



# TRAFFIC IMPACT ANALYSIS (TIA) FOR DUKE REALTY- HIGH CUBE WAREHOUSE

January 2019



## TABLE OF CONTENTS

---

<b>1.0 EXECUTIVE SUMMARY</b>	<b>1-1</b>
<b>2.0 INTRODUCTION</b>	<b>2-1</b>
<b>3.0 AREA CONDITIONS</b>	<b>3-1</b>
<b>4.0 PROJECTED FUTURE TRAFFIC</b>	<b>4-1</b>
<b>5.0 TRAFFIC ANALYSIS</b>	<b>5-1</b>
<b>6.0 MITIGATIONS AND RECOMMENDATIONS</b>	<b>6-1</b>

## LIST OF APPENDICES

Scoping Agreement .....	Appendix A
Cumulative Project Information .....	Appendix B
Traffic Count Worksheets .....	Appendix C
Signal Warrant Worksheets .....	Appendix D
Level of Service Calculation Worksheets .....	Appendix E
Queuing Analysis.....	Appendix F
Model Worksheets.....	Appendix G

## LIST OF DEFINITIONS & ACRONYMS

Access		Any entrance or exit point to a primary highway
Annual Average Daily Traffic	AADT	The total annual volume of traffic passing a point or segment of a highway in both directions divided by the number of days in the year
Capacity		The maximum hourly rate at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions
Decision sight distance		The distance required for a driver to detect an unexpected or otherwise difficult-to-perceive information source or hazard in a roadway environment that may be visually cluttered, recognize the hazard or its threat potential, select an appropriate speed and path, and initiate and complete the required maneuver safely and efficiently
Design year		20 years following the opening year or year the project is open to traffic
Development traffic		Traffic volumes that are generated by the development
Directional distribution		The directional split of traffic during the peak or design hour, commonly expressed as a percentage in the peak and off-peak flow directions
Highway Capacity Manual	HCM	A manual published by the Transportation Research Board as a means of standardizing the techniques used to evaluate the quality of service provided by various transportation facilities
Institute of Transportation Engineers	ITE	An international educational and scientific association of transportation professionals. ITE facilitates the application of technology and scientific principles to research, planning, functional design, implementation, operation, policy development, and management for all transportation modes
Intersection sight distance		The distance at which a motorist attempting to enter or cross a highway should be able to observe traffic in order to make his desired movement. The required distance varies with the speed of the traffic on the main highway
Level of Service	LOS	A qualitative measure describing operational conditions within a traffic stream based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience
Opening year		The year the project is scheduled to be open to traffic
Pass-by trips		Trips that would have traveled on a street adjacent to a retail land use even if the retail land use was not present

Peak hour		That hour during which the maximum amount of travel occurs. It may be specified as the morning peak hour or the afternoon or evening peak hour
Queuing		A stacking of vehicles waiting to be serviced and/or processed
Sight distance		The distance visible to the driver of a passenger vehicle measured along the normal travel path of a roadway from a designated location and to a specified height above the roadway when the view is unobstructed by traffic
Stopping sight distance		The distance required by a driver of a vehicle, traveling at a given speed, to bring the vehicle to a stop after an object on the roadway becomes visible. It includes the distance traveled during driver perception and reaction times and the vehicle braking distance
Study area		The portion(s) of the transportation system, which is directly affected by the planned development, to be included within the scope of the TIA analysis
Traffic impact		The effect of site traffic on highway operations and safety
Traffic Impact Analysis	TIA	A traffic engineering study, which determines the potential traffic impacts of a proposed traffic generator. A complete analysis includes an estimation of future traffic with and without the proposed generator, analysis to traffic impacts, and recommended roadway improvements, which may be necessary to accommodate the expected traffic
Traffic Impact Study	TIS	A TIA that requires more comprehensive analysis and documentation based on forecasted traffic that is above a defined traffic threshold
Trip distribution		The allocation of the site-generated traffic among all possible approach and departure routes
Trip generation		The estimation of the number of origins from and destinations to a site resulting from the land-use activity on that site
Capital Investment Program	CIP	
Gross Floor Area	GFA	
Highway Capacity Manual	HCM	
High-occupancy vehicle	HOV	
Land use	LU	
Volume to capacity	V/C	
South Bound Left	SBL	
North Bound Left	NBL	
North Bound Right	NBR	

South Bound Right	SBR	
West Bound Right	WBR	
West Bound Left	WBL	
East Bound Right	EBR	
North Bound Through	NBT	
South Bound Through	SBT	
East Bound Through	EBT	
West Bound Through	WBT	
Thousand Square Feet	TSF	
Passenger Car	PCE	
San Bernardino County Association of Governments	SANBAG	
Manual of Uniform Traffic Control Devices	MUTCD	
Right In Right Out	RIRO	
Existing Plus Ambient Growth Plus Cumulative Plus Project	EACP	

## 1.0 EXECUTIVE SUMMARY

### 1.1 Introduction

The proposed project is located on the northwest corner of the intersection of Alabama Street and Palmetto Avenue in San Bernardino County. It is located in the “Donut Hole” region of unincorporated San Bernardino County. The Project proposes to construct a transload and short-term storage warehouse at the site and construct required improvements to its frontage and any necessary measures to nearby intersections to maintain acceptable traffic operations.

### 1.2 Purpose of Report and Study Objectives

The purpose of this study is to evaluate the effects on traffic circulation produced from the proposed development of the Alabama Street and Palmetto Avenue High-Cube Transload and Short-Term Storage Warehouse (THE PROJECT) in the County of San Bernardino.

The objectives of this study include the following:

- Document Existing (2018) traffic conditions in the vicinity of the proposed development;
- Determine the traffic generated from the proposed development;
- Evaluate Existing Plus Project (2018) traffic conditions;
- Evaluate Existing Plus Ambient Growth Plus Project (2020) traffic conditions;
- Evaluate Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) traffic conditions;
- Evaluate Build-Out Year Plus Cumulative Projects (2040) traffic conditions;
- Evaluate Build-Out year Plus Cumulative Projects Plus Project (2040) traffic conditions;
- Determine if the level of service (LOS) required by the County of San Bernardino, City of Redlands City of Highland, and/or California Department of Transportation (Caltrans) will be maintained within the study area, and if not, determine the mitigation measures that will be necessary in order to maintain the required LOS;
- Determine if peak hour traffic signal warrants are met for any of the unsignalized study area intersections;
- Evaluate the adequacy of on-site circulation for the proposed development;
- Determine if safety and/or operational improvements are necessary due to the proposed development;
- Determine queue lengths at selected intersections.

### 1.3 Traffic and Transportation Mitigation Measures

This traffic impact analysis demonstrates that the direct traffic impacts generated by THE PROJECT can be mitigated to meet the required level of service if the following recommended mitigation measures are adopted.

#### 1.3.1 Project Design Features - Roadway & Safety Improvements

- Construct partial width improvements on the northerly side of Palmetto Avenue at its ultimate cross-section as a collector street adjacent to project boundary line.

- Construct partial width improvements on the westerly side of Alabama Street at its ultimate cross-section as a major arterial adjacent to project boundary line.
- Modify the existing traffic signal at intersection of Alabama Street and River Bluff Avenue to provide full access for all movements at the intersection.
- Signing/striping should be implemented in conjunction with detailed construction plans for THE PROJECT site.
- Sight distance at THE PROJECT entrance roadway will be reviewed with respect to standard County of San Bernardino sight distance standards at the time of preparation of final grading, landscape, site development, and street improvement plans.

### 1.3.2 Project Mitigation Measures - Intersection Improvements

- Construct the intersection of West Driveway 1 and Palmetto Avenue (Int. 15) to include the following geometrics.  
Northbound: No proposed improvements.  
Southbound: Shared left-right turn lane.  
Eastbound: Convert through lane to shared through-left turn lane.  
Westbound: Convert through lane to shared through-right turn lane
- Construct the intersection of West Driveway 2 and Palmetto Avenue (Int. 16) to include the following geometrics.  
Northbound: No proposed improvements.  
Southbound: Shared left-right turn lane.  
Eastbound: Convert through lane to shared through-left turn lane.  
Westbound: Convert through lane to shared through-right turn lane.
- Construct the intersection of East Driveway 3 and Palmetto Avenue (Int. 17) to include the following geometrics.  
Northbound: No proposed improvements.  
Southbound: Shared left-right turn lane.  
Eastbound: Convert through lane to shared through-left turn lane.  
Westbound: Convert through lane to shared through-right turn lane.
- Construct the intersection of Alabama Street and North Driveway 4 (Int. 18) to restrict the movements for right in right out only.  
Northbound: No proposed improvements.  
Southbound: Convert through lane to shared through-right turn lane.  
Eastbound: Add a right turn lane.  
Westbound: Does not exist.
- Construct the intersection of Alabama Street and South Driveway 6 (Int. 19) to restrict the movements for right in right out only.  
Northbound: No proposed improvements.  
Southbound: Convert through lane to shared through-right turn lane.

Eastbound: Add a right turn lane.

Westbound: Does not exist.

### 1.3.3 Project Fair Share Mitigation Summary

**Table 1-1** summarizes the proposed mitigation measure and associated funding mechanism for THE PROJECT as a result of the traffic study. The funding mechanisms is the:

- San Bernardino Associated Governments (SANBAG) Congestion Management Program

Program improvements: SANBAG congestion management program provides funding for the 2040 improvements mentioned in the Table 1-1. The fee of \$0.73 per square foot is charged for every high – cube warehouse project developed in the Redlands Donut Hole under the SANBAG congestion management program.

Non Program Improvements: The non-program improvements are the improvements which are not funded by any program in County of San Bernardino or Caltrans. THE PROJECT has one non-program improvement. As the impact is generated in 2040 Cumulative Plus Project Condition the fair share towards the improvement is calculated based on the number of project trips and total number of cumulative trips.

**Table 1-1 – Project Fair Share Mitigation Summary**

No.	Intersection	Jurisdiction	Recommended Improvement	Ep & EAP Improvements	EAPC (2020) Improvements		Build-Out Year (2040) Cumulative Plus Projects Improvements		Payment System
				Project Improvements	Program <sup>1</sup> Improvements	Non Program Improvements	Program <sup>1</sup> Improvements	Non Program Improvements	
1	California Street (NS) / I-10 WB Ramps (EW)	Caltrans	1. One NBL Turn Lane		1. One NBL Turn Lane		1. One NBL Turn Lane		Program Improvement
2	California Street (NS) / I-10 EB Ramps (EW)	Caltrans	1. One SBL Turn Lane 2. One EBL Turn Lane		1. One SBL Turn Lane 2. One EBL Turn Lane		1. One SBL Turn Lane		Program Improvement
3	Alabama Street (NS) / 5th Street (EW)	City of Highland	1. One Overlapping NBR Turn Lane	1. One Overlapping NBR Turn Lane					Project Improvement
4	Alabama Street (NS) / Palmetto Avenue (EW)	Unincorporated / Donut Hole	1. One WBT Lane 2. One EBT Lane				1. One WBT Lane 2. One EBT Lane		Program Improvement
5	Alabama Street (NS)/Dwy-5-Riverbluff Ave(EW)	Unincorporated/ Donut Hole	1. One EB Shared Left/Through/Right Turn Lane. 2. One NBL Turn Lane. 3. One WB Shared Through-Right Turn Lane	1. One EB Shared Left/Through/Right Turn Lane. 2. One NBL Turn Lane. 3. One WB Shared Through-Right Turn Lane					Project Improvements
6	Alabama Street (NS) / San Bernardino Avenue (EW)	Unincorporated / Donut Hole	1. One EBT Lane 2. One WBL Turn Lane				1. One EBT Lane 2. One WBL Turn Lane		Program Improvement
7	Alabama Street (NS) / Lugonia Avenue (EW)	Unincorporated / Donut Hole / City of Redlands	1. One NBR Turn Lane 2. One WBL Turn Lane 3. One EBR Turn Lane 4. One WBR Turn Lane	1. One NBR Turn Lane			2. One WBL Turn Lane	3. One EBR Turn Lane 4. One WBR Turn Lane	Fair Share/Project Improvement/Program Improvement
8	Alabama Street (NS) / I-10 WB Ramps (EW)	Caltrans	1. One NBL Turn Lane 2. One SBR Turn Lane				1. One NBL Turn Lane 2. One SBR Turn Lane		Program Improvement
9	Alabama Street (NS) / I-10 EB Ramps (EW)	Caltrans	1. One NBT Lane					1. One NBT Lane	Fair Share
10	SR 210 SB Ramps (NS) / San Bernardino Avenue (EW)	Caltrans	1. One WBT Lane 2. Restripe EB Lanes					1. One WBT Lane 2. Restripe EB Lanes	Fair Share

<sup>1</sup>Program improvements constructed by project may be eligible for fee credit. In lieu fee payment is at discretion of County

## 2.0 INTRODUCTION

### 2.1 Purpose of Report and Study Objectives

The purpose of this study is to evaluate the effects on traffic circulation produced from the proposed development of THE PROJECT.

The objectives of this study include the following:

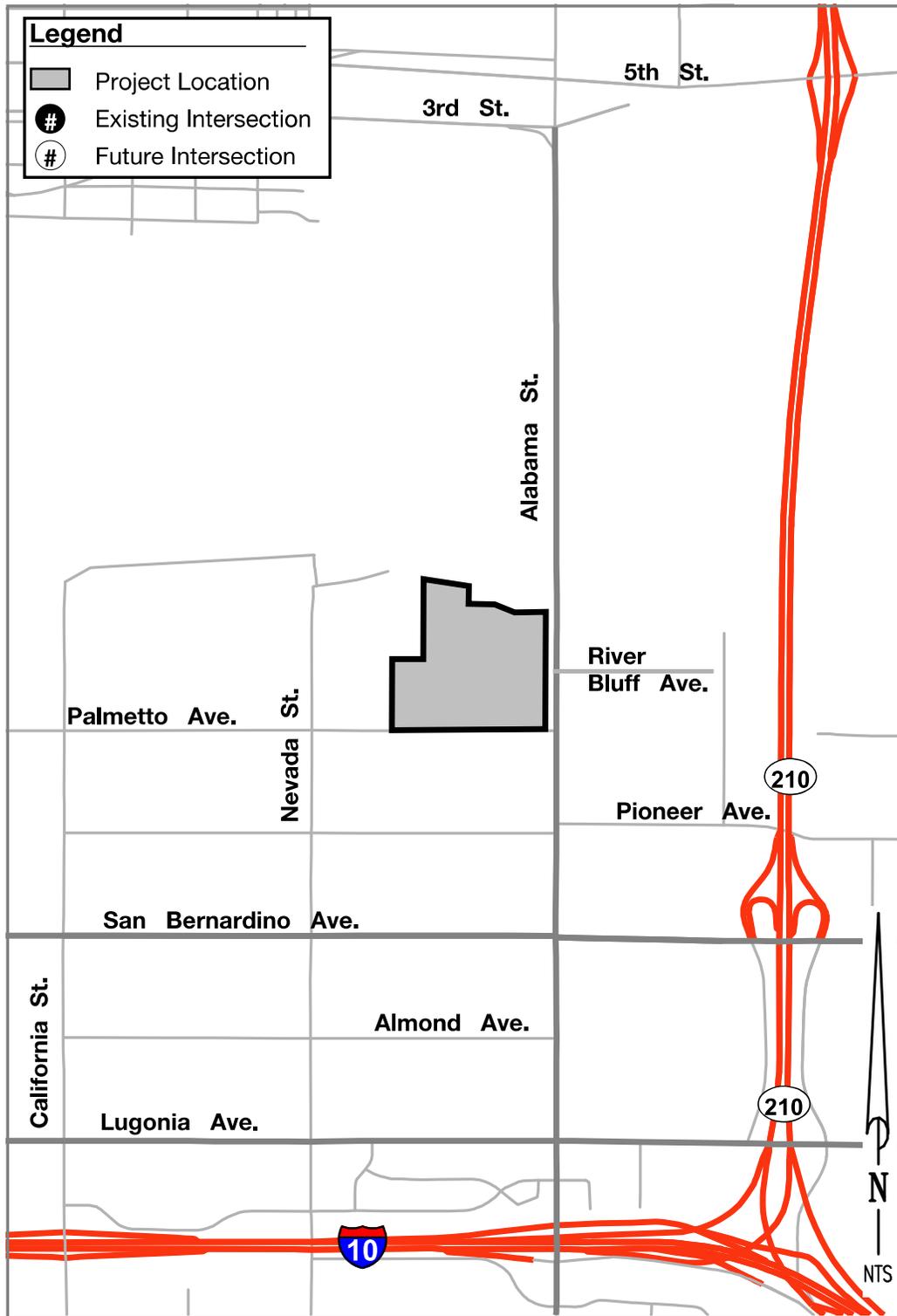
- Document Existing (2018) traffic conditions in the vicinity of the proposed development;
- Determine the traffic generated from the proposed development;
- Evaluate Existing Plus Project (2018) traffic conditions;
- Evaluate Existing Plus Ambient Growth Plus Project (2020) traffic conditions;
- Evaluate Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) traffic conditions;
- Evaluate Build-Out Year Plus Cumulative Projects (2040) traffic conditions;
- Evaluate Build-Out year Plus Cumulative Projects Plus Project (2040) traffic conditions;
- Determine if the level of service (LOS) required by the County of San Bernardino, City of Redlands, City of Highland, and/or California Department of Transportation (Caltrans) will be maintained within the study area, and if not, determine the mitigation measures that will be necessary in order to maintain the required LOS;
- Determine if peak hour traffic signal warrants are met for any of the unsignalized study area intersections;
- Evaluate the adequacy of on-site circulation for the proposed development;
- Determine if safety and/or operational improvements are necessary due to the proposed development; and
- Determine queue lengths at selected intersections.

### 2.2 Site Location and Study Area

The proposed project is located in the County of San Bernardino. THE PROJECT is located on the northwest corner of Alabama Street and Palmetto Avenue. The study area is located within the East Valley Specific Plan area.

The project site location is presented on **Figure 2-A**.

Figure 1 Project Site Location Map



## 2.3 Development Project Description

### 2.3.1 Project Size and Description

THE PROJECT site encompasses approximately 54.76 acres. THE PROJECT is currently proposed for development of a 1,192,671 square feet gross floor area high-cube warehouse.

### 2.3.2 Existing Land Use and Zoning

Existing land use and zoning designations are as follows:

- Existing Zoning: IR (Regional Industrial)
- Existing Land Use: Vacant

### 2.3.3 Proposed Land Use and Zoning

Proposed land use and zoning designations are as follows:

- Proposed Zoning: IR (Regional Industrial)
- Proposed Land Use: Industrial

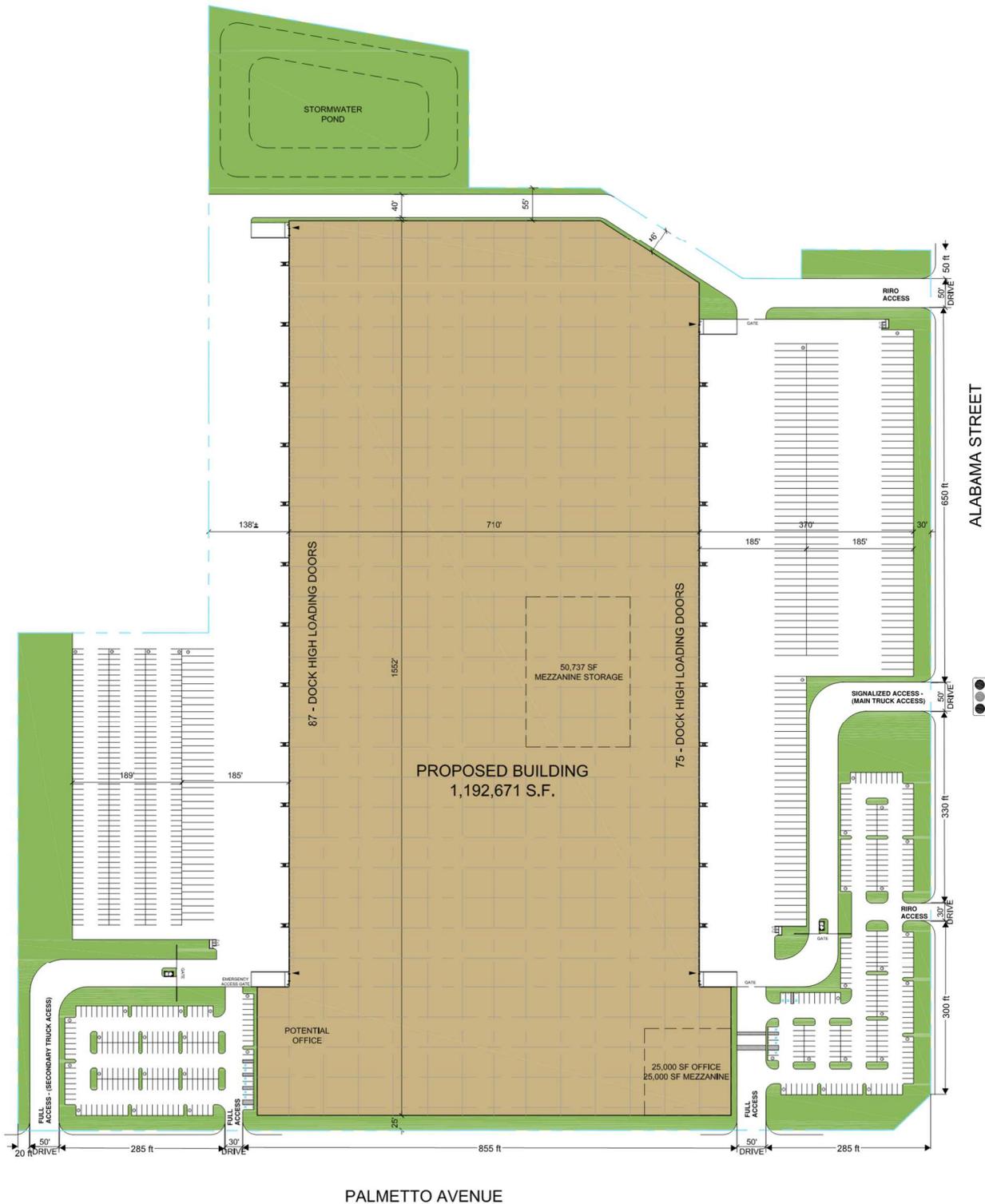
### 2.3.4 Site Plan of Proposed Project

The current proposed project layout is shown on **Figure 2** which includes the proposed Project site access points. As indicated below, The project will have access to Alabama Street east of the project and Palmetto Avenue south of the project.

The project access points/driveways include the following:

1. N/S full-access driveway with one-way stop control on Palmetto Avenue (Int. 15);
2. N/S full-access driveway with one-way stop control on Palmetto Avenue (Int. 16);
3. N/S full-access driveway with one-way stop control on Palmetto Avenue (Int. 17);
4. E/W right-in/right-out driveway with one-way stop control on Alabama Street (Int. 18);
5. E/W full-access driveway with signalized control on Alabama Street (int. 5);
6. E/W right-in/right-out driveway with one-way stop control on Alabama Street (int. 19).

Figure 2 – Project Site Plan



### **2.3.5 Proposed Project Opening Year and Proposed Project Phasing**

For analysis purposes, it is assumed that the project will be developed in a single phase and full development is anticipated by 2020.

### **2.3.6 Sphere of Influence**

THE PROJECT is within the sphere of influence or within one mile of the border of the City of San Bernardino, the City of Redlands, and the City of Highland.

### **2.3.7 Committed Roadway Improvements**

Several intersection and roadway improvement projects are planned to be constructed by the county in the future within the study area.

Intersection Improvements:

1. Alabama Street (NS) and Lugonia Avenue (EW)
  - a. Add northbound right-turn lane and second westbound left-turn lane.
2. Alabama Street (NS) and San Bernardino Avenue (EW)
  - a. Reconfigure eastbound approach for three through lanes and one right-turn lane. Reconfigure westbound approach to include two left-turn lanes.

The County also plans to improve following interchanges under the SANBAG Congestion Management Program:

1. I-10 (EW) and California Street (NS)
2. I-10 (EW) and Alabama Street (NS)

Roadway Improvements:

1. Alabama Street from Pioneer Avenue to Palmetto Avenue
  - a. Widen the roadway from one lane in each direction to two lanes in each direction.
2. Alabama Street from I-10 WB Ramps to I-10 EB Ramps
  - a. Widen overcrossing to two to three lanes in each direction. Re-configure ramps.

## 3.0 AREA CONDITIONS

### 3.1 Existing Roadway Descriptions

#### 3.1.1 Primary Arterial

- 5th Street is a divided 4-lane east-west arterial in the project area with a painted median. It is classified as a primary arterial east of Palm Avenue/Alabama Street and is classified as a Major Highway west of Palm Avenue/Alabama Street in the City of Highlands General Plan Circulation Element and provides connectivity to the State Route-210 freeway. Its ultimate cross section includes six through lanes and a raised median. East of the freeway interchange, it continues as Greenspot Road. Street parking is not allowed. There are existing sidewalks on both sides of the street, and designated bike lanes in most areas within the study area.

#### 3.1.2 Major Arterial

- Alabama Street is a divided 2-lane north-south arterial with a painted median in the frontage area of the project. Alabama Street is a divided 6-lane north-south arterial with a raised median south of the project. It is classified as a major arterial in the County of San Bernardino East Valley Area Plan and provides connectivity to the I-10 and SR-210 freeways. North of the City of Highland border, it continues as Palm Avenue and is classified as a Major Highway. Its ultimate cross section includes six through lanes and a raised median. Street parking is not allowed. There are existing sidewalks on both sides of the street and designated bike lanes where improvements have been constructed within the study area.
- San Bernardino Avenue is a divided 6-lane east-west arterial with a raised median in the project area. It is classified as a major arterial in the County of San Bernardino East Valley Area Plan and provides connectivity to the SR-210 freeway. Its ultimate cross section includes six through lanes and a raised median. Street parking is not allowed. There are existing sidewalks on both sides of the street where improvements have been constructed, but designated bike lanes do not exist within the study area.
- California Street is a divided 6-lane north-south arterial with a raised median in the project area. It is classified as a major arterial in the City of Redlands General Plan Circulation Element and provides connectivity to the I-10 freeway. Its ultimate cross section includes six through lanes and a raised median. Street parking is not allowed. There are existing sidewalks on both sides of the street where improvements have been constructed, but designated bike lanes do not exist within the study area.

#### 3.1.3 Major Highway

- 3rd Street is a divided 4-lane east-west roadway in the project area with a painted median. It is classified as a major highway in the City of Highlands General Plan Circulation Element. Its ultimate cross section includes four through lanes and a raised median. Street parking is allowed. There are existing sidewalks on both sides of the street where improvements have been construction, but designated bike lanes do not exist within the study area.
- Lugonia Avenue is a divided 4-lane east-west roadway with a painted median in the project area. It is classified as a major highway in the County of San Bernardino East Valley Area Plan and provides connectivity to the SR-210 freeway. Its ultimate cross section includes four through lanes and a raised or painted median. Street parking is not allowed. There are existing sidewalks on both sides of the street

where improvements have been constructed, but designated bike lanes do not exist within the study area.

### 3.1.4 Collector

- Palmetto Avenue is an undivided 2-lane east-west roadway in the project area. It is classified as a collector in the County of San Bernardino East Valley Area Plan. Its ultimate cross section includes four through lanes and no median. Street parking is not allowed. There are existing sidewalks where improvements have been constructed, but designated bike lanes do not exist within the study area.

### 3.1.5 Local

- River Bluff Avenue is a divided 2-lane east-west roadway in the project area. It is not classified in the County of Riverside General Plan Circulation Element, but acts as a local roadway. It provides connectivity to one warehouse property. Street parking is not allowed. There are existing sidewalks on the north side of the street, but designated bike lanes do not exist within the study area.

## 3.2 Study Area Intersections and Roadways

Key study intersections and roadway segments are typically selected based on their location in relation to the vicinity of the project and whether potential significant project-related traffic will pass through them. The key intersections and roadway segments were identified in coordination with the County of San Bernardino staff and are shown on **Figure 3**. The study area includes the following intersections:

1. California Street (NS) / I-10 WB Ramps (EW)
2. California Street (NS) / I-10 EB Ramps (EW)
3. Alabama Street (NS) / 5<sup>th</sup> Street (EW)
4. Alabama Street (NS) / 3<sup>rd</sup> Street (EW)
5. Alabama Street (NS) / Project Driveway 5–River Bluff Avenue (EW)
6. Alabama Street (NS) / Palmetto Avenue (EW)
7. Alabama Street (NS) / San Bernardino Avenue (EW)
8. Alabama Street (NS) / Lugonia Avenue (EW)
9. Alabama Street (NS) / I-10 WB Ramps (EW)
10. Alabama Street (NS) / I-10 EB Ramps (EW)
11. SR-210 SB Ramps (NS) / 5<sup>th</sup> Street (EW)
12. SR-210 NB Ramps (NS) / 5<sup>th</sup> Street (EW)
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)
15. Project Driveway 1 (NS) / Palmetto Avenue (EW)
16. Project Driveway 2 (NS) / Palmetto Avenue (EW)
17. Project Driveway 3 (NS) / Palmetto Avenue (EW)
18. Alabama Street (NS) / Project Driveway 4 (EW)
19. Alabama Street (NS) / Project Driveway 6 (EW)

### 3.3 Existing Traffic Controls and Intersection Geometrics

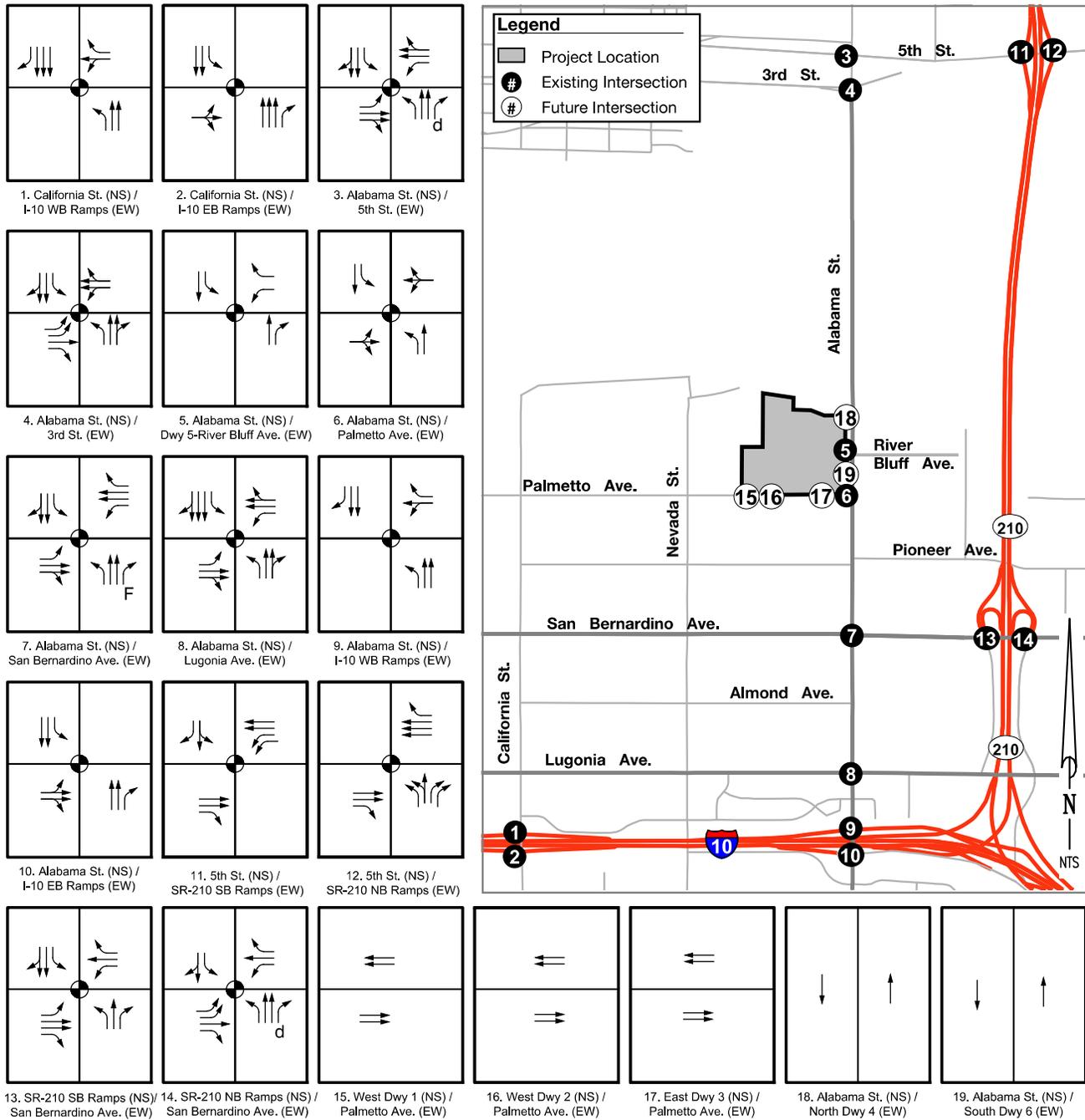
The existing roadway system is shown on **Figure 3**. It identifies the existing intersection traffic controls (i.e. signals and signage), intersection geometrics, and the number of vehicle lanes for each intersection within the study area.

### 3.4 Existing Traffic Volumes

Nineteen key study intersections have been identified as the locations at which to evaluate existing and future traffic operating conditions. Some portion of potential project-related traffic will pass through each of these locations, and their analysis will reveal the expected relative impacts of the project. These key study intersections noted in Section 3.2 were selected for evaluation based on discussions with the County of San Bernardino staff.

The existing AM peak period and PM peak period intersection turning movement counts at the 19 study intersections were conducted by Counts Unlimited, Inc. on February 21, 2018. Because of the high number of heavy vehicles in the area and the truck-intensive land use of the project, raw turning movement counts were converted into passenger car equivalent (PCE). PCE is defined as the number of passenger cars that will result in the same operational conditions as a single heavy vehicle of a particular type. The traffic count worksheets are provided in Appendix C. The AM and PM peak hour intersection turning movement volumes are presented on **Figure 4** and **Figure 5**, respectively.

Figure 3 - Existing Roadway System



**LEGEND**

- Existing Traffic Signal
- Existing Lane Geometrics
- d Existing Defacto Right Turn
- F Existing Free Right Turn Lane

**Figure 4 - Existing (2018) AM Peak Hour Intersection Volumes**

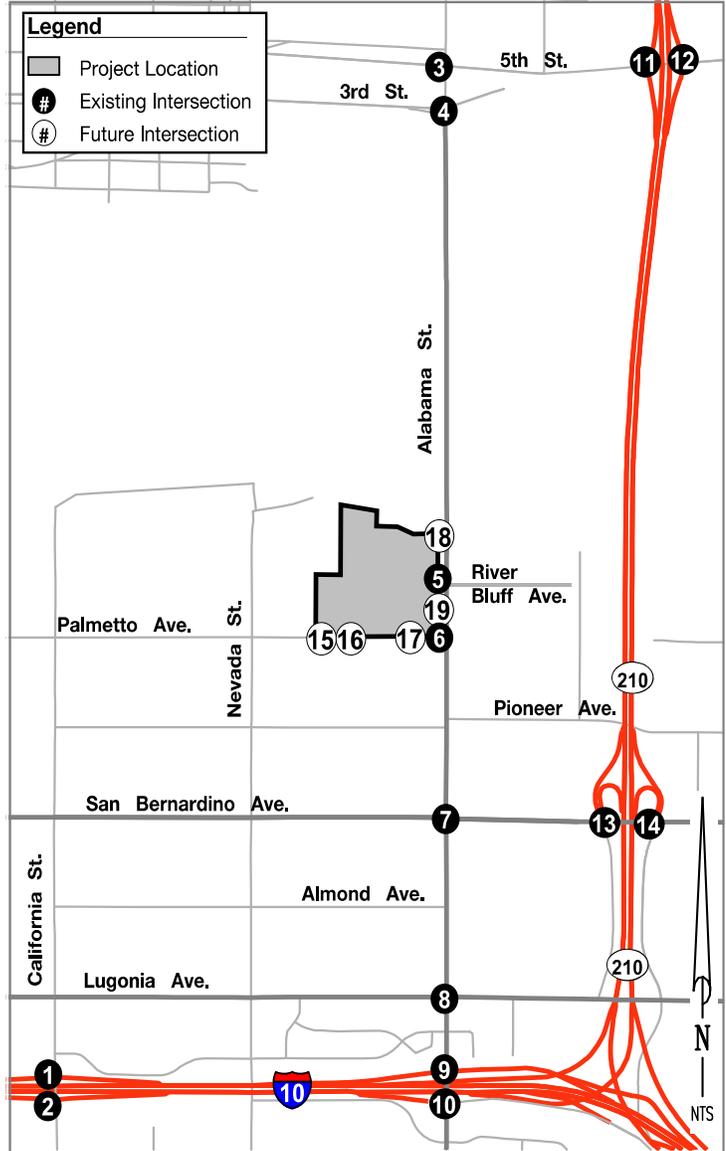
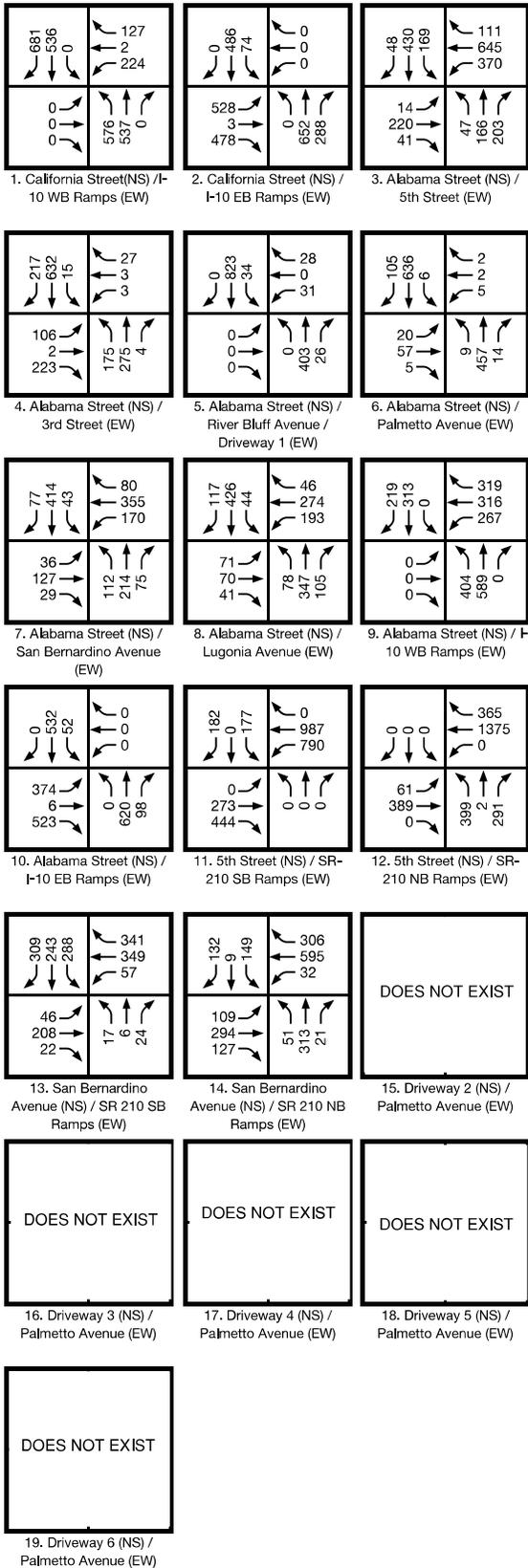
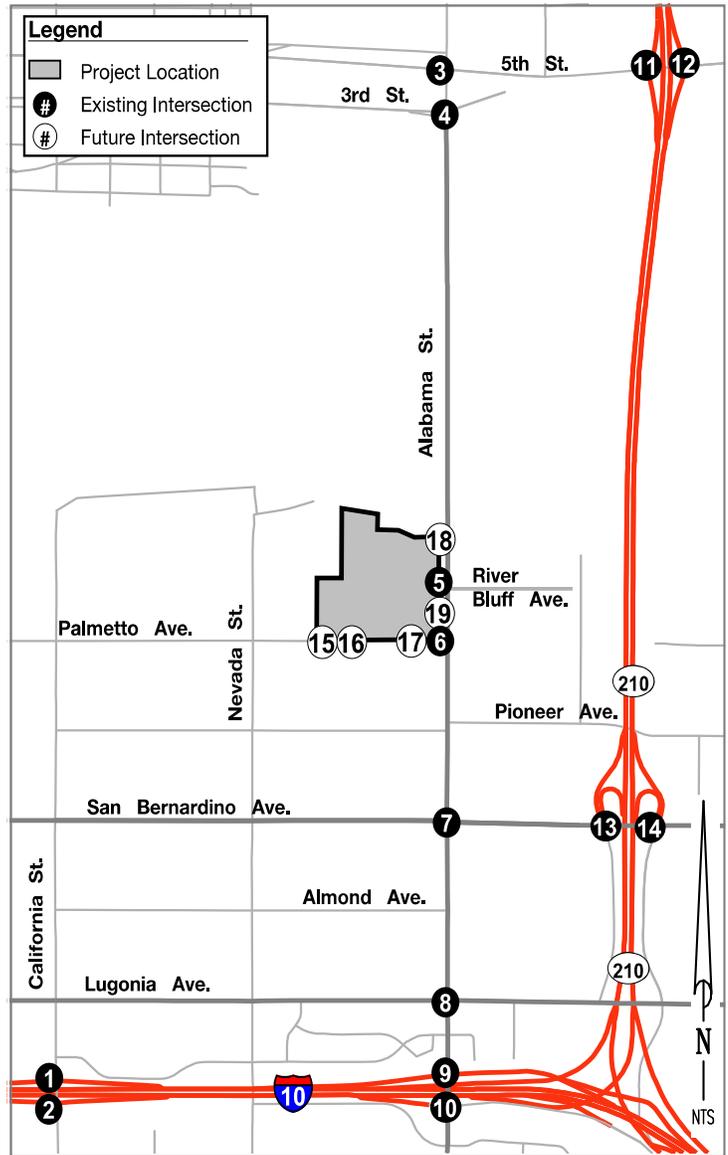
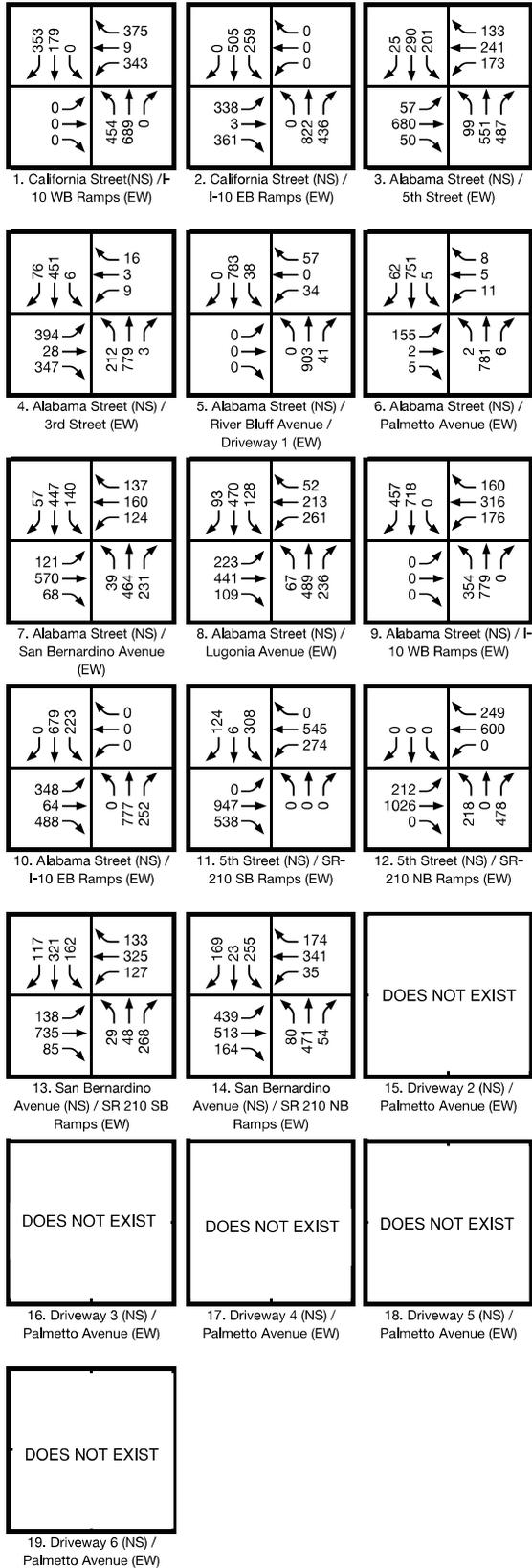


Figure 5 - Existing (2018) PM Peak Hour Intersection Volumes



### 3.5 Levels of Service – Existing (2018) Conditions

The intersection levels of service for existing (2018) conditions shown on **Table 3-1** are based upon the existing roadway system shown on **Figure 4** and the existing AM and PM peak hour intersection volumes shown on **Figure 5** and **Figure 6**, respectively. The level of service calculation worksheets are provided in Appendix E. The following study intersections are expected to operate at an unacceptable level of service:

1. California Street (NS)/ I-10 WB Ramps
2. California Street (NS) / I-10 EB Ramps

**Table 3-1 – Intersection Levels of Service – Existing (2018) Conditions**

Intersection	Peak Hour	Traffic Control	Delay (sec)	LOS
1. California Street (NS) / I-10 WB Ramps (EW)	AM PM	Signal	<b>69.7</b> 33.7	<b>E</b> C
2. California Street (NS) / I-10 EB Ramps (EW)	AM PM	Signal	<b>60.5</b> <b>56.8</b>	<b>E</b> <b>E</b>
3. Alabama Street (NS) / 5th Street (EW)	AM PM	Signal	34.6 48.4	C D
4. Alabama Street (NS) / 3rd Street (EW)	AM PM	Signal	20.4 31.8	C C
5. Alabama Street (NS) / Dwy 5-River Bluff Avenue (EW)	AM PM	Signal	7.1 5.0	A A
6. Alabama Street (NS) / Palmetto Avenue (EW)	AM PM	Signal	9.7 10.4	A A
7. Alabama Street (NS) / San Bernardino Avenue (EW)	AM PM	Signal	28.9 30.2	C C
8. Alabama Street (NS) / Lugonia Avenue (EW)	AM PM	Signal	23.8 33.4	C C
9. Alabama Street (NS) / I-10 WB Ramps (EW)	AM PM	Signal	35.3 33.3	D C
10. Alabama Street (NS) / I-10 EB Ramps (EW)	AM PM	Signal	27.4 33.2	C C
11. SR-210 SB Ramps (NS) / 5th Street (EW)	AM PM	Signal	24.7 33.4	C C
12. SR-210 NB Ramps (NS) / 5th Street (EW)	AM PM	Signal	18.1 34.2	B C
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	AM PM	Signal	35.1 27.3	D C
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	AM PM	Signal	33.7 35.3	C C
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	AM PM	<b>Does Not Exist</b>		
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	AM PM	<b>Does Not Exist</b>		
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	AM PM	<b>Does Not Exist</b>		
18. Alabama Street (NS) / North Dwy 4 (EW)	AM PM	<b>Does Not Exist</b>		
19. Alabama Street (EW) / South Dwy 6 (EW)	AM PM	<b>Does Not Exist</b>		

### 3.6 General Plan Circulation

The current County of San Bernardino General Plan circulation element for the East Valley Area Plan is shown on **Figure 6**, City of Redlands General Plan circulation element is shown in **Figure 7**, City of Highland General Plan circulation element is shown in **Figure 8**.

*\*Palmetto Avenue is identified as Collector in the East Valley Area Plan*

### 3.7 Bicycle Facilities

The East Valley Area Plan includes a planned trail system that includes Class I, Class II, and Class IV bikeways. Class III bikeways are not currently within the plan area. While planned, no bicycle lanes exist in the project area within San Bernardino County. The East Valley Plan Trail System is shown on **Figure 9**.

### 3.8 Transit Facilities

The project area is served by OmniTrans route 15. A map of OmniTrans route 15 is shown on **Figure 10**. The nearest bus stop is located at the intersection of Alabama Street and San Bernardino Avenue.

### 3.9 Pedestrian Facilities

Pedestrian facilities only exist within the study area where developments have made frontage improvements. There are many sidewalk gaps in close proximity of the project site. Pedestrian facilities are nearly complete in other areas of the East Valley Area Plan that are closer to build-out conditions.

**Figure 6– San Bernardino County General Plan Circulation and Transportation**

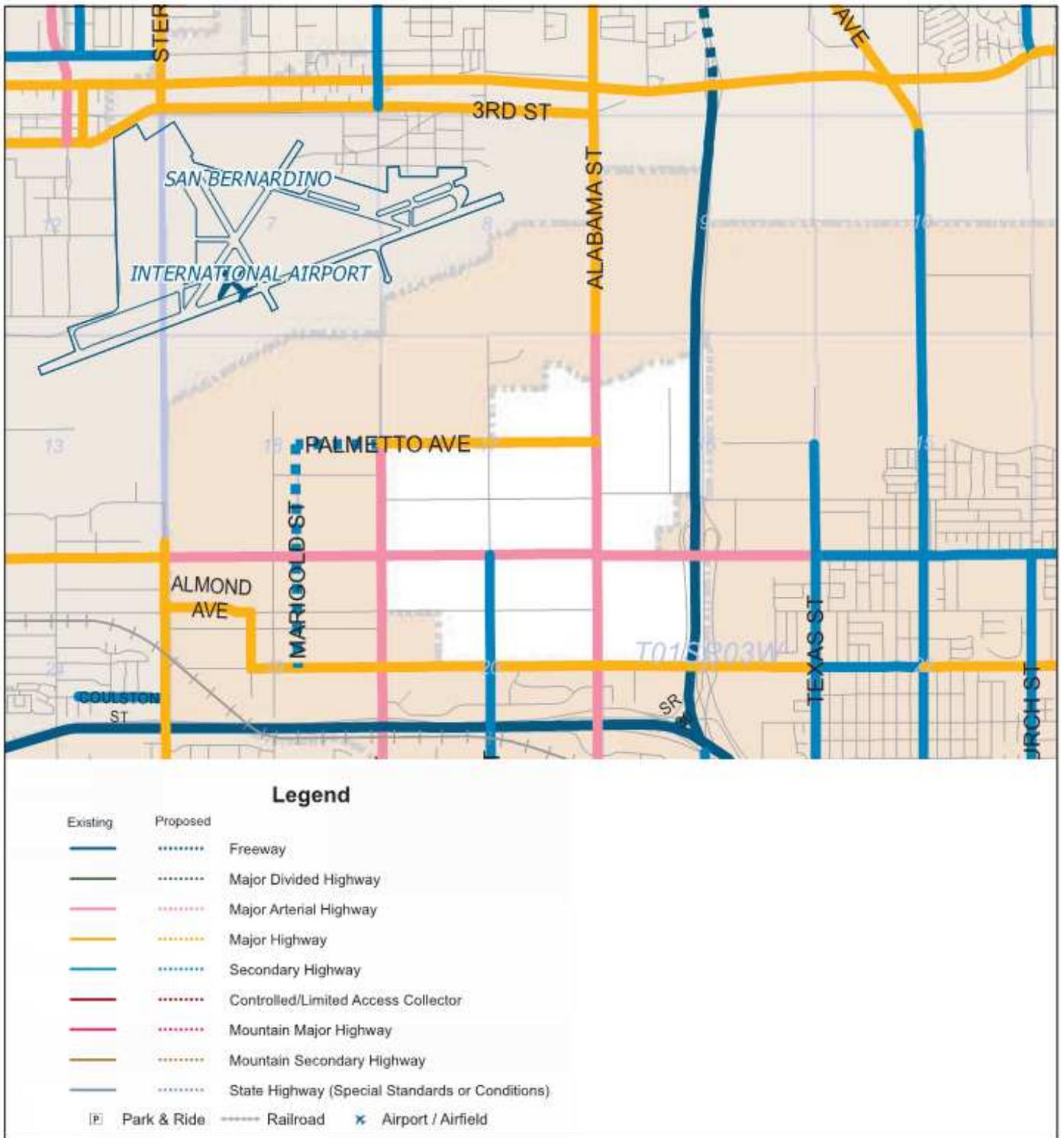


Figure 7 City of Highland General Circulation Plan and Transportation

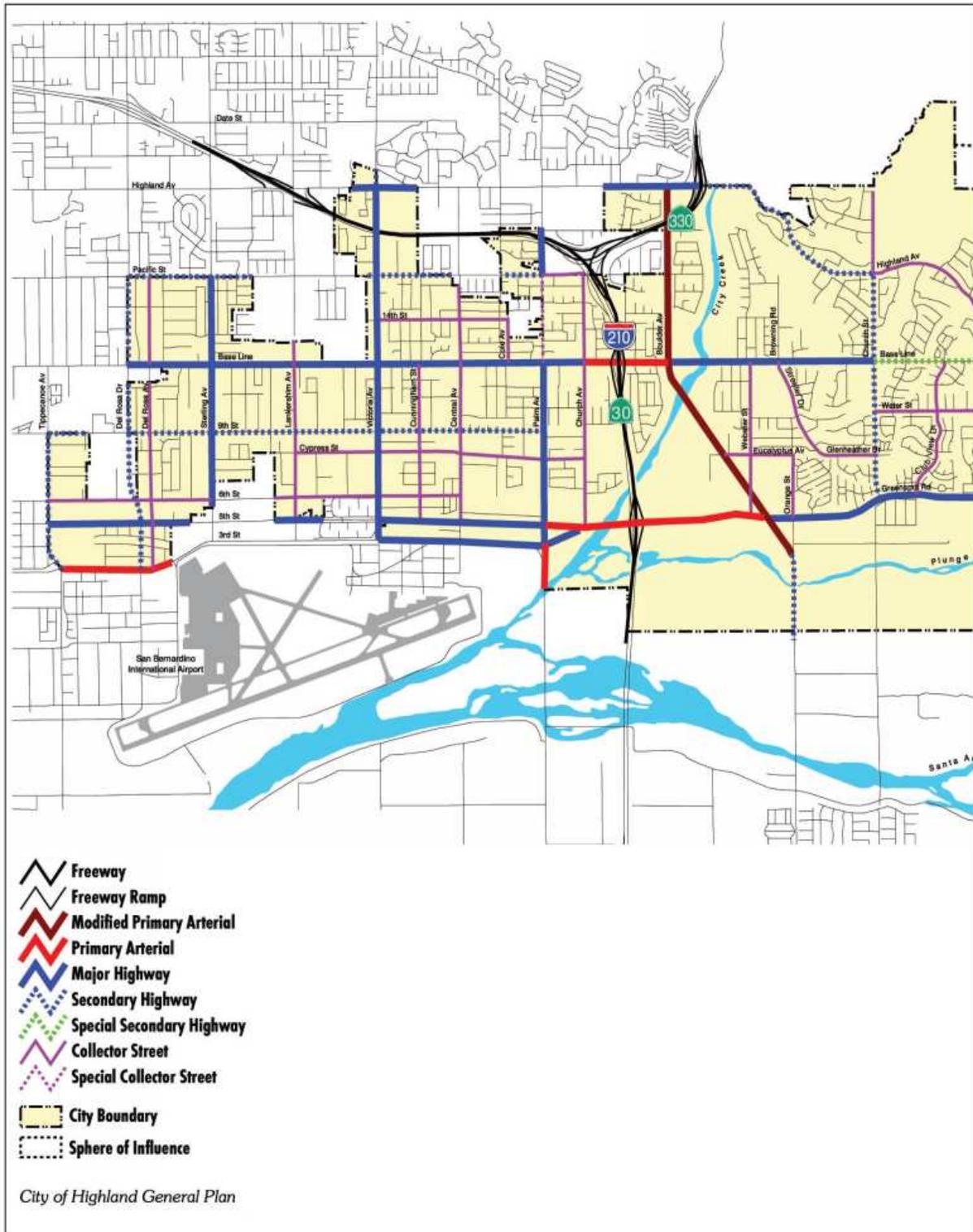


Figure 8 City of Redlands General Circulation Plan

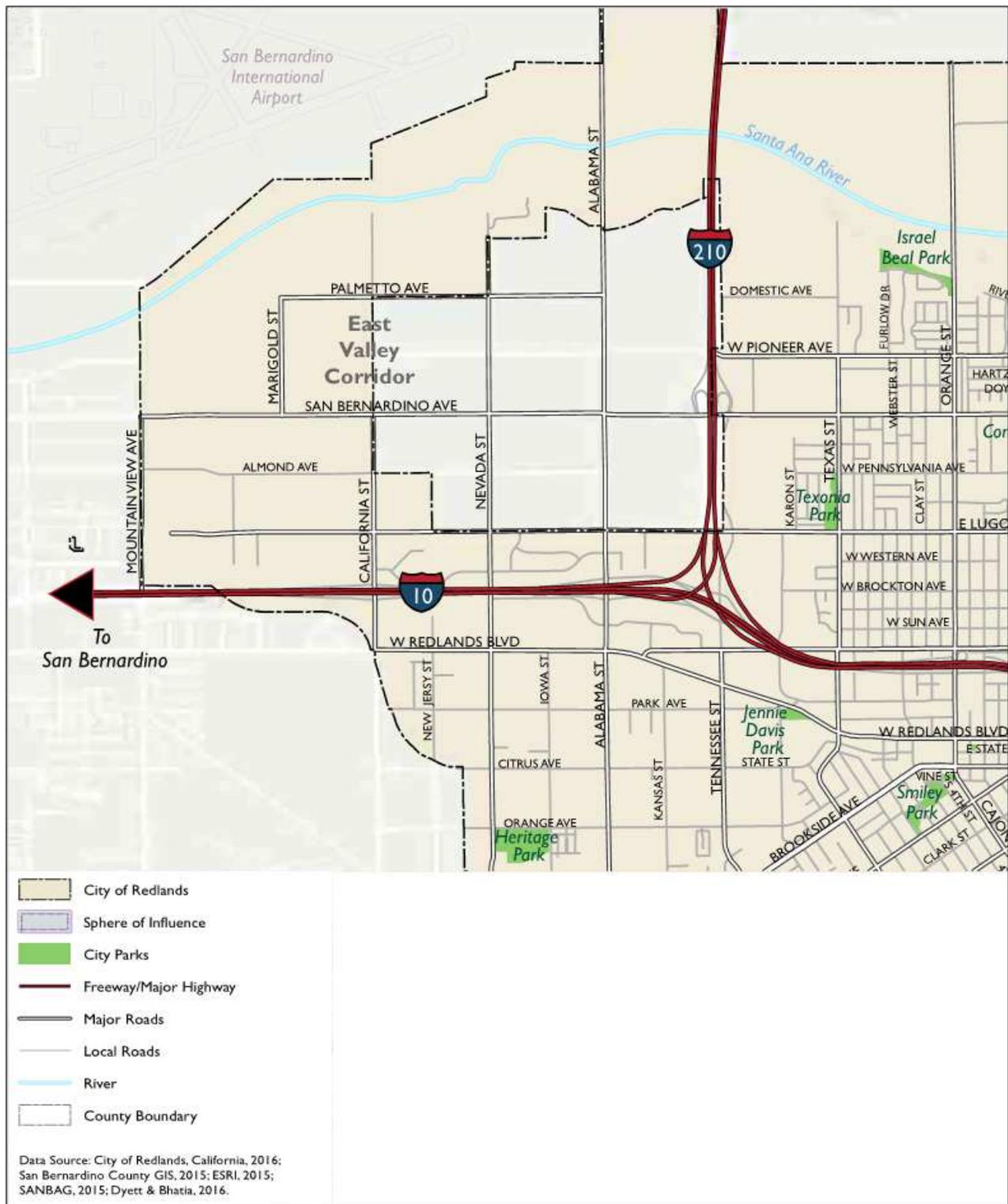
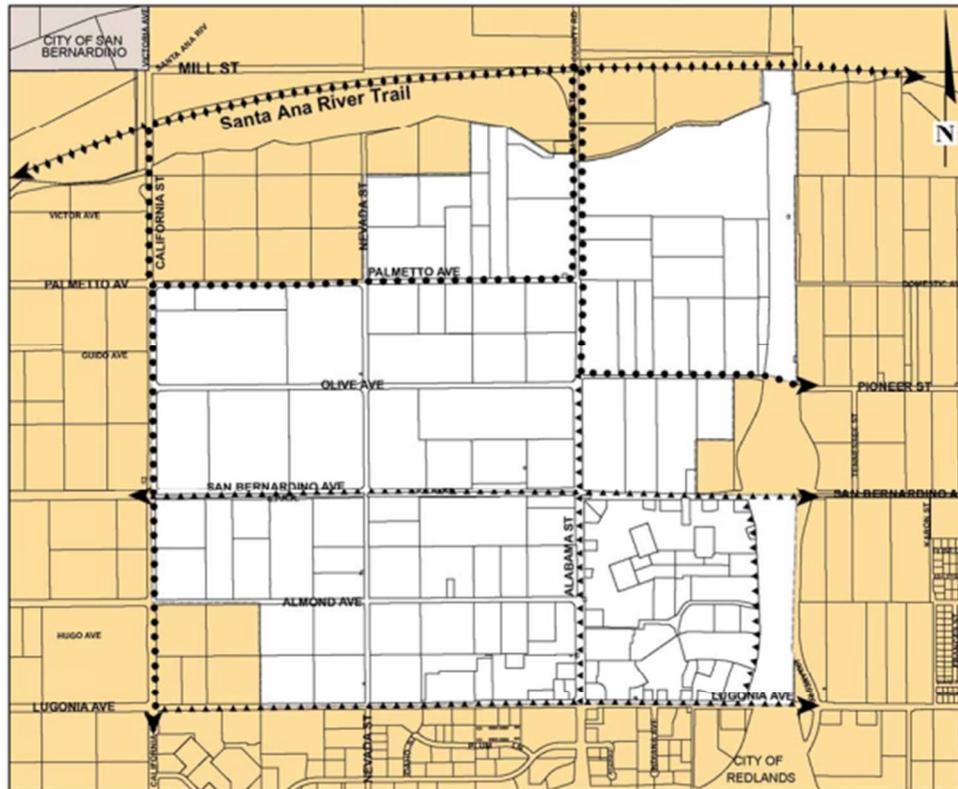


Figure 9– East Valley Plan Trail System



Legend

- ● ● Class I - Bikeways
- ▲ ▲ ▲ Class II - Bikeways
- - - Class III - Bikeways (none currently within Plan Area)
- ◆ ◆ ◆ Class IV - Bikeways (shared use)
- ◀ Link to existing or proposed trails

Figure 10 – OmniTrans Route 15 Map



## 4.0 PROJECTED FUTURE TRAFFIC

### 4.1 Method of Projection

In order to estimate the traffic impact characteristics of the project, a multi-step process has been utilized. The first step is traffic generation which estimates the total arriving and departing traffic during a peak hour and on a daily basis. The traffic generation potential is forecast by applying the appropriate vehicle trip generation rates to the project development tabulation. The second step of the forecasting process is traffic distribution, which identifies the origins and destinations of inbound and outbound project traffic based on existing/expected future travel patterns in the study area. The third step is traffic assignment, which involves the allocation of project traffic to study area street segments and intersections. Traffic distribution patterns are indicated by general percentage orientation, while traffic assignment allocates specific volume forecasts to individual roadway segments and intersection turning movements throughout the study area. The impact of the project is isolated by comparing operation level of service conditions at selected key study intersections using expected future traffic volumes with and without forecasted project traffic.

The method of traffic projection is based on the following criteria:

- Existing traffic conditions (2018);
- Ambient growth projections;
- Project generated traffic; and
- Cumulative project generated traffic.
- Build-out (2040) year traffic

This report uses a project opening year of 2020 for analysis purposes.

### 4.2 Project Generated Traffic

#### 4.2.1 Project Trip Generation

##### Trip Generation Rates

Trip generation represents the amount of traffic traveling to and from the proposed project, which are defined as inbound and outbound trips. An inbound and outbound trip by the same vehicle is considered two separate trips or trip ends. **Table 4-1** shows the peak hour and daily trip generation rates for the proposed project by the associated land use. The trip generation volumes used in this study are based upon the development of a 1,192,671 square feet gross floor area warehouse.

The trip generation rates for this warehousing land use are based on the fitted curve equation for trip generation provided in the *Trip Generation Manual (10th Edition)* by the Institute of Transportation Engineers (ITE), 2017. The inbound and outbound peak hour trip generation rates are calculated by multiplying the total peak hour generation rate by the directional distribution provided in the *Trip Generation Manual*.

The County of San Bernardino utilizes Passenger Car Equivalent (PCE) factors that are recommended by the San Bernardino County Congestion Management Program (CMP), 2016 Update. PCE factors have been used

to convert heavy truck trips (large 2-axles, 3-axles and 4+-axles) to passenger equivalent trips. A factor of 1.5 was applied to large 2-axle trucks, a factor of 2.0 was applied to 3-axle trucks and a factor of 3.0 was applied to 4+-axle trucks.

**Table 4-1 – Trip Generation Rates**

TRIP GENERATION RATES								
Land Use	Units <sup>1</sup>	AM Peak Hour			PM Peak Hour			Daily
		Total	In	Out	Total	In	Out	
High-Cube Transload and Short-Term Storage Warehouse	TSF	--	--	--	--	--	--	--
Trip Generation Rates <sup>2</sup>		0.080	0.062	0.018	0.100	0.028	0.072	1.40
PCE Inbound/Outbound Splits <sup>3</sup>		100%	77%	23%	100%	28%	72%	--
PASSENGER CAR EQUIVALENT RATES CALCULATIONS								
Land Use	Unit	AM Peak Hour			PM Peak Hour			Daily
		Total	In	Out	Total	In	Out	
<b>Passenger Cars</b>								
Recommended Mix (%) <sup>4</sup>		79.57%	79.57%	79.57%	79.57%	79.57%	79.57%	79.57%
PCE Factor <sup>5</sup>		1.0	1.0	1.0	1.0	1.0	1.0	1.0
PCE Rates		0.064	0.049	0.015	0.080	0.022	0.057	1.114
<b>2-Axle Trucks</b>								
Recommended Mix (%) <sup>4</sup>		3.46%	3.46%	3.46%	3.46%	3.46%	3.46%	3.46%
PCE Factor <sup>5</sup>		1.5	1.5	1.5	1.5	1.5	1.5	1.5
PCE Rates		0.004	0.003	0.001	0.005	0.001	0.004	0.073
<b>3-Axle Trucks</b>								
Recommended Mix (%) <sup>4</sup>		4.64%	4.64%	4.64%	4.64%	4.64%	4.64%	4.64%
PCE Factor <sup>5</sup>		2.0	2.0	2.0	2.0	2.0	2.0	2.0
PCE Rates		0.008	0.006	0.002	0.009	0.003	0.007	0.130
<b>4-Axle Trucks</b>								
Recommended Mix (%) <sup>4</sup>		12.33%	12.33%	12.33%	12.33%	12.33%	12.33%	12.33%
PCE Factor <sup>5</sup>		3.0	3.0	3.0	3.0	3.0	3.0	3.0
PCE Rates		0.030	0.023	0.007	0.037	0.010	0.027	0.518
Final Rates (PCE)								
Passenger Cars		0.064	0.049	0.015	0.080	0.022	0.057	1.114
Trucks (2 Axle)		0.004	0.003	0.001	0.005	0.001	0.004	0.073
Trucks (3 Axle)		0.008	0.006	0.002	0.009	0.003	0.007	0.130
Trucks (4+ Axle)		0.030	0.023	0.007	0.037	0.010	0.027	0.518

<sup>1</sup>TSF = 1,000 Square Feet Gross Floor Area.

<sup>2</sup>Average trip generation rates from Trip Generation Manual, ITE, 10th Edition (2017).

<sup>3</sup>Inbound/Outbound Splits per ITE Trip Generation, 10th Ed., 2017.

<sup>4</sup>Passenger car / 2 axle / 3 axle / 4+ axle truck split from Truck Trip Generation Study by the City of Fontana, 2003.

<sup>5</sup>PCE Factor per San Bernardino County CMP, 2016 Update are used.

### Project Trip Generation

The trip generation potential for the proposed warehouse was forecast using ITE Land Use Code 154: High-Cube Transload and Short-Term Storage Warehouse equations. The trip generation volumes are developed by multiplying the trip generation rates from the previous section by the square footage of the proposed Project. **Table 4-2** presents the daily and peak hour trip generation for the proposed Project. As shown, the proposed project is anticipated to generate approximately 2,202 daily PCE trip-ends, including 127 PCE trip-ends during the AM peak hour and 158 PCE trip-ends during the PM peak hour.

**Table 4-2 – Project Trip Generation (in PCE)**

Land Use	Qty	Unit	AM Peak Hour			PM Peak Hour			Daily
			Total	In	Out	Total	In	Out	
High-Cube Transload and Short-Term Storage Warehouse	1200	TSF							
<i>Passenger Cars (PCE = 1.0)</i>			77	59	18	96	28	68	1,337
<i>Trucks (2 Axle, PCE = 1.5)</i>			5	4	1	6	2	4	87
<i>Trucks (3 Axle, PCE = 2.0)</i>			9	7	2	11	3	8	156
<i>Trucks (4+ Axle, PCE = 3.0)</i>			36	27	8	45	13	32	621
<b>PROJECT TOTAL (IN PCE)</b>			127	97	29	158	46	112	2,202

TSF = 1,000 Square Feet Gross Floor Area.

#### 4.2.2 Project Trip Distribution

Trip distribution represents the directional orientation of traffic to and from the project site. Trip distribution is influenced by the geographical location of the site, type of land use in the study area, such as shopping centers and recreational sites, and proximity to the regional freeway system.

The trip directional orientation of traffic for the proposed project was determined based upon the existing roadway system, existing traffic patterns, and existing and future land uses. The directional distribution for the proposed project traffic for passenger vehicles and trucks assumed in this study are shown on **Figure 11** and **Figure 12**, respectively. This shows the direction that vehicles will travel from the project site to their next destination.

#### 4.2.3 Project Modal Split

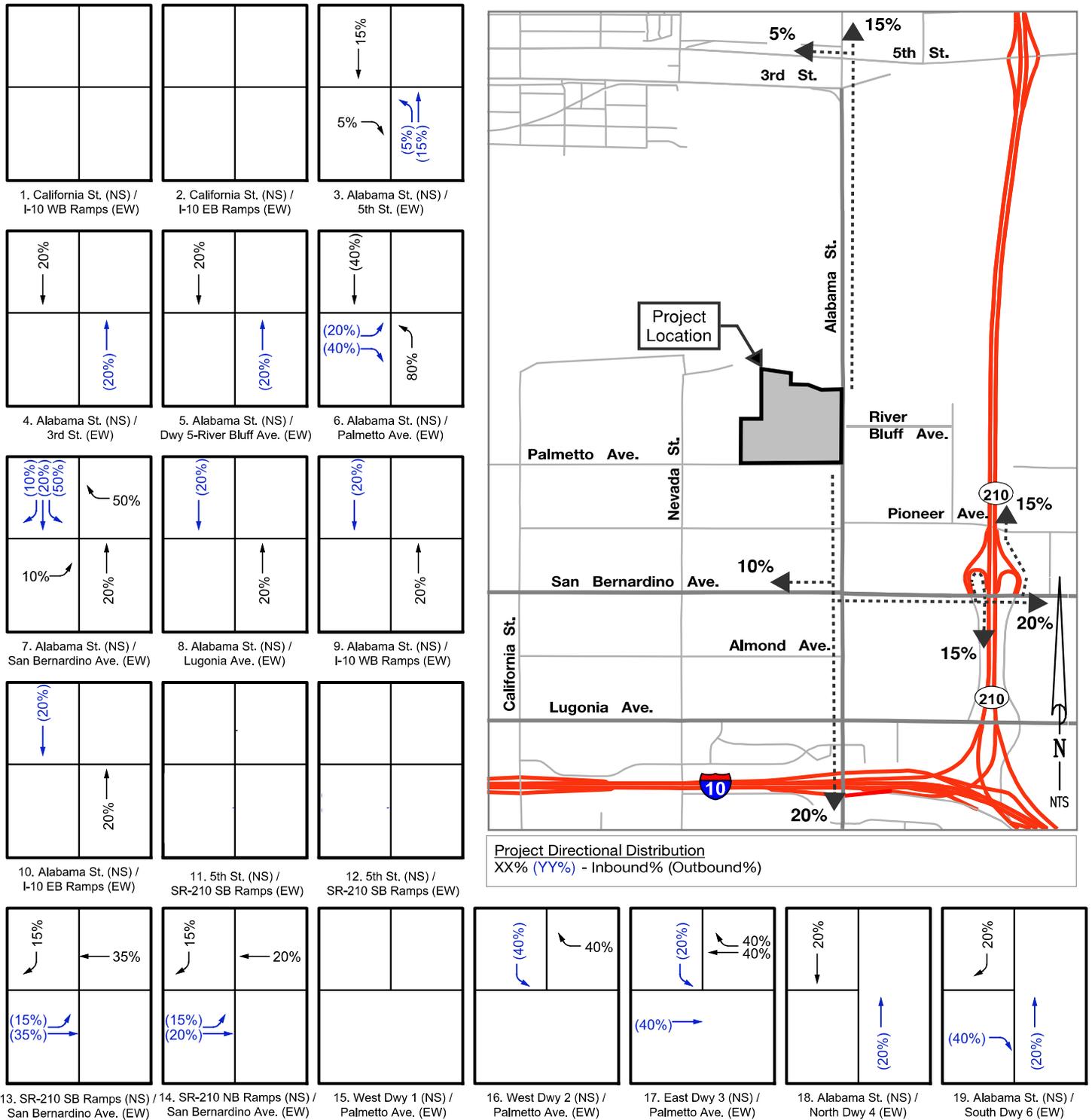
The traffic reducing potential of public transit has not been considered in this study. Therefore, the traffic projections provided in this report are considered conservative since public transit could reduce traffic volumes in the project area.

#### 4.2.4 Project Trip Assignment

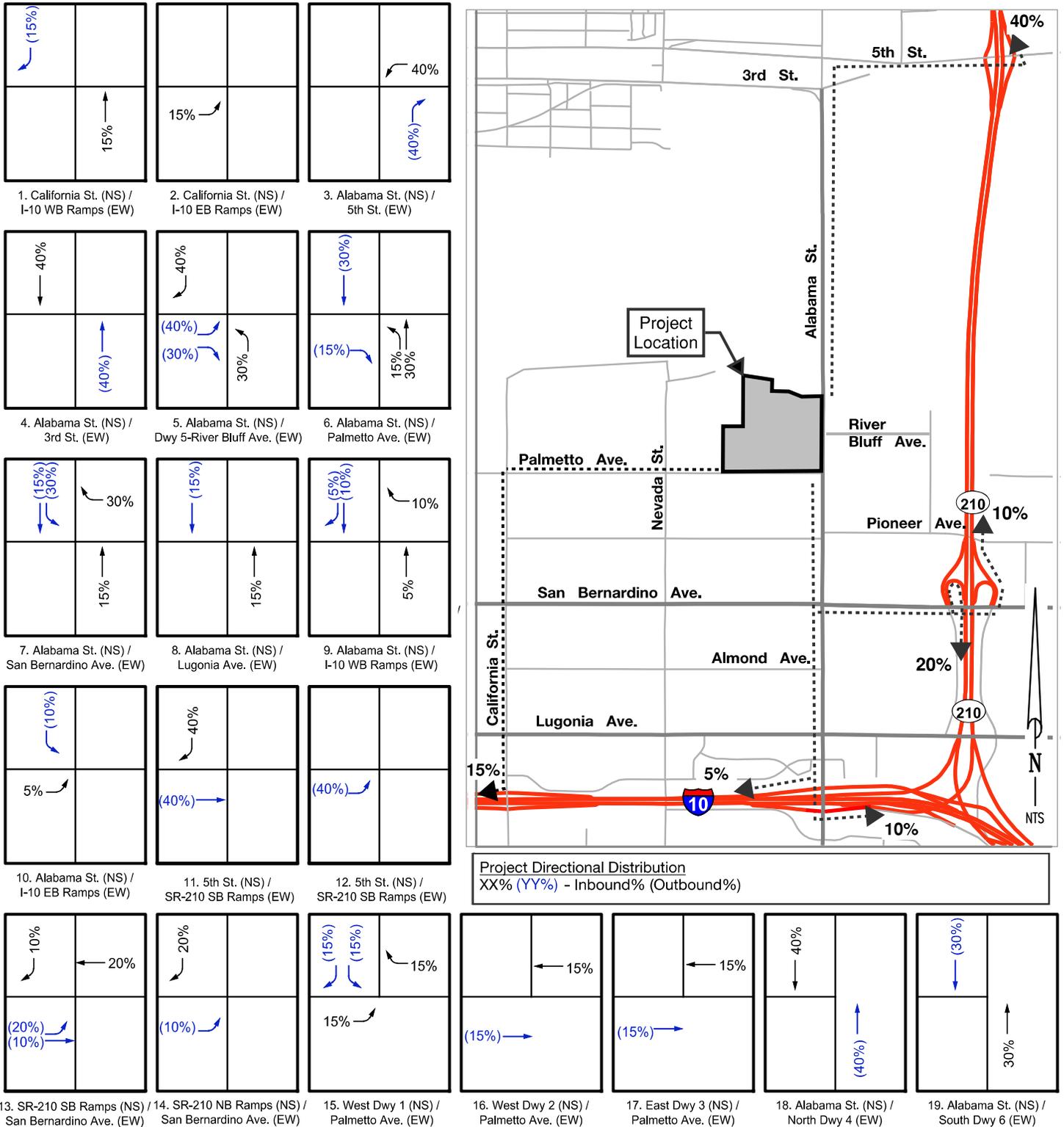
Trip assignment is the result of assigning the previously-discussed trip generation numbers to the City’s circulation system using the aforementioned trip distribution.

The project related AM peak hour and PM peak hour intersection turning movement volumes for passenger cars and trucks plus passenger cars are shown on **Figure 13** and **Figure 14**, respectively. These figures show the number of turning movements at each intersection in the study area for the AM and PM hours.

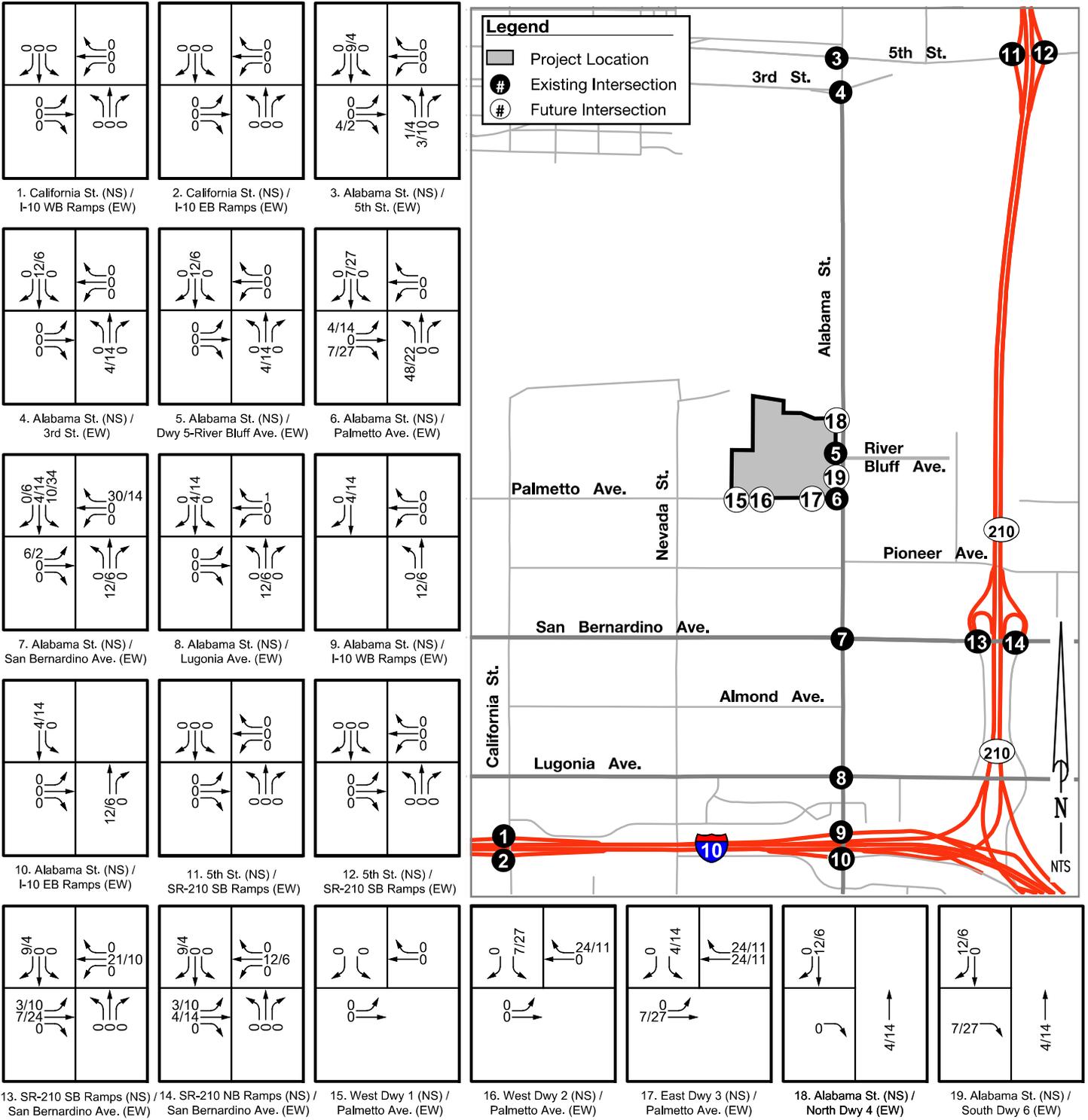
**Figure 11– Directional Distribution of Project Traffic (Passenger Cars)**



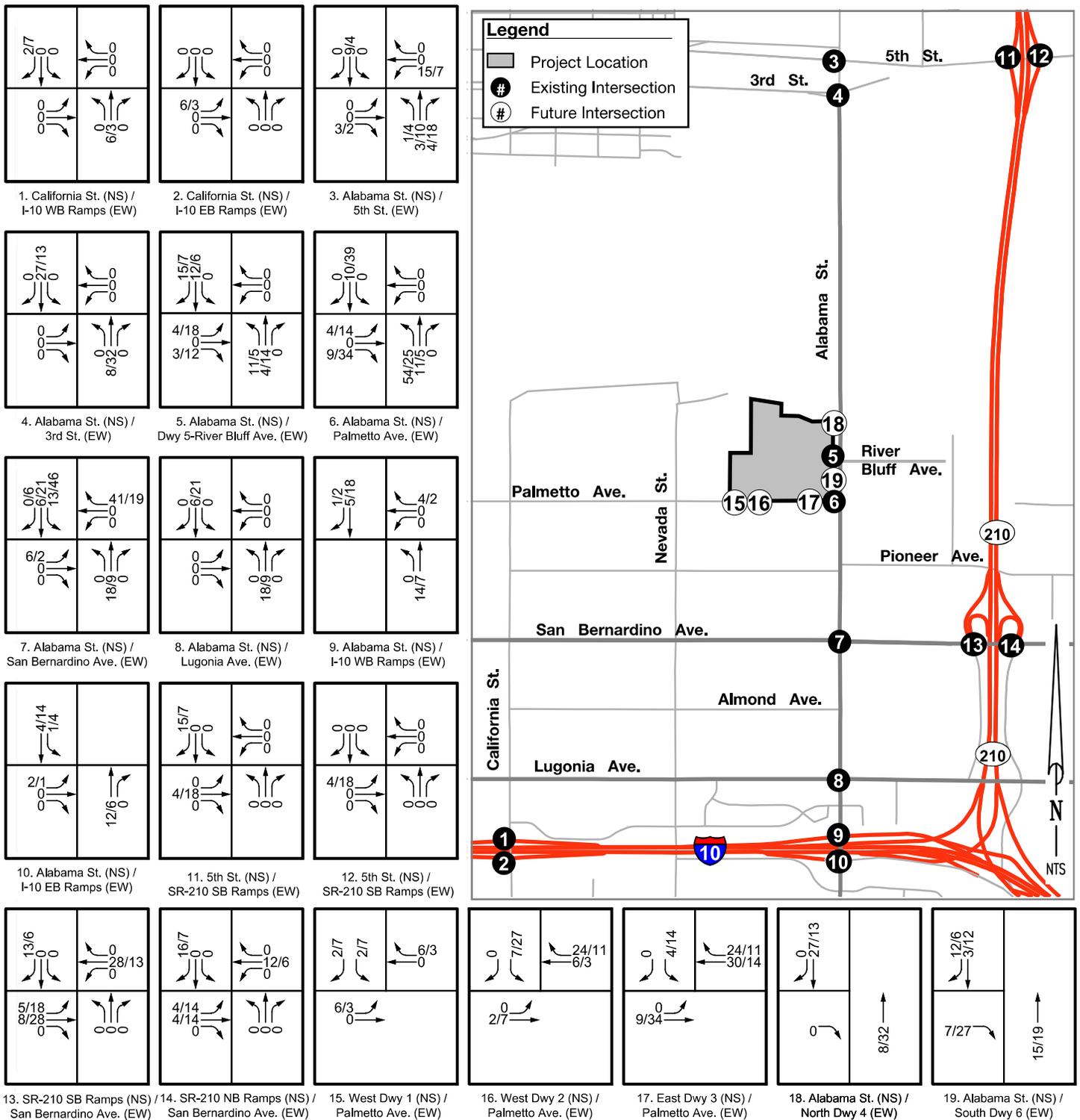
**Figure 12 – Directional Distribution of Project Traffic (Trucks)**



**Figure 13– Project Only AM/PM Peak Hour Intersection Volumes (Passenger Cars Only)**



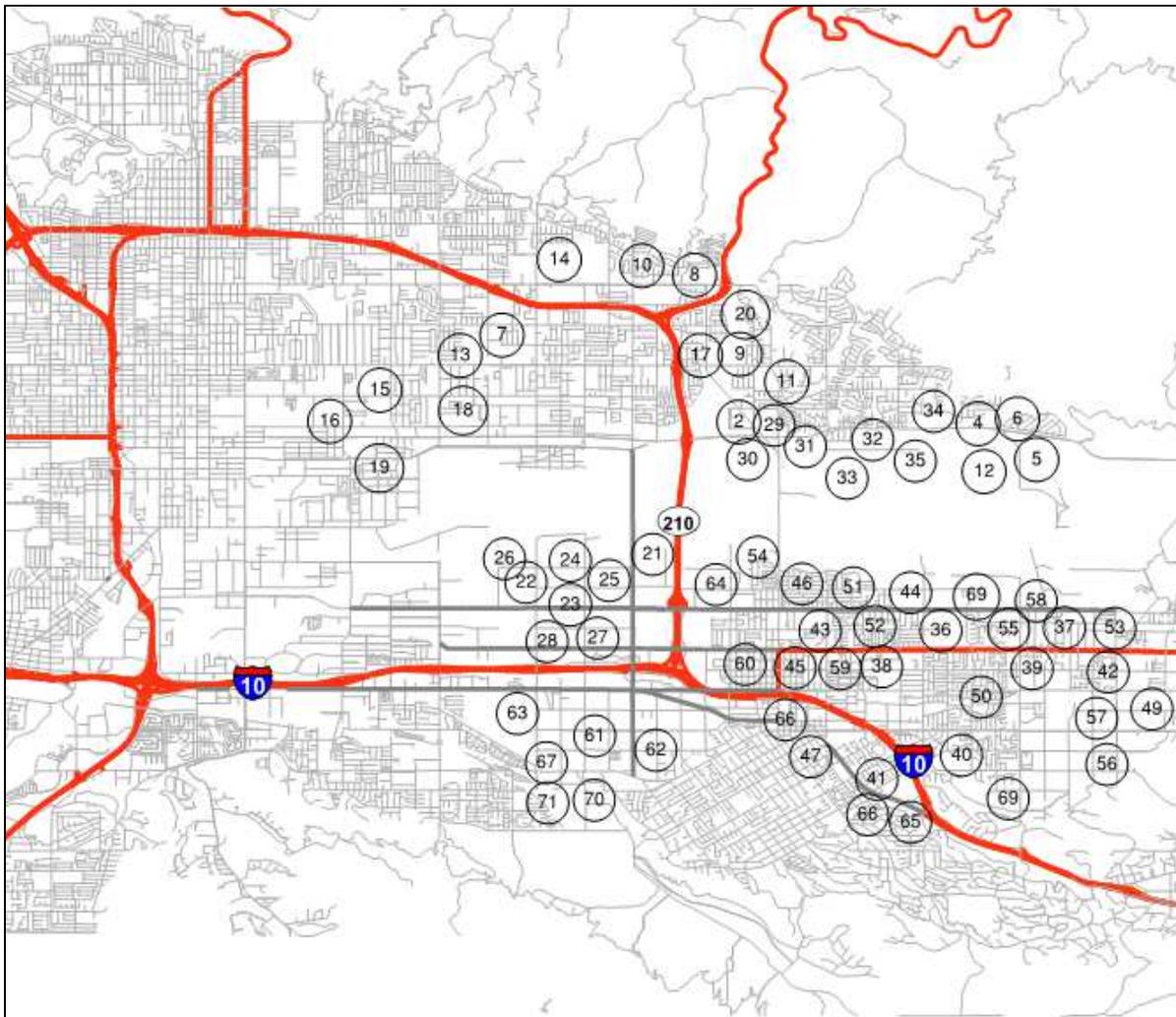
**Figure 14– Project Only AM/PM Peak Hour Intersection Volumes (Passenger Cars + Trucks)**



### 4.3 Cumulative Project Generated Traffic

Cumulative projects are those projects identified by the Counties and Cities within the study area that are anticipated to be completed and contribute vehicle trips to the roadway network by the project’s opening year (2020). The County of San Bernardino, City of Highland, and City of Redlands provided Webb a list of projects that are in development within the study area of this project. Traffic from these cumulative projects is expected to have an impact on levels of service. The cumulative projects within the study area are listed in **Table 4-3** and the locations are provided in **Figure 15**. The AM and PM peak hour intersection turning movement volumes for cumulative projects are shown on **Figure 16** and **Figure 17**, respectively.

**Figure 15 Cumulative Project Location Map**



**Table 4-3 – Cumulative Projects within the Study Area**

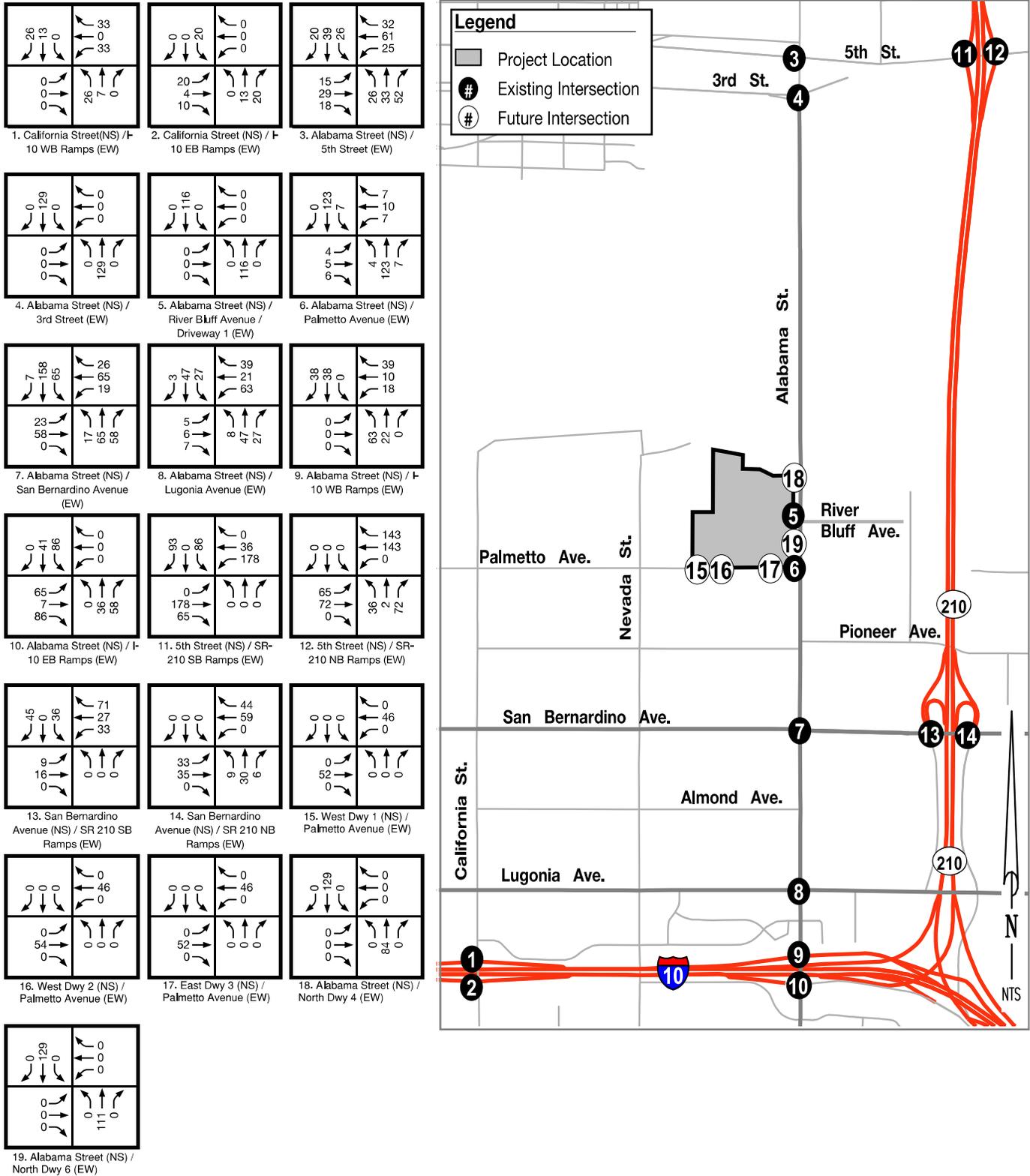
Project/Map ID	Land Use	Qty	Unit	AM Peak Hour	PM Peak Hour	Daily
City of Redlands, City of Highland and County of San Bernardino						
1. Blossom Trails	Residential Condominium/Townhouse	306	DU	135	159	1,778
2. Richmond American 121 SFD Gated Community	Single-Family Detached Housing	121	DU	90	120	1,142
3. Centerstone Single Family Homes	Single-Family Detached Housing	125	DU	93	124	1,180
4. Heather Glen TPM 17604 South of Greenspot Rd, Between Merris & Weaver	Single-Family Detached Housing	215	DU	159	213	2,030
5. SWC Alta Vista and Santa Ana Canyon Road	Single-Family Detached Housing	56	DU	41	55	529
6. Mediterra Specific Plan	Single-Family Detached Housing	300	DU	222	297	2,832
7. Highland Park - Mastercraft Homes	Single-Family Detached Housing	46	DU	34	46	434
8. San Manuel Village	Fast-Food Restaurant with Drive-Through Window	3.5	TSF	141	114	1,648
	<i>Pass by Trips (49% AM, 50% PM, Fast Food)</i>			69	57	824
	<i>Sub-Total Trip Gen.</i>			72	57	824
9. Other Partiall Built Restaurants	Fast-Food Restaurant with Drive-Through Window	2.7	TSF	109	88	1,272
	<i>Pass by Trips (49% AM, 50% PM, Fast Food)</i>			53	44	636
	<i>Sub-Total Trip Gen.</i>			56	44	636
10. Highland Crossroads	Shopping Center	42.84	TSF	40	163	1,617
				4	16	162
	<i>Pass by Trips</i>				55	809
	<i>Sub-Total Trip Gen.</i>			36	91	647
11. Boulder Avenue / Greenspot Road CUP-007-008 - Boulder Holdinas	Fast-Food Restaurant with Drive-Through Window	14.38	TSF	578	470	6,772
	<i>Pass by Trips(49% Am, 50% PM, Fast Food)</i>			283	235	3,386
	<i>Sub-Total Trip Gen</i>			295	235	3,386
	Shopping Center	16.33	TSF	15	62	616
	Internal Trips (10%)			2	6	62
	<i>Pass by Trips</i>				21	308
<i>Sub-Total Trip Gen.</i>			14	35	246	
12. Greenspot Village & Marketplace Other Commercial and Residential	Residential Condominium/Townhouse	*		2,453	2,624	28,361
13. NWC Seine / Base Line	Fast-Food Restaurant with Drive-Through Window	5.143	TSF	207	168	2,422
	<i>Pass by Trips (49% AM, 50% PM, Fast Food)</i>			101	84	1,211
	<i>Sub-Total Trip Gen.</i>			106	84	1,211
14. Orange New Jersey Pro	Industrial Park	126.9	TSF	51	51	428

Project/Map ID	Land Use	Qty	Unit	AM Peak Hour	PM Peak Hour	Daily
15. Arco, Victoria / Highland Avenue - Gas Station	Convenience Market with Gasoline Pumps	2.4	TSF	98	122	2,029
	Motel	72	Rooms	27	27	241
	<i>Total</i>			125	149	2,270
	<i>Internal Trips</i>			13	15	227
	<i>Pass by Trips</i>			61	72	1,015
	<i>Sub-Total Trip Gen</i>			52	62	1,029
16. Transition Properties	Warehousing	117.9	TSF	20	22	205
	<i>Passenger Cars (PCE = 1.0)</i>			25	29	289
	<i>Trucks (2 Axle, PCE = 1.5)</i>			2	3	41
	<i>Trucks (3 Axle, PCE = 2.0)</i>			6	6	73
	<i>Trucks (4+ Axle, PCE = 3.0)</i>			20	10	202
	<i>Total</i>			53	48	605
17. Keven Chong - Northwest Corner of Base Line and Boulder	Drive-in Bank	5.2	TSF	49	106	520
18. Pepito's	High-Turnover (Sit-Down) Restaurant	7.5	TSF	75	73	841
	<i>Pass by Trips (43% PM, High-Turnover Restaurant)</i>				31	421
	<i>Sub-Total Trip Gen</i>			75	42	421
19. Arco Addition of Car Wash and QSR	Gasoline/Service Station with Convenience Market	15.2	TSF	1,248	1,482	2,474
	<i>Pass by Trips</i>			749	874	1,237
	<i>Sub-Total Trip Gen</i>			499	608	1,237
20. Highland Park - Mastercraft Homes	Single-Family Detached Housing	46	DU	34	46	434
21. 27573 River Bluff Road	Warehousing	289.3	TSF	49	55	503
	<i>Passenger Cars (PCE = 1.0,</i>			61	73	709
	<i>Trucks (2 Axle, PCE = 1.5)</i>			6	7	100
	<i>Trucks (3 Axle, PCE = 2.0)</i>			6	13	179
	<i>Trucks (4+ Axle, PCE = 3.0,</i>			49	26	494
	<i>Total</i>			122	119	1,483
22. KTR Property Trust, at Nevada Street and Pioneer Avenue , Northeast Corner	Warehousing	206.7	TSF	35	39	360
	<i>Passenger Cars (PCE = 1.0,</i>			44	52	506
	<i>Trucks (2 Axle, PCE = 1.5)</i>			4	5	72
	<i>Trucks (3 Axle, PCE = 2.0)</i>			6	9	128
	<i>Trucks (4+ Axle, PCE = 3.0,</i>			35	18	353
	<i>Total</i>			89	84	1,059
23. Prologis L P at Alabama St, West Side; San Bernardino Ave, North Side	Warehousing	166	TSF	28	32	289
	<i>Passenger Cars (PCE = 1.0,</i>			35	41	407
	<i>Trucks (2 Axle, PCE = 1.5)</i>			4	4	58
	<i>Trucks (3 Axle, PCE = 2.0)</i>			6	8	103
	<i>Trucks (4+ Axle, PCE = 3.0,</i>			28	15	284
	<i>Total</i>			73	68	851

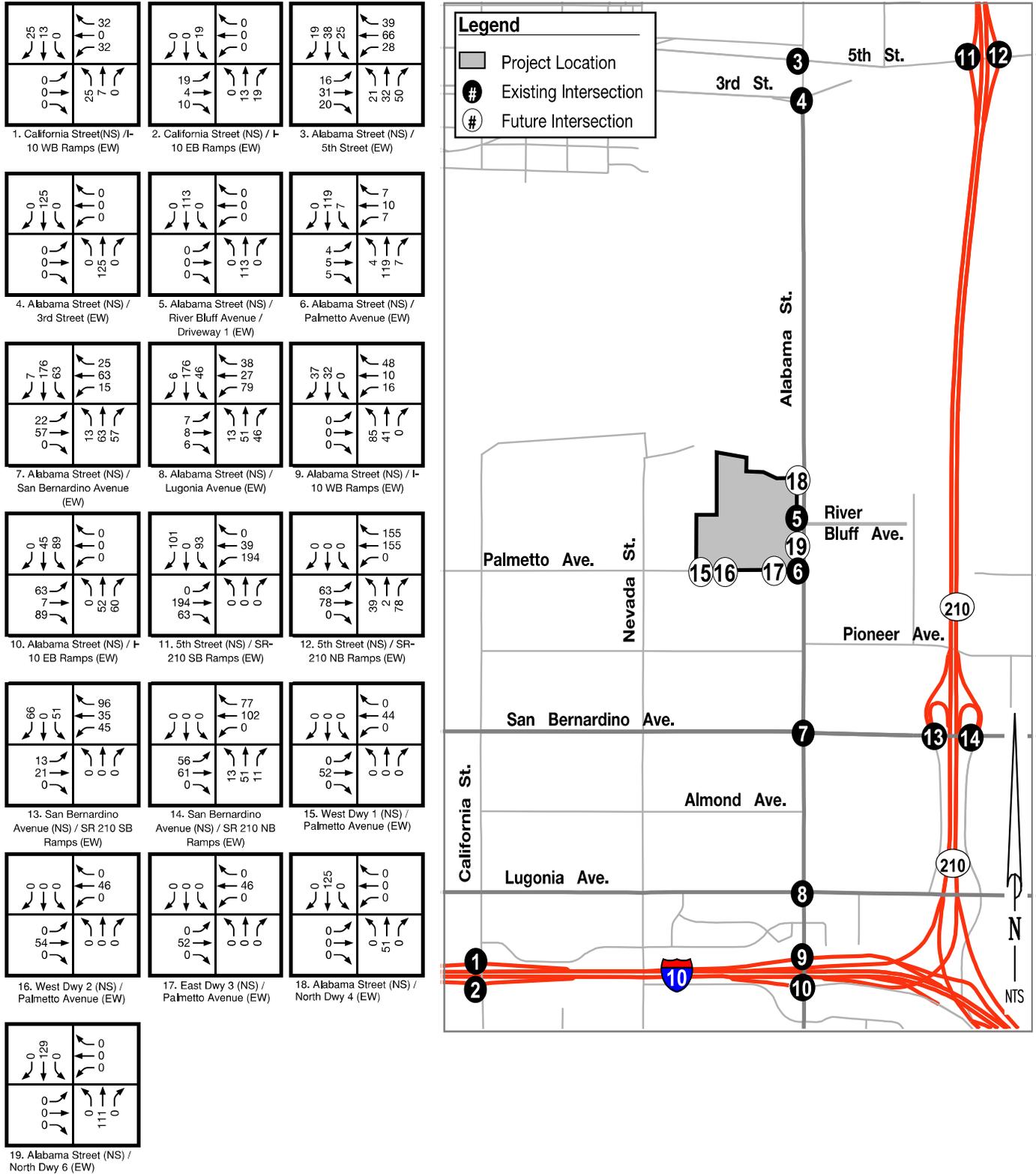
Project/Map ID	Land Use	Qty	Unit	AM Peak Hour	PM Peak Hour	Daily
24. Jackson Smith-Newcastle Partners, San Bernardino Ave. North Side; Alabama St., Approx 630'	Warehousing	190.1	TSF	32	36	331
	<i>Passenger Cars (PCE = 1.0),</i>			40	48	466
	<i>Trucks (2 Axle, PCE = 1.5),</i>			4	5	66
	<i>Trucks (3 Axle, PCE = 2.0),</i>			6	9	118
	<i>Trucks (4+ Axle, PCE = 3.0),</i>			32	17	325
	<i>Total</i>			82	79	975
25. Stone Creek Company at Alabama Street and Almond Avenue, Northwest Corner	Single-Family Detached Housing	17	DU	13	17	160
	Hotel	180	Rooms	85	108	1,505
26. Prologis L P Almond Avenue and Nevada Street Southeast Corner	Warehousing	425	TSF	72	81	740
	<i>Passenger Cars (PCE = 1.0),</i>			90	107	1,041
	<i>Trucks (2 Axle, PCE = 1.5),</i>			9	10	148
	<i>Trucks (3 Axle, PCE = 2.0),</i>			6	19	263
	<i>Trucks (4+ Axle, PCE = 3.0),</i>			72	38	726
	<i>Total</i>			177	174	2,178
27. Prokos, at Lugonia Ave., Approx 171' North of; Citrus Plaza Drive, Approx, 372'	High-Turnover (Sit-Down) Restaurant	7	TSF	70	68	785
	<i>Pass by Trips (43% PM, High-Turnover Restaurant),</i>				29	393
	<i>Total Trip Gen</i>			70	39	393
28. St. Adelaide Expansion - New Ministry Offices - Phase I of II Built	General Office Building	9	TSF	14	13	99
29. Blossom Trails	Single-Family Detached Housing	14	DU	10	14	132
30. Chong Homes	Single-Family Detached Housing	5	DU	4	5	43
31. Peter Le	Single-Family Detached Housing	8	DU	6	8	76
32. Hispano Investors Residential	Single-Family Detached Housing	17	DU	13	17	160
33. Golden Security Bank	Single-Family Detached Housing	9	DU	7	9	85
34. Ross Jones (Residential)	Single-Family Detached Housing	4	DU	3	4	38
35. South Terminus of Lillian Lane	Single-Family Detached Housing	13	DU	10	13	123
36. Tract 18988 Pioneer/Texas	Single-Family Detached Housing	82	DU	61	81	774
37. Tract 18979	Single-Family Detached Housing	55	DU	41	54	519
38. Tract 18762	Single-Family Detached Housing	228	DU	169	226	2,152

Project/Map ID	Land Use	Qty	Unit	AM Peak Hour	PM Peak Hour	Daily
39. Tract 18845	Single-Family Detached Housing	24	DU	18	24	61
40. Tract 16915	Single-Family Detached Housing	6	DU	4	6	15
41. Tract 16586	Single-Family Detached Housing	76	DU	56	75	717
42. Tract 16878	Single-Family Detached Housing	67	DU	50	66	632
43. Tract 19975	Single-Family Detached Housing	67	DU	50	66	632
44. Tract 17022	Single-Family Detached Housing	12	DU	9	12	113
45. CUP 1045 Libert Lane	Single-Family Detached Housing	80	DU	59	79	755
46. Tract 17265	Single-Family Detached Housing	24	DU	18	24	227
47. Tract 17675	Single-Family Detached Housing	11	DU	8	11	104
48. Tract Parcel Map 17548	Single-Family Detached Housing	3	Per	1	1	8
49. Tract 16402	Single-Family Detached Housing	26	DU	19	26	245
50. Tract 16816	Single-Family Detached Housing	10	DU	7	10	94
51. Tract 16287	Single-Family Detached Housing	12	DU	9	12	113
52. Tract 18182	Single-Family Detached Housing	27	DU	20	27	255
53. Tract 17080	Single-Family Detached Housing	8	DU	6	8	76
54. Tract 18952	Single-Family Detached Housing	131	DU	97	130	1,237
55. Tract 18979	Single-Family Detached Housing	55	DU	41	54	519
56. Tract 19956	Single-Family Detached Housing	40	DU	30	40	378
57. Tract 19942	Single-Family Detached Housing	34	DU	25	34	321
58. Tract 19975	Single-Family Detached Housing	67	DU	50	66	632
59. Tract 20079	Single-Family Detached Housing	14	DU	10	14	132
60. CUP 1102 & Zone	Single-Family Detached Housing	96	DU	71	95	906
61. CRA 893 Apt Bldg	Single-Family Detached Housing	8	DU	6	8	76
62. CUP 1096 Casa Loma	Single-Family Detached Housing	120	DU	89	119	1,133
63. Tract 20126	Single-Family Detached Housing	103	DU	76	102	972
64. Redlands Crossing W/Walmart	Shopping Center	256.6	46	241	978	9,687
65. CUP 905 Revision 3	Shopping Center	88.08	TSF	83	336	3,325
66. CUP 335 Redlands	Hospital	8.53	TSF	10	10	141
67. CRA 889 5000sf	Shopping Center	28.49	TSF	27	109	1,075
68. Hotel	Hotel	77	Rooms	36	46	644
69. MOD Packinghouse	Quality Restaurant	14	TSF	11	105	1,259
70. CRA 890 Parkford Shopping Center Expansion	Shopping Center	15	TSF	14	57	566
71. CUP 1076 123 Hotel	Hotel	123	Rooms	58	74	1,028
Total				6,500	8,584	84,993

Figure 16 – Cumulative Projects Only AM Peak Hour Intersection Volumes



**Figure 17 – Cumulative Projects Only PM Peak Hour Intersection Volumes**

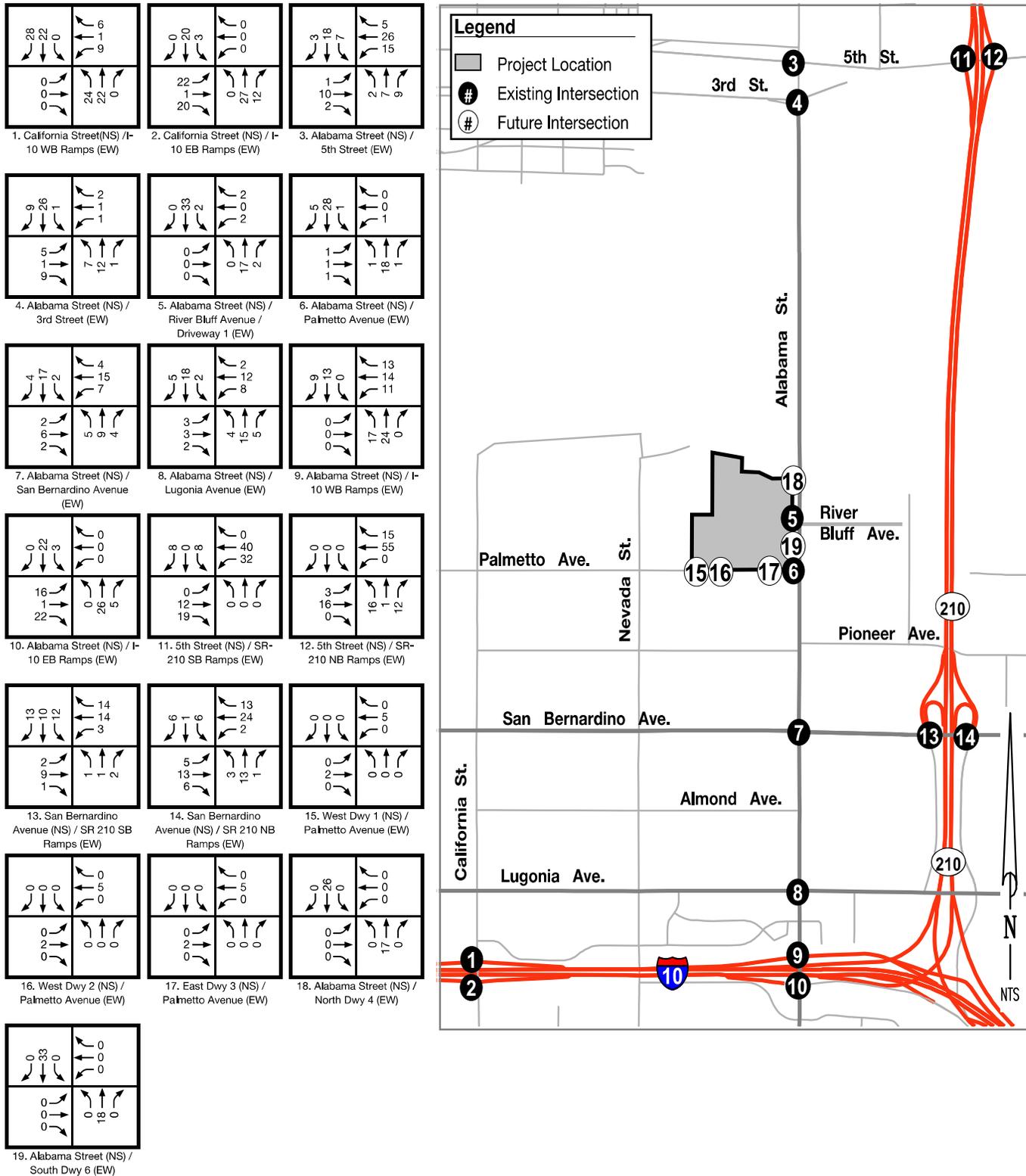


#### 4.4 Ambient Growth

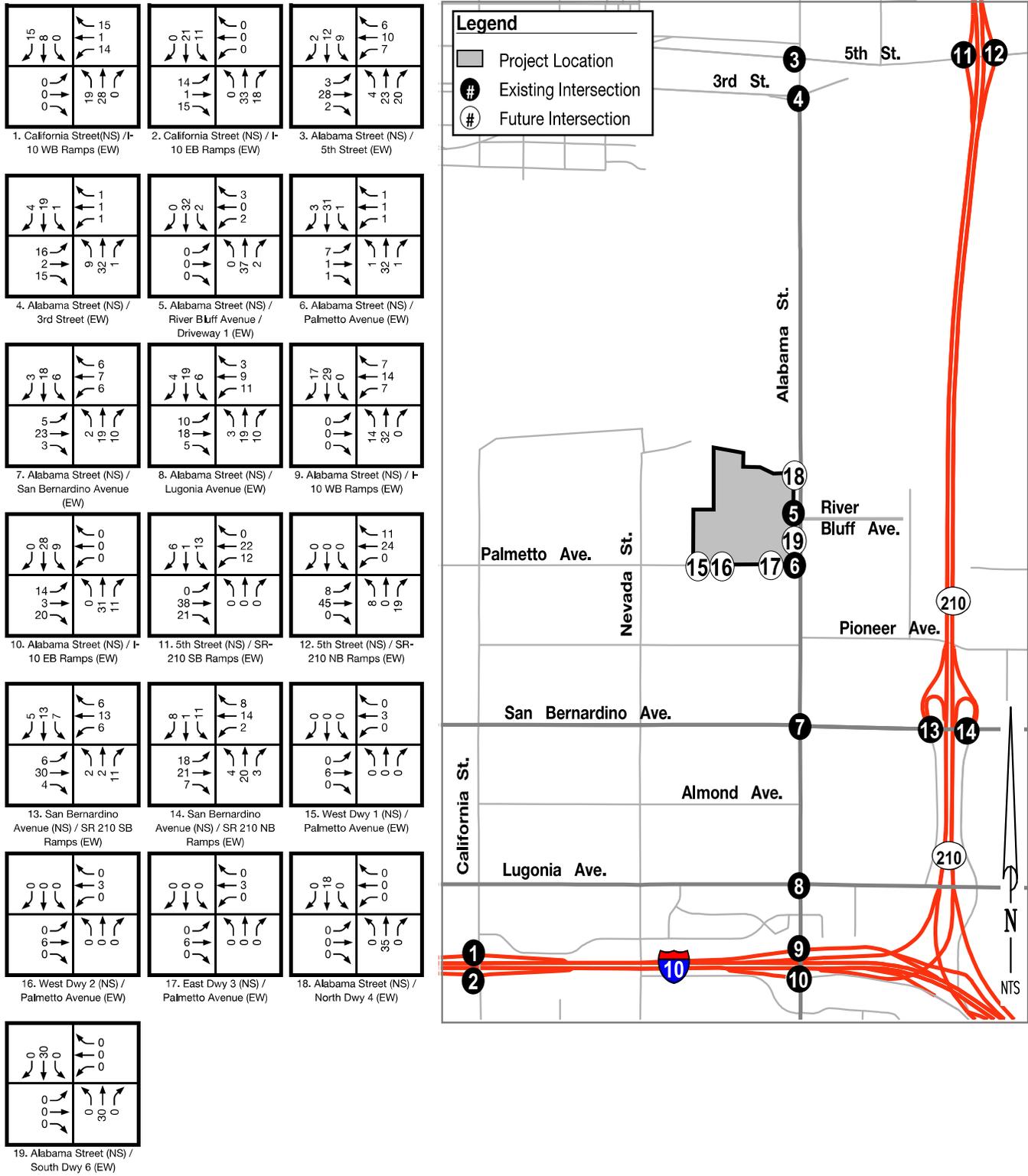
In order to evaluate traffic conditions for the opening year, area wide growth on existing roadways must be projected. The majority of the anticipated growth within the study area is accounted for with other cumulative project traffic. The ambient traffic growth factor is intended to include unknown and future cumulative projects in the study area, as well as account for regular growth in traffic volumes due to the development of projects outside the study area. Per discussion with San Bernardino County Traffic Division staff, this study will utilize a 2 percent per year growth rate. The AM and PM peak hour intersection turning movement volumes for ambient growth only are shown on **Figure 18** and **Figure 19**, respectively.

The AM and PM peak hour intersection turning movement volumes for ambient growth plus cumulative project trips are shown on **Figure 20** and **Figure 21**, respectively

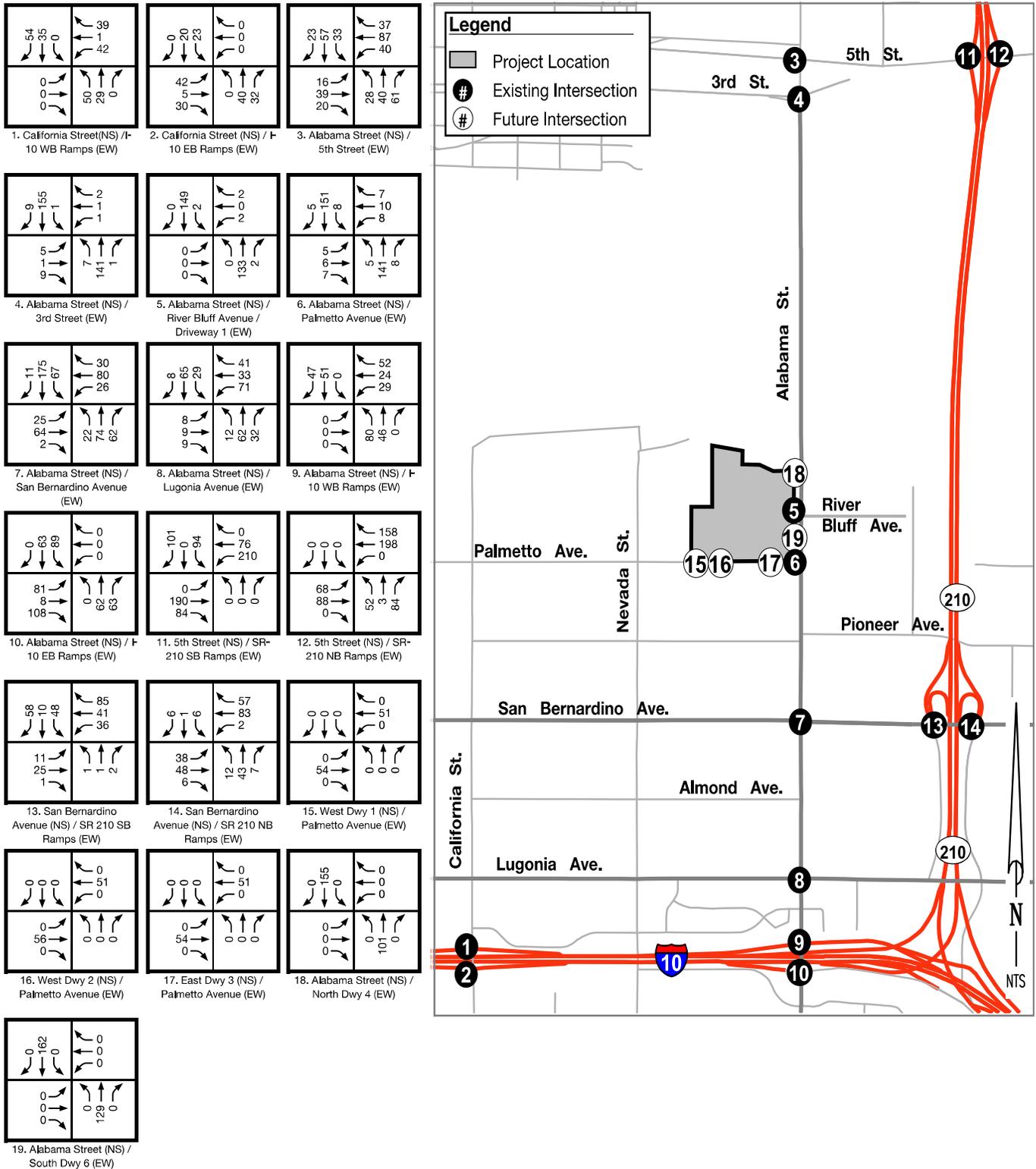
**Figure 18 – Ambient Growth Only AM Peak Hour Intersection Volumes**



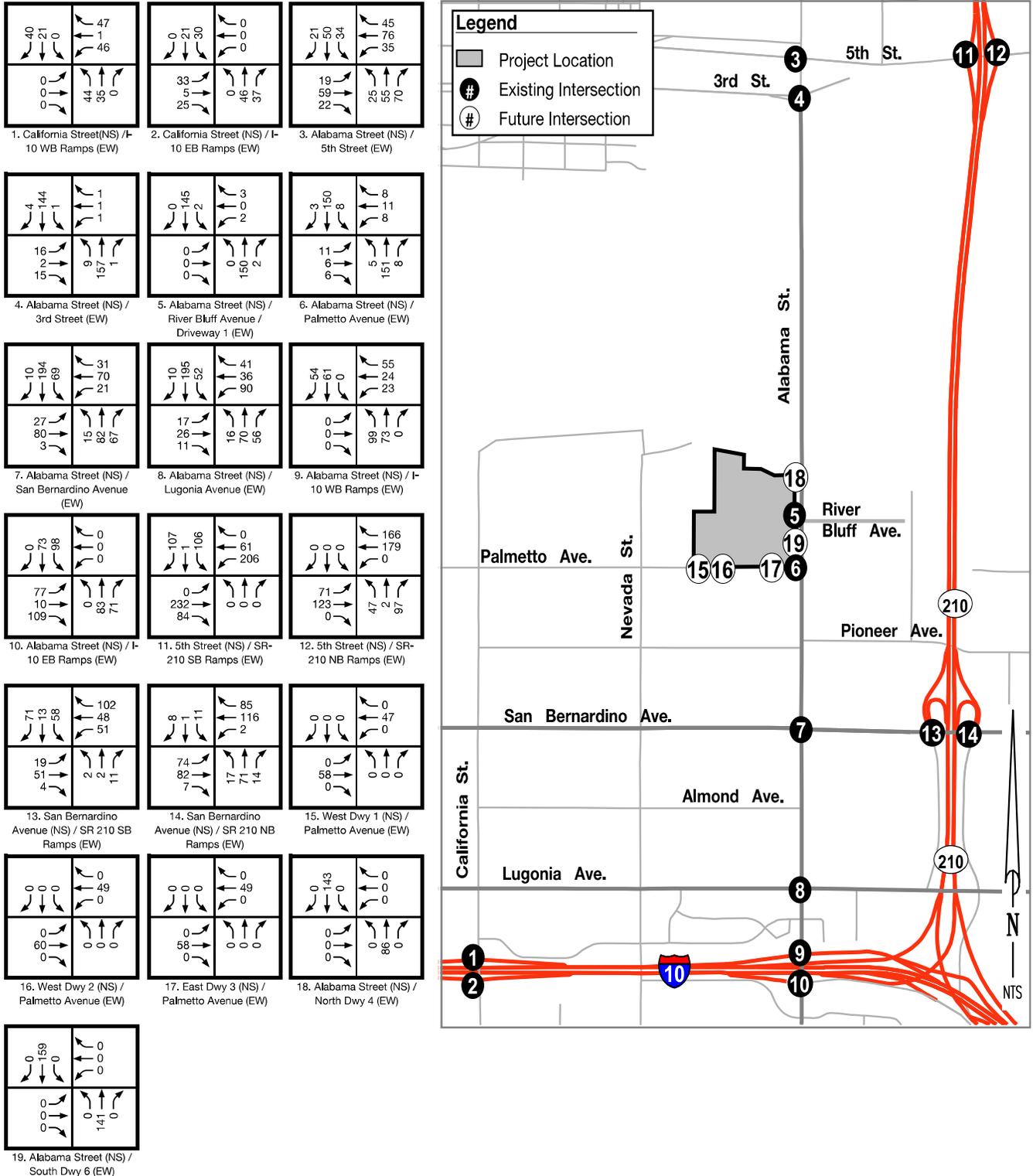
**Figure 19– Ambient Growth Only PM Peak Hour Intersection Volumes**



**Figure 20 – Ambient Growth Plus Cumulative Projects AM Peak Hour Intersection Volumes**



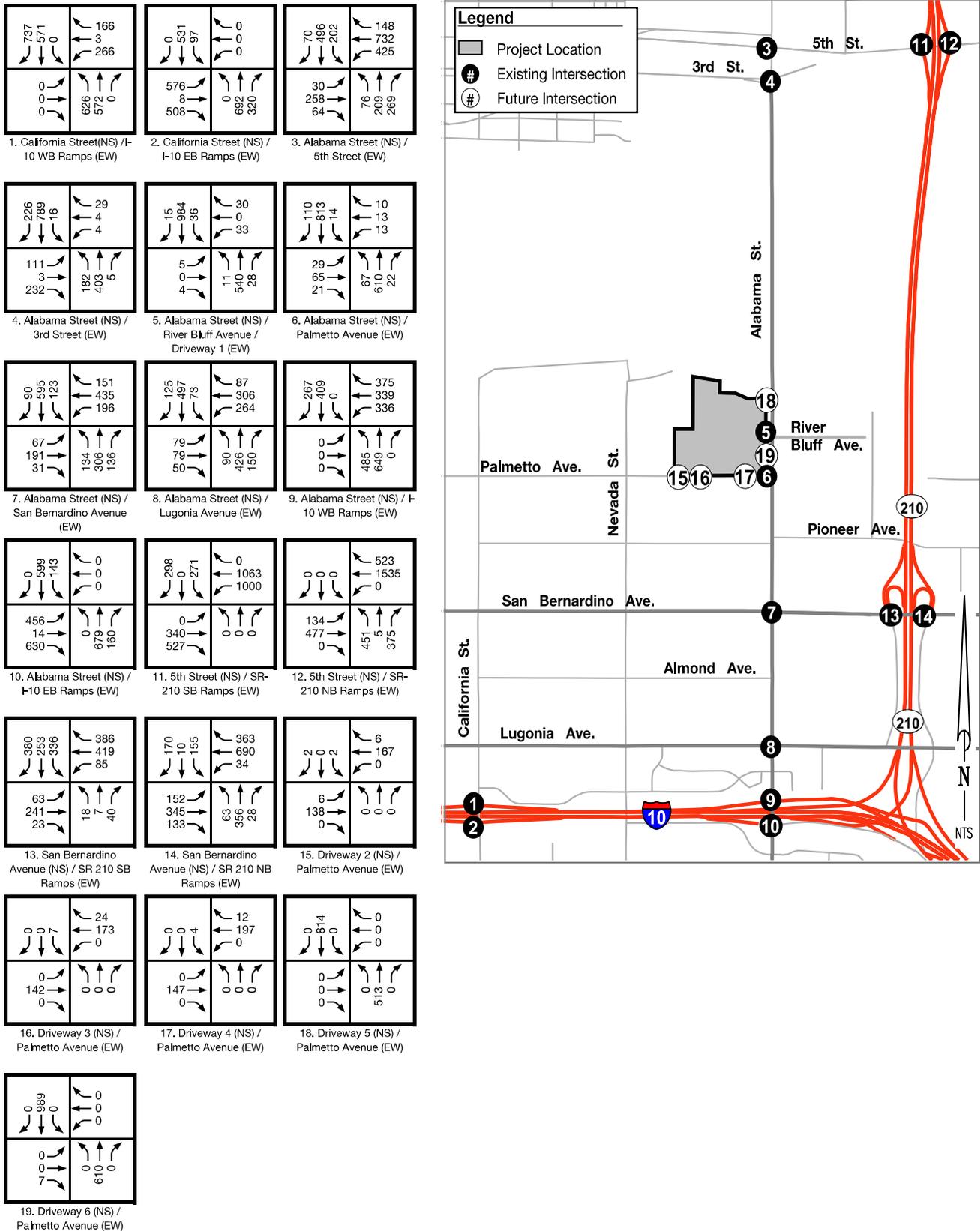
**Figure 21 – Ambient Growth Plus Cumulative Projects PM Peak Hour Intersection Volumes**



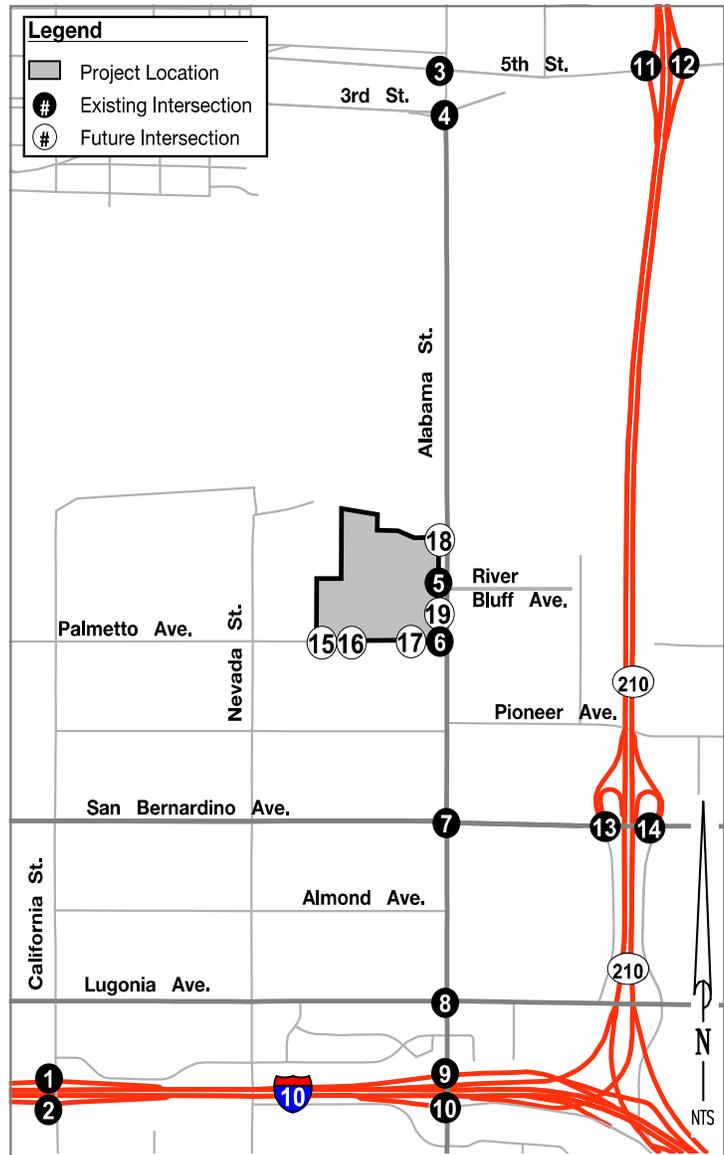
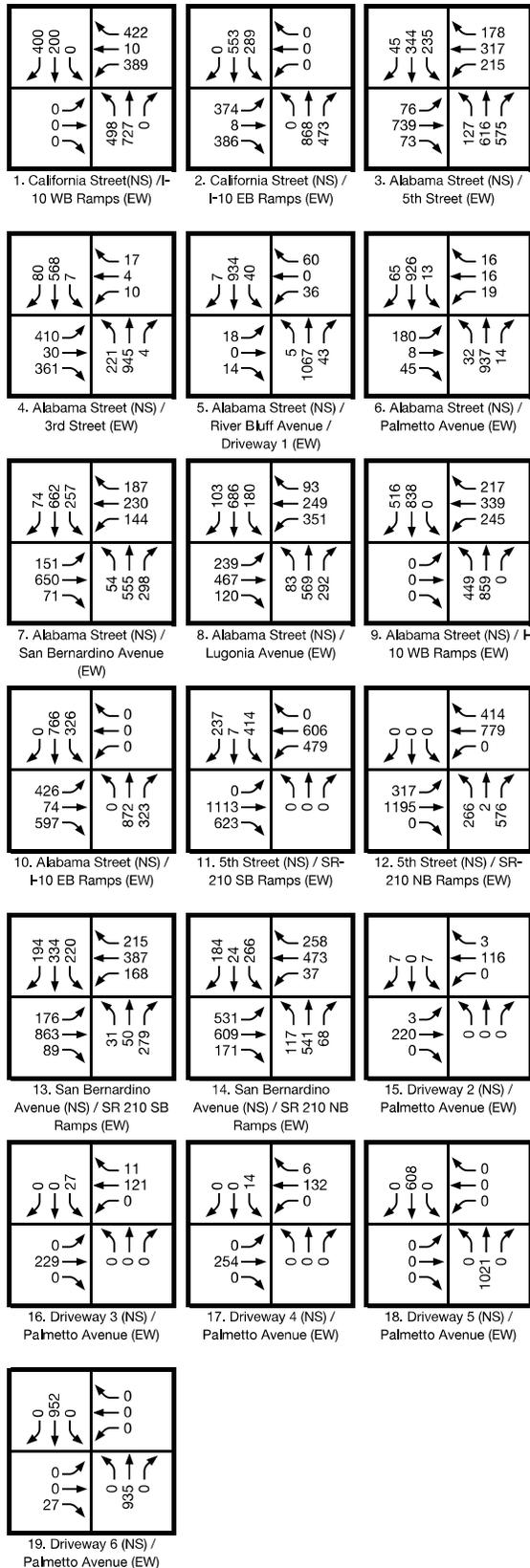
#### 4.5 Total Traffic (2020)

Traffic conditions for the opening year include existing traffic, ambient growth, cumulative project trips, and the proposed Project trips. All of the types of trips are included in the analysis to result in forecasted intersection LOS for the opening year (2020). The AM and PM peak hour intersection turning movement volumes for existing plus ambient plus cumulative plus Project are shown on **Figure 22** and **Figure 23**, respectively.

**Figure 22 – Existing Plus Ambient Growth Plus Cumulative Projects Plus Project AM Peak Hour Intersection Volumes**



**Figure 23 – Existing Plus Ambient Growth Plus Cumulative Projects Plus Project PM Peak Hour Intersection Volumes**



## 4.6 Build Out Year (2040) Trip Generation

The San Bernardino County Guidelines require examination of traffic impacts under build-out year 2040 conditions. The San Bernardino County TIA procedures require that an analysis be conducted utilizing year 2040 traffic data from an approved local or regional traffic model provided by San Bernardino County Transportation Authority (SBCTA). SBCTA developed year 2040 traffic volumes using future traffic projections from the East Valley Traffic Model (EVTM), maintained by the City of San Bernardino.

The following describes in detail the methodology employed for passenger vehicles to determine the a.m. and p.m. peak hour intersection turn movements for year 2040 conditions. Volume development sheets are included in Appendix G. The methodology used is consistent with San Bernardino Associated Governments (SANBAG) procedures for post-processing of modeled traffic volumes. The base year for the passenger vehicle model is 2000 and the forecast year is 2040.

1. The modeled build out (year 2040) peak period directional arterial traffic volumes include the traffic volumes from the traffic analysis zones (TAZs) containing the proposed project. Build out peak period directional traffic volumes were subtracted from the modeled year 2040 peak period traffic volumes to obtain the adjusted year 2040 modeled peak period volumes.
2. The difference between the modeled base year and adjusted year 2040 peak period directional arterial traffic volumes (for each intersection approach and departure) was identified from loaded network model plots. This difference defines the growth in traffic from current conditions to year 2040 conditions.
3. The incremental growth in peak period approach and departure volumes was factored to develop the incremental change in peak hour volumes. The EVTM uses a three-hour a.m. peak period and a four-hour p.m. peak period. The Southern California Association of Governments (SCAG) has established that the a.m. peak hour comprises 38 percent of the peak period and that the p.m. peak hour comprises 28 percent of the peak period. Therefore, the incremental changes in peak period volumes were multiplied by the appropriate factors to develop incremental changes in peak hour volumes.
4. The incremental growth in approach and departure volumes between 2012 and 2040 was factored to reflect the forecast growth between the year of the collected counts (2018) and 2040. For this purpose, linear growth between the 2012 base condition and the forecast 2040 condition was assumed. Since the increment between 2018 and 2040 is 22 years of the 28-year time span, a factor of 0.79 (i.e., 22/28) was used.
5. The forecast growth in approach and departure volumes through year 2040 conditions was added to the 2010 collected counts, resulting in “post-processed” forecast year 2040 link volumes.
6. Forecast year 2040 turn volumes were developed using existing turn volumes and the future approach and departure volumes, based on the methodologies contained in the National Cooperative Highway Research Program Report (NCHRP) 255: Highway Traffic Data for Urbanized Area Project Planning and Design (Transportation Research Board, December 1982).
7. The project only traffic forecasts have been generated by applying the trip generation, distribution and traffic assignment calculations. Project traffic volumes were then subtracted from the refined future year EVTAM traffic model volumes to determine build-out Year (2040) without project traffic conditions. The initial estimate of the build-out year (2040) peak hour turning movements was then reviewed by Webb for reasonableness at intersections where model results showed unreasonable turning

movements. The initial raw model estimates were adjusted to achieve flow conservation, reasonable growth, and reasonable diversion between parallel routes.

The post-processing worksheets for the build-out year (2040) trip generation and model plots are provided in the Appendix G.

## 5.0 TRAFFIC ANALYSIS

### 5.1 Level of Service Methodology

The San Bernardino County Transportation Division requires that the most recent release of the Transportation Research Board Highway Capacity Manual (HCM) be used to analyze Level of Service (LOS). The Highway Capacity Manual 6<sup>th</sup> Edition (HCM6) was used for the analysis.

Quality of service describes how well a transportation facility or service operates from the traveler's perspective. Level of service (LOS) is a quantitative stratification of a performance measure or measures that represent quality of service. LOS is measured on a familiar A to F scale where LOS A represents the best conditions from a traveler's perspective and LOS F the worst. A simple LOS letter system is used to hide much of the complexity of transportation facility performance in order to simplify decision making on whether facility performance is generally acceptable and whether a future change in performance is likely to be perceived as significant by the general public. One reason for the widespread adoption of the LOS concept by agencies is the concept's ability to communicate roadway performance to nontechnical decision makers.

The HCM6 evaluates the LOS of intersections based upon the control delay per vehicle. Control delay is defined as the delay associated with vehicles slowing in advance of an intersection, the time spent stopped on an intersection approach, the time spent as vehicles move up in the queue, and the time needed for vehicles to accelerate to their desired speed. The methodology used to evaluate the intersection level of service differs on whether the intersection is signalized or unsignalized. Levels of service at signalized and unsignalized intersections have been evaluated using Synchro Version 10, which is based upon HCM6 methodologies.

Delays and queue lengths were analyzed using Synchro Version 10.0. Synchro is a computerized micro-simulation modeling software program that analyzes traffic models by simulating the behavior of individual vehicles within the traffic circulation network.

#### 5.1.1 Signalized Intersections

Signalized intersections have been evaluated using the Operational Method as described in Chapter 16, Section II of the HCM6. According to this methodology, the level of service for signalized intersections is based upon the weighted average control delay, in seconds per vehicle, of all vehicles passing through the intersection. **Table 5-1** shows the criteria used to determine the level of service for signalized intersections.

**Table 5-1 – Level of Service for Signalized Intersections**

Level of Service	Control Delay (sec/vehicle)	Description
A	≤ 10	Minimal delay and primarily free-flow operation. Most vehicles do not stop because they arrive during the green indication or only stop for a brief amount of time as the signal changes.
B	> 10 – 20	Short delay and reasonably unimpeded operation. Many vehicles do not stop because they arrive during the green indication or only stop for a short amount of time as the signal changes. More vehicles stop than with LOS A.
C	> 20 – 35	Moderate delay and stable operation. Individual cycle failures (i.e. when queued vehicles do not clear the signal during the next green indication) may begin to appear. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.
D	> 35 – 55	Less stable operation in which small increases in vehicles may cause substantial increases in delay. Many vehicles stop and individual cycle failures are noticeable.
E	> 55 – 80	Significant delay and unstable operation. Most vehicles stop and individual cycle failures are frequent.
F	> 80	Considerable delay and extensive queuing. Almost all vehicles stop and most cycles fail to clear the queue.

Source: Transportation Research Board Highway Capacity Manual 6

### 5.1.2 Unsignalized Intersections

Unsignalized intersections were evaluated using Chapter 19-20 of the HCM 6. According to this methodology, the level of service for all-way stop intersections is based upon the weighted average control delay, in seconds per vehicle, of all vehicles passing through the intersection. For two-way stop controlled intersections, the level of service is based on the highest control delay of all controlled movements for the intersection. **Table 5-2** shows the criteria used to determine the level of service for unsignalized intersections.

**Table 5-2 – Level of Service for Unsignalized Intersections**

Level of Service	Control Delay (sec/vehicle)	Description
A	≤ 10	Minimal delay. Usually no conflicting traffic.
B	> 10 – 15	Short delay. Occasionally some conflicting traffic.
C	> 15 – 25	Noticeable delay, but not inconveniencing. Usually some conflicting traffic.
D	> 25 – 35	Noticeable delay and irritating. A significant amount of conflicting traffic. Increased likelihood of risk taking.
E	> 35 – 50	Significant delay approaching tolerance level. Lots of conflicting traffic, but with some gaps of suitable size. Risk taking behavior likely.
F	> 50	Considerable delay exceeding tolerance level. Lots of conflicting traffic, with not enough gaps of suitable size. High likelihood of risk taking.

Source: Transportation Research Board Highway Capacity Manual 6

## 5.2 Acceptable Level of Service

### 5.2.1 County of San Bernardino

The acceptable Level of Service (LOS) for the unincorporated County of San Bernardino is LOS D and it should be maintained during the peak commute hours.

### 5.2.2 City of Highland

The acceptable LOS for the City of Highland is based on the City of Highland General Plan, Chapter 3:

*The Circulation Element establishes that the LOS should be LOS D or better for major intersections in the City. For peak operating periods LOS D is considered acceptable. Therefore, any City of Highland intersection operating at LOS “E” or “F” is considered deficient.*

### 5.2.3 City of Redlands

The acceptable LOS for the City of Redlands is based on the City of Redlands General Plan, Policy 5.20c:

*Where the current level of service at a location within the City of Redlands is below the Level of Service (LOS) C standard, no development project shall be approved that cannot be mitigated so that it does not reduce the existing level of service at that location except as provided in Section 5.20b.*

### 5.2.4 Caltrans

The acceptable LOS for Caltrans facilities is based on the Caltrans’ *Guide for the Preparation of Traffic Impact Studies* Section II:

*Caltrans endeavors to maintain a target LOS at the transition between LOS “C” and LOS “D” on State highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the*

*appropriate target LOS. If an existing State highway facility is operating at less than the appropriate target LOS, the existing measures of effectiveness (MOE) should be maintained.*

Per discussion with Mark Roberts, Caltrans District 8 Office Chief, Intergovernmental Review, Community and Regional Planning, the region-wide goal for acceptable LOS on all freeways, roadway segments, and intersections is LOS D.

### **5.3 Determination of Significant Impact**

The determination of significant impacts used in this study is based on the County of San Bernardino Traffic Impact Analysis Guidelines, Sections 10.8.1 and 10.8.2, with modifications to accommodate the varying acceptable LOS standards in different jurisdictions:

#### **5.3.1 Signalized intersections**

*Any study intersection that is operating at a LOS 'A', 'B', 'C' or 'D' for any study scenario without project traffic in which the addition of project traffic causes the intersection to degrade to a LOS 'E' or 'F' shall mitigate the impact to bring the intersection back to at least LOS 'D'.*

*Any study intersection that is operating at a LOS 'E' or 'F' for any study scenario without project traffic shall mitigate any impacts so as to bring the intersection back to the overall level of delay established prior to project traffic being added.*

*For scenarios which include the addition of Cumulative Project Traffic (i.e. shared impacts), study intersections shall be mitigated to LOS 'D' or better in the Valley and Mountain regions and LOS 'C' or better in the Desert regions of the County.*

#### **5.3.2 Unsignalized intersections**

*An impact is considered significant if the study determines that either section a) or both sections b) and c) occur.*

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

*OR*

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

*AND*

*c) One or both of the following conditions are met:*

*1) The project adds ten (10) or more trips to any approach*

*2) The intersection meets the peak hour traffic signal warrant after the addition of project traffic (per Section 10.5.2 c)).*

*Once a significant impact has been identified, mitigation shall be provided as follows:*

*1. For scenarios involving project traffic but not Cumulative Project Traffic, the LOS shall be mitigated to either LOS 'D' or better for case a) above or to pre-project LOS and delay for case b) above.*

*2. For scenarios that include Cumulative Project Traffic study intersections shall be mitigated to LOS 'D' or better in the Valley and Mountain regions and LOS 'C' or better in the Desert regions of the County.*

## 5.4 Capacity and Level of Service and Improvement Analysis

### 5.4.1 Levels of Service – Existing Plus Project (2018) Conditions

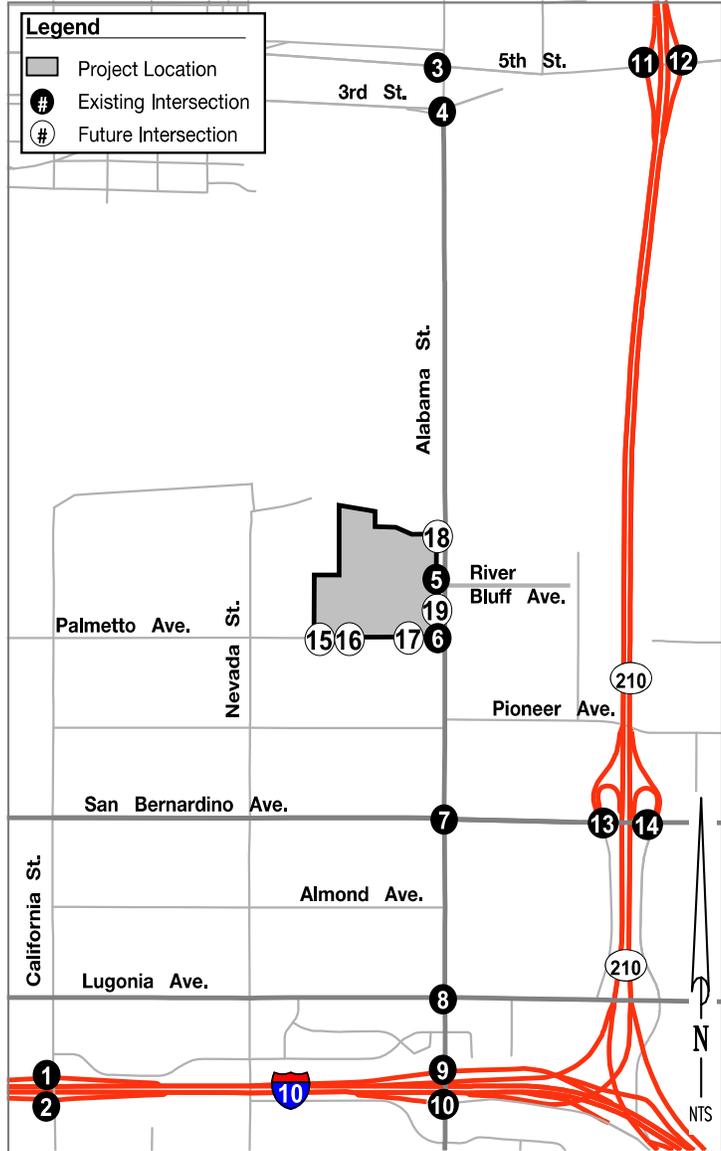
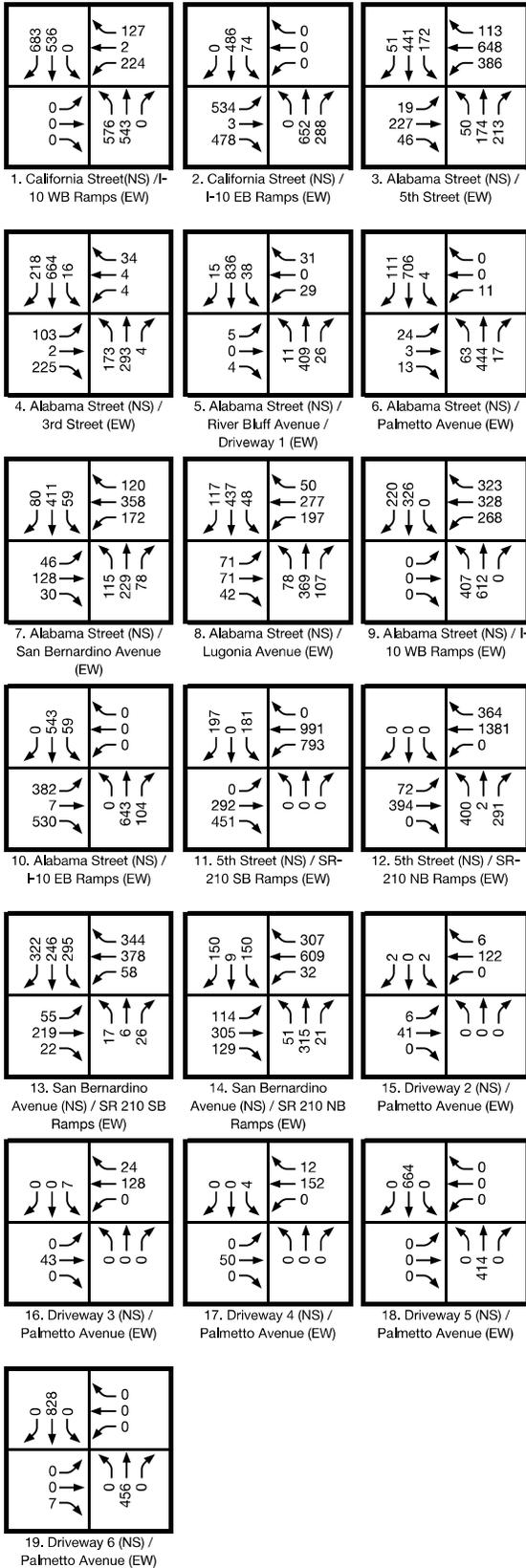
The Existing Plus Project (2018) scenario includes existing traffic and project traffic. **Table 5-3** provides the projected delay and levels of service at the study intersections under Existing Plus Project conditions without off-site improvements. These levels of service vary from LOS A to E. The Existing Plus Project AM and PM peak hour intersection turning movement volumes are shown on **Figure 24** and **Figure 25**, respectively. The levels of service are based upon the existing geometrics for the study area intersections. The level of service calculation worksheets are provided in Appendix E. The following study intersections are expected to operate at an unacceptable level of service:

1. California Street (NS)/ I-10 WB Ramps
2. California Street (NS) / I-10 EB Ramps

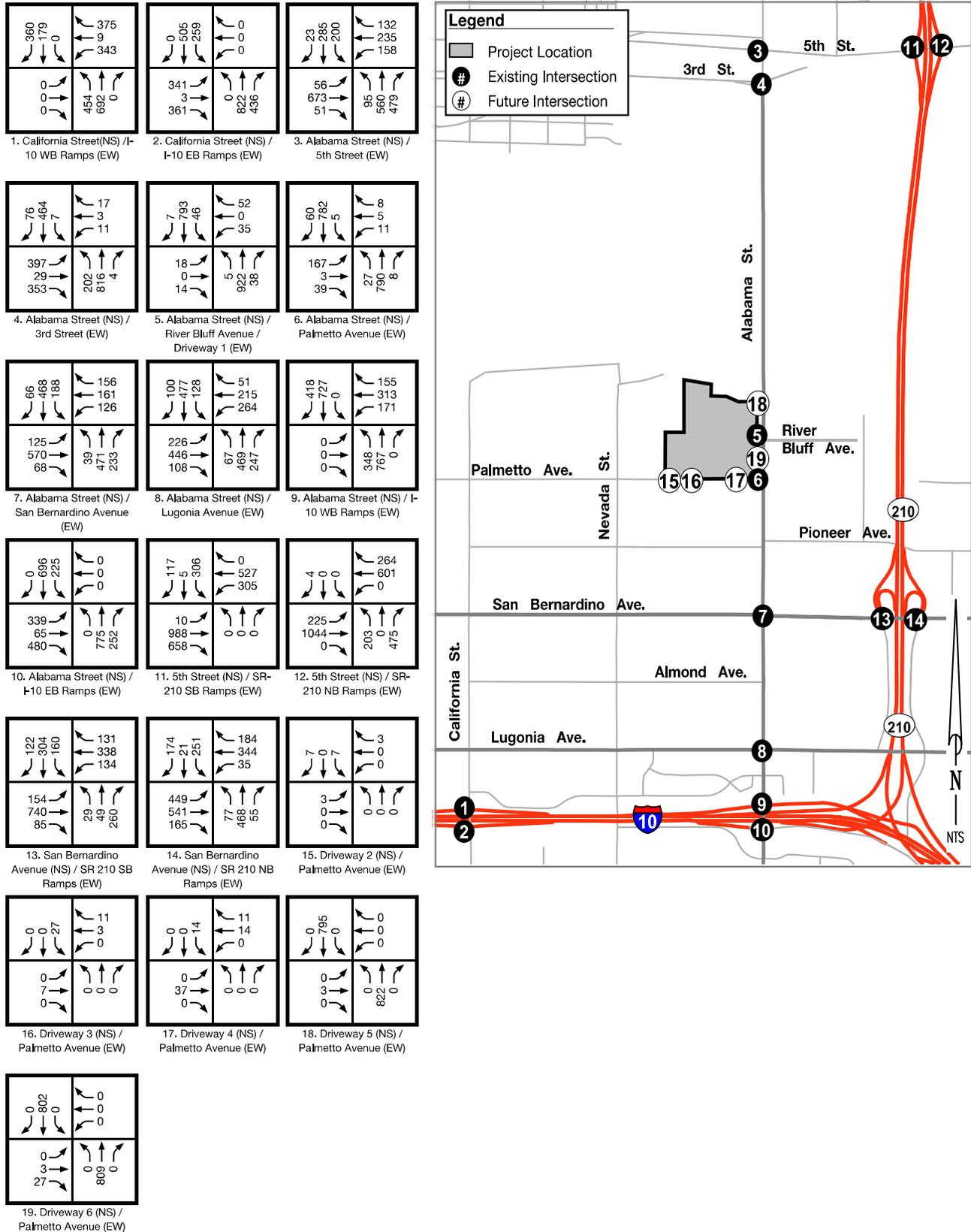
**Table 5-3 – Intersection Levels of Service – Existing Plus Project (2018) Conditions**

Intersection	Peak Hour	Traffic Control	Delay (sec)	LOS
1. California Street (NS) / I-10 WB Ramps (EW)	AM	Signal	<b>72.2</b>	<b>E</b>
	PM		29.3	C
2. California Street (NS) / I-10 EB Ramps (EW)	AM	Signal	<b>61.0</b>	<b>E</b>
	PM		<b>57.3</b>	<b>E</b>
3. Alabama Street (NS) / 5th Street (EW)	AM	Signal	35.2	D
	PM		51.2	D
4. Alabama Street (NS) / 3rd Street (EW)	AM	Signal	26.2	C
	PM		28.9	C
5. Alabama Street (NS) / Dwy 5-River Bluff Avenue (EW)	AM	Signal	9.1	A
	PM		7.2	A
6. Alabama Street (NS) / Palmetto Avenue (EW)	AM	Signal	14.6	B
	PM		13.2	B
7. Alabama Street (NS) / San Bernardino Avenue (EW)	AM	Signal	26.8	C
	PM		31.6	C
8. Alabama Street (NS) / Lugonia Avenue (EW)	AM	Signal	25.5	C
	PM		34.5	C
9. Alabama Street (NS) / I-10 WB Ramps (EW)	AM	Signal	34.9	D
	PM		33.5	C
10. Alabama Street (NS) / I-10 EB Ramps (EW)	AM	Signal	21.3	D
	PM		27.8	C
11. SR-210 SB Ramps (NS) / 5th Street (EW)	AM	Signal	33.2	C
	PM		16.3	B
12. SR-210 NB Ramps (NS) / 5th Street (EW)	AM	Signal	11.9	B
	PM		17.1	B
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	28.5	C
	PM		28.0	C
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	30.1	C
	PM		34.3	C
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.4	A
	PM		7.0	A
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.3	A
	PM		1.0	A
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.2	A
	PM		0.5	A
18. Alabama Street (NS) / North Dwy 4 (EW)	AM	OWSS	0.0	A
	PM		0.0	A
19. Alabama Street (EW) / South Dwy 6 (EW)	AM	OWSS	0.1	A
	PM		0.3	A

**Figure 24 – Existing Plus Project (2018) AM Peak Hour Intersection Volumes**



**Figure 25 – Existing Plus Project (2018) PM Peak Hour Intersection Volumes**



#### 5.4.2 Levels of Service – Existing Plus Ambient Growth Plus Project (2020) Conditions

The Existing Plus Ambient Growth Plus Project (2020) scenario includes existing traffic, an ambient growth of two percent per year for two years to 2020 (four percent total ambient growth) and project traffic. **Table 5-4** provides the projected delay and levels of service at the study intersections under Existing Plus Ambient Growth Plus Project conditions without off-site improvements. These levels of service vary from LOS A to E. The Existing Plus Ambient Growth Plus Project AM and PM peak hour intersection turning movement volumes are shown on **Figure 26** and **Figure 27**, respectively. The levels of service are based upon the existing geometrics for the study intersections. The level of service calculation worksheets are provided in Appendix E. The following study intersections are expected to operate at an unacceptable level of service:

1. California Street (NS)/ I-10 WB Ramps
2. California Street (NS) / I-10 EB Ramps
3. Alabama Street (NS) / 5<sup>th</sup> Street (EW)
8. Alabama Street (NS) / Lugonia Avenue (EW)

**Table 5-4 – Intersection Levels of Service – Existing Plus Ambient Growth Plus Project (2020) Conditions**

Intersection	Peak Hour	Traffic Control	Delay (sec)	LOS
1. California Street (NS) / I-10 WB Ramps (EW)	AM	Signal	<b>69.3</b>	<b>E</b>
	PM		36.9	D
2. California Street (NS) / I-10 EB Ramps (EW)	AM	Signal	<b>62.1</b>	<b>E</b>
	PM		<b>77.9</b>	<b>E</b>
3. Alabama Street (NS) / 5th Street (EW)	AM	Signal	35.3	D
	PM		<b>61.6</b>	<b>E</b>
4. Alabama Street (NS) / 3rd Street (EW)	AM	Signal	17.8	C
	PM		29.6	C
5. Alabama Street (NS) / Dwy 5-River Bluff Avenue (EW)	AM	Signal	6.9	A
	PM		8.1	A
6. Alabama Street (NS) / Palmetto Avenue (EW)	AM	Signal	8.2	B
	PM		14.6	B
7. Alabama Street (NS) / San Bernardino Avenue (EW)	AM	Signal	25.0	C
	PM		35.3	D
8. Alabama Street (NS) / Lugonia Avenue (EW)	AM	Signal	22.4	C
	PM		<b>41.3</b>	<b>D</b>
9. Alabama Street (NS) / I-10 WB Ramps (EW)	AM	Signal	33.9	C
	PM		36.3	D
10. Alabama Street (NS) / I-10 EB Ramps (EW)	AM	Signal	24.9	C
	PM		36.4	D
11. SR-210 SB Ramps (NS) / 5th Street (EW)	AM	Signal	29.1	C
			36.2	D
12. SR-210 NB Ramps (NS) / 5th Street (EW)	AM	Signal	11.8	B
	PM		24.4	C
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	38.2	D
	PM		40.2	D
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	31.0	C
	PM		46.7	D
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.4	A
	PM		0.6	A
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.3	A
	PM		1.0	A
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.2	A
	PM		0.5	A
18. Alabama Street (NS) / North Dwy 4 (EW)	AM	OWSS	0.1	A
	PM		0.1	A
19. Alabama Street (EW) / South Dwy 6 (EW)	AM	OWSS	0.1	A
	PM		0.3	A

**Figure 26 – Existing Plus Ambient Growth Plus Project (2020) AM Peak Hour Intersection Volumes**

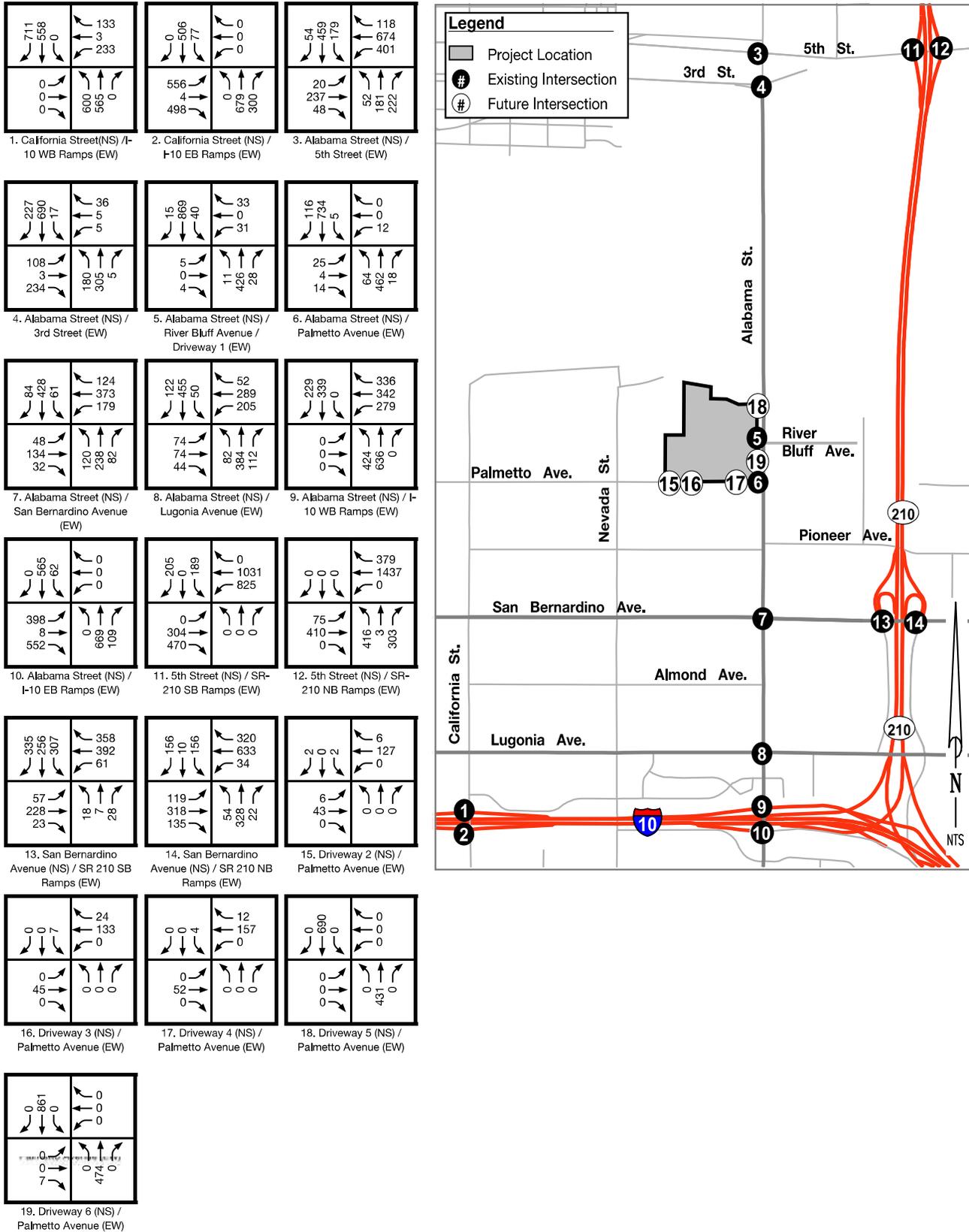
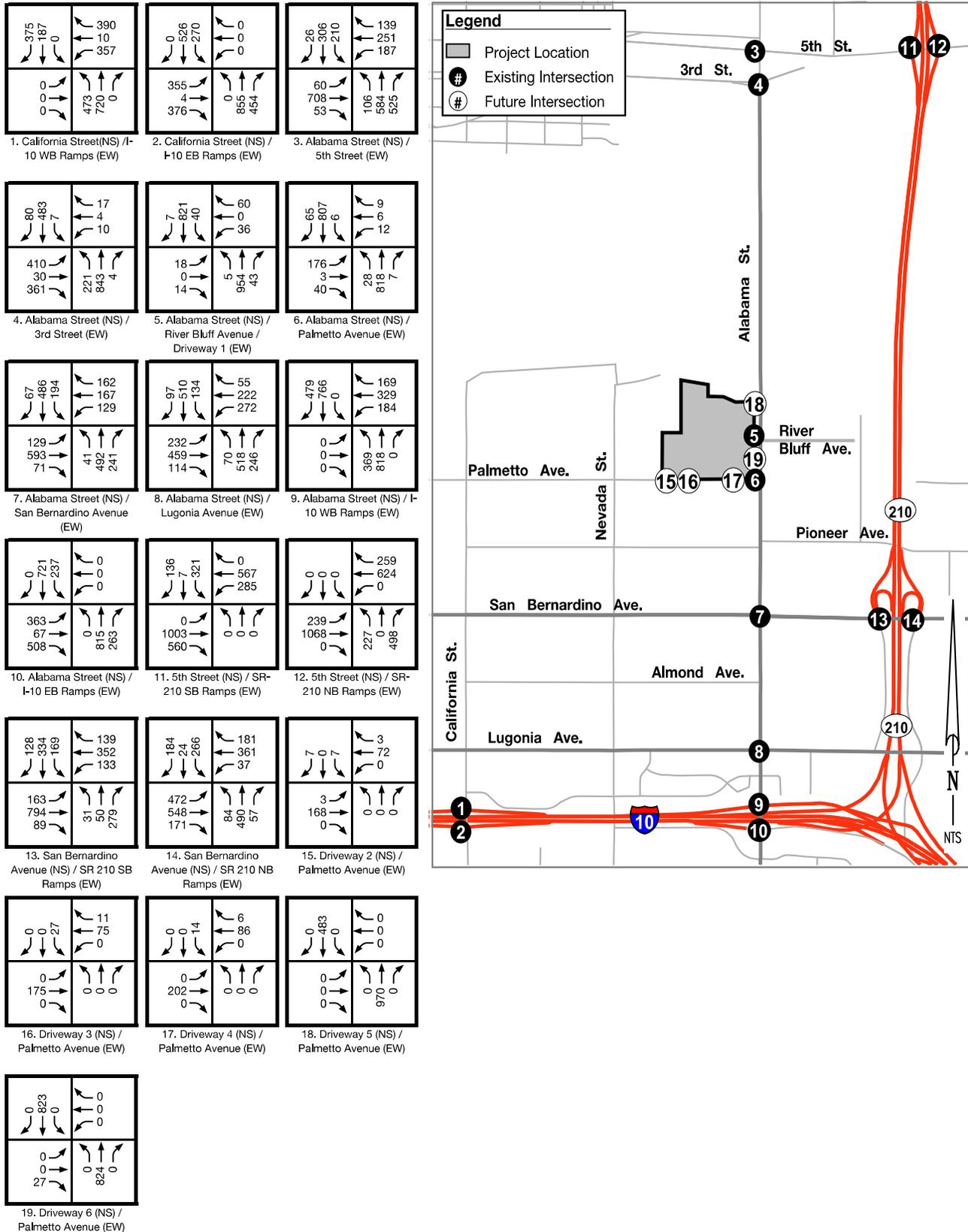


Figure 27 – Existing Plus Ambient Growth Plus Project (2020) PM Peak Hour Intersection Volumes



### 5.4.3 Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) Conditions

The Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) scenario includes existing traffic, an ambient growth of two percent per year for two years to 2020 (four percent total ambient growth), other projects in the project area provided by the County of San Bernardino, City of Highland, and City of Redlands, and project traffic. **Table 5-5** provides the projected delay and levels of service at the study intersections under Existing Plus Ambient Growth Plus Cumulative Plus Project conditions without off-site improvements. These levels of service vary from LOS A to F. The Existing Plus Ambient Growth Plus Cumulative Projects Plus Project AM and PM peak hour intersection turning movement volumes are shown on **Figure 28** and **Figure 29**, respectively. The levels of service are based upon the existing geometrics for the study intersections. The level of service calculation worksheets are provided in Appendix E. The following study intersections are expected to operate at an unacceptable level of service:

1. California Street (NS)/ I-10 WB Ramps
2. California Street (NS) / I-10 EB Ramps
3. Alabama Street (NS) / 5<sup>th</sup> Street (EW)
8. Alabama Street (NS) / Lugonia Avenue (EW)
9. Alabama Street (NS) / I-10 WB Ramps (EW)

**Table 5-5 – Intersection Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) Conditions**

Intersection	Peak Hour	Traffic Control	Delay (sec)	LOS
1. California Street (NS) / I-10 WB Ramps (EW)	AM	Signal	<b>91.1</b>	<b>F</b>
	PM		54.8	D
2. California Street (NS) / I-10 EB Ramps (EW)	AM	Signal	<b>75.5</b>	<b>E</b>
	PM		<b>95.4</b>	<b>F</b>
3. Alabama Street (NS) / 5th Street (EW)	AM	Signal	39.4	D
	PM		<b>58.1</b>	<b>E</b>
4. Alabama Street (NS) / 3rd Street (EW)	AM	Signal	22.5	C
	PM		28.9	C
5. Alabama Street (NS) / Dwy 5-River Bluff Avenue (EW)	AM	Signal	7.1	A
	PM		9.0	A
6. Alabama Street (NS) / Palmetto Avenue (EW)	AM	Signal	11.6	B
	PM		18.1	B
7. Alabama Street (NS) / San Bernardino Avenue (EW)	AM	Signal	32.1	C
	PM		44.3	D
8. Alabama Street (NS) / Lugonia Avenue (EW)	AM	Signal	28.1	C
	PM		<b>57.7</b>	<b>E</b>
9. Alabama Street (NS) / I-10 WB Ramps (EW)	AM	Signal	43.0	D
	PM		<b>62.4</b>	<b>E</b>
10. Alabama Street (NS) / I-10 EB Ramps (EW)	AM	Signal	41.9	D
	PM		54.7	D
11. SR-210 SB Ramps (NS) / 5th Street (EW)	AM	Signal	19.5	B
			32.5	C
12. SR-210 NB Ramps (NS) / 5th Street (EW)	AM	Signal	15.1	B
			26.3	C
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	34.6	C
			42.4	D
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	29.3	C
			43.7	D
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.3	A
			PM	0.4
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.2	A
			PM	0.8
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.1	A
			PM	0.4
18. Alabama Street (NS) / North Dwy 4 (EW)	AM	OWSS	0.1	A
			PM	0.1
19. Alabama Street (EW) / South Dwy 6 (EW)	AM	OWSS	0.1	A
			PM	0.3

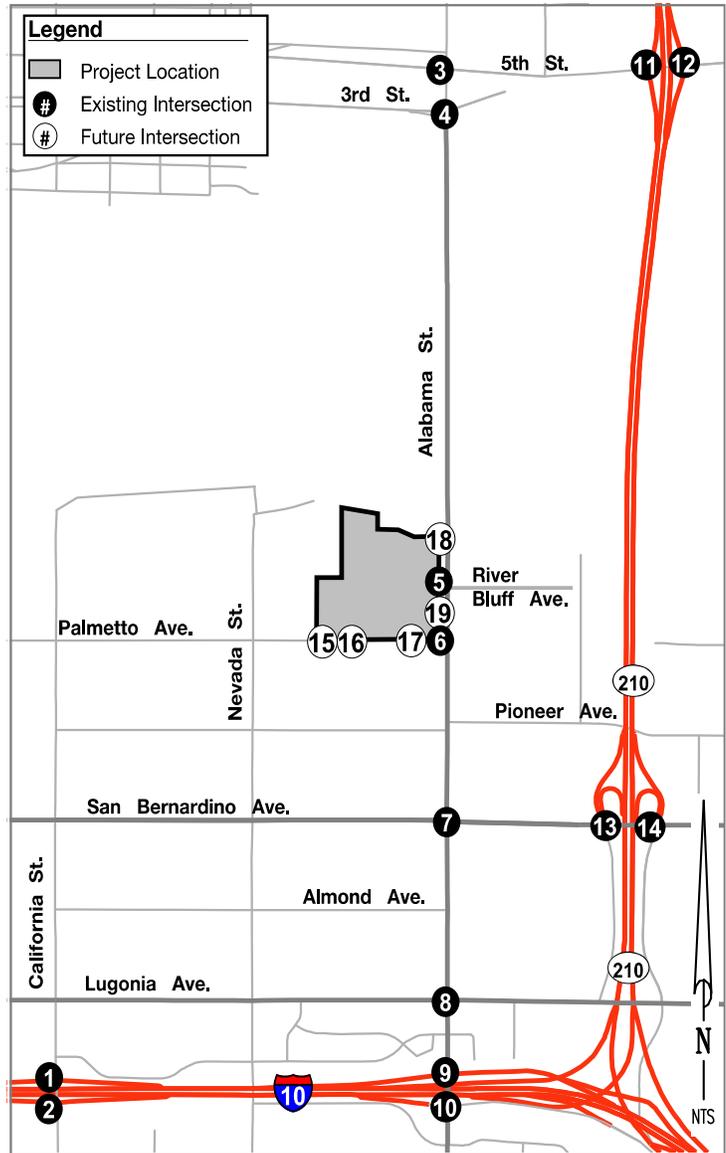
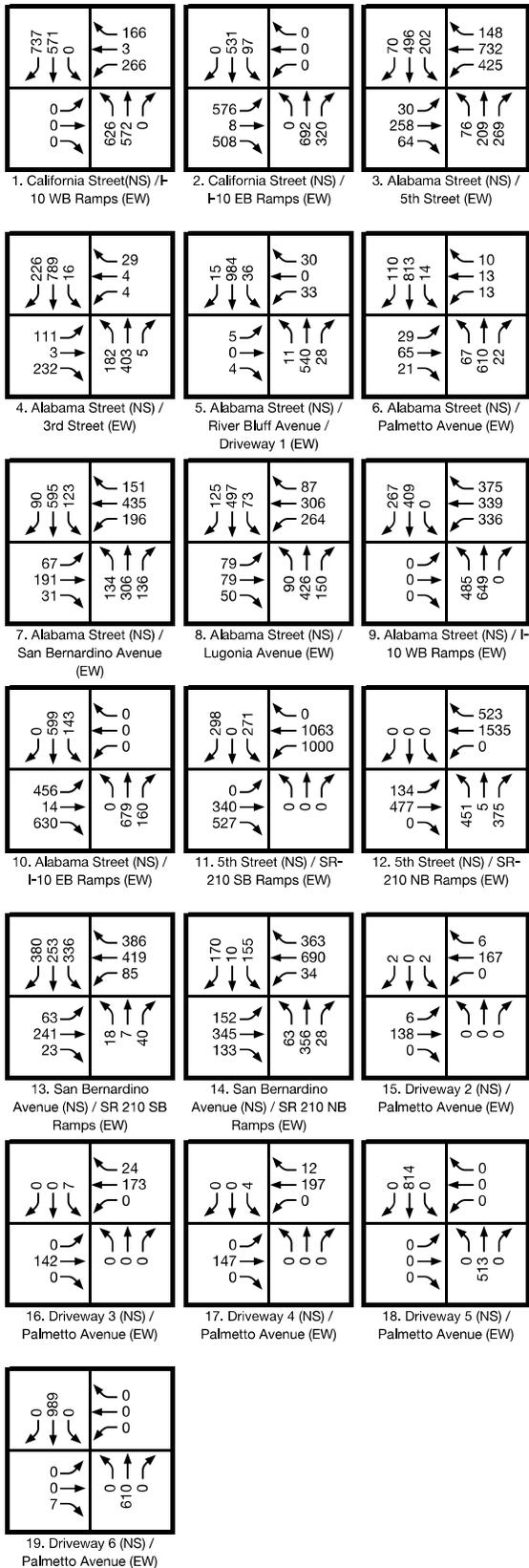
**5.4.4 Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) with Improvements**

**Table 5-6** provides the projected delay and levels of service at the study intersections under Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) conditions with off-site improvements. With the recommended off-site improvements, the study area intersections would operate at an acceptable LOS C/D or better. The level of service calculation worksheets are provided in Appendix E.

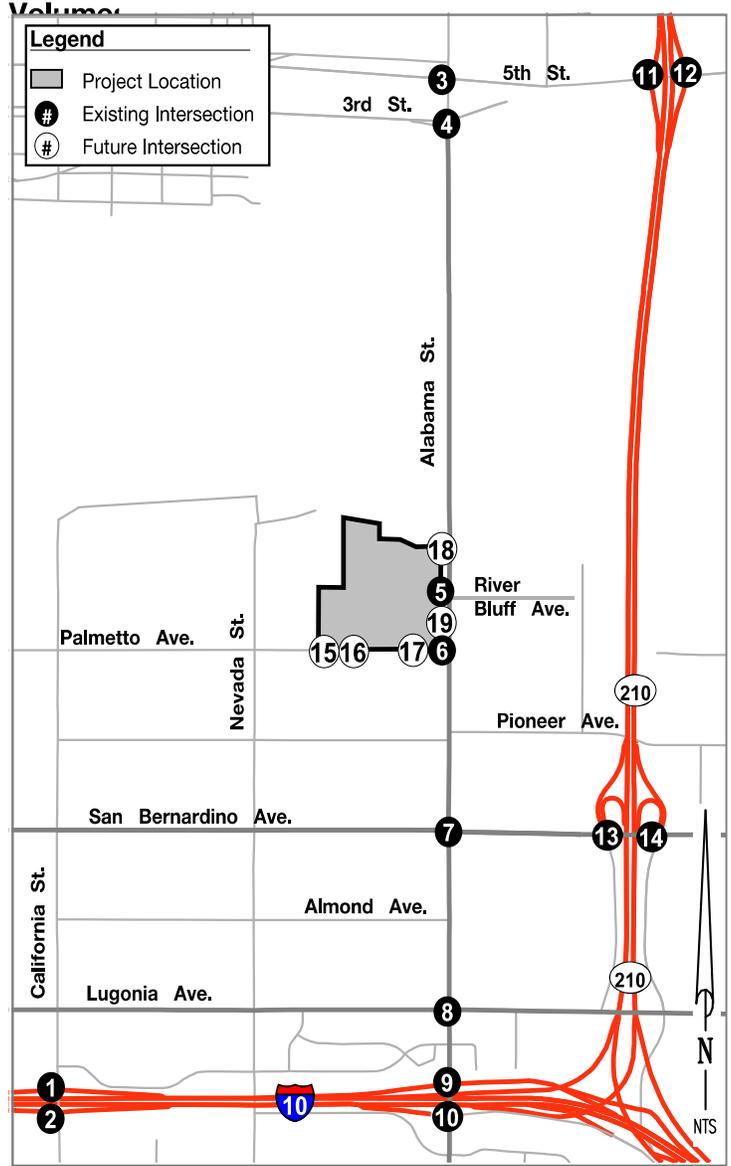
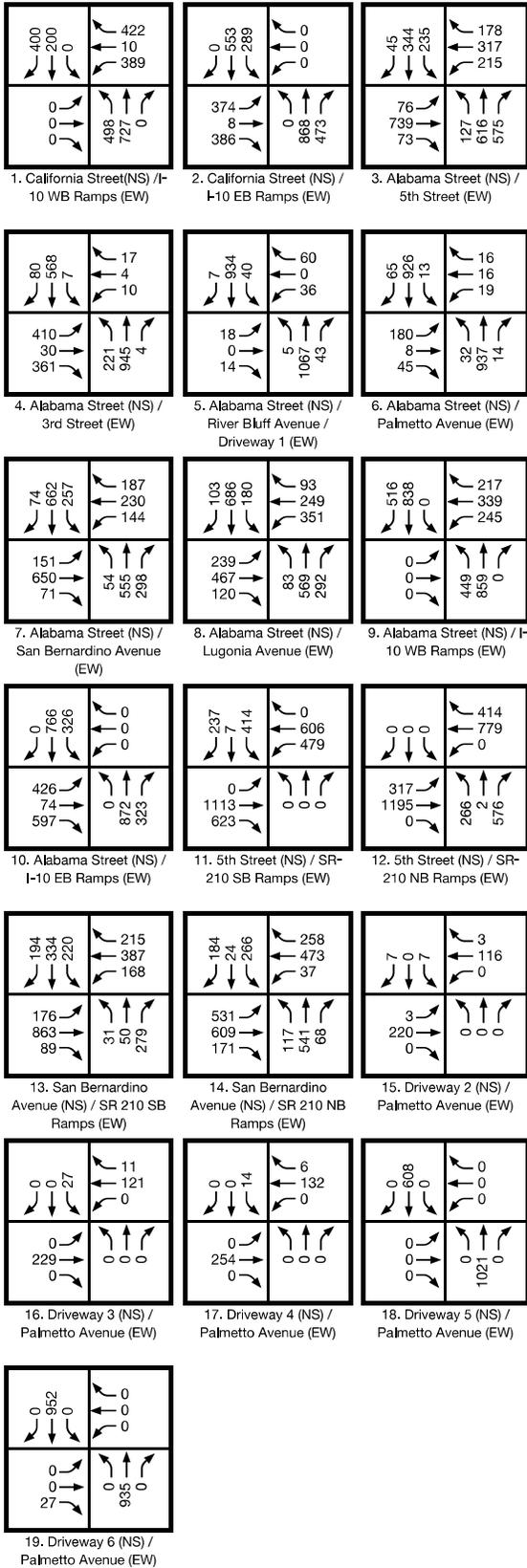
**Table 5-6 – Intersection Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) with Improvements**

Intersection	Peak Hour	Traffic Control	Without Mitigation		With Mitigation	
			Delay (sec)	LOS	Delay (sec)	LOS
1. California Street (NS) / I-10 WB Ramps (EW)	AM	Signal	<b>91.1</b>	<b>F</b>	50.4	D
	PM		54.8	D	27.4	C
2. California Street (NS) / I-10 EB Ramps (EW)	AM	Signal	<b>75.5</b>	<b>E</b>	23.7	C
	PM		<b>95.4</b>	<b>F</b>	38.3	D
3. Alabama Street (NS) / 5th Street (EW)	AM	Signal	39.7	D	37.0	D
	PM		<b>58.1</b>	<b>E</b>	53.9	D
8. Alabama Street (NS) / Lugonia Avenue (EW)	AM	Signal	28.0	C	19.4	C
	PM		<b>57.7</b>	<b>E</b>	34.6	C
9. Alabama Street (NS) / I-10 WB Ramps (EW)	AM	Signal	43.0	D	44.9	D
	PM		<b>62.2</b>	<b>E</b>	34.4	C

**Figure 28-Existing Plus Ambient Growth Plus Cumulative Plus Project AM Peak Hour Intersection Volumes**



**Figure 29-Existing Plus Ambient Growth Plus Cumulative Plus Project PM Peak Hour Intersection**



#### 5.4.5 Levels of Service – Build-Out Year Plus Cumulative Projects (2040) Conditions

The Build-Out Year Plus Cumulative Projects (2040) scenario includes forecasted traffic volumes at expected area build-out and other projects in the project area provided by the County of San Bernardino, City of Highland, and City of Redlands. **Table 5-7** provides the projected delay and levels of service at the study intersections under Build-Out Year Plus Cumulative Projects conditions without off-site improvements. These levels of service vary from LOS A to F. The Build-Out Year Plus Cumulative Projects AM and PM peak hour intersection turning movement volumes are shown on **Figure 30** and **Figure 31**, respectively. The levels of service are based upon the existing geometrics for the study intersections. The level of service calculation worksheets are provided in Appendix E. The following study intersections are expected to operate at an unacceptable level of service:

1. California Street (NS) / I-10 WB Ramps (EW)
2. California Street (NS) / I-10 EB Ramps (EW)
3. Alabama Street (NS) / 5<sup>th</sup> Street (EW)
4. Alabama Street (NS) / 3<sup>rd</sup> Street (EW)
8. Alabama Street (NS) / Lugonia Avenue (EW)
9. Alabama Street (NS) / I-10 WB Ramps (EW)
10. Alabama Street (NS) / I-10 EB Ramps (EW)
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)

**Table 5-7 – Intersection Levels of Service – Build-Out Year Plus Cumulative Projects (2040) Conditions**

Intersection	Peak Hour	Traffic Control	Delay (sec)	LOS
1. California Street (NS) / I-10 WB Ramps (EW)	AM	Signal	53.0	D
	PM		101.6	F
2. California Street (NS) / I-10 EB Ramps (EW)	AM	Signal	78.9	E
	PM		125.5	F
3. Alabama Street (NS) / 5th Street (EW)	AM	Signal	53.2	D
	PM		86.2	F
4. Alabama Street (NS) / 3rd Street (EW)	AM	Signal	62.0	E
	PM		32.7	C
5. Alabama Street (NS) / Dwy 5-River-Bluff Avenue (EW)	AM	Signal	5.8	A
	PM		9.4	A
6. Alabama Street (NS) / Palmetto Avenue (EW)	AM	Signal	7.1	A
	PM		17.1	B
7. Alabama Street (NS) / San Bernardino Avenue (EW)	AM	Signal	31.1	C
	PM		33.2	C
8. Alabama Street (NS) / Lugonia Avenue (EW)	AM	Signal	28.7	C
	PM		61.5	E
9. Alabama Street (NS) / I-10 WB Ramps (EW)	AM	Signal	103.0	F
	PM		128.6	F
10. Alabama Street (NS) / I-10 EB Ramps (EW)	AM	Signal	43.8	D
	PM		69.8	E
11. SR-210 SB Ramps (NS) / 5th Street (EW)	AM	Signal	27.9	C
	PM		43.2	D
12. SR-210 NB Ramps (NS) / 5th Street (EW)	AM	Signal	24.9	C
	PM		36.5	D
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	36.1	D
	PM		49.8	D
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	34.9	C
	PM		129.3	F
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	AM PM	Does Not Exist		
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	AM PM	Does Not Exist		
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	AM PM	Does Not Exist		
18. Alabama Street (NS) / North Dwy 4 (EW)	AM PM	Does Not Exist		
19. Alabama Street (EW) / South Dwy 6 (EW)	AM PM	Does Not Exist		

### 5.4.6 Levels of Service – Build-Out Year Plus Cumulative Projects (2040) with Improvements

**Table 5-8** provides the projected delay and levels of service at the study intersections under Build-Out Year Plus Cumulative Projects (2040) conditions with off-site improvements. With the recommended off-site improvements, the study area intersections would operate at an acceptable LOS C/D or better. The level of service calculation worksheets are provided in Appendix E.

**Table 5-8 – Intersection Levels of Service – Build-Out Year Plus Cumulative Plus Project (2040) with Improvements**

Intersection	Peak Hour	Traffic Control	Without Mitigation		With Mitigation	
			Delay (sec)	LOS	Delay (sec)	LOS
1. California Street (NS) / I-10 WB Ramps (EW)	AM	Signal	<b>55.0</b>	<b>E</b>	47.8	D
	PM		<b>105.0</b>	<b>F</b>	36.6	D
2. California Street (NS) / I-10 EB Ramps (EW)	AM	Signal	<b>78.7</b>	<b>E</b>	22.2	C
	PM		<b>125.0</b>	<b>F</b>	52.6	D
3. Alabama Street (NS) / 5th Street (EW)	AM	Signal	<b>53.2</b>	<b>D</b>	43.5	D
	PM		<b>91.8</b>	<b>F</b>	54.5	D
4. Alabama Street (NS) / 3rd Street (EW)	AM	Signal	<b>60.0</b>	<b>E</b>	51.3	D
	PM		<b>34.6</b>	<b>C</b>	34.9	C
8. Alabama Street (NS) / Lugonia Avenue (EW)	AM	Signal	<b>28.7</b>	<b>C</b>	32.8	C
	PM		<b>61.5</b>	<b>E</b>	34.8	C
9. Alabama Street (NS) / I-10 WB Ramps (EW)	AM	Signal	<b>103.0</b>	<b>F</b>	46.5	D
	PM		<b>128.5</b>	<b>F</b>	50.7	D
10. Alabama Street (NS) / I-10 EB Ramps (EW)	AM	Signal	<b>43.8</b>	<b>D</b>	41.6	D
	PM		<b>69.8</b>	<b>E</b>	48.3	D
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	<b>34.9</b>	<b>C</b>	42.0	D
	PM		<b>129.3</b>	<b>F</b>	48.6	D

**Figure 30 - Build-Out Year 2040 Cumulative Projects AM Peak Hours Intersection Volumes**

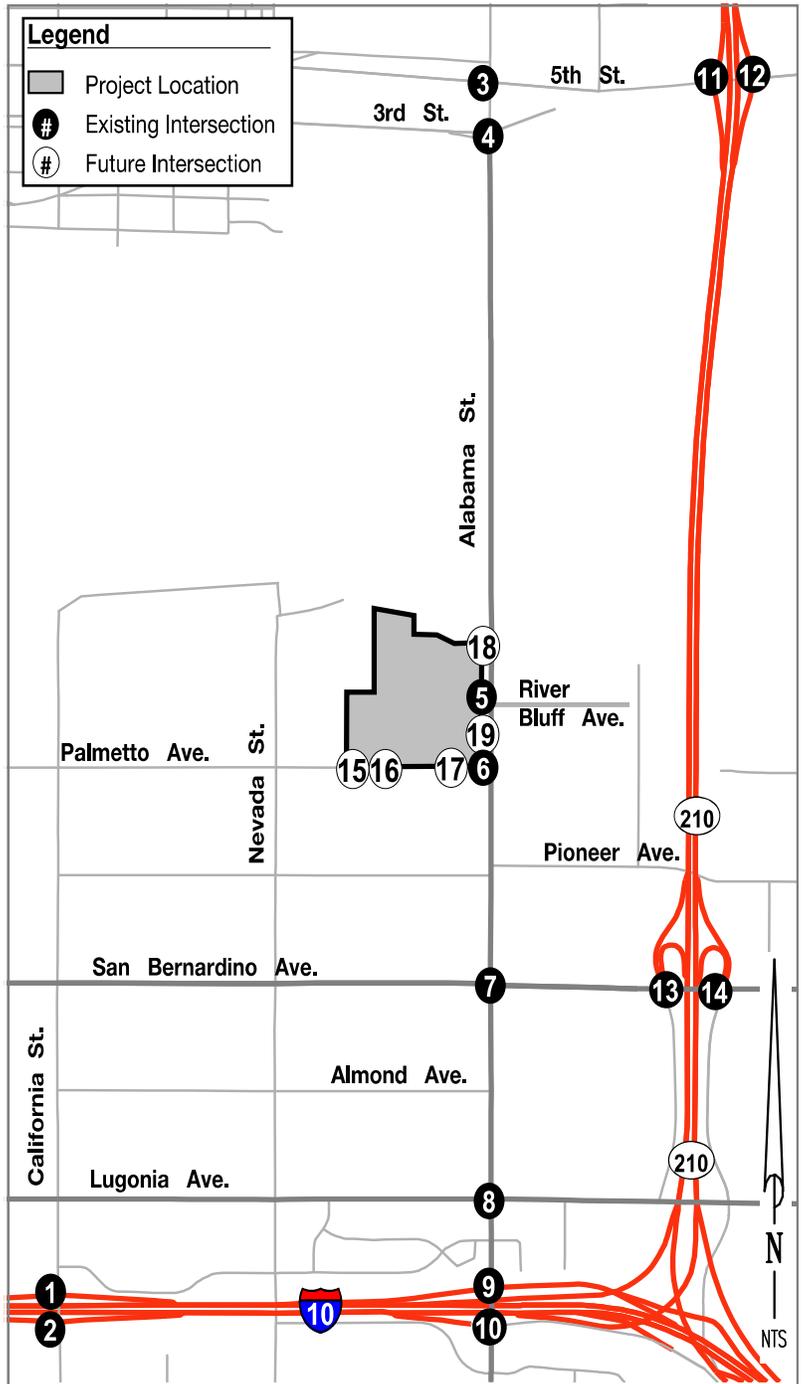
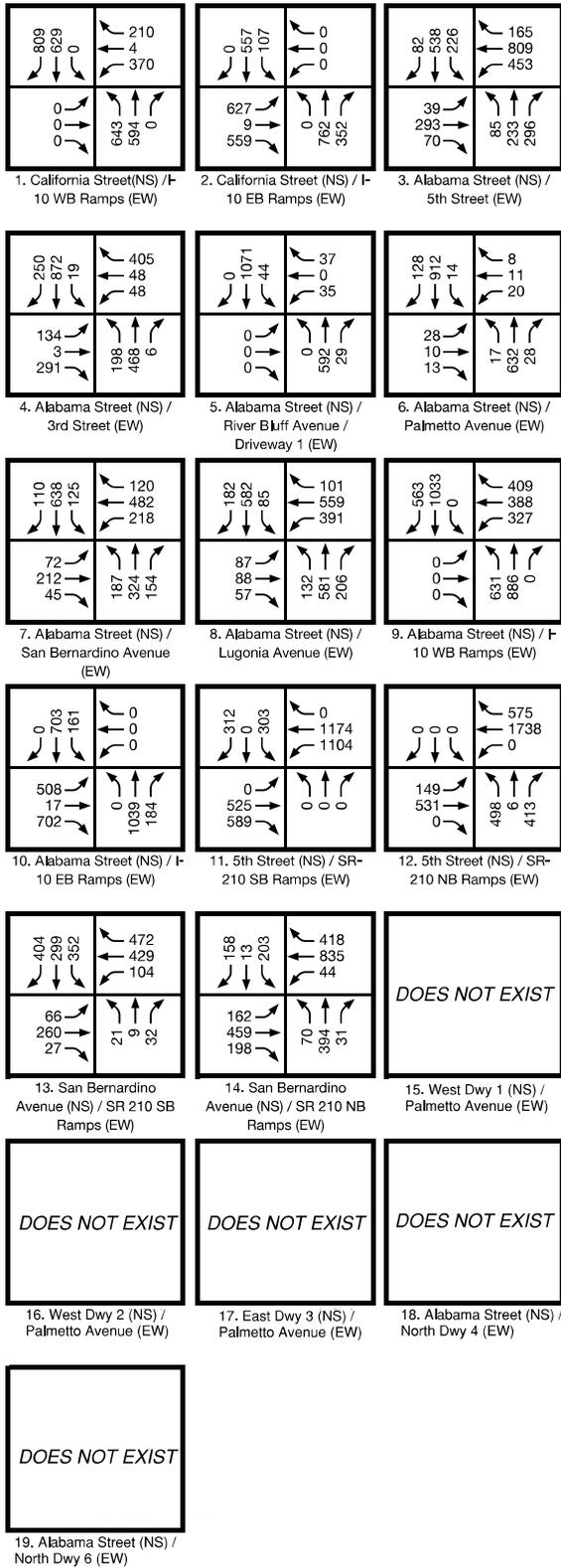
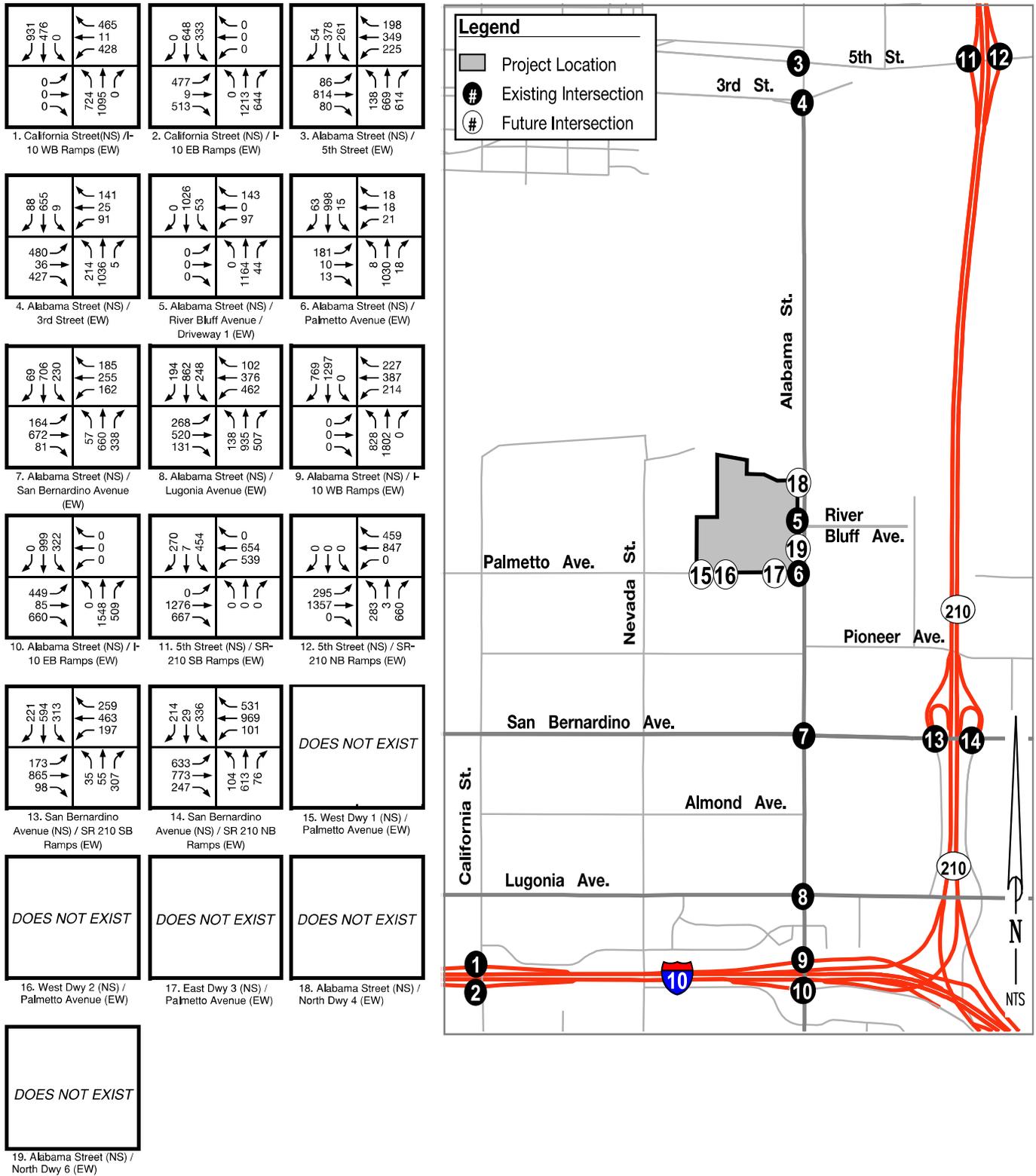


Figure 31 - Build Out Year 2040 Cumulative Projects PM Peak Hour Intersection Volumes



### 5.4.7 Levels of Service – Build-Out Year Plus Cumulative Projects Plus Project (2040) Conditions

The Build-Out Year Plus Cumulative Projects Plus Project (2040) scenario includes forecasted traffic volumes at expected area build-out and other projects in the project area provided by the County of San Bernardino, City of Highland, and City of Redlands, and the project. **Table 5-9** provides the projected delay and levels of service at the study intersections under Build-Out Year Plus Cumulative Projects Plus Project conditions. These levels of service vary from LOS A to F. The Build-Out Year Plus Cumulative Projects Plus Project AM and PM peak hour intersection turning movement volumes are shown on **Figure 32** and **Figure 33**, respectively. The levels of service are based upon the build out year geometries for the study area intersections. The level of service calculation worksheets are provided in Appendix E. The following study intersections are expected to operate at an unacceptable level of service:

1. California Street (NS) / I-10 WB Ramps (EW)
2. California Street (NS) / I-10 EB Ramps (EW)
3. Alabama Street (NS) / 5<sup>th</sup> Street (EW)
4. Alabama Street (NS) / 3<sup>rd</sup> Street (EW)
8. Alabama Street (NS) / Lugonia Avenue (EW)
9. Alabama Street (NS) / I-10 WB Ramps (EW)
10. Alabama Street (NS) / I-10 EB Ramps (EW)
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)

**Table 5-9 – Intersection Levels of Service – Build-Out Year Plus Cumulative Projects Plus Project (2040) Conditions**

Intersection	Peak Hour	Traffic Control	Delay (sec)	LOS
1. California Street (NS) / I-10 WB Ramps (EW)	AM	Signal	50.2	D
	PM		<b>112.9</b>	<b>F</b>
2. California Street (NS) / I-10 EB Ramps (EW)	AM	Signal	<b>77.0</b>	<b>E</b>
	PM		<b>113.1</b>	<b>F</b>
3. Alabama Street (NS) / 5th Street (EW)	AM	Signal	<b>98.5</b>	<b>F</b>
	PM		<b>90.2</b>	<b>F</b>
4. Alabama Street (NS) / 3rd Street (EW)	AM	Signal	<b>69.5</b>	<b>E</b>
	PM		33.4	C
5. Alabama Street (NS) / Dwy 5-River-Bluff Avenue (EW)	AM	Signal	7.4	A
	PM		22.3	C
6. Alabama Street (NS) / Palmetto Avenue (EW)	AM	Signal	9.6	A
	PM		30.0	C
7. Alabama Street (NS) / San Bernardino Avenue (EW)	AM	Signal	27.3	C
	PM		35.1	D
8. Alabama Street (NS) / Lugonia Avenue (EW)	AM	Signal	27.1	C
	PM		<b>60.6</b>	<b>E</b>
9. Alabama Street (NS) / I-10 WB Ramps (EW)	AM	Signal	<b>106.7</b>	<b>F</b>
	PM		<b>124.9</b>	<b>F</b>
10. Alabama Street (NS) / I-10 EB Ramps (EW)	AM	Signal	38.9	D
	PM		<b>71.7</b>	<b>E</b>
11. SR-210 SB Ramps (NS) / 5th Street (EW)	AM	Signal	21.0	C
			38.1	D
12. SR-210 NB Ramps (NS) / 5th Street (EW)	AM	Signal	13.4	B
	PM		30.8	C
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	33.9	C
	PM		40.5	D
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	34.1	C
	PM		<b>116.6</b>	<b>F</b>
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.1	A
	PM		0.4	A
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.1	A
	PM		0.7	A
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	AM	OWSS	0.1	A
	PM		0.4	A
18. Alabama Street (NS) / North Dwy 4 (EW)	AM	OWSS	<b>0.1</b>	A
	PM		0.3	A
19. Alabama Street (EW) / South Dwy 6 (EW)	AM	OWSS	0.1	A
	PM		0.1	A

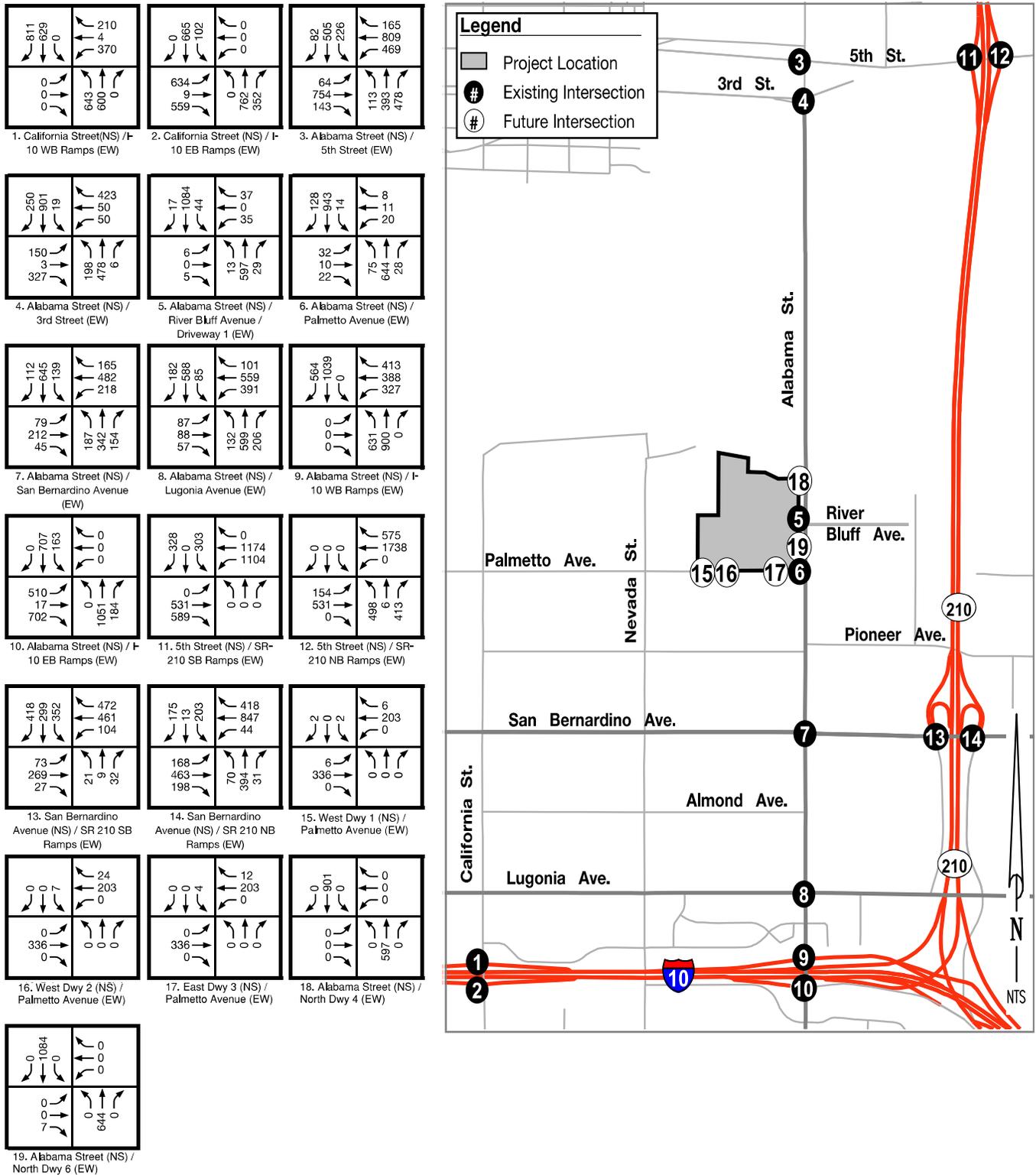
**5.4.8 Levels of Service – Build-Out Year Plus Cumulative Projects Plus Project (2040) with Improvements**

**Table 5-10** provides the projected delay and levels of service at the study intersections under Build-Out Year Plus Cumulative Projects Plus Project (2040) conditions with off-site improvements. With the recommended off-site improvements, the study area intersections would operate at an acceptable LOS C/D or better. The level of service calculation worksheets are provided in Appendix E.

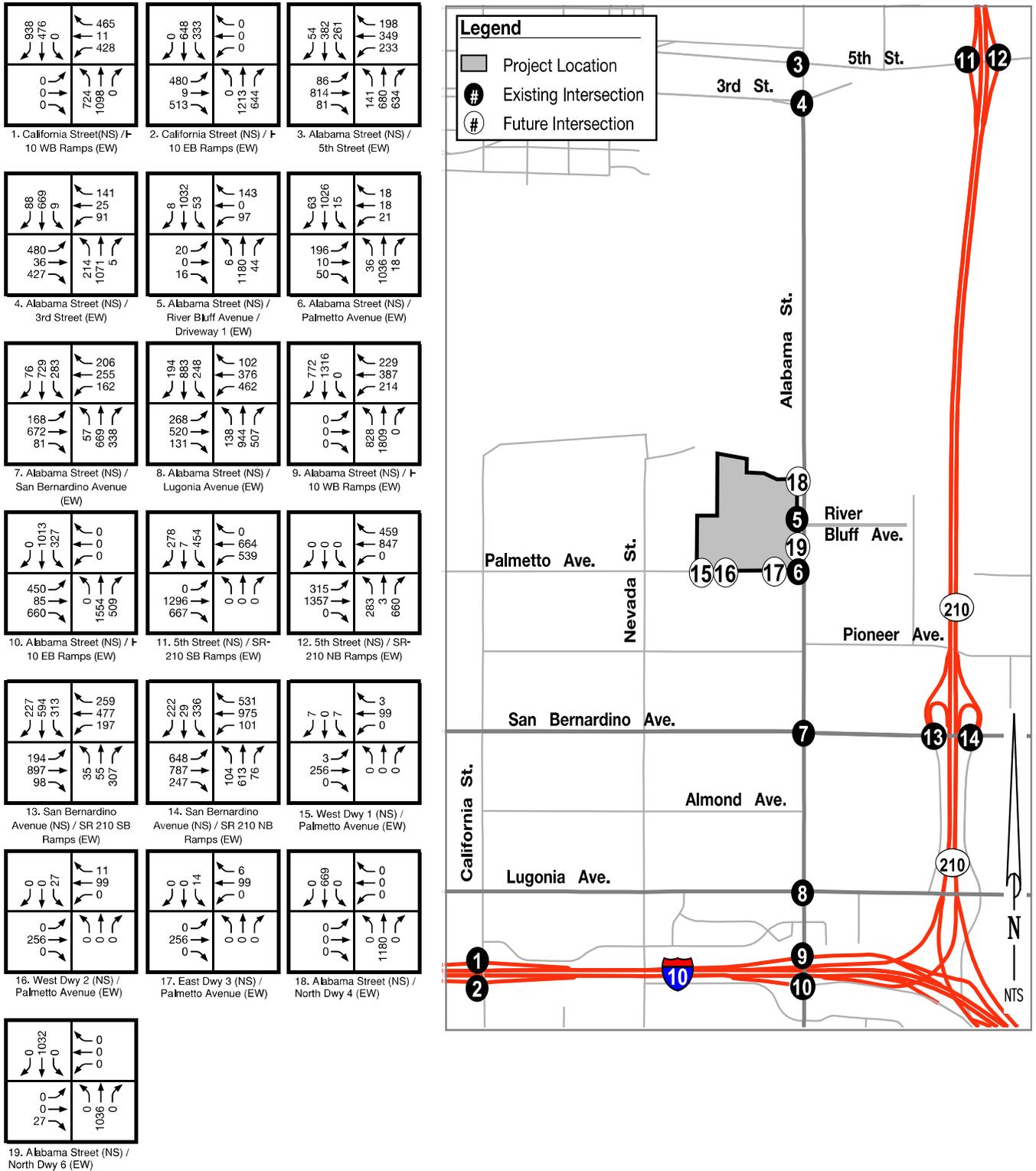
**Table 5-10 – Intersection Levels of Service – Build Out Year Plus Cumulative Plus Project (2040) Conditions with Improvements**

Intersection	Peak Hour	Traffic Control	Without Mitigation		With Mitigation	
			Delay (sec)	LOS	Delay (sec)	LOS
1. California Street (NS) / I-10 WB Ramps (EW)	AM	Signal	50.2	D	48.7	D
	PM		<b>112.9</b>	<b>F</b>	43.7	D
2. California Street (NS) / I-10 EB Ramps (EW)	AM	Signal	<b>77.0</b>	<b>E</b>	22.8	C
	PM		<b>113.1</b>	<b>F</b>	49.5	D
3. Alabama Street (NS) / 5th Street (EW)	AM	Signal	<b>98.5</b>	<b>F</b>	53.6	D
	PM		<b>90.2</b>	<b>F</b>	54.0	D
4. Alabama Street (NS) / 3rd Street (EW)	AM	Signal	<b>67.5</b>	<b>E</b>	50.1	D
	PM		36.6	D	31.5	C
8. Alabama Street (NS) / Lugonia Avenue (EW)	AM	Signal	27.1	C	25.8	C
	PM		<b>60.6</b>	<b>E</b>	33.6	C
9. Alabama Street (NS) / I-10 WB Ramps (EW)	AM	Signal	<b>106.5</b>	<b>F</b>	45.1	D
	PM		<b>125.2</b>	<b>F</b>	43.4	D
10. Alabama Street (NS) / I-10 EB Ramps (EW)	AM	Signal	38.9	D	32.8	C
	PM		<b>71.7</b>	<b>E</b>	45.0	D
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	AM	Signal	34.1	C	28.2	C
	PM		<b>116.6</b>	<b>F</b>	49.9	D

**Figure 32-Build-Out Year Plus Cumulative Projects Plus Projects (2040) Condition AM Peak Hour Intersection Volumes**



**Figure 33-Build-Out Year Plus Cumulative Projects Plus Project (2040) Conditions PM Peak Hour Intersection Volumes**



## 6.0 MITIGATIONS AND RECOMMENDATIONS

### 6.1 Traffic Impacts and Level of Service Analysis

#### 6.1.1 Proposed Improvements and Mitigation Measures – Existing Plus Project (2018) Conditions

**Table 6-1** and **Figure 34** present the proposed improvement and mitigation measures in order to achieve a satisfactory level of service at the study intersections in Existing Plus Project (2018) conditions. The proposed improvement and mitigation measures are as follows:

##### *Improvements*

5. **Alabama Street (NS) / Dwy-5-River-Bluff Avenue (EW):** Add one left turn lane for northbound approach, one shared right turn lane for southbound approach and eastbound shared left/through/right turn lane.
15. **West Dwy 1 (NS) / Palmetto Avenue (EW):** Add one shared left-right turn lane for southbound approach, one shared left turn lane for eastbound approach and add a shared right turn lane to the westbound approach.
16. **West Dwy 2 (NS) / Palmetto Avenue (EW):** Add one shared left-right turn lane for southbound approach, one shared left turn lane for eastbound approach and add one shared right turn lane for westbound approach.
17. **East Dwy 3 (NS) / Palmetto Avenue (EW):** Add one shared left-right turn lane for southbound approach, one shared left turn lane for eastbound approach and add one shared right turn lane for westbound approach.
18. **Alabama Street (NS) / North Dwy 4 (EW):** Add one shared northbound left turn lane, one shared right turn lane for southbound approach and add one right turn lane for westbound approach.
19. **Alabama Street (EW) / South Dwy 6 (EW):** Add one shared northbound left turn lane, one shared right turn lane for southbound approach and a right turn lane for westbound approach.

##### *Mitigations*

1. **California Street (NS) / I-10 Westbound Ramps (EW):** Add one left turn lane for northbound approach.
2. **California Street (NS) / I-10 Eastbound Ramps (EW):** Add one left turn lane for southbound approach. Restripe eastbound approach to include 1 left turn lane, one shared through-right turn lane.

**Table 6-1 – Summary of Intersection Improvements for Existing Plus Project (2018) Conditions**

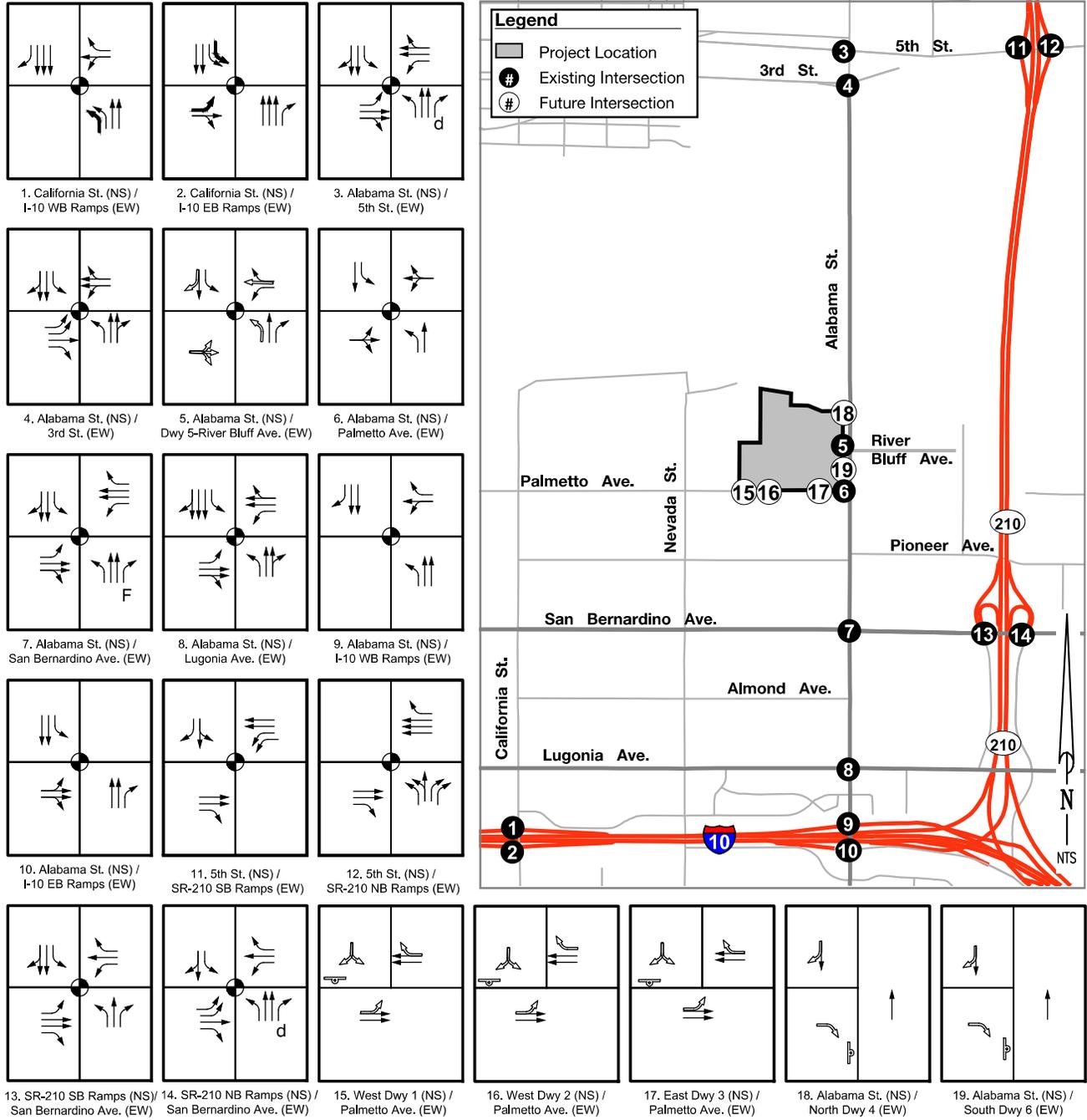
Intersection		Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
			L	T	R	L	T	R	L	T	R	L	T	R	
1.	California Street (NS) / I-10 WB Ramps (EW)	Existing	1	2	NA	NA	3	1	NA	NA	NA	S	1	1	Signal
		EP Improvements													
		EP Mitigations	2	2	NA	NA	3	1	NA	NA	NA	S	1	1	
2.	California Street (NS) / I-10 EB Ramps (EW)	Existing	NA	3	1	1	2	NA	S	1	S	NA	NA	NA	Signal
		EP Improvements													
		EP Mitigations	NA	3	1	1	2	NA	1	1	S	NA	NA	NA	
3.	Alabama Street (NS) / 5th Street (EW)	Existing	1	2	1D	1	2	S	1	2	1	1	2	S	Signal
		EP Improvements													
		EP Mitigations	1	2	1OL	1	2	S	1	2	S	1	2	S	
4.	Alabama Street (NS) / 3rd Street (EW)	Existing	1	2	S	1	2	S	2	1	1	S	2	S	Signal
		EP Improvements													
		EP Mitigations													
5.	Alabama Street (NS) / Dwy 5-River Bluff Avenue (EW)	Existing	NA	1	1	1	1	NA	S	1	S	1	NA	1	Signal
		EP Improvements													
		EP Mitigations													
6.	Alabama Street (NS) / Palmetto Avenue (EW)	Existing	1	1	NA	1	1	NA	S	1	S	S	1	S	Signal
		EP Improvements													
		EP Mitigations													
7.	Alabama Street (NS) / San Bernardino Avenue (EW)	Existing	1	2	1	1	2	S	1	2	S	1	2	1	Signal
		EP Improvements													
		EP Mitigations													
8.	Alabama Street (NS) / Lugonia Avenue (EW)	Existing	1	3	S	1	3	S	1	2	S	1	2	S	Signal
		EP Improvements													
		EP Mitigations													
9.	Alabama Street (NS) / I-10 WB Ramps (EW)	Existing	1	2	NA	NA	2	1	NA	NA	NA	S	1	1	Signal
		EP Improvements													
		EP Mitigations													
10.	Alabama Street (NS) / I-10 EB Ramps (EW)	Existing	NA	2	1	1	2	NA	S	2	S	NA	NA	NA	Signal
		EP Improvements													
		EP Mitigations													
11.	SR-210 SB Ramps (NS) / 5th Street (EW)	Existing	NA	NA	NA	S	1	1	NA	2	1	2	2	NA	Signal
		EP Improvements													
		EP Mitigations													
12.	SR-210 NB Ramps (NS) / 5th Street (EW)	Existing	1S	1	2	NA	NA	NA	1	2	NA	NA	3	1	Signal
		EP Improvements													
		EP Mitigations													
13.	SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	Existing	1	1	1	1	1	1	1	2	1	1	1	1	Signal
		EP Improvements													
		EP Mitigations													
14.	SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	Existing	1	2	1	1	1	S	2	1	1	1	1	1	Signal
		EP Improvements													
		EP Mitigations													
15.	West Dwy 1 (NS) / Palmetto Avenue (EW)	Existing	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	OWSC
		EP Improvements				S	NA	1	S	1	NA	NA	1	S	
		EP Mitigations													
16.	West Dwy 2 (NS) / Palmetto Avenue (EW)	Existing	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	OWSC
		EP Improvements				S	NA	1	S	1	NA	NA	1	S	
		EP Mitigations													
17.	East Dwy 3 (NS) / Palmetto Avenue (EW)	Existing	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	OWSC
		EP Improvements				S	NA	1	S	1	NA	NA	1	S	
		EP Mitigations													
18.	Alabama Street (NS) / North Dwy 4 (EW)	Existing	NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	OWSC
		EP Improvements				NA	1	S	NA	NA	NA	NA	NA	1	
		EP Mitigations													
19.	Alabama Street (EW) / South Dwy 6 (EW)	Existing	NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	OWSC
		EP Improvements				NA	1	S	NA	NA	NA	NA	NA	1	
		EP Mitigations													

Notes\* EP- Existing Plus Project, NA-Not Available, S-Shared, L-Left, T-Through, R-Right, OL-Overlap, 1D-Defacto

**#-Improvement**

**#-Mitigation**

**Figure 34 – Summary of Intersection Improvements for Existing Plus Project (2018) Conditions**



### 6.1.2 Proposed Improvements and Mitigation Measures – Existing Plus Ambient Growth Plus Project (2020) Conditions

**Table 6-2** and **Figure 35** present the proposed improvement and mitigation measures in order to achieve a satisfactory level of service at the study intersections in Existing Plus Ambient Growth Plus Project (2020) conditions. No additional improvements are proposed for existing plus ambient growth plus project conditions.

#### *Mitigations*

3. **Alabama Street (NS) / 5<sup>th</sup> Street (EW):** Add one overlapping northbound right turn lane.
8. **Alabama Street (NS) / Lugonia Avenue (EW):** Add one northbound right turn lane.

**Table 6-2 – Summary of Intersection Improvements for Existing Plus Ambient Growth Plus Project (2020) Conditions**

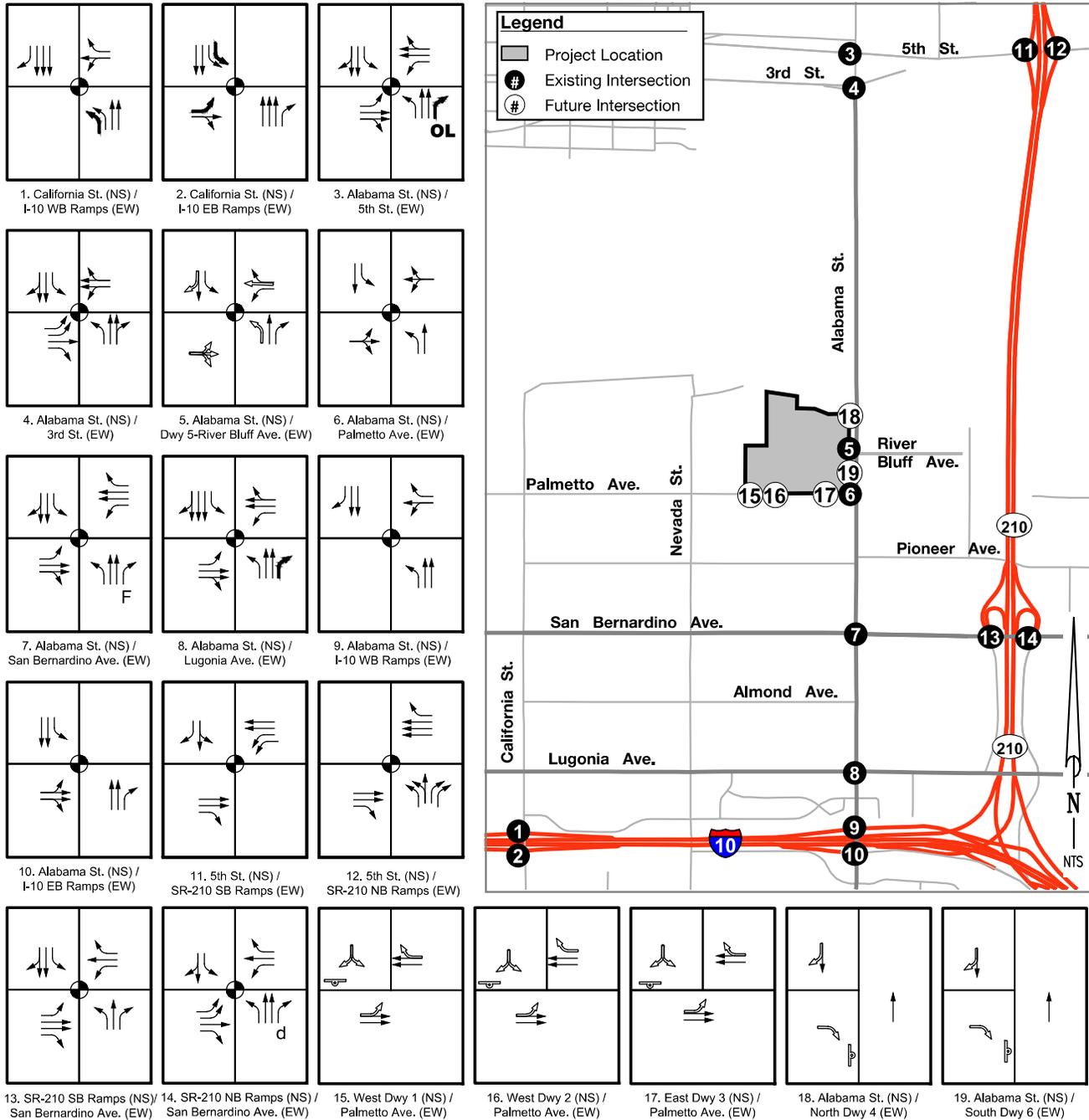
Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. California Street (NS) / I-10 WB Ramps (EW)	Existing	1	2	NA	NA	3	1	NA	NA	NA	S	1	1	Signal
	EAP Improvements EAP Mitigations	2	2	NA	NA	3	1	NA	NA	NA	S	1	1	
2. California Street (NS) / I-10 EB Ramps (EW)	Existing	NA	3	1	1	2	NA	S	1	S	NA	NA	NA	Signal
	EAP Improvements EAP Mitigations	NA	3	1	1	2	NA	1	1	S	NA	NA	NA	
3. Alabama Street (NS) / 5th Street (EW)	Existing	1	2	1D	1	2	S	1	2	1	1	2	S	Signal
	EAP Improvements EAP Mitigations	1	2	1OL	1	2	S	1	2	S	1	2	S	
4. Alabama Street (NS) / 3rd Street (EW)	Existing	1	2	S	1	2	S	2	1	1	S	2	S	Signal
	EAP Improvements EAP Mitigations													
5. Alabama Street (NS) / Dwy 5-River Bluff Avenue (EW)	Existing	NA	1	1	1	1	NA	S	1	S	1	NA	1	Signal
	EAP Improvements EAP Mitigations													
6. Alabama Street (NS) / Palmetto Avenue (EW)	Existing	1	1	NA	1	1	NA	S	1	S	S	1	S	Signal
	EAP Improvements EAP Mitigations													
7. Alabama Street (NS) / San Bernardino Avenue (EW)	Existing	1	2	1	1	2	S	1	2	S	1	2	1	Signal
	EAP Improvements EAP Mitigations													
8. Alabama Street (NS) / Lugonia Avenue (EW)	Existing	1	3	S	1	3	S	1	2	S	1	2	S	Signal
	EAP Improvements EAP Mitigations	1	3	1	1	3	S	1	2	S	1	2	S	
9. Alabama Street (NS) / I-10 WB Ramps (EW)	Existing	1	2	NA	NA	2	1	NA	NA	NA	S	1	1	Signal
	EAP Improvements EAP Mitigations													
10. Alabama Street (NS) / I-10 EB Ramps (EW)	Existing	NA	2	1	1	2	NA	S	2	S	NA	NA	NA	Signal
	EAP Improvements EAP Mitigations													
11. SR-210 SB Ramps (NS) / 5th Street (EW)	Existing	NA	NA	NA	S	1	1	NA	2	1	2	2	NA	Signal
	EAP Improvements EAP Mitigations													
12. SR-210 NB Ramps (NS) / 5th Street (EW)	Existing	1S	1	2	NA	NA	NA	1	2	NA	NA	3	1	Signal
	EAP Improvements EAP Mitigations													
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	Existing	1	1	1	1	1	1	1	2	1	1	1	1	Signal
	EAP Improvements EAP Mitigations													
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	Existing	1	2	1	1	1	S	2	1	1	1	1	1	Signal
	EAP Improvements EAP Mitigations													
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	Existing	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	OWSC
	EAP Improvements EAP Mitigations				S	NA	1	S	1	NA	NA	1	S	
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	Existing	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	OWSC
	EAP Improvements EAP Mitigations				S	NA	1	S	1	NA	NA	1	S	
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	Existing	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	OWSC
	EAP Improvements EAP Mitigations				S	NA	1	S	1	NA	NA	1	S	
18. Alabama Street (NS) / North Dwy 4 (EW)	Existing	NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	OWSC
	EAP Improvements EAP Mitigations	NA	1	NA	NA	1	S	NA	NA	NA	NA	NA	1	
19. Alabama Street (EW) / South Dwy 6 (EW)	Existing	NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	OWSC
	EAP Improvements EAP Mitigations	NA	1	NA	NA	1	S	NA	NA	NA	NA	NA	1	

Notes\* EAP- Existing Plus Ambient Growth Plus Project, NA-Not Available, S-Shared,L-Left,T-Through,R-Right,OL-Overlap,1D-Defacto

#-Improvement

#-Mitigation

**Figure 35 – Summary of Intersection Improvements for Existing Plus Ambient Growth Plus Project (2020) Conditions**



**LEGEND**

- Existing Traffic Signal
- ⊥ Existing Stop Sign
- ↔ Existing Lane Geometrics
- d Existing Defacto Right Turn
- F Existing Free Right Turn Lane
- ↔ Proposed Lane Geometrics
- ↔ Proposed Improvement Lane Geometrics
- ⊥ Proposed Improvement Stop Sign
- OL Proposed Overlap Right Turn

### 6.1.3 Proposed Improvement and Mitigation Measures – Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) Conditions

**Table 6-3** and **Figure 36** present the proposed improvement and mitigation measures in order to achieve a satisfactory level of service at the study intersections in Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) conditions. In addition to existing plus project improvements, following improvement and mitigation measures are proposed,

#### *Mitigations*

- 9. Alabama Street (NS) / I-10 WB Ramps (EW):** Restripe westbound approach to include one left turn lane, one shared through-right turn lane.

**Table 6-3 – Summary of Intersection Improvements for Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) Conditions**

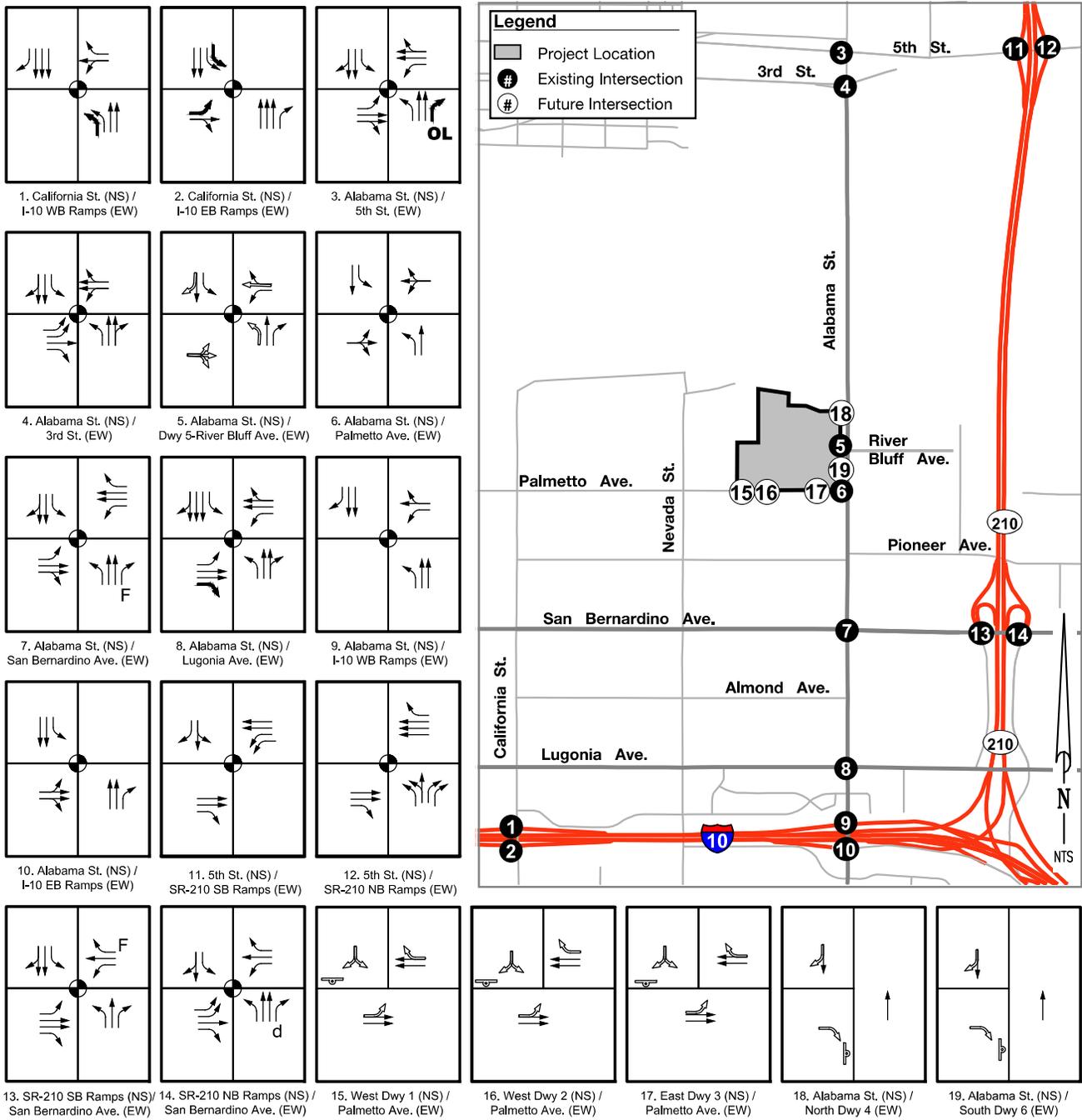
Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. California Street (NS) / I-10 WB Ramps (EW)	Existing	1	2	NA	NA	3	1	NA	NA	NA	S	1	1	Signal
	EACP Improvements EACP Mitigations	<b>2</b>	2	NA	NA	3	1	NA	NA	NA	S	1	1	
2. California Street (NS) / I-10 EB Ramps (EW)	Existing	NA	3	1	1	2	NA	S	1	S	NA	NA	NA	Signal
	EACP Improvements EACP Mitigations	NA	3	1	<b>2</b>	2	NA	S	1	S	NA	NA	NA	
3. Alabama Street (NS) / 5th Street (EW)	Existing	1	2	1D	1	2	S	1	2	S	1	2	S	Signal
	EACP Improvements EACP Mitigations	1	2	<b>1OL</b>	1	2	S	1	2	S	1	2	S	
4. Alabama Street (NS) / 3rd Street (EW)	Existing	1	2	S	1	2	S	2	1	1	S	2	S	Signal
	EACP Improvements EACP Mitigations													
5. Alabama Street (NS) / Dwy 5-River Bluff Avenue (EW)	Existing	NA	1	1	1	1	NA	S	1	S	1	NA	1	Signal
	EACP Improvements EACP Mitigations													
6. Alabama Street (NS) / Palmetto Avenue (EW)	Existing	1	1	NA	1	1	NA	S	1	S	S	1	S	Signal
	EACP Improvements EACP Mitigations													
7. Alabama Street (NS) / San Bernardino Avenue (EW)	Existing	1	2	1	1	2	S	1	2	S	1	2	1	Signal
	EACP Improvements EACP Mitigations													
8. Alabama Street (NS) / Lugonia Avenue (EW)	Existing	1	3	S	1	3	S	1	2	S	1	2	S	Signal
	EACP Improvements EACP Mitigations	1	3	<b>1</b>	1	3	S	1	2	S	1	2	S	
9. Alabama Street (NS) / I-10 WB Ramps (EW)	Existing	1	2	NA	NA	2	1	NA	NA	NA	S	1	1	Signal
	EACP Improvements EACP Mitigations	1	2	NA	NA	2	1	NA	NA	NA	<b>1</b>	1	<b>S</b>	
10. Alabama Street (NS) / I-10 EB Ramps (EW)	Existing	NA	2	1	1	2	NA	S	2	S	NA	NA	NA	Signal
	EACP Improvements EACP Mitigations													
11. SR-210 SB Ramps (NS) / 5th Street (EW)	Existing	NA	NA	NA	S	1	1	NA	2	1	2	2	NA	Signal
	EACP Improvements EACP Mitigations													
12. SR-210 NB Ramps (NS) / 5th Street (EW)	Existing	1S	1	2	NA	NA	NA	1	2	NA	NA	3	1	Signal
	EACP Improvements EACP Mitigations													
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	Existing	1	1	1	1	1	1	1	2	1	1	1	1	Signal
	EACP Improvements EACP Mitigations													
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	Existing	1	2	1	1	1	S	2	1	1	1	1	1	Signal
	EACP Improvements EACP Mitigations													
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	Existing	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	OWSC
	EACP Improvements EACP Mitigations				<b>S</b>	NA	<b>1</b>	<b>S</b>	<b>1</b>	NA	NA	<b>1</b>	<b>S</b>	
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	Existing	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	OWSC
	EACP Improvements EACP Mitigations				<b>S</b>	NA	<b>1</b>	<b>S</b>	<b>1</b>	NA	NA	<b>1</b>	<b>S</b>	
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	Existing	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	OWSC
	EACP Improvements EACP Mitigations				<b>S</b>	NA	<b>1</b>	<b>S</b>	<b>1</b>	NA	NA	<b>1</b>	<b>S</b>	
18. Alabama Street (NS) / North Dwy 4 (EW)	Existing	NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	OWSC
	EACP Improvements EACP Mitigations	NA	<b>1</b>	NA	NA	<b>1</b>	<b>S</b>	NA	NA	NA	NA	NA	<b>1</b>	
19. Alabama Street (EW) / South Dwy 6 (EW)	Existing	NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	OWSC
	EACP Improvements EACP Mitigations	NA	<b>1</b>	NA	NA	<b>1</b>	<b>S</b>	NA	NA	NA	NA	NA	<b>1</b>	

Notes\* EACP- Existing Plus Ambient Growth Plus Cumulative Plus Project, NA-Not Available, S-Shared,L-Left,T-Through,R-Right,OL-Overlap,1D-Defacto

**#-Improvement**

**#-Mitigation**

**Figure 36 – Summary of Intersection Improvements for Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) Conditions**



**LEGEND**

- Existing Traffic Signal
- Existing Stop Sign
- Existing Lane Geometrics
- Existing Defacto Right Turn
- Existing Free Right Turn Lane
- Proposed Lane Geometrics
- Proposed Improvement Lane Geometrics
- Proposed Improvement Stop Sign
- Proposed Overlap Right Turn

#### 6.1.4 Proposed Improvement and Mitigation Measures – Build-Out Year Plus Cumulative Projects (2040) Conditions

**Table 6-4** and **Figure 37** present the proposed improvement and mitigation measures in order to achieve a satisfactory level of service at the study intersections in Build-Out Year Plus Cumulative Projects (2040) conditions. The proposed improvement and mitigation measures are as follows:

##### *Improvements*

1. **California Street (NS) / I-10 WB Ramps (EW):** Add one left turn lane for northbound approach.
2. **California Street (NS) / I-10 Eastbound Ramps (EW):** Add one left lane for southbound approach.
6. **Alabama Street (NS) / Palmetto Avenue (EW):** Add one through lane for eastbound approach and one through lane for westbound approach.
7. **Alabama Street (NS) / San Bernardino Avenue (EW):** Add one through lane and one right turn lane for eastbound approach and one left turn lane for westbound approach.
8. **Alabama Street (NS) / Lugonia Avenue (EW):** Add one northbound right turn lane and one westbound left turn lane.

##### *Mitigations*

3. **Alabama Street (NS) / 5<sup>th</sup> Street (EW):** Add one overlapping northbound right turn lane.
4. **Alabama Street (NS) / 3<sup>rd</sup> Street (EW):** Add one westbound left turn lane and one westbound right-turn lane.
5. **Alabama Street (NS) /Lugonia Avenue (EW) :** Add one eastbound right turn lane and westbound right turn lane.
9. **Alabama Street (NS) / I-10 WB Ramps (EW):** Add one left turn lane for northbound approach and one right turn lane for southbound approach.
10. **Alabama Street (NS)/ I-10 EB Ramps (EW):** Add one through lane for northbound approach.
14. **SR-210 NB Ramps (NS) / San Bernardino Avenue (EW):** Convert geometry of eastbound right turn lane to eastbound through-right lane. Add one through lane for the westbound approach.

Note\* The intersection mitigations from existing conditions, considered in the general plan improvement programs are provided as improvements in the build-out year 2040 conditions.

**Table 6-4 – Summary of Intersection Improvements for Build-Out Year Plus Cumulative Projects (2040) Conditions**

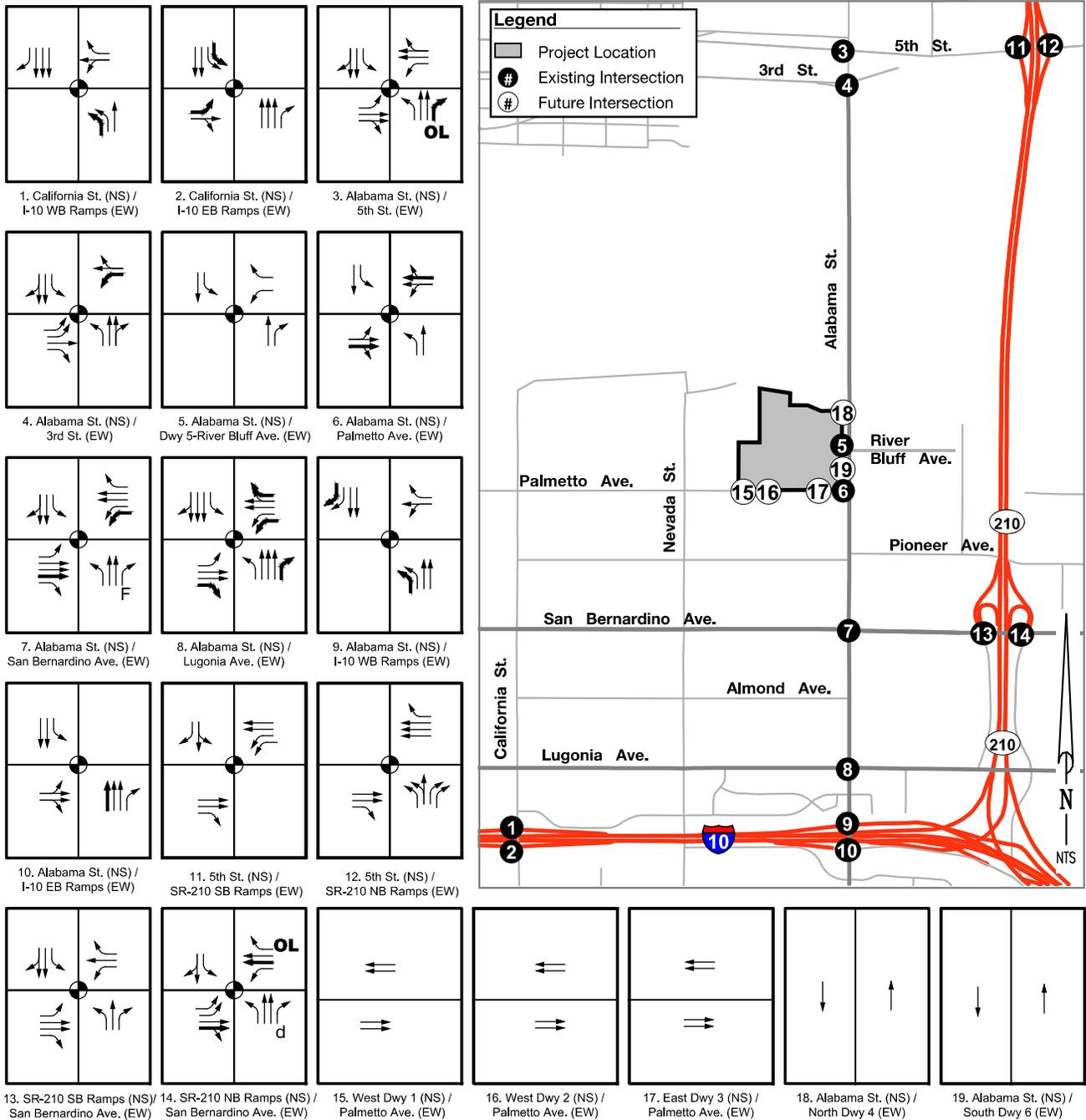
Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. California Street (NS) / I-10 WB Ramps (EW)	Existing 2040 Improvements 2040 Mitigations	1 2	2 2	NA NA	NA NA	3 3	1 1	NA NA	NA NA	NA NA	S S	1 1	1 1	Signal
2. California Street (NS) / I-10 EB Ramps (EW)	Existing 2040 Improvements 2040 Mitigations	NA NA NA	3 3 3	1 1 1	1 2 2	2 2 NA	NA NA NA	S S 1	1 1 1	S S S	NA NA NA	NA NA NA	NA NA NA	Signal
3. Alabama Street (NS) / 5th Street (EW)	Existing 2040 Improvements 2040 Mitigations	1 1	2 2	1D 1OL	1 1	2 2	S S	1 1	2 2	S S	1 1	2 2	S S	Signal
4. Alabama Street (NS) / 3rd Street (EW)	Existing 2040 Improvements 2040 Mitigations	1 1	2 2	S S	1 1	2 2	S S	2 2	1 1	1 1	S 1	1 1	1 1	Signal
5. Alabama Street (NS) / Dwy 5-River Bluff Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	NA NA	1 1	1 1	1 1	1 1	NA NA	S S	1 1	S S	1 1	NA NA	1 1	Signal
6. Alabama Street (NS) / Palmetto Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	1 1	1 1	NA NA	1 1	1 1	NA NA	S S	1 2	S S	S S	1 2	S S	Signal
7. Alabama Street (NS) / San Bernardino Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	1 1	2 2	1 1	1 1	2 2	S S	1 1	2 3	S S	1 2	2 2	1 1	Signal
8. Alabama Street (NS) / Lugonia Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	1 1 1	3 3 3	S 1 1	1 1 1	3 3 S	S S S	1 1 1	2 2 2	S S 1	1 2 2	2 2 2	S S 1	Signal
9. Alabama Street (NS) / I-10 WB Ramps (EW)	Existing 2040 Improvements 2040 Mitigations	1 2	2 2	NA NA	NA NA	2 2	1 2	NA NA	NA NA	NA NA	S S	1 1	1 1	Signal
10. Alabama Street (NS) / I-10 EB Ramps (EW)	Existing 2040 Improvements 2040 Mitigations	NA NA	2 3	1 1	1 1	2 2	NA NA	S S	2 2	S S	NA NA	NA NA	NA NA	Signal
11. SR-210 SB Ramps (NS) / 5th Street (EW)	Existing 2040 Improvements 2040 Mitigations	NA NA	NA NA	NA NA	S S	1 1	1 1	NA NA	2 2	1 1	2 2	2 NA	NA	Signal
12. SR-210 NB Ramps (NS) / 5th Street (EW)	Existing 2040 Improvements 2040 Mitigations	1S	1	2	NA	NA	NA	1	2	NA	NA	3	1	Signal
13. SR-210 SB Ramps (NS) / San Bernardino Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	1 1	1 1	1 1	1 1	1 1	1	2 2	1 1	1 1	1 1	1 1	1	Signal
14. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	1 1	2 2	1 1	1 1	1 S	S	2 2	1 2	1 S	1 1	2 1OL	1	Signal
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	Does Not Exist												
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	Does Not Exist												
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	Does Not Exist												
18. Alabama Street (NS) / North Dwy 4 (EW)	Existing 2040 Improvements 2040 Mitigations	Does Not Exist												
19. Alabama Street (EW) / South Dwy 6 (EW)	Existing 2040 Improvements 2040 Mitigations	Does Not Exist												

Notes \*NA-Not Available, S-Shared, L-Left, T-Through, R-Right, OL: Overlap, 1D-Defacto

**#-Improvement**

**#-Mitigation**

**Figure 37 – Summary of Intersection Improvements for Build-Out Year Plus Cumulative Projects (2040) Conditions**



**LEGEND**

- Existing Traffic Signal
- Proposed Traffic Signal
- Existing Stop Sign
- Proposed Stop Sign
- Existing Lane Geometrics
- Proposed Lane Geometrics
- d Existing Defacto Right Turn
- OL Proposed Overlap Right Turn
- F Existing Free Right Turn Lane

### 6.1.5 Proposed Improvement and Mitigation Measures – Build-Out Year Plus Cumulative Plus Project (2040) Conditions

**Table 6-5** and **Figure 38** present the proposed improvement and mitigation measures in order to achieve a satisfactory level of service at the study intersections in Build-Out Year Plus Cumulative Plus Project (2040) conditions. In addition to 2040 cumulative project improvements and mitigations, following improvement and mitigation measures are proposed,

#### *Improvements*

- 5. Alabama Street (NS) / Dwy-5-River-Bluff Avenue (EW):** Add one left turn lane for northbound approach, one shared right turn lane for southbound approach and eastbound shared left/through/right turn lane.
- 15. West Dwy 1 (NS) / Palmetto Avenue (EW):** Add one shared left turn lane for southbound approach, one shared left turn lane for eastbound approach and add a shared right turn lane to the westbound approach.
- 16. West Dwy 2 (NS) / Palmetto Avenue (EW):** Add one shared left turn lane for southbound approach, one shared left turn lane for eastbound approach and add one shared right turn lane for westbound approach.
- 17. West Dwy 3 (NS) / Palmetto Avenue (EW):** Add one shared left turn lane for southbound approach, one shared left turn lane for eastbound approach and add one shared right turn lane for westbound approach.
- 18. Alabama Street (NS) / North Dwy 4 (EW):** Add one shared right turn lane for southbound approach and add one right turn lane for westbound approach.
- 19. Alabama Street (EW) / South Dwy 6 (EW):** Add one shared right turn lane for southbound approach and a right turn lane for westbound approach.

**Table 6-5 – Summary of Intersection Improvements for Build-Out Year Plus Cumulative Plus Project (2040) Conditions**

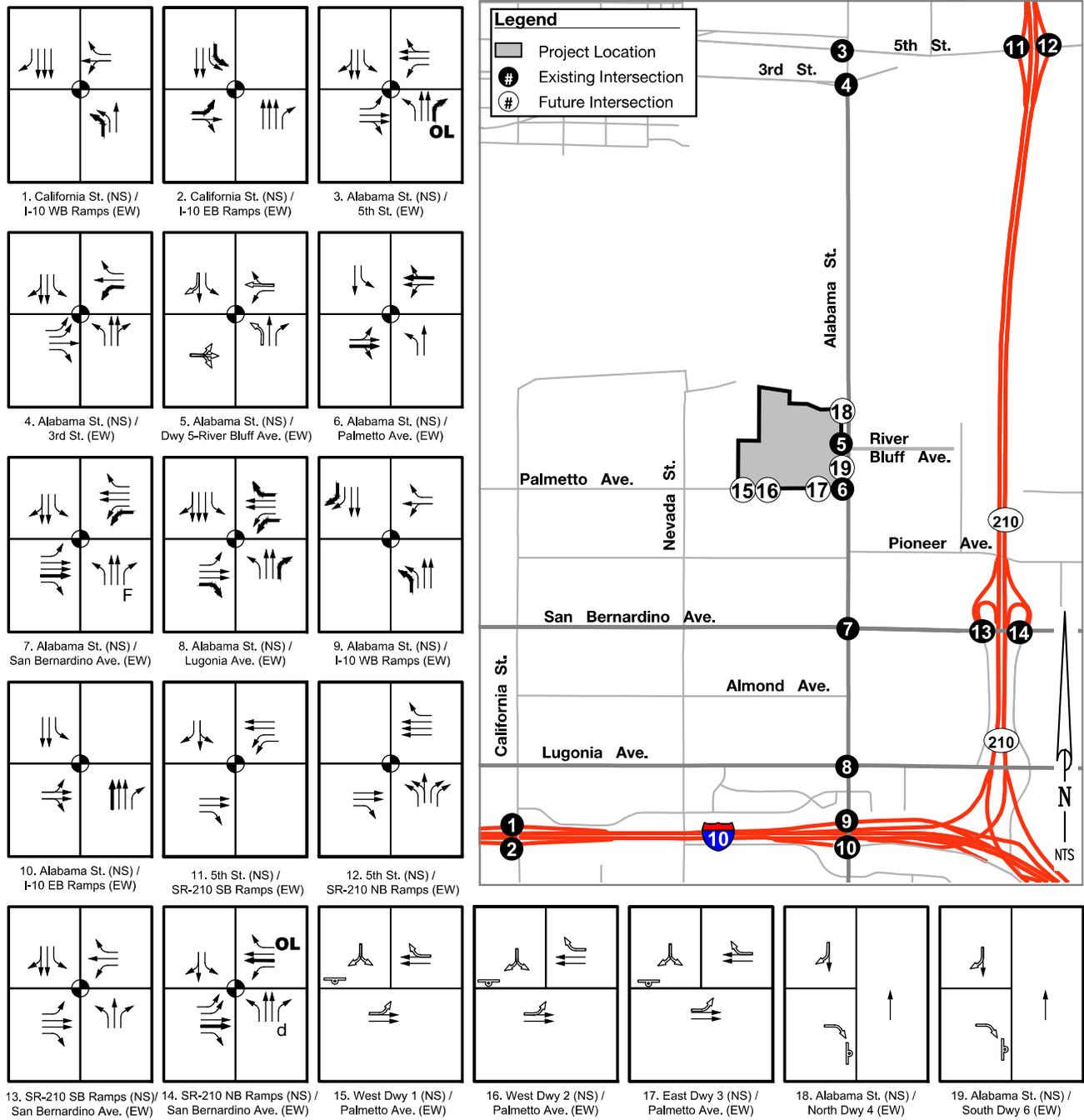
Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. California Street (NS) / I-10 WB Ramps (EW)	Existing 2040 Improvements 2040 Mitigations	1	2	NA	NA	3	1	NA	NA	NA	S	1	1	Signal
		2	2	NA	NA	3	1	NA	NA	NA	S	1	1	
		NA	3	1	1	2	NA	S	1	S	NA	NA	NA	
2. California Street (NS) / I-10 EB Ramps (EW)	Existing 2040 Improvements 2040 Mitigations	NA	3	1	2	2	NA	S	1	S	NA	NA	NA	Signal
		NA	3	1	2	2	NA	S	1	S	NA	NA	NA	
		NA	3	1	2	2	NA	1	1	S	NA	NA	NA	
3. Alabama Street (NS) / 5th Street (EW)	Existing 2040 Improvements 2040 Mitigations	1	2	1D	1	2	S	1	2	1	1	2	S	Signal
		1	2	1OL	1	2	S	1	2	S	1	2	S	
		1	2	S	1	2	S	2	1	1	S	2	S	
4. Alabama Street (NS) / 3rd Street (EW)	Existing 2040 Improvements 2040 Mitigations	1	2	S	1	2	S	2	1	1	S	2	S	Signal
		1	2	S	1	2	S	2	1	1	S	2	S	
		NA	1	1	1	1	NA	S	1	S	1	NA	1	
5. Alabama Street (NS) / Dwy 5-River Bluff Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	NA	1	1	1	1	NA	S	1	S	1	NA	1	Signal
		NA	1	1	1	1	NA	S	1	S	1	NA	1	
		1	1	NA	1	1	NA	S	2	S	S	2	S	
6. Alabama Street (NS) / Palmetto Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	1	1	NA	1	1	NA	S	1	S	S	1	S	Signal
		1	1	NA	1	1	NA	S	2	S	S	2	S	
		1	2	1	1	2	S	1	2	S	1	2	1	
7. Alabama Street (NS) / San Bernardino Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	1	2	1	1	2	S	1	2	S	1	2	1	Signal
		1	2	1	1	2	S	1	3	S	2	2	1	
		1	3	S	1	3	S	1	2	S	1	2	S	
8. Alabama Street (NS) / Lugonia Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	1	3	1	1	3	S	1	2	S	2	2	S	Signal
		1	3	1	1	3	S	1	2	S	2	2	S	
		1	3	1	1	3	S	1	2	1	2	2	1	
9. Alabama Street (NS) / I-10 WB Ramps (EW)	Existing 2040 Improvements 2040 Mitigations	1	2	NA	NA	2	1	NA	NA	NA	S	1	1	Signal
		2	2	NA	NA	2	2	NA	NA	NA	S	1	1	
		NA	2	1	1	2	NA	S	2	S	NA	NA	NA	
10. Alabama Street (NS) / I-10 EB Ramps (EW)	Existing 2040 Improvements 2040 Mitigations	NA	2	1	1	2	NA	S	2	S	NA	NA	NA	Signal
		NA	3	1	1	2	NA	S	2	S	NA	NA	NA	
		NA	NA	NA	S	1	1	NA	2	1	2	2	NA	
11. SR-210 SB Ramps (NS) / 5th Street (EW)	Existing 2040 Improvements 2040 Mitigations	1S	1	2	NA	NA	NA	1	2	NA	NA	3	1	Signal
		1	1	1	1	1	1	1	2	1	1	1	1	
		1	2	1	1	1	S	2	1	1	1	1	1	
12. SR-210 NB Ramps (NS) / San Bernardino Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	1	2	1	1	1	S	2	2	S	1	2	1OL	Signal
		1	2	1	1	1	S	2	2	S	1	2	1OL	
		NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	
15. West Dwy 1 (NS) / Palmetto Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	NA	NA	NA	S	NA	1	S	1	NA	NA	1	S	OWSC
		NA	NA	NA	S	NA	1	S	1	NA	NA	1	S	
		NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	
16. West Dwy 2 (NS) / Palmetto Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	NA	NA	NA	S	NA	1	S	1	NA	NA	1	S	OWSC
		NA	NA	NA	S	NA	1	S	1	NA	NA	1	S	
		NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	NA	
17. East Dwy 3 (NS) / Palmetto Avenue (EW)	Existing 2040 Improvements 2040 Mitigations	NA	NA	NA	S	NA	1	S	1	NA	NA	1	S	OWSC
		NA	NA	NA	S	NA	1	S	1	NA	NA	1	S	
		NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	
18. Alabama Street (NS) / North Dwy 4 (EW)	Existing 2040 Improvements 2040 Mitigations	NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	OWSC
		NA	1	NA	NA	1	S	NA	NA	NA	NA	NA	1	
		NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	
19. Alabama Street (EW) / South Dwy 6 (EW)	Existing 2040 Improvements 2040 Mitigations	NA	1	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	OWSC
		NA	1	NA	NA	1	S	NA	NA	NA	NA	NA	1	
		NA	1	NA	NA	1	S	NA	NA	NA	NA	NA	1	

Notes\*NA-Not Available, S-Shared,L-Left,T-Through,R-Right,OL:Overlap,1D-Defacto

#-Improvement

#-Mitigation

**Figure 38– Summary of Intersection Improvements for Build-Out Year Plus Cumulative Plus Project (2040) Conditions**



**LEGEND**

- Existing Traffic Signal
- Existing Stop Sign
- Existing Lane Geometrics
- Existing Defacto Right Turn
- Existing Free Right Turn Lane
- Proposed Lane Geometrics
- Proposed Improvement Lane Geometrics
- Proposed Improvement Stop Sign
- Proposed Overlap Right Turn

## 6.2 Traffic Signal Warrants

Conducting traffic signal warrants is a method of determining whether or not an unsignalized intersection needs to install a traffic signal. Traffic conditions that satisfy a traffic signal warrant are more likely to require the installation of a traffic signal. However, the California Manual on Uniform Traffic Control Devices (MUTCD) states that the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal. Peak hour traffic signal warrant analysis should only be considered as an “indicator” of the likelihood of an unsignalized intersection warranting a traffic signal. Intersections that exceed the peak hour warrant are more likely to meet one or more of the other volume based signal warrants. The MUTCD also advises that a traffic control signal should not be installed unless:

- One or more of the traffic signal warrants is satisfied;
- An engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection; and
- It will not seriously disrupt progressive traffic flow.

For Existing (2018) traffic conditions, the peak hour traffic control signal warrant is not satisfied for any of the study area unsignalized intersections (see Appendix D for technical calculations).

For Existing Plus Project (2018) traffic conditions, the peak hour traffic control signal warrant is not satisfied for any of the study area unsignalized intersections (see Appendix D for technical calculations).

For Existing Plus Ambient Growth Plus Project (2020) traffic conditions, the peak hour traffic control signal warrant is not satisfied for any of the study area unsignalized intersections (see Appendix D for technical calculations).

For Existing Plus Ambient Growth Plus Cumulative Plus Project (2020) traffic conditions, the peak hour traffic control signal warrant is not satisfied for any of the study area unsignalized intersections (see Appendix D for technical calculations).

For Buildout Year Plus Cumulative Projects (2040) traffic conditions, the peak hour traffic control signal warrant is not satisfied for any of the study area unsignalized intersections (see Appendix D for technical calculations).

For Buildout Year Plus Cumulative Projects Plus Project (2040) traffic conditions, the peak hour traffic control signal warrant is not satisfied for any of the study area unsignalized intersections (see Appendix D for technical calculations).

## 6.3 Circulation Recommendations

This traffic impact analysis demonstrates that the direct traffic impacts generated by the project can be mitigated to meet the required level of service if the following recommended improvements are adopted.

### 6.3.1 Roadway and Safety Improvements

- Construct full width improvements on all internal roadways.

- Construct partial width improvements on the northerly side of Palmetto Avenue at its ultimate cross-section as a collector street adjacent to project boundary line.
- Construct partial width improvements on the westerly side of Alabama Street at its ultimate cross-section as a major arterial adjacent to project boundary line.
- Modify the existing traffic signal at intersection of Alabama Street and River Bluff Avenue to provide full access for all movements at the intersection.
- Signing/striping should be implemented in conjunction with detailed construction plans for THE PROJECT site.
- Sight distance at THE PROJECT entrance roadway will be reviewed with respect to standard County of San Bernardino sight distance standards at the time of preparation of final grading, landscape, site development, and street improvement plans.

### 6.3.2 Project Designed Intersection Improvements

- Construct the intersection of West Driveway 1 and Palmetto Avenue to include the following geometrics.  
Northbound: No proposed improvements.  
Southbound: Shared left-right turn lane.  
Eastbound: Convert through lane to shared through-left turn lane.  
Westbound: Convert through lane to shared through-right turn lane.
- Construct the intersection of West Driveway 2 and Palmetto Avenue to include the following geometrics.  
Northbound: No proposed improvements.  
Southbound: Shared left-right turn lane.  
Eastbound: Convert through lane to shared through-left turn lane.  
Westbound: Convert through lane to shared through-right turn lane.
- Construct the intersection of East Driveway 3 and Palmetto Avenue to include the following geometrics.  
Northbound: No proposed improvements.  
Southbound: Shared left-right turn lane.  
Eastbound: Convert through lane to shared through-left turn lane.  
Westbound: Convert through lane to shared through-right turn lane.
- Construct the intersection of North Driveway 4 and Alabama Street to restrict the movements for right in right out only.  
Northbound: No proposed improvements.  
Southbound: Convert through lane to shared through-right turn lane.  
Eastbound: Add a right turn lane.  
Westbound: Not available.

- Construct the intersection of South Driveway 6 and Alabama Street to restrict the movements for right in right out only.  
Northbound: No proposed improvements.  
Southbound: Convert through lane to shared through-right turn lane.  
Eastbound: Add a right turn lane.  
Westbound: Not available.

## 6.4 Regional Funding Mechanisms

THE PROJECT will participate in the cost of off-site improvements through the payment of “fair share” mitigation fees, including the following:

- San Bernardino Associated Governments (SANBAG) Congestion Management Program

Program improvements: SANBAG congestion management program provides funding for the 2040 improvements mentioned in the Table 1-1. The fee of \$0.73 per square foot is charged for every high –cube warehouse project developed in the Redlands Donut Hole under the SANBAG congestion management program. These fees will be collected and utilized as needed by the County of San Bernardino to construct the improvements necessary to assist in maintaining the required level of service.

Non Program Improvements: The non-program improvements are the improvements which are not funded by any program in County of San Bernardino or Caltrans. THE PROJECT has one non-program improvement. As the impact is generated in 2040 Cumulative Plus Project Condition the fair share towards the improvement is calculated based on the number of project trips and total number of cumulative trips.

**Table 6-6** summarizes the proposed mitigation measure and associated funding mechanism for the project as a result of the traffic study.

**Table 6-6– Project Mitigation Summary**

No.	Intersection	Jurisdiction	Recommended Improvement	Ep & EAP Improvements	EAPC (2020) Improvements		Build-Out Year (2040) Cumulative Plus Projects Improvements		Payment System
				Project Improvements	Program <sup>1</sup> Improvements	Non Program Improvements	Program <sup>1</sup> Improvements	Non Program Improvements	
1	California Street (NS) / I-10 WB Ramps (EW)	Caltrans	1. One NBL Turn Lane		1. One NBL Turn Lane		1. One NBL Turn Lane		Program Improvement
2	California Street (NS) / I-10 EB Ramps (EW)	Caltrans	1. One SBL Turn Lane 2. One EBL Turn Lane		1. One SBL Turn Lane 2. One EBL Turn Lane		1. One SBL Turn Lane		Program Improvement
3	Alabama Street (NS) / 5th Street (EW)	City of Highland	1. One Overlapping NBR Turn Lane	1. One Overlapping NBR Turn Lane					Project Improvement
4	Alabama Street (NS) / Palmetto Avenue (EW)	Unincorporated / Donut Hole	1. One WBT Lane 2. One EBT Lane				1. One WBT Lane 2. One EBT Lane		Program Improvement
5	Alabama Street (NS)/Dwy-5-Riverbluff Ave(EW)	Unincorporated/ Donut Hole	1. One EB Shared Left/Through/Right Turn Lane. 2. One NBL Turn Lane. 3. One WB Shared Through-Right Turn Lane	1. One EB Shared Left/Through/Right Turn Lane. 2. One NBL Turn Lane. 3. One WB Shared Through-Right Turn Lane					Project Improvements
6	Alabama Street (NS) / San Bernardino Avenue (EW)	Unincorporated / Donut Hole	1. One EBT Lane 2. One WBL Turn Lane				1. One EBT Lane 2. One WBL Turn Lane		Program Improvement
7	Alabama Street (NS) / Lugonia Avenue (EW)	Unincorporated / Donut Hole / City of Redlands	1. One NBR Turn Lane 2. One WBL Turn Lane 3. One EBR Turn Lane 4. One WBR Turn Lane	1. One NBR Turn Lane			2. One WBL Turn Lane 3. One EBR Turn Lane 4. One WBR Turn Lane		Fair Share/Project Improvement/Program Improvement
8	Alabama Street (NS) / I-10 WB Ramps (EW)	Caltrans	1. One NBL Turn Lane 2. One SBR Turn Lane				1. One NBL Turn Lane 2. One SBR Turn Lane		Program Improvement
9	Alabama Street (NS) / I-10 EB Ramps (EW)	Caltrans	1. One NBT Lane				1. One NBT Lane		Fair Share
10	SR 210 SB Ramps (NS) / San Bernardino Avenue (EW)	Caltrans	1. One WBT Lane 2. Restripe EB Lanes				1. One WBT Lane 2. Restripe EB Lanes		Fair Share

<sup>1</sup> Program improvements constructed by project may be eligible for fee credit. In lieu fee payment is at discretion of County



**Corporate Headquarters**

3788 McCray Street  
Riverside, CA 92506  
T: 951.686.1070

**Palm Desert Office**

36-951 Cook Street #103  
Palm Desert, CA 92211  
T: 760.568.5005

**Murrieta Office**

41391 Kalmia Street #320  
Murrieta, CA 92562  
T: 951.686.1070



[www.webbassociates.com](http://www.webbassociates.com)