TTM 20237
TRAFFIC IMPACT ANALYSIS
(REVISED)

City of Rialto

March 11, 2019

prepared by

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18-0131

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EXECUTIVE SUMMARY

The purpose of this Traffic Impact Analysis (Revised) is to provide an assessment of traffic operations resulting from development of the proposed TTM 20237 project and to identify measures necessary to mitigate potentially significant traffic impacts. This report analyzes traffic impacts for the anticipated project opening year in Year 2020.

Although this is a technical report, effort has been made to write the report clearly and concisely. To assist the reader with terms unique to transportation engineering, a glossary is provided in Appendix A.

PROJECT DESCRIPTION

The project site is proposing 61 single-family detached residential dwelling units and is located east of Acacia Avenue between Merrill Avenue and Randall Avenue in the City of Rialto. The project site is currently vacant except for an existing residence on the southern portion of the project site. Project site access is proposed to Acacia Avenue.

EXISTING OPERATIONS

The signalized study intersection currently operates within acceptable Levels of Service (D or better) during the peak hours for Existing conditions. The unsignalized study intersections currently operate at Levels of Service D or better with no vehicular movement having an average delay greater than 120 seconds during the peak hours (see Table 1).

PROJECT TRIPS

The proposed project is forecast to generate approximately 576 daily vehicle trips, including 45 vehicle trips during the AM peak hour and 60 vehicle trips during the PM peak hour (see Table 2).

FORECAST OPERATIONS

Existing Plus Project Conditions: The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Existing Plus Project conditions, except for the following study area intersection projected to operate at Level of Service E during the AM peak hour:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5

The following study area intersection is projected to be significantly impacted by the project for Existing Plus Project traffic conditions (see Table 4):

- Acacia Avenue (NS) at Randall Avenue (EW) - #5 (AM peak hour)

The study intersections are projected to have no significant impacts during the peak hours for Existing Plus Project traffic conditions, with improvements (see Table 4).

Existing Plus Ambient Growth: The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Existing Plus Ambient Growth traffic conditions, except for the following study area intersection projected to operate at Level of Service E during the AM peak hour:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5

Project Completion: The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Project Completion traffic conditions, except for the following study area intersection projected to operate at Level of Service E during the AM peak hour:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5

The following study area intersection is projected to be significantly impacted by the project for Project Completion traffic conditions (see Table 5):

- Acacia Avenue (NS) at Randall Avenue (EW) - #5 (AM peak hour)

The study intersections are projected to have no significant impacts during the peak hours for Project Completion traffic conditions, with improvements (see Table 5).

Existing Plus Ambient Growth Plus Cumulative: The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Existing Plus Ambient Growth Plus Cumulative traffic conditions, except for the following study area intersections projected to operate at Level of Service E/F during the AM peak hour:

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3
- Acacia Avenue (NS) at Randall Avenue (EW) - #5

Cumulative Conditions: The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Cumulative Conditions traffic conditions, except for the following study area intersections projected to operate at Level of Service E/F during the AM peak hour:

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3
- Acacia Avenue (NS) at Randall Avenue (EW) - #5

The following study area intersections are projected to be significantly impacted by the project for Cumulative Conditions traffic conditions (see Table 6):

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3 (AM peak hour)
- Acacia Avenue (NS) at Randall Avenue (EW) - #5 (AM peak hour)

The study intersections are projected to have no significant impacts during the peak hours for Cumulative Conditions traffic conditions, with improvements (see Table 6).

MITIGATION MEASURES

The following mitigation measure improvements are recommended for Existing Plus Project and Project Completion conditions:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5
  - Restripe eastbound approach to consist of one left turn lane and one shared through/right turn lane.

Additionally, the following mitigation measures are recommended for Cumulative Conditions:

- Sycamore Avenue (NS) at Randall Avenue (EW) - #2
  - Install traffic signal

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3
  - Install traffic signal

- Acacia Avenue (NS) at Randall Avenue (EW) - #5
  - Restripe eastbound approach to consist of one left turn lane and one shared through/right turn lane.

The project shall contribute towards the above improvements through payment of applicable Development Impact Fees or through an in-lieu fee on a fair share basis. Any programmed improvements constructed by the project may be eligible for a fee credit at the discretion of the City of Rialto.

1. INTRODUCTION

This section describes the purpose of this traffic impact analysis, project location, proposed development, and study area. Figure 1 shows the project location map and Figure 2 illustrates the project site plan.

PURPOSE AND OBJECTIVES

The purpose of this Traffic Impact Analysis (Revised) is to provide an assessment of traffic operations resulting from development of the proposed TTM 20237 project and to identify measures necessary to mitigate potentially significant traffic impacts. This report analyzes traffic impacts for the anticipated project opening year in Year 2020.

Although this is a technical report, effort has been made to write the report clearly and concisely. A glossary is provided in Appendix A to assist the reader with terms related to transportation engineering.

PROJECT DESCRIPTION

The project site is proposing 61 single-family detached residential dwelling units and is located east of Acacia Avenue between Merrill Avenue and Randall Avenue in the City of Rialto. The project site is currently vacant except for an existing residence on the southern portion of the project site. Project site access is proposed to Acacia Avenue.

STUDY AREA

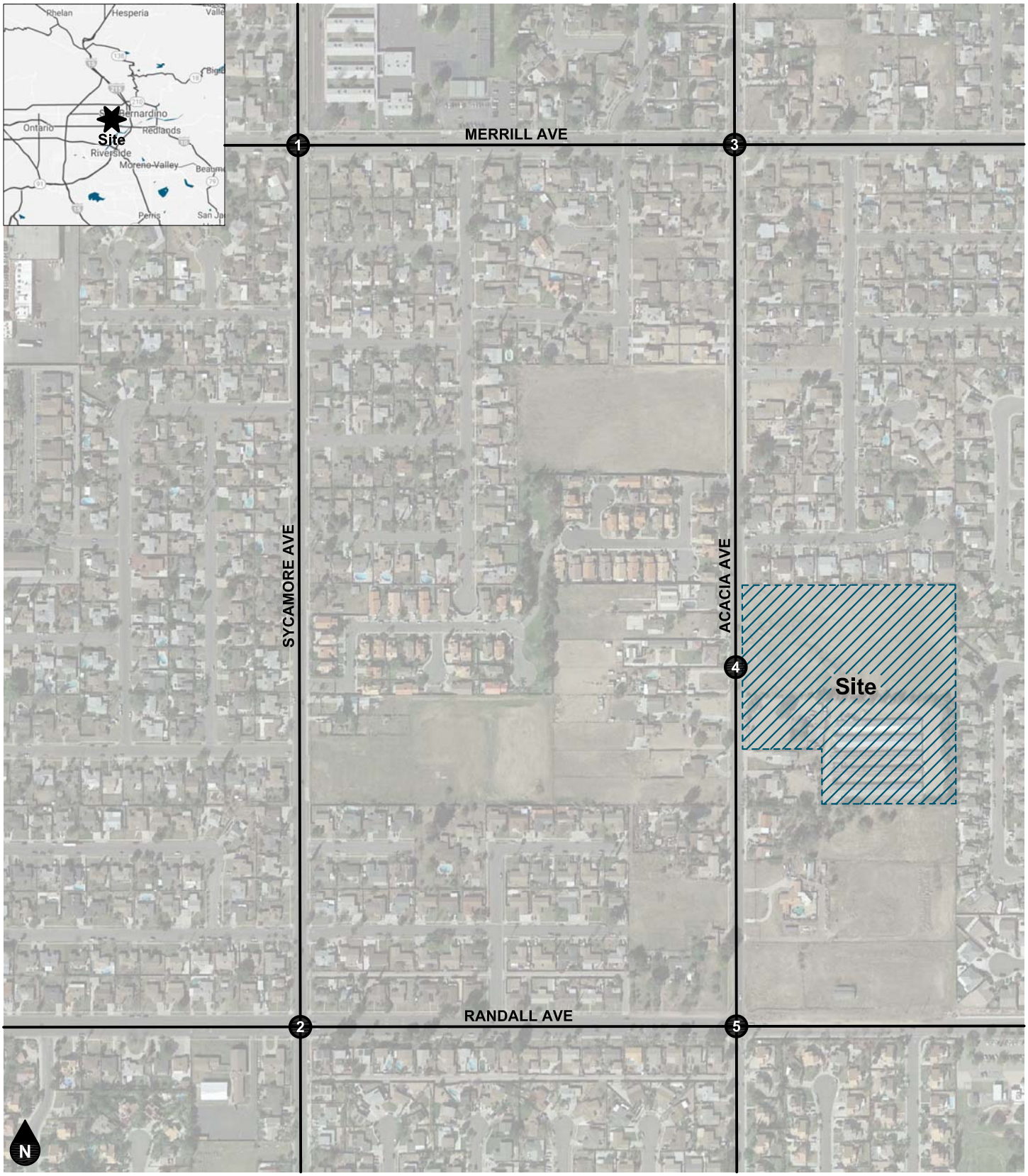
Based on the study intersections identified in the scoping agreement (see Appendix B), the study area consists of the following study intersections within the City of Rialto:

Study Intersections	Jurisdiction
1. Sycamore Avenue (NS) at Merrill Avenue (EW)	City of Rialto
2. Sycamore Avenue (NS) at Randall Avenue (EW)	City of Rialto
3. Acacia Avenue (NS) at Merrill Avenue (EW)	City of Rialto
4. Acacia Avenue (NS) at Project Access (EW)	City of Rialto
5. Acacia Avenue (NS) at Randall Avenue (EW)	City of Rialto

ANALYSIS SCENARIOS

The following scenarios are analyzed during typical weekday AM and PM peak hour traffic conditions:

- Existing
- Existing Plus Project
- Existing Plus Ambient Growth
- Project Completion (Existing Plus Ambient Growth Plus Project)
- Existing Plus Ambient Growth Plus Cumulative
- Cumulative Conditions (Existing Plus Ambient Growth Plus Project Plus Cumulative)



Legend

(#) Study Intersection

Figure 1
Project Location Map

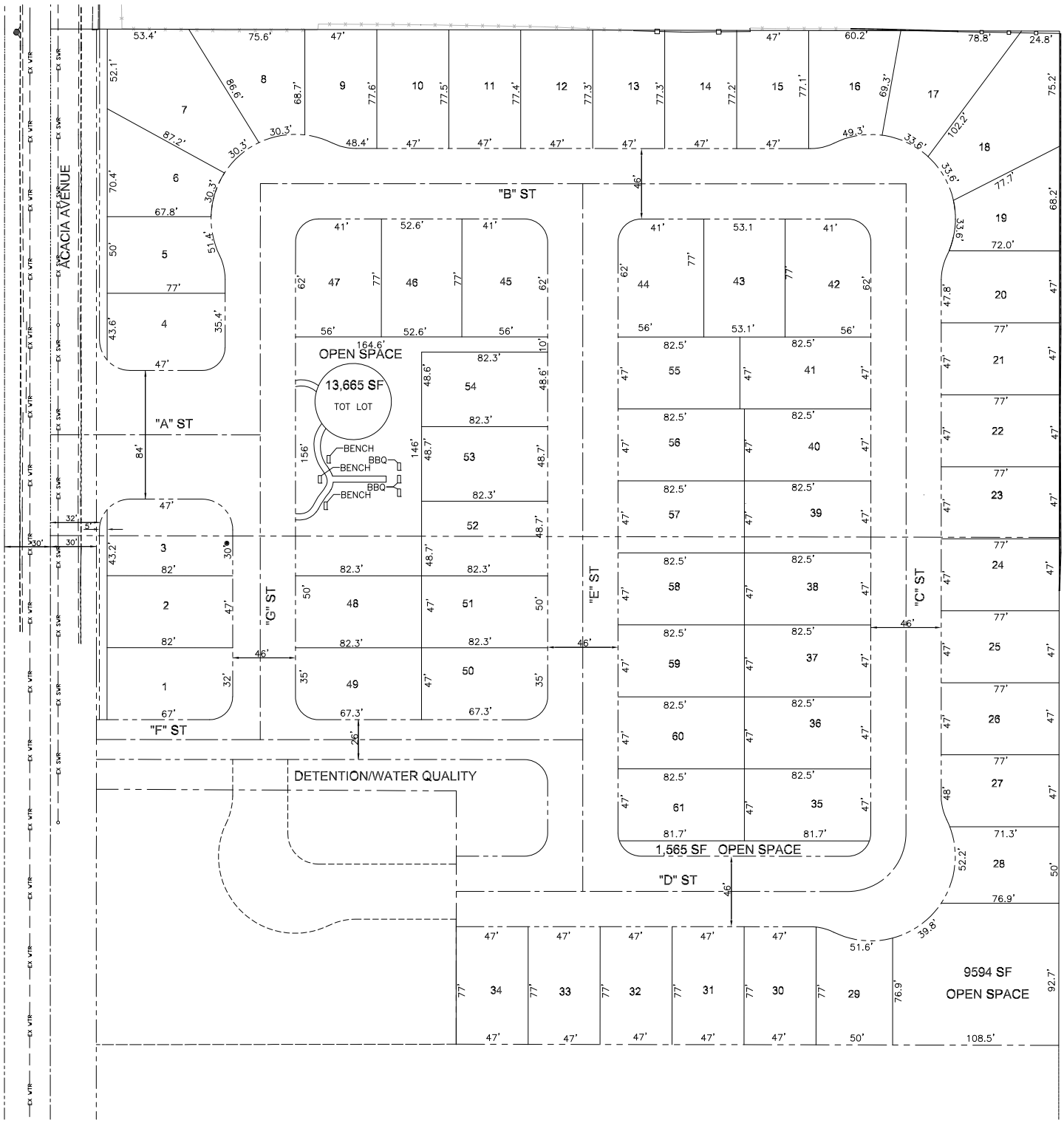


Figure 2
Site Plan

2. METHODOLOGY

This section discusses the analysis methodologies used to assess transportation facility performance as adopted by the respective jurisdictional agencies.

INTERSECTION DELAY METHODOLOGY

The technique used to assess the performance of intersections in the City of Rialto is known as the intersection delay methodology based on the procedures contained in the Highway Capacity Manual. The methodology compares the traffic volume using the intersection to the capacity of the intersection to calculate the delay associated with the traffic control at the intersection. The intersection delay is then correlated to a performance measure known as Level of Service based on the following thresholds:

Level of Service	Intersection Control Delay (Seconds / Vehicle)	
	Signalized Intersection	Unsignalized Intersection
A	≤ 10.0	≤ 10.0
B	> 10.0 to ≤ 20.0	> 10.0 to ≤ 15.0
C	> 20.0 to ≤ 35.0	> 15.0 to ≤ 25.0
D	> 35.0 to ≤ 55.0	> 25.0 to ≤ 35.0
E	> 55.0 to ≤ 80.0	> 35.0 to ≤ 50.0
F	> 80.0	> 50.0

Source: Transportation Research Board, Highway Capacity Manual (6th Edition).

Level of Service is used to qualitatively describe the performance of a roadway facility, ranging from Level of Service A (free-flow conditions) to Level of Service F (extreme congestion and system failure). Intersection delay analysis was performed using the Vistro (Version 6.00-00) software. The intersection Level of Service analysis has been performed in accordance with Appendix C of the San Bernardino County Congestion Management Program, including minimum phase times, lost time, and saturation flow rates.

If the paved lane width of a shared through/right turn lane is wide enough to permit a separate right turn, it is common practice for a right turn lane to be considered "de facto." To function as a de facto right turn lane there must be sufficient width for right turning vehicles to travel outside the through lane. This analysis uses a minimum lane width of 20 feet from curb to lane stripe.

The peak hour intersection turning movement volumes have been adjusted to peak 15 minute volumes for analysis purposes using the existing observed peak 15 minute to peak hour factors for all scenarios analyzed. In accordance with San Bernardino County Congestion Management Program guidelines, a peak hour factor of 0.95 is used for future analysis. This is to account for the effects of congestion on peak spreading. Peak spreading refers to the tendency of traffic volumes to spread more evenly across time as congestion increases.

PERFORMANCE STANDARDS

The City of Rialto 2010 General Plan Update contains the following policies applicable to Level of Service standards within the City:

- **Policy 4-1.20**: Design City streets so that signalized intersections operate at Level of Service (LOS) D or better during the morning and evening peak hours, and require new development to mitigate traffic impacts that degrade LOS below that level. The one exception will be Riverside Avenue south of the Metrolink tracks all the way to the City's southern border, which can operate at LOS E.

- **Policy 4-1.21**: Design City streets so that unsignalized intersections operate with no vehicular movement having an average delay greater than 120 seconds during the morning and evening peak hours, and require new development to mitigate traffic impacts that increase delay above that level.

THRESHOLDS OF SIGNIFICANCE

In accordance with Exhibit F of the City of Rialto Traffic Impact Analysis Report Guidelines and Requirements (December 2013), the following thresholds are used to determine if the project traffic impact is significant, either directly or indirectly:

- A significant impact is forecast to occur if the project causes the peak hour delay to increase as follows:

Level of Service	Increase in Delay (seconds)
A/B	10.0 seconds
C	8.0 seconds
D	5.0 seconds
E	2.0 seconds
F	1.0 seconds

If a project is forecast to cause a significant traffic impact, feasible mitigation measures that will reduce the impact to a less than significant level are identified. Mitigation measures can be in many forms, including the addition of lanes, traffic control modification, or demand management measures. If no feasible mitigation measures can be identified for a significantly impacted facility, the impact will remain significant and unavoidable and a statement of overriding considerations is required.

3. EXISTING CONDITIONS

EXISTING ROADWAY SYSTEM

Figure 3 identifies the lane geometry and intersection traffic controls for Existing conditions based on a field survey of the study area. Regional access to the project area is provided by the I-10 Freeway to the south of the project site, the SR-210 Freeway to the north of the project site, and the I-215 Freeway to the east of the project site. The key north-south roadways providing local circulation are Sycamore Avenue and Acacia Avenue. The key east-west roadways providing local circulation are Merrill Avenue and Randall Avenue.

Sycamore Avenue is a two lane undivided roadway and is classified as a Collector (64 foot right-of-way) in the City of Rialto General Plan. On-street parking is generally permitted in the project area. No bicycle facilities are provided in the study area. Sidewalks are generally provided on both sides of the roadway.

Acacia Avenue is a two lane undivided roadway and is classified as a Collector (64 foot right-of-way) in the City of Rialto General Plan. On-street parking is generally permitted in the project area. No bicycle facilities are provided in the study area. Sidewalks are generally provided on both sides of the roadway.

Merrill Avenue is a four lane undivided roadway and is classified as a Secondary Arterial (88 foot right-of-way) in the City of Rialto General Plan. On-street parking is generally permitted in the study area. No bicycle facilities are provided in the study area. Sidewalks are generally provided on both sides of the roadway.

Randall Avenue is a two lane undivided roadway east of Acacia Avenue and a four lane undivided roadway west of Acacia Avenue. Randall Avenue is classified as a Collector (64 foot right-of-way) in the City of Rialto General Plan. On-street parking is generally permitted in the study area. No bicycle facilities are provided in the study area. Sidewalks are generally provided on both sides of the roadway except on the north side of the roadway approximately 330 feet west of Acacia Avenue to approximately 650 feet east of Acacia Avenue.

PEDESTRIAN FACILITIES

Existing pedestrian facilities in the project vicinity are shown on Figure 4.

BICYCLE ROUTES

There are currently no bicycle lanes provided on the study area roadways as described above. The study area roadway segments are not anticipated to provide for bicycle routes as shown on the City of Rialto Bikeway Master Plan (see Figure 5).

TRANSIT FACILITIES

Figure 6 shows the existing transit routes available in the project vicinity. As shown on Figure 6, Omnitrans Route 15 provides service on Merrill Avenue.

GENERAL PLAN CONTEXT

Figure 7 shows the City of Rialto General Plan Circulation Element roadway classifications map. This figure shows the nature and extent of arterial and collector highways that are needed to adequately serve the ultimate development depicted by the Land Use Element of the General Plan. The City of Rialto standard roadway cross-sections are illustrated on Figure 8.

EXISTING ROADWAY VOLUMES

Figure 9 shows the Existing average daily traffic volumes. The Existing average daily traffic volumes have been factored from peak hour intersection turning movement volumes using the following formula for each intersection leg:

PM Peak Hour (Approach Volume + Exit Volume) x 14.2 = Leg Volume.

Based on conversations with the City of Rialto Public Works Department, the factor of 14.2 was utilized from the Riverside Avenue at Randall Avenue Traffic Impact Analysis, prepared by Kunzman Associates, Inc., January 3, 2019 (Revised). This analysis compared peak hour turning movement counts to 24-hour manual counts on Riverside Avenue to determine the factor in converting PM peak hour counts to average daily traffic volumes.

Existing peak hour intersection turning movement volumes are based upon AM peak period and PM peak period intersection turning movement counts obtained in November 2018 during typical weekday conditions. The AM peak period was counted between 7:00 AM and 9:00 AM and the PM peak period was counted between 4:00 PM and 6:00 PM. The actual peak hour within the peak period is the four consecutive 15 minute periods with the highest total volume when all movements are added together. Thus, the weekday PM peak hour at one intersection may be 4:45 PM to 5:45 PM if those four consecutive 15 minute periods have the highest combined volume. Intersection turning movement count worksheets are provided in Appendix C.

Figure 10 and Figure 11 show the Existing AM and PM peak hour intersection turning movement volumes, respectively.

EXISTING INTERSECTION LEVEL OF SERVICE

The intersection Levels of Service for Existing traffic conditions have been calculated and are shown in Table 1. Existing intersection Level of Service worksheets are provided in Appendix D.

The signalized study intersection currently operates within acceptable Levels of Service (D or better) during the peak hours for Existing traffic conditions. The unsignalized study intersections currently operate at Levels of Service D or better with no vehicular movement having an average delay greater than 120 seconds during the peak hours.

Table 1
Existing Intersection Level of Service

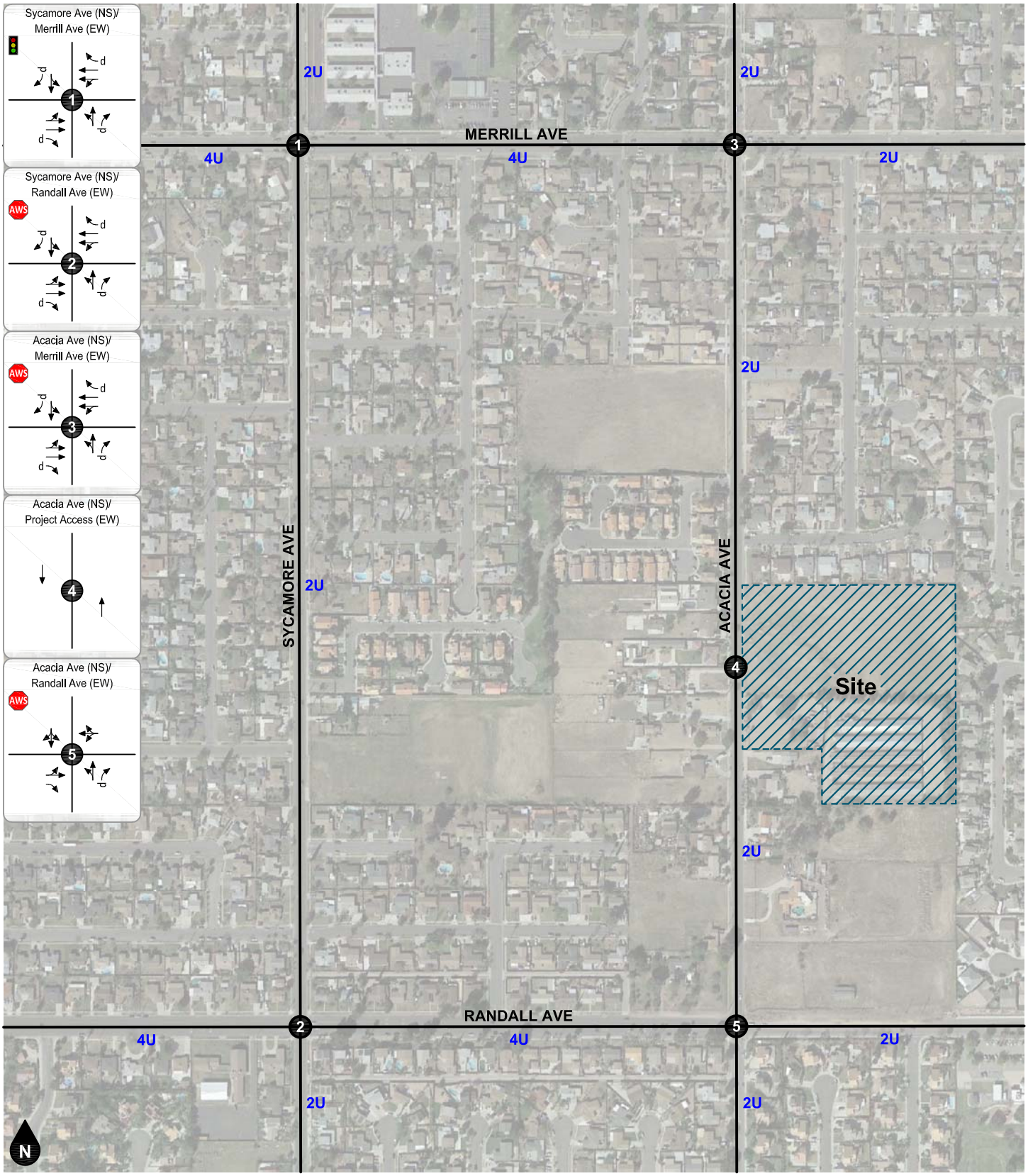
ID	Study Intersection	Traffic Control[1]	AM Peak Hour		PM Peak Hour	
			Delay[2]	LOS[3]	Delay[2]	LOS[3]
1.	Sycamore Avenue at Merrill Avenue	TS	47.4	D	12.9	B
2.	Sycamore Avenue at Randall Avenue	AWS	17.6	C	12.9	B
3.	Acacia Avenue at Merrill Avenue	AWS	27.2	D	14.0	B
5.	Acacia Avenue at Randall Avenue	AWS	34.4	D	10.4	B

Notes:

(1) TS = Traffic Signal; AWS = All Way Stop

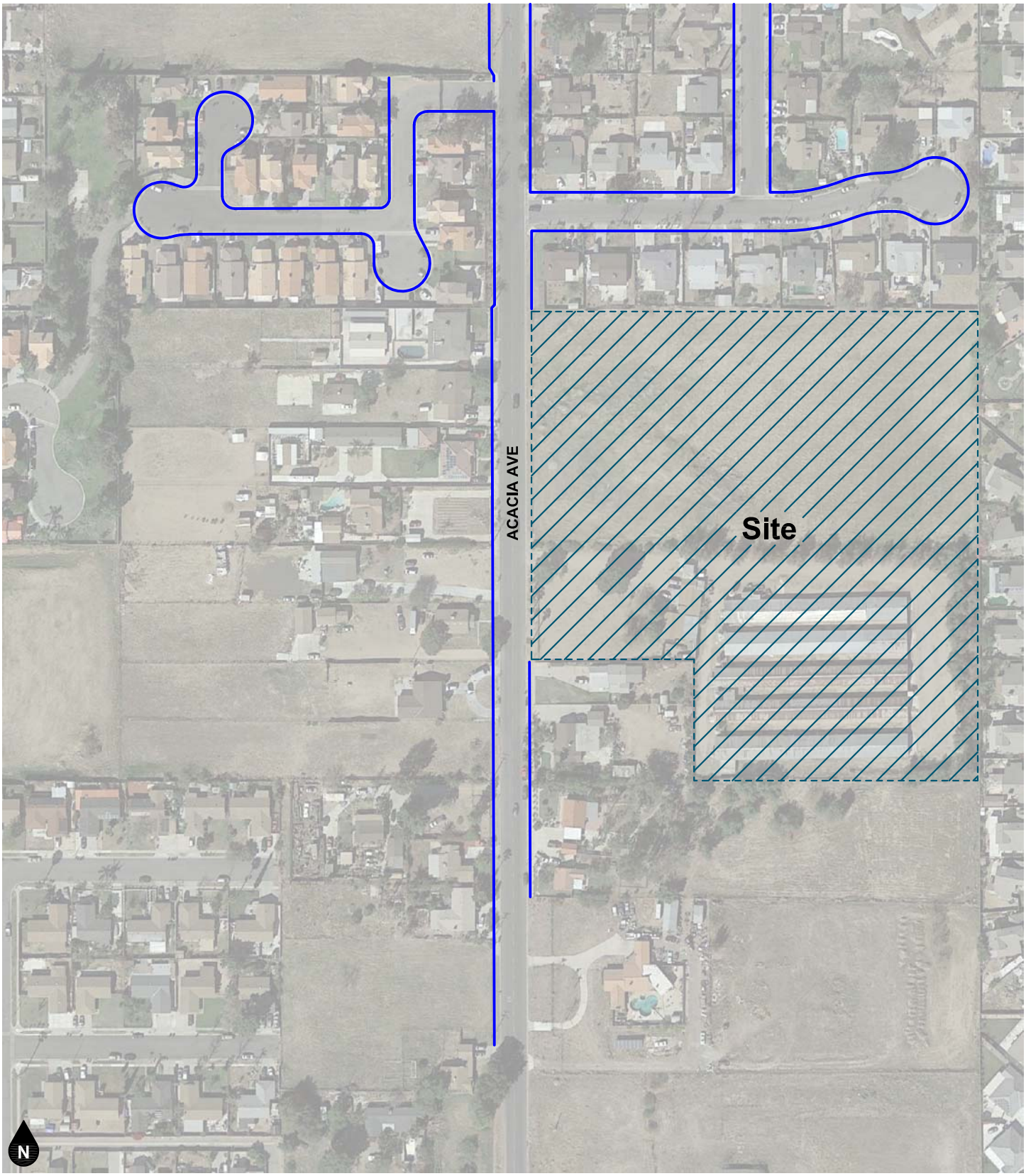
(2) Delay is shown in seconds/vehicle. For intersections with traffic signal or all way stop control, overall average intersection delay and Level of Service are shown. For intersections with cross street stop control, Level of Service is based on average delay of the worst individual lane (or

(3) LOS = Level of Service



Legend
- Traffic Signal
- AWS All Way Stop
- #U #-Lane Undivided Roadway
- Existing Lane
- d De Facto Right Turn Lane

Figure 3
Existing Lane Geometry and Intersection Traffic Controls



Legend
Sidewalk

Figure 4
Existing Pedestrian Facilities

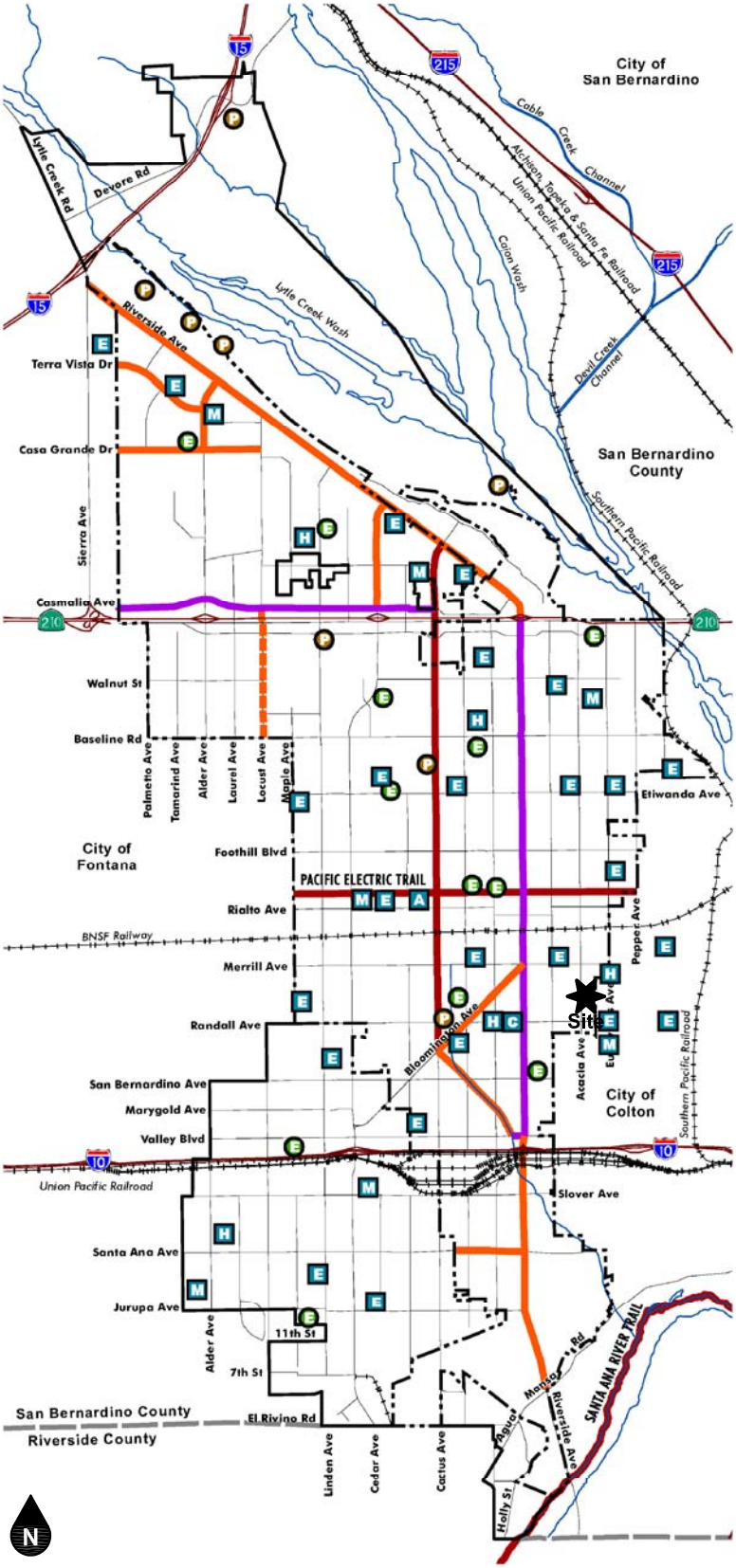


Figure 5
City of Rialto Bikeway Master Plan

Source: City of Rialto

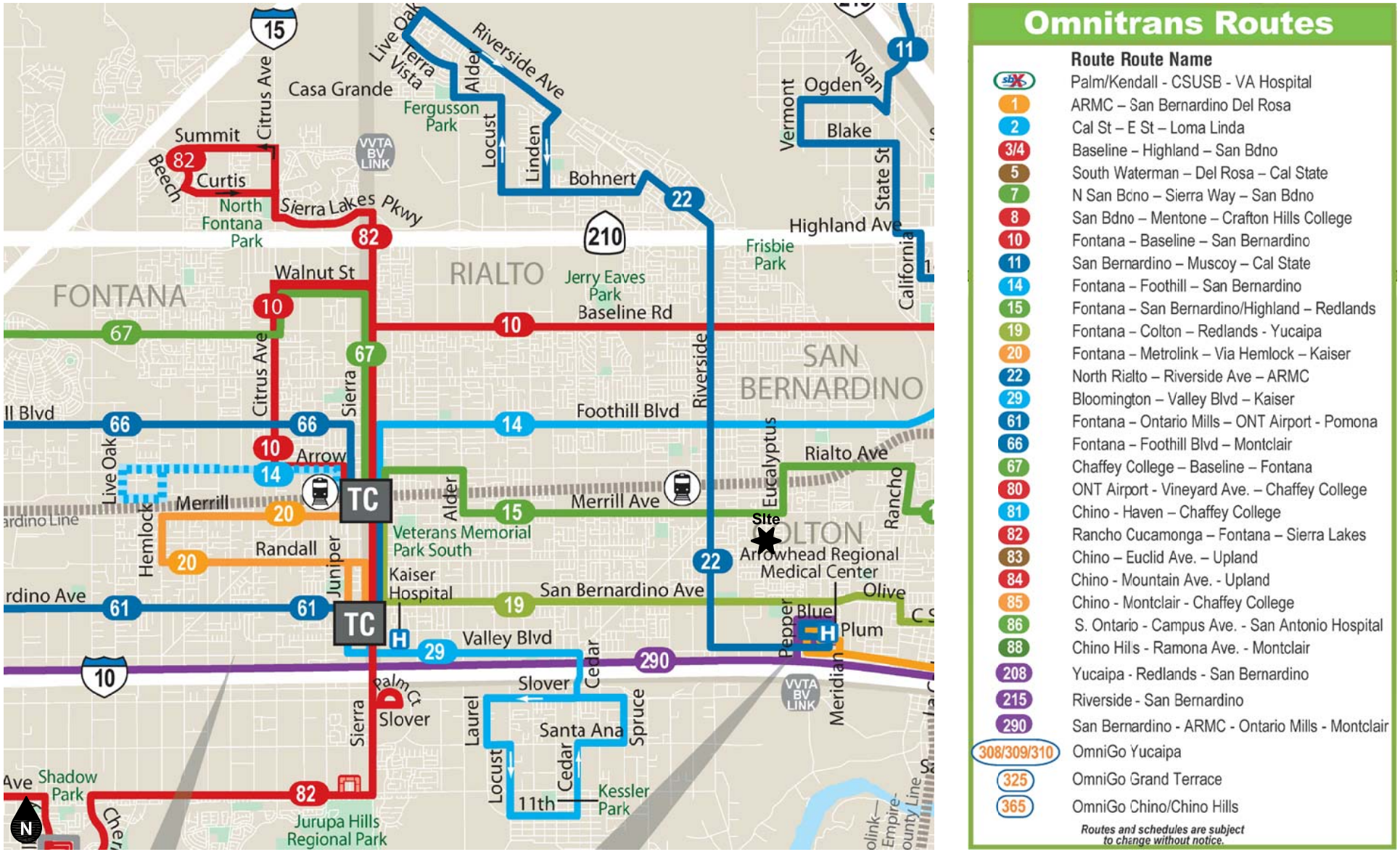


Figure 6
City of Rialto Transit Routes

Source: Omnitrans

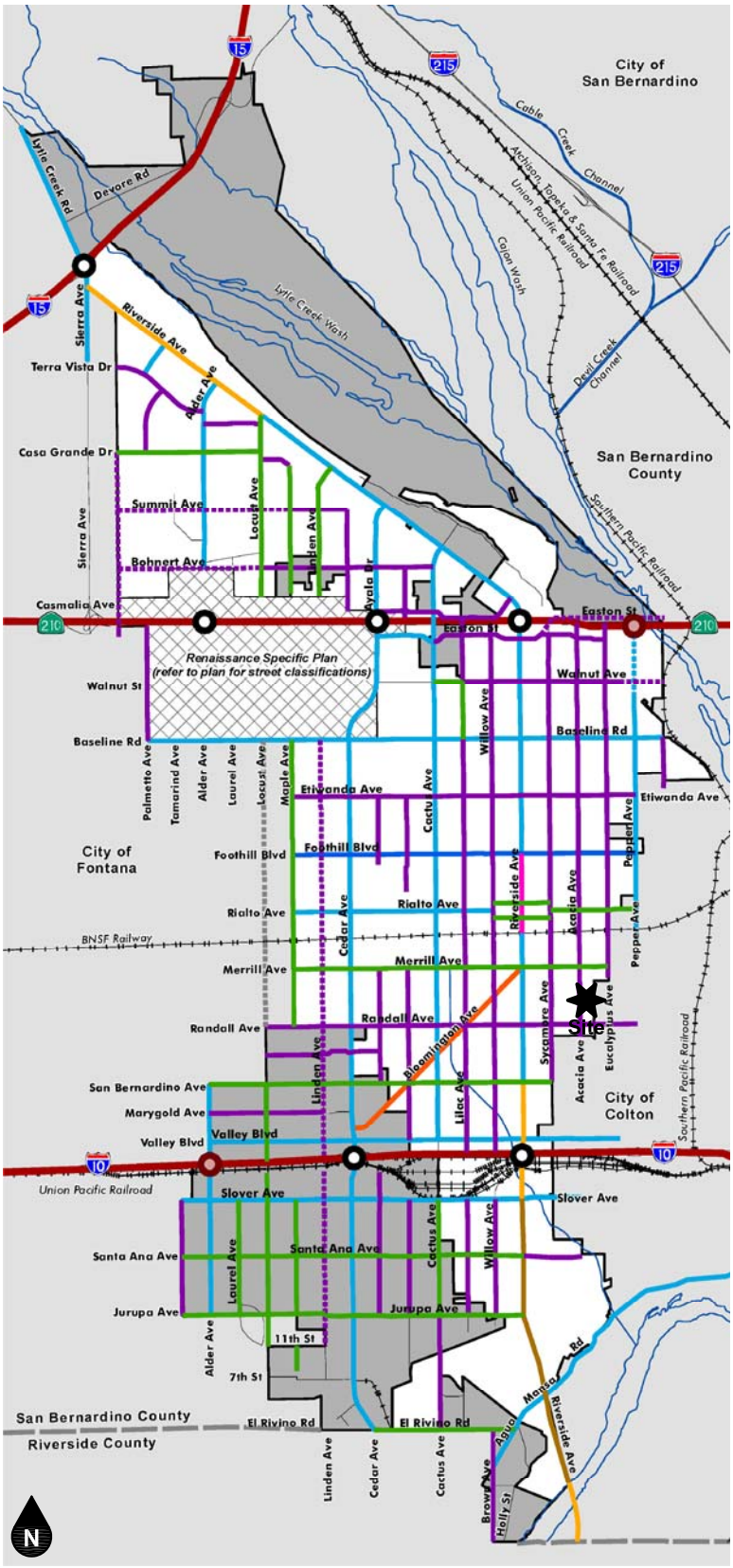
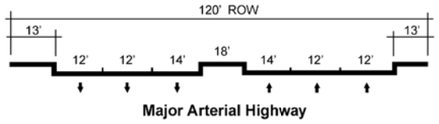


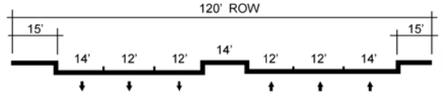
Figure 7
City of Rialto General Plan Circulation Element

Source: City of Rialto



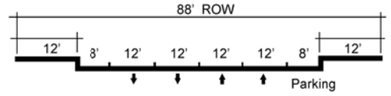
Major Arterial Highway

Major Arterial Highway



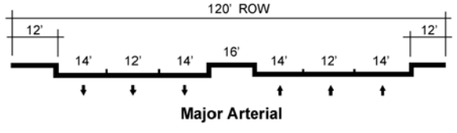
Modified Major Arterial II

Modified Major Arterial II



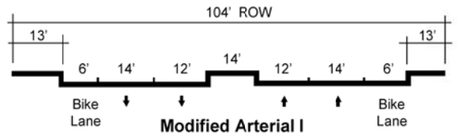
Secondary Arterial

Secondary Arterial



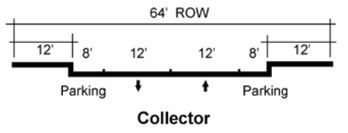
Major Arterial

Major Arterial



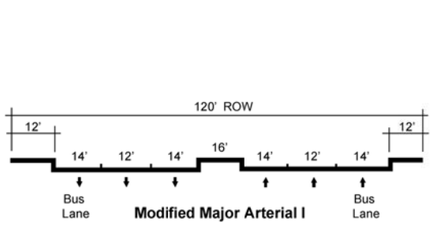
Modified Arterial I

Modified Arterial I



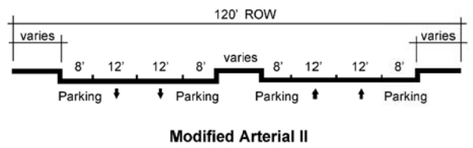
Collector

Collector Street



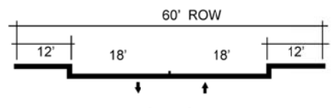
Modified Major Arterial I

Modified Major Arterial I



Modified Arterial II

Modified Arterial II

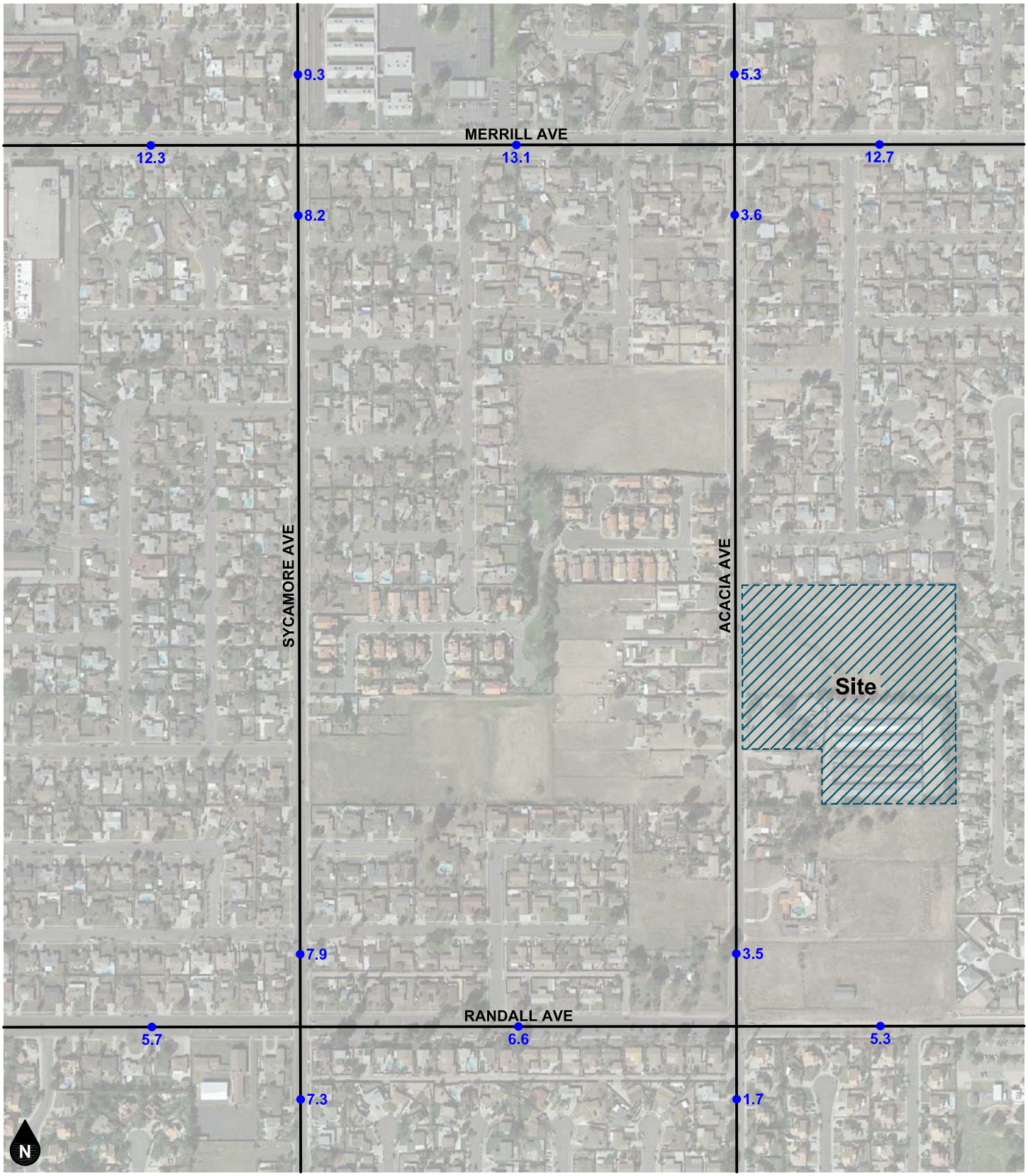


Local

Local Street

Figure 8
City of Rialto General Plan Roadway Cross-Sections

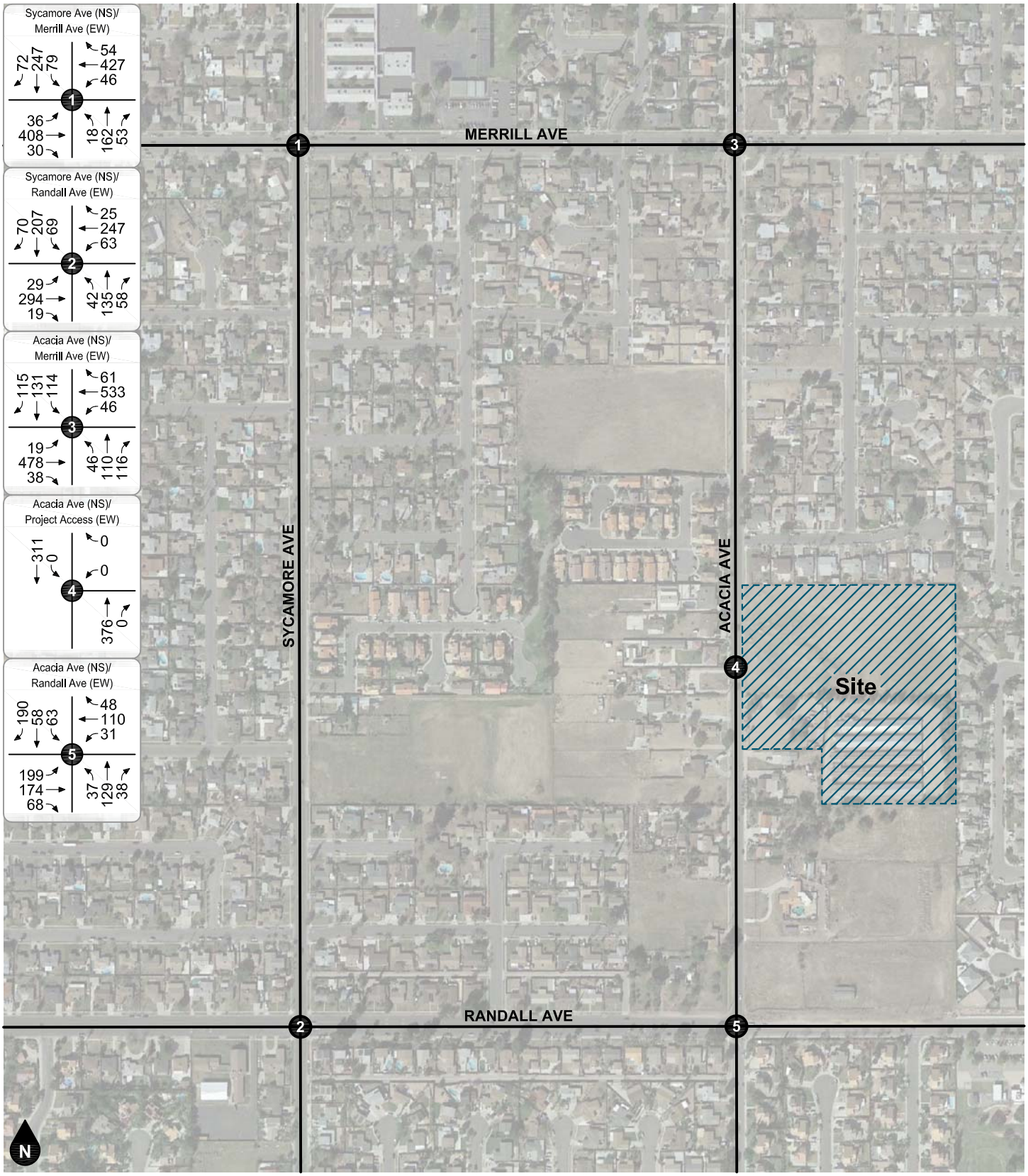
Source: City of Rialto



Legend

●## Vehicles Per Day (1,000's)

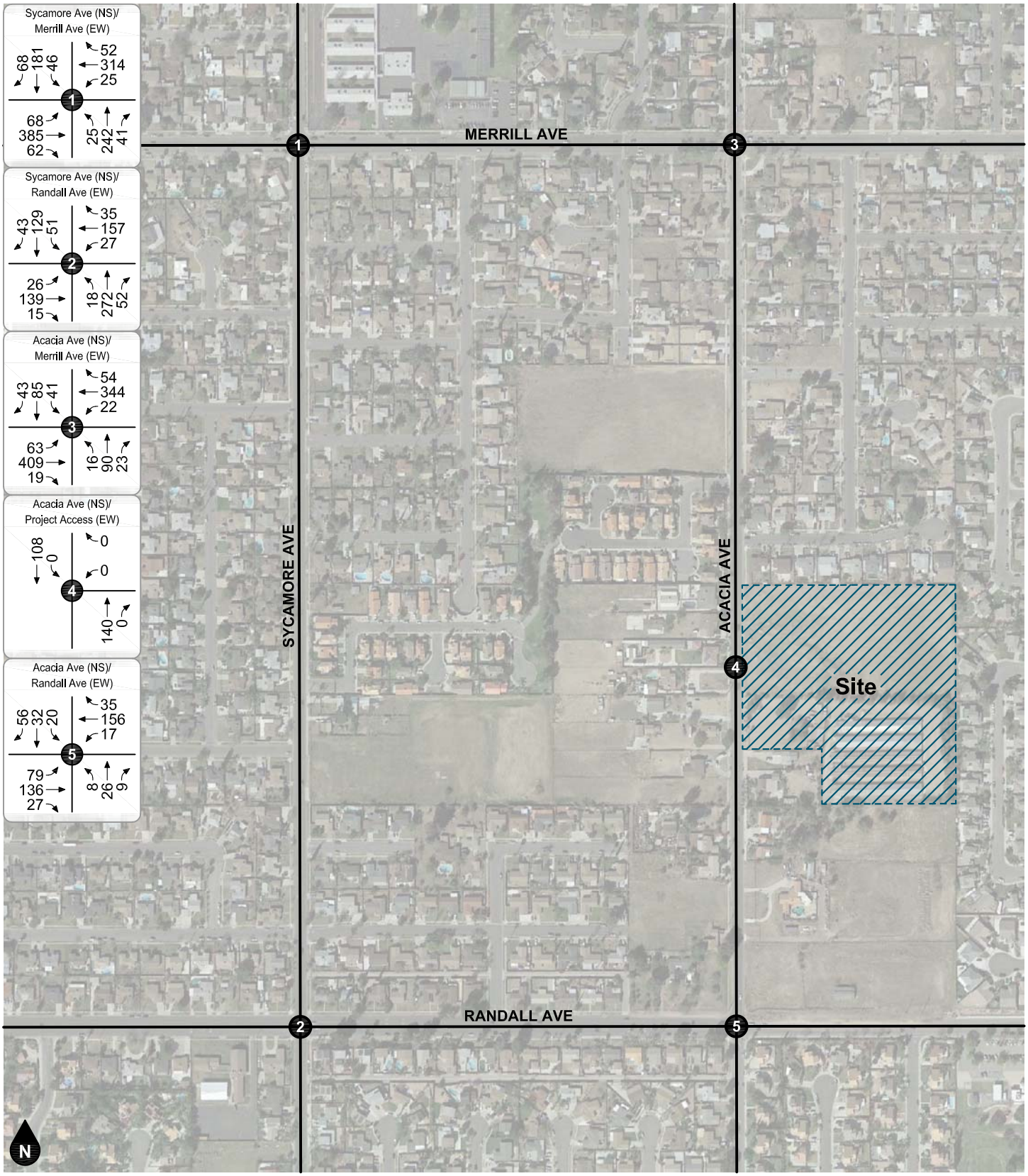
Figure 9
Existing Average Daily Traffic Volumes



Legend

(#) Study Intersection

Figure 10
Existing AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

Figure 11
Existing PM Peak Hour Intersection Turning Movement Volumes

4. PROJECT TRIP FORECASTS

This section describes how project trip generation, trip distribution, and trip assignment forecasts were developed. The forecast project volumes are illustrated on figures contained in this section.

The project site is proposing 61 single-family residential dwelling units and is located east of Acacia Avenue between Merrill Avenue and Randall Avenue in the City of Rialto. The project site is currently vacant except for an existing residence on the southern portion of the project site. Project site access is proposed to Acacia Avenue.

PROJECT TRIP GENERATION

The trips generated by the project are determined by multiplying an appropriate trip generation rate by the quantity of land use. Trip generation rates are predicated on the assumption that energy costs, the availability of roadway capacity, the availability of vehicles to drive, and our life styles remain similar to what are known today. A major change in these variables may affect trip generation rates.

Trip generation rates were determined for daily trips, AM peak hour inbound and outbound trips, and PM peak hour inbound and outbound trips for the proposed land use. By multiplying the trip generation rates by the land use quantity, the traffic volumes are determined. Table 2 exhibits the trip generation rates, project peak hour volumes, and project daily traffic volumes. The trip generation rates are from the Institute of Transportation Engineers, Trip Generation Manual, 10th Edition, 2017.

As shown in Table 2, the proposed project is forecast to generate approximately 576 daily vehicle trips, including 45 vehicle trips during the AM peak hour and 60 vehicle trips during the PM peak hour.

PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

Figure 12 shows the forecast directional distribution trip patterns for the project. The project trip distribution patterns are based on review of existing volume data, surrounding land uses, designated truck routes, and the local and regional roadway facilities in the project vicinity.

Based on the identified project trip generation and distributions, project average daily traffic volumes have been calculated and shown on Figure 13. The AM and PM peak hour intersection turning movement volumes expected from the project are depicted on Figure 14 and Figure 15, respectively.

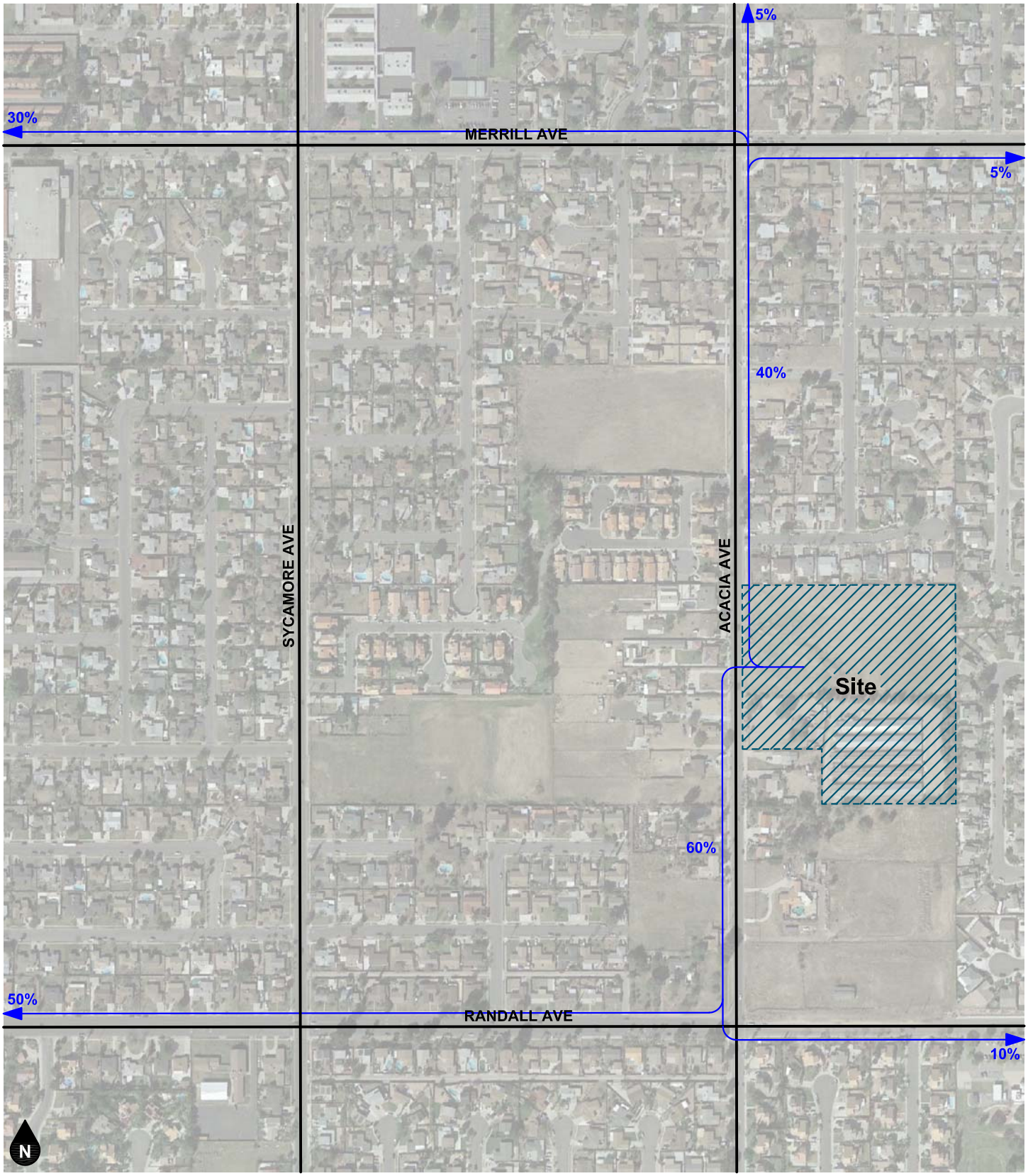
Table 2
Project Trip Generation

Trip Generation Rates									
			AM Peak Hour			PM Peak Hour			
Land Use	Source[1]	Unit[2]	% In	% Out	Total	% In	% Out	Total	Daily Rate
Single-Family Detached Residential	ITE 210	DU	25%	75%	0.74	63%	37%	0.99	9.44

Trips Generated									
			AM Peak Hour			PM Peak Hour			
Land Use	Quantity	Unit[2]	In	Out	Total	In	Out	Total	Daily
Single-Family Detached Residential	61	DU	**11**	**34**	**45**	**38**	**22**	**60**	**576**

Notes:
(1) ITE = Institute of Transportation Engineers, Trip Generation Manual, 10th Edition, 2017; ### = Land Use Code

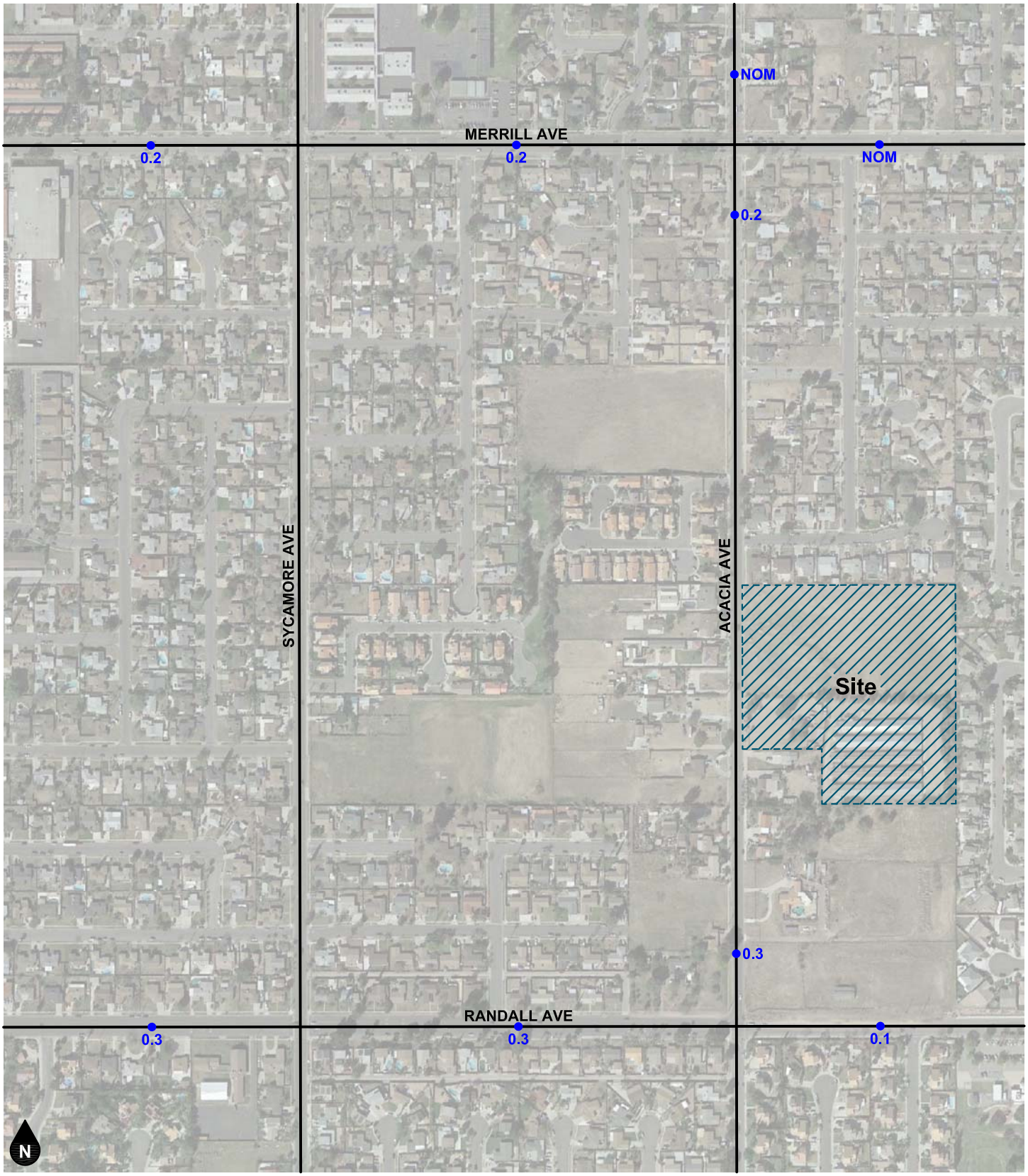
(2) DU = Dwelling Units



Legend

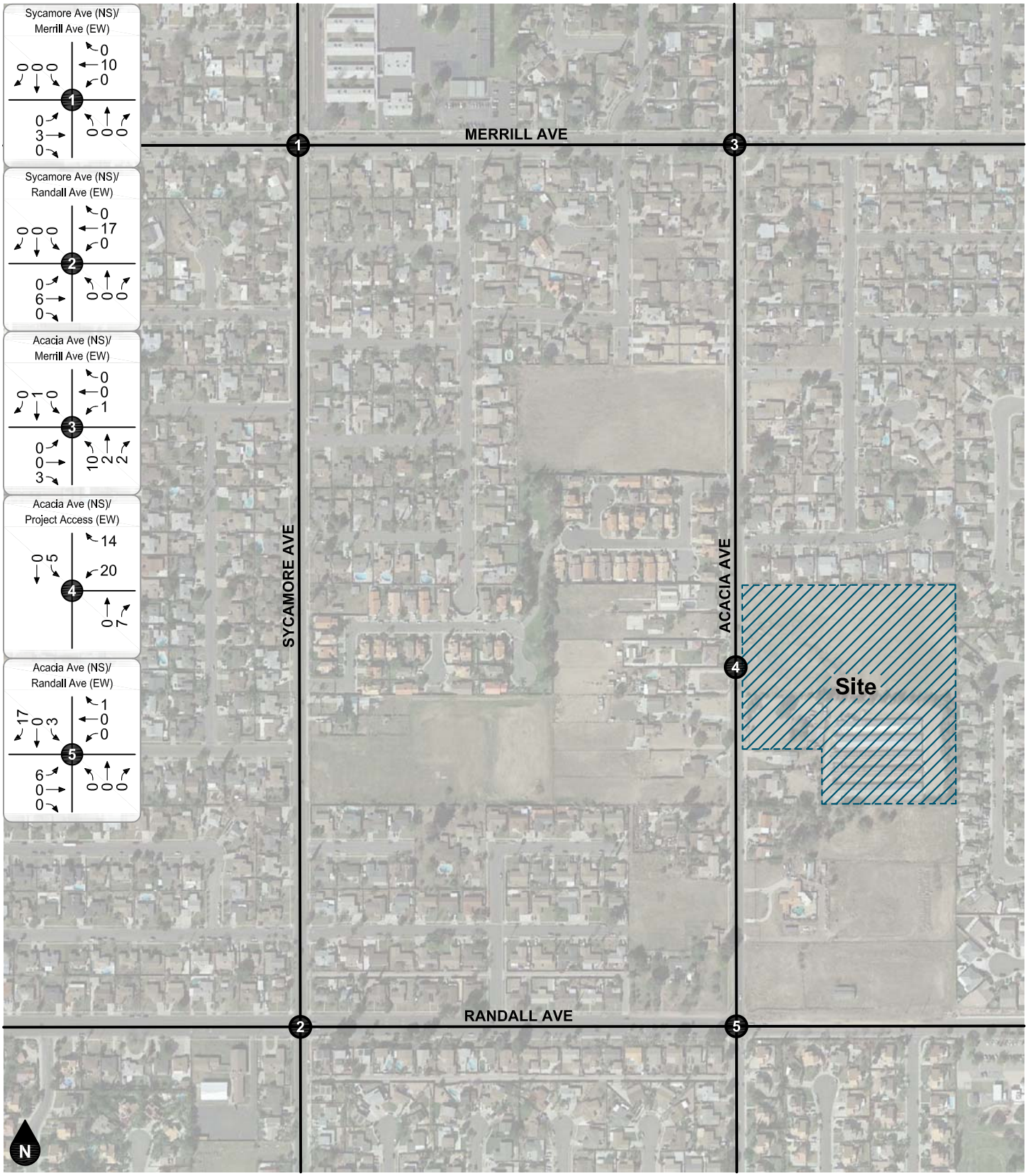
10% Percent To/From Project

Figure 12
Project Trip Distribution



Legend
● ## Vehicles Per Day (1,000's)
NOM Nominal; Less Than 50 Vehicles Per Day

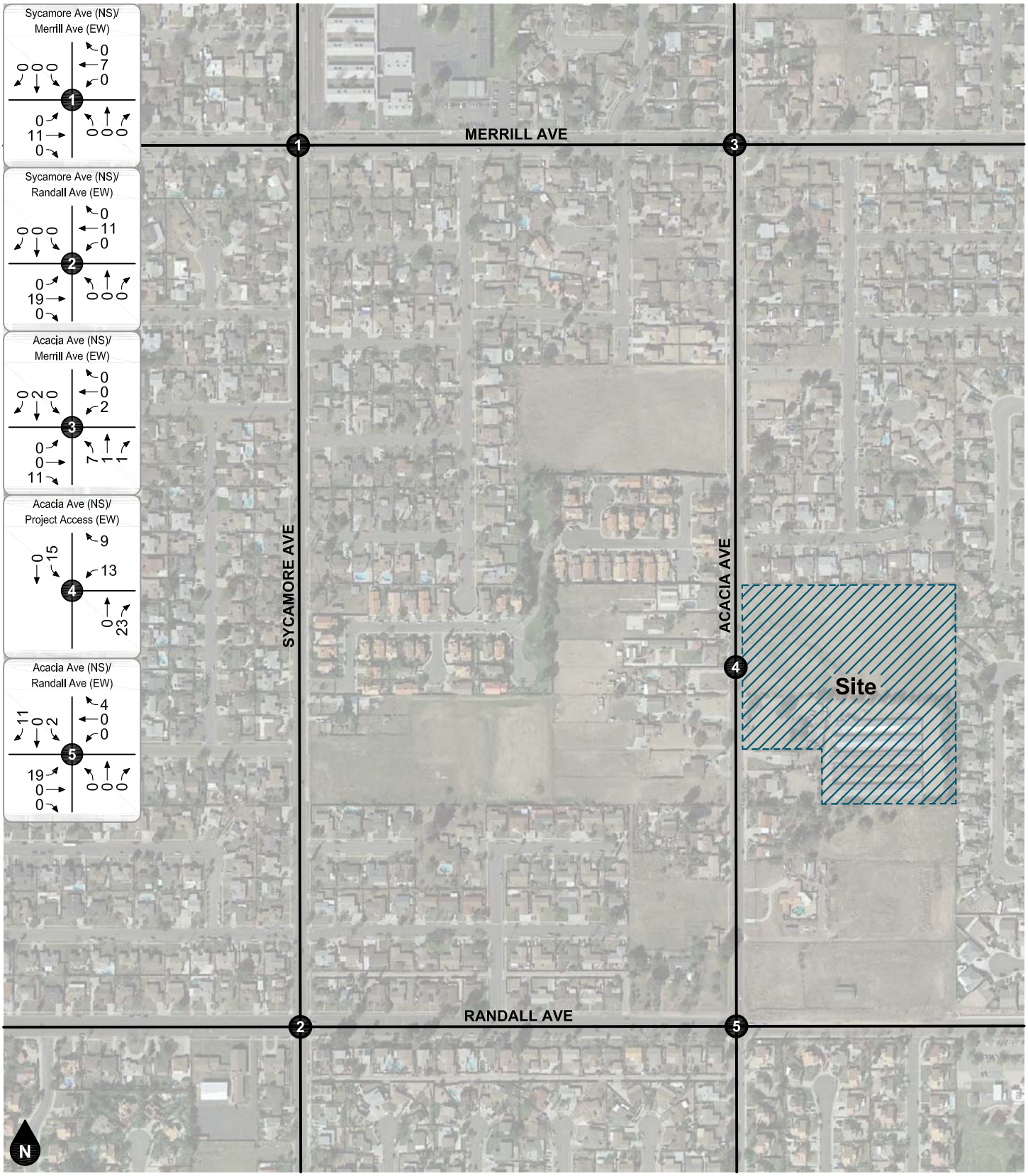
Figure 13
Project Average Daily Traffic Volumes



Legend

(#) Study Intersection

Figure 14
Project AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

Figure 15
Project PM Peak Hour Intersection Turning Movement Volumes

5. FUTURE VOLUME FORECASTS

This section describes how future volume forecasts for each analysis scenario were developed. Forecast study area volumes are illustrated on figures contained in this section.

AMBIENT GROWTH RATE

To account for areawide growth on roadways, traffic volumes have been calculated based on an annual growth rate of 2.0 percent per year over existing traffic volumes. This is a conservative assumption since the ambient growth was applied to all movements at the study intersections.

OTHER DEVELOPMENT

Location

A list of other pending or approved development projects in the study area were obtained from the City of Rialto, City of Colton, and City of San Bernardino staff. Other developments that will potentially add trips to the study intersections were identified and are shown on Figure 16.

Trip Generation

Other development trip generation forecasts are shown in Table 3.

Trip Distribution

For purposes of this traffic impact analysis, other developments were aggregated into Traffic Analysis Zone (TAZs). The forecast trip distribution patterns for the identified other development zones are provided in Appendix E.

Trip Assignment

The total average daily traffic volumes added to the study area by other developments are shown on Figure 17. The AM peak hour and PM peak hour intersection turning movement volumes added to the study intersections by other developments are shown on Figure 18 and Figure 19, respectively.

ANALYSIS SCENARIO VOLUME FORECASTS

Existing Plus Project

Existing Plus Project volume forecasts were developed by adding the project generated trips to Existing volumes. Existing Plus Project average daily traffic volumes are shown on Figure 20. Existing Plus Project AM and PM peak hour intersection turning movement volumes are shown on Figure 21 and Figure 22, respectively.

Existing Plus Ambient Growth

Existing Plus Ambient Growth volume forecasts were developed by adding ambient growth to Existing volumes. Existing Plus Ambient Growth average daily traffic volumes are shown on Figure 23. Existing Plus Ambient Growth AM and PM peak hour intersection turning movement volumes are shown on Figure 24 and Figure 25, respectively.

Project Completion

Project Completion volume forecasts were developed by adding ambient growth and project traffic to Existing volumes. Project Completion average daily traffic volumes are shown on Figure 26. Project Completion AM and PM peak hour intersection turning movement volumes are shown on Figure 27 and Figure 28, respectively.

Existing Plus Ambient Growth Plus Cumulative

Existing Plus Ambient Growth Plus Cumulative volume forecasts were developed by adding ambient growth and other development traffic to Existing volumes. Existing Plus Ambient Growth Plus Cumulative average daily traffic volumes are shown on Figure 29. Existing Plus Ambient Growth Plus Cumulative AM and PM peak hour intersection turning movement volumes are shown on Figure 30 and Figure 31, respectively.

Cumulative Conditions

Cumulative Conditions volume forecasts were developed by adding ambient growth, other development traffic, and project traffic to Existing volumes. Cumulative Conditions average daily traffic volumes are shown on Figure 32. Cumulative Conditions AM and PM peak hour intersection turning movement volumes are shown on Figure 33 and Figure 34, respectively.

Table 3
Other Development Trip Generation

Traffic Analysis Zone	Project Name	Land Use	Quantity	Units[2]	Peak Hour						Daily
					AM			PM			
					Inbound	Outbound	Total	Inbound	Outbound	Total	
1	128 East Wilson Street	Multi-Family Housing (Low-Rise)	3	DU	0	1	1	1	1	2	22
	West of Riverside Ave, South of Bloomington Avenue	Apartments	104	DU	11	37	48	37	22	59	761
	Bonnie View Drive between Willow Avenue and Riverside Avenue[4]	Single-Family Detached Residential	57	DU	11	32	43	36	21	57	538
	Subtotal				11	38	49	38	23	61	783
2	West of Cactus Avenue, South of Carter Avenue	Single-Family Detached Residential	76	DU	14	42	56	47	28	75	717
	Northeast corner of Cactus Avenue and Randall Avenue	Community Park	3.85	AC	0	0	0	0	0	0	3
	Subtotal				14	42	56	47	28	75	720
3	South of San Bernardino Avenue between Willow Avenue and Riverside Avenue	Warehouse - Cars	74.366	TSF	8	2	10	3	8	11	104
		Warehouse - Trucks (in PCE[3])			5	0	5	0	5	5	62
	515 West Valley Boulevard	Auto Dealership	4.381	TSF	6	2	8	4	6	10	122
	Subtotal				19	4	23	7	19	26	288
4	300 North Pepper Avenue	Medical College	300	ST	27	6	33	18	15	33	345
5	Old Walmart[4]	Commercial Retail	--	--	3	39	42	25	26	51	1,894
6	Randall Avenue Single-Family[4]	Single-Family Detached Residential	8	DU	1	4	5	5	3	8	76
7	Randall/Riverside Gas Station[4]	Gasoline Station with Convenience Market	20	FP	203	203	406	224	224	448	3,963
		Pass-By Reduction (25%)			-51	-51	-102	-56	-56	-112	-991
		Restaurant	2.500	TSF	14	11	25	15	9	24	280
		Pass-By Reduction (25% PM)			--	--	--	-4	-2	-6	-6
		Subtotal			166	163	329	179	175	354	3,246
8	Wagon Wheel Project[5]	Single-Family Detached Residential	50	DU	9	28	37	31	18	49	472
9	Rally's[4]	Fast-Food Restaurant With Drive-Thru	2.200	TSF	45	43	88	37	34	71	1,036
		Pass-By Reduction (25%)			-11	-11	-22	-9	-9	-18	-259
		Subtotal			34	32	66	28	25	53	777
10	Sycamore 32[6]	Single-Family Detached Residential	32	DU	6	18	24	20	12	32	302
Total					290	374	664	398	344	742	8,903

Notes:
(1) Source: Institute of Transportation Engineers, Trip Generation Manual, 10th Edition, 2017, Land Use Codes 150, 210, 220, 411, 540, 840, 932, 934, and 945, and City of Fontana, Truck Trip Generation Study, August 2003.

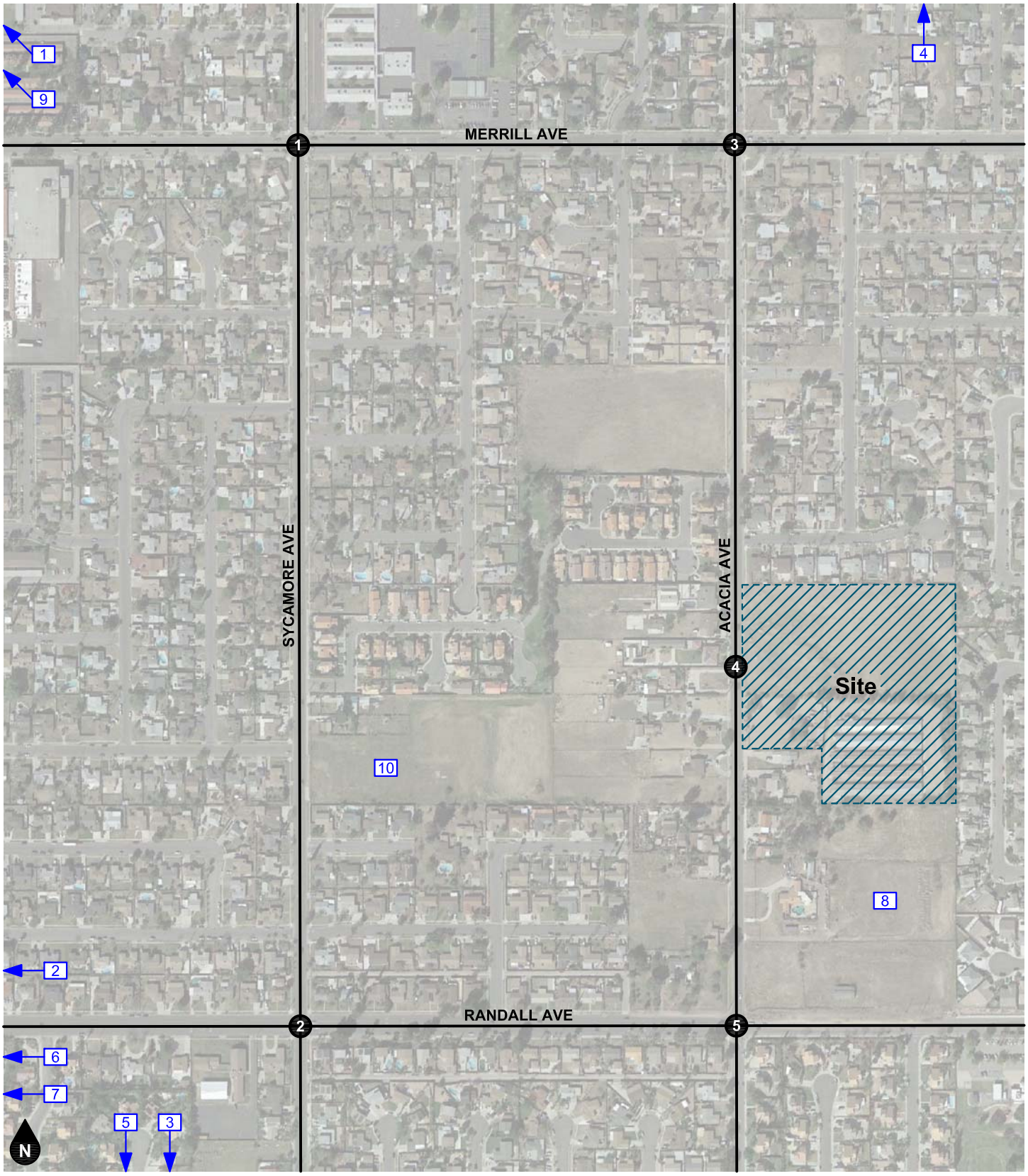
(2) DU = Dwelling Units; AC = Acres; TSF = Thousand Square Feet; ST = Students

(3) PCE = Passenger Car Equivalents

(4) Project information provided by City of Rialto Transportation Department staff.

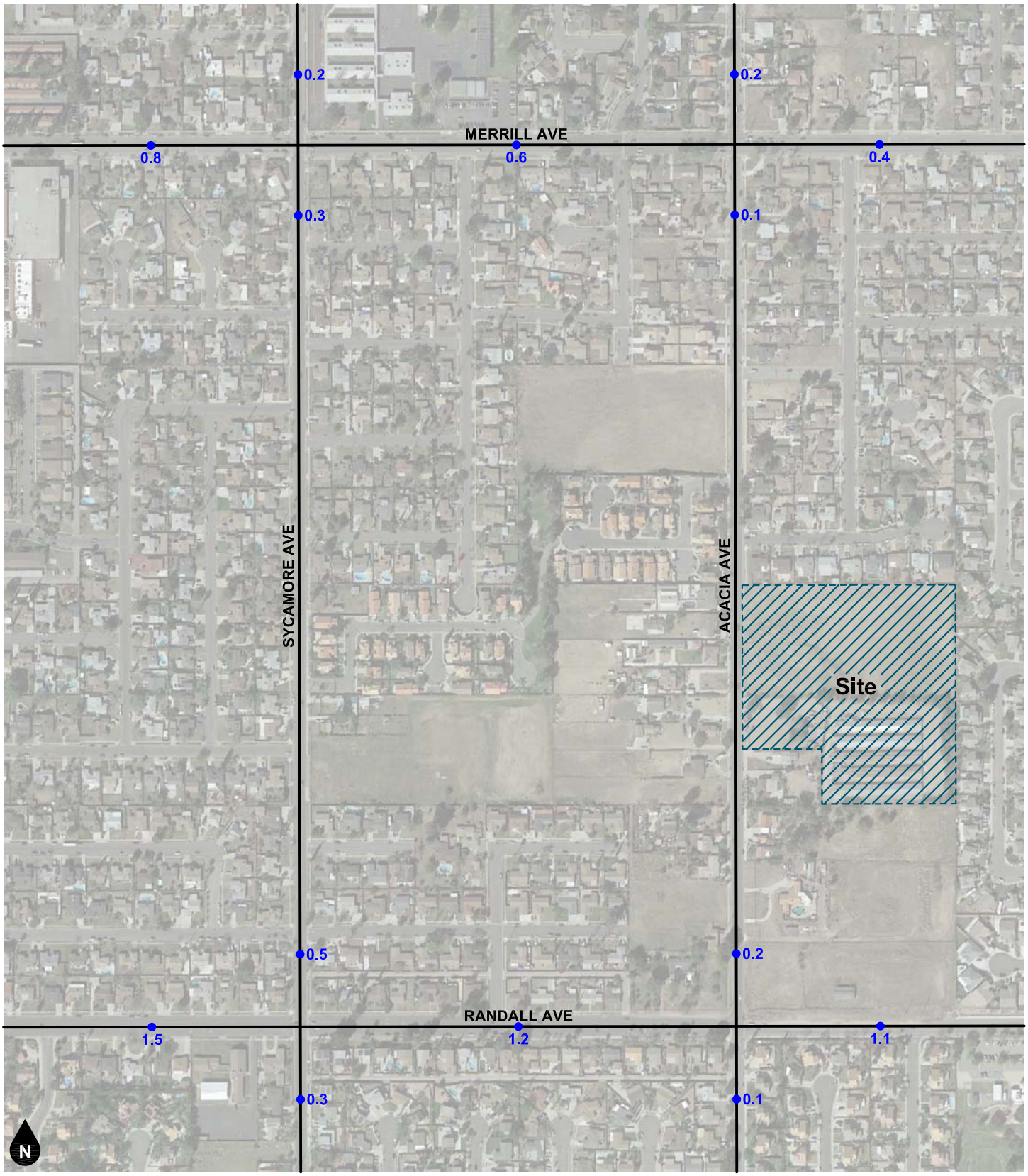
(5) Source: Wagon Wheel Project Focused Traffic Analysis (Revised), prepared by Kunzman Associates, Inc., March 12, 2018.

(6) Source: Sycamore 32 (TTM 20108) Fair Share Analysis, prepared by Ganddini Group, Inc., October 2, 2018.



Legend
[#] Traffic Analysis Zone

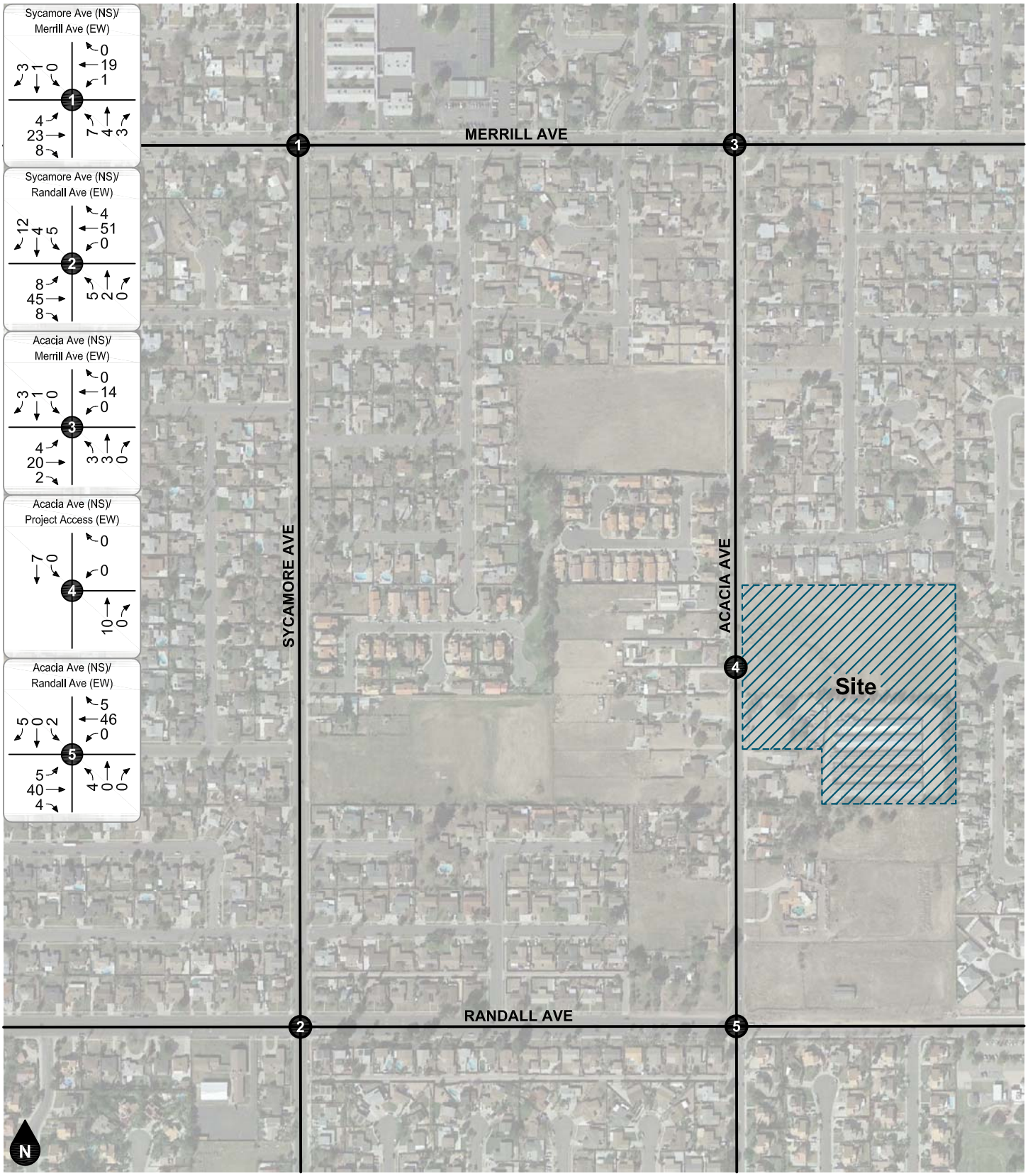
Figure 16
Other Development Traffic Analysis Zone Map



Legend

●## Vehicles Per Day (1,000's)

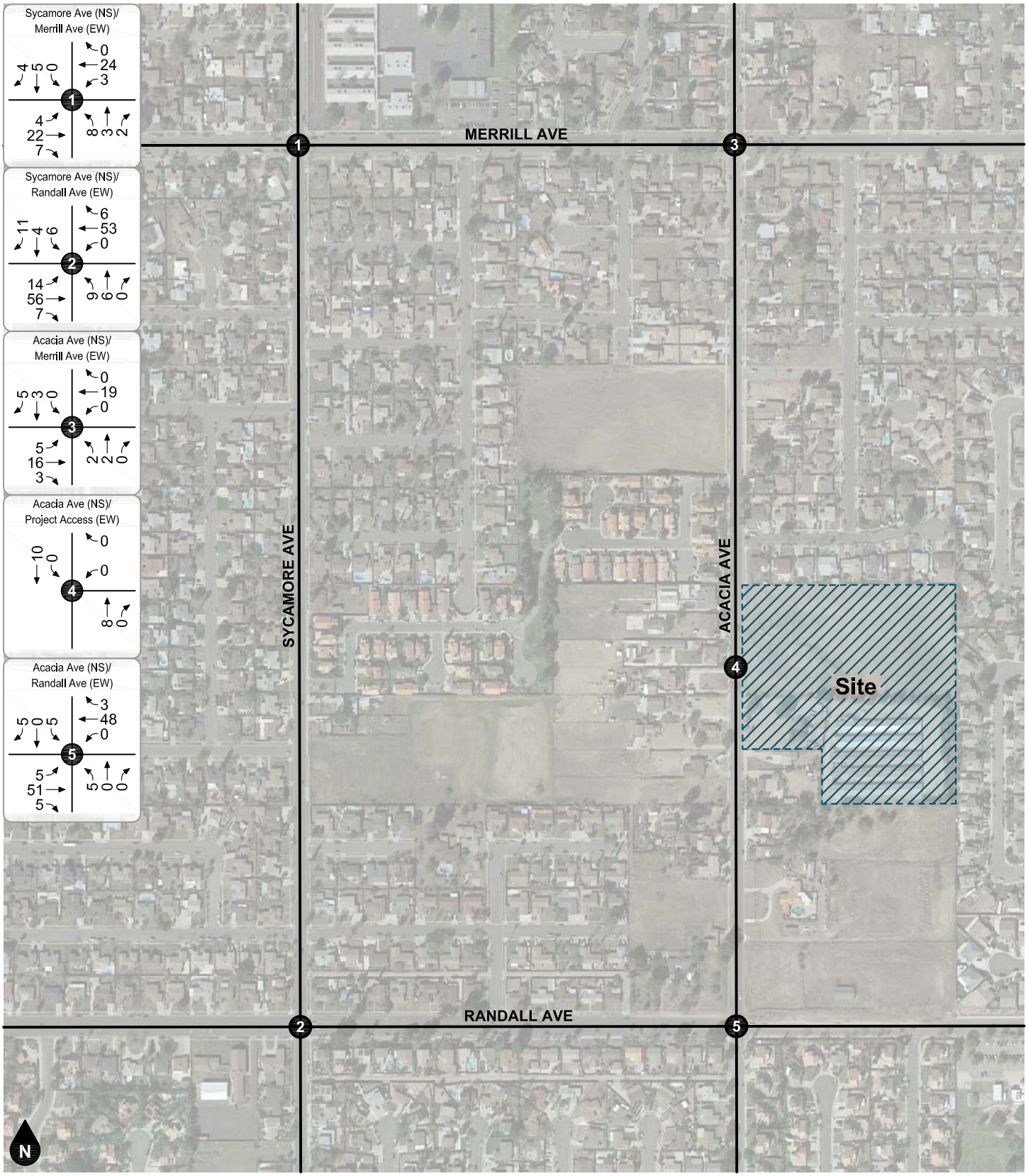
Figure 17
Other Development Average Daily Traffic Volumes



Legend

(#) Study Intersection

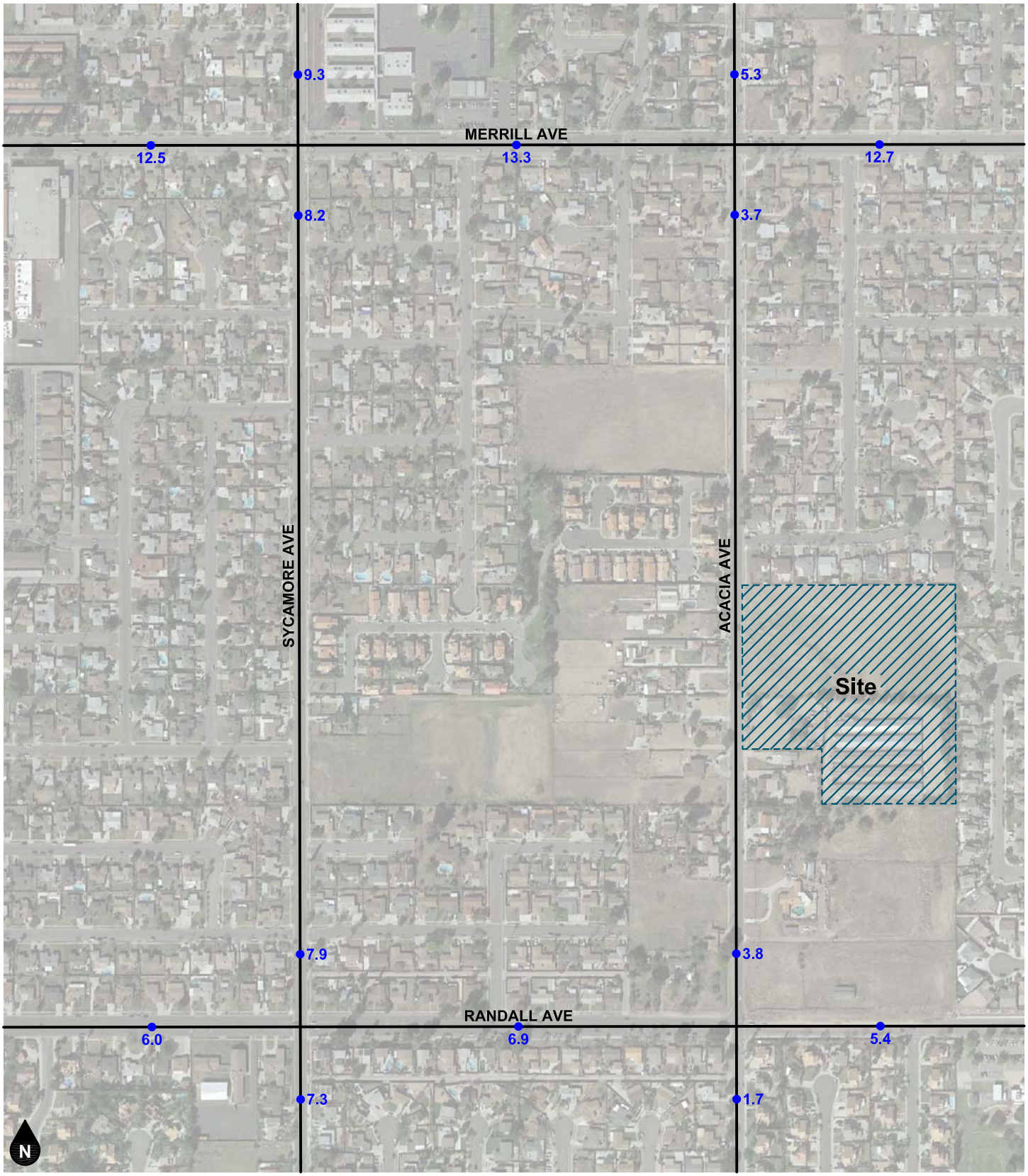
Figure 18
Other Development
AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

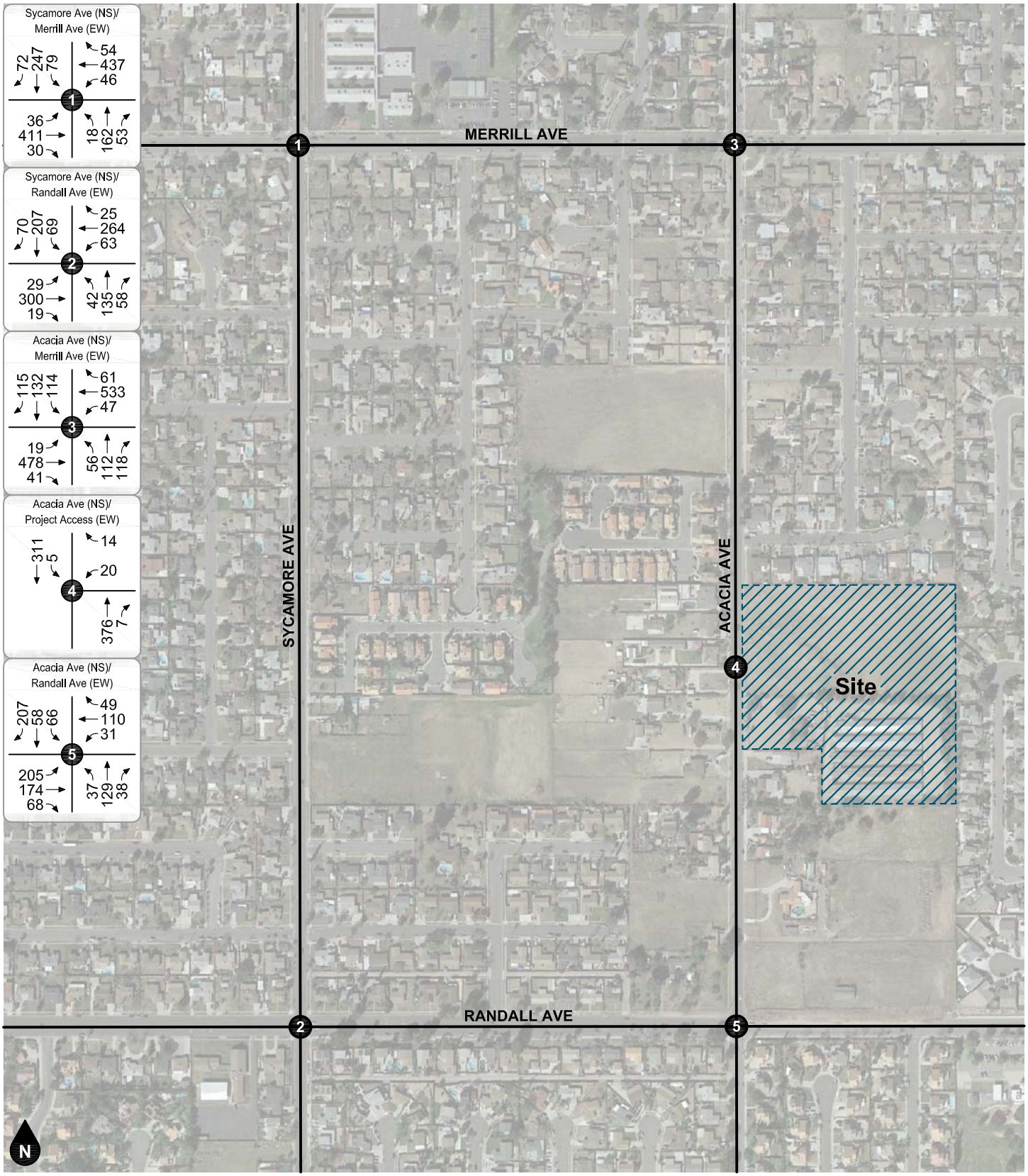
Figure 19
Other Development
PM Peak Hour Intersection Turning Movement Volumes



Legend

●## Vehicles Per Day (1,000's)

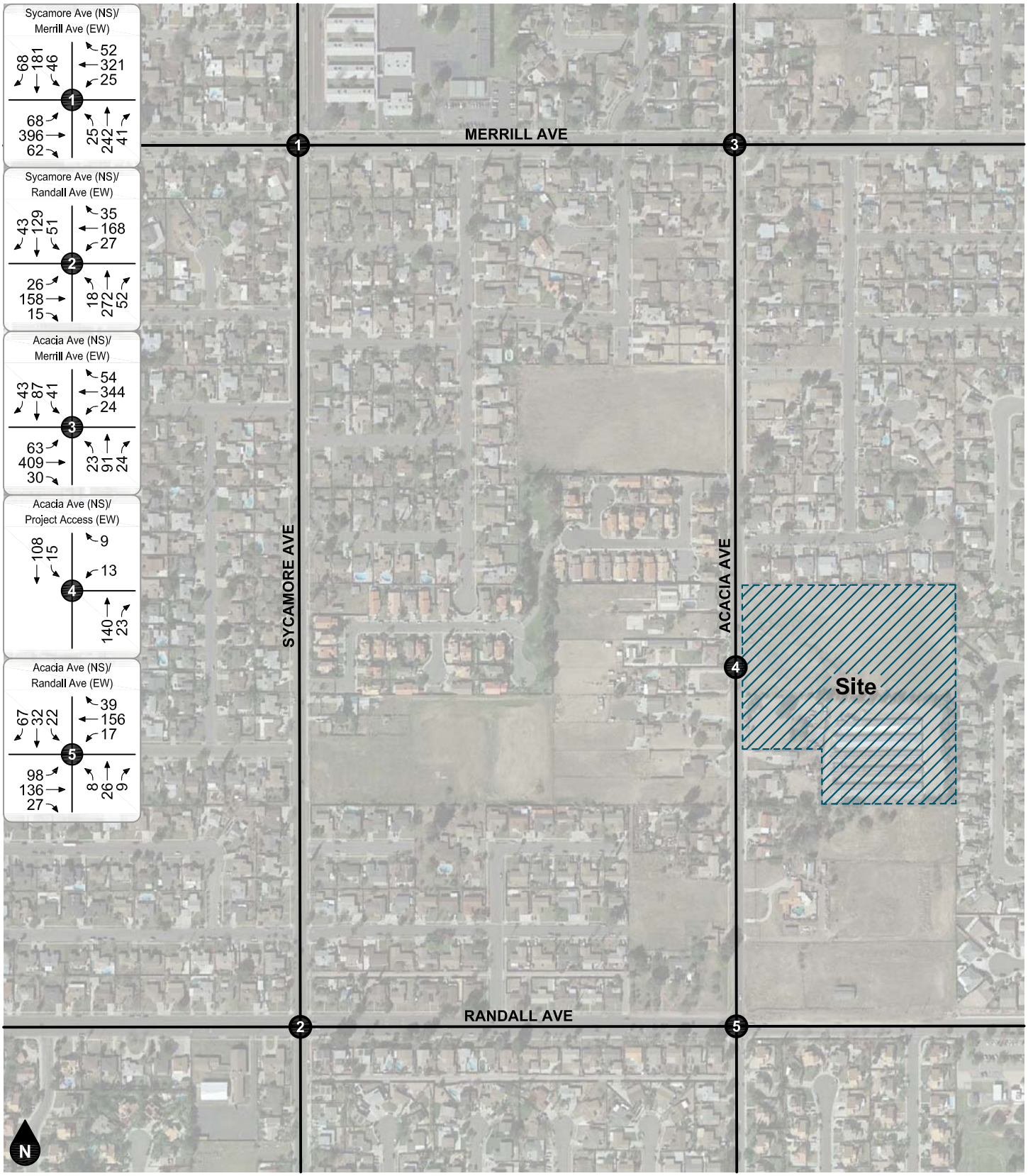
Figure 20
Existing Plus Project Average Daily Traffic Volumes



Legend

(#) Study Intersection

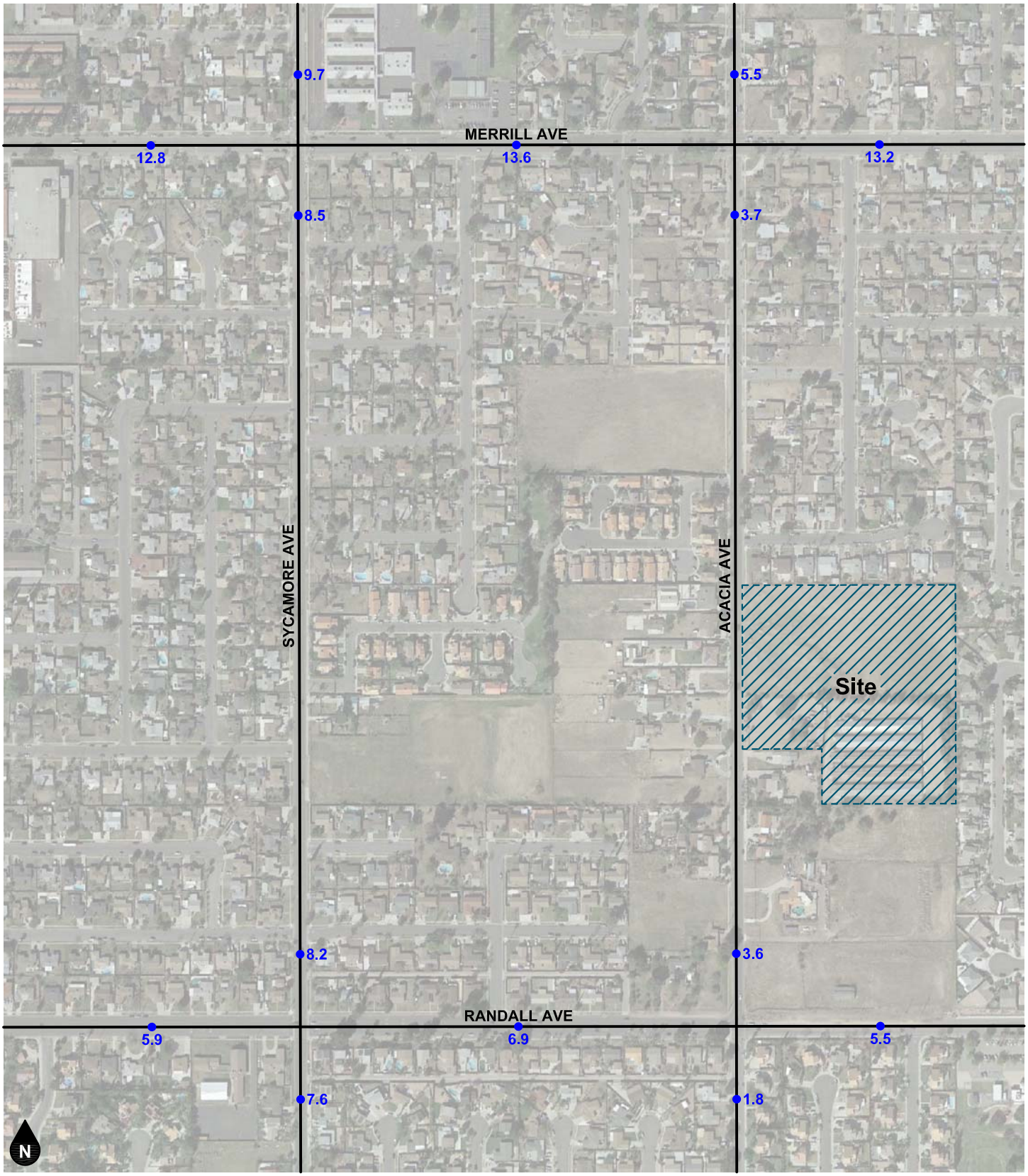
Figure 21
Existing Plus Project
AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

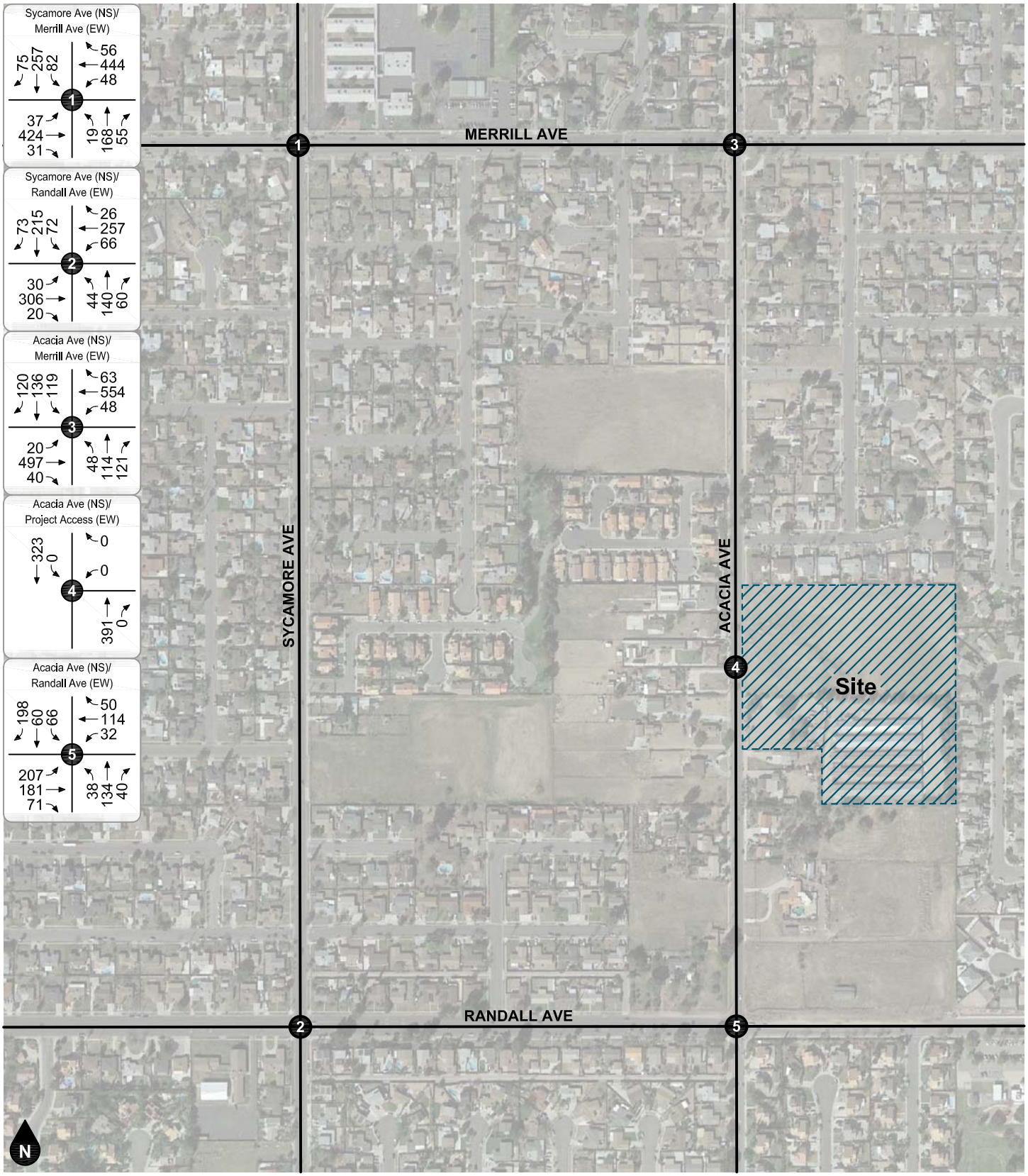
Figure 22
Existing Plus Project
PM Peak Hour Intersection Turning Movement Volumes



Legend

●## Vehicles Per Day (1,000's)

Figure 23
Existing Plus Ambient Growth Average Daily Traffic Volumes



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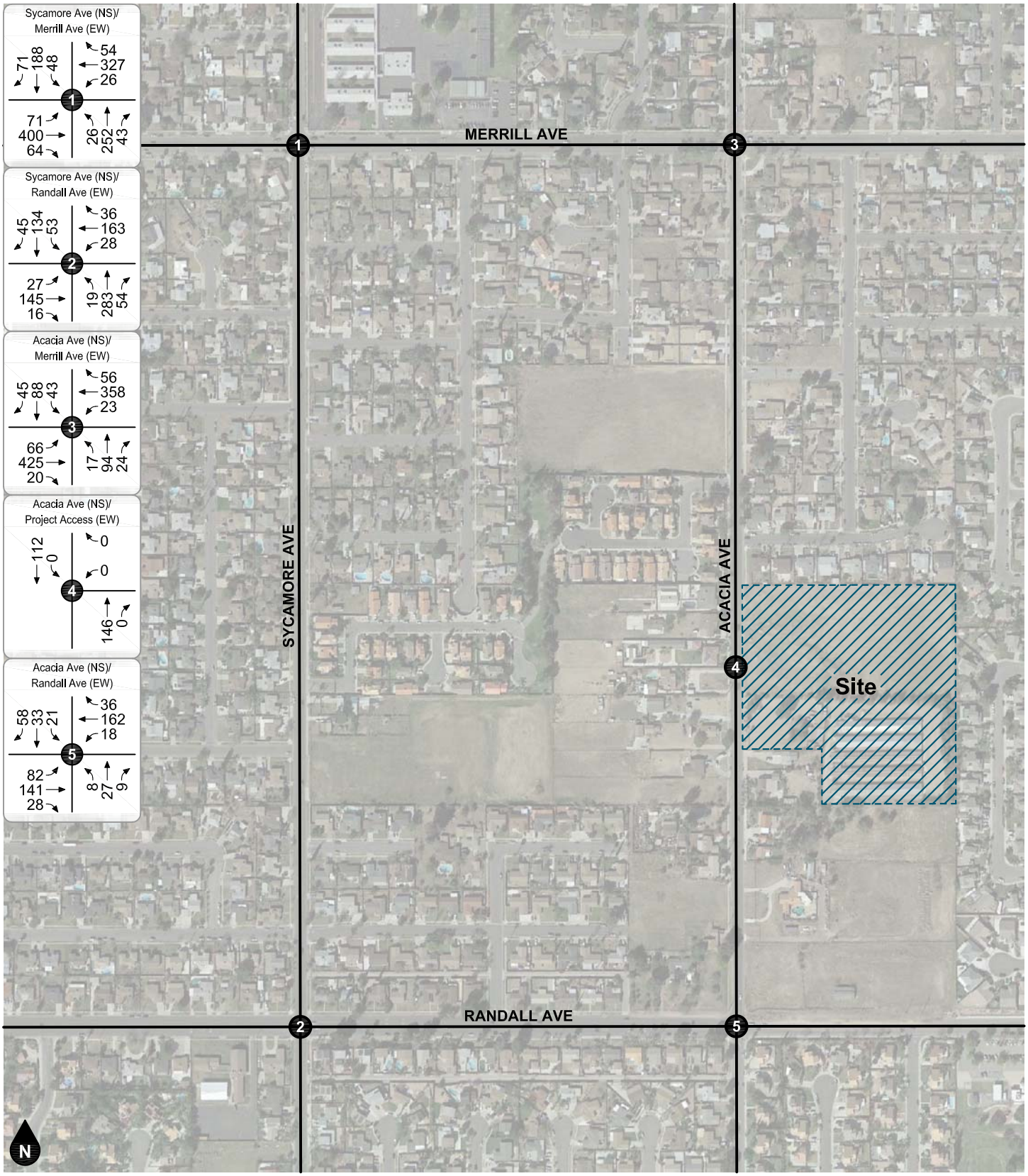
(#) Study Intersection

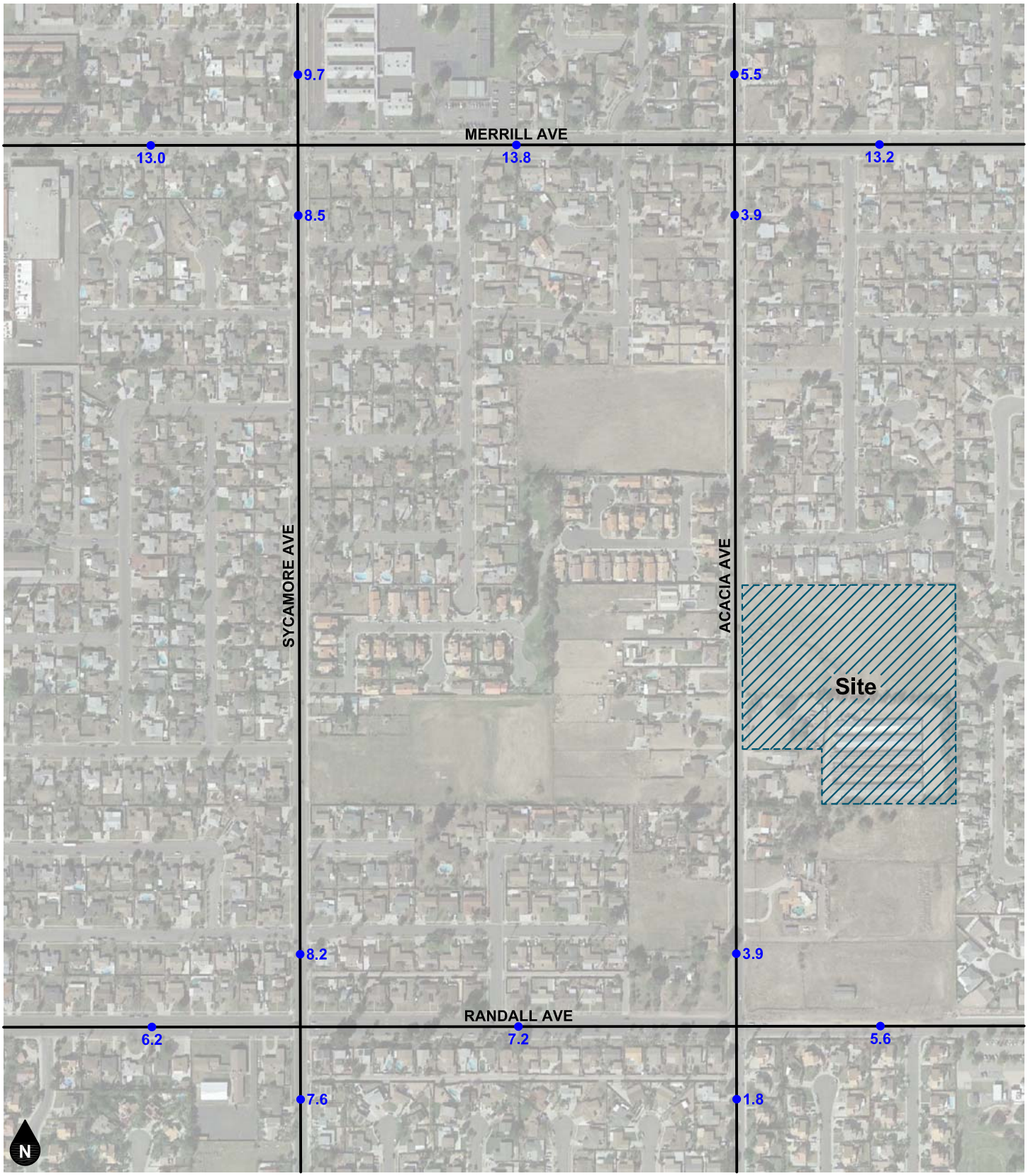
Figure 24
Existing Plus Ambient Growth
AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

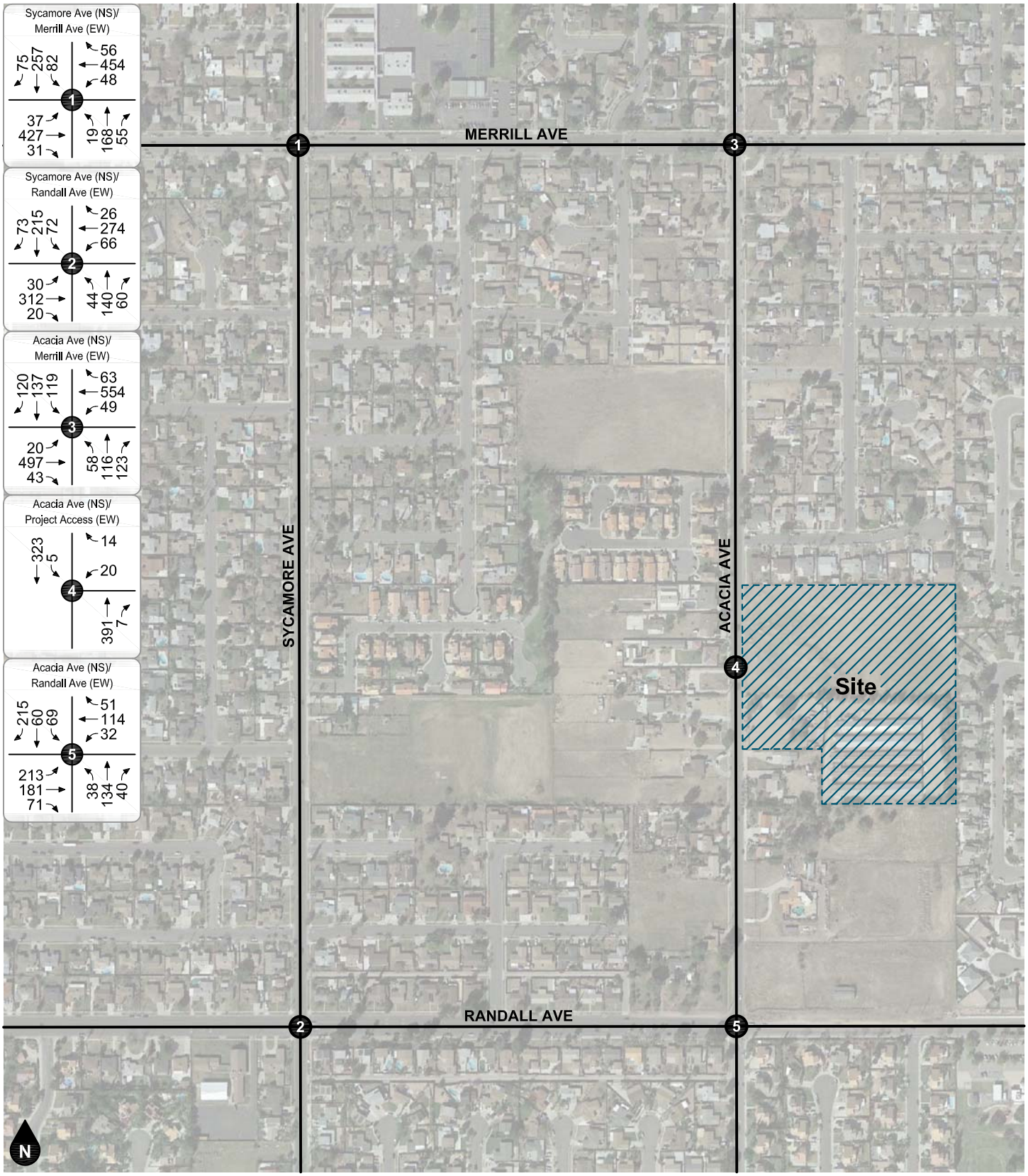
Figure 25
Existing Plus Ambient Growth
PM Peak Hour Intersection Turning Movement Volumes



Legend

●## Vehicles Per Day (1,000's)

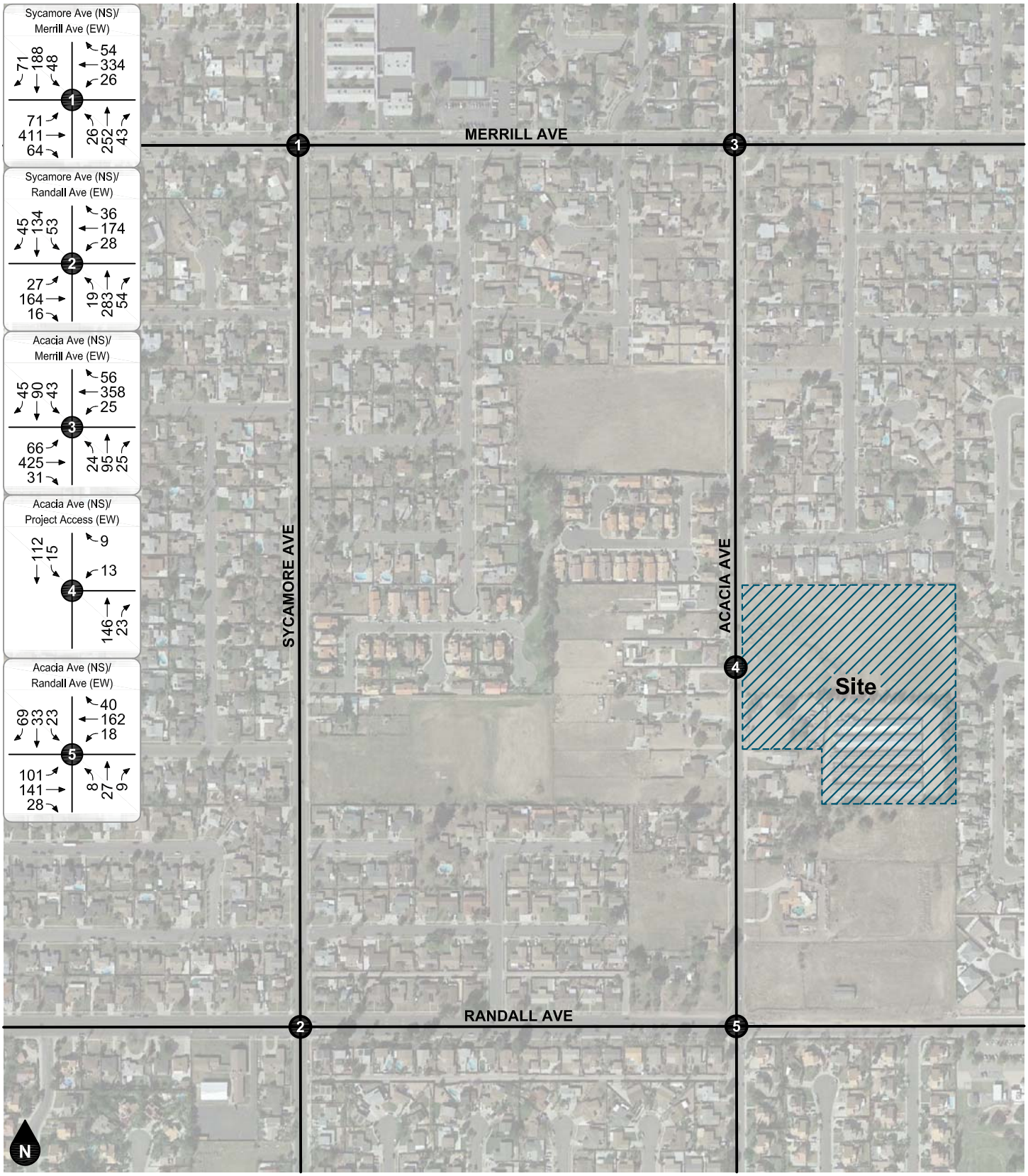
Figure 26
Project Completion Average Daily Traffic Volumes



Legend

(#) Study Intersection

Figure 27
Project Completion
AM Peak Hour Intersection Turning Movement Volumes



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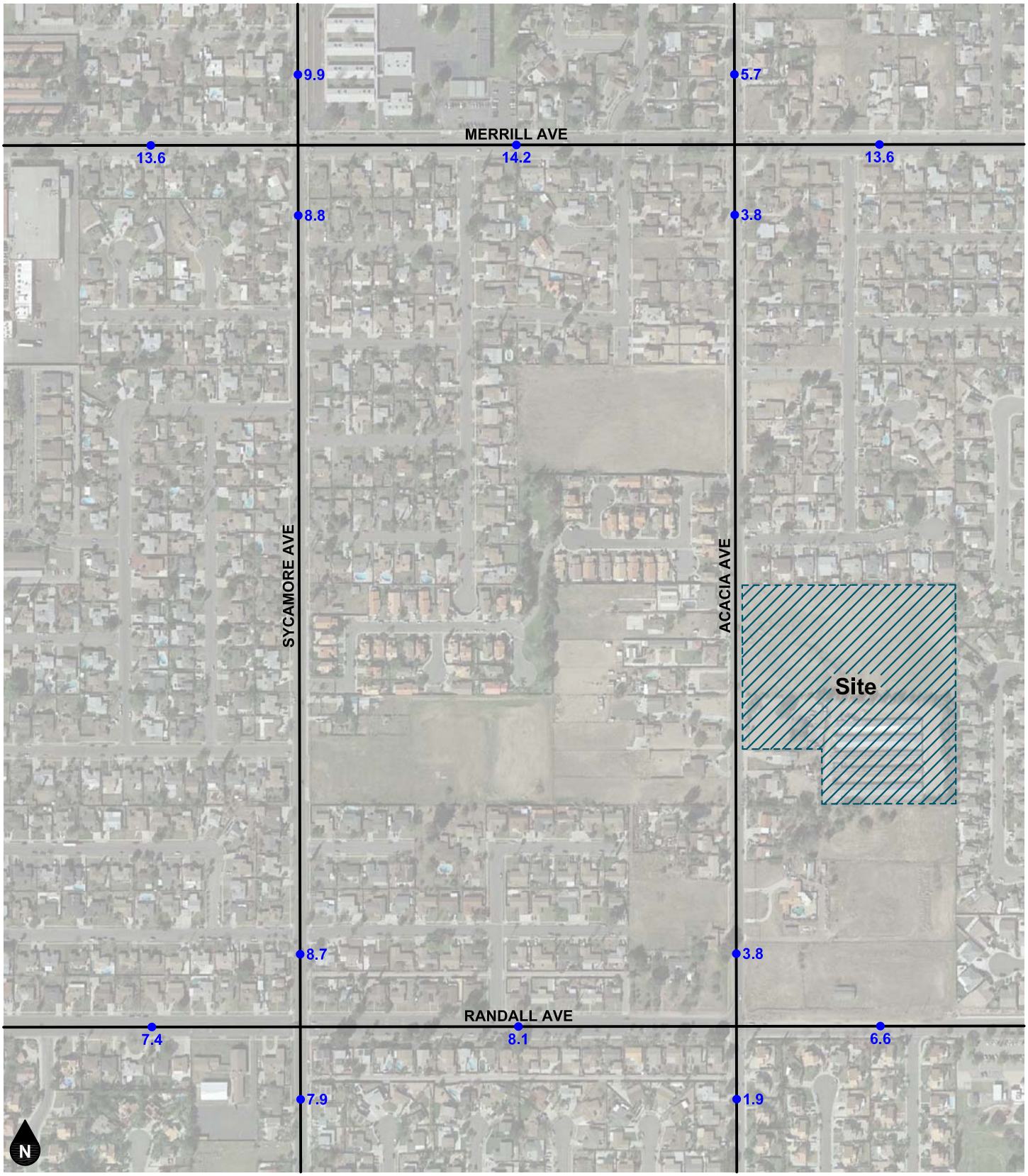
(#) Study Intersection

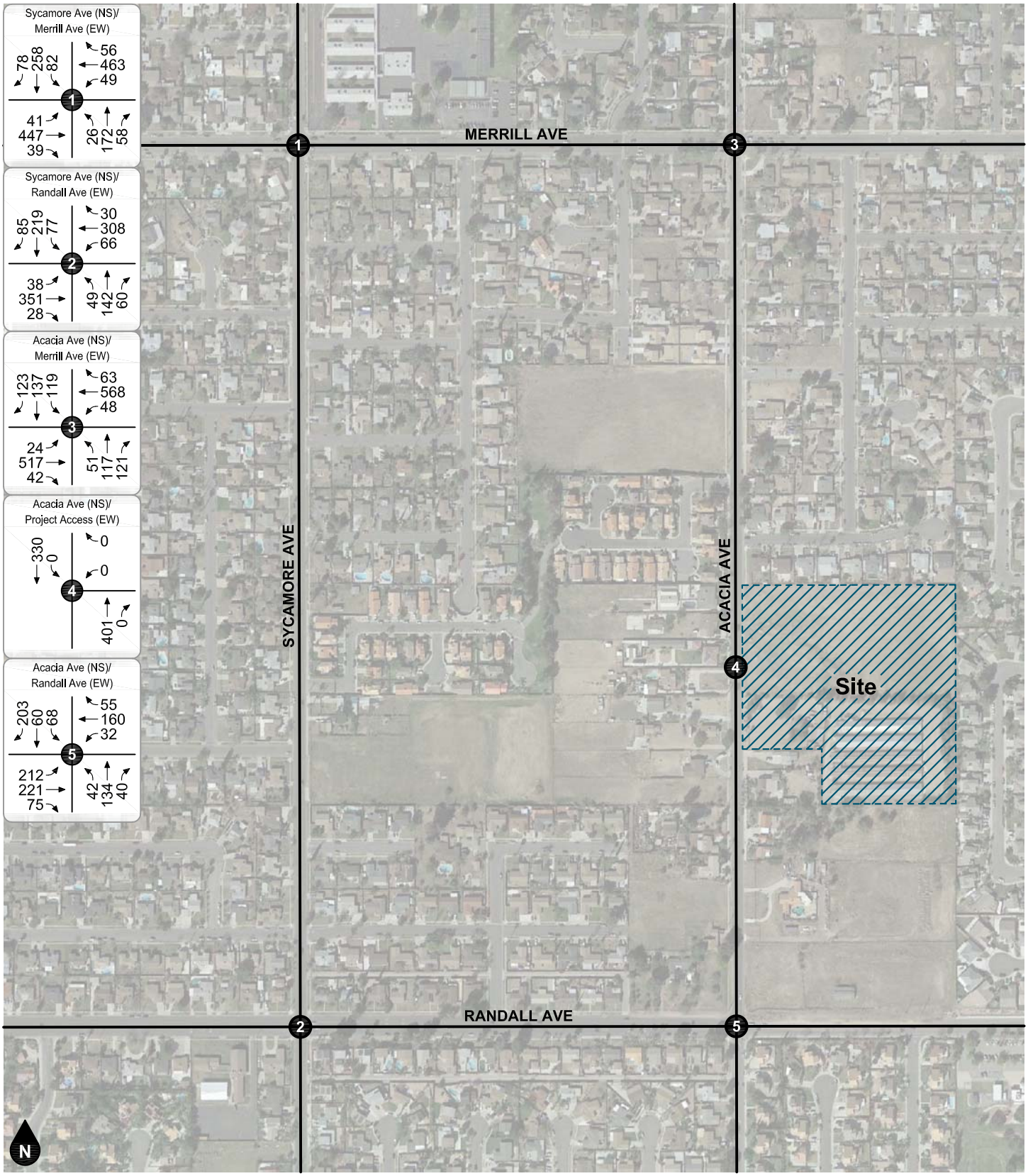
Figure 28
Project Completion
PM Peak Hour Intersection Turning Movement Volumes



Legend

●## Vehicles Per Day (1,000's)

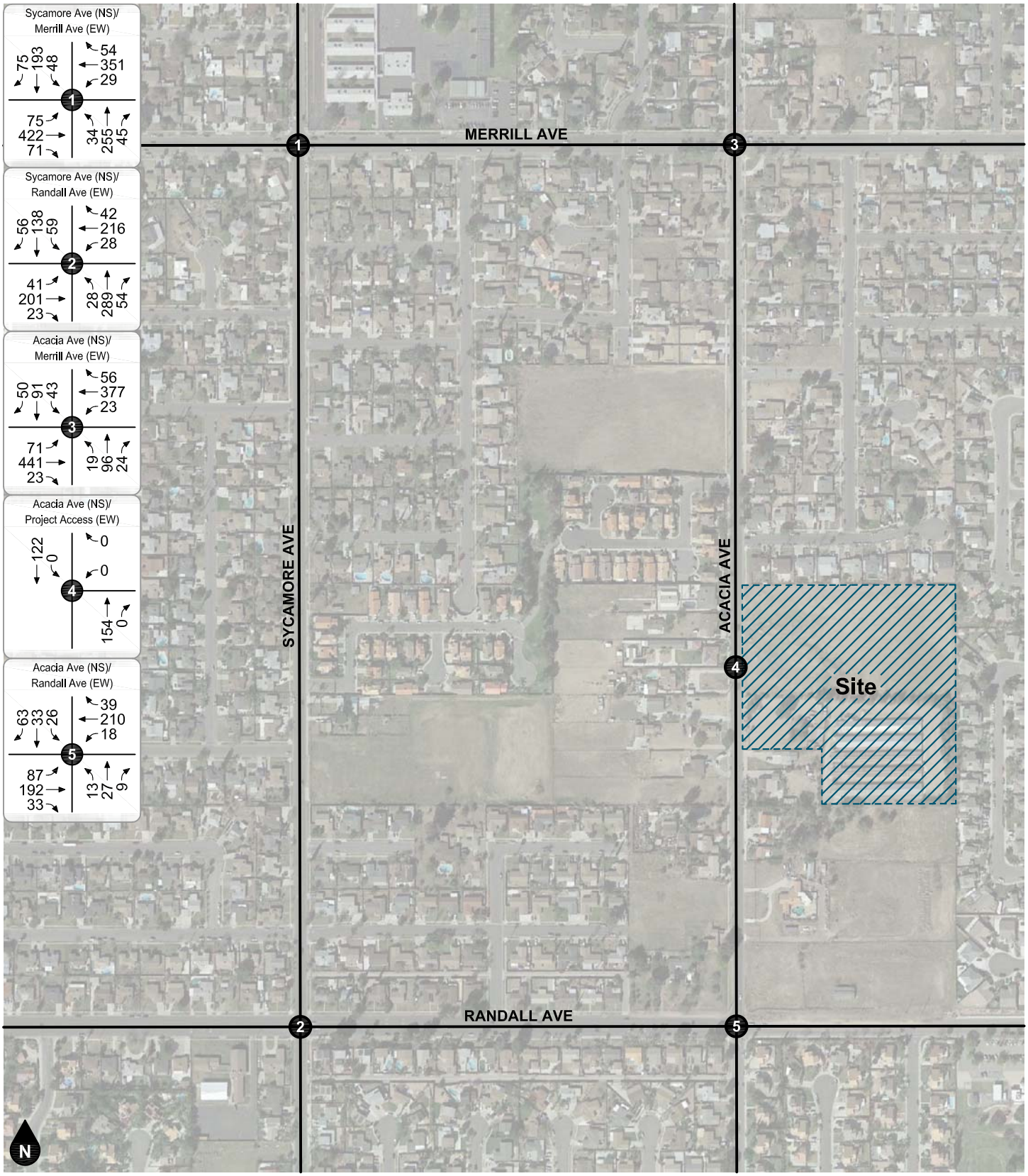
Figure 29
Existing Plus Ambient Growth Plus Cumulative Average Daily Traffic Volumes



Legend

(#) Study Intersection

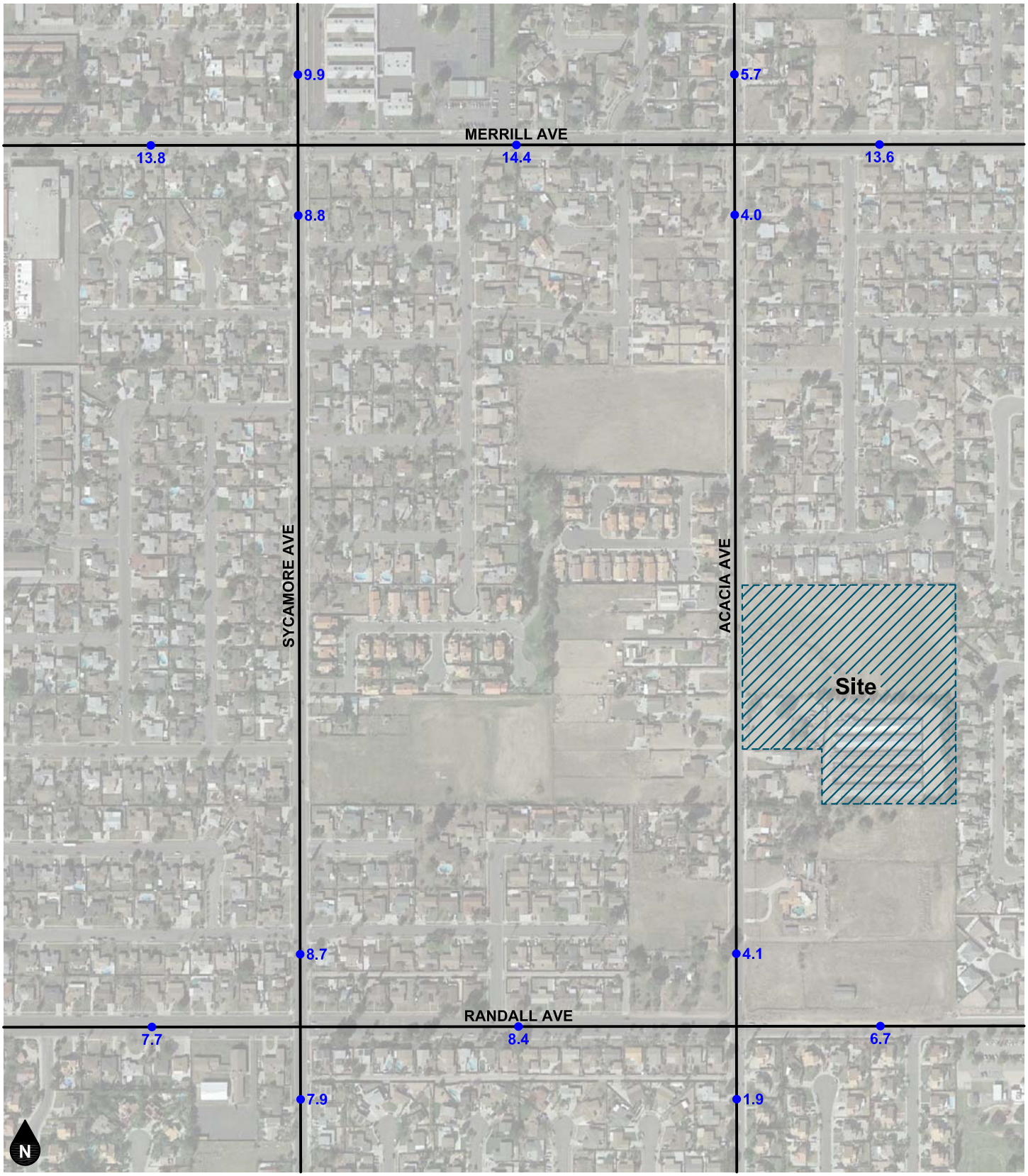
Figure 30
Existing Plus Ambient Growth Plus Cumulative
AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

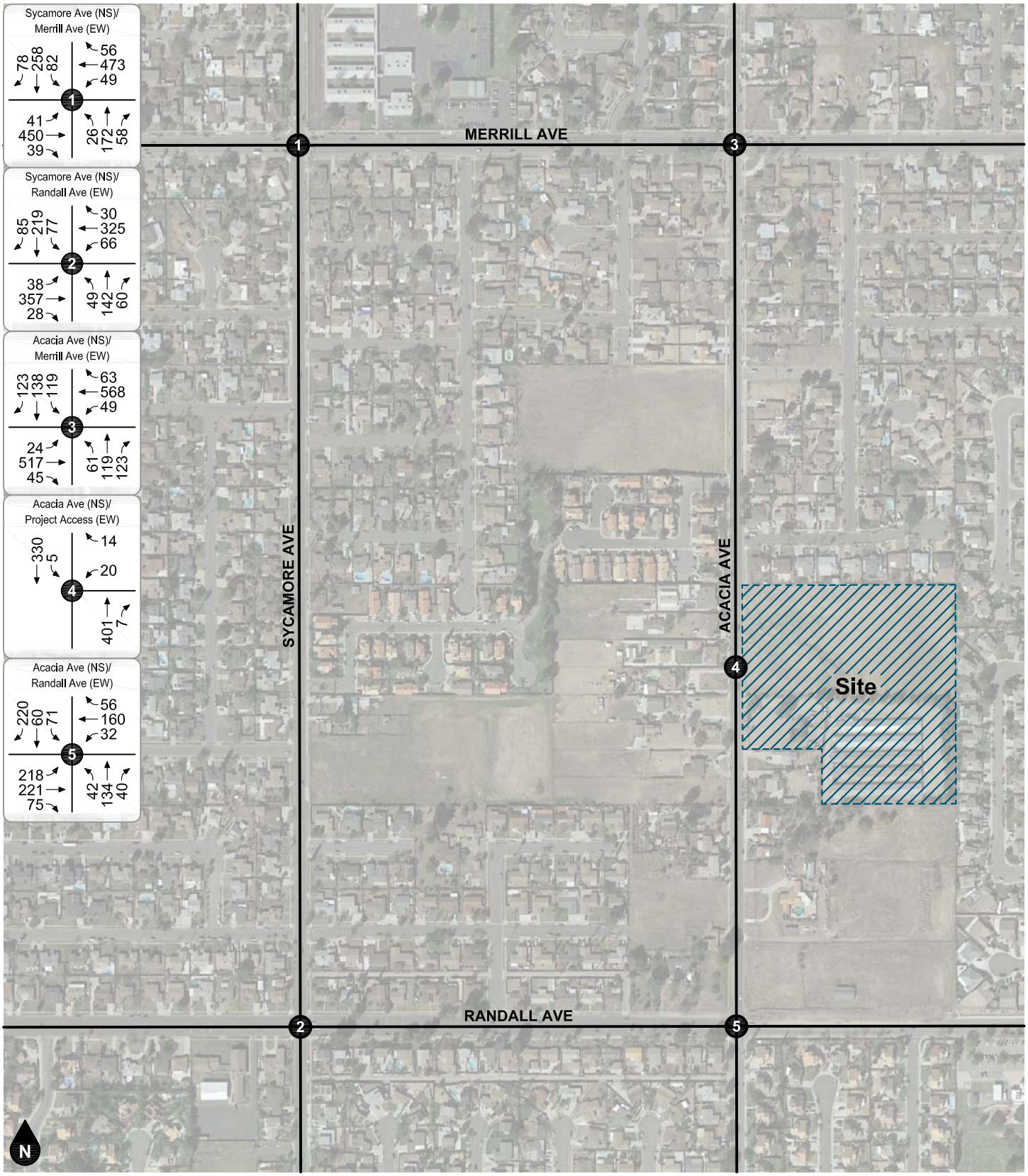
Figure 31
Existing Plus Ambient Growth Plus Cumulative
PM Peak Hour Intersection Turning Movement Volumes



Legend

●## Vehicles Per Day (1,000's)

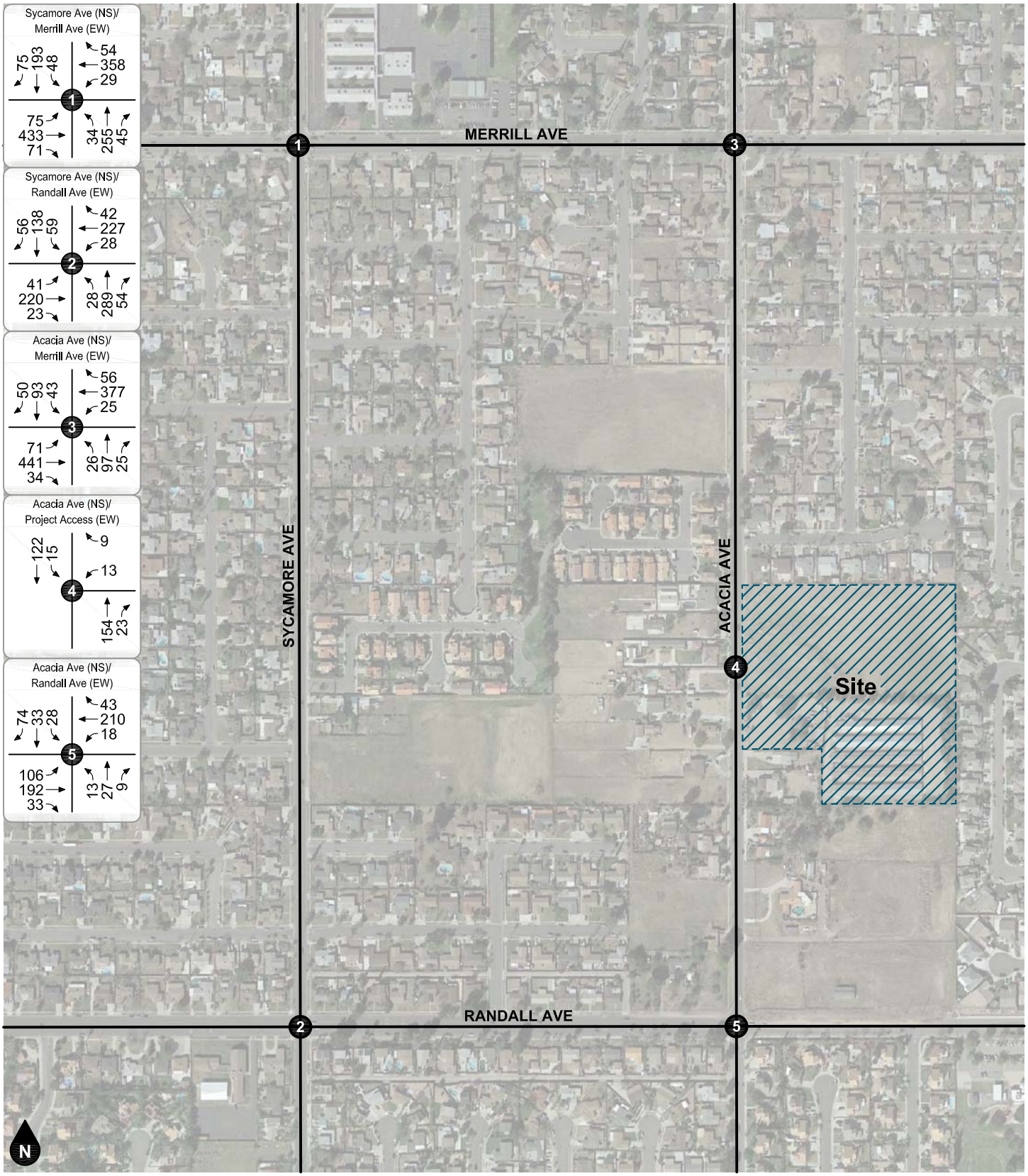
Figure 32
Cumulative Conditions Average Daily Traffic Volumes



Legend

(#) Study Intersection

Figure 33
Cumulative Conditions
AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

Figure 34
Cumulative Conditions
PM Peak Hour Intersection Turning Movement Volumes

6. FUTURE OPERATIONAL ANALYSIS

Detailed intersection Level of Service calculation worksheets for each of the following analysis scenarios are provided in Appendix D.

EXISTING PLUS PROJECT

The delay and Levels of Service for Existing Plus Project traffic conditions are shown in Table 4. The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Existing Plus Project traffic conditions, except for the following study area intersection projected to operate at Level of Service E during the AM peak hour:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5

The following study area intersection is projected to be significantly impacted by the project for Existing Plus Project traffic conditions (see Table 4):

- Acacia Avenue (NS) at Randall Avenue (EW) - #5 (AM peak hour)

The following mitigation measure improvements are recommended for Existing Plus Project traffic conditions:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5
  - Restripe eastbound approach to consist of one left turn lane and one shared through/right turn lane.

The study intersections are projected to have no significant impacts during the peak hours for Existing Plus Project traffic conditions, with improvements (see Table 4).

EXISTING PLUS AMBIENT GROWTH

Existing Plus Ambient Growth traffic conditions have been analyzed to determine potential significant impacts due to project traffic by analyzing without and with project traffic conditions. Existing Plus Ambient Growth exhibits "without project" traffic conditions while Project Completion shows "with project" traffic conditions.

The delay and Levels of Service for Existing Plus Ambient Growth traffic conditions are shown in Table 5. The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Existing Plus Ambient Growth traffic conditions, except for the following study area intersection projected to operate at Level of Service E during the AM peak hour:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5

PROJECT COMPLETION

The delay and Levels of Service for Project Completion traffic conditions are shown in Table 5. The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Project Completion traffic conditions, except for the following study area intersection projected to operate at Level of Service E during the AM peak hour:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5

The following study area intersection is projected to be significantly impacted for Project Completion traffic conditions (see Table 5):

- Acacia Avenue (NS) at Randall Avenue (EW) - #5 (AM peak hour)

The following mitigation measure improvements are recommended for Project Completion traffic conditions:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5
  - Restripe eastbound approach to consist of one left turn lane and one shared through/right turn lane.

The study intersections are projected to have no significant impacts during the peak hours for Project Completion traffic conditions, with improvements (see Table 5).

EXISTING PLUS AMBIENT GROWTH PLUS CUMULATIVE

Existing Plus Ambient Growth Plus Cumulative traffic conditions have been analyzed to determine potential significant impacts due to project traffic by analyzing without and with project traffic conditions. Existing Plus Ambient Growth Plus Cumulative exhibits "without project" traffic conditions while Cumulative Conditions shows "with project" traffic conditions.

The delay and Levels of Service for Existing Plus Ambient Growth Plus Cumulative traffic conditions are shown in Table 6. The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Existing Plus Ambient Growth Plus Cumulative traffic conditions, except for the following study area intersections projected to operate at Level of Service E/F during the AM peak hour:

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3
- Acacia Avenue (NS) at Randall Avenue (EW) - #5

CUMULATIVE CONDITIONS

The delay and Levels of Service for Cumulative Conditions traffic conditions are shown in Table 6. The study intersections are projected to operate within acceptable Levels of Service (D or better) during the peak hours for Cumulative Conditions traffic conditions, except for the following study area intersections projected to operate at Level of Service E/F during the AM peak hour:

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3
- Acacia Avenue (NS) at Randall Avenue (EW) - #5

The following study area intersections are projected to be significantly impacted by the project for Cumulative Conditions traffic conditions (see Table 6):

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3 (AM peak hour)
- Acacia Avenue (NS) at Randall Avenue (EW) - #5 (AM peak hour)

The following mitigation measure improvements are recommended for Project Completion traffic conditions:

- Sycamore Avenue (NS) at Randall Avenue (EW) - #2
  - Install traffic signal

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3
  - Install traffic signal

- Acacia Avenue (NS) at Randall Avenue (EW) - #5
  - Restripe eastbound approach to consist of one left turn lane and one shared through/right turn lane.

The study intersections are projected to have no significant impacts during the peak hours for Cumulative Conditions traffic conditions, with improvements (see Table 6).

Although the intersection of Sycamore Avenue at Randall Avenue is projected to operate at acceptable Levels of Service during the peak hours for all analysis scenarios, it has been included in the fair share analysis since the City of Rialto Public Works Department has indicated that the intersection is planned for signalization and all nearby projects have been conducting fair share for this improvement.

OTHER CONSIDERATIONS

City of Rialto policy requires two dedicated left turn lanes when left turns are greater than 200 vehicles during a peak hour. The eastbound left turn movement for the intersection of Acacia Avenue at Randall Avenue is projected for 218 movements for Cumulative conditions. Per City of Rialto policy, this would necessitate dual left turn lanes. The intersection currently does not have any dedicated eastbound left turn lanes with 199 movements. Recommended mitigation for Cumulative conditions consists of restriping the eastbound approach to consist of one left turn lane and one shared through/right turn lane. With this mitigation the intersection is projected to operate at acceptable Levels of Service during the peak hours.

Dual left turn lanes would be impractical and infeasible at this intersection. Therefore, it is recommended that City Policy based on turning movement volumes instead of intersection delay is superseded by the intersection Level of Service requirements and practicality. According to the City of Rialto Public Works Department staff, if future analysis of this intersection requires signalization then the need for dual left turn lanes should be reviewed at that time.

TRAFFIC SIGNAL WARRANT

The potential need for installation of a traffic signal at the unsignalized study intersections has been evaluated using the California Department of Transportation peak hour volume traffic signal warrant (Warrant 3), as specified in Section 4C of the California Manual of Uniform Traffic Control Devices (2014 Update). Traffic signal warrant worksheets are provided in Appendix F.

A traffic signals is forecast to be warranted for Cumulative Conditions traffic conditions at the following study intersection:

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3

Table 4
Existing Plus Project Intersection Level of Service

ID	Study Intersection	Traffic Control[1]	Existing				Existing Plus Project				Change in Delay		Significant Impact
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour	PM Peak Hour	
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]			
1.	Sycamore Avenue at Merrill Avenue	TS	47.4	D	12.9	B	47.4	D	12.9	B	0.0	0.0	No
2.	Sycamore Avenue at Randall Avenue	AWS	17.6	C	12.9	B	18.0	D	13.1	B	0.4	0.2	No
3.	Acacia Avenue at Merill Avenue	AWS	27.2	D	14.0	B	27.6	D	14.1	B	0.4	0.1	No
4.	Acacia Avenue at Project Access	**CSS**	-	-	-	-	15.0	B	10.4	B	-	-	-
5.	Acacia Avenue at Randall Avenue	AWS	34.4	D	10.4	B	39.9	E	10.8	B	5.5	0.4	Yes
	- With Improvements		-	-	-	-	21.8	C	10.1	B	-12.6	-0.3	No

Notes:

(1) TS = Traffic Signal; AWS = All Way Stop; CSS = Cross Street Stop; **CSS** = Improvement

(2) Delay is shown in seconds/vehicle. For intersections with traffic signal or all way stop control, overall average intersection delay and Level of Service are shown. For intersections with cross street stop control, Level of Service is based on average delay of the worst individual lane (or movements sharing a lane).

(3) LOS = Level of Service

Table 5
Project Completion Intersection Level of Service

ID Study Intersection	Traffic Control[1]	Existing Plus Ambient Growth				Existing Plus Ambient Growth Plus Project				Change in Delay		Significant Impact
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour	PM Peak Hour	
		Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]			
1. Sycamore Avenue at Merrill Avenue	TS	53.8	D	13.3	B	53.7	D	13.3	B	-0.1	0.0	No
2. Sycamore Avenue at Randall Avenue	AWS	18.8	C	13.4	B	19.3	C	13.7	B	0.5	0.3	No
3. Acacia Avenue at Merrill Avenue	AWS	32.4	D	14.7	B	33.2	D	14.7	B	0.8	0	No
4. Acacia Avenue at Project Access	**CSS**	-	-	-	-	15.4	C	10.5	B	-	-	-
5. Acacia Avenue at Randall Avenue	AWS	40.8	E	10.6	B	46.1	E	11.0	B	5.3	0.4	Yes
- With Improvements		-	-	-	-	24.9	C	10.3	B	-15.9	-0.3	No

Notes:

(1) TS = Traffic Signal; AWS = All Way Stop; CSS = Cross Street Stop; **CSS** = Improvement

(2) Delay is shown in seconds/vehicle. For intersections with traffic signal or all way stop control, overall average intersection delay and Level of Service are shown. For intersections with cross street stop control, Level of Service is based on average delay of the worst individual lane (or movements sharing a lane).

(3) LOS = Level of Service

Table 6
Cumulative Conditions Intersection Level of Service

ID	Study Intersection	Traffic Control[1]	Existing Plus Ambient Growth Plus Cumulative				Existing Plus Ambient Growth Plus Project Plus Cumulative				Change in Delay		Significant Impact
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour	PM Peak Hour	
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]			
1.	Sycamore Avenue at Merrill Avenue	TS	53.2	D	13.6	B	53.1	D	13.7	B	-0.1	0.1	No
2.	Sycamore Avenue at Randall Avenue	AWS	22.1	C	15.3	C	22.8	C	15.6	C	0.7	0.3	No
3.	Acacia Avenue at Merrill Avenue	AWS	38.4	E	15.4	C	40.2	E	15.5	C	1.8	0.1	Yes
	- With Improvements	**TS**	-	-	-	-	41.1	D	14.0	B	2.7	-1.4	No
4.	Acacia Avenue at Project Access	**CSS**	-	-	-	-	15.6	C	10.6	B	-	-	-
5.	Acacia Avenue at Randall Avenue	AWS	63.7	F	12.2	B	72.7	F	12.8	B	9.0	0.6	Yes
	- With Improvements						34.7	D	11.5	B	-29.0	-0.7	No

Notes:

(1) TS = Traffic Signal; AWS = All Way Stop; CSS = Cross Street Stop; **CSS** = Improvement

(2) Delay is shown in seconds/vehicle. For intersections with traffic signal or all way stop control, overall average intersection delay and Level of Service are shown. For intersections with cross street stop control, Level of Service is based on average delay of the worst individual lane (or movements sharing a lane).

(3) LOS = Level of Service

7. MITIGATION MEASURES

SUMMARY OF MITIGATION MEASURE IMPROVEMENTS

The following mitigation measure improvements are recommended for Existing Plus Project and Project Completion traffic conditions:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5
  - Restripe eastbound approach to consist of one left turn lane and one shared through/right turn lane.

Additionally, the following mitigation measures are recommended for Cumulative Conditions traffic conditions:

- Sycamore Avenue (NS) at Randall Avenue (EW) - #2
  - Install traffic signal

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3
  - Install traffic signal

- Acacia Avenue (NS) at Randall Avenue (EW) - #5
  - Restripe eastbound approach to consist of one left turn lane and one shared through/right turn lane.

The project shall contribute towards the above improvements through payment of applicable Development Impact Fees or through an in-lieu fee on a fair share basis. Any programmed improvements constructed by the project may be eligible for a fee credit at the discretion of the City of Rialto.

FAIR SHARE ANALYSIS

The project fair share of the cost to implement the recommended off-site improvements listed above has been calculated in Table 7. The project fair share is based on the proportion of project peak hour traffic volume contributed to the improvement location relative to the total new peak hour traffic volume for Cumulative Conditions traffic conditions. The cost estimates for the identified improvements have been obtained from the County of San Bernardino Congestion Management Program (2003 Update); see Appendix G.

Although the intersection of Sycamore Avenue at Randall Avenue is projected to operate at acceptable Levels of Service during the peak hours for all analysis scenarios, it has been included in the fair share analysis since the City of Rialto Public Works Department has indicated that the intersection is planned for signalization and all nearby projects have been conducting fair share for this improvement.

As shown in Table 7, the project fair share cost estimate is $126,100.

The project fair share shown above represents a rough order of magnitude; it is intended only for the discussion purposes of this traffic impact analysis and does not imply any legal responsibility or formula for contributions or mitigation.

Table 7
Fair Share Analysis

ID	Study Intersection	Peak Hour	Peak Hour Volumes: Existing	Existing Plus Ambient Growth Plus Project Plus Cumulative	Total New Trips	Project Trips	Project Share
2.	Sycamore Avenue at Randall Avenue	AM	1,258	1,476	218	23	10.6%
		PM	964	1,205	241	30	12.4%
3.	Acacia Avenue at Merrill Avenue	AM	1,807	1,949	142	19	13.4%
		PM	1,209	1,338	129	24	18.6%
5.	Acacia Avenue at Randall Avenue	AM	1,145	1,329	184	27	14.7%
		PM	601	786	185	36	19.5%

ID	Study Intersection	Improvement	Cost Estimate	Project Share[1]
2.	Sycamore Avenue at Randall Avenue	Install Traffic Signal	$ 400,000	$ 49,800
3.	Acacia Avenue at Merrill Avenue	Install Traffic Signal	$ 400,000	$ 74,400
5.	Acacia Avenue at Randall Avenue	Restripe eastbound shared left/through lane to left turn lane and right turn lane to shared through/right turn lane	$ 10,000	$ 1,900
Total			$ 410,000	$ 126,100

Notes:
(1) Project share based on greater of AM or PM peak hour project share percentage.

8. CONCLUSIONS

MITIGATION MEASURES

The following mitigation measure improvements are recommended for Existing Plus Project and Project Completion traffic conditions:

- Acacia Avenue (NS) at Randall Avenue (EW) - #5
  - Restripe eastbound approach to consist of one left turn lane and one shared through/right turn lane.

Additionally, the following mitigation measures are recommended for Cumulative Conditions traffic conditions:

- Sycamore Avenue (NS) at Randall Avenue (EW) - #2
  - Install traffic signal

- Acacia Avenue (NS) at Merrill Avenue (EW) - #3
  - Install traffic signal

- Acacia Avenue (NS) at Randall Avenue (EW) - #5
  - Restripe eastbound approach to consist of one left turn lane and one shared through/right turn lane.

Although the intersection of Sycamore Avenue at Randall Avenue is projected to operate at acceptable Levels of Service during the peak hours for all analysis scenarios, it has been included in the fair share analysis since the City of Rialto Public Works Department has indicated that the intersection is planned for signalization and all nearby projects have been conducting fair share for this improvement.

The project shall contribute towards the above improvements through payment of applicable Development Impact Fees or through an in-lieu fee on a fair share basis. Any programmed improvements constructed by the project may be eligible for a fee credit at the discretion of the City of Rialto.

GENERAL RECOMMENDATIONS

All roadway design, traffic signing and striping, and traffic control improvements relating to the proposed project should be constructed in accordance with applicable engineering standards and to the satisfaction of the City of Rialto Public Works Department.

Site-adjacent roadways should be constructed at their ultimate half-section width, including landscaping and parkway improvements in conjunction with development, or as otherwise required by the City of Rialto Public Works Department.

On-site traffic signing and striping plans should be submitted for City of Rialto approval in conjunction with detailed construction plans for the project.

Off-street parking should be provided to meet City of Rialto Municipal Code requirements.

The final grading, landscaping, and street improvement plans should demonstrate that sight distance standards are met in accordance with applicable City of Rialto/California Department of Transportation sight distance standards.

As is the case for any roadway design, the City of Rialto should periodically review traffic operations in the vicinity of the project once the project is constructed to assure that the traffic operations are satisfactory.