

**KUNZMAN ASSOCIATES**

TRAFFIC ENGINEERING AND  
TRANSPORTATION PLANNING

April 7, 2023

Gevork Martirosian, P.E.  
Gevork Consulting Engineering  
285 E. Imperial Highway, Suite 208  
Fullerton, Ca. 92835

Dear Mr. Martirosian:

## **INTRODUCTION**

The firm of Kunzman Associates is pleased to submit this Trip Generation Analysis in the City of Rialto. Kunzman Associates has been asked to prepare this trip generation analysis to document the proposed project trip generation and trip distribution for the City of Rialto so that they can determine if a focused traffic analysis is required.

This letter summarizes our methodology, analysis, and findings. Although this is a technical report, every effort has been made to write the report clearly and concisely. To assist the reader with those terms unique to transportation engineering, a glossary of terms is provided within Appendix A.

## **PROJECT LOCATION**

The proposed project site is located at 935 South Lilac Avenue project in the City of Rialto. It is important to note that the project site is located in the southeast corner of the six-legged intersection of Lilac Avenue (NS)/Randall Avenue (EW)/Bloomington Avenue (SWNE). Figure 1 shows the project location map.

## **PROJECT DESCRIPTION**

The proposed project site is currently developed with 1 single-family residential dwelling unit. The proposed project site is proposed to be developed with 8,806 square feet of Medical Office land use and 9,966 square feet of strip retail plaza land use. Figure 2 contains the proposed project site plan.

The proposed project will have full access to Lilac Avenue and right turn in/out only access to Randall Avenue.

## **PROPOSED PROJECT TRIP GENERATION**

Trip generation rates were determined for daily traffic, morning peak hour inbound and outbound traffic and evening peak hour inbound and outbound traffic for the proposed land uses. By multiplying the traffic generation rates by the land use quantities, the traffic volumes are determined. The traffic generation rates are from the Institute of Transportation Engineers, Trip Generation, 11th Edition, 2021.

Table 1 exhibits the existing vehicle trip generation rates, peak hour volumes, and daily volumes.

Table 2 exhibits the proposed vehicle trip generation rates, peak hour volumes, and daily volumes.

Table 3 exhibits the additional vehicle trips the proposed development is proposed to generate and contribute to the surrounding street system.

The proposed development is projected to generate approximately 666 additional daily vehicle trips, 41 of which will occur during the morning peak hour and 77 of which will occur during the evening peak hour.

## **PROJECT TRIP DISTRIBUTION**

Figures 3 and 4 contain the proposed project trip distribution for the new trips generated by the project.

## **REQUIREMENTS FOR ANALYSIS**

Within the City of Rialto, an intersection analysis is required if a proposed project contributes more than 50 peak hour trips to a potential study area intersection during the morning or evening peak hours.

## **CONCLUSION**

Based on the proposed project trip generation and trip distribution, the maximum project contribution to the six-legged intersection of Lilac Avenue (NS)/Randall Avenue (EW)/Bloomington Avenue (SWNE), is 37 vehicles during the morning peak hour and 67 vehicles during the evening peak hour.

The project is projected to contribute over 50 peak hour vehicle trips.

Technically, a focused analysis should be conducted for the proposed project. The projected project trip contribution is just over the thresholds of requiring an analysis.

The City will have to decide if a study is required. The decision should be based on their understanding of the traffic conditions in the study area. If the traffic operation is satisfactory, an analysis should not be conducted. If the traffic operation is unsatisfactory, an analysis should be conducted.

It has been a pleasure to service your needs on this project. Should you have any questions or if we can be of further assistance, please do not hesitate to call at (714) 904-2821.

Sincerely,

KUNZMAN ASSOCIATES



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Associate

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Robert W Kunzman  
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William A Kunzman, P.E.  
Principal

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**Table 1**

**Existing Development Trip Generation<sup>1</sup>**

Land Use	Quantity	Units <sup>2</sup>	Peak Hour						Daily
			Morning			Evening			
			Inbound	Outbound	Total	Inbound	Outbound	Total	
<u>Trip Generation Rates</u>									
Single-Famil Detached Residntial	1.000	DU	0.18	0.52	0.70	0.59	0.35	0.94	9.43
<u>Trips Generated</u>									
Single-Famil Detached Residntial	1.000	DU	0	1	1	1	0	1	9

<sup>1</sup> Source: Institute of Transportation Engineers, Trip Generation, 11th Edition, 2021, Land Use Category 210.

<sup>2</sup> DU = Dwelling Unit

**Table 2**

**Proposed Project Trip Generation<sup>1</sup>  
Option C (50% Retail/50% Medical Office)**

Land Use	Quantity	Units <sup>2</sup>	Peak Hour						Daily
			Morning			Evening			
			Inbound	Outbound	Total	Inbound	Outbound	Total	
<u>Trip Generation Rates</u>									
Medical Office	1.000	TSF	2.50	0.60	3.10	1.18	2.75	3.93	36.00
Strip Retail Plaza	1.000	TSF	1.42	0.94	2.36	3.30	3.29	6.59	54.45
<u>Trips Generated</u>									
Medical Office	8.806	TSF	22	5	27	10	24	34	317
Strip Retail Plaza	9.966	TSF	14	9	23	33	33	66	543
- Pass-By (34%, 34%, 34%) <sup>3</sup>			-5	-3	-8	-11	-11	-22	-185
<b>Total</b>			<b>31</b>	<b>11</b>	<b>42</b>	<b>32</b>	<b>46</b>	<b>78</b>	<b>675</b>

<sup>1</sup> Source: Institute of Transportation Engineers, Trip Generation, 11th Edition, 2021, Land Use Categories 720 and 822.

<sup>2</sup> TSF = Thousand Square Feet

<sup>3</sup> Source: Institute of Transportation Engineers, Trip Generation Handbook, 3rd Edition, 2017, Land Use Category 820. Only PM peak hour data is available. PM peak hour data assumed for AM, PM, and Daily traffic volumes.

**Table 3**

**Trip Generation Comparison<sup>1</sup>**

Project	Peak Hour						Daily
	Morning			Evening			
	Inbound	Outbound	Total	Inbound	Outbound	Total	
Existing Development	0	1	1	1	0	1	9
Proposed Development	31	11	42	32	46	78	675
Total New Trips	31	10	41	31	46	77	666

<sup>1</sup> See Tables 1 and 2.

Figure 1  
Project Location Map





Figure 2  
Site Plan

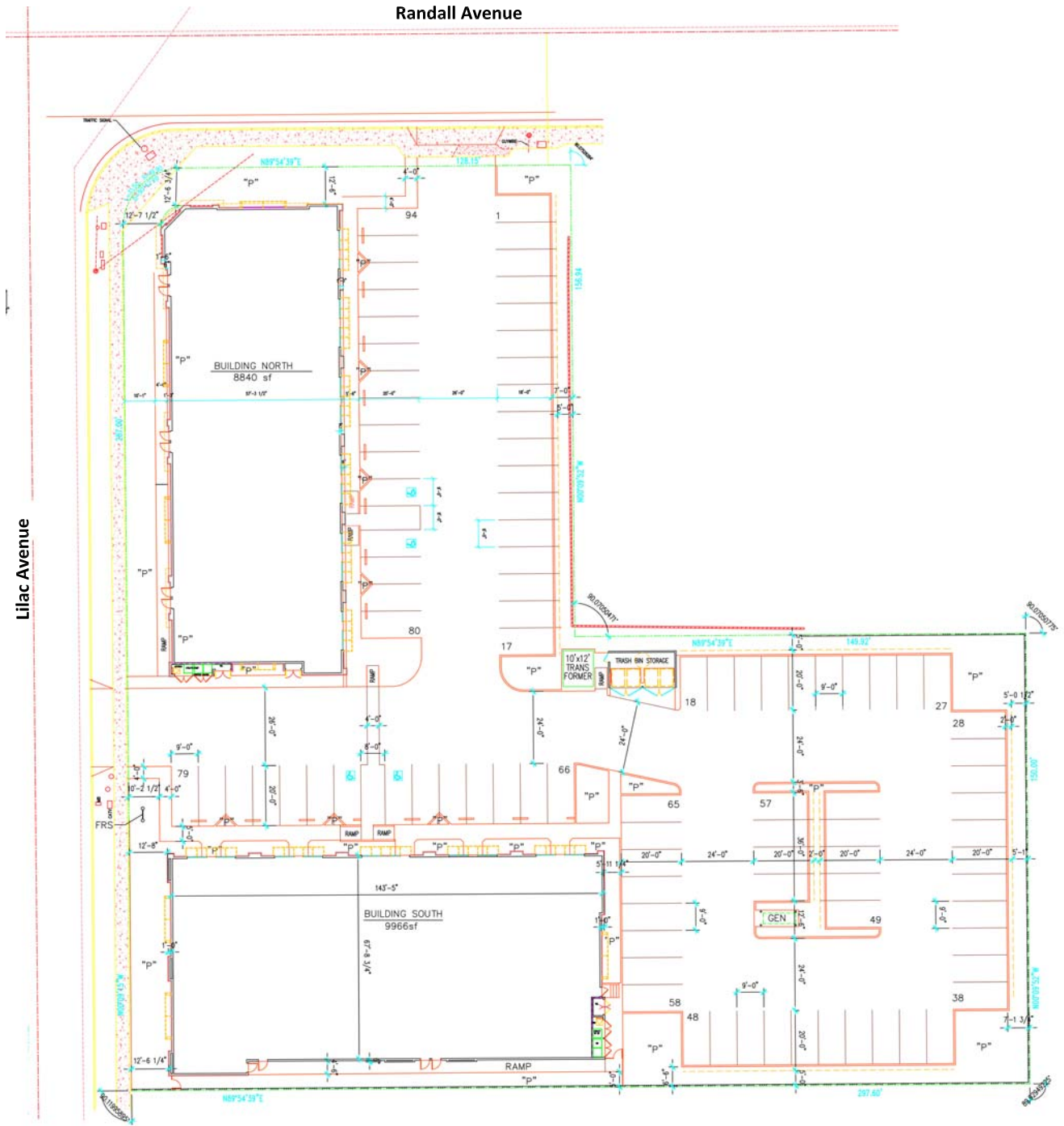




Figure 3  
Project Outbound Trip Distribution

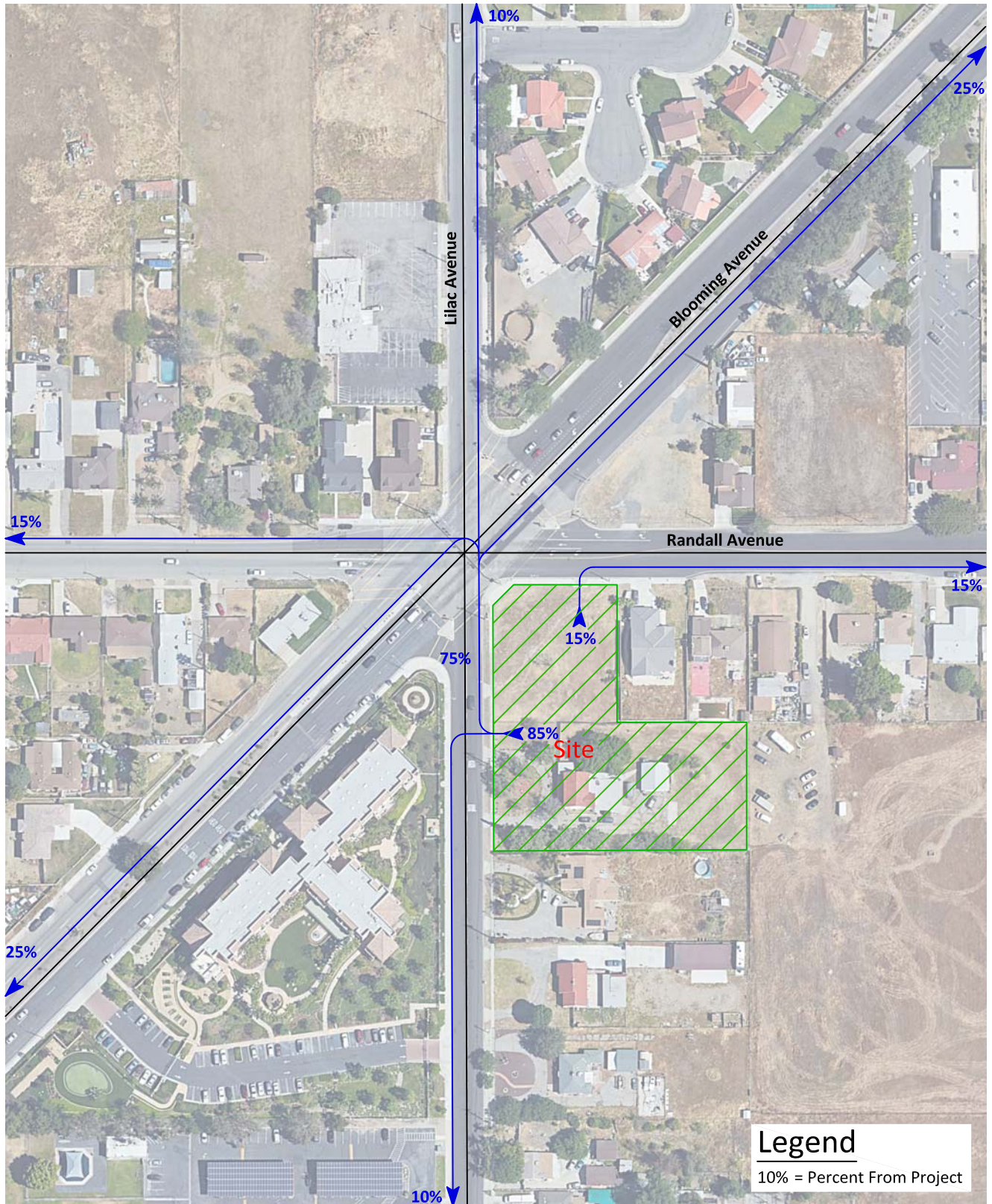
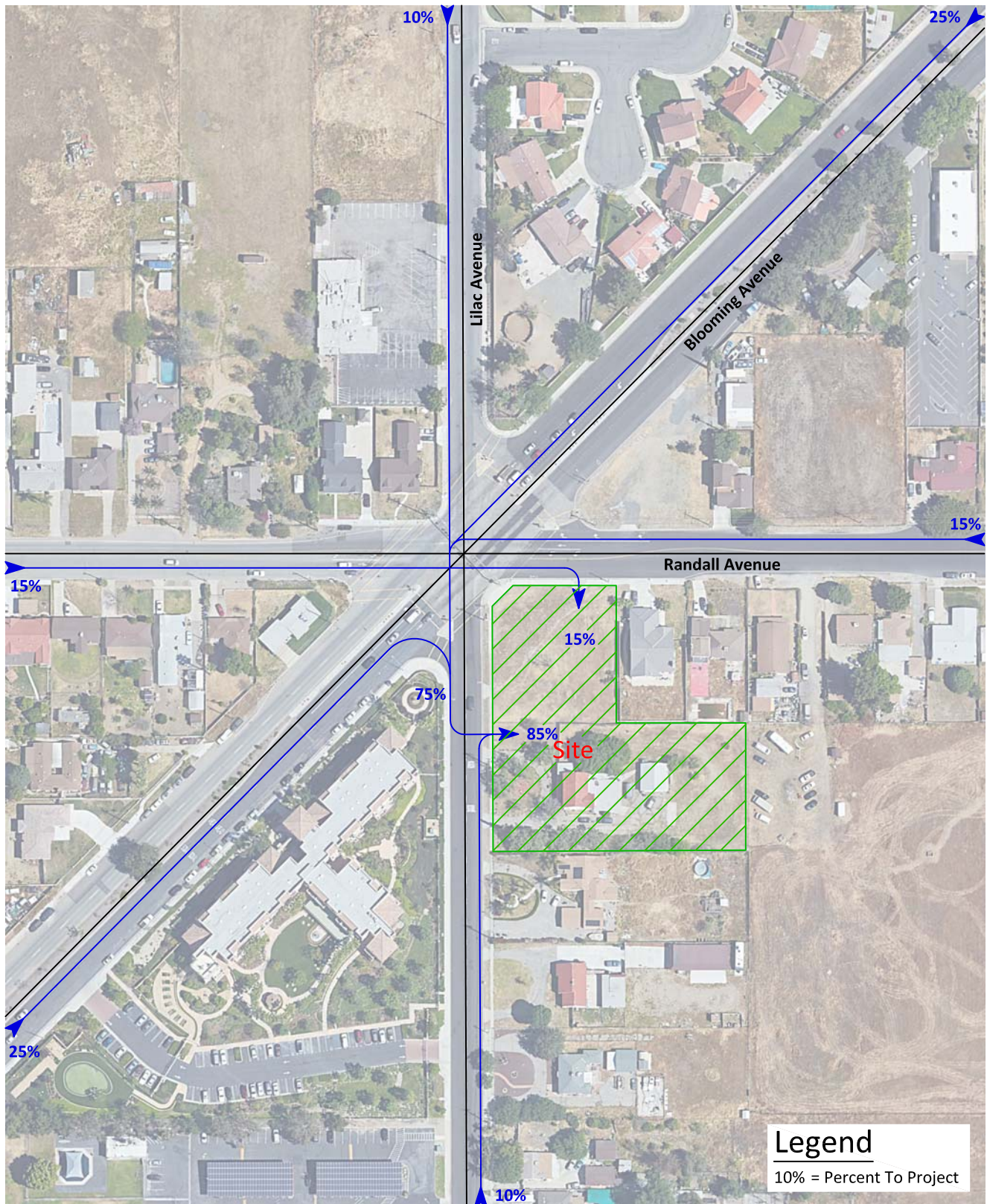




Figure 4  
Project Inbound Trip Distribution



**APPENDIX A**

**GLOSSARY OF TRANSPORTATION TERMS**

## GLOSSARY OF TRANSPORTATION TERMS

### COMMON ABBREVIATIONS

AC:	Acres
ADT:	Average Daily Traffic
Caltrans:	California Department of Transportation
DU:	Dwelling Unit
ICU:	Intersection Capacity Utilization
LOS:	Level of Service
TSF:	Thousand Square Feet
V/C:	Volume/Capacity
VMT:	Vehicle Miles Traveled

### TERMS

**AVERAGE DAILY TRAFFIC:** The total volume during a year divided by the number of days in a year. Usually only weekdays are included.

**BANDWIDTH:** The number of seconds of green time available for through traffic in a signal progression.

**BOTTLENECK:** A constriction along a travelway that limits the amount of traffic that can proceed downstream from its location.

**CAPACITY:** The maximum number of vehicles that can be reasonably expected to pass over a given section of a lane or a roadway in a given time period.

**CHANNELIZATION:** The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands, or other suitable means to facilitate the safe and orderly movements of both vehicles and pedestrians.

**CLEARANCE INTERVAL:** Nearly same as yellow time. If there is an all red interval after the end of a yellow, then that is also added into the clearance interval.

**CORDON:** An imaginary line around an area across which vehicles, persons, or other items are counted (in and out).

**CYCLE LENGTH:** The time period in seconds required for one complete

signal cycle.

**CUL-DE-SAC STREET:** A local street open at one end only, and with special provisions for turning around.

**DAILY CAPACITY:** The daily volume of traffic that will result in a volume during the peak hour equal to the capacity of the roadway.

**DELAY:** The time consumed while traffic is impeded in its movement by some element over which it has no control, usually expressed in seconds per vehicle.

**DEMAND RESPONSIVE SIGNAL:** Same as traffic-actuated signal.

**DENSITY:** The number of vehicles occupying in a unit length of the through traffic lanes of a roadway at any given instant. Usually expressed in vehicles per mile.

**DETECTOR:** A device that responds to a physical stimulus and transmits a resulting impulse to the signal controller.

**DESIGN SPEED:** A speed selected for purposes of design. Features of a highway, such as curvature, superelevation, and sight distance (upon which the safe operation of vehicles is dependent) are correlated to design speed.

**DIRECTIONAL SPLIT:** The percent of traffic in the peak direction at any point in time.

**DIVERSION:** The rerouting of peak hour traffic to avoid congestion.

**FORCED FLOW:** Opposite of free flow.

**FREE FLOW:** Volumes are well below capacity. Vehicles can maneuver freely and travel is unimpeded by other traffic.

**GAP:** Time or distance between successive vehicles in a traffic stream, rear bumper to front bumper.

**HEADWAY:** Time or distance spacing between successive vehicles in a traffic stream, front bumper to front bumper.

**INTERCONNECTED SIGNAL SYSTEM:** A number of intersections that

are connected to achieve signal progression.

**LEVEL OF SERVICE:** A qualitative measure of a number of factors, which include speed and travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs.

**LOOP DETECTOR:** A vehicle detector consisting of a loop of wire embedded in the roadway, energized by alternating current and producing an output circuit closure when passed over by a vehicle.

**MINIMUM ACCEPTABLE GAP:** Smallest time headway between successive vehicles in a traffic stream into which another vehicle is willing and able to cross or merge.

**MULTI-MODAL:** More than one mode; such as automobile, bus transit, rail rapid transit, and bicycle transportation modes.

**OFFSET:** The time interval in seconds between the beginning of green at one intersection and the beginning of green at an adjacent intersection.

**PLATOON:** A closely grouped component of traffic that is composed of several vehicles moving, or standing ready to move, with clear spaces ahead and behind.

**ORIGIN-DESTINATION SURVEY:** A survey to determine the point of origin and the point of destination for a given vehicle trip.

**PASSENGER CAR EQUIVALENTS (PCE):** One car is one Passenger Car Equivalent. A truck is equal to 2 or 3 Passenger Car Equivalents in that a truck requires longer to start, goes slower, and accelerates slower. Loaded trucks have a higher Passenger Car Equivalent than empty trucks.

**PEAK HOUR:** The 60 consecutive minutes with the highest number of vehicles.

**PRETIMED SIGNAL:** A type of traffic signal that directs traffic to stop and go on a predetermined time schedule without regard to traffic conditions. Also, fixed time signal.

**PROGRESSION:** A term used to describe the progressive movement of traffic through several signalized intersections.

**SCREEN-LINE:** An imaginary line or physical feature across which all



trips are counted, normally to verify the validity of mathematical traffic models.

**SIGNAL CYCLE:** The time period in seconds required for one complete sequence of signal indications.

**SIGNAL PHASE:** The part of the signal cycle allocated to one or more traffic movements.

**STARTING DELAY:** The delay experienced in initiating the movement of queued traffic from a stop to an average running speed through a signalized intersection.

**TRAFFIC-ACTUATED SIGNAL:** A type of traffic signal that directs traffic to stop and go in accordance with the demands of traffic, as registered by the actuation of detectors.

**TRIP:** The movement of a person or vehicle from one location (origin) to another (destination). For example, from home to store to home is two trips, not one.

**TRIP-END:** One end of a trip at either the origin or destination; i.e. each trip has two trip-ends. A trip-end occurs when a person, object, or message is transferred to or from a vehicle.

**TRIP GENERATION RATE:** The quantity of trips produced and/or attracted by a specific land use stated in terms of units such as per dwelling, per acre, and per 1,000 square feet of floor space.

**TRUCK:** A vehicle having dual tires on one or more axles, or having more than two axles.

**UNBALANCED FLOW:** Heavier traffic flow in one direction than the other. On a daily basis, most facilities have balanced flow. During the peak hours, flow is seldom balanced in an urban area.

**VEHICLE MILES OF TRAVEL:** A measure of the amount of usage of a section of highway, obtained by multiplying the average daily traffic by length of facility in miles.