffic Impact Analysis Preparation Guide* (April 2008), the California Department of Transportation (Caltrans) *Guide for the Preparation of Traffic Impact Studies* (December 2002), and consultation with County of Riverside 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

The Project is proposed to consist of a of up to approximately 710,736 square feet (sf) of high-cube warehouse and manufacturing uses divided over two building. Building A located in Parcel 1 will be developed with approximately 363,367 sf and Building B located in Parcel 2 will be developed with approximately 347,369 sf. The remainder of the Project site would not be developed. Up to 20 percent of the Project building areas are assumed to accommodate manufacturing occupancies. The Project is anticipated to be constructed and occupied by 2021.

The Project is proposed to have access on Nandina Avenue via Driveway 1, Oleander Avenue via Driveways 2 and 3, and the northly and southerly driveways on Harley Knox Boulevard. All Project access points are assumed to allow full-access. Regional access to the Project site is provided via the I-215 Freeway at Harley Knox Boulevard interchange.

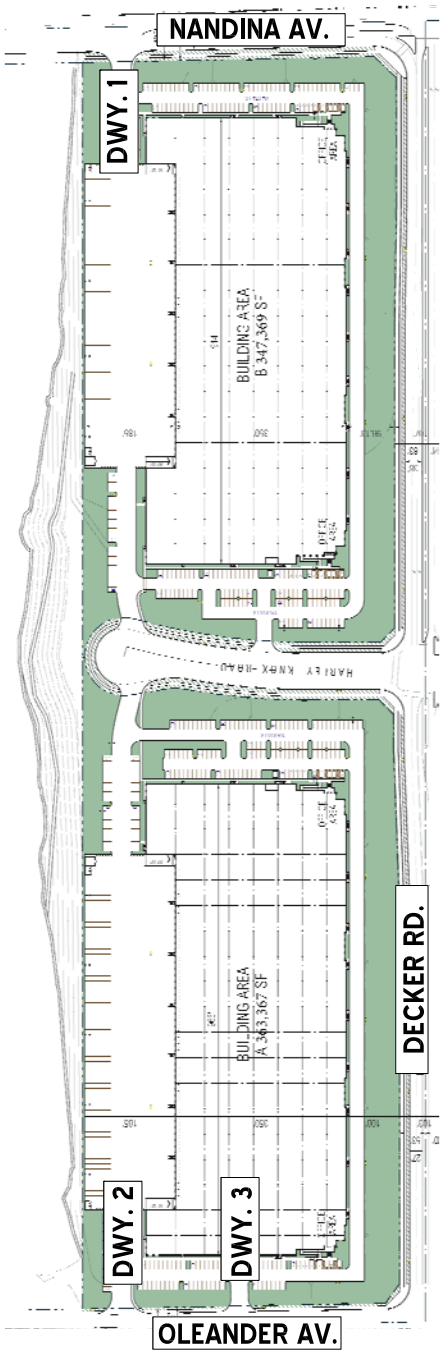
Trips generated by the Project's proposed land uses have been estimated based on trip generation rates collected by the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition, 2017. (3) The Project is estimated to generate a net total of 1,936 passenger-car-equivalent (PCE) trip-ends per day on a typical weekday with 187 AM PCE peak hour trips and 204 PM PCE peak hour trips. The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.1 *Project Trip Generation* of this report.

1.2 ANALYSIS SCENARIOS

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

- Existing (2019)
- Existing plus Project (E+P)
- Existing Plus Ambient Growth Plus Project (EAP) (2021)
- Existing Plus Ambient Growth Plus Project Plus Cumulative Projects (EAPC) (2021)

EXHIBIT 1-1: PRELIMINARY SITE PLAN



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1.2.1 EXISTING (2019) CONDITIONS

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

1.2.2 EXISTING PLUS PROJECT CONDITIONS

The Existing plus Project (E+P) analysis determines 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 scenario has been provided for information purposes.

1.2.3 EXISTING PLUS AMBIENT GROWTH PLUS PROJECT (2021) CONDITIONS

The EAP (2021) conditions analyses determines the traffic impacts based on a comparison of the EAP (2021) traffic conditions to existing conditions. To account for background traffic growth, an ambient growth factor from Existing (2019) conditions of 4.04% (2 percent per year, compounded over 2 years) is included for EAP (2021) traffic conditions. Other cumulative development projects are not included as part of the EAP (2021) analysis.

1.2.4 EXISTING PLUS AMBIENT GROWTH PLUS PROJECT PLUS CUMULATIVE (2021) CONDITIONS

To account for growth in traffic between Existing (2019) conditions and the Project Opening Year (2021), an annual traffic growth factor of 4.04% was assumed (4 percent per year, compounded over 2 years). The 2.0 percent annual growth rate is intended to capture non-specific ambient traffic growth.

Conservatively, the TIA estimates of area traffic growth then add traffic generated by other known or probable related projects. These related projects are at least in part already accounted for in the assumed 4.04% total ambient growth in traffic noted above; and in some instances, these related projects would likely not be implemented and operational within the 2021 Opening Year time frame assumed for the Project. The resulting traffic growth rate utilized in the TIA (4.04 percent ambient growth + traffic generated by related projects) would therefore tend to overstate rather than understate background cumulative traffic impacts under 2021 conditions.

1.3 STUDY AREA

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

1.3.1 INTERSECTIONS

The 9 study area intersections shown on Exhibit 1-2 and listed at Table 1-1 were selected for this TIA based on the County's Traffic Study Guidelines and in consultation with County of Riverside staff. Pursuant to the Traffic Study Guidelines, the County requires analysis of intersections where the Project would contribute 50 or more peak hour one-way trips.

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction	CMP?
1	Driveway 1 / Nandina Avenue (Future Intersection)	County of Riverside	No
2	Driveway 2 / Oleander Avenue (Future Intersection)	County of Riverside	No
3	Driveway 3 / Oleander Avenue (Future Intersection)	County of Riverside	No
4	Decker Road / Nandina Avenue (Future Intersection)	County of Riverside	No
5	Decker Road / Harley Knox Boulevard (Future Intersection)	County of Riverside	No
6	Decker Road / Oleander Avenue – Future Intersection	County of Riverside	No
7	Harvill Avenue / Harley Knox Boulevard	County of Riverside	No
8	I-215 Southbound Ramps / Harley Knox Boulevard	Caltrans, Riv. County	Yes
9	I-215 Northbound Ramps / Harley Knox Boulevard	Caltrans, Riv. County	Yes

The intent of a Congestion Management Program (CMP) is to more directly link land use, transportation, and air quality, thereby prompting reasonable growth management programs that will effectively utilize new transportation funds, alleviate traffic congestion and related deficiencies, and improve air quality. Counties within California have developed CMPs with varying methods and strategies to meet the intent of the CMP legislation. The County of Riverside CMP became effective with the passage of Proposition 111 in 1990 and updated most recently in 2011. The Riverside County Transportation Commission (RCTC) adopted the 2011 CMP for the County of Riverside in December 2011. (4) There are 2 study area intersections that are ramp-to-arterial intersections with the I-215 Freeway, which are identified as CMP facilities.

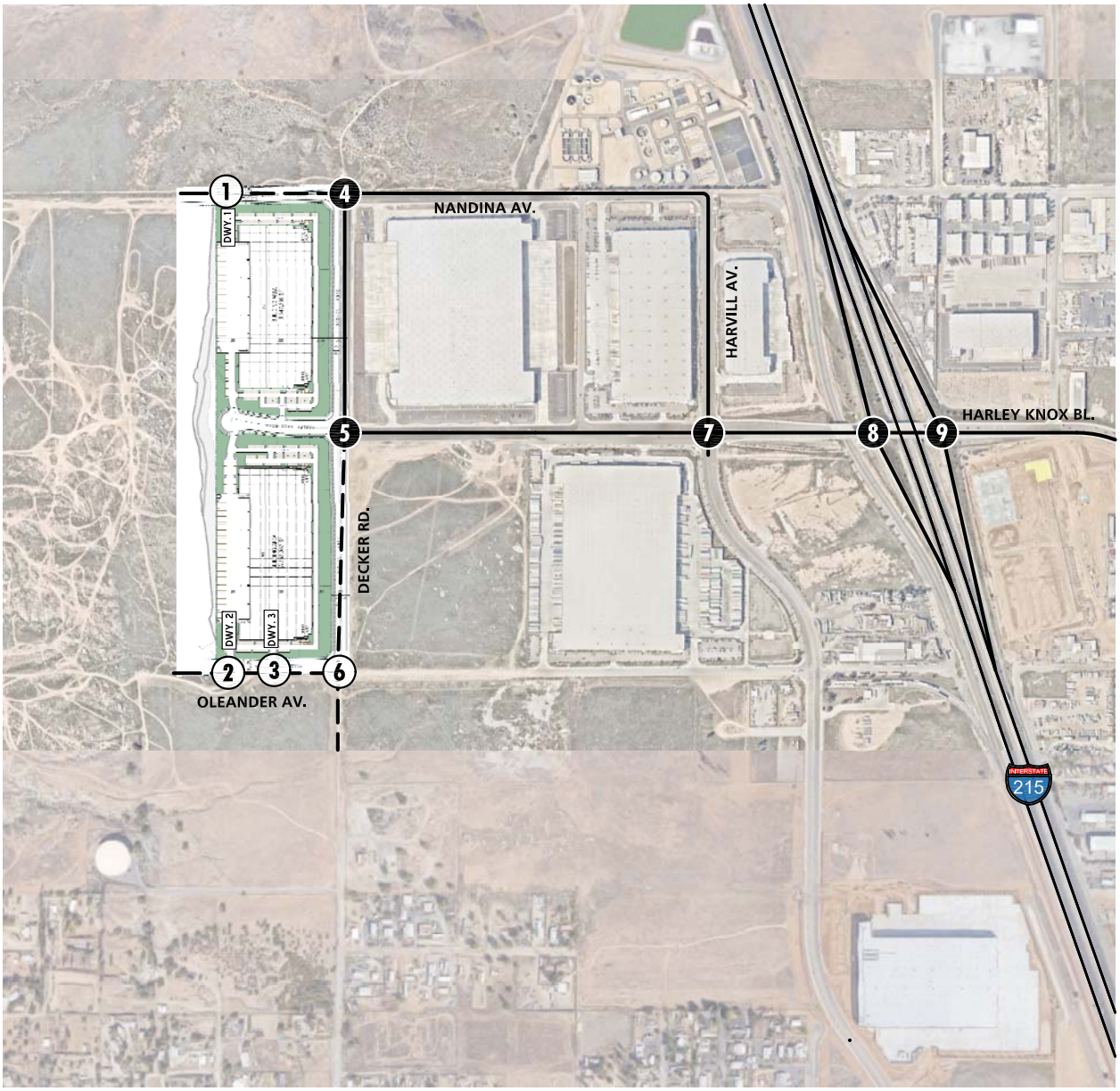
1.3.2 FREEWAY MAINLINE SEGMENTS

Study area freeway mainline analysis locations were selected based on Caltrans traffic study guidelines, which may require the analysis of State highway facilities. (2) This study evaluates the following freeway segments adjacent to the point of entry to the State Highway System (SHS), where the Project is anticipated to contribute 50 or more peak hour trips (see Table 1-2):

TABLE 1-2: FREEWAY MAINLINE SEGMENT ANALYSIS LOCATIONS

ID	Freeway Mainline Segments
1	I-215 Freeway – Southbound, North of Harley Knox Boulevard
2	I-215 Freeway – Southbound, South of Harley Knox Boulevard
3	I-215 Freeway – Northbound, South of Harley Knox Boulevard
4	I-215 Freeway – Northbound, North of Harley Knox Boulevard

EXHIBIT 1-2: LOCATION MAP



LEGEND:

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

N

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1.3.3 FREEWAY MERGE/DIVERGE RAMP JUNCTIONS

The study area freeway merge/diverge ramp junction analysis locations include the following freeway ramp junctions for each direction of flow as shown on Table 1-3, where the Project is anticipated to contribute 50 or more peak hour trips:

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

ID	Freeway Merge/Diverge Ramp Junctions
1	I-215 Freeway – Southbound, Off-Ramp at Harley Knox Boulevard (Diverge)
2	I-215 Freeway – Southbound, On-Ramp at Harley Knox Boulevard (Merge)
3	I-215 Freeway – Northbound, Off-Ramp at Harley Knox Boulevard (Diverge)
4	I-215 Freeway – Northbound, On-Ramp at Harley Knox Boulevard (Merge)

1.4 PROJECT IMPACTS

This section provides a summary of Project impacts. Section 2 *Methodologies* provides information on the methodologies used in the analysis, and Section 5 *E+P Traffic Analysis,* Section 6 *EAP (2021) Traffic Analysis*, and Section 7 *EAPC (2021) Traffic Analysis* includes the detailed analysis. A summary of intersection LOS results for all analysis scenarios is presented on Exhibit 1-3 and a summary of freeway LOS results for all analysis scenarios is presented on Exhibit 1-4.

1.4.1 INTERSECTIONS

EXISTING, E+P, AND EAP (2021) CONDITIONS

Intersection operations analysis conducted for Existing, E+P, and EAP (2021) traffic conditions indicates that all the study area intersections are anticipated to operate at acceptable level of service (LOS). The addition of Project traffic to the study area intersections did not result in any significant impacts to the intersection operations.

EAPC (2021) CONDITIONS

The following study area intersections are anticipated to operate at a deficient LOS during one or both peak hours for EAPC (2021) traffic conditions. The Project is anticipated to contribute to these deficiencies by adding traffic (as measured by 50 or more peak hours one-way trips) to already deficient intersections resulting in an increase to peak hour delays. Cumulative impacts are deficiencies that would not be directly caused by the Project. The Project would, however, contribute traffic to these deficient facilities along with other cumulative development projects, resulting in a cumulatively considerable impact.

- I-215 Southbound Ramps / Harley Knox Bl. (#8) – LOS F AM and PM peak hours
- I-215 Northbound Ramps / Harley Knox Bl. (#9) – LOS F AM and PM peak hours

EXHIBIT 1-3: SUMMARY OF INTERSECTION LOS BY ANALYSIS SCENARIO

#	Intersection	Existing (2019)	E+P	EAP (2021)	EAPC (2021)
1	Dwy. 1 & Nandina Av.	NA			
2	Dwy. 2 & Oleander Av.	NA			
3	Dwy. 3 & Oleander Av.	NA			
4	Decker Rd. & Nandina Av.				
5	Decker Rd. & Harley Knox Bl.				
6	Decker Rd. & Oleander Av.	NA			
7	Harvill Av. & Harley Knox Bl.				
8	I-215 SB Ramps & Harley Knox Bl.				
9	I-215 NB Ramps & Harley Knox Bl.				

LEGEND:

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

EXHIBIT 1-4: SUMMARY OF FREEWAY LOS BY ANALYSIS SCENARIO

Basic Freeway Segment

#	Mainline Segment	Existing (2019)	E+P	EAP (2021)	EAPC (2021)
1	I-215 Southbound North of Harley Knox Bl.				
2	I-215 Southbound South of Harley Knox Bl.				
3	I-215 Northbound South of Harley Knox Bl.				
4	I-215 Northbound North of Harley Knox Bl.				

Freeway Ramp Junction Merge/Diverge

#	Ramp or Segment	Existing (2019)	E+P	EAP (2021)	EAPC (2021)
1	I-215 Southbound Off-Ramp at Harley Knox Bl. (Diverge)				
2	I-215 Southbound On-Ramp at Harley Knox Bl. (Merge)				
3	I-215 Northbound Off-Ramp at Harley Knox Bl. (Diverge)				
4	I-215 Northbound On-Ramp at Harley Knox Bl. (Merge)				

LEGEND:

- = AM PEAK HOUR
- = PM PEAK HOUR
- = LOS A-D
- = LOS E
- = LOS F

1.4.2 FREEWAY FACILITIES

Off-ramp queuing analysis conducted for Existing, E+P, EAP (2021), and EAPC (2021) traffic conditions indicates that the off-ramps are not anticipated to exceed storage capacity. The addition of Project traffic to the off-ramp queues did not result in any exceedances in the storage capacity.

EXISTING, E+P, AND EAP (2021) CONDITIONS

Freeway facility analysis conducted for Existing, E+P, and EAP (2021) traffic conditions indicates that the following study area freeway mainline segments and ramp merge/diverge junctions are anticipated to operate at an unacceptable LOS during one or both peak hours:

- I-215 Northbound Mainline, South of Harley Knox Boulevard (#3) – LOS E AM peak hour only
- I-215 Northbound Ramp Diverge, Off-ramp at Harley Knox Boulevard (#3) – LOS E AM peak hour only

The addition of Project traffic to the freeway facilities did not result in any new impacts to the freeway mainline segments or ramp merge/diverge junctions.

EAPC (2021) CONDITIONS

Freeway facility analysis conducted for EAPC (2021) indicates that all study area freeway mainline segments and ramp merge/diverge junctions are anticipated to operate at an unacceptable LOS during one or both peak hours. The addition of Project traffic to the freeway facilities did not result in any new impacts to the freeway mainline segments or ramp merge/diverge junctions.

1.5 PROJECT IMPROVEMENTS

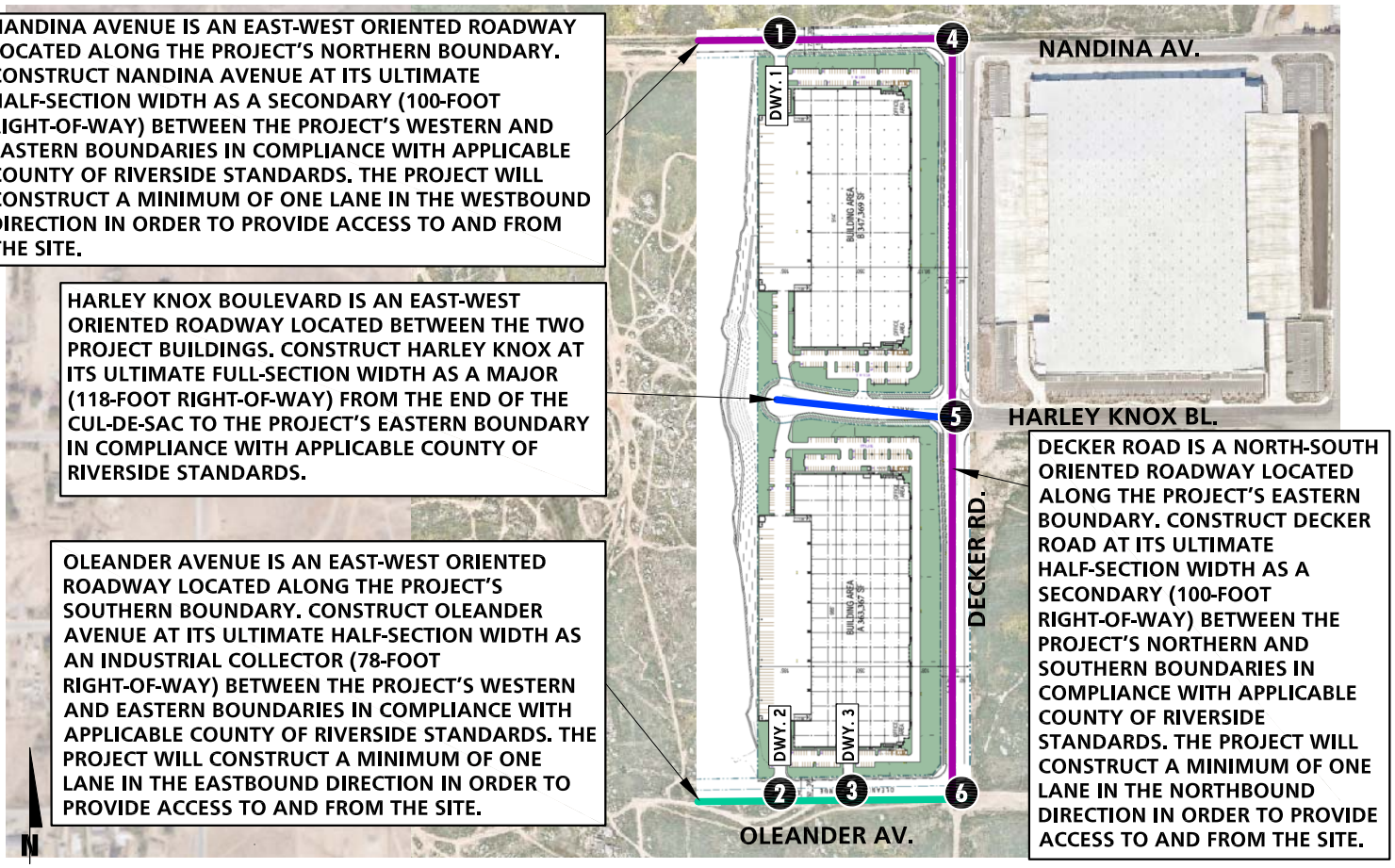
The Project would construct the following improvements. Please refer also to Exhibit 1-5 *Site Access and Site Adjacent Roadway Recommendations*.

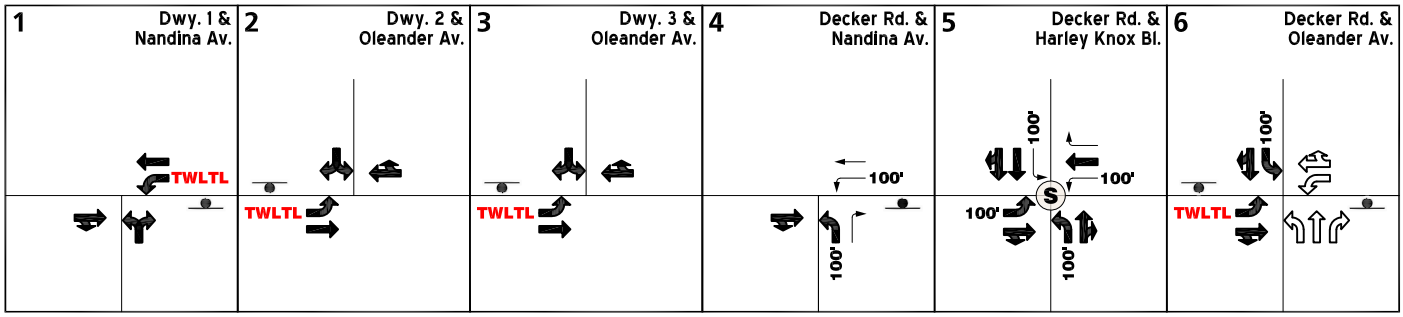
Nandina Avenue – Nandina Avenue is an east-west oriented roadway located along the Project's northern boundary. Construct Nandina Avenue between the Project's western and eastern boundaries at its ultimate half-section width as secondary highway (100-foot right-of-way), in compliance with applicable County of Riverside standards. The Project will also construct a minimum of one lane in the westbound direction in order to provide access to and from the site.

Oleander Avenue – Oleander Avenue is an east-west oriented roadway located along the Project's southern boundary. Construct Oleander Avenue between the Project's western and eastern boundaries at its ultimate half-section width as an industrial collector (78-foot right-of-way), in compliance with applicable County of Riverside standards. The Project will also construct a minimum of one lane in the eastbound direction in order to provide access to and from the site.

County of Riverside

EXHIBIT 1-5: SITE ACCESS AND SITE ADJACENT ROADWAY RECOMMENDATIONS





LEGEND:

- (S) = ALL WAY STOP
- = STOP SIGN
- = EXISTING LANE
- = PROJECT IMPROVEMENT
- = IMPROVEMENT BY OTHERS
- 100' = MINIMUM STORAGE LENGTH
- TWLTL = TWO WAY LEFT TURN LANE
- TWLTL = TWO WAY LEFT TURN LANE IMPROVEMENT
- = MAJOR (118' R-O-W)
- = SECONDARY (100' R-O-W)
- = INDUSTRIAL COLLECTOR (78' R-O-W)

ON-SITE TRAFFIC SIGNING AND STRIPING SHOULD BE IMPLEMENTED IN CONJUNCTION WITH DETAILED CONSTRUCTION PLANS FOR THE PROJECT SITE.

SIGHT DISTANCE AT EACH PROJECT ACCESS POINT SHOULD BE REVIEWED WITH RESPECT TO STANDARD CALTRANS AND CITY OF SAN BERNADINO SIGHT DISTANCE STANDARDS AT THE TIME OF PREPARATION OF FINAL GRADING, LANDSCAPE AND STREET IMPROVEMENT PLANS.

Decker Road – Decker Road is a north-south oriented roadway located along the Project's eastern boundary. Construct Decker Road from Project's northern boundary to the Project's southern boundary at its ultimate half-section width as a secondary highway (100-foot right-of-way), in compliance with applicable County of Riverside standards. The Project will also construct a minimum of one lane in the northbound direction in order to provide access to and from the site.

Harley Knox Boulevard – Harley Knox Boulevard is an east-west oriented roadway bisecting the Project. Construct Harley Knox Boulevard from the end of the cul-de-sac to the Project's eastern boundary at its ultimate full-section width as a major highway (118-foot right-of-way), in compliance with applicable County of Riverside standards.

Driveway 1 & Nandina Avenue (#1)

- Install a stop control on the northbound approach and a northbound shared left-right turn lane.
- Add an eastbound shared through-right turn lane.
- Add a westbound two-way left turn lane within the median.
- Add a westbound through lane.

Driveway 2 & Oleander Avenue (#2)

- Install a stop control on the southbound approach and a southbound shared left-right turn lane.
- Add an eastbound two-way left turn lane within the median.
- Add an eastbound through lane.
- Add a westbound shared through-right turn lane.

Driveway 3 & Oleander Avenue (#3)

- Install a stop control on the southbound approach and a southbound shared left-right turn lane.
- Add an eastbound two-way left turn lane within the median.
- Add an eastbound through lane.
- Add a westbound shared through-right turn lane.

Decker Road & Nandina Avenue (#4)

- Add a northbound left turn lane with a minimum of 100-feet of storage.
- Add an eastbound shared through-right turn lane.

Decker Road & Harley Knox Boulevard (#5)

- Add a northbound left turn lane with a minimum of 100-feet of storage.
- Add a northbound shared through-right turn lane.
- Add a southbound through lane.
- Add a southbound shared through-right turn lane.
- Add an eastbound left turn lane with a minimum of 100-feet of storage.
- Add an eastbound shared through-right turn lane.

- Add an westbound through lane.

Decker Road & Oleander Avenue (#6)

- Add a southbound left turn lane with a minimum of 100-feet of storage.
- Add a southbound shared through-right turn lane.
- Add an eastbound left turn lane.
- Add an eastbound shared through-right turn lane.

1.6 RECOMMENDED OFF-SITE IMPROVEMENTS

1.6.1 INTERSECTION IMPROVEMENTS

Table 1-4 identifies recommended off-site intersection improvements that would address deficiencies listed previously on Exhibit 1-3.

Payment of fees would fulfill the Applicant's mitigation responsibilities for Project impacts at the deficient locations identified on Exhibit 1-3.

1.6.2 FREEWAY MAINLINE/MERGE DIVERGE JUNCTION IMPROVEMENTS

The Project Study Report/Project Development Support in Riverside County on I-215 and SR-60 between Nuevo Road (I-215) & I-215/SR-60 Junction and Box Springs Road (I-215) & Day Street (SR-60), also known as the I-215 North Project, includes the construction of an high-occupancy vehicle (HOV) lane in each direction of the I-215 Freeway between Nuevo Road and Box Springs Road within the existing median.

Caltrans, the owner and operator of the State Highway System (SHS), has not identified or proposed other improvements to the study area SHS that would address existing and anticipated study area SHS LOS deficiencies. The Project Applicant would pay required TUMF offsetting the Project's Incremental and cumulative effects to the study area SHS.

Table 1-4

Summary of Improvements by Analysis Scenario

#	Intersection Location	Jurisdiction	EAPC 2021	Improvements in TUMF, DIF, etc.[1,2]	Fair Share %
8	I-215 Southbound Ramps / Harley Knox Bl.	Caltrans, County of Riverside	- Restripe southbound ramp to provide 2 southbound left turn lanes and 1 shared southbound left-through-right turn lane - Add a 2nd westbound left turn lane	Yes (TUMF)[3] Yes (TUMF)[3]	NA[4]
9	I-215 Northbound Ramps / Harley Knox Bl.	Caltrans, City of Perris	- Add a 2nd eastbound left turn lane - Add a westbound free-right turn lane	Yes (TUMF)[3] Yes (TUMF)[3]	NA[4]

[1] Improvements are included wholly or partially in one or more of the following: County of Riverside TUMF or DIF programs for local, regional, and specific plan components. Final determination on extent of the improvements included and covered by these fee programs is to be established by the governing lead agency.

[2] Program improvements constructed by the Project may be eligible for fee credit, at the discretion of the County.

[3] Although the interchange is identified as a TUMF interchange, the interchange is not currently identified on the Central Zone 5-Year Transportation Improvement Program Amendment (adopted June 30, 2016).

[4] Fair share percentage is not shown as the recommended improvements at this location are included in a pre-existing fee program. In the event that the pre-existing fee program does not fully cover mitigation of the identified cumulative impact, a fair share calculation may still be required.

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2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are generally consistent with County of Riverside and Caltrans traffic study guidelines. (1) (2)

2.1 LEVEL OF SERVICE

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

2.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The Highway Capacity Manual (HCM) methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (5) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

County of Riverside

The County of Riverside requires signalized intersection operations analysis based on the methodology described in the HCM 6th Edition. (5) Intersection LOS operations are based on 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.

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.

TABLE 2-1: SIGNALIZED INTERSECTION LOS THRESHOLDS

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

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.

California Department of Transportation (Caltrans)

Per the Caltrans *Guide for the Preparation of Traffic Impact Studies*, the traffic modeling and signal timing optimization software package Synchro (Version 10) has been utilized to analyze signalized intersections under Caltrans' jurisdiction, which include interchange to arterial ramps (i.e. I-215 Freeway ramps at Harley Knox Boulevard). (2) Signal timing for the freeway arterial-to-ramp intersections have been obtained from Caltrans District 8 and were utilized for the purposes of this analysis.

2.2.2 UNSIGNALIZED INTERSECTIONS

The County of Riverside requires the operations of unsignalized intersections be evaluated using the methodology described the HCM. (5) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2).

TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

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

Source: HCM

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

2.3 FREEWAY OFF-RAMP QUEUING ANALYSIS

The study area for this TIA includes the freeway-to-arterial interchange of the I-215 Freeway at Harley Knox Boulevard off-ramps. Consistent with Caltrans requirements, the 95th percentile queuing of vehicles has been assessed at the off-ramps to determine potential queuing deficiencies at the freeway ramp intersections on Harley Knox Boulevard. 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 deficiencies/needs of the intersections with traffic added from the proposed Project. Storage (turn-pocket) length recommendations at the ramps have been based upon the 95th percentile queue resulting from the Synchro progression analysis. The queue length reported is for the lane with the highest queue in the lane group.

There are two footnotes which appear on the Synchro outputs. One footnote indicates if the 95th percentile cycle exceeds capacity. Traffic is simulated for two complete cycles of the 95th percentile traffic in Synchro in order to account for the effects of spillover between cycles. In practice, the 95th percentile queue shown will rarely be exceeded and the queues shown with the footnote are acceptable for the design of storage bays. The other footnote indicates whether or not the volume for the 95th percentile queue is metered by an upstream signal. In many cases, the 95th percentile queue will not be experienced and may potentially be less than

the 50th percentile queue due to upstream metering. If the upstream intersection is at or near capacity, the 50th percentile queue represents the maximum queue experienced.

A vehicle is considered queued whenever it is traveling at less than 10 feet/second. A vehicle will only become queued when it is either at the stop bar or behind another queued vehicle. Although only the 95th percentile queue has been reported in the tables, the 50th percentile queue can be found in the appendix alongside the 95th percentile queue for each ramp location. The 50th percentile maximum queue is the maximum back of queue on a typical cycle during the peak hour, while the 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes during the peak hour. In other words, if traffic were observed for 100 cycles, the 95th percentile queue would be the queue experienced with the 95th busiest cycle. In other words, queues are lower than the reported 95th percentile queue 95 percent of the time and is only observed to exceed the 95th percentile queue 5 percent of the time. The 50th percentile, or average, queue represents the typical queue length for peak hour traffic conditions, while the 95th percentile queue is derived from the average queue plus 1.65 standard deviations. The 95th percentile queue is not necessarily ever observed; it is simply based on statistical calculations.

2.4 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by the 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 study area intersections. (6)

The signal warrant criteria for Existing conditions are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. The Caltrans CA MUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (6) Specifically, this TIA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing study area intersections for all analysis scenarios. 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 intersections that do not currently exist have been assessed regarding the potential need for new traffic signals based on future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets.

Traffic signal warrant analyses were performed for the following study area intersection shown on Table 2-3:

TABLE 2-3: TRAFFIC SIGNAL WARRANT ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction
1	Driveway 1 / Nandina Av.	County of Riverside
2	Driveway 2 / Oleander Av.	County of Riverside
3	Driveway 3 / Oleander Av.	County of Riverside
4	Decker Rd. / Nandina Av.	County of Riverside
5	Decker Rd. / Harley Knox Bl.	County of Riverside
6	Decker Rd. / Oleander Av.	County of Riverside

The Existing conditions traffic signal warrant analysis is presented in the subsequent section, Section 3 *Area Conditions* of this report. The traffic signal warrant analyses for future conditions are presented in Section 5 *E+P Traffic Conditions*, Section 6 *EAP (2021) Traffic Conditions*, and Section 7 EAPC (2021) *Traffic Conditions* of this report.

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

2.5 FREEWAY MAINLINE SEGMENT ANALYSIS METHODOLOGY

Consistent with recent Caltrans guidance, the traffic study has evaluated all freeway segments where the Project is anticipated to contribute 50 or more peak hour one-way trips. (2)

The freeway system in the study area has been broken into segments defined by the freeway-to-arterial interchange locations. The freeway segments have been evaluated in this TIA based upon peak hour directional volumes. The freeway segment analysis is based on the methodology described in the HCM and performed using HCS 7 software. The performance measure preferred by Caltrans to calculate LOS is density. Density is expressed in terms of passenger cars per mile per lane. Table 2-4 illustrates the freeway segment LOS descriptions for each density range utilized for this analysis.

TABLE 2-4: DESCRIPTION OF FREEWAY MAINLINE LOS

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

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

The number of lanes for existing baseline conditions has been obtained from field observations conducted by Urban Crossroads in September 2018. These existing freeway geometrics have been utilized for Existing (2019) baseline, E+P, EAP (2021), and EAPC (2021) traffic conditions.

The I-215 Freeway mainline volume data were obtained from the Caltrans Performance Measurement System (PeMS) website for the segments of the I-215 Freeway interchange at Harley Knox Boulevard. The data was obtained from September 2018. In an effort to conduct a conservative analysis, the maximum value observed within the 3-day period was utilized for the weekday morning (AM) and weekday evening (PM) peak hours. In addition, truck traffic, represented as a percentage of total traffic and actual vehicles (as opposed to PCE volumes) have been utilized for the purposes of the basic freeway segment analysis. (7)

2.6 FREEWAY MERGE/DIVERGE RAMP JUNCTION ANALYSIS

The freeway system in the study area has been broken into segments defined by freeway-to-arterial interchange locations resulting in 4 existing on and off ramp locations where the Project is anticipated to contribute 50 or more peak hour trips (see Table 1-3). Although the HCM indicates the influence area for a merge/diverge junction is 1,500 feet, the analysis presented in this traffic study has been performed at all ramp locations with respect to the nearest on or off ramp at each interchange in an effort to be consistent with Caltrans guidance/comments on other projects Urban Crossroads has worked on in the region.

The merge/diverge analysis is based on the HCM Ramps and Ramp Junctions analysis method and performed using HCS 7 software. The measure of effectiveness (reported in passenger car/mile/lane) are calculated based on the existing number of travel lanes, number of lanes at

the on and off ramps both at the analysis junction and at upstream and downstream locations (if applicable) and acceleration/deceleration lengths at each merge/diverge point. Table 2-5 presents the merge/diverge area level of service descriptions for each density range utilized for this analysis.

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

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

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

Similar to the basic freeway segment analysis, the I-215 Freeway mainline volume data were obtained from the Caltrans maintained PeMS website for the segments of the I-215 Freeway interchange at Harley Knox Boulevard. The ramp data (per the count data presented in Appendix 3.1) were then utilized to flow conserve the mainline volumes to determine the remaining I-215 Freeway mainline segment volumes. Flow conservation checks ensure that traffic flows from north to south (and vice versa) of the interchange area with no unexplained loss of vehicles. The data was obtained from September 2018. In an effort to conduct a conservative analysis, the maximum value observed within the 3-day period was utilized for the weekday morning (AM) and weekday evening (PM) peak hours. In addition, truck traffic, represented as a percentage of total traffic and actual vehicles (as opposed to PCE volumes) have been utilized for the purposes of the freeway ramp junction (merge/diverge) analysis. (7)

2.7 INTERSECTION LEVEL OF SERVICE (LOS) DEFICIENCIES DEFINED

Intersection LOS deficiencies would occur when minimum acceptable or target LOS conditions are not or cannot be achieved. The definition of an intersection deficiency has been obtained from each of the applicable surrounding jurisdictions.

2.7.1 COUNTY OF RIVERSIDE

Riverside County General Plan Policy C 2.1 (excerpted below) states that the County will maintain the following County-wide target LOS:

The following minimum target levels of service have been designated for the review of development proposals in the unincorporated areas of Riverside County with respect to transportation impacts on roadways designated in the Riverside County Circulation Plan which are currently County maintained, or are intended to be accepted into the County maintained roadway system:

- *LOS C shall apply to all development proposals in any area of the Riverside County not located within the boundaries of an Area Plan, as well as those areas located within the following Area*

Plans: REMAP, Eastern Coachella Valley, Desert Center, Palo Verde Valley, and those non-Community Development areas of the Elsinore, Lake Mathews/Woodcrest, Mead Valley and Temescal Canyon Area Plans.

- *LOS D shall apply to all development proposals located within any of the following Area Plans: Eastvale, Jurupa, Highgrove, Reche Canyon/Badlands, Lakeview/Nuevo, Sun City/Menifee Valley, Harvest Valley/Winchester, Southwest Area, The Pass, San Jacinto Valley, Western Coachella Valley and those Community Development Areas of the Elsinore, Lake Mathews/Woodcrest, Mead Valley and Temescal Canyon Area Plans.*
- *LOS E may be allowed by the Board of Supervisors within designated areas where transit-oriented development and walkable communities are proposed.*

Notwithstanding the forgoing minimum LOS targets, the Board of Supervisors may, on occasion by virtue of their discretionary powers, approve a project that fails to meet these LOS targets in order to balance congestion management considerations in relation to benefits, environmental impacts and costs, provided an Environmental Impact Report, or equivalent, has been completed to fully evaluate the impacts of such approval. Any such approval must incorporate all feasible mitigation measures, make specific findings to support the decision, and adopt a statement of overriding considerations.

2.7.2 Riverside County Transportation Commission (RCTC) CMP

In an effort to more directly link land use, transportation and air quality and promote reasonable growth, the County of Riverside adopted a CMP (December 2011). The RCTC monitors the CMP roadway network system to minimize LOS deficiencies. Within the Project study area, the I-215 Freeway is recognized as a key transportation facility within the CMP system. The RCTC has adopted LOS E as the minimum standard for intersections and segments along the CMP System of Highways and Roadways. However, for the purposes of this TIA, the more restrictive Caltrans LOS D standard is employed in evaluation of study area CMP facilities.

2.7.3 Caltrans

Caltrans acknowledges that the region-wide goal for an acceptable LOS on all SHS freeways, roadway segments, and intersections is LOS D. Accordingly, within this analysis, LOS D is employed as the target LOS for study area SHS freeway ramps, freeway segments, and freeway merge/diverge ramp junctions.

2.8 Deficiency Criteria

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

2.8.1 Intersections

For the study area intersections that lie within the County of Riverside, the following deficiency criteria is employed:

- When the pre-Project condition is at or better than LOS D (i.e., acceptable LOS), and project-generated traffic, as measured by 50 or more peak hour trips, causes deterioration below LOS D/LOS E (i.e., unacceptable LOS), a deficiency is deemed to occur.

When the pre-Project condition is already below LOS D (i.e., unacceptable LOS), the Project will be responsible for mitigating its impact to a level of service equal to or better than it was without the Project. Thus, for intersections currently operating at unacceptable LOS during either the AM and/or PM peak hour under Existing traffic conditions, improvements have been identified to mitigate the impacts of the Project to an intersection LOS that is equal to or better than pre-Project conditions.

2.8.2 CALTRANS FACILITIES

To determine whether the addition of project traffic to the SHS freeway segments would result in a deficiency, the following deficiency criteria is employed:

- 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 peak hour trips. A segment that is operating at or near capacity is deemed to be deficient.

2.9 PROJECT FAIR SHARE CALCULATION METHODOLOGY

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

Project Fair Share % = Project Traffic / (2021 With Project Total Traffic – Existing Traffic)

2.10 SB 743 CONSIDERATIONS

In the fall of 2013, Senate Bill 743 (SB 743) was passed by the legislature and signed into law by the governor. This legislation will eventually change the way that transportation studies are conducted for environmental documents. In the areas where SB 743 is implemented, delay-based metrics such as roadway capacity and level of service will no longer be the performance measures used for the determination of the transportation impacts of projects in studies conducted under CEQA. Instead, new performance measures such as vehicle miles travelled (VMT) or other similar measures will be used.

In December 2018 CEQA Guidelines were updated to include a threshold for evaluating traffic impacts using the VMT methodology. This new methodology is required to be used statewide after July 2020. During the preparation of this traffic impact study, VMT thresholds were not yet adopted by the lead agency. Therefore, this traffic impact study follows current practice regarding lead agency guidance as of the date of preparation. As such, and because the County

of Riverside as the lead agency has not yet adopted VMT thresholds, the analysis for this project utilizes the LOS methodology.

3 EXISTING CONDITIONS

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

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the agreement with County of Riverside staff (Appendix 1.1), the study area includes a total of 9 existing and future intersections as shown previously on Exhibit 1-2. Exhibit 3-1 illustrates the study area intersections and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

3.2 COUNTY OF RIVERSIDE GENERAL PLAN CIRCULATION ELEMENT

3.2.1 COUNTY OF RIVERSIDE

The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the study area, as identified on the County of Riverside General Plan Circulation Element, are described subsequently. Exhibit 3-2 shows the County of Riverside General Plan Circulation Element, and Exhibit 3-3 illustrates the County of Riverside General Plan roadway cross-sections.

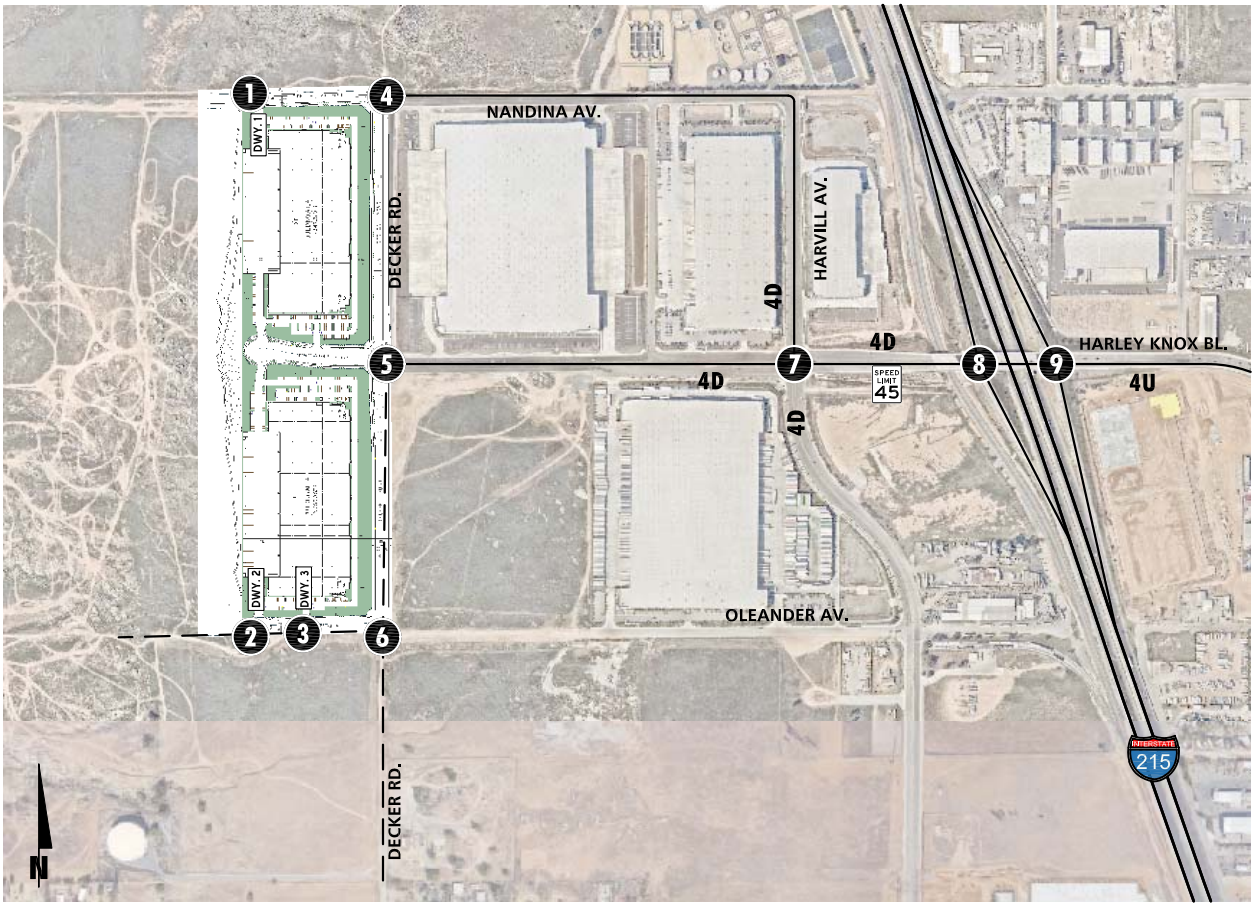
Urban Arterial Highways are 6 to 8 lanes with a minimum right-of-way of 152-feet. These highways are primarily for through traffic where traffic volumes exceed four-lane capacities. Access from other streets or highways shall be limited to approximately one-quarter mile intervals. The following study area roadway within the County of Riverside is classified as an Urban Arterial Highway:

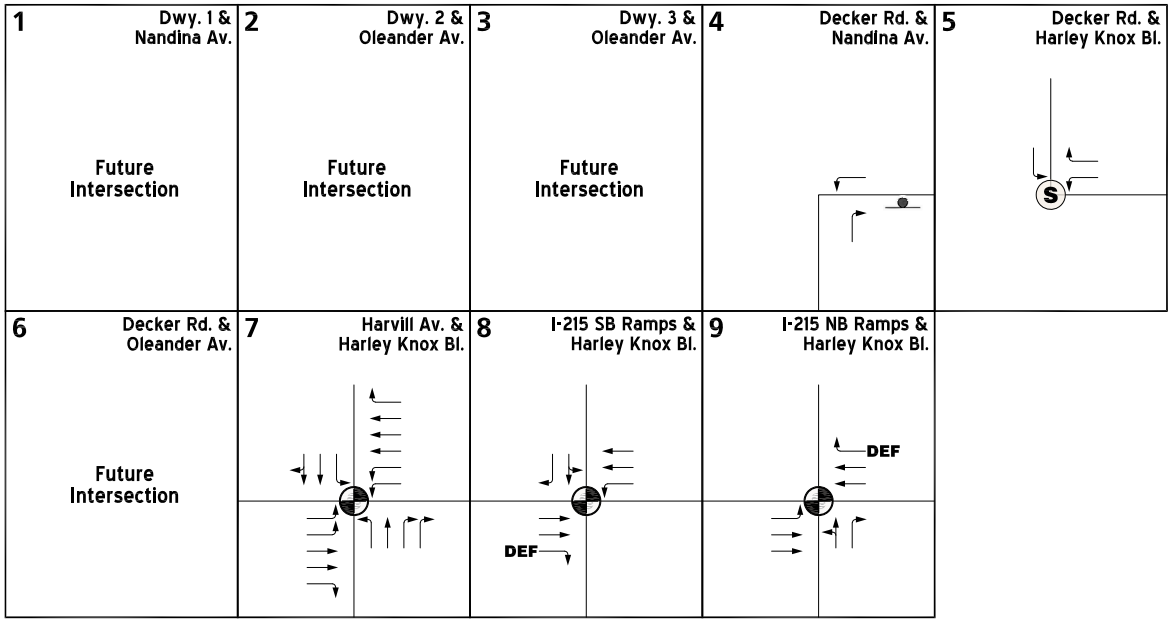
- Harley Knox Boulevard – from Decker Road to the I-215 Freeway

Major Highways are 4 lanes with a minimum right-of-way of 118-feet. These highways are intended to serve property zoned for major industrial and commercial uses, or to serve through traffic. Intersections with other streets or highways may be limited to approximately 660-foot intervals. The following study area roadway within the County of Riverside is classified as a Major Highway:

- Harvill Avenue
- Harley Knox Boulevard – west of Decker Road

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)

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URBAN CROSSROADS

EXHIBIT 3-2: RIVERSIDE COUNTY GENERAL PLAN CIRCULATION ELEMENT

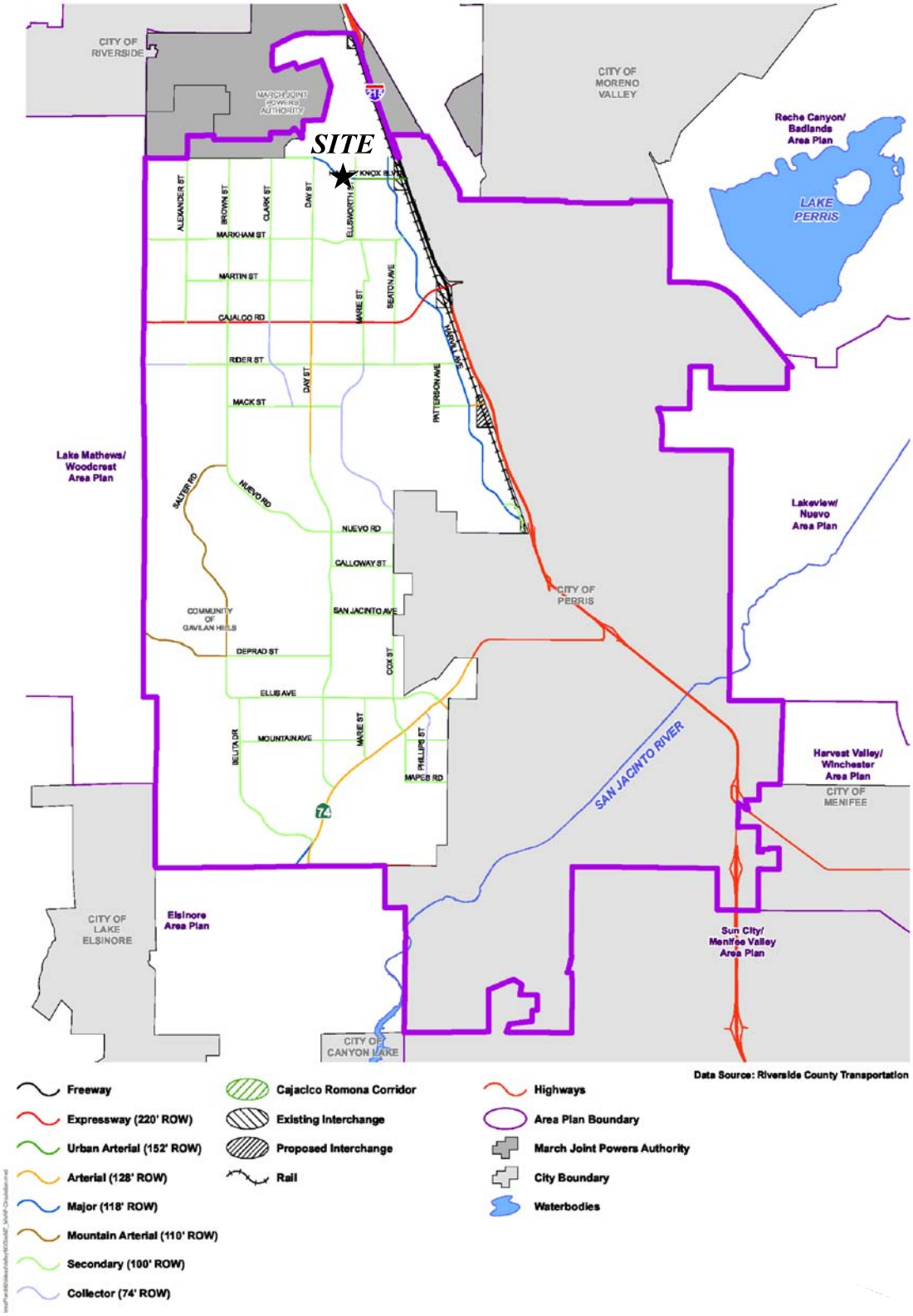
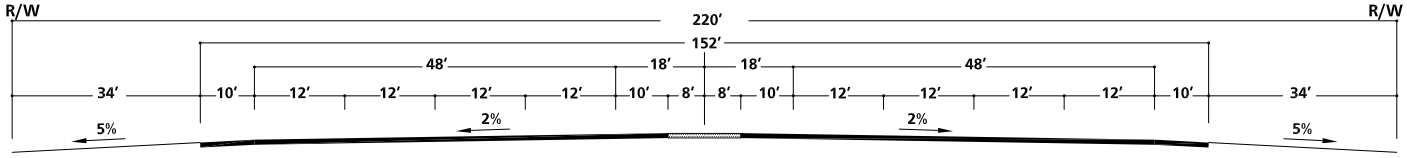
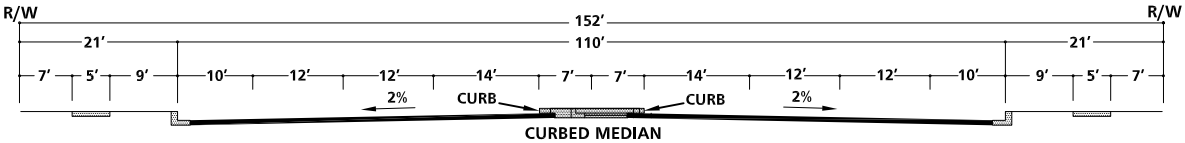


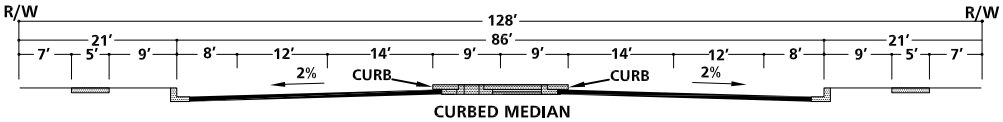
EXHIBIT 3-3: RIVERSIDE COUNTY GENERAL PLAN ROADWAY CROSS-SECTIONS



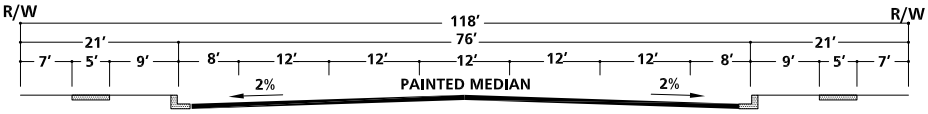
EXPRESSWAY - 8 LANES



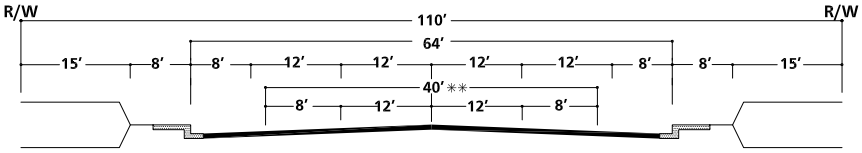
URBAN ARTERIAL HIGHWAY ✳



ARTERIAL HIGHWAY ✳

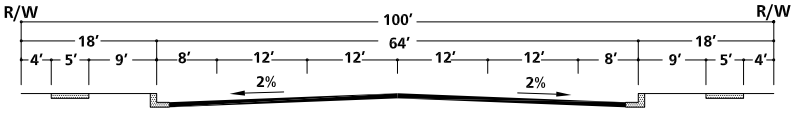


MAJOR HIGHWAY - 4 LANES

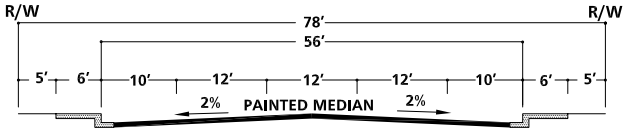


MOUNTAIN ARTERIAL - 2 TO 4 LANES

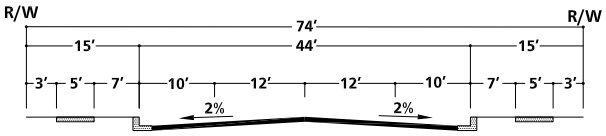
✳✳ 2 LANE SECTION



SECONDARY HIGHWAY



INDUSTRIAL COLLECTOR



COLLECTOR

✳ IMPROVEMENTS MAY BE RECONFIGURED TO ACCOMMODATE EXCLUSIVE TRANSIT LANES OR ALTERNATIVE LANE ARRANGEMENTS ADDITIONAL RIGHT OF WAY MAY BE REQUIRED AT INTERSECTIONS TO ACCOMMODATE ULTIMATE IMPROVEMENTS FOR STATE HIGHWAYS SHALL CONFORM TO CALTRANS DESIGN STANDARDS.

NOT TO SCALE

SOURCE: COUNTY OF RIVERSIDE

Secondary Highways are 4 lanes, generally with no turn lanes, and a minimum right-of-way of 100-feet. These highways are intended to serve through traffic along longer routes between major traffic generating areas or to serve property zoned for multiple residential, secondary industrial or commercial uses. Intersections with other streets and highways may be limited to 330-foot intervals. The following study area roadways within the County of Riverside are classified as a Secondary Highway:

- Decker Road
- Nandina Avenue – west of Day Street

Industrial Collectors are 2 lanes and have a minimum right-of-way of 78-feet. Industrial Collectors are circulatory streets with a continuous left-turn lane with at least one end connecting to a road of equal or greater classification. The following study area roadway within the County of Riverside is classified as an Industrial Collector:

- Oleander Avenue
- Nandina Avenue – from Decker Road to Harvill Avenue

3.3 TRUCK ROUTES

There are no truck routes defined within the County. Harley Knox Boulevard, east of the I-215 Freeway, is identified as designated City of Perris truck route.

3.4 BICYCLE & PEDESTRIAN FACILITIES

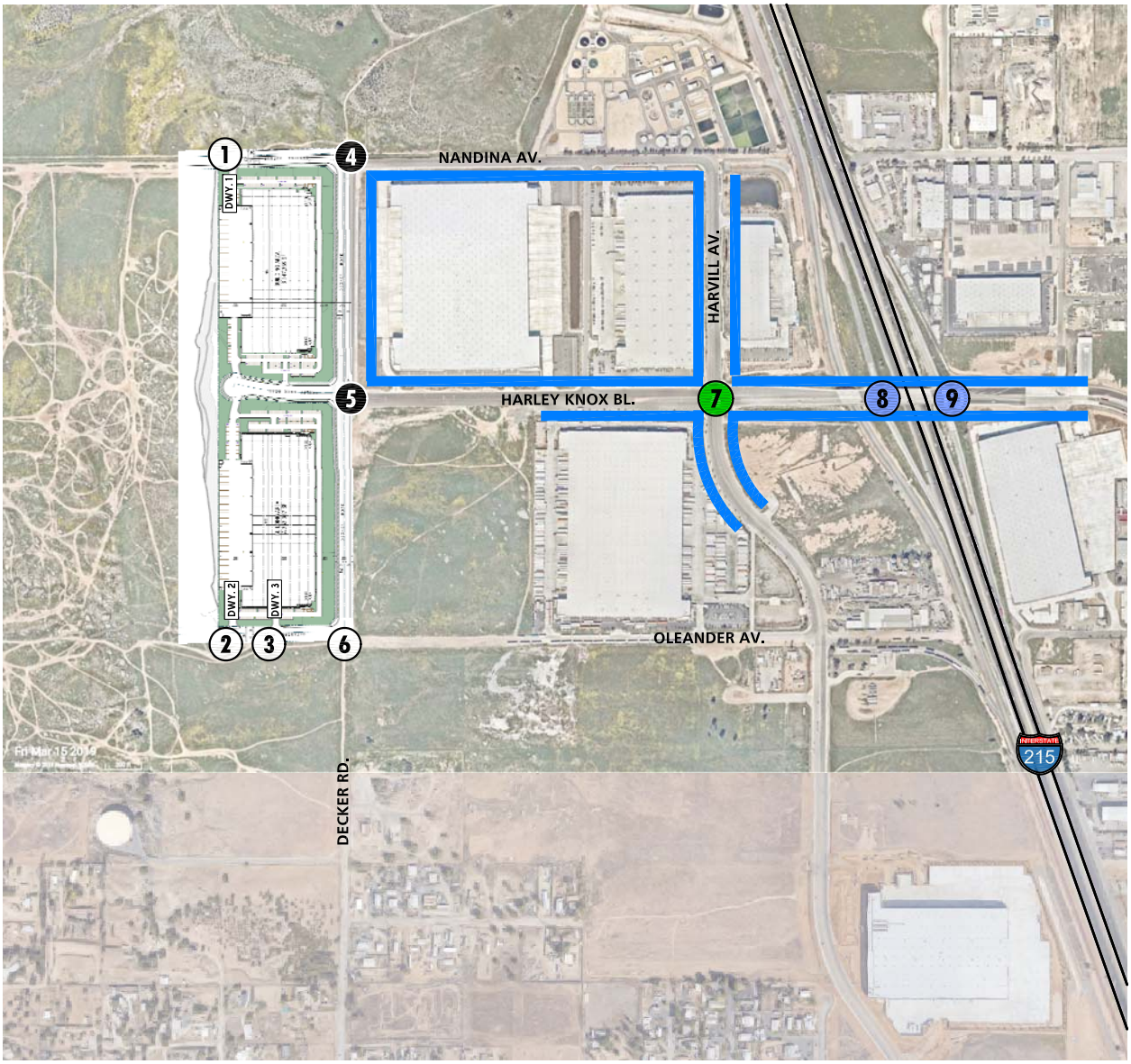
Field observations conducted in September 2018 indicate nominal pedestrian and bicycle activity within the study area. Exhibit 3-4 illustrates the existing pedestrian facilities, including sidewalks and crosswalk locations.

The trails and bikeway system, shown on Exhibit 3-5, shows the proposed trails are connected with major features within the County. There are proposed Community Trails along Oleander Avenue, Harvill Avenue (north of Oleander Avenue), and Harley Knox Boulevard within the study area.

3.5 TRANSIT SERVICE

The study area is currently served by the Riverside Transit Authority (RTA), a public transit agency serving the unincorporated Riverside County region. No bus routes currently provide proximate service (within one-quarter mile) of the Project site. Transit service is reviewed and updated by RTA 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. It is recommended that the Applicant work in conjunction with the Lead Agency and RTA to coordinate potential bus service to the Project site.

EXHIBIT 3-4: EXISTING PEDESTRIAN FACILITIES



LEGEND:

- = SIDEWALK
- 0 = FUTURE INTERSECTION
- 0 = CROSSWALK ON ALL APPROACHES
- 0 = CROSSWALK ON TWO APPROACHES
- 0 = NO CROSSWALK

N

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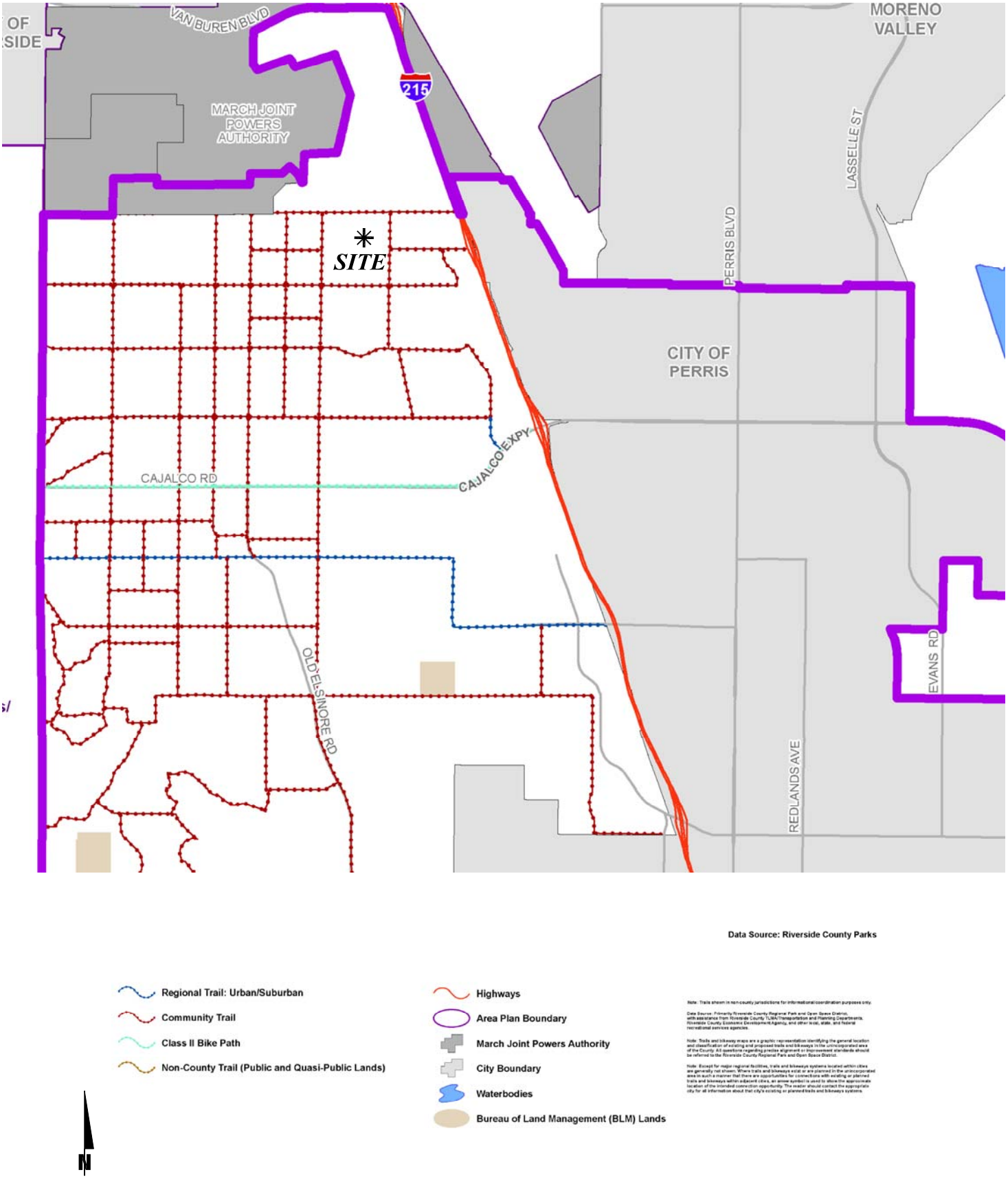
URBAN CROSSROADS

EXHIBIT 3-5: RIVERSIDE COUNTY TRAILS AND BIKEWAY SYSTEM



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3.6 TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in September 2018 plus an ambient growth rate of 2% to account for area growth. The following peak hours were selected for analysis:

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

The weekday AM and weekday PM peak hour count data is representative of typical weekday peak hour traffic conditions in the study area. There were no observations made in the field that would indicate atypical traffic conditions on the count dates, such as construction activity or detour routes and near-by schools were in session and operating on normal schedules. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1. These raw turning volumes have been flow conserved between intersections with limited access, no access and where there are currently no uses generating traffic (e.g., between ramp-to-arterial intersections, etc.). The traffic counts collected in September 2018 include the vehicle classifications as shown below:

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

To represent the impact large trucks, buses and recreational vehicles have on traffic flow; all trucks were converted into PCEs. By their size alone, these vehicles occupy the same space as two or more passenger cars. In addition, the time it takes for them to accelerate and slow-down is also much longer than for passenger cars, and varies depending on the type of vehicle and number of axles. For the purpose of this analysis, a PCE factor of 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 San Bernardino County CMP and are in excess of the corresponding factors recommended for use in the County of Riverside traffic study guidelines. (8) Although the County of Riverside has a recommended PCE factor of 2.0, the San Bernardino County CMP PCE factors have been utilized in an effort to conduct a more conservative analysis.

Existing weekday average daily traffic (ADT) volumes on arterial highways throughout the study area are shown on Exhibit 3-6. 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 17.3555 = 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 5.76 percent. As such, the above equation utilizing a factor of 17.3554 estimates the ADT volumes

on the study area roadway segments assuming a peak-to-daily relationship of approximately 5.76 percent (i.e., 1/0.0576 = 17.3555) 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 3-6.

3.7 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 existing study area intersections are currently operating at an acceptable LOS during the peak hours (i.e., LOS D or better).

Consistent with Table 3-1, a summary of the peak hour intersection LOS for Existing conditions are shown on Exhibit 3-7. The intersection operations analysis worksheets are included in Appendix 3.2 of this TIA.

3.8 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. No study area intersections currently warrant a traffic signal for Existing traffic conditions.

3.9 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Harley Knox Boulevard 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 mainline. Queuing analysis findings are presented in Table 3-2. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline. As shown on Table 3-2, there are no movements that are currently experiencing queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows. Worksheets for Existing traffic conditions off-ramp queuing analysis are provided in Appendix 3.3.

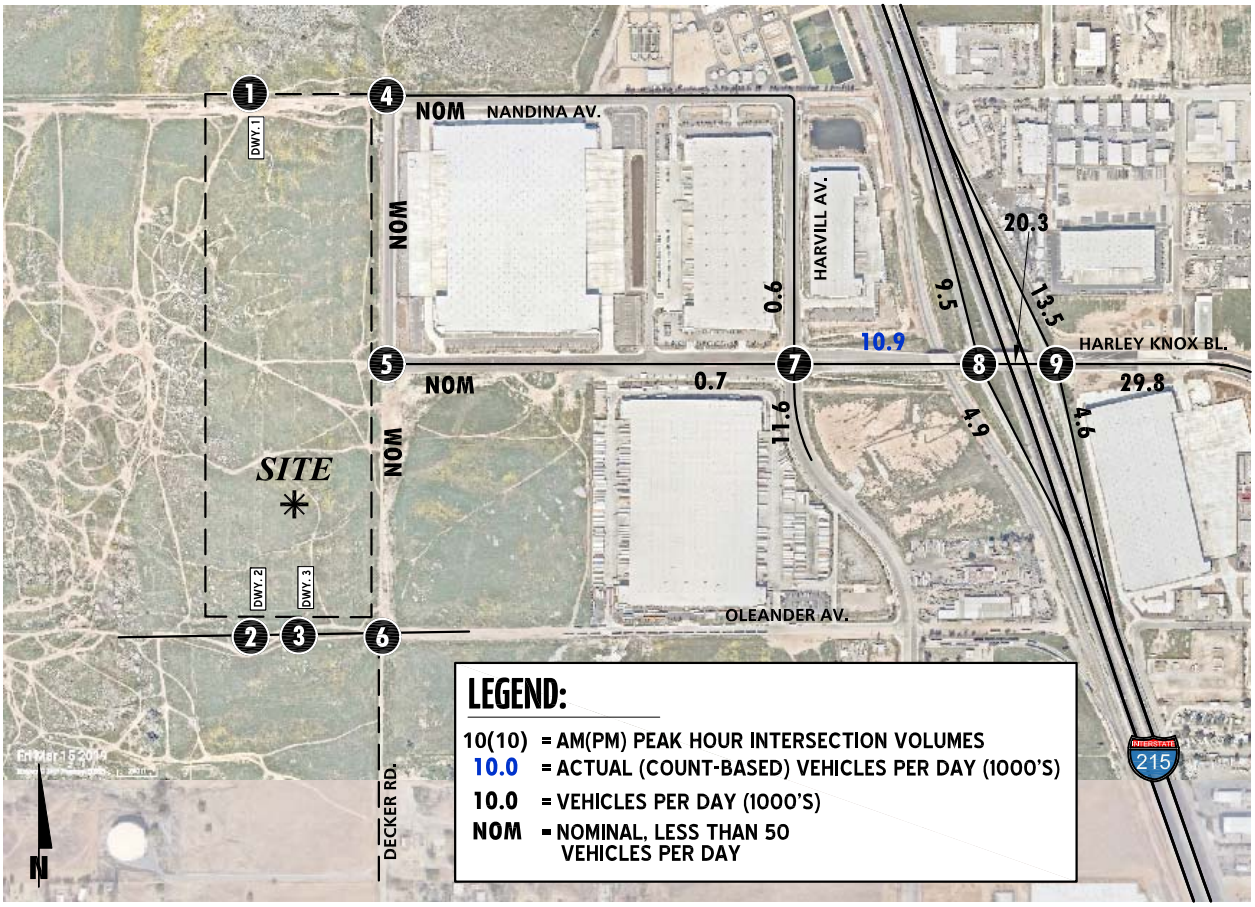
3.10 FREEWAY FACILITY ANALYSIS

Existing mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 3-8. As shown on Tables 3-3 and 3-4, the following study area freeway mainline segments and ramp merge/diverge junctions are anticipated to operate at an unacceptable LOS (i.e., LOS E or worse) during one or both peak hours:

- I-215 Northbound Mainline, South of Harley Knox Boulevard (#3) – LOS E AM peak hour only
- I-215 Northbound Ramp Diverge, Off-ramp at Harley Knox Boulevard (#3) – LOS E AM peak hour only

Existing freeway facility analysis worksheets are provided in Appendix 3.4.

EXHIBIT 3-6: EXISTING (2019) TRAFFIC VOLUMES (IN PCE)



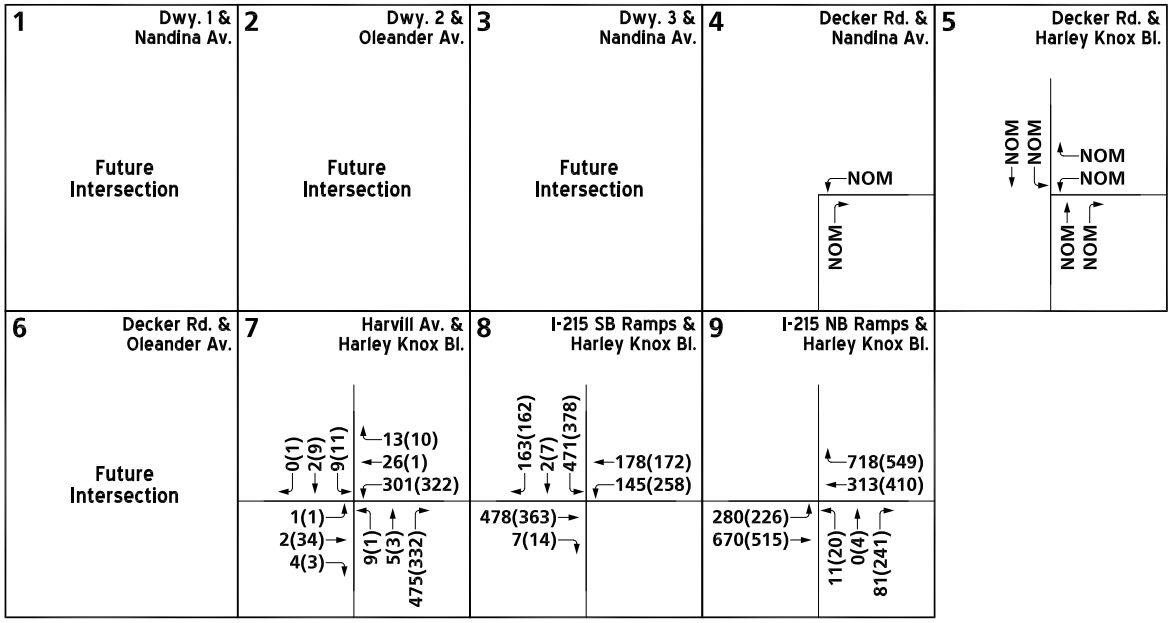
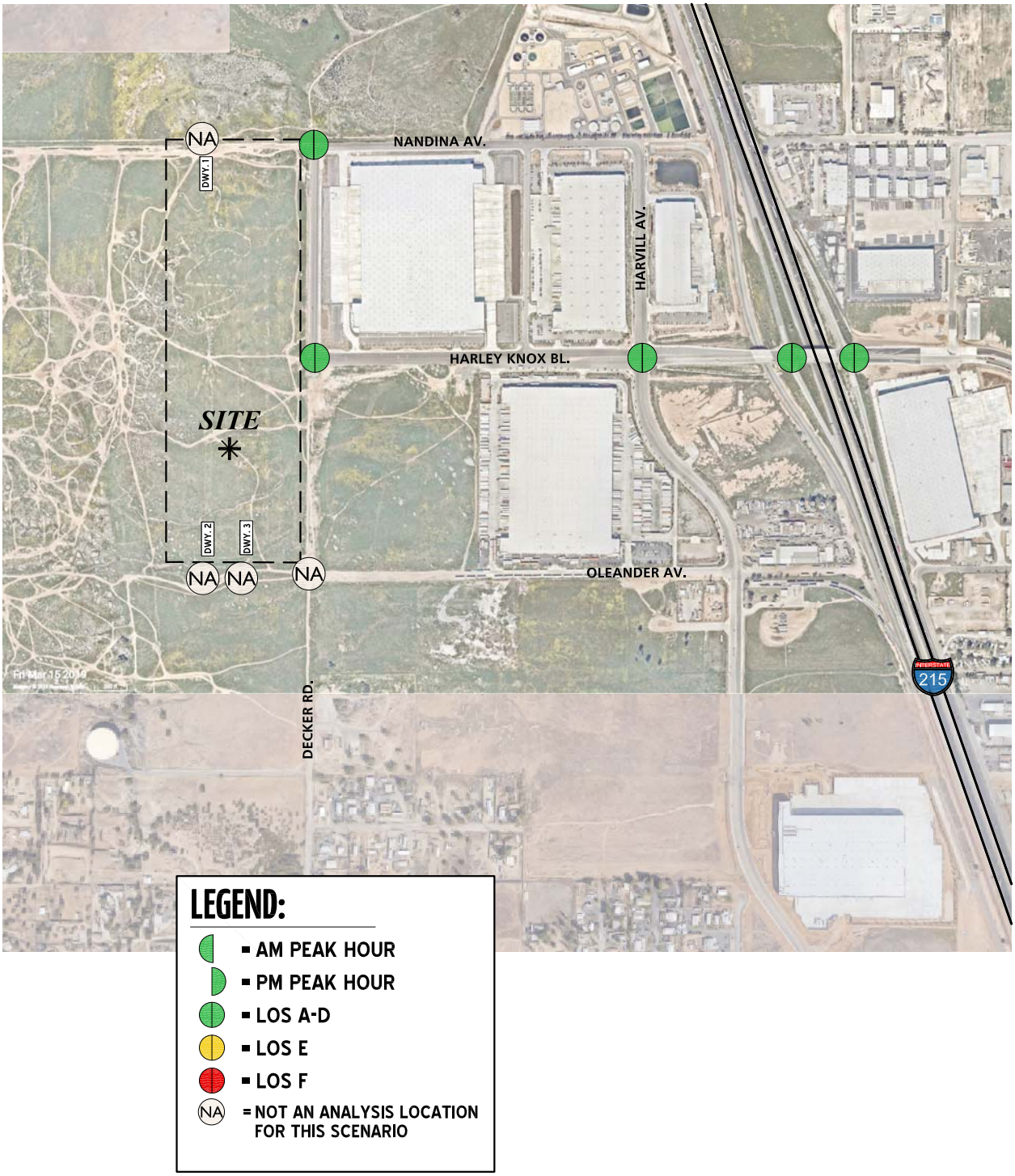


EXHIBIT 3-7: EXISTING (2019) SUMMARY OF LOS



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URBAN CROSSROADS

EXHIBIT 3-8: EXISTING (2019) FREEWAY MAINLINE VOLUMES

LEGEND:

⟵ 100/200 - AM/PM PEAK HOUR VOLUMES

NOTE: VOLUMES IN ACTUAL VEHICLES (NOT PCE)

N

Table 3-1

Intersection Analysis for Existing (2019) Conditions

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay (secs.)[2]		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1	Driveway 1 / Nandina Av.		Future Intersection															
2	Driveway 2 / Oleander Av.		Future Intersection															
3	Driveway 3 / Oleander Av.		Future Intersection															
4	Decker Rd. / Nandina Av.	CSS	0	0	1	0	0	0	0	0	0	1	0	0	0.0	0.0	A	A
5	Decker Rd. / Harley Knox Bl.	AWS	0	0	0	1	0	0	0	0	0	1	0	1	0.0	0.0	A	A
6	Decker Rd. / Oleander Av.		Future Intersection															
7	Harvill Av. / Harley Knox Bl.	TS	1	1	2	1	2	0	2	2	1	2	3	1	25.6	29.2	C	C
8	I-215 Southbound Ramps / Harley Knox Bl.	TS	0	0	0	0	1	1	0	2	d	1	2	0	25.9	28.4	C	C
9	I-215 Northbound Ramps / Harley Knox Bl.	TS	0	1	1	0	0	0	1	2	0	0	2	d	14.3	24.2	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

Table 3-2

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

Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM
I-215 SB Ramps / Harley Knox Bl.	SBL/T	1,330	336 [2]	310	Yes	Yes
	SBR	270	35	43	Yes	Yes
I-215 NB Ramps / Harley Knox Bl.	NBL/T	1,120	20	31	Yes	Yes
	NBR	265	33	44	Yes	Yes

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

[2] Maximum queue length for the approach reported.

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

Table 3-3

Basic Freeway Segment Analysis for Existing (2019) Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	Volume		Truck %	Truck %	Density[2]		LOS[3]	
				AM	PM	AM	PM	AM	PM	AM	PM
I-215	SB	North of Harley Knox Boulevard	3	3,880	5,276	3%	2%	20.9	30.7	C	D
		South of Harley Knox Boulevard	3	3,510	5,122	1%	1%	18.4	29.0	C	D
	NB	South of Harley Knox Boulevard	3	6,260	5,175	4%	3%	**43.3**	30.3	**E**	D
		North of Harley Knox Boulevard	3	5,497	4,755	3%	2%	33.3	26.5	D	D

* **BOLD** = Unacceptable Level of Service

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

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

[3] LOS = Level of Service

Table 3-4

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

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	AM Peak Hour		PM Peak Hour	
				Density[2]	LOS[3]	Density[2]	LOS[3]
I-215	SB	Off-Ramp at Harley Knox Boulevard	3	27.8	C	34.0	D
		On-Ramp at Harley Knox Boulevard	3	21.9	C	30.8	D
	NB	Off-Ramp at Harley Knox Boulevard	3	**39.3**	**E**	33.5	D
		On-Ramp at Harley Knox Boulevard	3	34.6	D	28.7	D

* **BOLD** = Unacceptable Level of Service

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

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

[3] LOS = Level of Service

3.11 RECOMMENDED IMPROVEMENTS

Improvement strategies have been recommended at intersections and freeway segments that have been identified as deficient under Existing (2019) traffic conditions in an effort to achieve an acceptable LOS (i.e., LOS D or better).

3.11.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

All study area intersections are currently operating at an acceptable LOS (LOS D) for Existing (2019) traffic conditions.

3.11.2 RECOMMENDED IMPROVEMENTS TO ADDRESS OFF-RAMP QUEUES

As shown previously on Table 3-2, there are no peak hour queuing issues at the I-215 Freeway at Harley Knox Boulevard interchange.

3.11.3 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON FREEWAY FACILITIES

The Project Study Report/Project Development Support in Riverside County on I-215 and SR-60 between Nuevo Road (I-215) & I-215/SR-60 Junction and Box Springs Road (I-215) & Day Street (SR-60), also known as the I-215 North Project, includes the construction of a high-occupancy vehicle (HOV) lane in each direction of the I-215 Freeway between Nuevo Road and Box Springs Road within the existing median. (9) (10)

At this time, the I-215 North Project has no anticipated start or completion date. Caltrans, the owner and operator of the SHS, has not identified or proposed other improvements to the study area SHS that would address existing and anticipated study area SHS LOS deficiencies.

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4 PROJECTED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment onto the study area roadway network. The Project is proposed to consist of a total of 710,736 square feet (sf) of high-cube warehouse and manufacturing uses divided over two buildings: Building A (363,367 sf) and Building B (347,369 sf). 20 percent of the total building square footage is assumed to be manufacturing use. The Project is anticipated to be constructed and occupied by 2021.

The Project is proposed to have access on Nandina Avenue via Driveway 1, Oleander Avenue via Driveways 2 and 3, and the northly and southerly driveways on Harley Knox Boulevard. All Project access points are assumed to allow full-access. Regional access to the Project site is provided via the I-215 Freeway at Harley Knox Boulevard interchange.

4.1 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic that is attracted and produced by a development, and is based upon the specific land uses planned for a given project. Trip generation rates (actual vehicles) for the Project are shown in Table 4-1 and trip generation rates (PCE) for the Project are shown in Table 4-2 illustrating daily and peak hour trip generation estimates based on the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, 2017, for High-Cube Transload and Short-Term Storage Warehouse (ITE Land Use Code 154). (3)

Data regarding the Project truck/passenger car vehicle mix has been obtained from High Cube Warehouse Vehicle Trip Generation Analysis (October 2016). (11) The South Coast Air Quality Management District's (SCAQMD) recommended truck mix, by axle type for high-cube warehouses has been utilized for the 2-axle, 3-axle, and 4+-axle trucks.

The trip generation rates used for this analysis are based upon information collected by the Institute of Transportation Engineers (ITE) as provided in their *Trip Generation* manual, 10th Edition, 2017. For purposes of this analysis, ITE land use codes 140 (Manufacturing) and 154 (High-Cube Warehouse/Distribution Center) have been used to derive site specific trip generation estimates. As noted on Table 4-1, refinements to the raw trip generation estimates have been made to provide a more detailed breakdown of trips by vehicle mix. Total vehicle mix percentages were also obtained from the ITE *Trip Generation* manual in conjunction with the South Coast Air Quality Management District's (SCAQMD) recommended truck mix, by axle type. Finally, 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 Congestion Management Program (CMP), 2016 Update. Trip generation rates with PCE factors are also shown on Table 4-1.

As shown on Table 4-2, the proposed Project is anticipated to generate a net total of 1,936 PCE trip-ends per day with 187 net PCE AM peak hour trips and 204 net PCE PM peak hour trips. For comparison, the proposed Project is anticipated to generate a net total of 1,366 actual vehicle trip-ends per day with 130 net actual vehicle AM peak hour trips and 153 net actual vehicle PM peak hour trips (as shown on Table 4-3).

4.2 PROJECT TRIP DISTRIBUTION

Trip distribution is the process of identifying the probable destinations, directions or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute.

The Project trip distribution was developed based on anticipated travel patterns to and from the site for both passenger cars and truck traffic. The truck trip distribution patterns have been developed based on the anticipated travel patterns for the high-cube warehousing trucks. The Project trip distribution patterns for both passenger cars and trucks were developed based on an understanding of existing travel patterns in the area, the geographical location of the site, and the site's proximity to the regional arterial and state highway system.

The Project passenger car trip distribution patterns are graphically depicted on Exhibit 4-1 and the Project truck trip distribution patterns are graphically depicted on Exhibit 4-2.

4.3 MODAL SPLIT

The traffic reducing potential of public transit, walking or bicycling have not been considered in this TIA.

4.4 PROJECT TRIP ASSIGNMENT

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

Table 4-1

Project Trip Generation Rates

Land Use[1]	Units[2]	ITE LU Code	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
PCE Rates									
High-Cube Warehouse/Distribution Center[3]	TSF	154	0.062	0.018	0.080	0.028	0.072	0.100	1.400
Passenger Cars			0.043	0.013	0.056	0.022	0.056	0.078	0.949
2-Axle Trucks (PCE = 1.5)			0.005	0.002	0.007	0.002	0.005	0.007	0.113
3-Axle Trucks (PCE = 2.0)			0.008	0.002	0.010	0.002	0.006	0.008	0.186
4-Axle+ Trucks (PCE = 3.0)			0.036	0.012	0.048	0.012	0.030	0.042	0.846
Manufacturing[4]	TSF	140	0.477	0.143	0.620	0.208	0.462	0.670	3.930
Passenger Cars			0.382	0.114	0.496	0.166	0.370	0.536	3.144
2-Axle Trucks (PCE = 1.5)			0.024	0.008	0.032	0.011	0.023	0.034	0.197
3-Axle Trucks (PCE = 2.0)			0.040	0.012	0.052	0.018	0.038	0.056	0.326
4-Axle+ Trucks (PCE = 3.0)			0.180	0.054	0.234	0.078	0.174	0.252	1.476
Land Use[1]	Units[2]	ITE LU Code	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Actual Vehicle Rates									
High-Cube Warehouse/Distribution Center[3]	TSF	154	0.062	0.018	0.080	0.028	0.072	0.100	1.400
Passenger Cars			0.043	0.013	0.056	0.022	0.056	0.078	0.949
2-Axle Trucks			0.003	0.001	0.004	0.001	0.003	0.004	0.075
3-Axle Trucks			0.004	0.001	0.005	0.001	0.003	0.004	0.093
4-Axle+ Trucks			0.012	0.004	0.016	0.004	0.010	0.014	0.282
Manufacturing[4]	TSF	140	0.477	0.143	0.620	0.208	0.462	0.670	3.930
Passenger Cars			0.382	0.114	0.496	0.166	0.370	0.536	3.144
2-Axle Trucks			0.016	0.005	0.021	0.007	0.015	0.022	0.131
3-Axle Trucks			0.020	0.006	0.026	0.009	0.019	0.028	0.163
4-Axle+ Trucks			0.060	0.018	0.078	0.026	0.058	0.084	0.492

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

[2] TSF = thousand square feet

[3] Vehicle Mix Source: Total truck percentage source from ITE Trip Generation manual for LU 154. Truck mix (by axle type) source from SCAQMD.

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

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

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

[4] Vehicle Mix Source: Total truck percentage source from ITE Trip Generation manual for LU 140. Truck mix (by axle type) source from SCAQMD.

AM/PM/Daily = 80.0% passenger cars, 3.34% 2-Axle trucks, 4.14% 3-Axle trucks, 12.52% 4-Axle trucks

Table 4-2

Project Trip Generation Summary (PCE)
80% High-Cube Warehouse and 20% Manufacturing

Land Use	Quantity	Units[1]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Building Area A (High-Cube Warehouse)	290.694	TSF							
Passenger Cars:			12	4	16	6	16	22	276
Truck Trips:									
2-axle:			1	1	2	1	1	2	34
3-axle:			2	1	3	1	2	3	56
4+-axle:			10	3	13	3	9	12	246
- Net Truck Trips (PCE) [2]			13	5	18	5	12	17	336
Building Area A (Manufacturing)	72.673	TSF							
Passenger Cars:			28	8	36	12	27	39	230
Truck Trips:									
2-axle:			2	1	3	1	2	3	16
3-axle:			3	1	4	1	3	4	24
4+-axle:			13	4	17	6	13	19	108
- Net Truck Trips (PCE) [2]			18	6	24	8	18	26	148
Building Area B (High-Cube Warehouse)	277.895	TSF							
Passenger Cars:			12	4	16	6	16	22	264
Truck Trips:									
2-axle:			1	1	2	1	1	2	32
3-axle:			2	1	3	1	2	3	52
4+-axle:			10	3	13	3	8	11	236
- Net Truck Trips (PCE) [2]			13	5	18	5	11	16	320
Building Area B (Manufacturing)	69.474	TSF							
Passenger Cars:			27	8	35	12	26	38	220
Truck Trips:									
2-axle:			2	1	3	1	2	3	14
3-axle:			3	1	4	1	3	4	24
4+-axle:			13	4	17	5	12	17	104
- Net Truck Trips (PCE) [2]			18	6	24	7	17	24	142
TOTAL NET TRIPS (PCE) [3]			***141***	***46***	***187***	***61***	***143***	***204***	***1,936***

[1] TSF = thousand square feet

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

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

Table 4-3

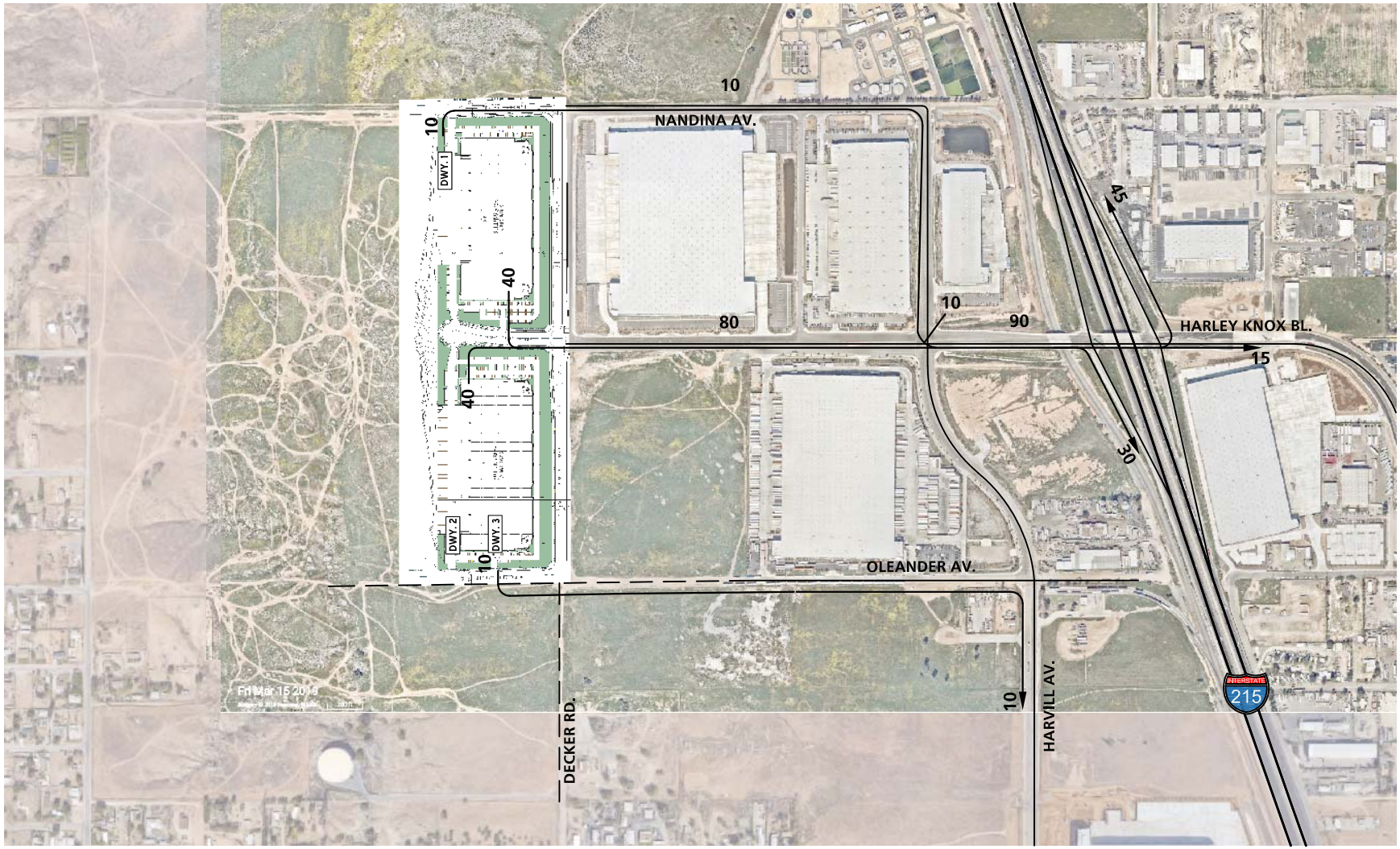
Project Trip Generation Summary (Actual Vehicles)
80% High-Cube Warehouse and 20% Manufacturing

Land Use	Quantity	Units[1]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Building Area A (High-Cube Warehouse)	290.694	TSF							
Passenger Cars:			12	4	16	6	16	22	276
Truck Trips:									
2-axle:			1	0	1	0	1	1	22
3-axle:			1	0	1	0	1	1	28
4+-axle:			3	1	4	1	3	4	82
- Net Truck Trips			6	1	6	1	5	6	132
Building Area A (Manufacturing)	72.673	TSF							
Passenger Cars:			28	8	36	12	27	39	230
Truck Trips:									
2-axle:			1	0	1	1	1	2	10
3-axle:			1	0	1	1	1	2	12
4+-axle:			4	1	5	2	4	6	36
- Net Truck Trips			6	1	7	4	6	10	58
Building Area B (High-Cube Warehouse)	277.895	TSF							
Passenger Cars:			12	4	16	6	16	22	264
Truck Trips:									
2-axle:			1	0	1	0	1	1	22
3-axle:			1	0	1	0	1	1	26
4+-axle:			3	1	4	1	3	4	80
- Net Truck Trips			5	2	7	1	5	6	128
Building Area B (Manufacturing)	69.474	TSF							
Passenger Cars:			27	8	35	12	26	38	220
Truck Trips:									
2-axle:			1	0	1	0	1	1	10
3-axle:			1	0	1	1	1	2	12
4+-axle:			4	1	5	2	4	6	36
- Net Truck Trips			6	1	7	3	6	9	58
TOTAL NET TRIPS[2]			***101***	***29***	***130***	***44***	***107***	***153***	***1,366***

[1] TSF = thousand square feet

[2] TOTAL NET TRIPS = Passenger Cars + Net Truck Trips.

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



LEGEND:

10 = PERCENT TO/FROM PROJECT

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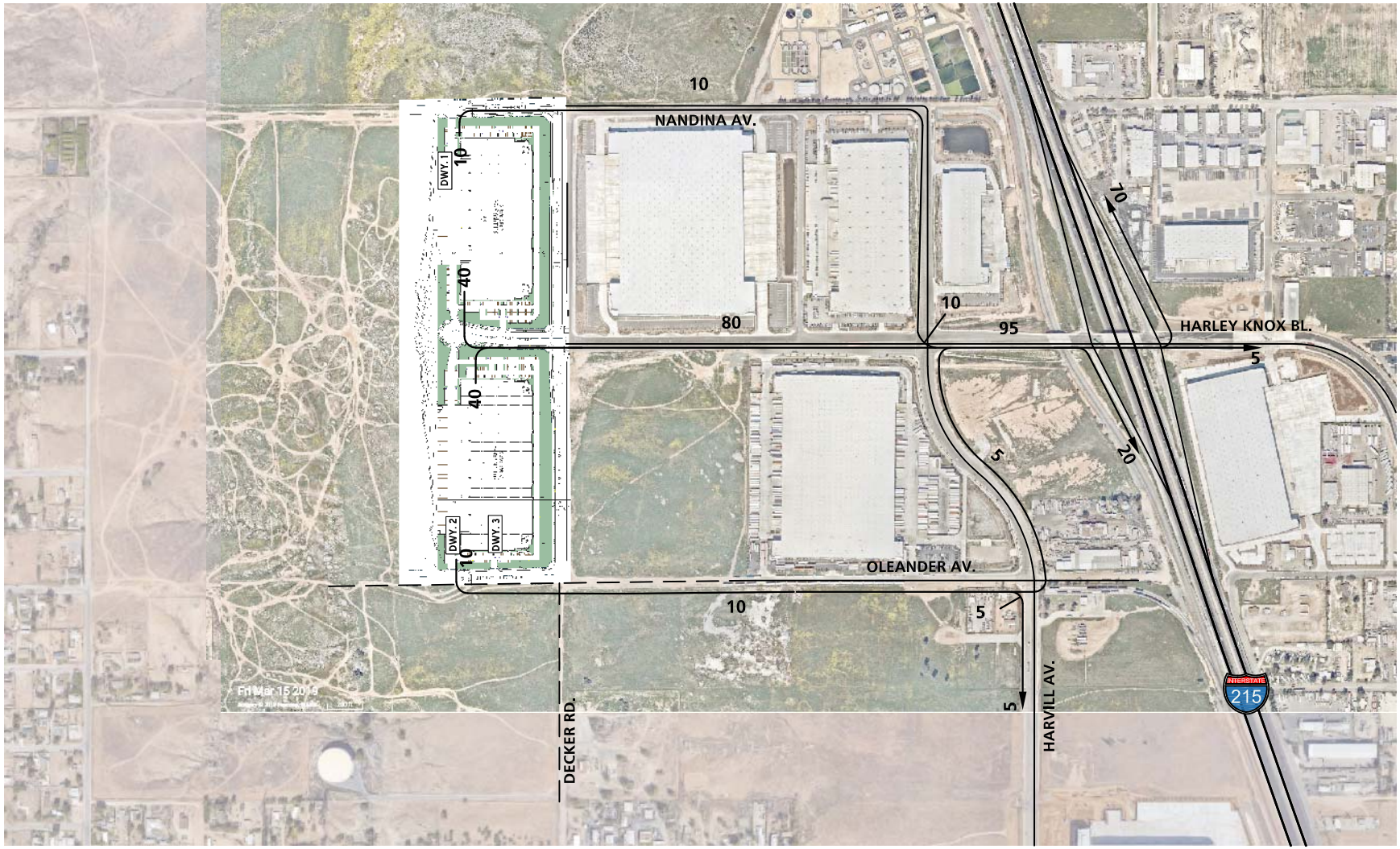
EXHIBIT 4-2: PROJECT (TRUCKS) TRIP DISTRIBUTION



LEGEND:

10 = PERCENT TO/FROM PROJECT

N

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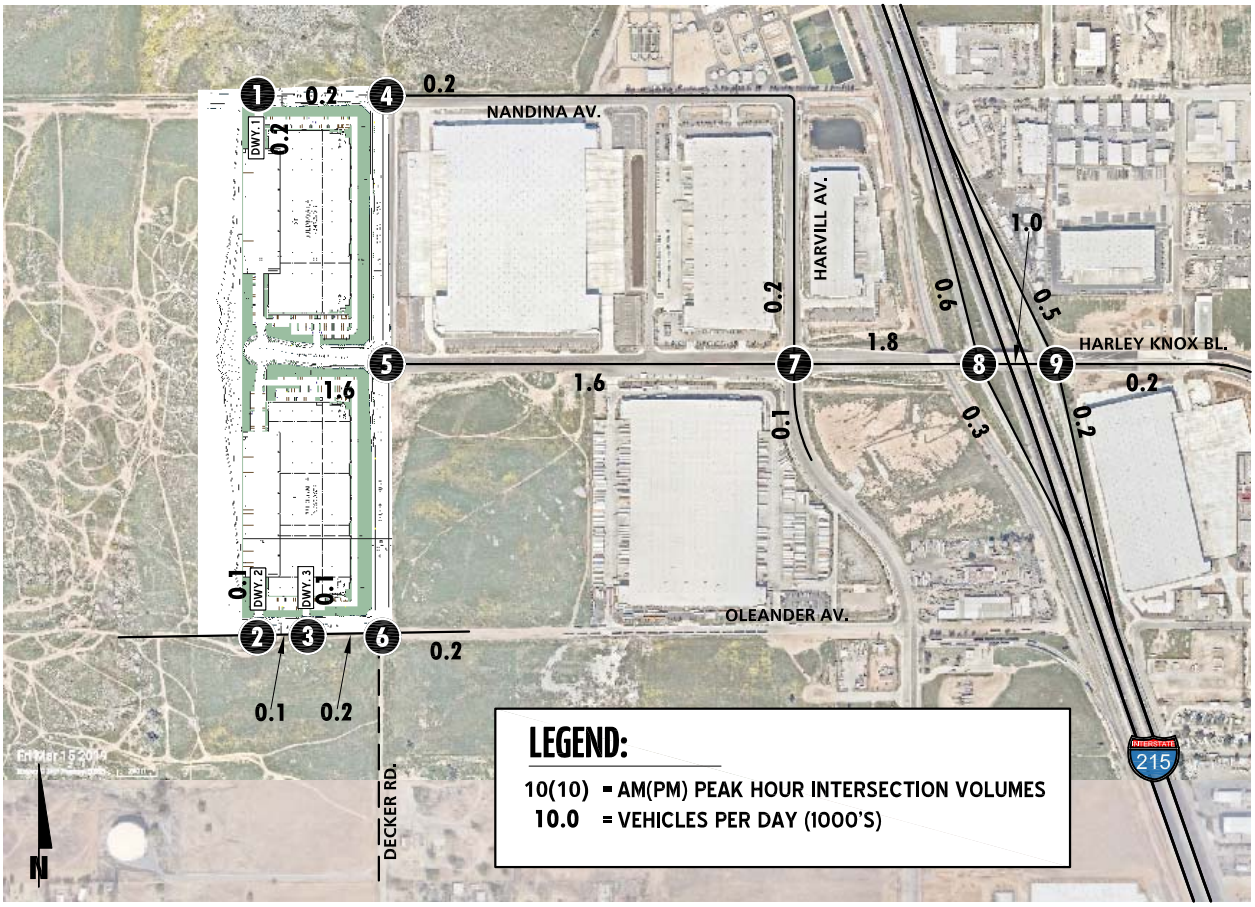
URBAN CROSSROADS

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



1 Dwy. 1 & Nandina Av.	2 Dwy. 2 & Oleander Av.	3 Dwy. 3 & Nandina Av.	4 Decker Rd. & Nandina Av.	5 Decker Rd. & Harley Knox Bl.
←0(0) ←14(6)	0(0) 2(6) ←6(3) ←0(0)	0(0) 2(9) ←8(4) ←6(3)	←14(6) ←0(0)	0(0) 0(0) 0(0) ←0(0) ←113(49) ←0(0)
0(0)→ 0(0)→ 0(0) 5(14)	0(0)→ 0(0)→	0(0)→ 2(6)→	5(14)→ 0(0)→ 0(0) 0(0)	0(0)→ 37(114)→ 0(0)→ 0(0) 0(0) 0(0)

6 Decker Rd. & Oleander Av.	7 Harvill Av. & Harley Knox Bl.	8 I-215 SB Ramps & Harley Knox Bl.	9 I-215 NB Ramps & Harley Knox Bl.
0(0) 0(0) 0(0) ←0(0) ←14(6) ←0(0)	0(0) 0(0) 5(14) ←14(6) ←113(49) ←3(1)	79(34) 0(0) 0(0) ←51(22) ←0(0)	←0(0) ←15(7)
0(0)→ 5(14)→ 0(0)→ 0(0) 0(0) 0(0)	0(0)→ 37(114)→ 0(0)→ 0(0) 0(0) 1(3)	31(95)→ 12(37)→	26(79)→ 5(16)→ 36(16) 0(0) 0(0)

4.5 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon background (ambient) growth at 2% per year for 2021 traffic conditions, consistent with the County of Riverside's traffic study requirements. The ambient growth factor is intended to approximate regional traffic growth. This ambient growth rate is added to existing traffic volumes to account for area-wide growth not reflected by cumulative development projects. Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the development of future projects that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies. The currently adopted Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan (RTP) (April 2016) growth forecasts for the unincorporated areas of the County of Riverside identifies projected growth in population of 359,000 in 2012 to 499,200 in 2040, or a 139.1 percent increase over the 28 year period. (12) The change in population equates to roughly a 1.18 percent growth rate compounded annually. Similarly, growth over the same 28 year period in households is projected to increase by 145.1 percent, or 1.34 percent annual growth rate. Finally, growth in employment over the same 28 year period is projected to increase by 222.1 percent, or a 2.89 percent annual growth rate.

Based on a comparison of Existing traffic volumes to the EAPC (2021) forecasts, the average growth rate is estimated at approximately 41.54 percent compounded annually between Existing and EAPC (2021) traffic conditions. The annual growth rate at each individual intersection is not lower than 35.33 percent compounded annually to as high as 45.53 percent compounded annually over the same 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 Riverside for EAPC (2021) 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 related development projects 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 Riverside. The cumulative project list includes known and foreseeable projects that are anticipated to contribute traffic to the study area intersections.

Where applicable, cumulative projects anticipated to contribute measurable traffic (i.e. 50 or more peak hour trips) to study area intersections have been manually added to the study area network to generate EAPC (2021) forecasts. In other words, this list of cumulative development projects has been reviewed to determine which projects would likely contribute measurable traffic through the study area intersections (e.g., those cumulative projects in close proximity to the proposed Project). For the purposes of this analysis, the cumulative projects that were

determined to affect one or more of the study area intersections are shown on Exhibit 4-4 and listed on Table 4-4. Any other cumulative projects that are not expected to contribute measurable traffic to study area intersections have not been included since the traffic would dissipate due to the distance from the Project site and study area intersections. Any additional traffic generated by other projects not on the cumulative projects list is accounted by the assumed 2% ambient growth factor noted previously.

4.7 OPENING YEAR (2021) TRAFFIC FORECASTS

To provide a comprehensive assessment of potential transportation network deficiencies, a "buildup" analysis was performed in support of this work effort. The "buildup" method was used to approximate the EAP and EAPC (2021) traffic forecasts that includes background traffic, and is intended to identify the significant impacts on both the existing and planned near-term circulation system. The "buildup" method was also utilized to approximate the EAP and EAPC (2021) traffic forecasts, and is intended to identify the cumulative impacts on both the existing and planned near-term circulation system. The EAP and EAPC (2021) traffic forecasts include background traffic, traffic generated by other cumulative development projects within the study area, and the traffic generated by the proposed Project.

The 2021 roadway network is similar to the existing conditions roadway network with the exception of future roadways and intersections proposed to be developed by the Project and other near-by cumulative projects.

The EAP and EAPC (2021) traffic analysis includes the following traffic conditions, with the various traffic components:

- EAP (2021)
    - Existing 2018 counts plus ambient growth (2.0%)
    - Ambient growth traffic (4.04% increase from Existing 2018 counts plus ambient growth (2.0%))
    - Project traffic
- EAPC (2021)
    - Existing 2018 counts plus ambient growth (2.0%)
    - Ambient growth traffic (4.04% increase from Existing 2018 counts plus ambient growth (2.0%))
    - Cumulative Development Project traffic
    - Project traffic

EXHIBIT 4-4: CUMULATIVE DEVELOPMENT LOCATION MAP

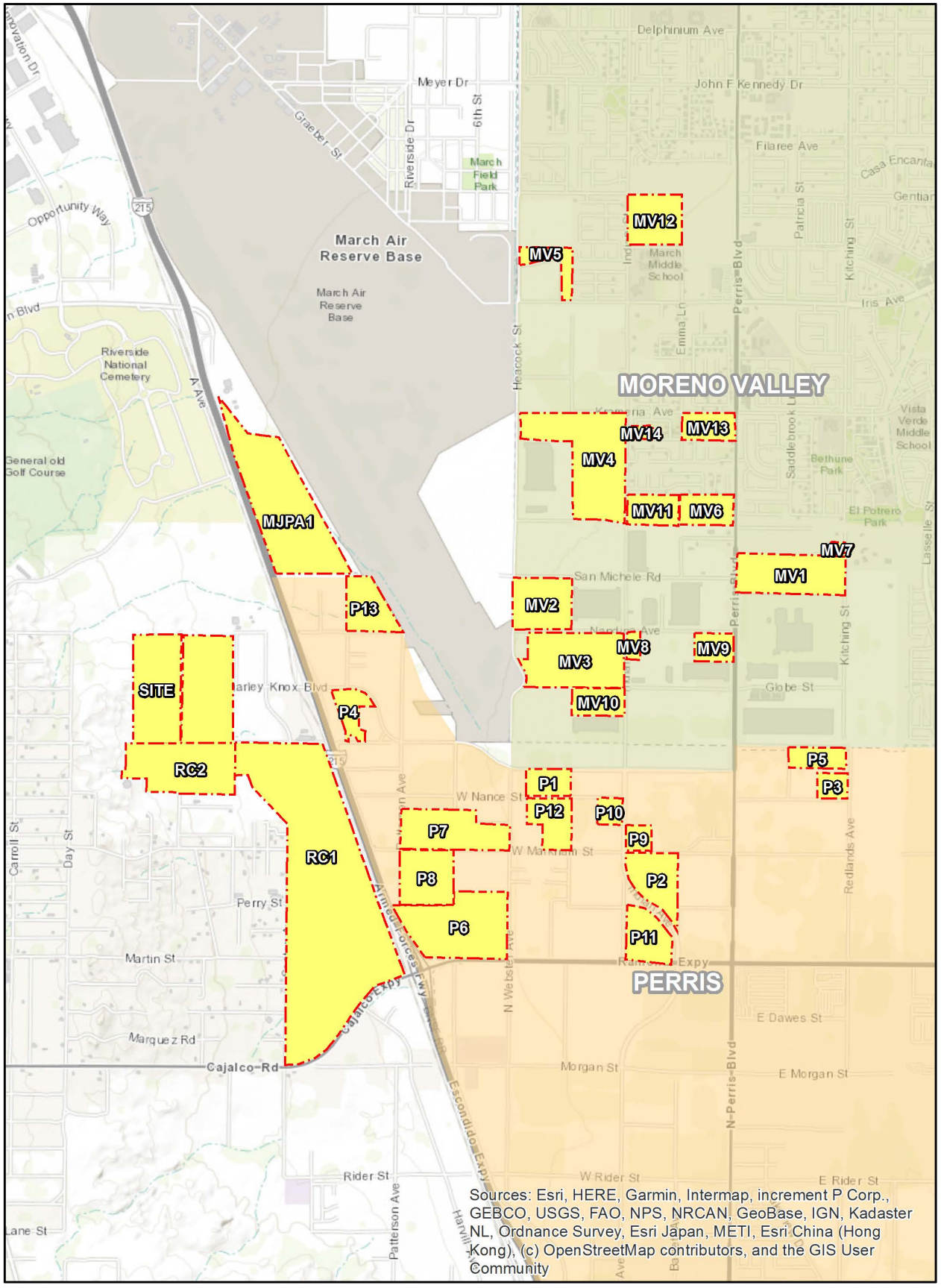


Table 4-4

Cumulative Development Land Use Summary

No.	Project Name / Case Number	Jurisdiction	Land Use[1]	Quantity	Units[2]	Location
P1	Bargemann / DPR 07-09-0018	Perris	Warehousing	173.00	TSF	NEC OF WEBSTER & NANCE
P2	Duke 2 / DPR 16-00008	Perris	High-Cube Warehouse	669.00	TSF	NEC OF INDIAN & MARKHAM
P3	Perris Circle 3	Perris	Warehousing	210.90	TSF	NWC OF REDLANDS AVE. AND NANCE AVE.
P4	Gateway / DPR 16-00003	Perris	High-Cube Warehouse	400.00	TSF	SOUTH OF HARLEY KNOX BLVD. EAST OF HWY. 215
P5	Harley Knox Commerce Park / DPR 16-004	Perris	High-Cube Warehouse	386.28	TSF	NWC OF HARLEY KNOX BLVD. & REDLANDS AVE.
P6	OLC 1 / DPR 12-10-0005	Perris	High-Cube Warehouse	1,455.00	TSF	WEST OF WEBSTER AVE. NORTH OF RAMONA EXWY.
P7	OLC2 / DPR 14-01-0015	Perris	High-Cube Warehouse	1,037.00	TSF	WEST OF WEBSTER AVE. NORTH OF MARKHAM ST.
P8	Duke at Patterson / DPR 17-00001	Perris	High-Cube Warehouse	811.00	TSF	SEC OF PATTERSON AVE. & MARKHAM ST.
P9	Markham Industrial / DPR 16-00015	Perris	Warehousing	170.00	TSF	NEC OF INDIAN AVE. & MARKHAM ST.
P10	Westcoast Textile / DPR 16-00001	Perris	Warehousing	180.00	TSF	SWC OF INDIAN ST. & NANCE ST.
P11	Indian/Ramona Warehouse	Perris	High-Cube Warehouse	428.73	TSF	NORTH OF RAMONA EXWY. WEST OF INDIAN AVE.
P12	IPT Perris DC II	Perris	High-Cube Warehouse	273.00	TSF	NEC OF WEBSTER & MARKHAM
P13	Western / Nandina Warehouse	Perris	High-Cube Warehouse	252.03	TSF	NEC OF WESTERN & NANDINA
MV1	Kearney	Moreno Valley	High-Cube Warehouse	1,100.00	TSF	EAST OF PERRIS BLVD. AT SAN MICHEL RD.
MV2	IDS	Moreno Valley	High-Cube Warehouse	701.00	TSF	SEC OF HEACOCK ST. & SAN MICHELE RD.
MV3	First Industrial	Moreno Valley	High-Cube Warehouse	1,380.00	TSF	SWC OF INDIAN AVE. & NANDINA AVE.
MV4	Prologis 1	Moreno Valley	High-Cube Warehouse	1,000.00	TSF	NEC OF INDIAN AVE. & MARIPOSA AVE.
MV5	Moreno Valley Industrial Park	Moreno Valley	High-Cube Warehouse	207.68	TSF	NEC OF HEACOCK ST. & IRIS AVE.
MV6	Tract 31442	Moreno Valley	SFDR	63.00	DU	NWC OF PERRIS BLVD. & MARIPOSA AVE.
MV7	Moreno Valley Utility Substation	Moreno Valley	High-Cube Warehouse	PUBLIC	TSF	NWC OF EDWIN RD. & KITCHING ST.
MV8	Phelan Development	Moreno Valley	High-Cube Warehouse	98.21	TSF	SEC OF INDIAN ST. & NANDINA AVE.
MV9	Nandina Industrial Center	Moreno Valley	High-Cube Warehouse	335.97	TSF	SOUTH OF NANDINA AVE. WEST OF PERRIS BLVD.
MV10	Indian Street Commerce Center	Moreno Valley	High-Cube Warehouse	433.92	TSF	SWC OF INDIAN ST. & GROVEVIEW RD.
MV11	Tract 32716	Moreno Valley	SFDR	57.00	DU	NEC OF INDIAN ST. & MARIPOSA AVE.
MV12	Tract 36760	Moreno Valley	SFDR	221.00	DU	SEC OF INDIAN ST. & GENTIAN AVE.
MV13	PEN18-0042	Moreno Valley	SFDR	2.00	DU	SEC OF INDIAN ST. & KRAMERIA AVE.
MV14	Tract 33024	Moreno Valley	SFDR	8.00	DU	SEC OF INDIAN ST. & KRAMERIA AVE.
MJPA1	VIP 215	March JPA	High-Cube Warehouse	2,219.85	TSF	NORTH OF NANDINA AVE. EAST OF HWY. 215
RC1	Majestic Freeway Business Center SP	Riverside County	General Light Industrial	6,200.00	TSF	NORTH OF RAMONA EXPY. SOUTH OF NANDINA AVE. WEST OF HWY. 215
RC2	Knox Business Park	Riverside County	High-Cube Warehouse	1,259.05	TSF	SOUTH OF OLEANDER AVE., WEST OF DECKER RD., & EAST OF DECKER RD.

[1] SFDR = Single Family Detached Residential

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

5 E+P TRAFFIC CONDITIONS

This section discusses the traffic forecasts for Existing plus Project (E+P) conditions and the resulting intersection operations, traffic signal warrant, and freeway mainline operations 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 EXISTING PLUS PROJECT TRAFFIC VOLUME FORECASTS

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

5.3 INTERSECTION OPERATIONS ANALYSIS

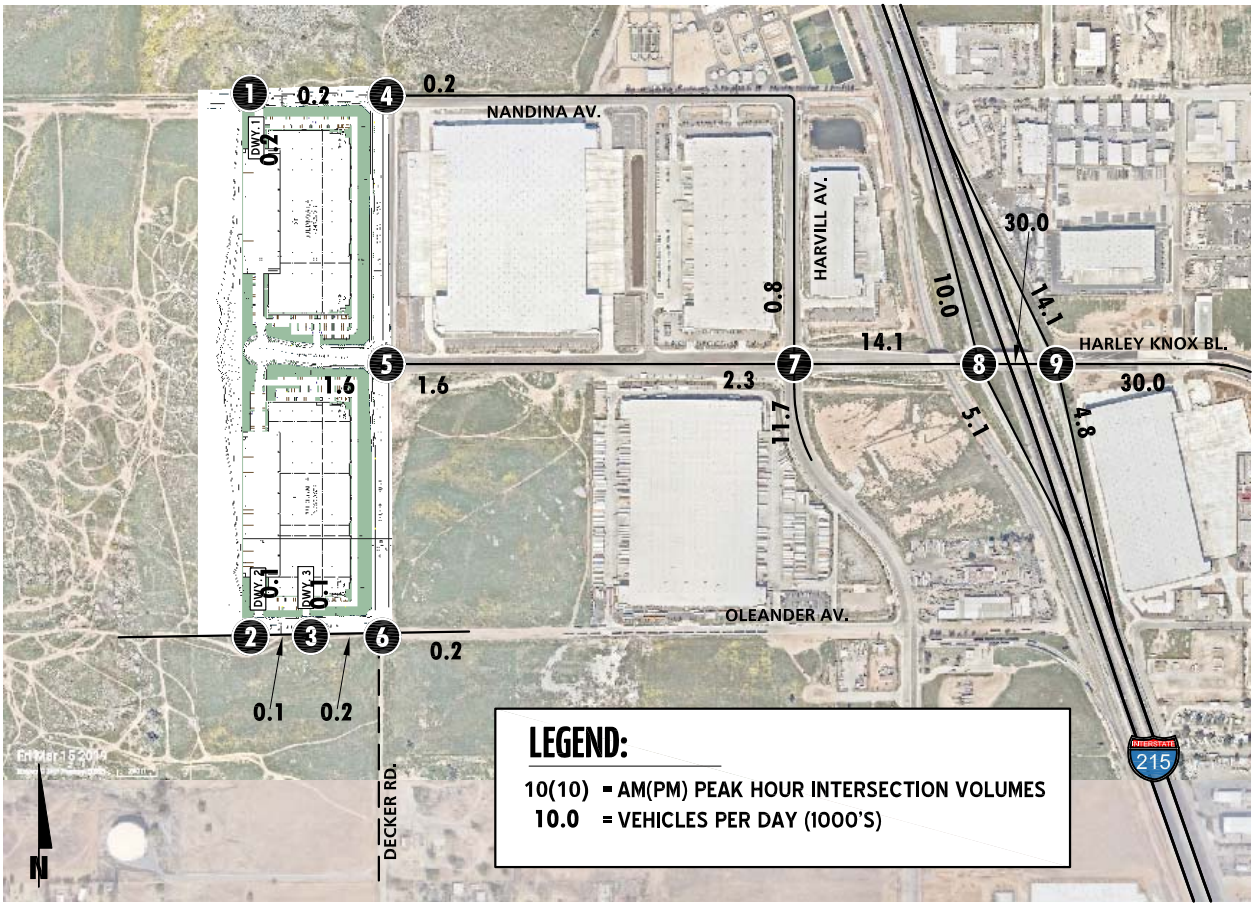
E+P peak hour traffic operations have been evaluated, for each phase of development, for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 5-1, which indicates that the study area intersections are anticipated to continue to operate at acceptable LOS under E+P traffic conditions, consistent with Existing traffic conditions. As such, the impact to study area intersections from the addition of Project traffic is anticipated to be less than significant.

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

5.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no intersections anticipated to meet traffic signal warrants for E+P traffic conditions (see Appendix 5.2).

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



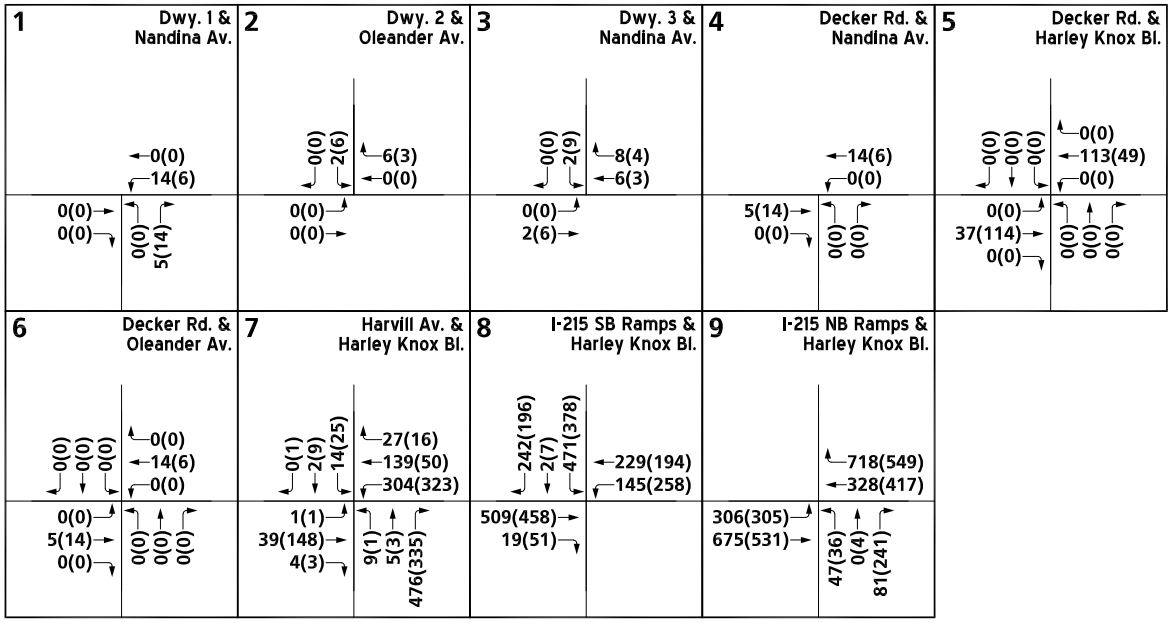
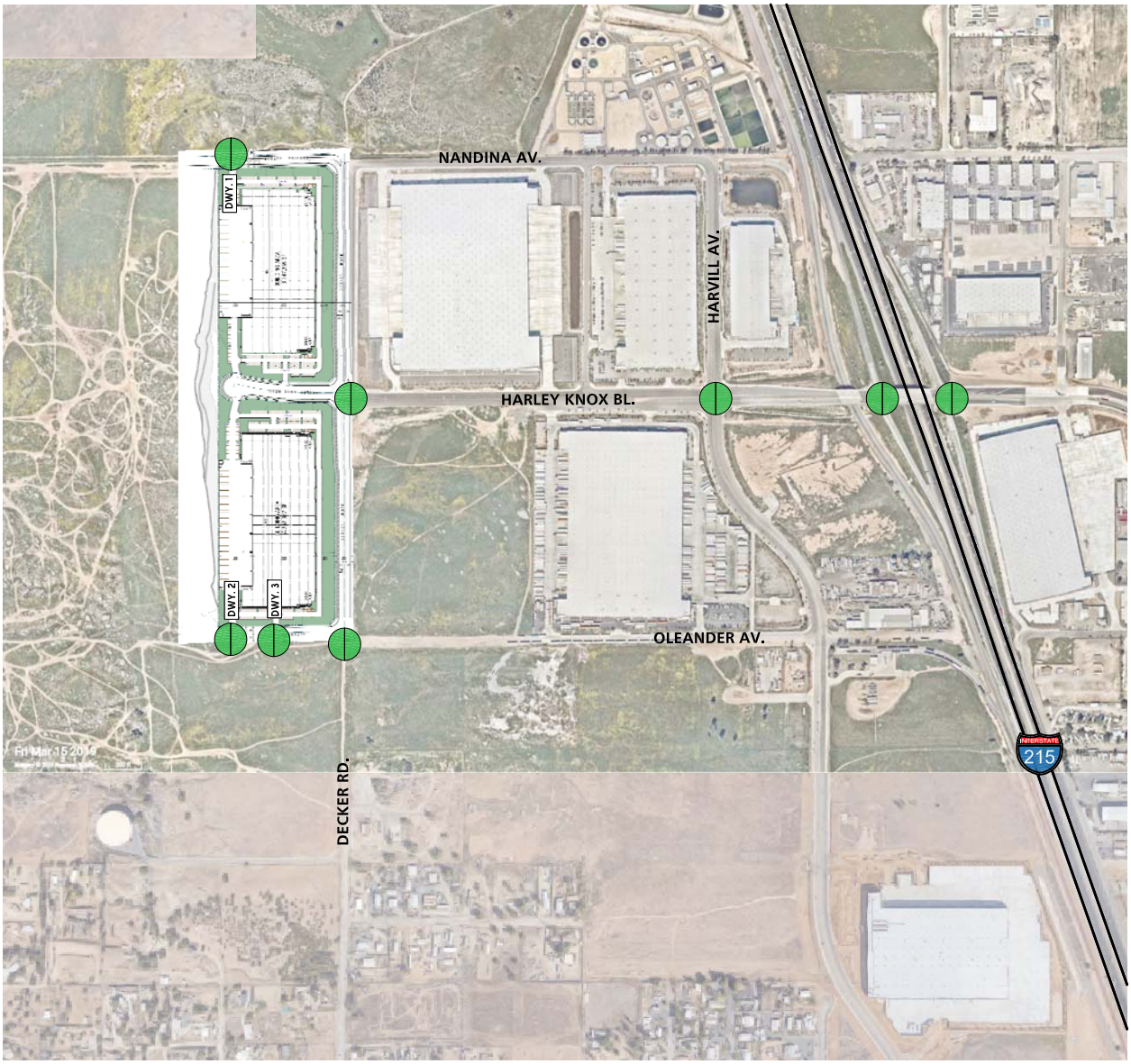


EXHIBIT 5-2: E+P SUMMARY OF LOS



LEGEND:

- = AM PEAK HOUR
- = PM PEAK HOUR
- = LOS A-D
- = LOS E
- = LOS F

N

Table 5-1

Intersection Analysis for E+P Conditions

#	Intersection	Traffic Control[2]	Existing (2019) Delay[1] (secs.) AM	Existing (2019) Delay[1] (secs.) PM	Existing (2019) Level of Service AM	Existing (2019) Level of Service PM	E+P Delay[1] (secs.) AM	E+P Delay[1] (secs.) PM	E+P Level of Service AM	E+P Level of Service PM
1	Driveway 1 / Nandina Av.	**CSS**	Future Intersection				8.3	8.4	A	A
2	Driveway 2 / Oleander Av.	**CSS**	Future Intersection				8.9	8.9	A	A
3	Driveway 3 / Oleander Av.	**CSS**	Future Intersection				8.9	8.9	A	A
4	Decker Rd. / Nandina Av.	CSS	0.0	0.0	A	A	0.0	0.0	A	A
5	Decker Rd. / Harley Knox Bl.	AWS	0.0	0.0	A	A	8.0	8.1	A	A
6	Decker Rd. / Oleander Av.	**CSS**	Future Intersection				0.0	0.0	A	A
7	Harvill Av. / Harley Knox Bl.	TS	25.6	29.2	C	C	28.1	36.8	C	D
8	I-215 Southbound Ramps / Harley Knox Bl.	TS	25.9	28.4	C	C	26.5	28.9	C	C
9	I-215 Northbound Ramps / Harley Knox Bl.	TS	14.3	24.2	B	C	16.1	36.9	B	D

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

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

5.5 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Harley Knox Boulevard 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 mainline. 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, 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 for E+P traffic conditions.

5.6 FREEWAY FACILITY ANALYSIS

E+P mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 5-3. As shown on Tables 5-3 and 5-4, there are no additional study area freeway mainline segments and ramp merge/diverge junctions that are anticipated to operate at an unacceptable LOS (i.e., LOS E or worse) during one or both peak hours, in addition to the freeway mainline segments and ramp merge/diverge junctions identified in Existing (2019) traffic conditions. E+P freeway facility analysis worksheets are provided in Appendix 5.4.

5.7 RECOMMENDED IMPROVEMENTS

Improvement strategies have been recommended at intersections and freeway segments that have been identified as deficient under E+P traffic conditions in an effort to achieve an acceptable LOS (i.e., LOS D or better).

5.7.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

All study area intersections are anticipated to operate at an acceptable LOS (LOS D) for E+P traffic conditions. As such, no improvements have been recommended.

5.7.2 RECOMMENDED IMPROVEMENTS TO ADDRESS OFF-RAMP QUEUES

As shown previously on Table 5-2, there are no peak hour queuing issues at the I-215 Freeway at Harley Knox Boulevard interchange. As such, no improvements have been recommended.

5.7.3 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON FREEWAY FACILITIES

The Project Study Report/Project Development Support in Riverside County on I-215 and SR-60 between Nuevo Road (I-215) & I-215/SR-60 Junction and Box Springs Road (I-215) & Day Street (SR-60), also known as the I-215 North Project, includes the construction of an high-occupancy vehicle (HOV) lane in each direction of the I-215 Freeway between Nuevo Road and Box Springs Road within the existing median. (9) (10)

Table 5-2

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

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2019)				E+P			
			95th Percentile Queue (Feet)[2]		Acceptable? [1]		95th Percentile Queue (Feet)[2]		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 SB Ramps / Harley Knox Bl.	SBL/T	1330	336 [2]	310	Yes	Yes	360 [2]	310 [2]	Yes	Yes
	SBR	270	35	43	Yes	Yes	45	47	Yes	Yes
I-215 NB Ramps / Harley Knox Bl.	NBL/T	1120	20	31	Yes	Yes	54	45	Yes	Yes
	NBR	265	33	44	Yes	Yes	33	44 [2]	Yes	Yes

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

[2] Maximum queue length for the approach reported.

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

Table 5-3

Basic Freeway Segment Analysis for E+P Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	Existing (2019)				E+P			
				Density[2]		LOS[3]		Density[2]		LOS[3]	
				AM	PM	AM	PM	AM	PM	AM	PM
I-215	SB	North of Harley Knox Boulevard	3	20.9	30.7	C	D	21.2	30.9	C	D
		South of Harley Knox Boulevard	3	18.4	29.0	C	D	18.4	29.2	C	D
	NB	South of Harley Knox Boulevard	3	**43.3**	30.3	**E**	D	**43.7**	30.4	**E**	D
		North of Harley Knox Boulevard	3	33.3	26.5	D	D	33.4	27.2	D	D

* **BOLD** = Unacceptable Level of Service

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

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

[3] LOS = Level of Service

Table 5-4

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

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	Existing (2019)				E+P			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS[3]	Density[2]	LOS[3]	Density[2]	LOS[3]	Density[2]	LOS[3]
I-215	SB	Off-Ramp at Harley Knox Boulevard	3	27.8	C	34.0	D	28.2	D	34.2	D
		On-Ramp at Harley Knox Boulevard	3	21.9	C	30.8	D	21.9	C	31.0	D
	NB	Off-Ramp at Harley Knox Boulevard	3	**39.3**	**E**	33.5	D	**39.6**	**E**	33.5	D
		On-Ramp at Harley Knox Boulevard	3	34.6	D	28.7	D	34.7	D	29.2	D

* **BOLD** = Unacceptable Level of Service

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

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

[3] LOS = Level of Service

EXHIBIT 5-3: E+P FREEWAY MAINLINE VOLUMES

LEGEND:

⟵ 100/200 = AM/PM PEAK HOUR VOLUMES

NOTE: VOLUMES IN ACTUAL VEHICLES (NOT PCE)

N

At this time, the I-215 North Project has no anticipated start or completion date. Caltrans, the owner and operator of the SHS, has not identified or proposed other improvements to the study area SHS that would address existing and anticipated study area SHS LOS deficiencies. The Project would pay required TUMF, offsetting the Project's incremental and cumulative effects to the study area SHS.

6 EAP (2021) TRAFFIC CONDITIONS

This section discusses the traffic forecasts for EAP (2021) conditions and the resulting intersection operations, traffic signal warrant, and freeway mainline operations analyses.

6.1 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 EAP conditions only (e.g., intersection and roadway improvements at the Project's frontage and driveways).

6.2 EAP (2021) TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 4.04% and the addition of Project traffic. Exhibit 6-1 shows the ADT and peak hour intersection turning movement volumes, which can be expected for EAP (2021) traffic conditions.

6.3 INTERSECTION OPERATIONS ANALYSIS

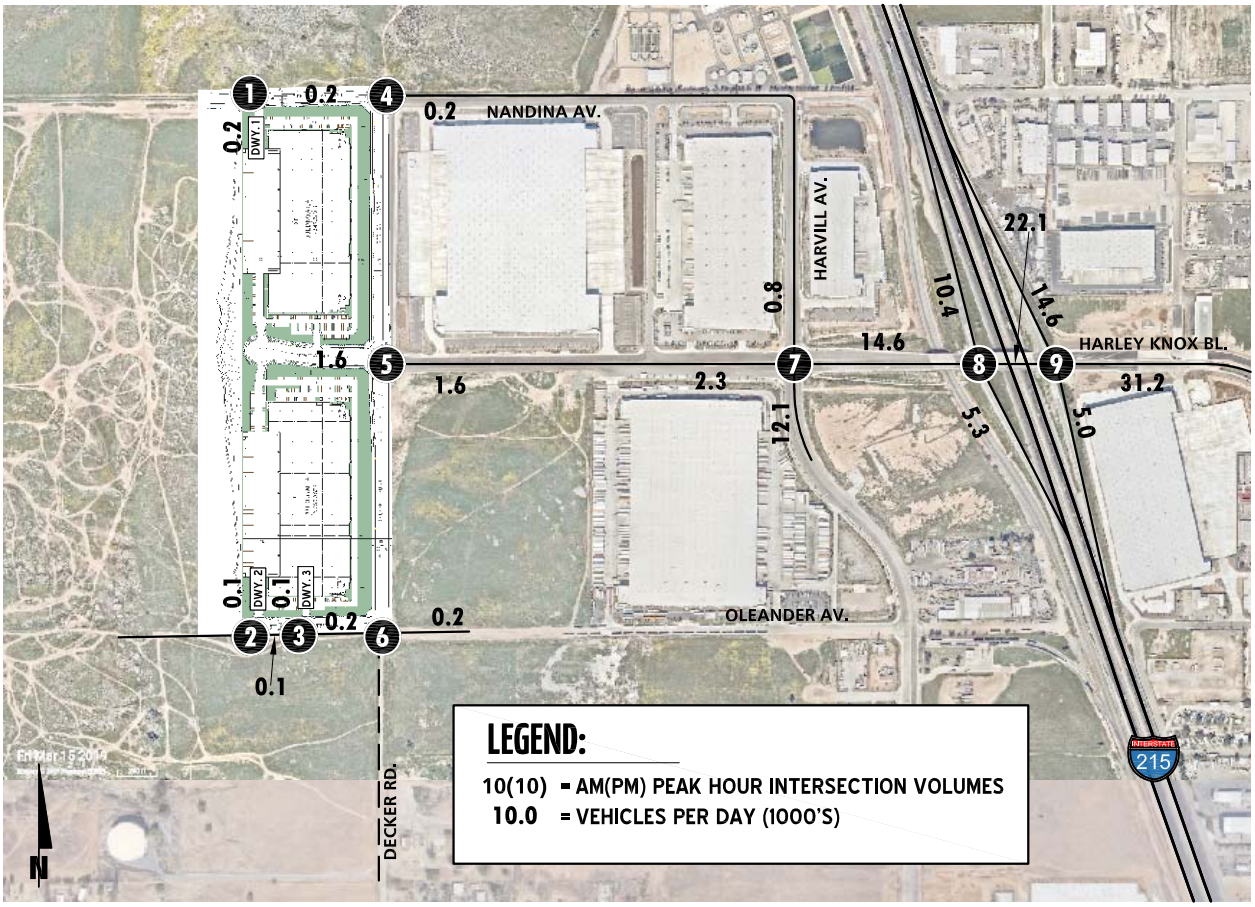
EAP (2021) peak hour traffic operations have been evaluated, for each phase of development, for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 6-1, which indicates that the study area intersections are anticipated to continue to operate at acceptable LOS under EAP (2021) traffic conditions, consistent with Existing traffic conditions. As such, the impact to study area intersections from the addition of Project traffic is anticipated to be less than significant.

A summary of the peak hour intersection LOS for EAP (2021) conditions are shown on Exhibit 6-2. The intersection operations analysis worksheets for EAP (2021) traffic conditions are included in Appendix 6.1 of this TIA.

6.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no intersections anticipated to meet traffic signal warrants for EAP (2021) traffic conditions (see Appendix 6.2).

EXHIBIT 6-1: EAP (2021) TRAFFIC VOLUMES (IN PCE)



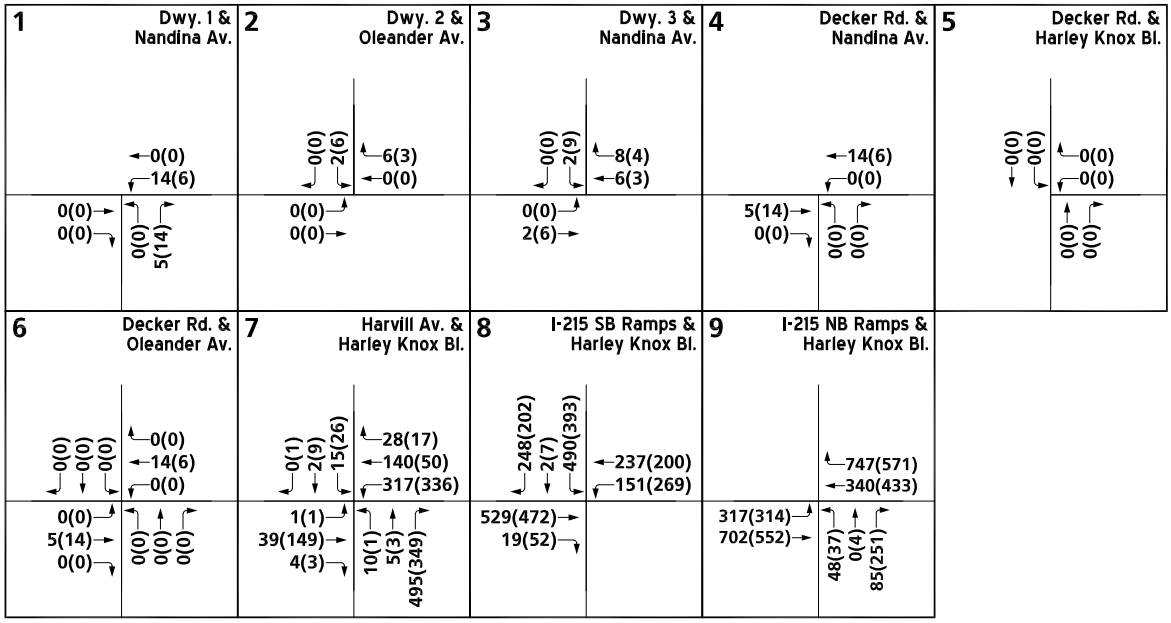
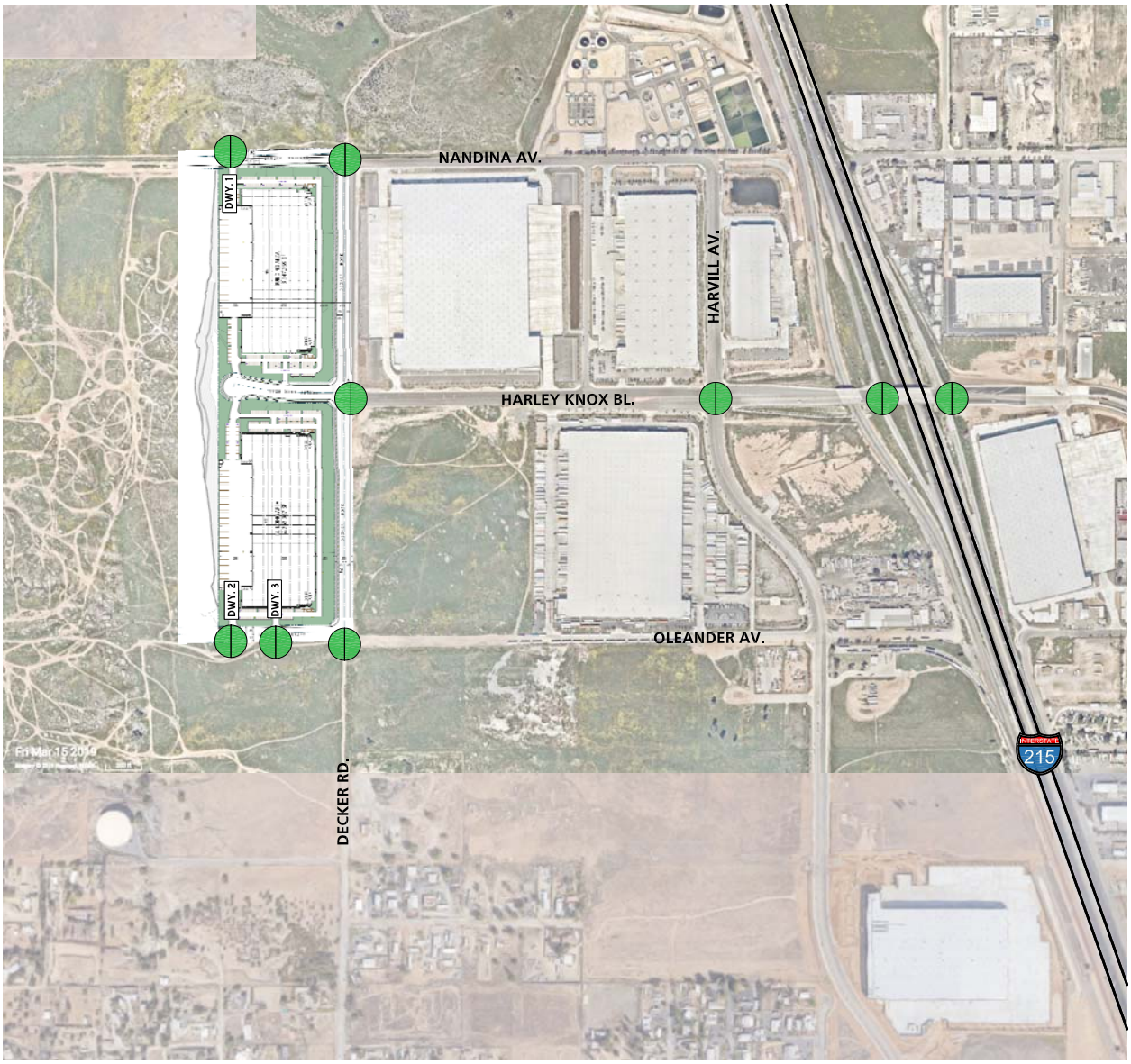


EXHIBIT 6-2: EAP (2021) SUMMARY OF LOS



LEGEND:

- = AM PEAK HOUR
- = PM PEAK HOUR
- = LOS A-D
- = LOS E
- = LOS F

N

Table 6-1

Intersection Analysis for EAP (2021) Conditions

#	Intersection	Traffic Control[2]	Existing (2019) Delay[1] (secs.) AM	Existing (2019) Delay[1] (secs.) PM	Existing (2019) Level of Service AM	Existing (2019) Level of Service PM	EAP (2021) Delay[1] (secs.) AM	EAP (2021) Delay[1] (secs.) PM	EAP (2021) Level of Service AM	EAP (2021) Level of Service PM
1	Driveway 1 / Nandina Av.	**CSS**	Future Intersection				8.3	8.4	A	A
2	Driveway 2 / Oleander Av.	**CSS**	Future Intersection				8.9	8.9	A	A
3	Driveway 3 / Oleander Av.	**CSS**	Future Intersection				8.9	8.9	A	A
4	Decker Rd. / Nandina Av.	CSS	0.0	0.0	A	A	0.0	0.0	A	A
5	Decker Rd. / Harley Knox Bl.	AWS	0.0	0.0	A	A	8.0	8.1	A	A
6	Decker Rd. / Oleander Av.	**CSS**	Future Intersection				0.0	0.0	A	A
7	Harvill Av. / Harley Knox Bl.	TS	25.6	29.2	C	C	28.1	36.8	C	D
8	I-215 Southbound Ramps / Harley Knox Bl.	TS	25.9	28.4	C	C	27.3	29.7	C	C
9	I-215 Northbound Ramps / Harley Knox Bl.	TS	14.3	24.2	B	C	17.8	42.3	B	D

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

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

6.5 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Harley Knox Boulevard 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 mainline. Queuing analysis findings are presented in Table 6-2 for EAP (2021) 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 EAP (2021) traffic conditions.

Worksheets for EAP (2021) traffic conditions off-ramp queuing analysis are provided in Appendix 6.3 for EAP (2021) traffic conditions.

6.6 FREEWAY FACILITY ANALYSIS

EAP (2021) mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 6-3. As shown on Tables 6-3 and 6-4, there are no additional study area freeway mainline segments and ramp merge/diverge junctions that are anticipated to operate at an unacceptable LOS (i.e., LOS E or worse) during one or both peak hours, in addition to the freeway mainline segments and ramp merge/diverge junctions identified in Existing (2019) and E+P traffic conditions. EAP (2021) freeway facility analysis worksheets are provided in Appendix 6.4.

6.7 RECOMMENDED IMPROVEMENTS

Improvement strategies have been recommended at intersections and freeway segments that have been identified as deficient under EAP (2021) traffic conditions in an effort to achieve an acceptable LOS (i.e., LOS D or better).

6.7.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

All study area intersections are anticipated to operate at an acceptable LOS (LOS D) for EAP (2021) traffic conditions. As such, no improvements have been recommended.

6.7.2 RECOMMENDED IMPROVEMENTS TO ADDRESS OFF-RAMP QUEUES

As shown previously on Table 6-2, there are no peak hour queuing issues at the I-215 Freeway at Harley Knox Boulevard interchange. As such, no improvements have been recommended.

6.7.3 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON FREEWAY FACILITIES

The Project Study Report/Project Development Support in Riverside County on I-215 and SR-60 between Nuevo Road (I-215) & I-215/SR-60 Junction and Box Springs Road (I-215) & Day Street (SR-60), also known as the I-215 North Project, includes the construction of an high-occupancy vehicle (HOV) lane in each direction of the I-215 Freeway between Nuevo Road and Box Springs Road within the existing median. (9) (10)

Table 6-2

Peak Hour Freeway Off-Ramp Queuing Summary for EAP (2021) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2019)				EAP (2021)			
			95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 SB Ramps / Harley Knox Bl.	SBL/T	1330	336 [2]	310	Yes	Yes	382 [2]	325	Yes	Yes
	SBR	270	35	43	Yes	Yes	45	47	Yes	Yes
I-215 NB Ramps / Harley Knox Bl.	NBL/T	1120	20	31	Yes	Yes	54	46	Yes	Yes
	NBR	265	33	44	Yes	Yes	36	56	Yes	Yes

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

[2] Maximum queue length for the approach reported.

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

Table 6-3

Basic Freeway Segment Analysis for EAP (2021) Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	Existing (2019)				EAP (2021)			
				Density[2]		LOS[3]		Density[2]		LOS[3]	
				AM	PM	AM	PM	AM	PM	AM	PM
I-215	SB	North of Harley Knox Boulevard	3	20.9	30.7	C	D	22.2	32.9	C	D
		South of Harley Knox Boulevard	3	18.4	29.0	C	D	19.2	31.0	C	D
	NB	South of Harley Knox Boulevard	3	**43.3**	30.3	**E**	D	**45.0**	32.3	**E**	D
		North of Harley Knox Boulevard	3	33.3	26.5	D	D	33.8	28.8	D	D

* **BOLD** = Unacceptable Level of Service

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

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

[3] LOS = Level of Service

Table 6-4

Freeway Ramp Junction Merge/Diverge Analysis for EAP (2021) Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	Existing (2019)				EAP (2021)			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS[3]	Density[2]	LOS[3]	Density[2]	LOS[3]	Density[2]	LOS[3]
I-215	SB	Off-Ramp at Harley Knox Boulevard	3	27.8	C	34.0	D	29.1	D	34.9	D
		On-Ramp at Harley Knox Boulevard	3	21.9	C	30.8	D	22.7	C	32.5	D
	NB	Off-Ramp at Harley Knox Boulevard	3	**39.3**	**E**	33.5	D	**40.4**	**F**	34.5	D
		On-Ramp at Harley Knox Boulevard	3	34.6	D	28.7	D	34.9	D	30.6	D

* **BOLD** = Unacceptable Level of Service

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

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

[3] LOS = Level of Service

EXHIBIT 6-3: EAP (2021) FREEWAY MAINLINE VOLUMES

LEGEND:

⟵ 100/200 - AM/PM PEAK HOUR VOLUMES

NOTE: VOLUMES IN ACTUAL VEHICLES (NOT PCE)

N

At this time, the I-215 North Project has no anticipated start or completion date. Caltrans, the owner and operator of the SHS, has not identified or proposed other improvements to the study area SHS that would address existing and anticipated study area SHS LOS deficiencies. The Project would pay required TUMF, offsetting the Project's incremental and cumulative effects to the study area SHS.

7 EAPC (2021) TRAFFIC CONDITIONS

This section discusses the methods used to develop EAPC (2021) traffic forecasts, and the resulting intersection operations, traffic signal warrant, and freeway mainline operations analyses.

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for EAPC (2021) 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 EAPC (2021) 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 EAPC (2021) conditions only (e.g., intersection and roadway improvements along the cumulative development's frontages and driveways).

7.2 EAPC (2021) TRAFFIC VOLUME FORECASTS

EAPC (2021) traffic volumes reflect existing conditions traffic volumes adjusted to reflect assumed ambient traffic growth (2% annually), traffic generated by related projects, and traffic generated by the Project. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for EAPC (2021) traffic conditions are shown on Exhibit 7-1.

7.3 INTERSECTION OPERATIONS ANALYSIS

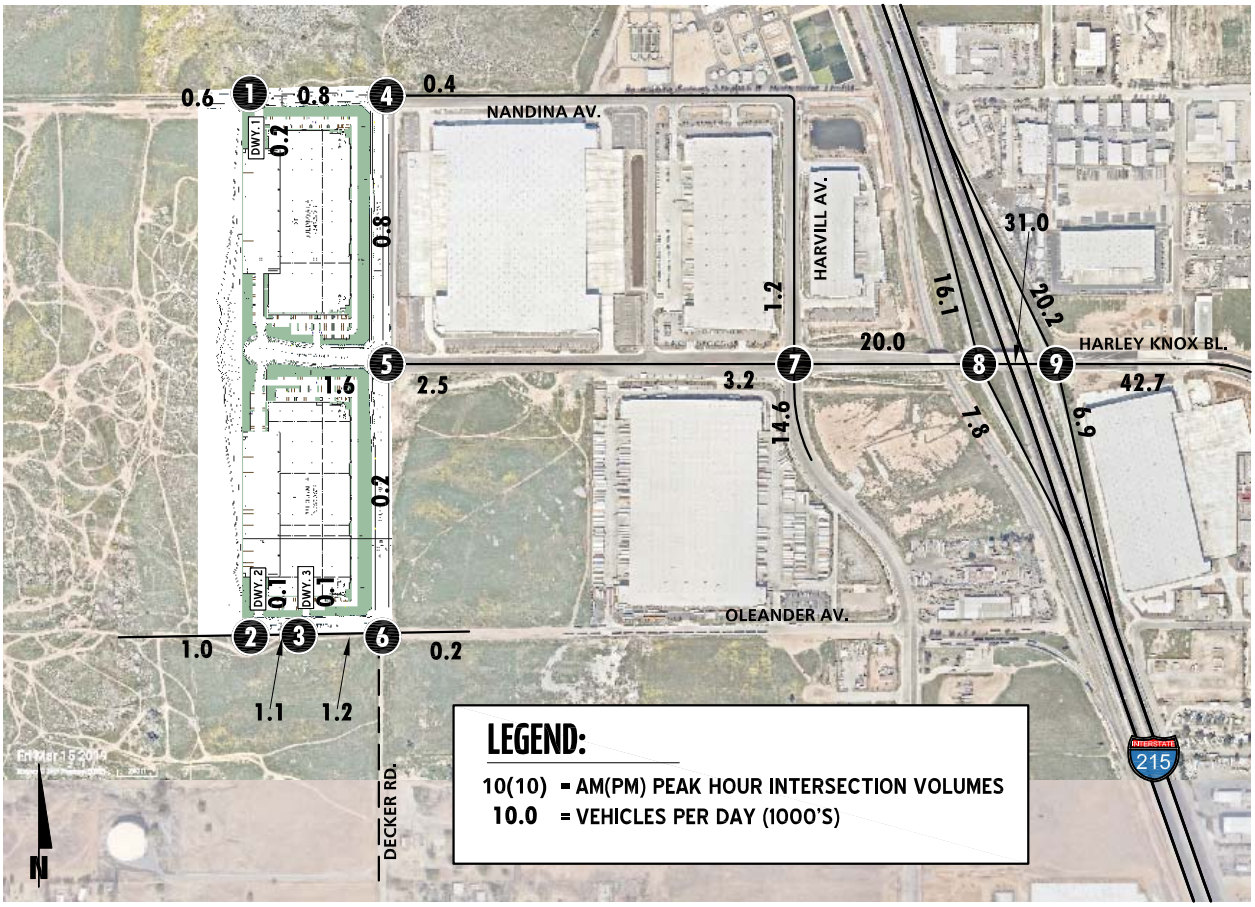
LOS calculations were conducted for the study intersections to evaluate their operations under EAPC (2021) conditions with roadway and intersection geometrics consistent with Section 7.1 *Roadway Improvements*. As shown on Table 7-1, the following additional study area intersections are anticipated to operate at an unacceptable LOS under EAPC (2021) traffic conditions:

- I-215 Southbound Ramps / Harley Knox Bl. (#8) – LOS F AM and PM peak hours
- I-215 Northbound Ramps / Harley Knox Bl. (#9) – LOS F AM and PM peak hours

A summary of the peak hour intersection LOS for EAPC (2021) conditions is shown on Exhibit 7-2. The intersection operations analysis worksheets for EAPC (2021) traffic conditions are included in Appendix 7.1 of this TIA.

Measures to address near-term cumulative deficiencies for EAPC (2021) traffic conditions are discussed in Section 7.7 *Recommended Improvements.*

EXHIBIT 7-1: EAPC (2021) TRAFFIC VOLUMES (IN PCE)



1 Dwy. 1 & Nandina Av. ←19(10) ←14(6) 9(20)→ 0(0)→ 0(0) 5(14)	**2** Dwy. 2 & Oleander Av. 0(0) 2(6) ←6(3) ←22(11) 0(0)→ 10(25)→	**3** Dwy. 3 & Nandina Av. 0(0) 2(9) ←8(4) ←28(21) 0(0)→ 12(45)→	**4** Decker Rd. & Nandina Av. ←14(6) ←5(5) 5(14)→ 9(20)→ 19(10) 5(5)	**5** Decker Rd. & Harley Knox Bl. 0(0) 0(0) 14(25) ←24(15) ←113(49) ←3(3) 0(0)→ 37(114)→ 0(0)→ 0(0) 0(0) 2(5)
6 Decker Rd. & Oleander Av. 0(0) 0(0) 3(3) ←2(5) ←48(24) ←0(0) 0(0)→ 20(53)→ 0(0)→ 0(0) 0(0) 0(0)	**7** Harvill Av. & Harley Knox Bl. 0(1) 5(11) 36(50) ←73(17) ←161(87) ←460(416) 1(1)→ 50(213)→ 6(9)→ 13(5) 9(5) 563(523)	**8** I-215 SB Ramps & Harley Knox Bl. 384(275) 2(7) 948(621) ←309(244) ←220(532) 607(679)→ 41(107)→	**9** I-215 NB Ramps & Harley Knox Bl. ←903(1064) ←434(713) 382(478)→ 1174(821)→ 95(62) 0(4) 301(310)	

Table 7-1

Intersection Analysis for EAPC (2021) Conditions

#	Intersection	Traffic Control[2]	Existing (2019) Delay[1] (secs.) AM	Existing (2019) Delay[1] (secs.) PM	Existing (2019) Level of Service AM	Existing (2019) Level of Service PM	EAPC (2021) Delay[1] (secs.) AM	EAPC (2021) Delay[1] (secs.) PM	EAPC (2021) Level of Service AM	EAPC (2021) Level of Service PM
1	Driveway 1 / Nandina Av.	**CSS**	Future Intersection				8.4	8.4	A	A
2	Driveway 2 / Oleander Av.	**CSS**	Future Intersection				9.0	9.0	A	A
3	Driveway 3 / Oleander Av.	**CSS**	Future Intersection				8.7	8.9	A	A
4	Decker Rd. / Nandina Av.	CSS	0.0	0.0	A	A	8.7	8.7	A	A
5	Decker Rd. / Harley Knox Bl.	AWS	0.0	0.0	A	A	8.0	8.2	A	A
6	Decker Rd. / Oleander Av.	**CSS**	Future Intersection				8.9	9.0	A	A
7	Harvill Av. / Harley Knox Bl.	TS	25.6	29.2	C	C	29.9	38.2	C	D
8	I-215 Southbound Ramps / Harley Knox Bl.	TS	25.9	28.4	C	C	**141.9**	**103.9**	**F**	**F**
9	I-215 Northbound Ramps / Harley Knox Bl.	TS	14.3	24.2	B	C	**85.5**	**214.6**	**F**	**F**

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

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

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

7.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

No study area intersections are anticipated to meet traffic signal warrants for EAPC (2021) traffic conditions (see Appendix 7.2).

7.5 OFF-RAMP QUEUING ANALYSIS

Queuing analysis findings for EAPC (2021) traffic conditions are shown on Table 7-2. 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. Worksheets for EAPC (2021) traffic conditions off-ramp queuing analysis are provided in Appendix 7.3.

7.6 FREEWAY FACILITY ANALYSIS

EAPC (2021) mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 7-3. As shown on Tables 7-3 and 7-4, all study area freeway mainline segments and ramp merge/diverge junctions are anticipated to operate at an unacceptable LOS (i.e., LOS E or worse) during one or both peak hours. EAPC (2021) freeway facility analysis worksheets are provided in Appendix 7.4.

7.7 RECOMMENDED IMPROVEMENTS

7.7.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

Improvement strategies have been recommended to address intersection LOS deficiencies identified in this analysis. The effectiveness of the recommended improvement strategies is presented on Table 7-5. Worksheets for EAPC (2021) conditions, with improvements, HCM calculation worksheets are provided in Appendix 7.5.

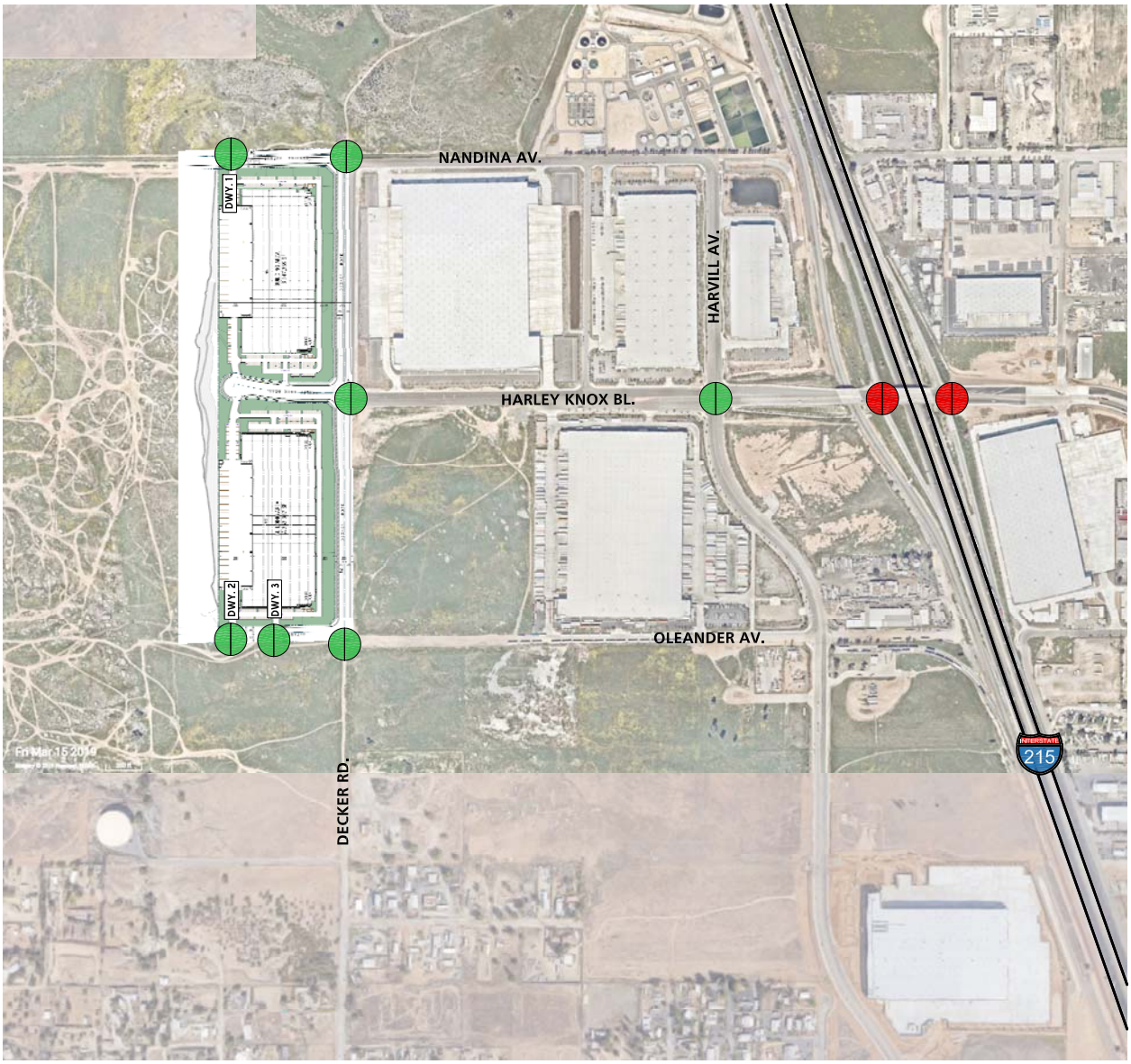
7.7.2 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON OFF-RAMP QUEUES

As shown previously 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. However, the improvements presented on Table 7-5 are anticipated to reduce the off-ramp queues and the results are shown on Table 7-6. Worksheets for EAPC (2021) conditions, with improvements, off-ramp queuing analysis worksheets are provided in Appendix 7.6.

7.7.3 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON FREEWAY FACILITIES

The Project Study Report/Project Development Support in Riverside County on I-215 and SR-60 between Nuevo Road (I-215) & I-215/SR-60 Junction and Box Springs Road (I-215) & Day Street (SR-60), also known as the I-215 North Project, includes the construction of an high-occupancy vehicle (HOV) lane in each direction of the I-215 Freeway between Nuevo Road and Box Springs Road within the existing median. (9) (10)

EXHIBIT 7-2: EAPC (2021) SUMMARY OF LOS



LEGEND:

- = AM PEAK HOUR
- = PM PEAK HOUR
- = LOS A-D
- = LOS E
- = LOS F

N

EXHIBIT 7-3: EAPC (2021) FREEWAY MAINLINE VOLUMES

LEGEND:

⟵ 100/200 - AM/PM PEAK HOUR VOLUMES

NOTE: VOLUMES IN ACTUAL VEHICLES (NOT PCE)

N

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Table 7-2

Peak Hour Freeway Off-Ramp Queuing Summary for EAPC (2021) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2019)				EAPC (2021)			
			95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 SB Ramps / Harley Knox Bl.	SBL/T	1330	336 [2]	310	Yes	Yes	881 [2]	665 [2]	Yes	Yes
	SBR	270	35	43	Yes	Yes	75	54	Yes	Yes
I-215 NB Ramps / Harley Knox Bl.	NBL/T	1120	20	31	Yes	Yes	112 [2]	66	Yes	Yes
	NBR	265	33	44	Yes	Yes	276 [2]	194	Yes	Yes

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

[2] Maximum queue length for the approach reported.

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

Table 7-3

Basic Freeway Segment Analysis for EAPC (2021) Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	Existing (2019)				EAPC (2021)			
				Density[2]		LOS[3]		Density[2]		LOS[3]	
				AM	PM	AM	PM	AM	PM	AM	PM
I-215	SB	North of Harley Knox Boulevard	3	20.9	30.7	C	D	**40.5**	**45.0**	**E**	**F**
		South of Harley Knox Boulevard	3	18.4	29.0	C	D	29.7	**42.5**	D	**F**
	NB	South of Harley Knox Boulevard	3	**43.3**	30.3	**E**	D	**45.0**	**45.0**	**F**	**F**
		North of Harley Knox Boulevard	3	33.3	26.5	D	D	**33.6**	**38.8**	**F**	**F**

* **BOLD** = Unacceptable Level of Service

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

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

[3] LOS = Level of Service

Table 7-4

Freeway Ramp Junction Merge/Diverge Analysis for EAPC (2021) Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	Existing (2019)				EAPC (2021)			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS[3]	Density[2]	LOS[3]	Density[2]	LOS[3]	Density[2]	LOS[3]
I-215	SB	Off-Ramp at Harley Knox Boulevard	3	27.8	C	34.0	D	**39.2**	**E**	**41.2**	**F**
		On-Ramp at Harley Knox Boulevard	3	21.9	C	30.8	D	31.6	D	**42.0**	**F**
	NB	Off-Ramp at Harley Knox Boulevard	3	**39.3**	**E**	33.5	D	**40.4**	**F**	**53.7**	**F**
		On-Ramp at Harley Knox Boulevard	3	34.6	D	28.7	D	**34.9**	**F**	**39.8**	**F**

* **BOLD** = Unacceptable Level of Service

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

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

[3] LOS = Level of Service

Table 7-5

Intersection Analysis for EAPC (2021) 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
8	I-215 Southbound Ramps / Harley Knox Bl.																	
	- Without Improvements	TS	0	0	0	0	1	1	0	2	d	1	2	0	**141.9**	**103.9**	**F**	**F**
	- With Improvements[4]	TS	0	0	0	**2**	1	**0**	0	2	d	**2**	2	0	37.5	35.1	D	D
9	I-215 Northbound Ramps / Harley Knox Bl.																	
	- Without Improvements	TS	0	1	1	0	0	0	1	2	0	0	2	d	**85.5**	**214.6**	**F**	**F**
	- With Improvements[4]	TS	0	1	1	0	0	0	**2**	2	0	0	2	**1>>**	20.8	22.4	C	C

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

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

L = Left; T = Through; R = Right; >> = Free-Right Turn Lane; 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

[4] Cycle length increased to 120 seconds for both AM and PM peak hours.

Table 7-6

Peak Hour Freeway Off-Ramp Queuing Summary for EAPC (2021) Conditions With Improvements

Intersection	Movement	Available Stacking Distance (Feet)	Without Improvements				With Improvements			
			95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 SB Ramps / Harley Knox Bl.	SBL/T	1330	881 [2]	665 [2]	Yes	Yes	392 [2]	302	Yes	Yes
	SBR	270	75	54	Yes	Yes	58	72	Yes	Yes
I-215 NB Ramps / Harley Knox Bl.	NBL/T	1120	112 [2]	66	Yes	Yes	122	80	Yes	Yes
	NBR	265	276 [2]	194	Yes	Yes	312 [2]	236	Yes	Yes

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

[2] Maximum queue length for the approach reported.

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

At this time, the I-215 North Project has no anticipated start or completion date. Caltrans, the owner and operator of the SHS, has not identified or proposed other improvements to the study area SHS that would address existing and anticipated study area SHS LOS deficiencies. The Project would pay required TUMF, offsetting the Project's incremental and cumulative effects to the study area SHS.

8 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements throughout the County of Riverside are funded by a combination of fair share fee contributions, Development Impact Fee (DIF) programs, and the Western Riverside Council of Governments (WRCOG) Transportation Uniform Mitigation Fee (TUMF) program. Transportation improvement funding mechanisms of relevance to the Project are summarized below.

8.1 TRANSPORTATION UNIFORM MITIGATION FEE (TUMF) PROGRAM

The Project Applicant will be required to pay TUMF program fees. The TUMF program is administered by the WRCOG based upon a regional Nexus Study most recently updated in 2017 to address major changes in right of way acquisition and improvement cost factors. (13) This regional program was put into place to ensure that development pays its fair share and that funding is in place for construction of facilities needed to maintain the requisite level of service and critical to mobility in the region. TUMF is a truly regional mitigation fee program and is imposed and implemented in every jurisdiction in Western Riverside County.

TUMF guidelines empower a local zone committee to prioritize and arbitrate certain projects. The Project is located in the Central Zone. The zone has developed a 5-year capital improvement program to prioritize public construction of certain roads. TUMF is focused on improvements necessitated by regional growth. Although the I-215/Harley Knox Boulevard interchange is identified as a TUMF interchange, the improvements to the I-215 Freeway/Harley Knox Boulevard Interchange are not currently identified in the Central Zone 5-Year Capital Improvement Program.

8.2 DEVELOPMENT IMPACT FEE (DIF) PROGRAM

The Project is located within the County's Mead Valley Area Plan and therefore will be subject to County of Riverside Development Impact Fees (DIF). The DIF program consists of two separate transportation components: Roads, Bridges and Major Improvements component and the Traffic Signals component. Eligible facilities for funding by the County DIF program are identified on the County's Public Needs List, which currently extends through the year 2020.

The cost of signalizing DIF network intersections is identified under the Traffic Signals component of the DIF program. County staff generally defines DIF eligible intersections as those consisting of two intersecting general plan roadways. If the intersection meets this requirement, it is potentially eligible for up to $235,000 of credit, which is subject to negotiations with the County.

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9 REFERENCES

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