



REVISED TRAFFIC IMPACT ANALYSIS
QUAIL RUN APARTMENTS



April 2015



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A L B E R T A .

WEBB

A S S O C I A T E S

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April 29, 2015

Mr. Steve Sommers
SDH & Associates, Inc.
5225 Canyon Crest Drive, Suite 71-439
Riverside, CA 92507

RE: Revised Traffic Impact Analysis Report, Quail Run Apartments, Riverside, CA.

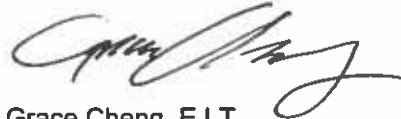
Dear Mr. Sommers,

We are pleased to submit herewith our Revised Traffic Impact Analysis Report for the proposed Quail Run Apartments which we have prepared at your request.

If you have any questions regarding this report, please call the undersigned for clarification.

Sincerely yours,

ALBERT A. WEBB ASSOCIATES



Grace Cheng, E.I.T.
Assistant Engineer



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Vice President



TABLE OF CONTENTS

SECTION 1 - EXECUTIVE SUMMARY.....1-1

- Purpose of Report and Study Objectives 1-1
- Site Location and Study Area 1-1
- Development Description 1-1
 - Project Size 1-1
 - Project Trip Generation 1-1
 - Project Site Circulation 1-1
 - Project Zoning and Land Use 1-1
- Principal Findings 1-2
 - Required Level of Service 1-2
 - Levels of Service – Existing Conditions 1-2
 - Levels of Service – Existing Plus Ambient Growth Plus Project Conditions 1-2
 - Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions 1-2
 - Levels of Service – 2025 General Plan with Project Conditions 1-3
- Traffic Signal Warrants 1-3
- Circulation Recommendations 1-4
 - On-Site Recommendations 1-4
- Safety and Operational Improvements 1-4
- Regional Funding Mechanisms 1-4
- Project Mitigation Summary 1-4

SECTION 2 - INTRODUCTION.....2-1

- Purpose of Report and Study Objectives 2-1
- Site Location and Study Area 2-1
- Development Project Description 2-3
 - Project Size and Description 2-3
 - Existing Land Use and Zoning 2-3
 - Proposed Land Use and Zoning 2-3
 - Site Plan of Proposed Project 2-3
 - Site Access 2-3
 - Proposed Project Opening Year and Proposed Project Phasing 2-3
 - Sphere of Influence 2-3

SECTION 3 - AREA CONDITIONS.....3-5

- Study Intersections 3-5
- Study Roadway Segments 3-5
- Existing Traffic Controls and Intersection Geometrics 3-5
- Existing Traffic Volumes 3-5

▪ Level of Service Methodology _____	3-10
Signalized Intersections _____	3-10
Unsignalized Intersections _____	3-10
Roadway Segments _____	3-11
▪ Required Level of Service _____	3-11
▪ Levels of Service – Existing Conditions _____	3-12
▪ General Plan Circulation _____	3-13
▪ Transit Service _____	3-13

SECTION 4 - PROJECTED FUTURE TRAFFIC.....4-1

▪ Method of Projection _____	4-1
▪ Ambient Growth _____	4-1
▪ Project Generated Traffic _____	4-1
Project Trip Generation _____	4-1
Project Trip Distribution _____	4-2
Project Modal Split _____	4-2
Project Trip Assignment _____	4-2
▪ Cumulative Project Generated Traffic _____	4-7
▪ Year 2025 Traffic _____	4-11

SECTION 5 - TRAFFIC ANALYSIS.....5-1

▪ Capacity and Level of Service and Improvement Analysis _____	5-1
Levels of Service – Existing Plus Ambient Growth Plus Project Conditions _____	5-1
Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions _____	5-6
Levels of Service – 2025 General Plan with Project Conditions _____	5-11
Levels of Service – 2025 General Plan with Project with Improvements _____	5-12

SECTION 6 - FINDINGS AND RECOMMENDATIONS.....6-1

▪ Traffic Impacts and Level of Service Analysis _____	6-1
Proposed Intersection Geometry – Existing Plus Ambient Growth Plus Project Conditions _____	6-1
Proposed Intersection Geometry – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions _____	6-3
Proposed Mitigation Measures – 2025 General Plan with Project Conditions _____	6-5
▪ Traffic Signal Warrants _____	6-7
▪ Circulation Recommendations _____	6-7
On-Site Recommendations _____	6-7
▪ Safety and Operational Improvements _____	6-8
▪ Regional Funding Mechanisms _____	6-8

LIST OF TABLES

Table 1-1 – Intersection Project Mitigation Summary	1-5
Table 1-2 – Intersection Fair Share Analysis	1-5
Table 3-1 – Level of Service for Signalized Intersections.....	3-10
Table 3-2 – Level of Service for Unsignalized Intersections.....	3-11
Table 3-3 – Level of Service for Roadway Segments – City of Riverside	3-11
Table 3-4 – Intersection Levels of Service – Existing Conditions.....	3-12
Table 3-5 – Roadway Levels of Service – Existing Conditions.....	3-12
Table 4-1 – Trip Generation Rates	4-1
Table 4-2 – Project Trip Generation.....	4-2
Table 4-3 – Cumulative Projects within the Study Area	4-7
Table 4-4 – Year 2025 Modelling	4-11
Table 5-1 – Intersection Levels of Service – Existing Plus Ambient Growth Plus Project Conditions.....	5-1
Table 5-2 – Roadway Levels of Service – Existing Plus Ambient Growth Plus Project Conditions.....	5-2
Table 5-3 – Intersection Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions.....	5-6
Table 5-4 – Roadway Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions	5-7
Table 5-5 – Intersection Levels of Service – 2025 General Plan with Project Conditions	5-11
Table 5-6 – Roadway Levels of Service – 2025 General Plan with Project Conditions	5-12
Table 5-7 – Intersection Levels of Service – 2025 General Plan with Project with Improvements	5-12
Table 6-1 – Summary of Intersection Improvements for Existing Plus Ambient Growth Plus Project Conditions.....	6-1
Table 6-2 – Summary of Roadway Geometry for Existing Plus Ambient Growth Plus Project Conditions	6-1
Table 6-3 – Summary of Intersection Improvements for Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions	6-3
Table 6-4 – Summary of Roadway Geometry for Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions	6-3
Table 6-5 – Summary of Intersection Improvements for 2025 General Plan with Project Conditions.....	6-5
Table 6-6 – Summary of Roadway Geometry for 2025 General Plan with Project Conditions.....	6-5
Table 6-7 – Intersection Project Mitigation Summary	6-8
Table 6-8 – Intersection Fair Share Analysis	6-8

LIST OF FIGURES

Figure 2-A – Project Site Location Map.....	2-2
Figure 2-B – Project Site Plan.....	2-4
Figure 3-A – Existing Roadway System.....	3-6
Figure 3-B – Existing AM Peak Hour Intersection Volumes	3-7
Figure 3-C – Existing PM Peak Hour Intersection Volumes	3-8
Figure 3-D – Existing Average Daily Traffic (ADT) Volumes.....	3-9
Figure 3-E – City of Riverside 2025 General Plan Circulation Element	3-14
Figure 4-A – Directional Distribution of Project Traffic	4-3
Figure 4-B – Project Only AM Peak Hour Intersection Volumes	4-4
Figure 4-C – Project Only PM Peak Hour Intersection Volumes	4-5
Figure 4-D – Project Only Average Daily Traffic (ADT) Volumes	4-6
Figure 4-E – Cumulative Projects within the Study Area.....	4-7
Figure 4-F – Cumulative Projects Only AM Peak Hour Intersection Volumes.....	4-8
Figure 4-G – Cumulative Projects Only PM Peak Hour Intersection Volumes	4-9
Figure 4-H – Cumulative Projects Only Average Daily Traffic (ADT) Volumes	4-10
Figure 5-A – Existing Plus Ambient Growth Plus Project AM Peak Hour Intersection Volumes.....	5-3
Figure 5-B – Existing Plus Ambient Growth Plus Project PM Peak Hour Intersection Volumes	5-4

Figure 5-C – Existing Plus Ambient Growth Plus Project PM Peak Hour ADT Volumes5-5

Figure 5-D – Existing Plus Ambient Growth Plus Cumulative Plus Project AM Peak Hour Intersection Volumes5-8

Figure 5-E – Existing Plus Ambient Growth Plus Cumulative Plus Project PM Peak Hour Intersection Volumes.....5-9

Figure 5-F – Existing Plus Ambient Growth Plus Cumulative Plus Project ADT Volumes5-10

Figure 5-G – 2025 General Plan with Project AM Peak Hour Intersection Volumes5-13

Figure 5-H – 2025 General Plan with Project PM Peak Hour Intersection Volumes5-14

Figure 5-I – 2025 General Plan with Project ADT Volumes5-15

Figure 6-A – Summary of Improvements for Existing Plus Ambient Growth Plus Project.....6-2

Figure 6-B – Summary of Improvements for Existing Plus Ambient Growth Plus Cumulative Plus Project6-4

Figure 6-C – Summary of Improvements for 2025 General Plan with Project6-6

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

Year 2025 Model Output and NCHRP Worksheets Appendix F

EXECUTIVE SUMMARY

▪ 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 Quail Run Apartments (Proposed Project) in the City of Riverside.

The objectives of this study include the following:

- Document existing traffic conditions in the vicinity of the proposed development;
- Determine the traffic generated from the proposed development;
- Evaluate existing plus ambient growth plus project traffic conditions;
- Evaluate existing plus ambient growth plus other cumulative projects plus project traffic conditions;
- Determine if the level of service (LOS) required by the City of Riverside 2025 General Plan will be maintained at all study area intersections, 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;

▪ Site Location and Study Area

The proposed project is located in the City of Riverside. Quail Run Apartments is located on the northwest corner of Quail Run Road and Central Avenue.

▪ Development Description

Project Size

The project site encompasses approximately 30.9 acres. The project is currently proposed for development of 220 units of apartments.

Project Trip Generation

The proposed project is anticipated to generate approximately 1,457 daily trip-ends, including 112 trip-ends during the AM peak hour and 139 trip-ends during the PM peak hour.

Project Site Circulation

The project will have access to Central Avenue south of the project.

Project Zoning and Land Use

The existing and proposed zoning and land use designations are as follows:

- Existing Zoning: OS
- Proposed Zoning: MHDR
- Existing Land Use: Open Space
- Proposed Land Use: Residential Apartments

■ Principal Findings

Required Level of Service

According to the City of Riverside Traffic Impact Analysis Guidelines, Exhibit F:

City of Riverside allows Level of Service (LOS) D to be used as the maximum acceptable threshold for the study intersections and roadways of Collector or higher classification. LOS C is to be maintained on all street intersections. For projects in conformance with the General Plan, a significant impact occurs at a study intersection when the peak hour LOS falls below C, or D per CCM-2.3 as noted below. For projects that propose uses or intensities above that contained in the General Plan, a significant impact at a study intersection is when the addition of project related trips causes either peak hour LOS to degrade from acceptable (LOS A thru D) to unacceptable levels (E or F) or the peak hour delay to increase as follows:

LOS A/B = By 10.0 seconds

LOS C = By 8.0 seconds

LOS D = By 5.0 seconds

LOS E = By 2.0 seconds

LOS F = By 1.0 seconds

Policy CCM-2.3:

Maintain LOS D or better on Arterial Streets wherever possible. At key locations, such as City Arterials that are used by regional freeway bypass traffic and at heavily traveled freeway interchanges, allow LOS E at peak hours as the acceptable standard on a case-by-case basis.

Per discussion with the City of Riverside, Central Avenue is considered to be a City Arterial that is used for accessing a freeway interchange and therefore street segments and intersections are to maintain a level of service (LOS) of E.

Levels of Service – Existing Conditions

The existing levels of service for the study area intersections vary from LOS A to D. None of the study area intersections operate at an unacceptable LOS.

The existing levels of service for the study area roadway segments are LOS <C. None of the study area segments operate at an unacceptable LOS.

Levels of Service – Existing Plus Ambient Growth Plus Project Conditions

For existing plus ambient growth plus project traffic conditions without off-site improvements, the study area intersections are expected to operate at levels of service that vary from LOS A to D. None of the study area intersections operate at an unacceptable LOS.

The existing plus ambient growth plus project levels of service for the study area roadway segments are LOS <C. None of the study area segments operate at an unacceptable LOS:

Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions

For existing plus ambient growth plus cumulative plus project traffic conditions without off-site improvements, the study area intersections are expected to operate at levels of service that vary from LOS A to D. None of the study area intersections operate at an unacceptable LOS.

The existing plus ambient growth plus project levels of service for the study area roadway segments are LOS <C. None of the study area segments operate at an unacceptable LOS.

Levels of Service – 2025 General Plan with Project Conditions

For 2025 General Plan with project traffic conditions without off-site improvements, the study area intersections are expected to operate at levels of service that vary from LOS A to F. The following study area intersections would operate at an unacceptable LOS:

3. Canyon Crest Drive (NS) / Central Avenue (EW) (LOS F – PM Peak Hour)
5. Quail Run Road (NS) / Central Avenue (EW) (LOS F – AM & PM Peak Hour)
7. Sycamore Canyon Boulevard (NS) / Central Avenue (EW) (LOS F – AM Peak Hour)

With the recommended improvements presented in Table 6-5 and Figure 6-C, levels of service at the impacted study area intersections could be improved to meet the required level of service.

The 2025 General Plan with project levels of service for the study area roadway segments vary from LOS <C to E. None of the study area segments operate at an unacceptable LOS.

▪ Traffic Signal Warrants

The California 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 Manual on Uniform Traffic Control Devices (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 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 traffic conditions, no additional study area unsignalized intersections are expected to meet the peak hour traffic control signal warrant (see Appendix D for technical calculations).

For existing plus ambient growth plus cumulative plus project traffic conditions, no additional study area unsignalized intersections are expected to meet the peak hour traffic control signal warrant (see Appendix D for technical calculations).

For 2025 General Plan with project traffic conditions, the peak hour traffic control signal warrant is expected to be satisfied for the following additional study area unsignalized intersection(s) (see Appendix D for technical calculations):

5. Quail Run Road (NS) / Central Avenue (EW)

▪ **Circulation Recommendations**

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

On-Site Recommendations

Roadways

- Construct full width improvements on all internal roadways.

Intersections

- Construct the intersection Project Driveway and Central Avenue to restrict movement to right-in and right-out only from the driveway with the following geometrics:
Northbound: Not Applicable.
Southbound: One right turn lane. Stop controlled.
Eastbound: Two through lanes.
Westbound: One through lane and one shared through and right turn lane.

▪ **Safety and Operational Improvements**

- Sight distance at the project entrance roadway should be reviewed with respect to standard City of Riverside sight distance standards at the time of preparation of final grading, landscape and street improvement plans.
- An acceleration lane should be provided in the median at the intersection of Quail Run Road and Central Avenue for safety.
- Participate in the phased construction of off-site traffic signals through payment of project's fair share of traffic signal mitigation fees.
- Signing/stripping should be implemented in conjunction with detailed construction plans for the project site.

▪ **Regional Funding Mechanisms**

The project will participate in the cost of off-site improvements through payment of the following "fair share" mitigation fees:

- Transportation Uniform Mitigation Fee (TUMF), current at time of construction.
- City of Riverside Development Impact Fee (DIF), current at time of construction.

These fees should be collected and utilized as needed by the City of Riverside to construct the improvements necessary to maintain the required level of service.

▪ **Project Mitigation Summary**

Table 1-1 summarizes the proposed mitigation measure and associated funding mechanism for the project as a result of the traffic study for intersections.

Table 1-1 – Intersection Project Mitigation Summary

No.	Intersection	Jurisdiction	Target LOS	LOS w/o Mitigation		Mitigation Measure	LOS with Mitigation		Funding Mechanism
				AM	PM		AM	PM	
2025 General Plan with Project									
3	Canyon Crest Drive (NS) / Central Avenue (EW)	City of Riverside	D	D	F	Construct 2nd westbound left-turn pocket.	D	E	Project Developer Fair Share
5	Quail Run Road (NS) / Central Avenue (EW)	City of Riverside	D	F	F	Install traffic signal.	C	B	Project Developer Fair Share
7	Sycamore Canyon Boulevard (NS) / Central Avenue (EW)	City of Riverside	D	F	E	Construct 2nd northwestbound through lane.	E	E	Project Developer Fair Share

The following table summarizes the fair share analysis for intersections that need mitigation in the 2025 General Plan with Project scenario.

Table 1-2 – Intersection Fair Share Analysis

No.	Intersection	Existing Volume		Project Volume		Future Development		Year 2025 with Project		% Fair Share	Mitigation Cost	Estimated Fair Share Cost
		AM	PM	AM	PM	AM	PM	AM	PM			
2025 General Plan with Project												
3	Canyon Crest Drive (NS) / Central Avenue (EW)	3495	3728	74	87	1335	1322	4904	5137	6.6%	\$ 72,700	\$ 5,000
5	Quail Run Road (NS) / Central Avenue (EW)	1907	1976	84	121	1193	1184	3184	3281	10.2%	\$363,300	\$ 37,000
7	Sycamore Canyon Boulevard (NS) / Central Avenue (EW)	2802	2254	40	48	2590	1767	5432	4069	2.7%	\$ 30,100	\$ 1,000
		Total Project Fair Share										\$ 43,000

Based on the San Bernardino County CMP, Appendix G and the current price index value as compared to January 2003.

Note that for Canyon Crest Drive / Central Avenue, the implementation of the 2nd westbound left turn pocket will require 11' lanes and removal of the median for the westbound leg. Sycamore Canyon Boulevard will require road widening along Sycamore Canyon to construct an additional northwestbound through lane.

INTRODUCTION

▪ 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 Quail Run Apartments.

The objectives of this study include the following:

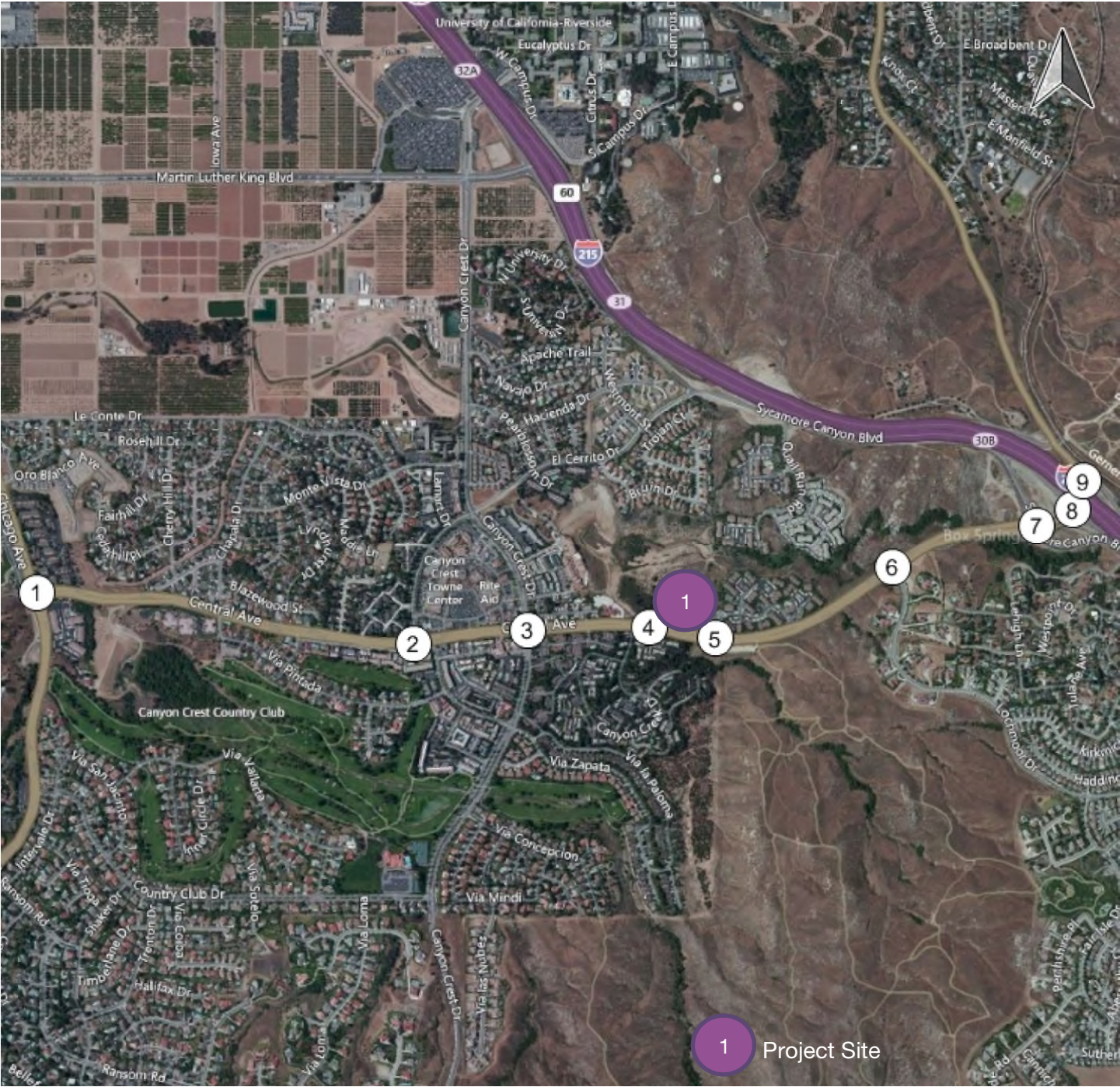
- Document existing traffic conditions in the vicinity of the proposed development;
- Determine the traffic generated from the proposed development;
- Evaluate existing plus ambient growth plus project traffic conditions;
- Evaluate existing plus ambient growth plus other projects plus project traffic conditions;
- Evaluate 2025 General Plan with project traffic conditions;
- Determine if the level of service (LOS) required by the City of Riverside 2025 General Plan will be maintained at all study area intersections, 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;

▪ Site Location and Study Area

The proposed project is located in the City of Riverside. Quail Run Apartments is located on the northwest corner of Quail Run Road and Central Avenue.

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

Figure 2-A – Project Site Location Map



▪ **Development Project Description**

Project Size and Description

The project site encompasses approximately 30.9 acres. The project is currently proposed for development of 220 units of apartments.

Existing Land Use and Zoning

Existing land use and zoning designations are as follows:

- Existing Zoning: OS (Open Space)
- Existing Land Use: Open Space

Proposed Land Use and Zoning

Proposed land use and zoning designations are as follows:

- Proposed Zoning: MHDR (Medium High Density Residential)
- Proposed Land Use: Apartments

Site Plan of Proposed Project

The current proposed project layout is shown on Figure 2-B.

Site Access

As indicated on Figure 2-B, Quail Run Apartments will have access to Central Avenue south of the project.

Proposed Project Opening Year and Proposed Project Phasing

For analysis purposes, it is assumed that Quail Run Apartments will be developed in a single phase and full development is anticipated by 2016.

Sphere of Influence

Quail Run Apartments is not within the sphere of influence or within one mile of the border of any city. The project is within one mile of a Caltrans District 8 facility.

[illegible]

AREA CONDITIONS

▪ Study Intersections

The study area includes the following intersections:

1. Chicago Avenue (NS) / Central Avenue (EW)
2. El Cerrito Drive (NS) / Central Avenue (EW)
3. Canyon Crest Drive (NS) / Central Avenue (EW)
4. Project Driveway (NS) / Central Avenue (EW)
5. Quail Run Road (NS) / Central Avenue (EW)
6. Lochmoor Drive (NS) / Central Avenue (EW)
7. Sycamore Canyon Boulevard (NS) / Central Avenue (EW)
8. I-215 Southbound Ramps (NS) / Central Avenue (EW)
9. Central Avenue (NS) / I-215 Northbound Off-Ramp (EW)

Study area intersections selected in the scoping agreement were based on preliminary trip generation and trip distribution. During traffic study preparation, we determined that the intersection of Watkins Drive and I-215 Northbound On-Ramp will have very minimal project traffic (14 trips in the AM and 7 in the PM, much less than the 50 trip threshold). Therefore, it is not included in the traffic study.

▪ Study Roadway Segments

The study area includes the following roadway segments along Central Avenue:

1. Chicago Avenue to El Cerrito Drive
2. El Cerrito Drive to Canyon Crest Drive
3. Canyon Crest Drive to Project Driveway
4. Project Driveway to Quail Run Road
5. Quail Run Road to Lochmoor Drive
6. Lochmoor Drive to Sycamore Canyon Boulevard

Note that Sycamore Canyon Boulevard to I-215 Northbound On-ramp was not analyzed due to the length of these segments. The Highway Capacity Manual advises that the operation of short roadway segments is controlled by the operation of the intersections rather than the capacity of the roadway segment itself.

▪ Existing Traffic Controls and Intersection Geometrics

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

▪ Existing Traffic Volumes

The existing AM peak period and PM peak period intersection turning movement counts were conducted by Counts Unlimited, Inc. The traffic count worksheets are provided in Appendix C. The AM and PM peak hour intersection turning movement volumes are presented on Figure 3-B and Figure 3-C, respectively. The Average Daily Traffic (ADT) volumes on study roadway segments are approximated based on 10 times the PM peak volume counts and are presented on Figure 3-D.

Figure 3-A – Existing Roadway System

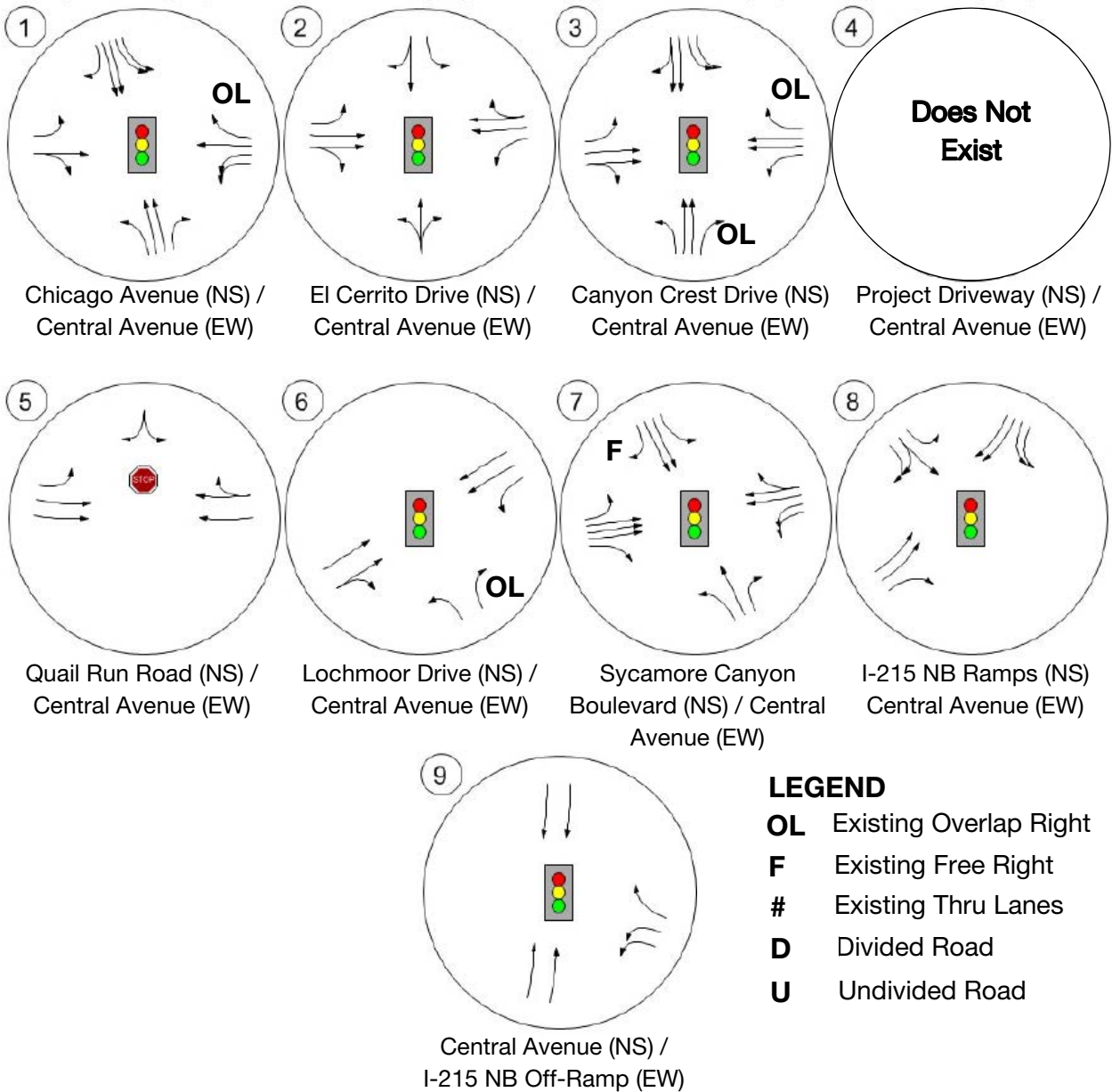
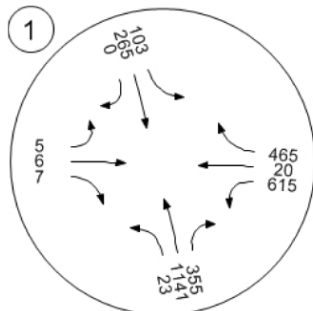
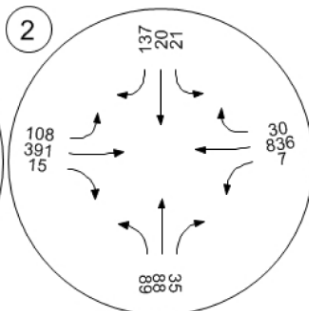


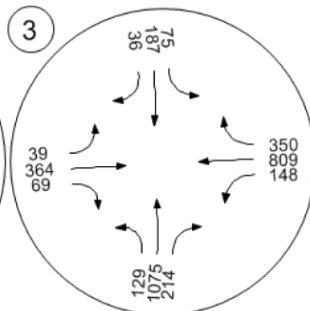
Figure 3-B – Existing AM Peak Hour Intersection Volumes



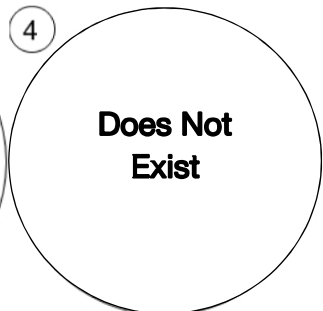
Chicago Avenue (NS) /
Central Avenue (EW)



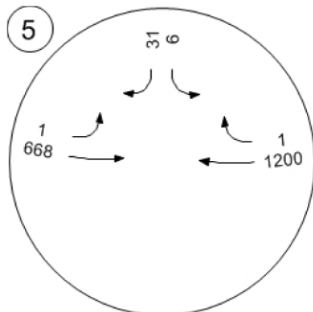
El Cerrito Drive (NS) /
Central Avenue (EW)



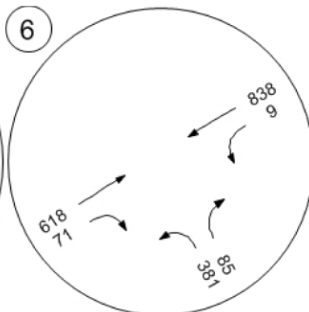
Canyon Crest Drive (NS) /
Central Avenue (EW)



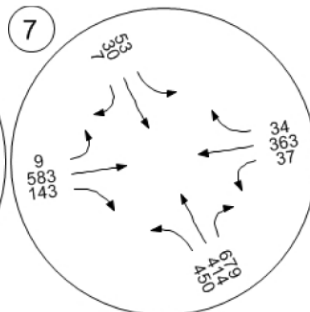
Project Driveway (NS) /
Central Avenue (EW)



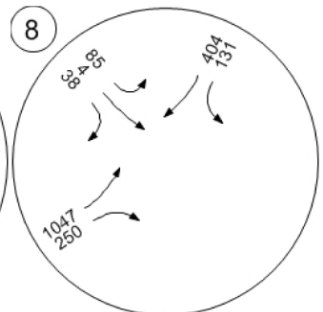
Quail Run Road (NS) /
Central Avenue (EW)



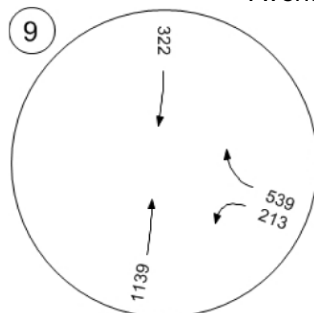
Lochmoor Drive (NS) /
Central Avenue (EW)



Sycamore Canyon
Boulevard (NS) / Central
Avenue (EW)



I-215 NB Ramps (NS)
Central Avenue (EW)



Central Avenue (NS) /
I-215 NB Off-Ramp (EW)

Figure 3-C – Existing PM Peak Hour Intersection Volumes

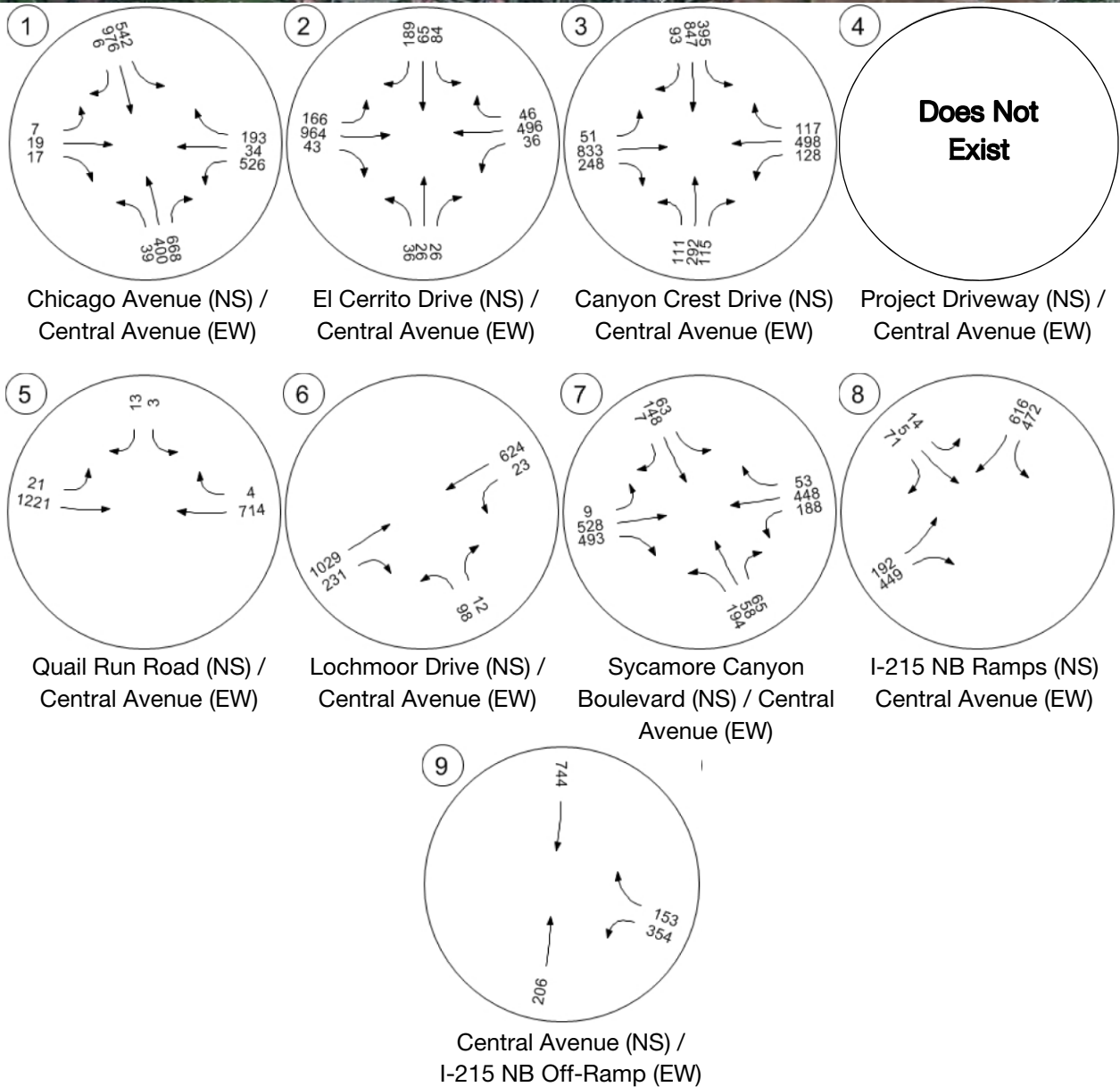
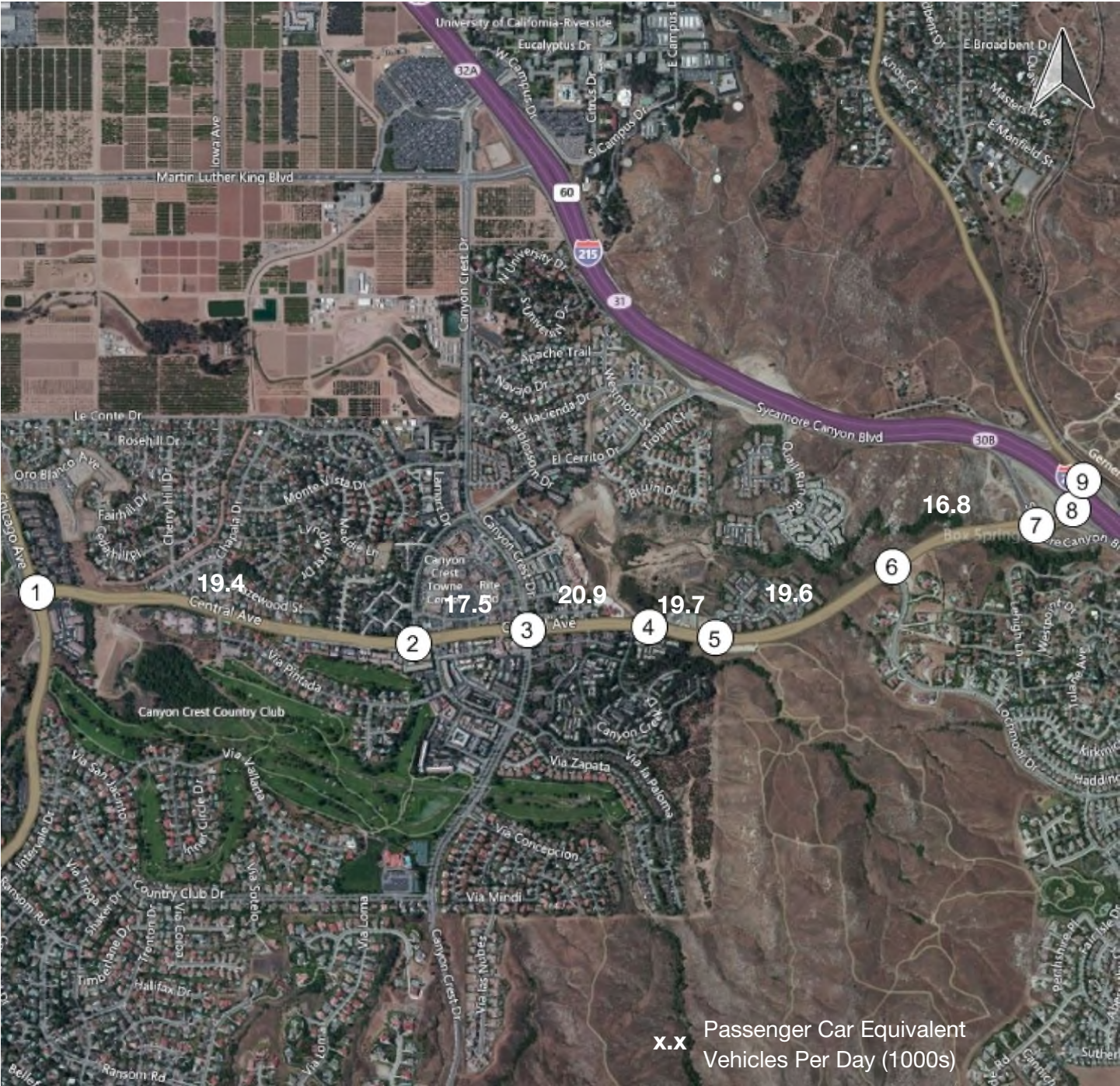


Figure 3-D – Existing Average Daily Traffic (ADT) Volumes



▪ Level of Service Methodology

The City of Riverside Traffic Engineering Division requires that the Transportation Research Board Highway Capacity Manual 2010 (HCM2010) or the most recent release of the HCM be used to analyze Level of Service (LOS).

The HCM2010 evaluates the LOS of intersections based upon the control delay per vehicle. 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 PTV Vistro 3, which is based upon HCM2010 methodologies.

Signalized Intersections

Signalized intersections have been evaluated using the Operational Method as described in Chapter 18, of the HCM2010. 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 3-1 shows the criteria used to determine the level of service for signalized intersections.

Table 3-1 – Level of Service for Signalized Intersections

Level of Service	Control Delay per Vehicle (sec/veh)
A	≤ 10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

Unsignalized Intersections

Unsignalized intersections have been evaluated using Chapter 19-20 of the HCM2010. 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 3-2 shows the criteria used to determine the level of service for unsignalized intersections.

Table 3-2 – Level of Service for Unsignalized Intersections

Level of Service	Average Control Delay (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Roadway Segments

The LOS for roadway segments is based upon the two-way ADT volume. Table 3-3 shows the criteria used in this study to determine the LOS for roadway segments in the City of Riverside.

Table 3-3 – Level of Service for Roadway Segments – City of Riverside

Roadway Classification	Number of Lanes	Maximum Two-Way Traffic Volume (ADT) ¹		
		Service Level C	Service Level D	Service Level E
88' Arterial	4	16,800	19,400	22,000
110' Arterial	4	26,200	29,600	33,000

All capacity figures are based on optimum conditions and are intended as guidelines for planning purposes only.

Required Level of Service

According to the City of Riverside Traffic Impact Analysis Guidelines, Exhibit F:

City of Riverside allows Level of Service (LOS) D to be used as the maximum acceptable threshold for the study intersections and roadways of Collector or higher classification. LOS C is to be maintained on all street intersections. For projects in conformance with the General Plan, a significant impact occurs at a study intersection when the peak hour LOS falls below C, or D per CCM-2.3 as noted below. For projects that propose uses or intensities above that contained in the General Plan, a significant impact at a study intersection is when the addition of project related trips causes either peak hour LOS to degrade from acceptable (LOS A thru D) to unacceptable levels (E or F) or the peak hour delay to increase as follows:

LOS A/B = By 10.0 seconds

LOS C = By 8.0 seconds

LOS D = By 5.0 seconds

LOS E = By 2.0 seconds

LOS F = By 1.0 seconds

Policy CCM-2.3:

Maintain LOS D or better on Arterial Streets wherever possible. At key locations, such as City Arterials that are used by regional freeway bypass traffic and at heavily traveled

freeway interchanges, allow LOS E at peak hours as the acceptable standard on a case-by-case basis.

Per discussion with the City of Riverside, Central Avenue is considered to be a City Arterial that is used for accessing a freeway interchange and therefore street segments and intersections are to maintain a level of service (LOS) of E.

▪ Levels of Service – Existing Conditions

The intersection levels of service for existing conditions shown on Table 3-4 are based upon the existing roadway system shown on Figure 3-A and the existing AM and PM peak hour intersection volumes shown on Figure 3-B and Figure 3-C, respectively. The roadway levels of service for existing conditions is shown on Table 3-4 are based upon the existing roadway system and the ADT volumes shown on Figure 3-D. The level of service calculation worksheets are provided in Appendix E.

Table 3-4 – Intersection Levels of Service – Existing Conditions

Intersection	Peak Hour	Traffic Control	Delay (sec)	LOS
1. Chicago Avenue (NS) Central Avenue (EW)	AM PM	Signalized	27.8 27.6	C C
2. El Cerrito Drive (NS) Central Avenue (EW)	AM PM	Signalized	22.1 23.7	C C
3. Canyon Crest Drive (NS) Central Avenue (EW)	AM PM	Signalized	35.9 44.0	D D
4. Project Driveway (NS) Central Avenue (EW)	AM PM	<i>Does Not Exist</i>		
5. Quail Run Road (NS) Central Avenue (EW)	AM PM	Two-way stop	24.8 16.8	C C
6. Lochmoor Drive (NS) Central Avenue (EW)	AM PM	Signalized	14.5 7.0	B A
7. Sycamore Canyon Boulevard (NS) Central Avenue (EW)	AM PM	Signalized	34.2 28.8	C C
8. I-215 SB Ramps (NS) Central Avenue (EW)	AM PM	Signalized	12.2 13.5	B B
9. Central Avenue (NS) I-215 NB Off-Ramp (EW)	AM PM	Signalized	20.5 10.0	C A

Table 3-5 – Roadway Levels of Service – Existing Conditions

Roadway Segment	Roadway Classification	Lanes	V/C	LOS
Central Avenue				
Chicago Avenue to El Cerrito Drive	110' Arterial	4	0.59	<C
El Cerrito Drive to Canyon Crest Drive	110' Arterial	4	0.53	<C
Canyon Crest Drive to Project Driveway	110' Arterial	4	0.63	<C
Project Driveway to Quail Run Road	110' Arterial	4	0.60	<C
Quail Run Road to Lochmoor Drive	110' Arterial	4	0.59	<C
Lochmoor Drive to Sycamore Canyon Blvd	110' Arterial	4	0.51	<C

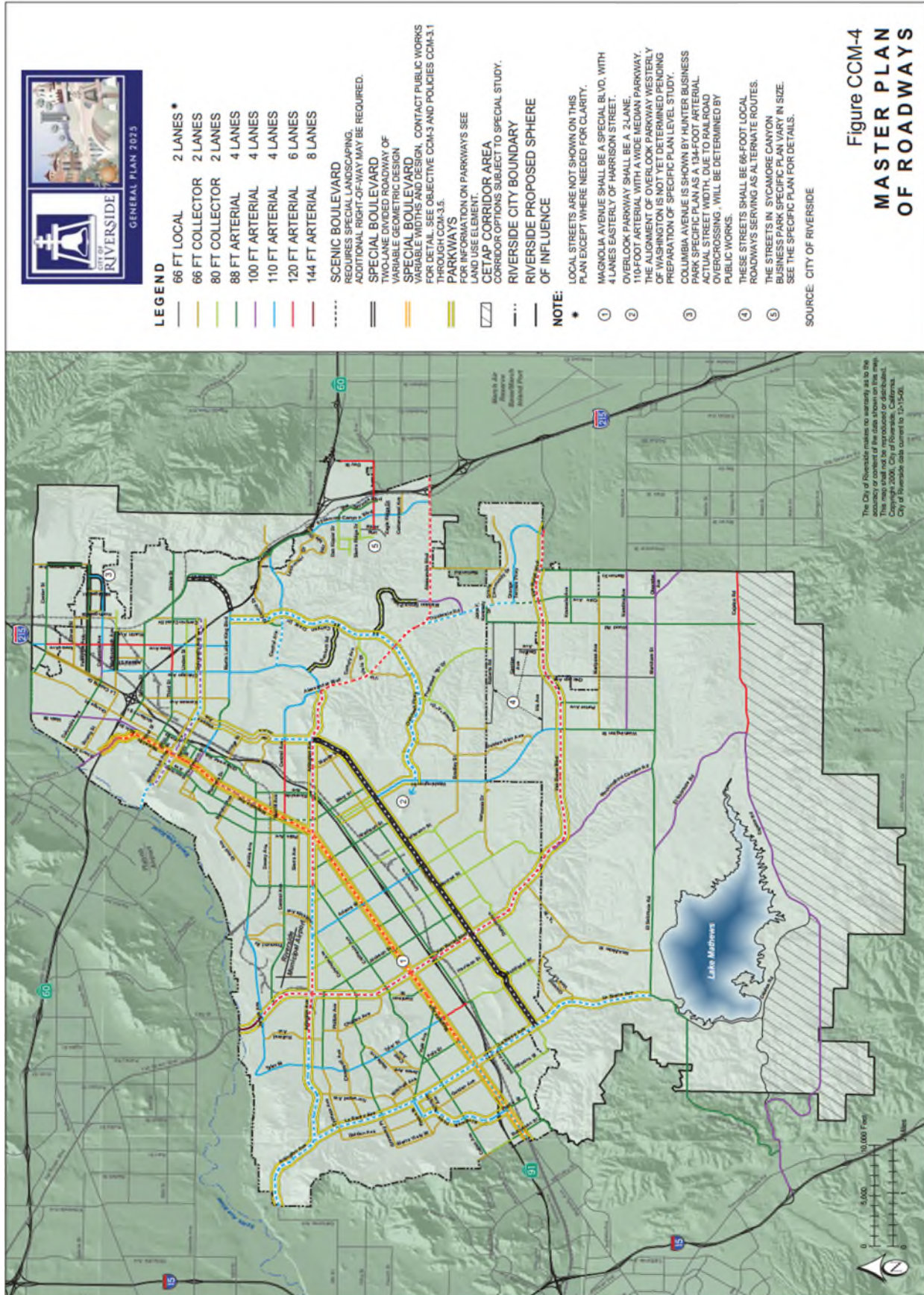
- **General Plan Circulation**

The current City of Riverside General Plan circulation element is shown on Figure 3-E.

- **Transit Service**

The project area is served by Riverside Transit Agency (RTA) route 16 (Riverside Downtown Terminal to Moreno Valley Mall) and route 51 (University of California, Riverside to Canyon Crest Towne Centre).

Figure 3-E – City of Riverside 2025 General Plan Circulation Element



PROJECTED FUTURE TRAFFIC

Method of Projection

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

- Existing traffic conditions;
- Ambient growth projections;
- Project generated traffic; and
- Cumulative project generated traffic.

This report uses a study year of 2016 for analysis purposes.

Ambient Growth

In order to evaluate traffic conditions for the study year, area wide growth on existing roadways must be projected. The majority of the anticipated growth within the study area is accounted for with cumulative project traffic. Per discussion with City of Riverside Public Works Department staff, this study will utilize a 2 percent per year growth rate.

Project Generated Traffic

Project Trip Generation

Trip Generation Rates

Trip generation represents the amount of traffic traveling to and from the proposed project. The traffic generation figures used in this study are based upon the development of 220 units of apartments. Table 4-1 shows the peak hour and daily trip generation rates for the proposed project.

The trip generation rates for apartments are based on the fitted curve equation for trip generation provided in the *Trip Generation Manual (9th Edition)* by the Institute of Transportation Engineers (ITE), 2012. 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*.

Table 4-1 – Trip Generation Rates

Land Use	Unit	AM Peak Hour			PM Peak Hour			Daily
		Total	In	Out	Total	In	Out	
Apartments Land Use Category: 220	DU	0.51	0.10	0.41	0.62	0.40	0.22	6.65

DU = Dwelling Units.

Average trip generation rates from *Trip Generation Manual, ITE, 9th Edition* (2012) except as noted.

Project Trip Generation

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 1,463 daily trip-ends, including 112 trip-ends during the AM peak hour and 136 trip-ends during the PM peak hour.

Table 4-2 – Project Trip Generation

Land Use	Qty	Unit	AM Peak Hour			PM Peak Hour			Daily
			Total	In	Out	Total	In	Out	
Apartments	220	DU	112	22	90	136	88	48	1,463
PROJECT TOTAL			112	22	90	136	88	48	1,463

DU = Dwelling Units.

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 assumed in this study is shown on Figure 4-A.

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.

Project Trip Assignment

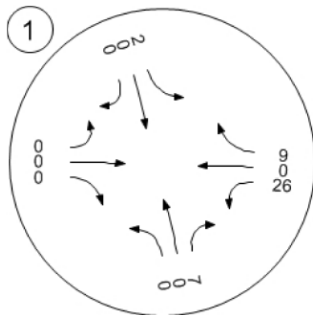
Trip assignment is the result of assigning the previously discussed trip generation numbers to the circulation system using the previously discussed trip distribution.

The project related AM peak hour and PM peak hour intersection turning movement volumes are shown on Figure 4-B and Figure 4-C, respectively. The project related ADT volumes on study roadway segments are shown on Figure 4-D.

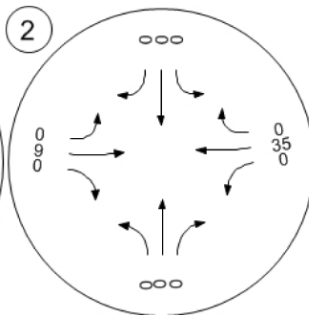
Figure 4-A – Directional Distribution of Project Traffic



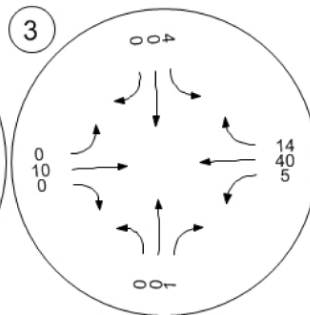
Figure 4-B – Project Only AM Peak Hour Intersection Volumes



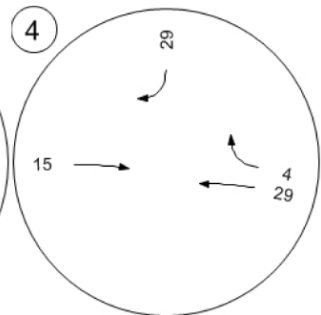
Chicago Avenue (NS) /
Central Avenue (EW)



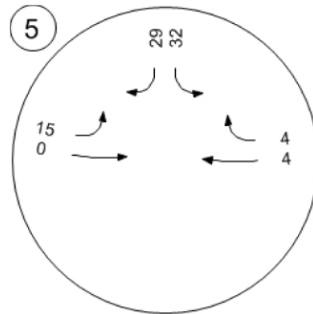
El Cerrito Drive (NS) /
Central Avenue (EW)



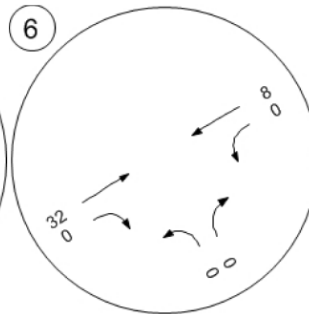
Canyon Crest Drive (NS) /
Central Avenue (EW)



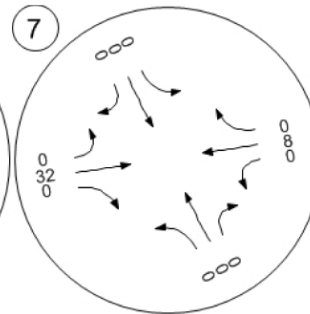
Project Driveway (NS) /
Central Avenue (EW)



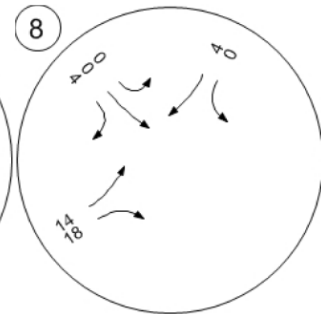
Quail Run Road (NS) /
Central Avenue (EW)



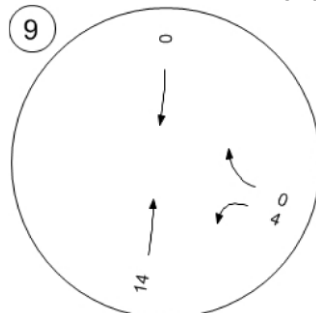
Lochmoor Drive (NS) /
Central Avenue (EW)



Sycamore Canyon
Boulevard (NS) / Central
Avenue (EW)

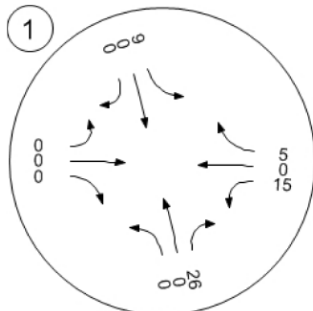


I-215 NB Ramps (NS)
Central Avenue (EW)

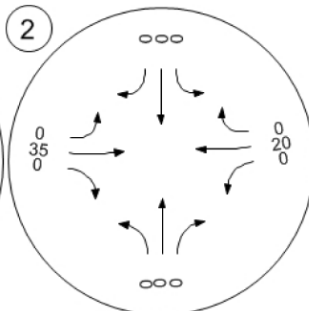


Central Avenue (NS) /
I-215 NB Off-Ramp (EW)

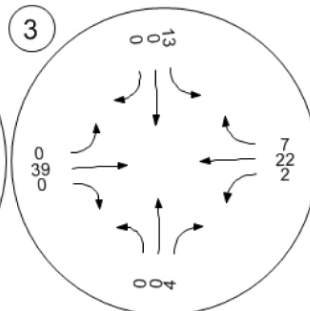
Figure 4-C – Project Only PM Peak Hour Intersection Volumes



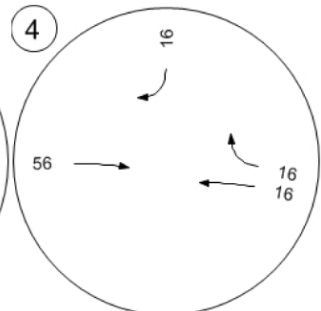
Chicago Avenue (NS) /
Central Avenue (EW)



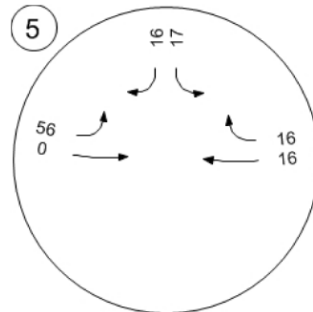
El Cerrito Drive (NS) /
Central Avenue (EW)



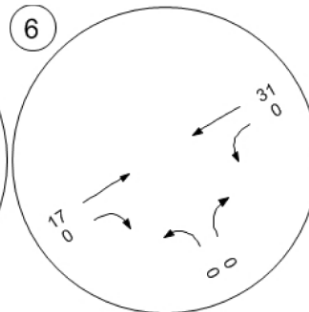
Canyon Crest Drive (NS) /
Central Avenue (EW)



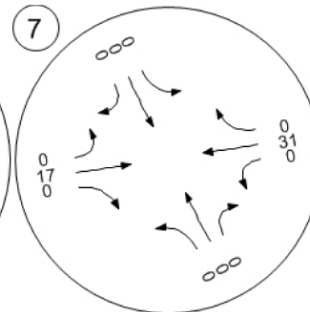
Project Driveway (NS) /
Central Avenue (EW)



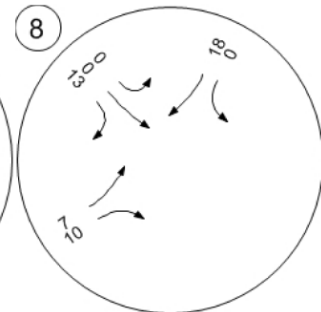
Quail Run Road (NS) /
Central Avenue (EW)



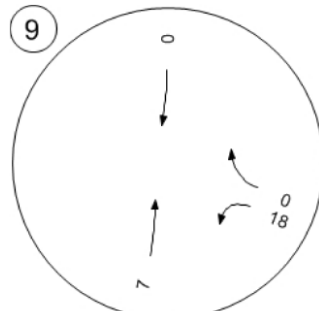
Lochmoor Drive (NS) /
Central Avenue (EW)



Sycamore Canyon
Boulevard (NS) / Central
Avenue (EW)



I-215 NB Ramps (NS)
Central Avenue (EW)



Central Avenue (NS) /
I-215 NB Off-Ramp (EW)

Figure 4-D – Project Only Average Daily Traffic (ADT) Volumes



■ **Cumulative Project Generated Traffic**

Cumulative project traffic from within the study area is expected to have an impact on levels of service. The cumulative projects within the study area are listed in Table 4-3. These projects were included as per discussion with City of Riverside Planning Department staff. The location of these projects are shown on Figure 4-E. The AM and PM peak hour intersection turning movement volumes for cumulative projects are shown on Figure 4-F and Figure 4-G, respectively. The ADT volumes for cumulative projects are shown on Figure 4-H.

Table 4-3 – Cumulative Projects within the Study Area

Project	Land Use	Qty	Unit	AM Peak Hour	PM Peak Hour	Daily
11. P13-0553, P13-0554, P13-0583, P14-0065	Apartments	275	DU	140	171	1,829
12. P14-0517	High-Cube Warehouse	316.23	TSF	35	38	531
13. P13-0607, P13-0608, P13-0609	High-Cube Warehouse	171.62	TSF	19	21	288
TOTAL				194	230	2,648

DU = Dwelling Units, TSF = 1,000 Square Feet Gross Floor Area.

Figure 4-E – Cumulative Projects within the Study Area



Figure 4-F – Cumulative Projects Only AM Peak Hour Intersection Volumes

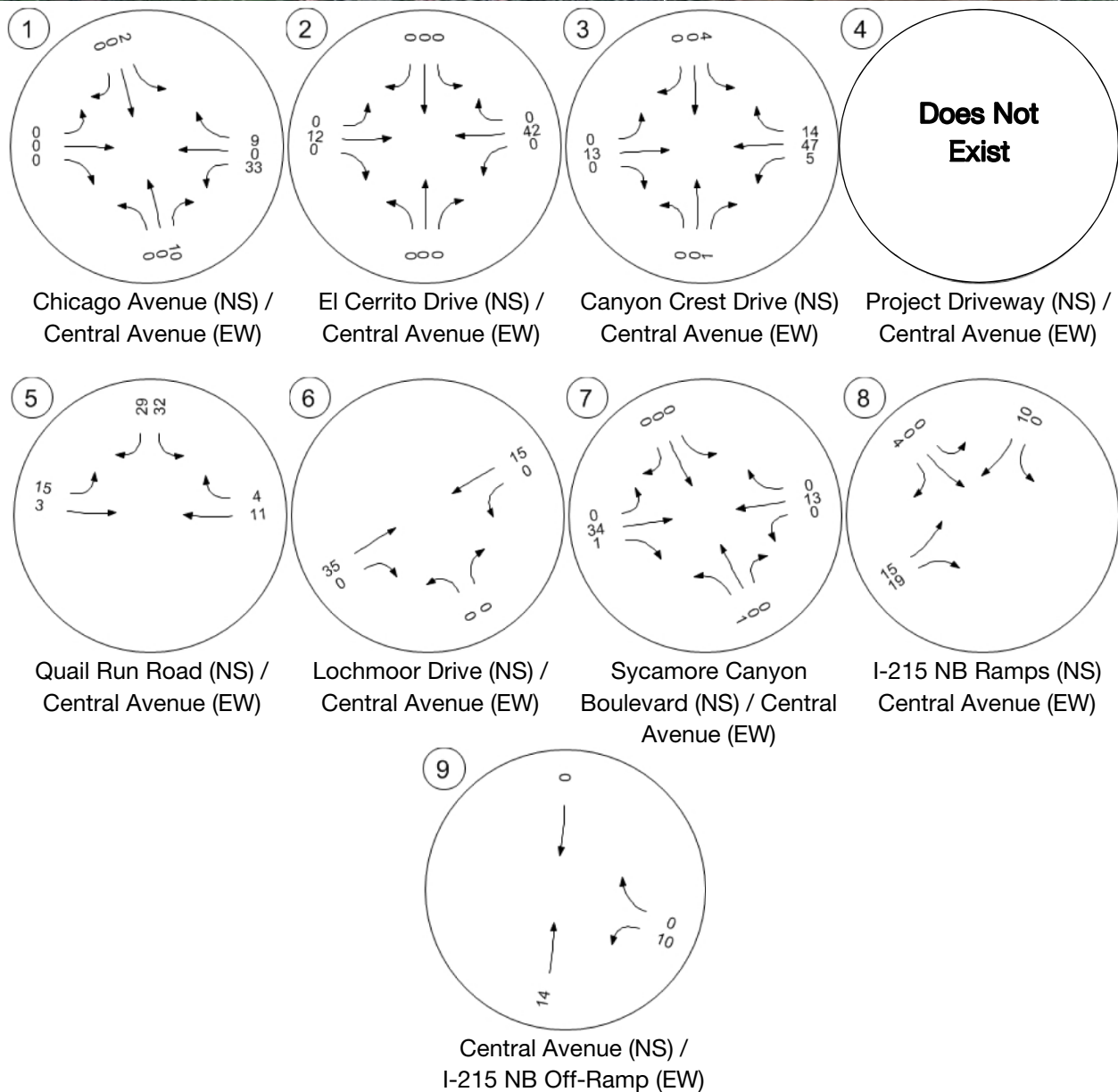


Figure 4-G – Cumulative Projects Only PM Peak Hour Intersection Volumes

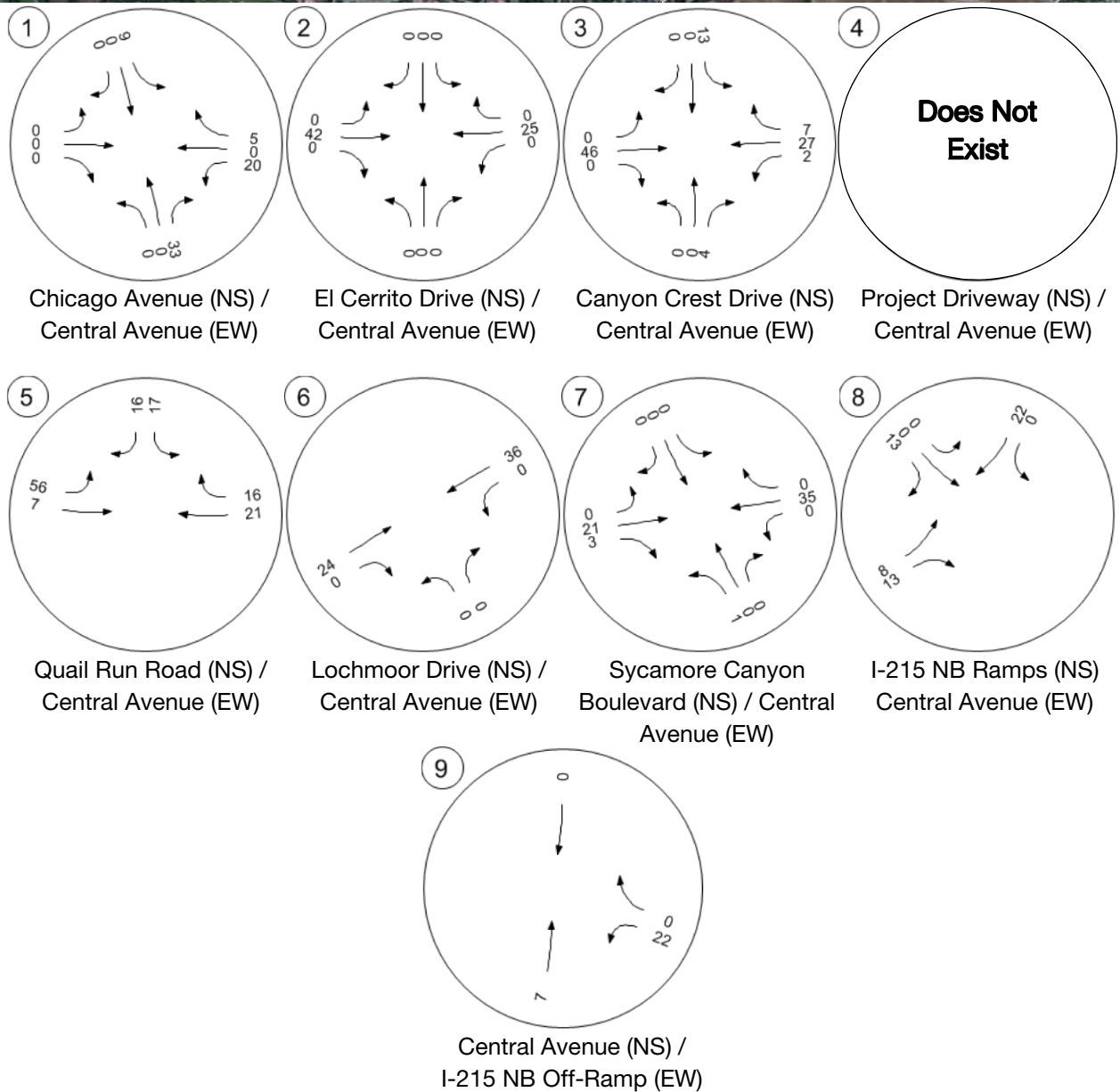


Figure 4-H – Cumulative Projects Only Average Daily Traffic (ADT) Volumes



▪ **Year 2025 Traffic**

Year 2025 without project and year 2025 with project traffic conditions were derived from the travel demand model currently being used for long range planning in the City of Riverside.

The City of Riverside developed the model based on the Regional Model of the Southern California Association of Governments (SCAG) 2008 RTP transportation demand model. The SCAG model covers the entire SCAG region and is calibrated to year 2000 travel behavior and validated with year 2003 travel statistics. The regional model was used as the parent model and subarea modeling procedures were then used to create a focused subarea model for the City.

The year 2025 without project and year 2025 with project volumes used in this study are based on Exhibit 12 V/C numbers in the General Plan Traffic Study and the City of Riverside's standard for capacities. They have been refined and adjusted based on forecasted percent growth from existing as shown in the table below and the National Cooperative Highway Research Program (NCHRP) methodology briefly explained below.

The model peak hour directional link volume forecasts have been refined using the growth increment approach. Existing peak hour intersection arrival and departure data is a necessary input to this approach since it serves as the starting point for the refinement process and also provides important insight into current travel patterns and the relationship between peak hour and daily traffic conditions. The initial turning movement proportions are estimated based upon the relationship of each approach leg's forecast traffic volume to the other legs' forecast volumes at the intersection. Table 4-4 models the percent increase from 2014 to 2025 calculated for each leg. This initial estimate is then entered into a spreadsheet program consistent with the NCHRP Report 255. A linear programming algorithm is used to calculate individual turning movements which match the known directional roadway segment volumes computed in the previous step. This program computes a likely set of intersection turning movements from intersection approach counts and the initial turning proportions from each approach leg. Please see Appendix E for model output and NCHRP technical calculations.

Table 4-4 – Year 2025 Modelling

Intersection		Ex NB	2025 NB	% Increase	Ex SB	2025 SB	% Increase	Ex EB	2025 EB	% Increase	Ex WB	2025 WB	% Increase
Chicago Avenue	Central Avenue	26260	33990	29%	21240	24420	15%	1220	0	10%	19820	22770	15%
El Cerrito Drive	Central Avenue	2320	0	10%	5760	1540	10%	18940	21810	15%	16520	20920	27%
Canyon Crest Drive	Central Avenue	17410	24750	42%	17950	15840	10%	18340	20920	14%	20860	31020	49%
Project Driveway	Central Avenue	0	0	0%	0	0	0%	19690	31020	58%	19690	31020	58%
Quail Run Road	Central Avenue	0	0	0%	410	0	10%	19690	31020	58%	19420	31020	60%
Lochmoor Drive	Central Avenue	3640	10750	195%	0	0	0%	19820	31020	57%	16880	20790	23%
Sycamore Canyon Blvd	Central Avenue	11460	26840	134%	3380	11750	248%	16790	20790	24%	13450	17461	30%
I-215 SB Ramp	Central Avenue	9260	0	10%	900	0	10%	13280	17241	30%	12940	17576	36%
Central Avenue	I-215 NB Off-Ramp	13040	17711	36%	11030	15620	42%	0	0	0%	5070	0	10%

Note that the model plot shows the eastbound leg of Central Avenue at Lochmoor Drive to have a V/C of 1.01, which was not used in the modelling. 0.94 was used for the segment between Canyon Crest Drive and Lochmoor Drive instead. This is to better balance the traffic predicted at the intersection and also since there is no reasonable cut-off or major traffic generating zone along Central Avenue between Canyon Crest Drive and Lochmoor Drive to explain the increase of cars. So, the resulting 31,020 seemed to be the more reasonable ADT for Central Avenue in this segment.

TRAFFIC ANALYSIS

Capacity and Level of Service and Improvement Analysis

Levels of Service – Existing Plus Ambient Growth Plus Project Conditions

The existing plus ambient growth plus project scenario includes existing traffic, an ambient growth of two percent for two years to 2016 and project traffic. Table 5-1 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 D. The existing plus ambient growth plus project AM and PM peak hour intersection turning movement volumes are shown on Figure 5-A and Figure 5-B, 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. None of the study intersections are expected to operate at an unacceptable level of service.

Table 5-2 provides the projected delay and levels of service at the study roadway segments under existing plus ambient growth plus project conditions without off-site improvements. These levels of service for the roadway segments are LOS <C. The existing plus ambient growth plus project ADT volumes are shown on Figure 5-C. None of the study roadway segments are expected to operate at an unacceptable level of service.

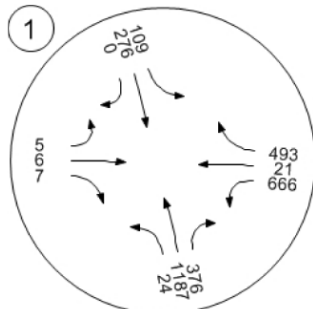
Table 5-1 – Intersection Levels of Service – Existing Plus Ambient Growth Plus Project Conditions

Intersection	Peak Hour	Without Project			With Project		
		Traffic Control	Delay (sec)	LOS	Traffic Control	Delay (sec)	LOS
1. Chicago Avenue (NS) Central Avenue (EW)	AM PM	Signalized	29.6 29.0	C C	Signalized	30.4 30.3	C C
2. El Cerrito Drive (NS) Central Avenue (EW)	AM PM	Signalized	22.5 24.0	C C	Signalized	22.9 24.3	C C
3. Canyon Crest Drive (NS) Central Avenue (EW)	AM PM	Signalized	37.3 46.2	D D	Signalized	37.9 47.8	D D
4. Project Driveway (NS) Central Avenue (EW)	AM PM	Does Not Exist			One-way stop	15.7 11.3	C B
5. Quail Run Road (NS) Central Avenue (EW)	AM PM	Two-way stop	26.2 17.3	D C	Two-way stop	34.8 21.0	D C
6. Lochmoor Drive (NS) Central Avenue (EW)	AM PM	Signalized	15.1 7.2	B A	Signalized	15.2 7.2	B A
7. Sycamore Canyon Boulevard (NS) Central Avenue (EW)	AM PM	Signalized	35.8 29.7	D C	Signalized	36.2 29.5	D C
8. I-215 SB Ramps (NS) Central Avenue (EW)	AM PM	Signalized	11.8 13.3	B B	Signalized	11.7 13.1	B B
9. Central Avenue (NS) I-215 NB Off-Ramp (EW)	AM PM	Signalized	23.1 10.0	C B	Signalized	23.5 10.1	C B

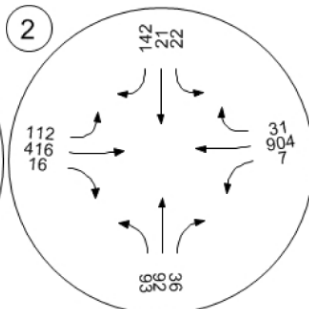
Table 5-2 – Roadway Levels of Service – Existing Plus Ambient Growth Plus Project Conditions

Roadway Segment	Roadway Classification	Lns	Without Project		With Project	
			V/C	LOS	V/C	LOS
Central Avenue						
Chicago Avenue to El Cerrito Drive	110' Arterial	4	0.59	<C	0.63	<C
El Cerrito Drive to Canyon Crest Drive	110' Arterial	4	0.53	<C	0.57	<C
Canyon Crest Drive to Project Driveway	110' Arterial	4	0.63	<C	0.68	<C
Project Driveway to Quail Run Road	110' Arterial	4	0.60	<C	0.65	<C
Quail Run Road to Lochmoor Drive	110' Arterial	4	0.59	<C	0.63	<C
Lochmoor Drive to Sycamore Canyon Blvd	110' Arterial	4	0.51	<C	0.55	<C

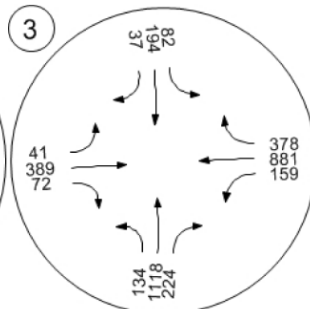
Figure 5-A – Existing Plus Ambient Growth Plus Project AM Peak Hour Intersection Volumes



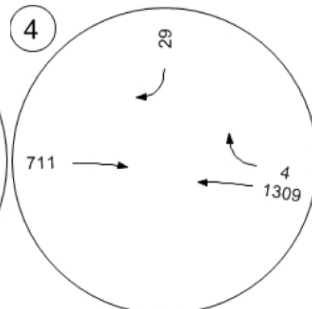
Chicago Avenue (NS) /
Central Avenue (EW)



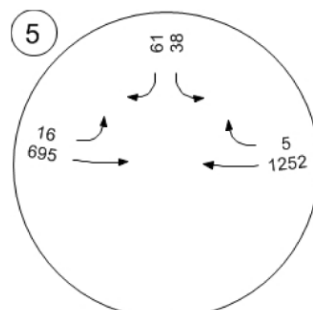
El Cerrito Drive (NS) /
Central Avenue (EW)



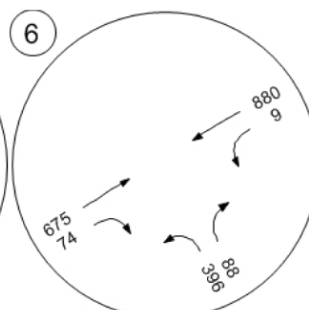
Canyon Crest Drive (NS) /
Central Avenue (EW)



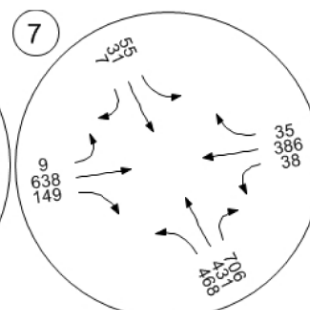
Project Driveway (NS) /
Central Avenue (EW)



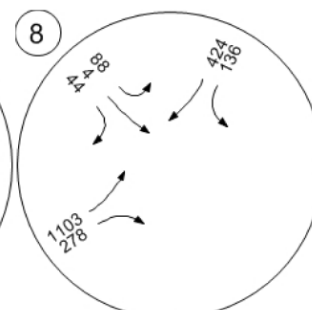
Quail Run Road (NS) /
Central Avenue (EW)



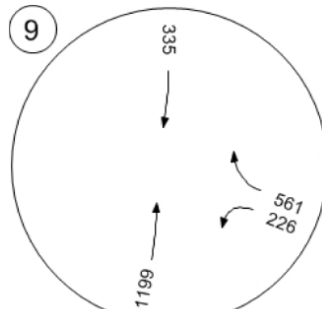
Lochmoor Drive (NS) /
Central Avenue (EW)



Sycamore Canyon
Boulevard (NS) / Central
Avenue (EW)



I-215 NB Ramps (NS)
Central Avenue (EW)



Central Avenue (NS) /
I-215 NB Off-Ramp (EW)

Figure 5-B – Existing Plus Ambient Growth Plus Project PM Peak Hour Intersection Volumes

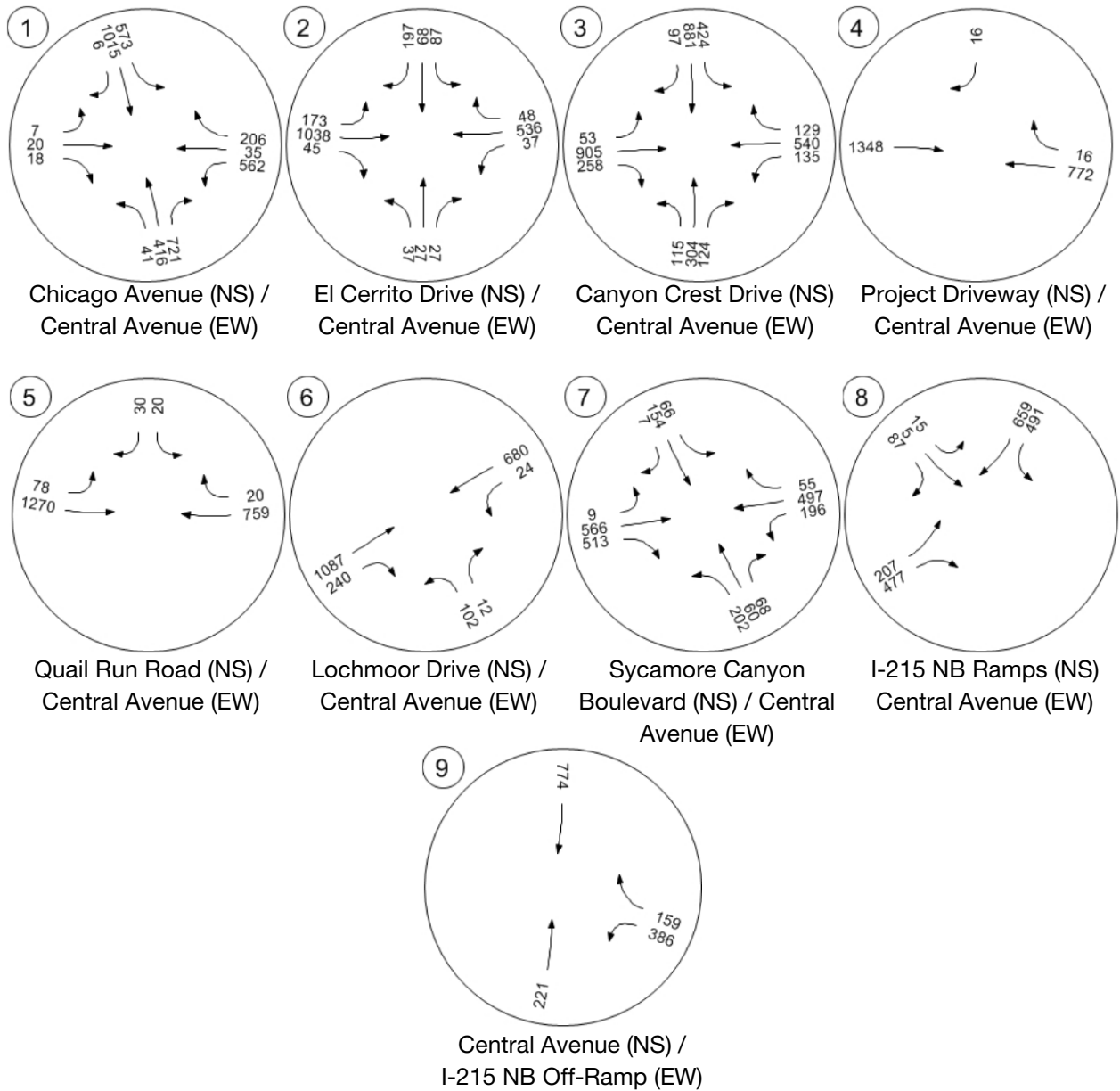


Figure 5-C – Existing Plus Ambient Growth Plus Project PM Peak Hour ADT Volumes



Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions

The existing plus ambient growth plus project scenario includes existing traffic, an ambient growth of two percent for two years to 2016, other projects in the project area provided by the City of Riverside and project traffic. Table 5-3 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 D. The existing plus ambient growth plus cumulative plus project AM and PM peak hour intersection turning movement volumes are shown on Figure 5-D and Figure 5-E, 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. None of the study intersections are expected to operate at an unacceptable level of service.

Table 5-4 provides the projected delay and levels of service at the study roadway segments under existing plus ambient growth plus project conditions without off-site improvements. These levels of service for roadway segments are LOS <C. The existing plus ambient growth plus cumulative plus project ADT volumes are shown on Figure 5-F. None of the study roadway segments are expected to operate at an unacceptable level of service.

Table 5-3 – Intersection Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions

Intersection	Peak Hour	Without Project			With Project		
		Traffic Control	Delay (sec)	LOS	Traffic Control	Delay (sec)	LOS
1. Chicago Avenue (NS) Central Avenue (EW)	AM PM	Signalized	29.7 29.2	C C	Signalized	30.6 30.6	C C
2. El Cerrito Drive (NS) Central Avenue (EW)	AM PM	Signalized	22.6 24.1	C C	Signalized	23.0 24.3	C C
3. Canyon Crest Drive (NS) Central Avenue (EW)	AM PM	Signalized	37.3 46.4	D D	Signalized	38.0 48.0	D D
4. Project Driveway (NS) Central Avenue (EW)	AM PM	Does Not Exist			One-way stop	15.8 11.3	C B
5. Quail Run Road (NS) Central Avenue (EW)	AM PM	Two-way stop	26.3 17.4	D C	Two-way stop	34.9 21.2	D C
6. Lochmoor Drive (NS) Central Avenue (EW)	AM PM	Signalized	15.1 7.2	B A	Signalized	15.2 7.2	B A
7. Sycamore Canyon Boulevard (NS) Central Avenue (EW)	AM PM	Signalized	35.7 29.7	D C	Signalized	36.1 29.6	D C
8. I-215 SB Ramps (NS) Central Avenue (EW)	AM PM	Signalized	11.8 13.2	B B	Signalized	11.7 13.1	B B
9. Central Avenue (NS) I-215 NB Off-Ramp (EW)	AM PM	Signalized	23.1 10.0	C B	Signalized	23.6 10.1	C B

Table 5-4 – Roadway Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions

Roadway Segment	Roadway Classification	Lns	Without Project		With Project	
			V/C	LOS	V/C	LOS
Central Avenue						
Chicago Avenue to El Cerrito Drive	110' Arterial	4	0.62	<C	0.63	<C
El Cerrito Drive to Canyon Crest Drive	110' Arterial	4	0.55	<C	0.57	<C
Canyon Crest Drive to Project Driveway	110' Arterial	4	0.66	<C	0.69	<C
Project Driveway to Quail Run Road	110' Arterial	4	0.62	<C	0.65	<C
Quail Run Road to Lochmoor Drive	110' Arterial	4	0.62	<C	0.64	<C
Lochmoor Drive to Sycamore Canyon Blvd	110' Arterial	4	0.53	<C	0.55	<C

Figure 5-D – Existing Plus Ambient Growth Plus Cumulative Plus Project AM Peak Hour Intersection Volumes

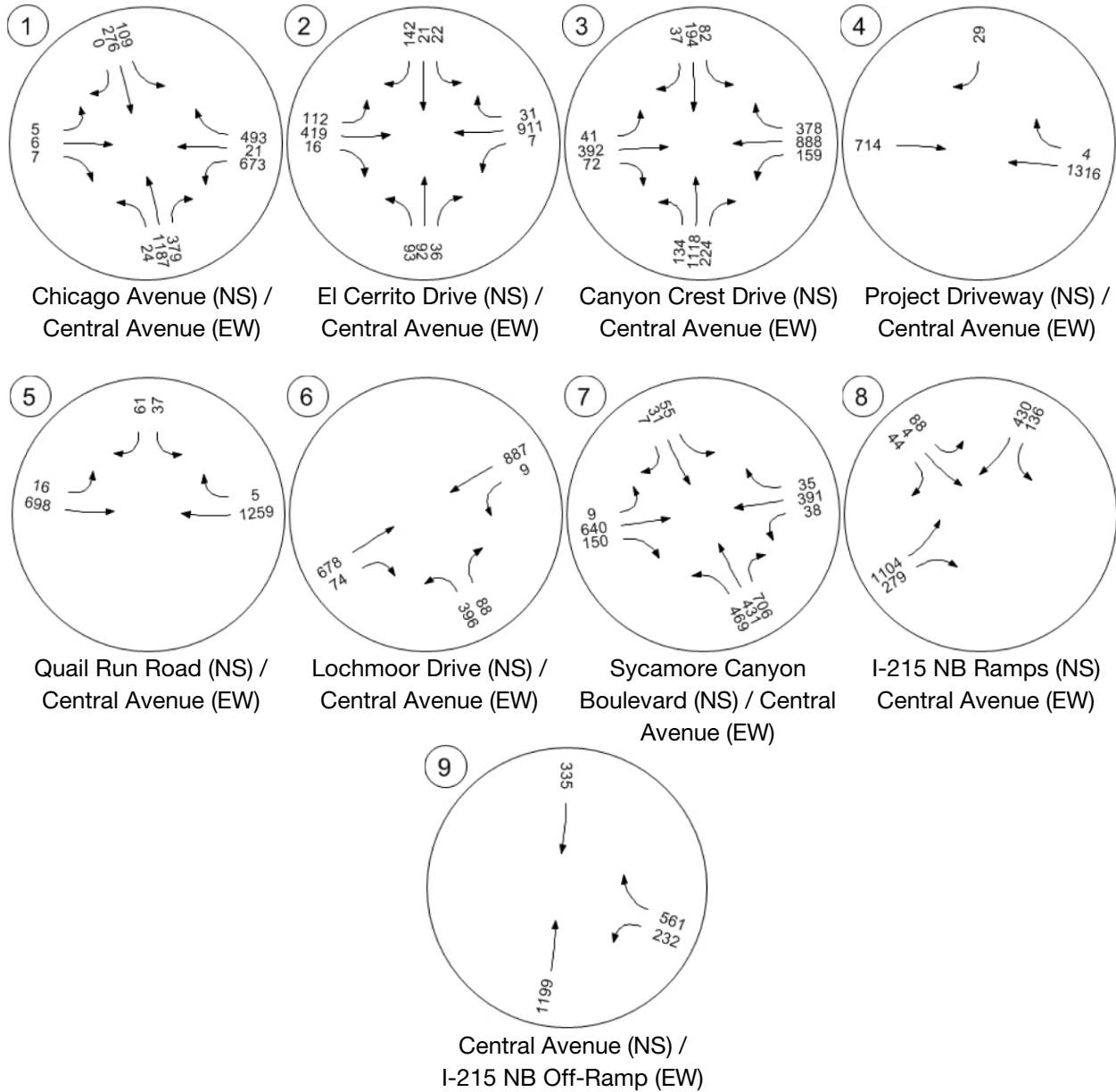


Figure 5-E – Existing Plus Ambient Growth Plus Cumulative Plus Project PM Peak Hour Intersection Volumes

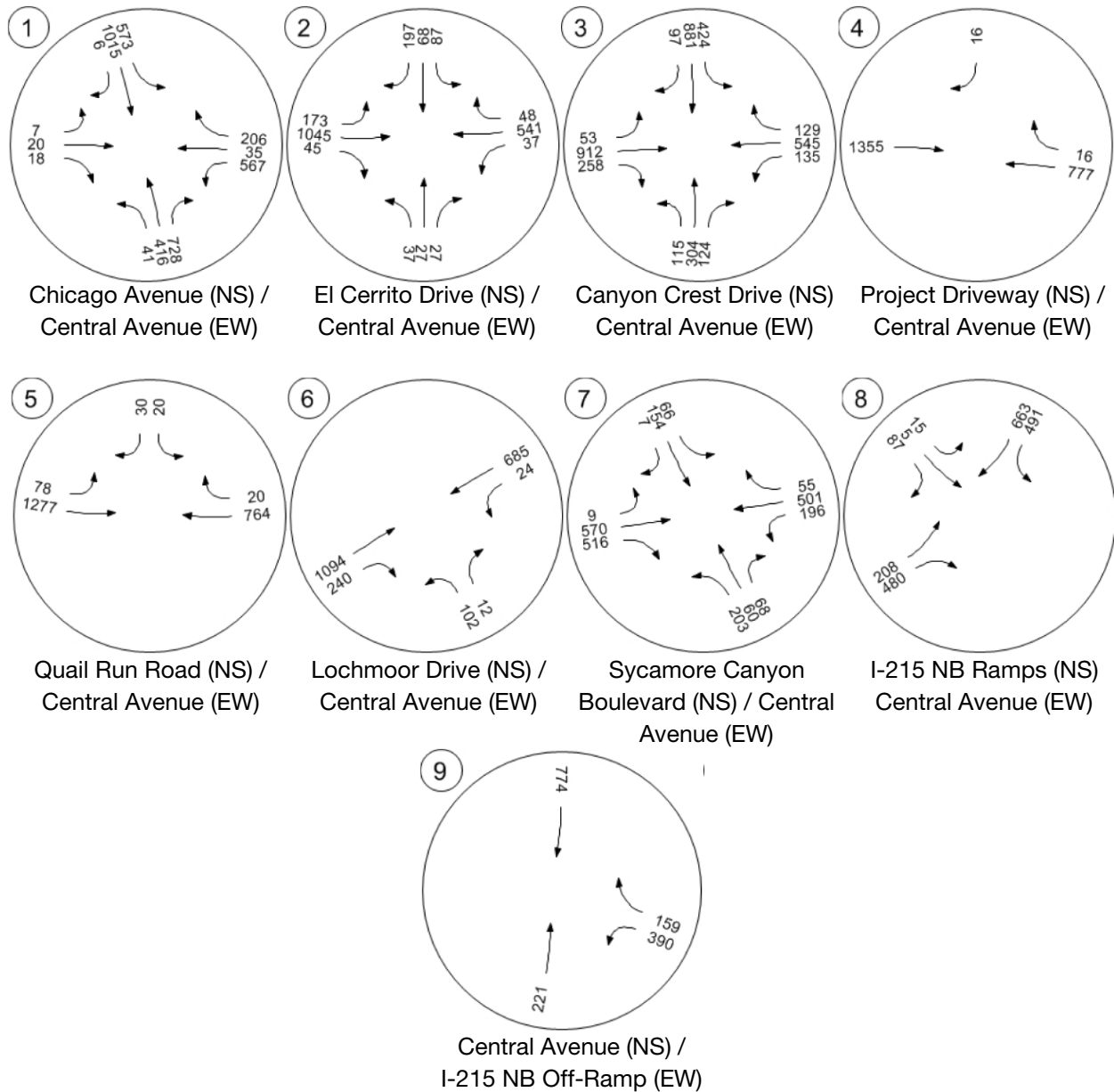


Figure 5-F – Existing Plus Ambient Growth Plus Cumulative Plus Project ADT Volumes



Levels of Service – 2025 General Plan with Project Conditions

The 2025 General Plan with project scenario includes 2025 General Plan and project traffic.

Table 5-5 provides the projected delay and levels of service at the study intersections under 2025 General Plan with project conditions without off-site improvements. These levels of service vary from LOS A to F. The 2025 General Plan with project AM and PM peak hour intersection turning movement volumes are shown on Figure 5-G and Figure 5-H, 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:

3. Canyon Crest Drive (NS) / Central Avenue (EW) (LOS F – PM Peak Hour)
5. Quail Run Road (NS) / Central Avenue (EW) (LOS F – AM & PM Peak Hour)
7. Sycamore Canyon Boulevard (NS) / Central Avenue (EW) (LOS F – AM Peak Hour)

Table 5-6 provides the projected delay and levels of service at the study roadway segments under the 2025 General Plan with project conditions without off-site improvements. These levels of service vary from LOS <C to E. The 2025 General Plan with project ADT volumes are shown on Figure 5-I. None of the study roadway segments are expected to operate at an unacceptable level of service.

Table 5-5 – Intersection Levels of Service – 2025 General Plan with Project Conditions

Intersection	Peak Hour	Without Project			With Project		
		Traffic Control	Delay (sec)	LOS	Traffic Control	Delay (sec)	LOS
1. Chicago Avenue (NS) Central Avenue (EW)	AM	Signalized	31.3	C	Signalized	32.0	C
	PM		31.5	C		32.8	C
2. El Cerrito Drive (NS) Central Avenue (EW)	AM	Signalized	23.3	C	Signalized	23.6	C
	PM		25.0	C		25.2	C
3. Canyon Crest Drive (NS) Central Avenue (EW)	AM	Signalized	45.6	D	Signalized	46.3	D
	PM		106.2	F		112.4	F
4. Project Driveway (NS) Central Avenue (EW)	AM	Does Not Exist			One-way stop	21.7	C
	PM					13.4	B
5. Quail Run Road (NS) Central Avenue (EW)	AM	Two-way stop	48.2	E	Two-way stop	87.4	F
	PM		47.8	E		OFL	F
6. Lochmoor Drive (NS) Central Avenue (EW)	AM	Signalized	52.2	D	Signalized	53.5	D
	PM		20.5	C		20.6	C
7. Sycamore Canyon Boulevard (NS) Central Avenue (EW)	AM	Signalized	133.4	F	Signalized	135.9	F
	PM		57.5	E		57.1	E
8. I-215 SB Ramps (NS) Central Avenue (EW)	AM	Signalized	10.5	B	Signalized	10.4	B
	PM		12.2	B		12.1	B
9. Central Avenue (NS) I-215 NB Off-Ramp (EW)	AM	Signalized	51.2	D	Signalized	51.7	D
	PM		9.6	A		9.7	A

OFL = Overflow conditions; Delay > 200 sec

Significant Impact

Table 5-6 –Roadway Levels of Service – 2025 General Plan with Project Conditions

Roadway Segment	Roadway Classification	Lns	Without Project		With Project	
			V/C	LOS	V/C	LOS
Central Avenue						
Chicago Avenue to El Cerrito Drive	110' Arterial	4	0.68	<C	0.69	<C
El Cerrito Drive to Canyon Crest Drive	110' Arterial	4	0.63	<C	0.65	<C
Canyon Crest Drive to Project Driveway	110' Arterial	4	0.94	E	0.97	E
Project Driveway to Quail Run Road	110' Arterial	4	0.94	E	0.97	E
Quail Run Road to Lochmoor Drive	110' Arterial	4	0.94	E	0.95	E
Lochmoor Drive to Sycamore Canyon Blvd	110' Arterial	4	0.63	<C	0.65	<C

Levels of Service – 2025 General Plan with Project with Improvements

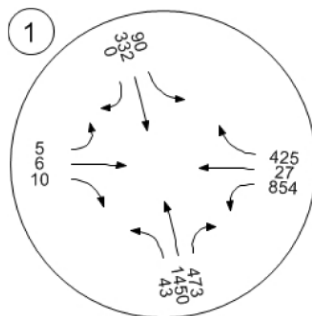
Table 5-7 provides the projected delay and levels of service at the study intersections under existing plus ambient growth plus cumulative plus project conditions with off-site improvements. With the recommended off-site improvements, the study area intersections would operate at an acceptable LOS D or better. The level of service calculation worksheets are provided in Appendix E.

Table 5-7 – Intersection Levels of Service – 2025 General Plan with Project with Improvements

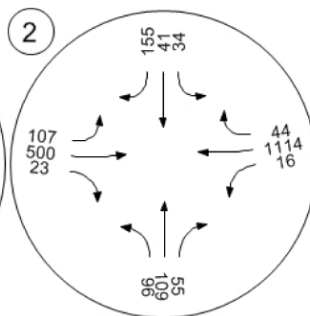
Intersection	Peak Hour	Without Improvements			With Improvements		
		Traffic Control	Delay (sec)	LOS	Traffic Control	Delay (sec)	LOS
3. Canyon Crest Drive (NS) Central Avenue (EW)	AM	Signalized	46.3	D	Signalized	40.2	D
	PM		112.4	F		68.0	E
5. Quail Run Road (NS) Central Avenue (EW)	AM	Two-way stop	87.4	F	Signalized	26.4	C
	PM		OFL	F		13.9	B
7. Sycamore Canyon Boulevard (NS) Central Avenue (EW)	AM	Signalized	135.9	F	Signalized	61.8	E
	PM		57.1	E		56.8	E

OFL = Overflow conditions; Delay > 200 sec

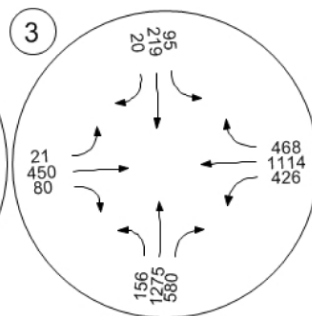
Figure 5-G – 2025 General Plan with Project AM Peak Hour Intersection Volumes



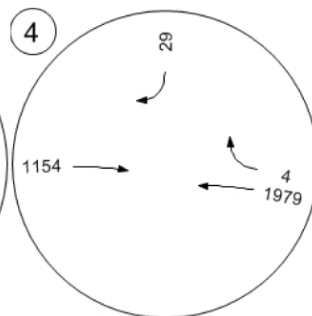
Chicago Avenue (NS) /
Central Avenue (EW)



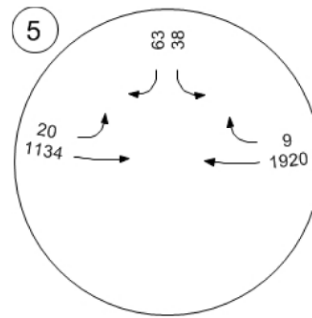
El Cerrito Drive (NS) /
Central Avenue (EW)



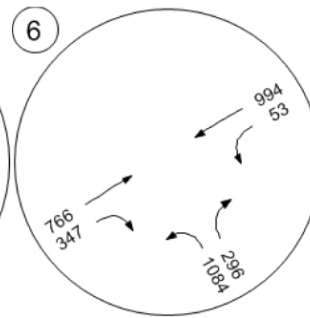
Canyon Crest Drive (NS) /
Central Avenue (EW)



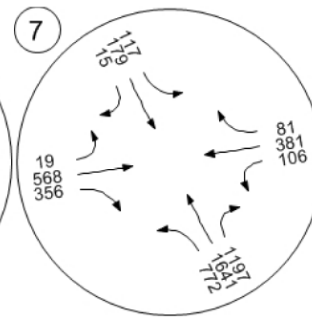
Project Driveway (NS) /
Central Avenue (EW)



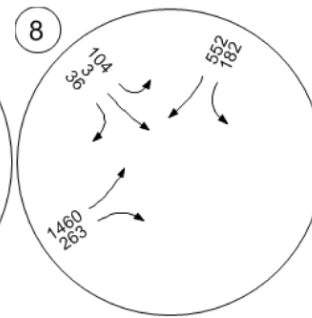
Quail Run Road (NS) /
Central Avenue (EW)



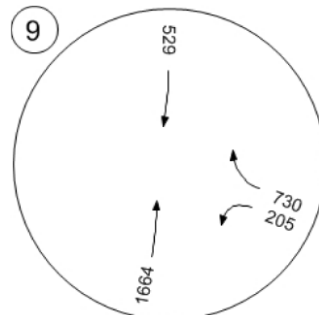
Lochmoor Drive (NS) /
Central Avenue (EW)



Sycamore Canyon
Boulevard (NS) / Central
Avenue (EW)

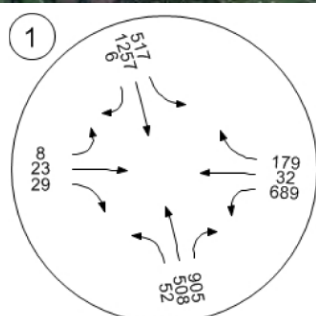


I-215 NB Ramps (NS)
Central Avenue (EW)

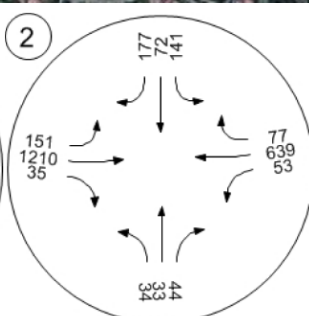


Central Avenue (NS) /
I-215 NB Off-Ramp (EW)

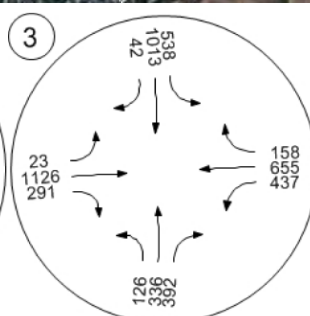
Figure 5-H – 2025 General Plan with Project PM Peak Hour Intersection Volumes



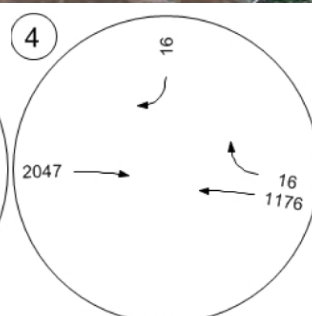
Chicago Avenue (NS) /
Central Avenue (EW)



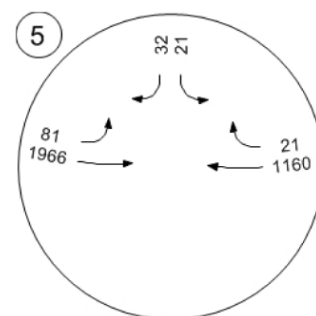
El Cerrito Drive (NS) /
Central Avenue (EW)



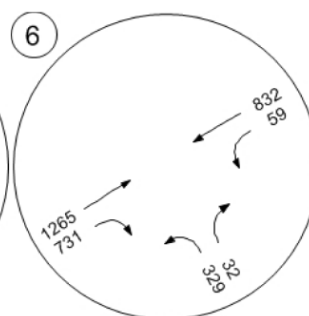
Canyon Crest Drive (NS) /
Central Avenue (EW)



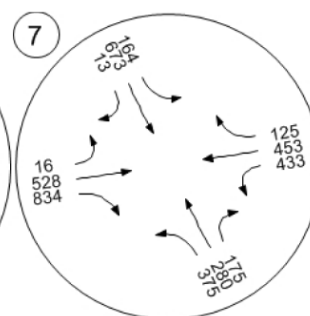
Project Driveway (NS) /
Central Avenue (EW)



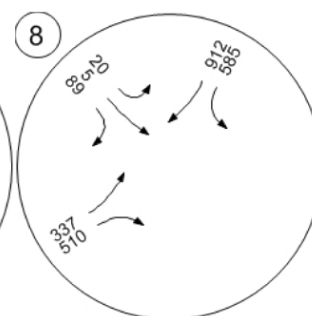
Quail Run Road (NS) /
Central Avenue (EW)



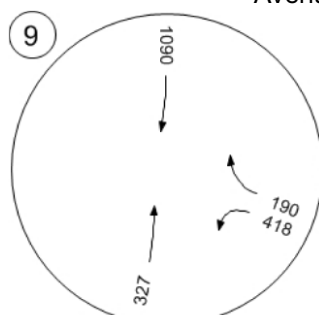
Lochmoor Drive (NS) /
Central Avenue (EW)



Sycamore Canyon
Boulevard (NS) / Central
Avenue (EW)

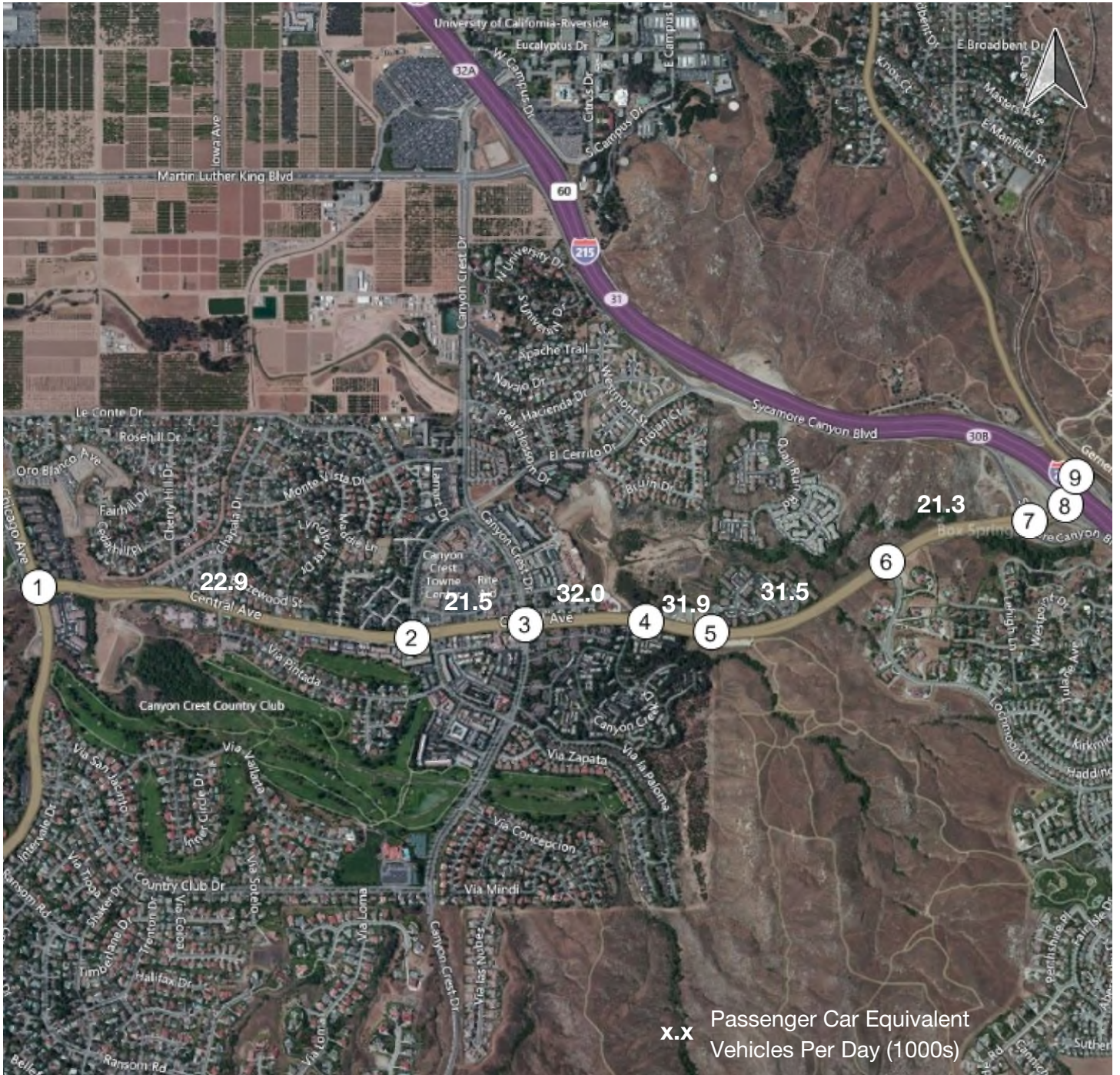


I-215 NB Ramps (NS)
Central Avenue (EW)



Central Avenue (NS) /
I-215 NB Off-Ramp (EW)

Figure 5-I – 2025 General Plan with Project ADT Volumes



FINDINGS AND RECOMMENDATIONS

Traffic Impacts and Level of Service Analysis

Proposed Intersection Geometry – Existing Plus Ambient Growth Plus Project Conditions

Table 6-1, Table 6-2 and Figure 6-A present the proposed intersection geometry at the study intersections and study roadway segments in existing plus ambient growth plus project conditions.

Table 6-1 – Summary of Intersection Improvements for Existing Plus Ambient Growth Plus Project Conditions

Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. Chicago Avenue (NS) Central Avenue (EW)	Existing	1	2	1	2	2	1	1	1	S	2	1	1ol	Signalized
2. El Cerrito Drive (NS) Central Avenue (EW)	Existing	S	1	S	1	1	S	1	2	S	1	2	S	Signalized
3. Canyon Crest Drive (NS) Central Avenue (EW)	Existing	1	2	1ol	2	2	S	1	2	S	1	2	1ol	Signalized
4. Project Driveway (NS) Central Avenue (EW)	Existing Improvements	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	2	NA	NA <i>One-way stop</i>
5. Quail Run Road (NS) Central Avenue (EW)	Existing	NA	NA	NA	NA	LR	NA	1	2	NA	NA	2	S	Two-way stop
6. Lochmoor Drive (NS) Central Avenue (EW)	Existing	1	NA	1ol	NA	NA	NA	NA	2	S	1	2	NA	Signalized
7. Sycamore Canyon Boulevard (NS) Central Avenue (EW)	Existing	1	1	1	1	2	1f	1	3	1	2	2	S	Signalized
8. I-215 SB Ramps (NS) Central Avenue (EW)	Existing	NA	NA	NA	1	TR	1	NA	2	1	2	2	NA	Signalized
9. Central Avenue (NS) I-215 NB Off-Ramp (EW)	Existing	NA	2	NA	NA	2	NA	NA	NA	NA	2	NA	1	Signalized

NA = Not Applicable

S = Lane is shared with through movement

LR = Lane shared by left-turn and right-turn movements

TR = Lane shared by through and right-turn movements

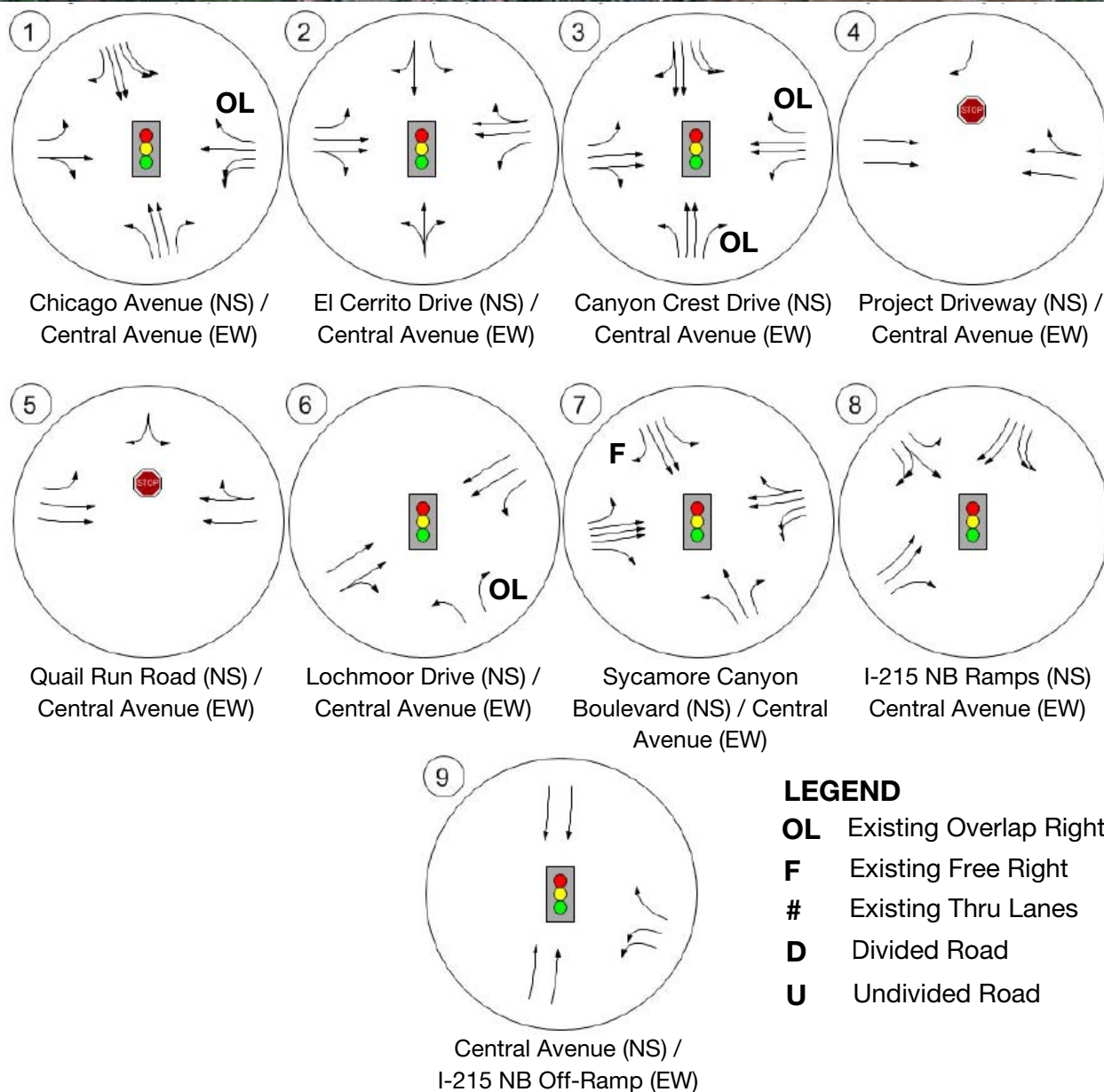
f = Free right-turn movement

ol = Overlap right-turn movement with left-turn movement

Table 6-2 – Summary of Roadway Geometry for Existing Plus Ambient Growth Plus Project Conditions

Roadway Segment	Roadway Classification	Lanes
Central Avenue		
Chicago Avenue to El Cerrito Drive	110' Arterial	4
El Cerrito Drive to Canyon Crest Drive	110' Arterial	4
Canyon Crest Drive to Project Driveway	110' Arterial	4
Project Driveway to Quail Run Road	110' Arterial	4
Quail Run Road to Lochmoor Drive	110' Arterial	4
Lochmoor Drive to Sycamore Canyon Blvd	110' Arterial	4

Figure 6-A – Summary of Improvements for Existing Plus Ambient Growth Plus Project



Proposed Intersection Geometry – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions

Table 6-3, Table 6-4 and Figure 6-B present the proposed intersection geometry at the study intersections in existing plus ambient growth plus cumulative plus project conditions.

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

Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. Chicago Avenue (NS) Central Avenue (EW)	Existing	1	2	1	2	2	1	1	1	S	2	1	1ol	Signalized
2. El Cerrito Drive (NS) Central Avenue (EW)	Existing	S	1	S	1	1	S	1	2	S	1	2	S	Signalized
3. Canyon Crest Drive (NS) Central Avenue (EW)	Existing	1	2	1ol	2	2	S	1	2	S	1	2	1ol	Signalized
4. Project Driveway (NS) Central Avenue (EW)	Existing Improvements	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	2	NA	NA One-way stop
5. Quail Run Road (NS) Central Avenue (EW)	Existing	NA	NA	NA	NA	LR	NA	1	2	NA	NA	2	S	Two-way stop
6. Lochmoor Drive (NS) Central Avenue (EW)	Existing	1	NA	1ol	NA	NA	NA	NA	2	S	1	2	NA	Signalized
7. Sycamore Canyon Boulevard (NS) Central Avenue (EW)	Existing	1	1	1	1	2	1f	1	3	1	2	2	S	Signalized
8. I-215 SB Ramps (NS) Central Avenue (EW)	Existing	NA	NA	NA	1	TR	1	NA	2	1	2	2	NA	Signalized
9. Central Avenue (NS) I-215 NB Off-Ramp (EW)	Existing	NA	2	NA	NA	2	NA	NA	NA	NA	2	NA	1	Signalized

OWSC = One Way Stop Controlled

TWSC = Two Way Stop Controlled

AWSC = All Way Stop Controlled

RIRO = Only Right In, Right Out movements allowed

NA = Not Applicable

S = Lane is shared with through movement

LR = Lane shared by left-turn and right-turn movements

TR = Lane shared by through and right-turn movements

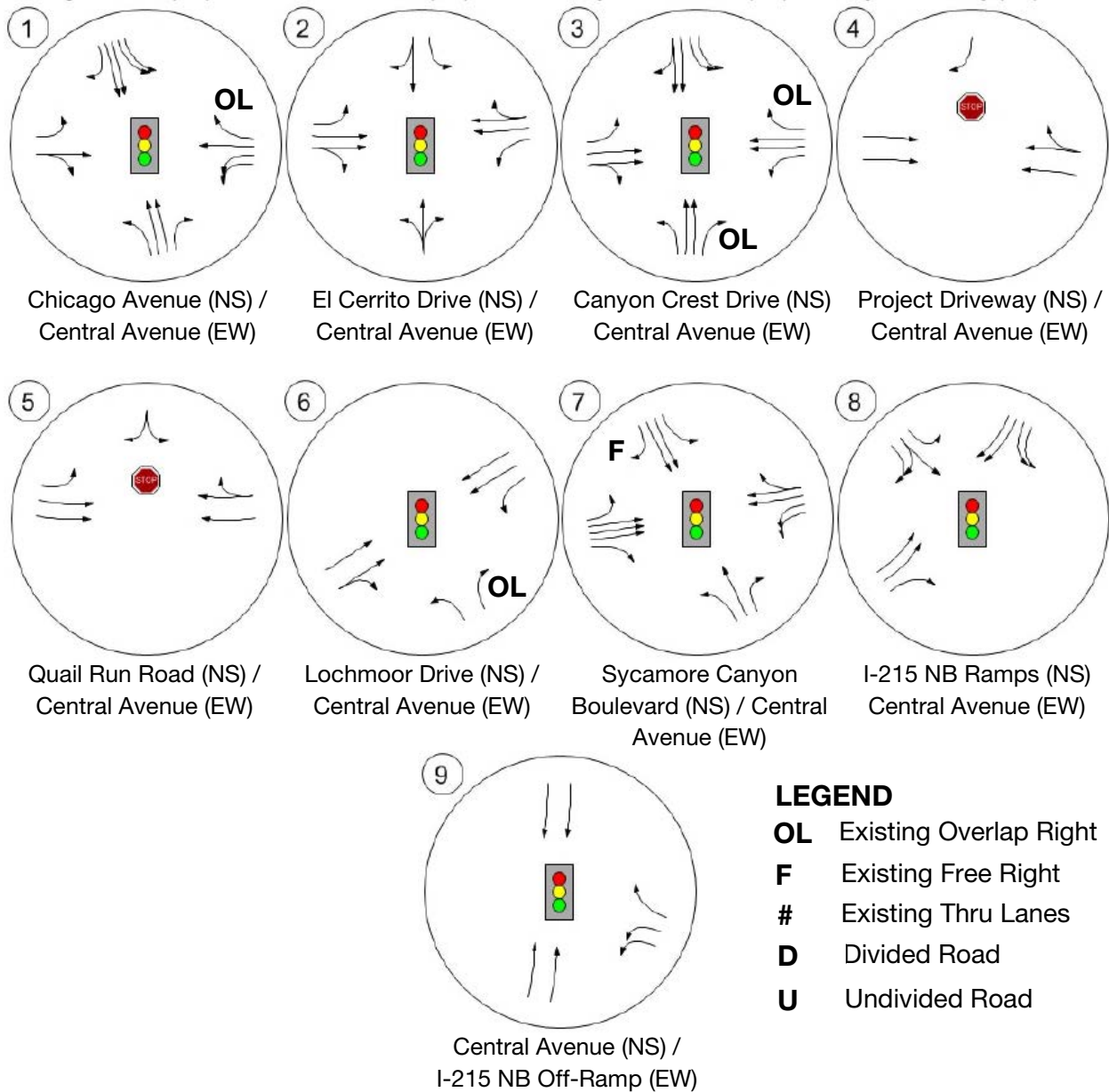
f = Free right-turn movement

ol = Overlap right-turn movement with left-turn movement

Table 6-4 – Summary of Roadway Geometry for Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions

Roadway Segment	Roadway Classification	Lanes
Central Avenue		
Chicago Avenue to El Cerrito Drive	110' Arterial	4
El Cerrito Drive to Canyon Crest Drive	110' Arterial	4
Canyon Crest Drive to Project Driveway	110' Arterial	4
Project Driveway to Quail Run Road	110' Arterial	4
Quail Run Road to Lochmoor Drive	110' Arterial	4
Lochmoor Drive to Sycamore Canyon Blvd	110' Arterial	4

Figure 6-B – Summary of Improvements for Existing Plus Ambient Growth Plus Cumulative Plus Project



Proposed Mitigation Measures – 2025 General Plan with Project Conditions

Table 6-5, Table 6-6 and Figure 6-C present the proposed mitigation measures in order to achieve a satisfactory level of service at the study intersections in 2025 General Plan with project conditions.

Table 6-5 – Summary of Intersection Improvements for 2025 General Plan with Project Conditions

Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. Chicago Avenue (NS) Central Avenue (EW)	Existing	1	2	1	2	2	1	1	1	S	2	1	1ol	Signalized
2. El Cerrito Drive (NS) Central Avenue (EW)	Existing	S	1	S	1	1	S	1	2	S	1	2	S	Signalized
3. Canyon Crest Drive (NS) Central Avenue (EW)	Existing Improvements	1	2	1ol	2	2	S	1	2	S	1	2	1ol	Signalized Signalized
4. Project Driveway (NS) Central Avenue (EW)	Existing Improvements	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	2	NA	NA One-way stop
5. Quail Run Road (NS) Central Avenue (EW)	Existing Improvements	NA	NA	NA	NA	LR	NA	1	2	NA	NA	2	S	Two-way stop Signalized
6. Lochmoor Drive (NS) Central Avenue (EW)	Existing	1	NA	1ol	NA	NA	NA	NA	2	S	1	2	NA	Signalized
7. Sycamore Canyon Boulevard (NS) Central Avenue (EW)	Existing Improvements	1	1	1	1	2	1f	1	3	1	2	2	S	Signalized Signalized
8. I-215 SB Ramps (NS) Central Avenue (EW)	Existing	NA	NA	NA	1	TR	1	NA	2	1	2	2	NA	Signalized
9. Central Avenue (NS) I-215 NB Off-Ramp (EW)	Existing	NA	2	NA	NA	2	NA	NA	NA	NA	2	NA	1	Signalized

NA = Not Applicable

S = Lane is shared with through movement

LR = Lane shared by left-turn and right-turn movements

TR = Lane shared by through and right-turn movements

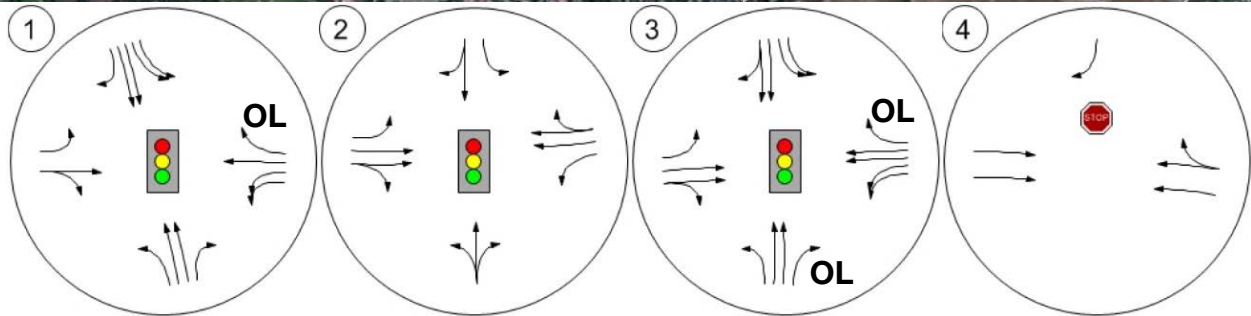
f = Free right-turn movement

ol = Overlap right-turn movement with left-turn movement

Table 6-6 – Summary of Roadway Geometry for 2025 General Plan with Project Conditions

Roadway Segment	Roadway Classification	Lanes
Central Avenue		
Chicago Avenue to El Cerrito Drive	110' Arterial	4
El Cerrito Drive to Canyon Crest Drive	110' Arterial	4
Canyon Crest Drive to Project Driveway	110' Arterial	4
Project Driveway to Quail Run Road	110' Arterial	4
Quail Run Road to Lochmoor Drive	110' Arterial	4
Lochmoor Drive to Sycamore Canyon Blvd	110' Arterial	4

Figure 6-C – Summary of Improvements for 2025 General Plan with Project

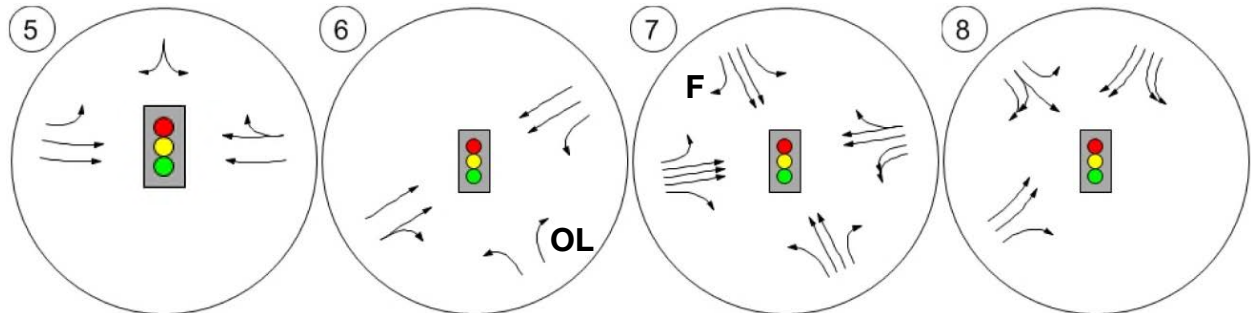


Chicago Avenue (NS) /
Central Avenue (EW)

El Cerrito Drive (NS) /
Central Avenue (EW)

Canyon Crest Drive (NS) /
Central Avenue (EW)

Project Driveway (NS) /
Central Avenue (EW)

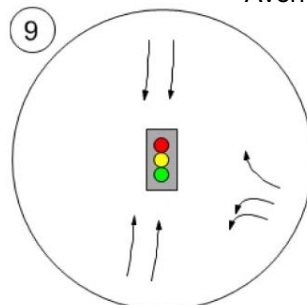


Quail Run Road (NS) /
Central Avenue (EW)

Lochmoor Drive (NS) /
Central Avenue (EW)

Sycamore Canyon
Boulevard (NS) / Central
Avenue (EW)

I-215 NB Ramps (NS)
Central Avenue (EW)



Central Avenue (NS) /
I-215 NB Off-Ramp (EW)

LEGEND

- OL** Existing Overlap Right
- F** Existing Free Right
- #** Existing Thru Lanes
- D** Divided Road
- U** Undivided Road
- #** Proposed Thru Lanes

▪ Traffic Signal Warrants

The California 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 Manual on Uniform Traffic Control Devices (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 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 traffic conditions, no additional study area unsignalized intersections are expected to meet the peak hour traffic control signal warrant (see Appendix D for technical calculations).

For existing plus ambient growth plus cumulative plus project traffic conditions, no additional study area unsignalized intersections are expected to meet the peak hour traffic control signal warrant (see Appendix D for technical calculations).

For 2025 General Plan with project traffic conditions, the peak hour traffic control signal warrant is expected to be satisfied for the following additional study area unsignalized intersection(s) (see Appendix D for technical calculations):

5. Quail Run Road (NS) / Central Avenue (EW)

▪ Circulation Recommendations

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

On-Site Recommendations

Roadways

- Construct full width improvements on all internal roadways.

Intersections

- Construct the intersection Project Driveway and Central Avenue to restrict movement to right-in and right-out only from the driveway with the following geometrics:
 - Northbound: Not Applicable.
 - Southbound: One right turn lane. Stop controlled.
 - Eastbound: Two through lanes.
 - Westbound: One through lane and one shared through and right turn lane.

▪ Safety and Operational Improvements

- Sight distance at the project entrance roadway should be reviewed with respect to standard City of Riverside sight distance standards at the time of preparation of final grading, landscape and street improvement plans.
- An acceleration lane should be provided in the median at the intersection of Quail Run Road and Central Avenue for safety.
- Participate in the phased construction of off-site traffic signals through payment of project's fair share of traffic signal mitigation fees.
- Signing/stripping should be implemented in conjunction with detailed construction plans for the project site.

▪ Regional Funding Mechanisms

The project will participate in the cost of off-site improvements through payment of the following "fair share" mitigation fees:

- Transportation Uniform Mitigation Fee (TUMF), current at time of construction.
- City of Riverside Development Impact Fee (DIF), current at time of construction.

These fees should be collected and utilized as needed by the City of Riverside to construct the improvements necessary to maintain the required level of service.

Table 6-7 summarizes the proposed mitigation measure and associated funding mechanism for the project as a result of the traffic study for intersections.

Table 6-7 – Intersection Project Mitigation Summary

No.	Intersection	Jurisdiction	Target LOS	LOS w/o Mitigation		Mitigation Measure	LOS with Mitigation		Funding Mechanism
				AM	PM		AM	PM	
2025 General Plan with Project									
3	Canyon Crest Drive (NS) / Central Avenue (EW)	City of Riverside	D	D	F	Construct 2nd westbound left-turn pocket.	D	E	Project Developer Fair Share
5	Quail Run Road (NS) / Central Avenue (EW)	City of Riverside	D	F	F	Install traffic signal.	C	B	Project Developer Fair Share
7	Sycamore Canyon Boulevard (NS) / Central Avenue (EW)	City of Riverside	D	F	E	Construct 2nd northwestbound through lane.	E	E	Project Developer Fair Share

The following table summarizes the fair share analysis for intersections that need mitigation in the 2025 General Plan with Project scenario.

Table 6-8 – Intersection Fair Share Analysis

No.	Intersection	Existing Volume		Project Volume		Future Development		Year 2025 with Project		% Fair Share	Mitigation Cost	Estimated Fair Share Cost
		AM	PM	AM	PM	AM	PM	AM	PM			
2025 General Plan with Project												
3	Canyon Crest Drive (NS) / Central Avenue (EW)	3495	3728	74	87	1335	1322	4904	5137	6.6%	\$ 72,700	\$ 5,000
5	Quail Run Road (NS) / Central Avenue (EW)	1907	1976	84	121	1193	1184	3184	3281	10.2%	\$363,300	\$ 37,000
7	Sycamore Canyon Boulevard (NS) / Central Avenue (EW)	2802	2254	40	48	2590	1767	5432	4069	2.7%	\$ 30,100	\$ 1,000
		Total Project Fair Share										\$ 43,000

Based on the San Bernardino County CMP, Appendix G and the current price index value as compared to January 2003.

Note that for Canyon Crest Drive / Central Avenue, the implementation of the 2nd westbound left turn pocket will require 11' lanes and removal of the median for the westbound leg. Sycamore Canyon Boulevard will require road widening along Sycamore Canyon to construct an additional northwestbound through lane.



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