Appendix I

General Aviation Improvement Program Traffic Impact Analysis

John Wayne Airport
General Aviation Improvement Program
TRAFFIC IMPACT ANALYSIS

Austin Transportation Consulting
ATC

County of Orange

April 16th, 2018

John Wayne Airport General Aviation Improvement Program
TRAFFIC IMPACT ANALYSIS

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John Wayne Airport General Aviation Improvement Program
TRAFFIC IMPACT ANALYSIS

CONTENTS

FIGURES

TABLES

APPENDICES

Executive Summary

This report describes the traffic impact analysis carried out for the John Wayne Airport (JWA) General Aviation Improvement Program (GAIP). It provides the traffic and transportation technical information for the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) documents prepared for this project.

Project Overview

The project will upgrade the General Aviation (GA) facilities at JWA based on a number of objectives including safety and security, land utilization, compatibility with commercial aviation operations, and economic and financial considerations. Five project alternatives are identified for the GAIP environmental analysis as follows:

No Project – No modifications or updating of the existing GA facilities

Proposed Project – Redevelopment of the GA facilities with two full service fixed base operators (FBO’s), one located on the west side and one on the east side of the airport

Project Alternative 1 - Redevelopment of the GA facilities with three full service FBO’s, one located on the west side and two on the east side of the airport

Project Alternative 2 - Redevelopment of the GA facilities with two full service FBO’s, both located on the east side of the airport

Project Alternative 3 – Only minor modifications to existing facilities as needed to comply with FAA airport design standards

For the Proposed Project and Project Alternative 1, the key feature that is of importance to the traffic analysis is the location of a full service FBO on the west side of the airport. It should be noted that neither the Proposed Project nor any of the project alternatives will affect existing or future commercial operations at JWA.

Methodology and Assumptions

Impact Analysis Baseline and Forecast Years. The Baseline year for the impact analysis is 2016, which thereby provides the existing environmental setting for the technical analyses. Two forecast years are then used to evaluate potential future project impacts, 2021 and 2026. Consistent with the requirements of environmental documents for projects such as this, the impact analysis addresses existing plus project conditions (i.e. an analysis of project traffic added to the existing environmental setting) and future with and without project conditions (i.e. a comparison of future project conditions with future No-Project conditions). The latter analysis satisfies the CEQA requirement for addressing existing plus cumulative plus project conditions.

GA Activity Forecasts. The traffic forecasts used in the traffic impact analysis are based on constrained forecasts of GA operations at JWA. These differ from the actual projected future demand, and address factors such as physical constraints that affect future GA operations at JWA. The GA forecasts use annual GA aircraft operations as the measure of GA activity.

GA Traffic Forecasts. The traffic analysis estimates the amount of traffic generated by the GA activities in each alternative, and then determines the potential impacts of this traffic on the surrounding roadway system. The traffic forecasts are derived from the corresponding forecasts of GA activity at JWA (annual aircraft operations), and include average daily weekday vehicle trips and peak hour trips (AM and PM).

Forecast Data

A summary of the GA operations for 2016 and the two forecast years together with the corresponding ground transportation traffic volumes can be seen in the following table.

Table E-1. GA Operations and Trip Generation Forecasts

Alternative	Measure	2016	2021	2026
No-Project	*Annual Operations*	*192,800*	*196,400*	*201,000*
	Daily Trips	1,648	1,724	1,796
Proposed Project	*Annual Operations*	*192,800*	*184,400*	*167,900*
	Daily Trips	1,648	1,661	1,638
Alternative 1	*Annual Operations*	*192,800*	*184,600*	*168,600*
	Daily Trips	1,648	1,664	1,649
Alternative 2	*Annual Operations*	*192,800*	*184,900*	*169,400*
	Daily Trips	1,648	1,657	1,627
Alternative 3	*Annual Operations*	*192,800*	*195,400*	*197,600*
	Daily Trips	1,648	1,699	1,739

Notes:
Annual Operations - Total annual GA aircraft take-offs plus landings
Daily Trips - Average weekday GA vehicle trips to and from JWA

The aircraft operations show some increase for No-Project conditions (and also for Project Alternative 3), with a commensurate increase in trips. However, for the Proposed Project and Project Alternatives 1 and 2, the future aircraft operations decrease from the 2016 Baseline to 2026 while the daily trips show minimal change. This is because these alternatives have a greater proportion of larger aircraft in the forecast years and hence more trips per aircraft.

Traffic Impact Analysis

The daily GA generated trips shown above are supplemented by the corresponding peak hour volumes (AM and PM) for use in the traffic impact analysis. The traffic impacts are related to the location of a full service FBO on the west side of the airport. Figure E-1 on the next page gives a project location map and shows the intersections

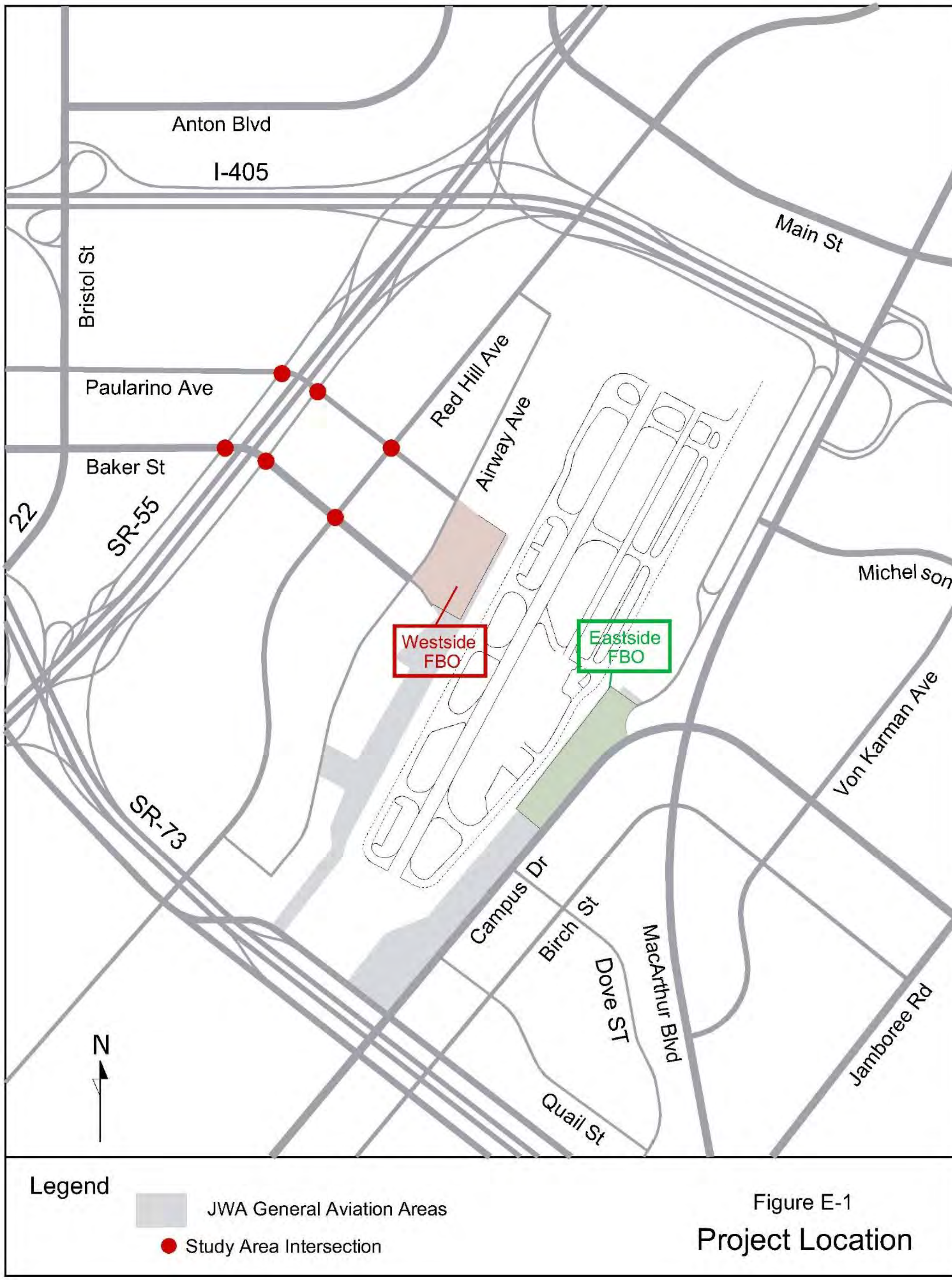


Figure E-1
Project Location

that are included in the impact analysis. Project related trips on the east side are either the same as or less than existing and therefore no impact analysis is carried out for that side of the airport.

Impact Analysis Scenarios. From the forecast year/project alternative combinations as listed above, two alternatives and a forecast year of 2026 were selected as defining the envelope of traffic impacts. In each case, existing plus project and Proposed Project versus No-Project comparisons were made, giving four analysis scenarios as follows:

- Proposed Project versus 2016 (Base = 2016)
- Project Alternative 1 versus 2016 (Base = 2016)
- Proposed Project versus No-Project (Base = 2026)
- Project Alternative 1 versus No-Project (Base = 2026)

All four analysis scenarios add traffic to the roadway system on the west side of the airport due to the relocation of one of the FBO's to that side. The impact analysis estimates the peak hour project traffic at selected intersections, and identifies any significant impacts from increases in traffic due to the project. As noted earlier, the two scenarios with a 2026 base satisfy the CEQA requirements to analyze existing plus cumulative plus project conditions.

Intersection Impacts. The six intersections that will have measureable added traffic from implementation of the GAIP were analyzed by adding project peak hour traffic to existing volumes and to future background (without project) volumes. Based on significance criteria used by the local jurisdiction (Costa Mesa in this case), the project was not found to cause any significant traffic impacts.

Construction Impacts. An analysis was made of the construction traffic that will be generated over the seven year construction period. The results showed that such traffic will not cause any significant impacts to the surrounding area roadway system.

Vehicle Miles Traveled (VMT). For informational purposes, estimates were made of the vehicle miles traveled (VMT) by the JWA GA generated trips. When compared to existing VMT for GA generated trips, the highest increase is for the No-Project with an increase in VMT of 9.0 percent by 2026, followed by Project Alternative 3 with an increase of 5.5 percent. The Proposed Project and Project Alternatives 1 and 2 show zero change or a decrease in VMT from 2016 to 2026.

Displaced Aircraft Impacts. Due to physical changes and related enhancements, the based aircraft capacity in the Proposed Project and Project Alternatives 1 and 2 will be less than the existing capacity. The traffic implications of the "displaced aircraft" were evaluated by estimating the potential increase in vehicle miles traveled (VMT) by JWA trips being diverted to other airports. It was found that when compared to total regional VMT, the added VMT represents an increase of .0022 percent, and would not be measurable in terms of highway capacity significance.

1. Introduction

This report describes the traffic impact analysis carried out for the John Wayne Airport (JWA) General Aviation Improvement Program (GAIP). It provides the traffic and transportation technical information for the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) documents prepared for this project.

1.1. Project Overview

The project will upgrade the General Aviation (GA) facilities at JWA based on a number of objectives that describe the overall intent of the program. Those objectives include safety and security, land utilization, compatibility with commercial aviation operations, and economic and financial considerations. Physical and other descriptive information on the GAIP can be found in related documents such as those listed in references 1 and 2 at the end of this chapter, and in the two environmental documents prepared for the project.

The project features that relate to potential traffic impacts are the location and function of GA facilities, and GA activities such as aircraft operations (i.e. GA aircraft take-offs and landings). Of importance in this regard are the fixed base operators (FBO's) which account for a large proportion of such activities. The traffic impact analysis uses this activity information to estimate the amount of traffic the project will add to the surrounding roadway system, and identify the potential impacts of that traffic.

Five project alternatives are identified for the GAIP environmental analysis, and these can be briefly described as follows:

No Project – No modifications or updating of the existing GA facilities

Proposed Project – Redevelopment of the GA facilities, including the provision of two full service FBO's, one located on the west side and one on the east side of the airport

Project Alternative 1 - Redevelopment of the GA facilities, including the provision of three full service FBO's, one located on the west side and two on the east side of the airport

Project Alternative 2 - Redevelopment of the GA facilities, including the provision of two full service FBO's, both located on the east side of the airport

Project Alternative 3 – Only minor modifications to existing facilities as needed to comply with FAA airport design standards

For the Proposed Project and Project Alternative 1, of importance to the traffic analysis is the location of a full service FBO on the west side of the airport. This is discussed in detail in Chapter 3, including a quantification of the traffic generated on the west side as a result of this FBO. It should be noted that neither the Proposed Project nor any of the project alternatives will affect existing or future commercial operations at JWA.

The estimates made in this report of the GA related ground transportation traffic and the resulting traffic impacts are based on the corresponding estimates of future GA aircraft operations. The GA operations forecasts are quantified in related GAIP technical reports (see References 1 and 2 at the end of this chapter), with estimates being given of the future GA demand and of the future GA operations as constrained by the physical space available for GA activities. It is the latter that are used here as the basis for estimating the amount of ground transportation traffic that will be generated by the GAIP, and they are referred to as the "constrained forecasts".

1.2. Impact Analysis Scope and Methodology

This section discusses the scope of the traffic impact analysis, and describes the methodology and assumptions used in the technical analysis.

1.2.1. Analysis Scope. The Baseline year for the GAIP environmental impact analysis is 2016, and information for this year provides the existing environmental setting for the technical analyses. Two forecast years are then used to evaluate potential future impacts, 2021 and 2026. As is discussed in Chapter 4, the 2026 forecasts are used for the future conditions traffic impact analysis, with a comparative discussion given for the 2021 forecasts.

The background traffic forecasts for the 2026 analysis represent "long range cumulative" conditions, and are based on buildout of the General Plans of the three cities in the project vicinity. The volumes thereby address cumulative projects along with future development as embodied in those General Plans. The use of these forecasts satisfies the need to address cumulative projects while ensuring consistency with each city's long range planning work. (See also the discussion on source of traffic forecast data in Section 1.2.3 below).

Consistent with the requirements of environmental documents for projects such as this, the impact analysis addresses existing plus project conditions (i.e. an analysis of project traffic added to the existing environmental setting) and future with and without project conditions (i.e. a comparison of future with-project conditions versus future No-Project conditions). The latter satisfies the CEQA requirements to analyze existing plus cumulative plus project conditions.

The traffic analysis first estimates the amount of GA ground traffic generated by the GA activities in each alternative, and then determines how this traffic is distributed onto the surrounding roadway system. From the 10 sets of trip generation forecasts (five alternatives with two forecast years), a selection was made of those scenarios that define the envelope of potential traffic impacts. Those impacts are primarily related to the additional traffic on the west side of the airport resulting from locating an FBO on the west side in the Proposed Project and Project Alternative 1. Further discussion of the selection of analysis scenarios can be found in Chapter 4.

1.2.2. Methodology. As noted earlier, the traffic forecasts used in the analysis are based on constrained forecasts of GA operations at JWA. These differ from the actual projected future demand, and address factors such as physical constraints that affect future GA operations at JWA. A detailed discussion on both the demand forecasts and the constrained forecasts can be found in the applicable GAIP engineering technical reports (see References 1 and 2 at the end of this chapter).

Based on the constrained forecasts of GA activity at JWA, two traffic measures are derived to describe ground transportation traffic related to these GA activities. The first is average weekday vehicle trips to and from the airport. The second measure is GA trips during the peak hours (AM and PM) on the adjacent roadway system. The average weekday trip generation gives an overall measure of GA traffic. While not used directly in the traffic impact analysis, it provides a convenient benchmark for comparing alternatives, and is also used in the air quality analyses for the GAIP NEPA environmental document.

For the traffic impact analysis, the peak hour trip generation is used to identify potential project impacts. This is consistent with the traffic impact analysis methodology used by the local jurisdictions in the surrounding area, and focuses on intersection performance during the two peak hours (see later section 1.2.4. on performance measures).

1.2.3. Study Area. There are two study areas used in the traffic analysis. The "secondary study area" is the area for which average daily traffic (ADT) data is presented, and includes the roadway system surrounding JWA. The "primary study area" encompasses those intersections that are included in the peak hour impact analysis. The criteria for selecting this primary study area mirrors the significance criteria used for identifying project impacts, and includes those intersections that have a "measurable" change in traffic as defined by the performance criteria of the local jurisdiction (see discussion in Section 2.1.2). Because of this specific intersection selection, the primary study area is more focused than the secondary study area.

1.2.4. Source of Traffic Forecast Data. The traffic forecast data used to portray future cumulative conditions is taken from the traffic modeling forecasts prepared by the three cities in the project vicinity. They represent long range cumulative conditions rather than a specific year (for example the ITAM volumes are labeled as "post-2035" while the Costa Mesa forecasts are referred to as "2035"). Hence they include cumulative projects plus other anticipated growth in each city, and also growth in regional through traffic on those roadways that serve regional and local traffic. On the east side of the airport, the primary source of traffic forecast data is the Irvine Transportation Analysis Model (ITAM), and a recent update to ITAM includes growth for JWA that reflects the 2014 Settlement Agreement (the Settlement Agreement established a ceiling on commercial operations at JWA). While the Costa Mesa traffic forecasts have yet to be updated, the future increase in traffic due to the Settlement Agreement does not affect any of the Costa Mesa roadways analyzed here.

1.2.5. Performance Measures. Peak hour intersection performance measures are used in the impact analysis for evaluating traffic volumes at the primary study area intersections. These performance measures provide the basis for defining "significance criteria" in accordance with environmental impact analysis guidelines and procedures. Intersection performance with and without project traffic is compared at each location, and criteria are applied to the difference in performance to determine if the project has a significant impact.

The peak hour performance measure used in the analysis is "intersection capacity utilization" (ICU). This determines intersection capacity based on the lane geometry of the intersection, and then estimates the amount of that capacity that is "utilized" by the specific peak hour turn movement volumes. A level of service (LOS) value is then determined from that ICU value. The LOS values are A through F (best to worst), with LOS D being the maximum acceptable value adopted by the local jurisdictions in the area. Appendix B, which presents the ICU calculations for the primary study area, provides information on the relationship between ICU and LOS.

1.3. References

1. "General Aviation Improvement Program Preliminary Engineering. General Aviation Forecasting and Analysis Technical Report", AECOM, December 2017.

2. "General Aviation Improvement Program Preliminary Engineering. Based Aircraft Capacity Analysis and General Aviation Constrained Forecasts". AECOM, November, 2017.

3. "Trip Generation Manual, 9th Edition", Institute of Transportation Engineers

4. "City of Costa Mesa General Plan Update Traffic Study". Stantec Consulting, February 12th, 2016.

5. "City of Irvine Transportation Analysis Model (ITAM), Version 17". City of Irvine ITAM data, November, 2017.

6. "John Wayne Airport Transportation Impact Analysis Report", Fehr & Peers, April, 2014.

7. "John Wayne Airport GAIP Construction Schedule" AECOM, November, 2017.

8. "Draft Program Environmental Impact Report on the Proposed Airport Master Plan" Santa Barbara Airport, August, 2015.

1.4. Acronyms

ADT - Average Daily Traffic

CEQA- California Environmental Quality Act

EIR – Environmental Impact Report

FBO - Fixed Base Operator

GA - General Aviation

GAIP - General Aviation Improvement Program

ICU- Intersection Capacity Utilization

ITAM- Irvine Transportation Analysis Model

ITE – Institute of Transportation Engineers

JWA – John Wayne Airport

LOS- Level of Service

NEPA- National Environmental Policy Act

PP- Proposed Project. Typically only used in a table heading, with description given at the bottom of the table. Similarly for No-Project (**NP),** Project Alternative 1 (**Alt. 1)**, etc.

TE – Tripends. A trip generation measure defined as the number of arriving plus departing ground transportation trips at a specific location over a given time period.

VMT – Vehicle Miles Traveled

2. Transportation Setting

This chapter describes the transportation setting for the proposed project. It presents existing and future traffic volumes, and summarizes the corresponding background (i.e. without project) conditions for the intersections addressed in the traffic impact analysis.

2.1. Background Traffic Volumes

The background traffic volumes used in this traffic impact analysis provide the without-project setting against which the with-project traffic volumes are compared. This section discusses those background volumes.

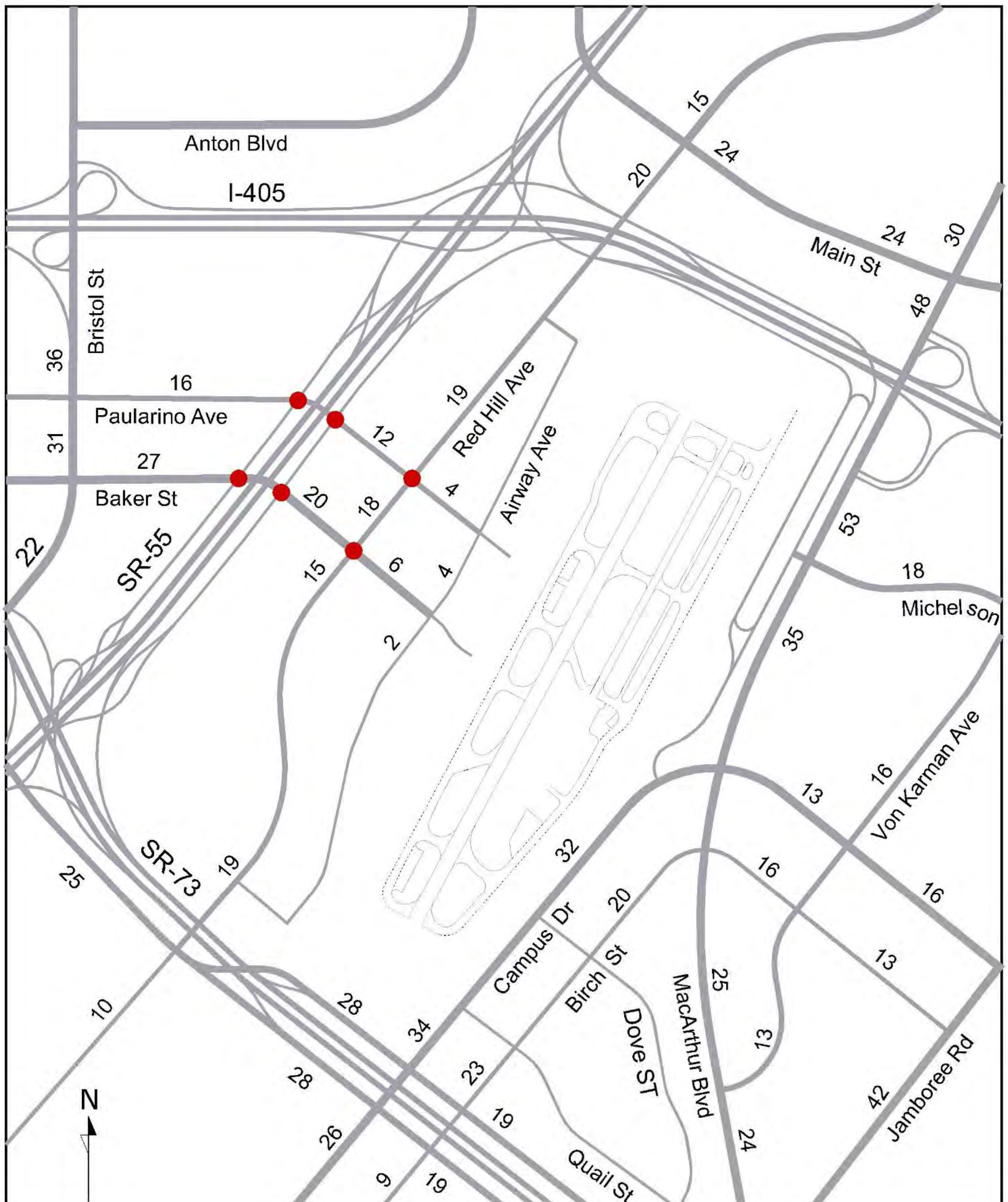
2.1.1 Average Daily Traffic. To provide information for the air quality analysis, average daily traffic (ADT) traffic volumes are presented here for the arterial highway system in the vicinity of JWA. Figure 2-1 shows the existing ADT volumes, these being taken from several sources, including data collected by the three cities in this area (Costa Mesa, Irvine, and Newport Beach), and the traffic flow map prepared by the Orange County Transportation Authority (OCTA).

The background volumes used for the analysis of future project impacts are referred to here as “future volumes”. As noted in Chapter 1, they represent long range cumulative conditions rather than a specific year. Figure 2-2 shows these future ADT volumes for the roadway system in the vicinity of JWA. As with the existing ADT volumes, this information is not specifically used in the traffic impact analysis, but provides background information for the air quality analysis.

2.1.2. Peak Hour Intersection Volumes. As discussed in Section 1.2, the traffic impact analysis uses peak hour intersection volumes to identify potential impacts in accordance with performance criteria used by the appropriate local jurisdiction. The intersections included in the analysis are those that will have a measurable increase in peak hour traffic as a result of the project (a peak hour ICU increase of more than 1.0 percent). On this basis the study area consists of six intersections in Costa Mesa on the west side of the airport. Existing and future no-project traffic volumes for these were taken from the City of Costa Mesa General Plan Update Traffic Study (see Reference 4 at the end of Chapter 1), and the intersection volumes can be found in Appendix B in the form of intersection capacity utilization (ICU) tables.

2.2. Peak Hour Intersection Performance

As described in Section 1.2.4, the traffic impact analysis uses peak hour ICU values to measure intersection performance. These are then used to assign a level of service (LOS) value. With and without project peak hour intersection volumes together with the corresponding ICU calculations can be found in Appendix B. *(text continues on page 13)*



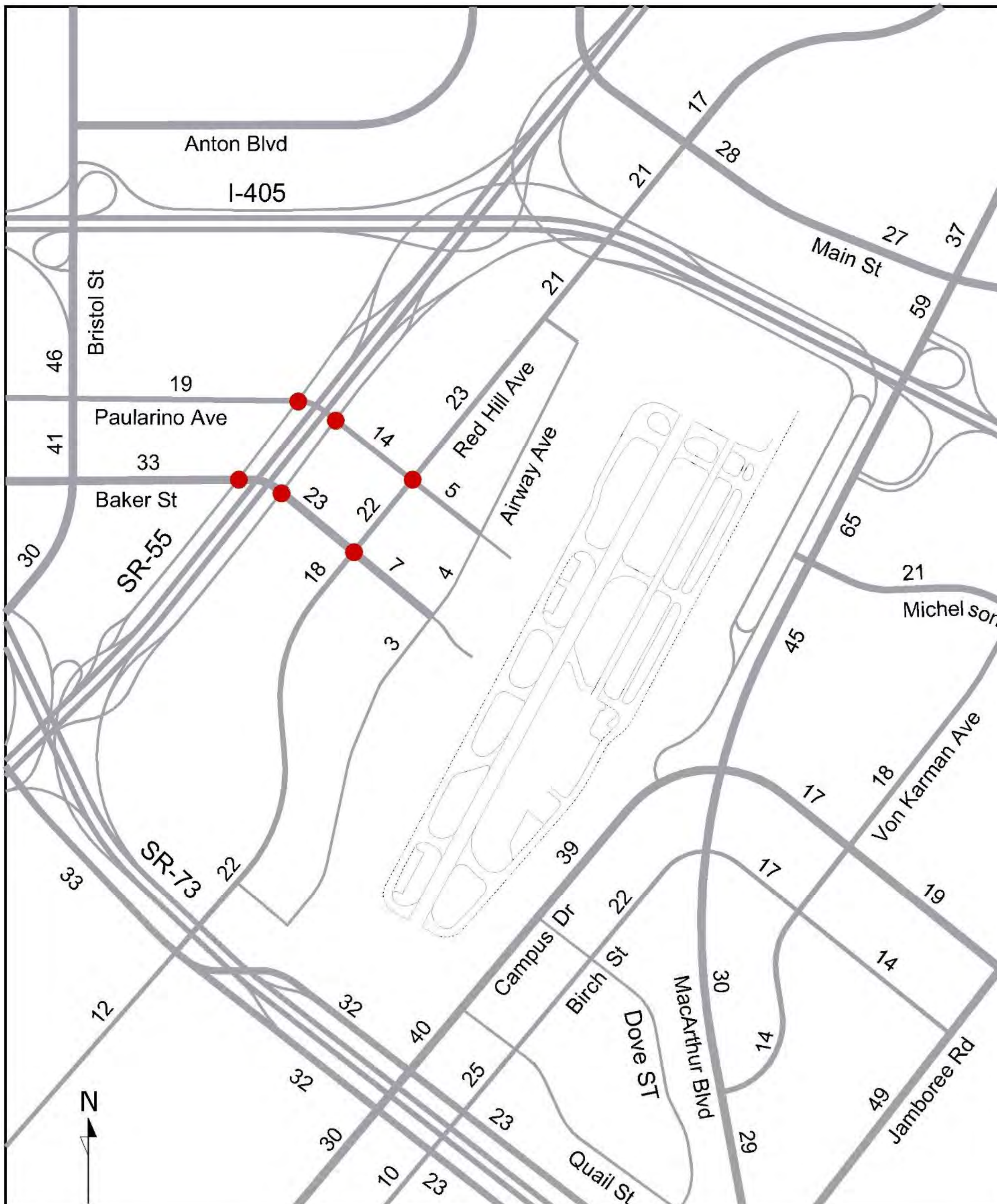
Legend

XY - Existing Average Daily Traffic (ADT) in 000's

● Study Area Intersection

Figure 2-1

Existing ADT Volumes



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XY - Future Average Daily Traffic (ADT) in 000's

● Study Area Intersection

Figure 2-2

Future ADT Volumes

The following Table 2-1 gives a summary of the without project ICU's and the corresponding LOS values.

Table 2-1. Without Project ICU and LOS Summary

Location	Scenario	AM Peak Hour		PM Peak Hour	
		ICU	LOS	ICU	LOS
SR-55 SB Ramps & Paularino	Existing	0.71	C	0.64	B
	Future	0.78	C	0.77	C
SR-55 NB Ramps & Paularino	Existing	0.68	B	0.71	C
	Future	0.74	C	0.83	D
Red Hill & Paularino	Existing	0.43	A	0.56	A
	Future	0.56	A	0.68	B
SR-55 SB Ramps & Baker	Existing	0.66	B	0.69	B
	Future	0.73	C	0.79	C
SR-55 NB Ramps & Baker	Existing	0.67	B	0.75	C
	Future	0.83	D	0.87	D
Red Hill & Baker	Existing	0.34	A	0.63	B
	Future	0.43	A	0.72	C

The City of Costa Mesa uses LOS D (ICU to not exceed .90) as the acceptable performance standard, and as can be seen, all intersections perform within this standard. Chapter 4 of this report summarizes the corresponding results for with-project conditions.

3. Project Traffic Characteristics

The traffic impact analysis is based on weekday vehicle trips generated by the GAIP. This chapter describes the project trip generation and geographic distribution of those project trips.

3.1. Trip Generation Rates

Trip generation rates for general aviation (GA) activities at JWA were derived using information from several sources. A full description of the derivation process can be found in Appendix A, and this section summarizes the basic relationships used to estimate project trips for the traffic impact analysis.

The variable used in the GA trip rates is aircraft operations (take-offs plus landings of GA aircraft). This is a representative measure of GA activity and thereby of GA related trips to and from the airport. The JWA GA forecasting reports (References 1 and 2 in Chapter 1) provide existing and future information on GA operations at JWA, with the data separated into four types of GA aircraft:

Piston – single and twin piston engine aircraft
Turbine – aircraft with turboprop engines
Jet – aircraft with jet engines
Helicopter – private and government operated helicopters (e.g. OCSD)

The forecasts indicate a change in the aircraft mix over time, with less piston aircraft and more jet aircraft compared to existing GA operations. This in turn means more of the larger GA aircraft, which due to their higher passenger occupancy, have a greater number of ground transportation trips per aircraft. To account for this change over time, trip generation rates were derived for each of the four types of aircraft, and these are summarized in Table 3-1 below.

Table 3-1. GA Trip Generation Rates by Aircraft Type

Trip Rate	Piston	Turbine	Jet	Helicopter	Average*
TE/Annual Operations (000's)	5.83	13.57	19.43	9.74	8.55

TE - Tripends (arriving plus departing ground transportation vehicle trips)
* Average trip rate for 2016 aircraft mix (varies for forecast years due to different aircraft mix)

The trip rates for each aircraft type are assumed to remain constant for the forecast years, and the average rate changes for those forecast years in response to the change in aircraft mix. It should be noted that the existing and future aircraft operations are also separated into those by "based aircraft" and those by "transient aircraft". The latter are referred to as itinerant operations (i.e. "itinerant operations" are made by "transient aircraft"). The same trip rates are applied to both types of operations.

3.2. Project Trip Generation

As noted in Chapter 1, there are five project alternatives addressed in this report including the No-Project Alternative. The existing Baseline for the impact analysis is 2016, with forecasts given for 2021 and 2026.

Trip generation by year and by aircraft type is given in Appendix A for each of the project alternatives and the differences in aircraft mix over time can be seen in Table A-4 of that appendix. The following Table 3-2 summarizes the GA trip generation results totaled over all aircraft types for each of the five project alternatives.

Table 3-2. JWA GA Trip Generation Summary

ALTERNATIVE	Measure	2016	2021	2026
No-Project	*Annual Operations*	*192,800*	*196,400*	*201,000*
	AM Tripends	125	131	137
	PM Tripends	120	125	130
	ADT Tripends	1,648	1,724	1,796
Proposed Project	*Annual Operations*	*192,800*	*184,400*	*167,900*
	AM Tripends	125	127	125
	PM Tripends	120	120	119
	ADT Tripends	1,648	1,661	1,638
Alternative 1	*Annual Operations*	*192,800*	*184,600*	*168,600*
	AM Tripends	125	127	125
	PM Tripends	120	121	120
	ADT Tripends	1,648	1,664	1,649
Alternative 2	*Annual Operations*	*192,800*	*184,900*	*169,400*
	AM Tripends	125	127	124
	PM Tripends	120	120	118
	ADT Tripends	1,648	1,657	1,627
Alternative 3	*Annual Operations*	*192,800*	*195,400*	*197,600*
	AM Tripends	125	130	132
	PM Tripends	120	124	126
	ADT Tripends	1,648	1,699	1,739

Notes:
AM Tripends - AM peak hour GA vehicle trips to and from JWA
PM Tripends - PM peak hour GA vehicle trips to and from JWA
ADT Tripends - Average daily GA vehicle trips to and from JWA

For the Proposed Project and Project Alternatives 1 and 2, the future aircraft operations decrease from the 2016 Baseline to 2026 (e.g. from 192,800 to 167,900 for the Proposed Project) while the corresponding trip generation shows minimal change (from 1,648 daily tripends in 2016 to 1,638 in 2026). This is because the lower number of aircraft operations in the future is offset by the higher average trip generation rates caused by the greater proportion of larger aircraft. The trip rate difference due to this change in aircraft mix can be seen in the following Table 3-3.

Table 3-3. Trip Rate Comparison - Existing Versus 2026 Proposed Project

Project	Annual Aircraft Operations						Average ADT Rate*
	Year	Piston	Turbine	Jet	Helicopter	TOTAL	
Baseline	2016	147,300	9,800	31,800	3,900	192,800	8.550
		76.4%	*5.1%*	*16.5%*	*2.0%*	*100.0%*	
Proposed Project	2026	111,000	11,700	40,400	4,800	167,900	9.756
		66.1%	*7.0%*	*24.1%*	*2.9%*	*100.0%*	

* Average ADT Trip Rate (daily tripends per annual operations in 000's) based on mix of aircraft types

As can be seen here, the average trip rate increases by around 14 percent from 2016 to 2026 (from 8.550 to 9.756) for the Proposed Project, and this is offset by a proportionate decrease in annual operations. Similar results are obtained for Project Alternatives 1 and 2 which also have higher 2026 trip rates compared to 2016 due to the change in aircraft mix over time.

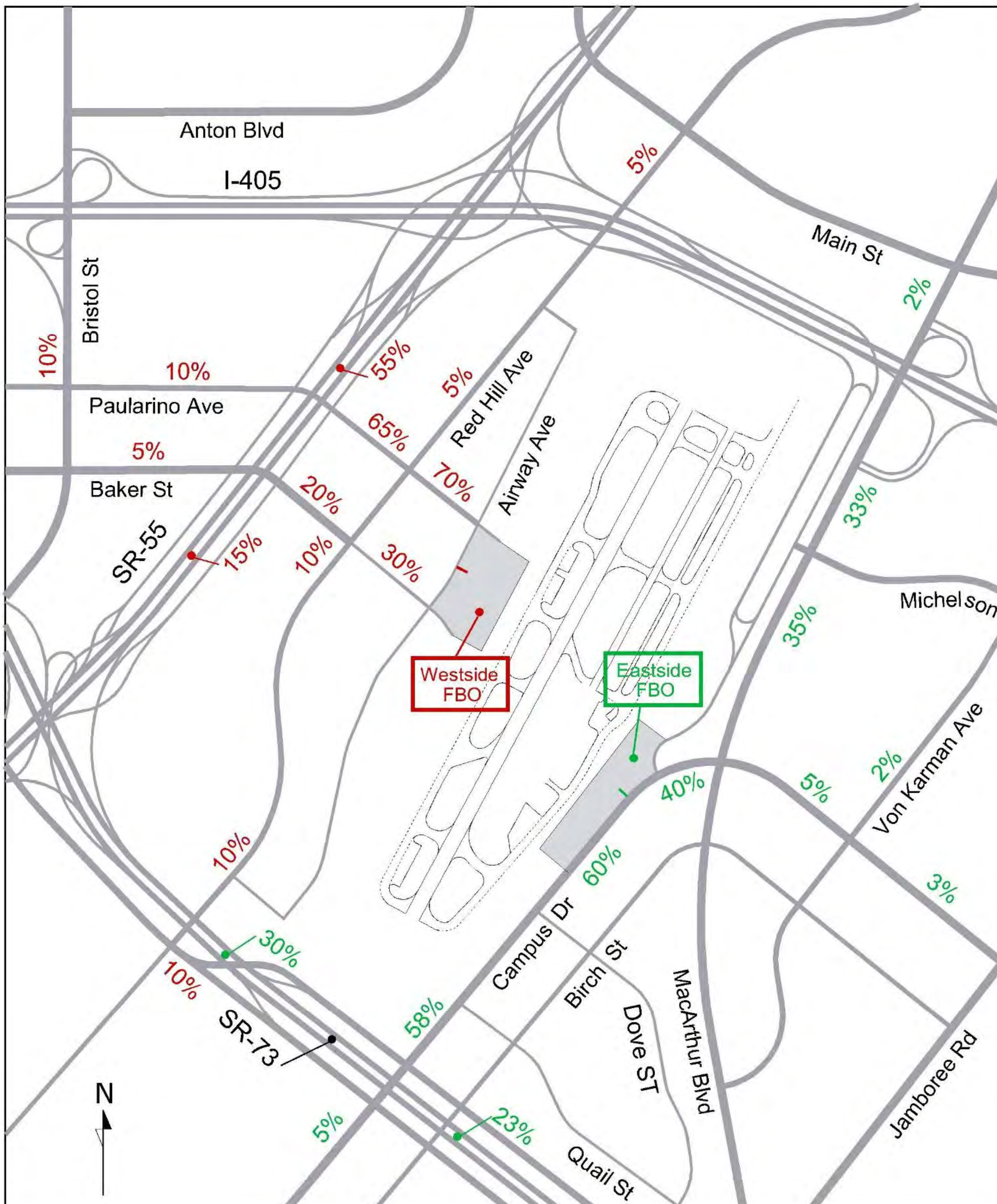
For the No-Project and for Project Alternative 3 (which is essentially the same as the No-Project), the change in aircraft mix over time is only slight (some increase in operations by jet aircraft but minimal decrease for piston aircraft). This results in an increase in average trip rate of less than five percent (from 8.550 to 8.940). However, in this case there is an increase in total aircraft operations in the future, which combined with the slightly higher trip rate results in a nine percent increase in trip generation (from 1,648 daily No-Project tripends in 2016 to 1,796 by 2026).

When the No-Project and Proposed Project trip generation for 2026 are compared, the daily trip generation for the Proposed Project is actually less than for the No-Project (1,638 versus 1,796). The potential traffic impacts of the Proposed Project thereby occur from the relocation of one of the FBO's to the west side of the airport rather than from any increase in total trip generation. The same applies to Project Alternative 1.

For Project Alternative 2, the 2026 trip generation is less than the 2026 No-Project trip generation. In this case there is no FBO on the west side of the airport, and hence this alternative does not cause any project impacts on either side of the airport.

3.3. Project Trip Distribution

The geographic distribution of GA related traffic is illustrated in Figure 3-1, with each side of the airport shown separately. This project trip distribution has been estimated



Legend

WZ% - West side trip distribution

XY% - East side trip distribution

Figure 3-1

Project Trip Distribution

here by considering the two components of GA operations noted earlier, based aircraft (at JWA), and transient aircraft based elsewhere and flying into JWA.

For the based aircraft, the distribution of ground transportation trips is related to the locations of registered pilots and/or aircraft owners, and information on this is given in the GA forecasting report (Reference 1 in Chapter 1). That locational data was used here to estimate a representative geographic distribution for this traffic component.

For itinerant aircraft, ground transportation trips are assumed to be generally related to activity areas, examples of which are the Irvine Business Complex, Irvine Spectrum, the Anaheim resort area, etc. The geographic distribution of trips for this component was estimated by considering the demographics of the surrounding area and Orange County in particular.

For both GA trip components, freeway accessibility is a key consideration in determining the local streets used to access the GA activities on each side of the airport. This is because of the somewhat regional geographic dispersion of such trips, and hence the local streets carrying JWA GA traffic are primarily those directly serving the regional freeway system.

3.4. Ground Transportation Modes

The GA ground transportation trips have been in defined in terms of vehicle trips entering and leaving the airport (referred to as "tripends" in trip generation terminology). These trips are made by private vehicles, rental cars, Lyft, Uber, conventional taxicabs, and limousine services. The based aircraft trips are more likely to be made by private vehicles, most of which will park at the airport, whereas the other types of vehicles will typically serve visitors arriving and departing in transient aircraft.

The trip rate discussion and accompanying trip generation results assume a mix of all such vehicles. They all use capacity on the surrounding roadways, and no attempt has been made to estimate the actual mix. Parking will be provided for the based aircraft users, and for the non-based aircraft trips, much of the interface will be focused at the FBO's, with rental car concessions and a variety of ground transportation services offered as part of the overall FBO services.

Four of Orange County Transportation Authority's bus routes are accessible to the east side and/or west side GA areas. Routes 76 and 212 serve the JWA commercial terminal, Route 71 provides service along Red Hill Avenue, and Route 178 provides service along Birch Street. The vehicle trip estimates presented here do not assume any use of public transit, but these bus routes do provide a transit mode option, particularly for GA workers. It is less likely that GA aircraft arrival and departure passengers would use transit, given the range of other options.

4. Traffic Impact Analysis

This chapter describes the results of the ground transportation traffic impact analysis for the GAIP. Average daily traffic (ADT) information is first presented, followed by a peak hour analysis for the intersections that will have measurable traffic increases due to the project. Project related vehicle miles traveled is also addressed.

4.1 Impact Analysis Scenarios

As described in Chapter 3, the traffic analysis addresses five project alternatives and two forecast years. The previous chapter presented trip generation estimates for all ten combinations. For the actual impact analysis, four analysis scenarios were selected as defining the envelope of traffic impacts due to the GAIP:

- Proposed Project versus 2016 (Base = 2016)
- Project Alternative 1 versus 2016 (Base = 2016)
- Proposed Project versus No-Project (Base = 2026)
- Project Alternative 1 versus No-Project (Base = 2026)

This selection of impact analysis scenarios was based on specific traffic attributes of the project alternatives and forecast years as discussed below.

4.1.1 Project Alternatives. Of the four project alternatives (i.e. excluding the No-Project), two were selected for analysis, the Proposed Project and Project Alternative 1. Both of these have a full service FBO on the west side and thereby add traffic to the roadway system in that area. Project Alternative 2 retains the FBO’s on the east side and has minimal change in trip generation in 2021 and 2026 compared to 2016. Hence it does not cause any traffic impacts.

Project Alternative 3 is essentially the same as the No-Project, adding a similar amount of traffic to the east side of the airport. The background traffic forecasts in this area were obtained from the Irvine Transportation Analysis Model (see Reference 5 in Chapter 1) which includes increases in traffic commensurate with the increase in traffic due to an increase in commercial and GA activity at JWA. Hence, this alternative is already accounted for in the background (i.e. without project) traffic in this area.

4.1.2. Forecast Year(s). As summarized in Chapter 3, the 2021 trip generation forecasts for each project alternative except Alternative 3 are similar in magnitude to the 2026 forecasts. For Project Alternative 3, the 2021 forecasts are lower than for 2026. Also, project construction is scheduled to occur over a seven year period commencing in 2019, and hence will be underway in 2021. Accordingly, of the two forecast years, 2026 will have greater project traffic impacts than 2021 and has been used for the analysis.

4.2 Impact Analysis Traffic Volumes

As has been discussed in the previous section, the two project alternatives addressed in the impact analysis have one of the full service FBO's relocated to the west side of the airport. This increases traffic on that side while reducing traffic on the east side. Table 4-1 which follows summarizes these differences, thereby giving the traffic impact volumes to be addressed in the four impact analysis scenarios.

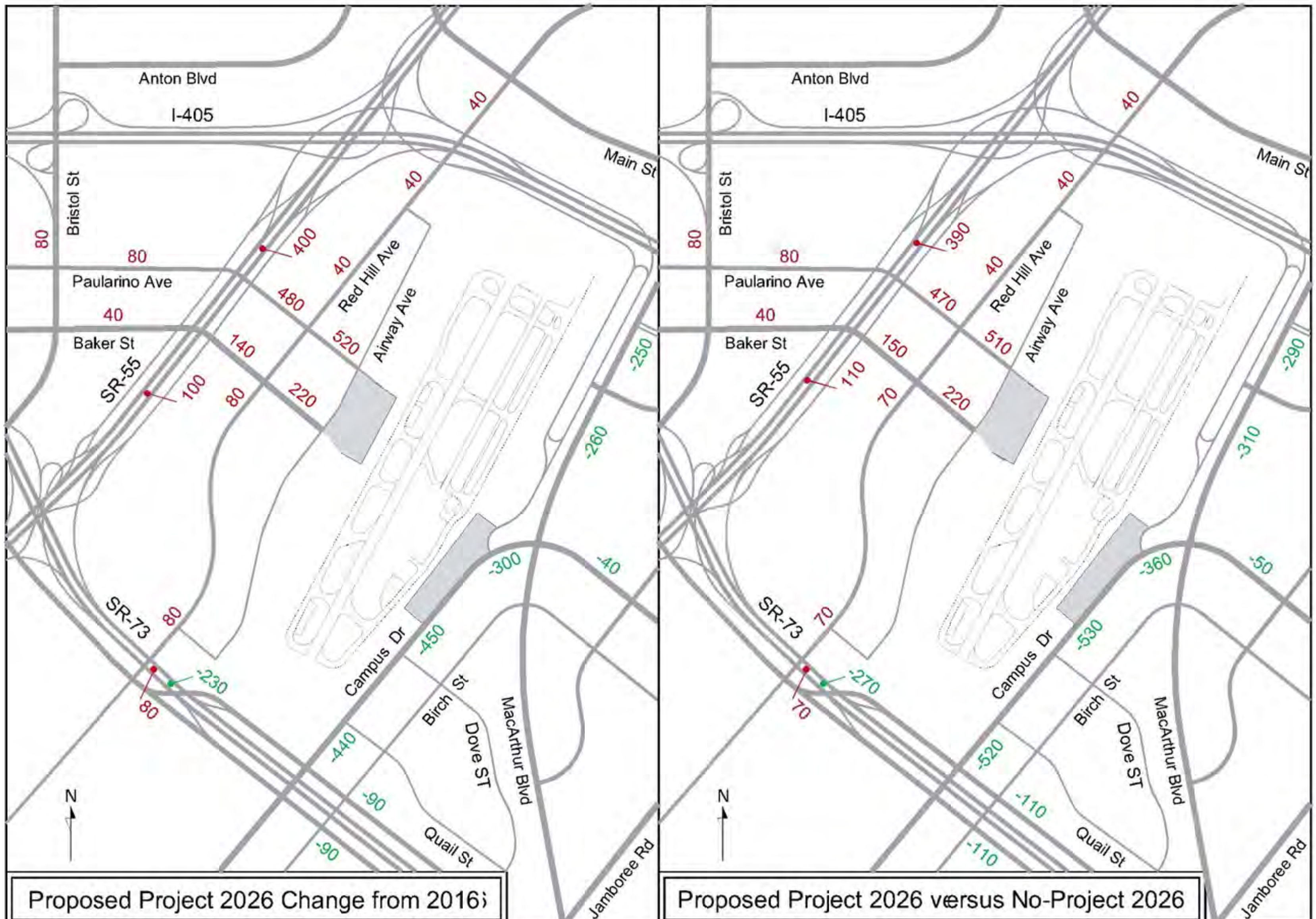
Table 4-1. Traffic Impact Volumes

ALT.	Difference	Westside/ Eastside	AM PEAK HOUR			PM PEAK HOUR			ADT
			In	Out	Total	In	Out	Total	
PP	2026 to 2016 Difference	West side Difference	35	22	57	25	29	54	738
		East side Difference	-35	-22	-57	-25	-30	-55	-748
		Total Difference	0	0	0	0	-1	-1	-10
	2026 No-Project Difference	West side Difference	35	21	56	25	29	54	730
		East side Difference	-42	-26	-68	-30	-35	-65	-888
		Total Difference	-7	-5	-12	-5	-6	-11	-158
Alt. 1	2026 to 2016 Difference	West side Difference	27	17	44	19	23	42	578
		East side Difference	-27	-17	-44	-19	-23	-42	-578
		Total Difference	0	0	0	0	0	0	0
	2026 No-Project Difference	West side Difference	27	16	43	19	23	42	570
		East side Difference	-34	-21	-55	-24	-28	-52	-717
		Total Difference	-7	-5	-12	-5	-5	-10	-147

PP - Proposed Project
Alt. 1 ï Project Alternative 1

Project traffic added to the west side is a maximum of 738 ADT, with 57 trips as the maximum traffic addition during either of the peak hours.

4.2.1. ADT Traffic Volumes. The impact analysis for the Proposed Project and Project Alternative 1 involves two scenarios, one addressing existing plus project conditions and the other addressing project versus No-Project conditions in a future setting. The project trip distribution shown in the previous chapter was applied to the difference volumes presented above to estimate the project trips on the surrounding roadway system. The resulting project ADT contributions to those surrounding roadways can be seen in Figure 4-1 for the Proposed Project and in Figure 4-2 for Project Alternative 1.
(text continues on page 23)



Legend

XY - Average Daily Traffic (ADT) - Positive difference

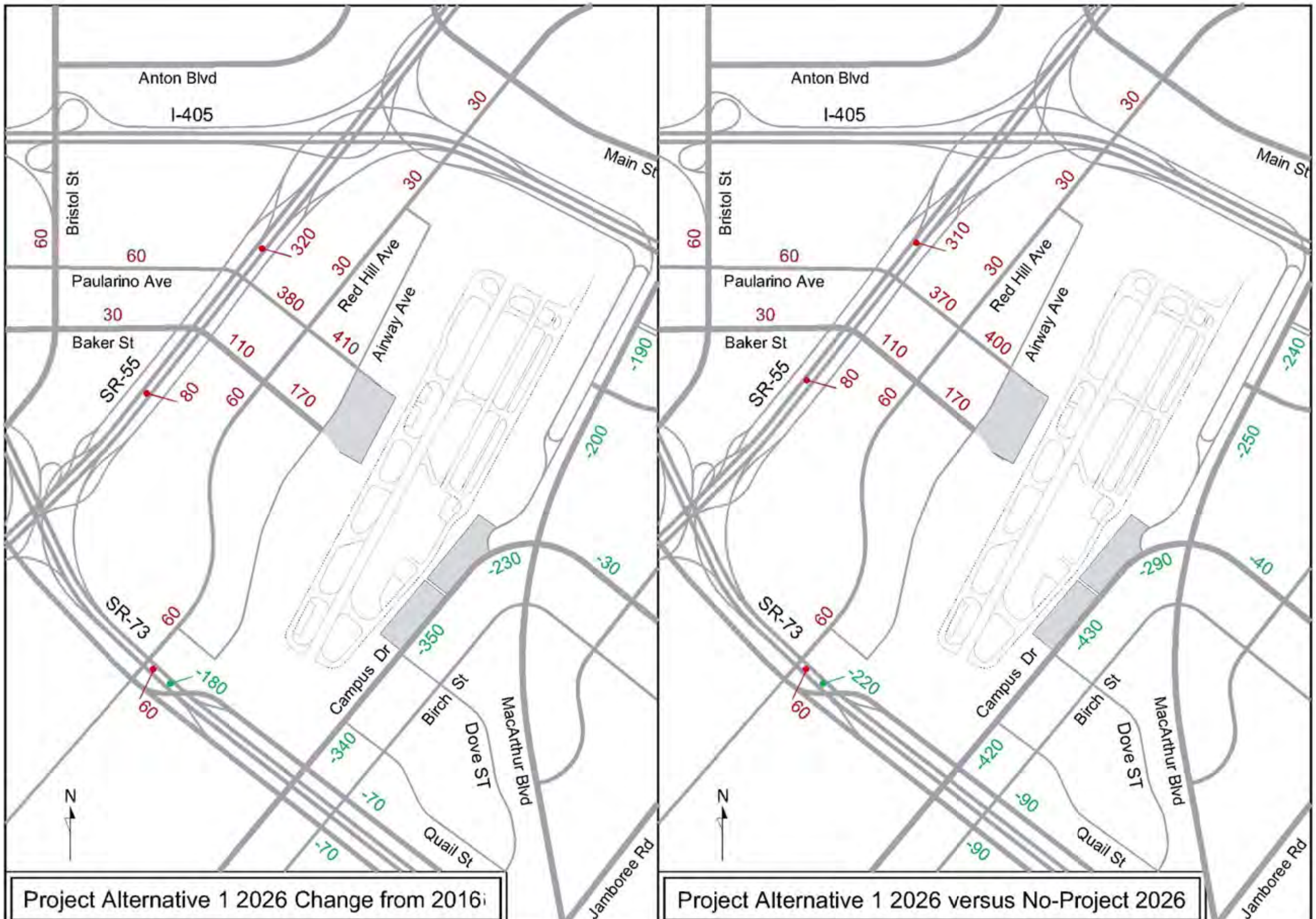
WZ - Average Daily Traffic (ADT) - Negative Difference

GA FBO's

Note: Project volume differences less than 30 not shown

Figure 4-1

Proposed Project ADT Volumes



Legend

XY - Average Daily Traffic (ADT) - Positive Difference

WZ - Average Daily Traffic (ADT) - Negative Difference

GA FBO's

Note: Project volume differences less than 30 not shown

Figure 4-2

Project Alternative 1 ADT Volumes

As can be seen from these diagrams, the project volumes have negative values on the east side and positive on the west side because of the FBO on the west side in these two alternatives. This ADT information is given here for informational purposes and for use in the air quality analysis, and the traffic impact analysis uses peak hour volumes as discussed in the next section.

4.2.2. Peak Hour Traffic Volumes. As described in Section 4.1, four scenarios are analyzed for potential peak hour project impacts. The project added trips for these are shown in Figure 4-3, which gives the inbound and outbound trips for the AM and PM peak hours on the roadways serving the west side FBO.

It should be noted that while there is other GA activity on the west side of the airport, most of those are existing uses that will remain. Also, their trip generation is relatively low. Hence the increase in GA generated trips is largely related to the full service FBO located on the west side for the Proposed Project and Project Alternative 1.

The next section evaluates these peak hour project trips and identifies their potential traffic impacts on the six primary study area intersections.

4.3. Peak Hour Intersection Analysis

A summary of the with-project intersection capacity utilization (ICU) values and the corresponding levels of service (LOS) is given in Table 4-2. The corresponding no-project values are also listed here for comparison purposes.

As can be seen from the ICU comparison values, the highest contribution to any ICU value is .01, and does not cause the acceptable LOS D to be exceeded (ICU to not exceed .90). Hence the project does not have any significant impacts at these intersections.

4.4. Vehicle Miles Traveled

For informational purposes, this section estimates the potential change in vehicle miles traveled (VMT) as a result of the project. The VMT is not specific to a defined study area but shows the overall change in VMT caused by project generated trips.

Information given in the JWA engineering technical reports (References 1 and 2 in Chapter 1), include the geographic distribution of aircraft owners/pilots for JWA GA aircraft. An analysis of this data indicates an average distance of 15.25 miles from JWA. This applies to the based aircraft, which account for around 50 percent of the total GA operations, the remainder being from transient aircraft. Local destinations for passengers on transient aircraft are primarily major activity centers, and an average distance of 10.0 miles is considered representative for these. Hence the average trip distance for GA ground transportation trips is estimated at 12.6 miles. *(text continues on page 26)*

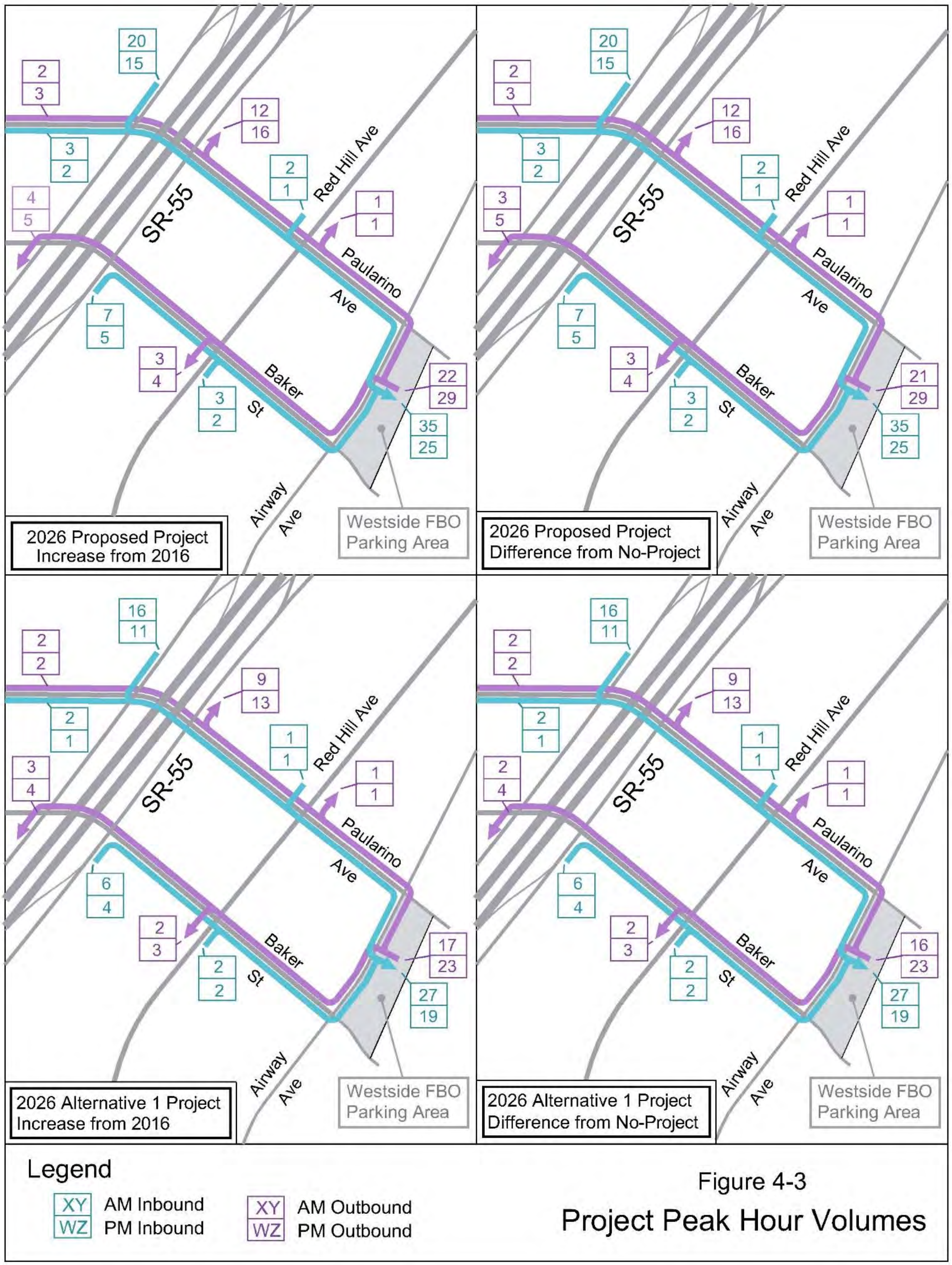


Figure 4-3
Project Peak Hour Volumes

Table 4-2. Peak Hour ICU and LOS Summary

Location	Scenario	AM Peak Hour		PM Peak Hour	
		ICU	LOS	ICU	LOS
SR-55 SB Ramps & Paularino	Existing	0.71	C	0.64	B
	Existing plus Proposed Project	0.72	C	0.64	B
	Existing plus Project Alternative 1	0.72	C	0.64	B
	Future	0.78	C	0.77	C
	Future plus Proposed Project	0.79	C	0.77	C
	Future plus Project Alternative 1	0.79	C	0.77	C
SR-55 NB Ramps & Paularino	Existing	0.68	B	0.71	C
	Existing plus Proposed Project	0.68	B	0.71	C
	Existing plus Project Alternative 1	0.68	B	0.71	C
	Future	0.74	C	0.83	D
	Future plus Proposed Project	0.75	C	0.84	D
	Future plus Project Alternative 1	0.75	C	0.84	D
Red Hill & Paularino	Existing	0.43	A	0.56	A
	Existing plus Proposed Project	0.44	A	0.57	A
	Existing plus Project Alternative 1	0.44	A	0.57	A
	Future	0.56	A	0.68	B
	Future plus Proposed Project	0.57	A	0.69	B
	Future plus Project Alternative 1	0.57	A	0.68	B
SR-55 SB Ramps & Baker	Existing	0.66	B	0.69	B
	Existing plus Proposed Project	0.66	B	0.70	B
	Existing plus Project Alternative 1	0.66	B	0.70	B
	Future	0.73	C	0.79	C
	Future plus Proposed Project	0.73	C	0.79	C
	Future plus Project Alternative 1	0.73	C	0.79	C
SR-55 NB Ramps & Baker	Existing	0.67	B	0.75	C
	Existing plus Proposed Project	0.67	B	0.75	C
	Existing plus Project Alternative 1	0.67	B	0.75	C
	Future	0.83	D	0.87	D
	Future plus Proposed Project	0.83	D	0.87	D
	Future plus Project Alternative 1	0.83	D	0.87	D
Red Hill & Baker	Existing	0.34	A	0.63	B
	Existing plus Proposed Project	0.35	A	0.63	B
	Existing plus Project Alternative 1	0.35	A	0.63	B
	Future	0.43	A	0.72	C
	Future plus Proposed Project	0.43	A	0.72	C
	Future plus Project Alternative 1	0.43	A	0.72	C

The location of an FBO on the west side of the airport in the Proposed Project and Project Alternative 1 is not anticipated to change this average trip length. Some trips will be shorter, specifically those to/from western Orange County and Los Angeles County. This will be offset by longer trips to southeast Orange County, and specifically major activity areas such as the Irvine Business Complex and Irvine Spectrum. Hence the same average trip length of 12.6 miles is used here to calculate VMT for all the project alternatives.

The 2016 and 2026 VMT for each of the project alternatives is summarized below in Table 4-3.

Table 4-3. Average Weekday VMT Summary

ALTERNATIVE	2016		2026		*Increase 2016-2026*
	ADT	VMT	ADT	VMT	
No-Project	1,648	20,765	1,796	22,630	*9.0%*
Proposed Project	1,648	20,765	1,638	20,639	*-0.6%*
Alternative 1	1,648	20,765	1,649	20,777	*0.0%*
Alternative 2	1,648	20,765	1,627	20,500	*-1.3%*
Alternative 3	1,648	20,765	1,739	21,911	*5.5%*

Notes:
ADT - Average daily traffic generated by the project
VMT - Vehicle miles traveled for project trips (Based on average distance of 12.6 miles)

The highest increase is for the No-Project with an increase in VMT of 9.0 percent, followed by Project Alternative 3 with an increase of 5.5 percent. The Proposed Project and Project Alternatives 1 and 2 show minimal change in VMT from 2016 to 2026 (either zero or a slight decrease).

5. Special Issues

This chapter addresses special traffic issues relative to the GAIP, including construction traffic impacts and the traffic impacts of displaced aircraft. Project access for the full service FBO's on each side of the airport is also discussed.

5.1. Construction Traffic Impacts

Construction work for the GAIP is planned to take place over a seven year period commencing in 2019. During that time, construction workers and service vehicles will access the site on a daily basis, and this section quantifies that traffic and evaluates its potential impacts on the surrounding street system.

5.1.1. Construction Traffic Trip Rates. Trip generation rates for construction traffic can be found in the California Emissions Estimation Model (CalEEMod) that is used throughout the State for estimating emissions produced by land use projects. The model estimates vehicle trips related to construction and also to the post-construction land uses in the project when those uses are operational. For the GAIP, trips in the second of those two categories (those from operational uses) are discussed elsewhere in this report, and hence only the construction traffic relationships are addressed here.

The construction trip rates in the CalEEMod are derived from studies of construction traffic generated by various land use types (residential, commercial/retail, and office/industrial). For the GAIP, the rates for office/industrial uses are considered the most applicable, and are as follows:

Table 5-1. Construction Trip Rates

Trip Type	Rate Metric	Rate
Worker Trips	Daily trips per 1,000 sq. ft. of building area	0.4200
Vendor Trips	Daily trips per 1,000 sq. ft. of building area	0.1639
Source: CalEEMod User's Guide Appendix A (Calculation Details)		

The trips calculated by these rates are the sum of arriving plus departing vehicles (referred to as "tripends" in other parts of this report). The worker trips are those made by workers on the job-site during the day and are generally by light vehicles (passenger cars and pickups). The vendor trips are all other trips to/from the job-site, and involve both light and heavy vehicles. Examples of the heavy vehicle trips are building material supply, concrete delivery, construction equipment delivery, waste removal, etc.

While the corresponding peak hour trip rates are not given in CalEEMod, a peak hour derivation can be made by considering the daily pattern of construction trips. For example, those made by construction workers peak between 6:00 to 8:00 AM and 3:30

to 4:30 PM, and Vendor trips are relatively constant from 8:00 AM to 4:00 PM. The following table summarizes the representative peak hour/ADT factors used in the derivation of the peak hour trip rates.

Table 5-2. Construction Trip Peak Hour Factors

Percent of ADT - AM Peak Hour			Percent of ADT - PM Peak Hour		
Workers	Vendors	Total Trips	Workers	Vendors	Total Trips
0.2000	0.1250	0.1789	0.1000	0.1250	0.1070

It should be noted that these factors apply to the peak hours of the adjacent streets, and differ from the peak hours of the construction trips (which for workers tend to be earlier than those of the adjacent streets). The application of these factors to the daily rates gives the corresponding peak hour trip rates for construction traffic.

5.1.2. Construction Traffic Trip Generation. The seven year construction timeline is specifically designed to minimize the disruption to GA activities while construction is taking place. Accordingly, the work is phased such that each phase focuses on a specific area or function, and the amount of actual construction activity at any time is only a small component of the overall project construction. Hence, the applicable trip generation for construction trips is estimated here by identifying overlaps in the construction activities during each phase, and determining the maximum number of construction trips that will occur during that phase.

The construction traffic results are given in Tables 5-3 and 5-4 for the Proposed Project and Project Alternative 1 respectively. The activities listed in these tables for each phase are from the overall construction schedule (Reference 7 in Chapter 1) and are those that overlap with the highest number of construction trips in that phase. In cases where the construction involves facilities such as T-hangars and box-hangars, the use of the construction trip rates for office/industrial land use probably overestimates the trips for these facilities, since they have considerably less structural and architectural components than the office and FBO facilities.

The highest number of construction trips identified here occurs in Phase 13, and comprises 81 daily vehicle tripends, with 15 in the AM peak hour and 9 in the PM peak hour. The next section discusses the traffic impacts of these trips.

5.1.3. Construction Traffic Impacts. The GAIP construction activities will occur on both the east side and west side of the airport, sequenced according to the specific phase of the construction schedule. The trip distribution for the associated traffic is assumed here to be similar to that shown in this report for GA trips. *(text continues on page 31)*

Table 5-3. Construction Trips – Proposed Project

Phase	Activity ID*	Description	Square Feet**	Daily Tripends			Pk Hr Tripends	
				Workers	Vendors	Total	AM	PM
1	C01011 C01001	Sheriff's Office and FBO	63.7	27	10	37	7	4
2	C02011 C02001	Office and FBO	62.1	26	10	36	6	4
3 & 3A	C03001 C03011 C03031	FBO, office and aircraft service area	36.0	15	6	21	4	2
4	D04001 D04031	FBO and apron	28.1	12	5	16	3	2
5	C05041 C05051	FBO and apron	48.3	20	8	28	5	3
7-8	C07001	T hangars	66.9	28	11	39	7	4
9A-9B	C09001	Flight School offices	10.0	4	2	6	1	1
10	C10001	T hangars and apron	48.3	20	8	28	5	3
11	C11101	Box hangars	71.5	30	12	42	7	4
12	C12001	Box hangars and T hangars	55.6	23	9	32	6	3
13	C13001 C13081 C13091	Offices, FBO hangars and customs area	139.3	59	23	81	15	9
Vehicle Trip Rates (tripends per 1,000 square feet)				*0.4200*	*0.1639*	*0.5839*	*0.1045*	*0.0625*

* Activity ID as given in construction schedule prepared by AECOM
** Total building area in 000's of square feet

Table 5-4. Construction Trips – Project Alternative 1

Phase	Activity ID*	Description	Square Feet**	Daily Tripends			Peak Hour	
				Workers	Vendors	Total	AM	PM
1	C01011 C01001	Sheriff's Office and FBO	63.7	27	10	37	7	4
2	C02011 C02001	Office and FBO	62.1	26	10	36	6	4
3 & 3A	C03001 C03011 C03031	FBO, office and aircraft service area	36.0	15	6	21	4	2
4	D04001 D04031	FBO and apron	28.1	12	5	16	3	2
5	C05041 C05051	FBO and apron	48.3	20	8	28	5	3
7-8	C07001	T hangars	66.9	28	11	39	7	4
9A-9B	C09001	Flight School offices	10.0	4	2	6	1	1
10	C10001	T hangars and apron	48.3	20	8	28	5	3
11	C11101	Box hangars	71.5	30	12	42	7	4
12	C12001	Box hangars and T hangars	55.6	23	9	32	6	3
13	C13001 C13081 C13091	Offices, FBO hangars and customs area	139.3	59	23	81	15	9
Vehicle Trip Rates (tripends per 1,000 square feet)				*0.4200*	*0.1639*	*0.5839*	*0.1045*	*0.0625*

* Activity ID as given in construction schedule prepared by AECOM
** Total building area in 000's of square feet

For the west side, the peak hour construction trip generation is considerably less than the GA trips addressed here in the impact analysis (15 and 9 trips in the AM and PM for construction compared to 57 and 54 respectively for the GA trips). Hence, any potential impacts due to construction traffic are already addressed in the GA traffic impact analysis.

For the east side, the construction trips will be additive to the background traffic. However, it is to be noted that an early construction phase is the construction of the westside FBO, after which one of the eastside FBO's will be relocated over to that new facility. Construction work will then commence on the east side. Hence the construction traffic on the east side will be compensated for by the reduction in GA traffic due to that FBO relocation to the west side. Since the construction traffic is less than the relocated FBO traffic, the result is no net increase in traffic on the east side.

5.2. Displaced Aircraft Impact Analysis

Due to physical changes and related enhancements, the based aircraft capacity in the Proposed Project and Project Alternatives 1 and 2 will be less than the existing capacity. Hence there will be insufficient capacity to accommodate all of the currently based aircraft. This is discussed in related technical reports (see Reference 2), and this section discusses potential traffic impacts from some of the currently based aircraft being displaced from the GA facilities at JWA to other locations.

5.2.1. Methodology. The based aircraft that will need to be served by other airports are referred to here as "displaced aircraft". They are defined as the difference between the number of based aircraft at JWA under existing conditions versus the number of based aircraft under Proposed Project or project alternative conditions.

The traffic impact from these displaced aircraft is related to the potential for the ground transportation trips to/from alternative airports being longer than the same trips to/from JWA. Such increase in trip length would add vehicle miles traveled (VMT) to the regional highway system. Accordingly, an estimate is made here of the potential VMT added under the GAIP due to displaced aircraft.

The approach used for deriving the potential added VMT is to first estimate the ground transportation trips generated by the displaced aircraft and then to derive the VMT that would occur from an increase in average trip length of those trips. The results are discussed in the next section.

5.2.2. Displaced Aircraft Analysis Results. In the 2016 baseline condition, there were 482 based aircraft at JWA, and this reduces to 354 in 2026 for the Proposed Project, 356 for Project Alternative 1, and 361 for Project Alternative 2. Hence the highest number of displaced aircraft occurs in 2026 under the Proposed Project, and comprises 128 aircraft (a 27 percent reduction).

For existing conditions, 49 percent of the total GA operations are from based aircraft versus transient aircraft. Hence, 808 of the existing 1,648 daily ground transportation trips are due to based aircraft (1,648 x .49), and 27 percent of these 808 trips gives 218 as the number of vehicle trips related to the displaced aircraft.

The GA Forecasting and Analysis report for JWA (Reference 1 in Chapter 1) examines 15 airports with GA facilities in an area defined as the Competitive Market Area (CMA). In addition to Orange County, the CMA includes parts of Los Angeles, Riverside, and San Bernardino Counties, and information in that report shows that 90 percent of JWA registered aircraft owners are in Orange County with the remainder in those adjacent counties. Using statistical data given in that same report, it is estimated that the average trip distance for JWA related GA trips is 15.25 miles. This gives a weekday VMT of 3,325 for trips generated by the displaced aircraft (218 trips x 15.25 miles).

The displacement of based aircraft will change the average trip lengths of the trips associated with these aircraft. Those to/from adjacent counties are likely to be reduced due to alternative available airports in those counties, while the Orange County trip lengths will likely be increased. For the purpose of this analysis it is assumed that the maximum increase in average trip length that could reasonably be expected is 100 percent (i.e., a doubling of the average trip length for all trips associated with the displaced aircraft). This is considered a worst case given the 14 alternative airports in the CMA and hence the opportunity for relocation to facilities that do not involve substantially greater travel distances, and in some cases, shorter distances.

The results of the VMT analysis for displaced aircraft (DA) are summarized below.

Table 5-5. Displaced Aircraft VMT

1. Displaced Aircraft (DA)	2. DA Weekday Trips	3. DA Weekday VMT	4. DA Added Weekday VMT	5. DA Percent of Regional VMT
128	218	3,325	6,649	0.0022%

Measures:

1. Displaced aircraft in 2026 for Proposed Project
2. Displaced aircraft weekday ground trips to/from JWA
3. Vehicle miles traveled (VMT) by displaced aircraft (based on 15.25 mile average trip length)
4. Added VMT from displaced aircraft trips (based on 100 percent longer trips to those airports)
5. Added VMT compared to total regional weekday VMT (estimated at around 300M VMT)

When compared to total regional VMT, this added VMT for the Proposed Project represents an increase of .0022 percent. It would not be measurable in terms of highway capacity significance, and its air quality impact is discussed in the appropriate section of the accompanying environmental documents.

5.3. FBO Driveway Access

Access to the reconstructed FBO's on the east and west sides of the airport will be via new access driveways. While details of these will not be fully known until actual design work is carried out, this section provides some initial discussion on the potential access locations.

5.3.1. West Side Access. For the west side, it is anticipated that a parking lot will be constructed to serve the FBO on that side of the airport under the Proposed Project or Project Alternative 1. The parking lot will have one or two access driveways onto Airway Avenue between Paularino Avenue and Baker Street, and possibly also onto the current Paularino Avenue GA access road east of Airway Avenue.

Airway Avenue has traffic volumes of 4,000 ADT currently, with minimal increase anticipated in the future (apart from project traffic, which is estimated at less than 1,000 vehicles per day). Hence, project traffic using these driveways will be entering and exiting against low conflicting traffic volumes, and will experience minimal delay.

5.3.2. East Side Access. The FBO(s) on the east side will be consolidated into the northeast part of the GA area (one is currently in the southeast GA area opposite Quail Street). It is anticipated that they will be served by a new parking lot, or possibly more than one parking lot, depending on the particular project alternative and the space allocated to parking. The highest volume access to/from Campus Drive would occur with all parking concentrated at a single access point located south of the Airport Way intersection. With future volumes of almost 40,000 ADT on Campus Drive in this vicinity, an analysis was made of the traffic implications of an access driveway at this location.

The Campus Drive access point considered here would be unsignalized, and would allow right-in, right-out and left-in turn movements (i.e. no left-out). The highest delay to traffic entering and exiting the driveway would be in the PM peak hour when the opposing through traffic (southwest on Campus Drive) is highest. The analysis is described in Appendix C, and involves a traffic simulation of the access driveway using future PM peak hour volumes. The Airport Way intersection is considered in the simulation analysis since the traffic signal at that location influences the opposing (southwest) traffic flow at the driveway.

The results show that such a driveway would function adequately, with an estimated average vehicle delay for right turn exiting traffic during the PM peak hour of 14.8 seconds, and for left turn entering traffic of 11.8 seconds. A 150 foot turn pocket length for the left turn entry would provide adequate storage for any queue formation due to vehicles waiting to make the turn.

Appendix A
Project Trip Generation

This appendix discusses the general aviation (GA) ground transportation trip generation for John Wayne Airport (JWA). It has been prepared to describe the existing and future traffic demand for the GA activities at the airport.

A.1. Overview

The trip generation estimates for the GAIP are in the form of average daily weekday vehicle trips plus the corresponding trips during the AM and PM peak hours of the adjacent roadway system. Entering and leaving trips are tabulated separately for the two peak hours. A baseline year of 2016 is used to describe existing conditions, and forecast years of 2021 and 2026 are used for future conditions.

Trip generation is typically estimated by applying trip rates to some measure of activity. In the case of GA, candidate measures include based aircraft, and aircraft operations (takeoffs and landings over a given time period). The measure used here is annual aircraft operations. Based aircraft is a common measure of GA activity, but does not have reliable trip rate data. Hence, aircraft operations is the preferred measure of GA activity for estimating ground transportation trip generation. A further advantage of this variable is that it is one of the primary measures featured in the GA forecasts prepared for the GAIP (see references 1 and 2 in this report).

A.2. Trip Generation Rates

A common source of trip rates for estimating trip generation is the Institute of Transportation Engineers (ITE) Trip Generation Manual (Reference 3 in Chapter 1). This gives results from nationwide surveys of various types of land use, and has seen regular updates over the past several decades. Land Use Code 022 in the manual is labeled "General Aviation Airport", and provides data from traffic counts carried out at several such facilities. However, the sample size is small (five or less for many measures) and most of the information is from surveys carried out several decades ago.

The most reliable recent data is from the environmental impact report (EIR) prepared for the Santa Barbara Airport Master Plan in 2015 (see Reference 8 in Chapter 1). Traffic data was collected specifically for the GA activities at the airport, and was correlated to the GA aircraft operations at that time. Furthermore, while smaller in scale than the GA operations at JWA, the mix of aircraft is similar, and two of the JWA fixed base operators (FBO's) have facilities at the Santa Barbara Airport (SBA). Accordingly, the SBA information provides a reasonable GA trip generation comparison for JWA.

Trip rates from Santa Barbara and the comparative ITE rates are summarized below together with the rates used here for the JWA GAIP traffic impact analysis.

Table A-1. General Aviation Trip Generation Rates

Data Source	Measure	AM Peak Hour			PM Peak Hour			Average Daily
		In	Out	Total	In	Out	Total	
Santa Barbara	Annual Aircraft Operations (000's)	0.364	0.251	0.615	0.301	0.290	0.591	8.154
Santa Barbara Adjusted*	Annual Aircraft Operations (000's)	0.381	0.263	0.644	0.315	0.303	0.618	8.529
ITE Code 022	Average Weekday Aircraft Operations	Not Available**			Not Available**			1.970
JWA GAIP Traffic Study	Annual Aircraft Operations (000's)	0.400	0.250	0.650	0.290	0.330	0.620	8.550
	Weekday Aircraft Operations	0.126	0.079	0.205	0.091	0.104	0.195	2.693

* Adjusted for JWA aircraft mix
** Rates for peak hour of adjacent traffic not given

The JWA GAIP rates listed here are derived from the Santa Barbara rates by adjusting for aircraft mix at the two airports. While annual aircraft operations is the primary variable, the weekday rates are shown here to provide a comparison with the ITE rate. The ITE rate is lower, probably due to the aircraft mixes at the ITE surveyed airports having less large aircraft (e.g. turbo and jet powered), and therefore less passengers and less ground transportation demand. It does however provide a useful comparative benchmark for the proposed JWA GAIP rates.

A further verification of the GAIP rates can be seen from traffic counts carried out at the intersection of Campus Drive and Quail Street in 2015. The west leg of this intersection serves one of the JWA GA fixed base operators, and thereby gives the peak hour entering and exiting trips for the weekday of the count. Applying the GAIP trips rates to the total GA annual operations in 2016 (192,800) gives the following comparison between total airport GA trip generation and those for the southeast FBO:

Table A-2. Southeast FBO Trip Generation Comparison

Data Source	Measure	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Total JWA GA (2016)	Trip Rate	0.400	0.250	0.650	0.290	0.330	0.620
	Total Tripends	77	48	125	56	64	120
Southeast FBO (2015)	Count	35	6	41	16	18	34
	Percent of Total	45.5%	12.5%	32.8%	28.6%	28.1%	28.3%

As shown here, the AM and PM peak hour totals are 33 and 28 percent of the JWA totals respectively. Since this operation is one of the two active FBOs, it is estimated to account for at least 40 percent of the total GA trip generation at JWA. Hence it can be concluded from this comparison that the GAIP trip rates are representative of existing JWA GA trip characteristics, and may slightly over-estimate the actual trip generation.

Over time, it is estimated that the aircraft mix for JWA GA operations will change towards more of the larger aircraft using the airport. This is shown clearly in the aviation forecasts and it is reasonable to assume that larger aircraft generate more trips per operation than smaller aircraft because of their greater seating capacity. To account for this change over time, GAIP trip generation rates were derived for each of the aircraft types used in the aviation forecasts (piston, turbo, jet, and helicopter). The results of this derivation are as follows:

Table A-3. GA Trip Generation Rates by Aircraft Type

Measure	Piston	Turbine	Jet	Helicopter/ Other	TOTAL
Annual Operations (2016)	147,300	9,800	31,800	3,900	192,800
Weekday Operations	468	31	101	12	612
Weekday Tripends/Operation	1.5	3.5	5.0	2.5	2.2
Weekday Tripends	701.4	108.9	504.8	31.0	1,346
Non-Operations Tripends	157.8	24.5	113.6	7.0	303
Total Weekday Tripends (TE)	**859**	**133**	**618**	**38**	**1,648**
TE/Annual Operations (000's)	***5.83***	***13.57***	***19.43***	***9.74***	***8.55***

Notes:
Annual aircraft operations are total GA take-offs plus landings.
Trip Rates are weekday ground transportation vehicle tripends (TE) per annual aircraft operations (000's)

The rates show daily GA tripends by aircraft type and are derived using 2016 aircraft operations by type and representative aircraft occupancy factors for each type of aircraft. These weekday tripends/operation give the basic ground transportation trips related to aircraft takeoffs and landings. They are then increased by a factor (around 20 percent) to represent the indirect trips associated with GA (FBO staff, ground operations and service personnel, etc.).

A.3. Trip Generation Estimates

The daily trip generation rates by aircraft type were applied to the GA constrained forecasts for the No-Project, Proposed Project and Project Alternatives. The results are summarized in Table A-4.

Table A-4. Trip Generation Summary

ALT.	YEAR	Piston	Turbine	Jet	Helicopter	TOTAL	AVE RATE*
NP	**A. Annual GA Aircraft Operations**						
	2016	147,300	9,800	31,800	3,900	192,800	
	2021	146,400	10,400	35,400	4,200	196,400	
	2026	147,000	10,900	38,300	4,800	201,000	
	B. Weekday GA Ground Transportation Vehicles Entering plus Leaving						
	Rates	*5.83*	*13.57*	*19.43*	*9.74*		
	2016	859	133	618	38	1,648	8.548
	2021	854	141	688	41	1,724	8.778
	2026	857	148	744	47	1,796	8.935
PP	**A. Annual GA Aircraft Operations**						
	2016	147,300	9,800	31,800	3,900	192,800	
	2021	133,700	10,600	35,800	4,300	184,400	
	2026	111,000	11,700	40,400	4,800	167,900	
	B. Weekday GA Ground Transportation Vehicles Entering plus Leaving						
	Rates	*5.83*	*13.57*	*19.43*	*9.74*		
	2016	859	133	618	38	1,648	8.548
	2021	779	144	696	42	1,661	9.008
	2026	647	159	785	47	1,638	9.756
Alt 1	**A. Annual GA Aircraft Operations**						
	2016	147,300	9,800	31,800	3,900	192,800	
	2021	133,900	10,300	36,100	4,300	184,600	
	2026	111,600	10,800	41,400	4,800	168,600	
	B. Weekday GA Ground Transportation Vehicles Entering plus Leaving						
	Rates	*5.83*	*13.57*	*19.43*	*9.74*		
	2016	859	133	618	38	1,648	8.548
	2021	781	140	701	42	1,664	9.014
	2026	651	147	804	47	1,649	9.781
Alt. 2	**A. Annual GA Aircraft Operations**						
	2016	147,300	9,800	31,800	3,900	192,800	
	2021	135,000	10,000	35,600	4,300	184,900	
	2026	114,700	10,000	39,900	4,800	169,400	
	B. Weekday GA Ground Transportation Vehicles Entering plus Leaving						
	Rates	*5.83*	*13.57*	*19.43*	*9.74*		
	2016	859	133	618	38	1,648	8.548
	2021	787	136	692	42	1,657	8.962
	2026	669	136	775	47	1,627	9.604
Alt. 3	**A. Annual GA Aircraft Operations**						
	2016	147,300	9,800	31,800	3,900	192,800	
	2021	147,000	9,800	34,400	4,200	195,400	
	2026	147,000	9,500	36,400	4,700	197,600	
	B. Weekday GA Ground Transportation Vehicles Entering plus Leaving						
	Rates	*5.83*	*13.57*	*19.43*	*9.74*		
	2016	859	133	618	38	1,648	8.548
	2021	857	133	668	41	1,699	8.695
	2026	857	129	707	46	1,739	8.801

* Average ADT Trip Rate for the aircraft mix in each year for the given alternative

The aircraft operations forecasts for the Proposed Project and Project Alternatives 1 and 2 show a substantial decrease in piston aircraft operations, and an increase in jet aircraft operations compared to existing. The result is that the average GA trip rates increase for the two forecast years compared to the 2016 baseline. For the Proposed Project, this results in the future trip generation being similar in magnitude for 2016, 2021, and 2026, despite the total annual operations being lower in the forecast years. Similar results can be seen for Project Alternatives 1 and 2.

A.4. West Side/East Side Trip Generation

The Proposed Project and Project Alternative 1 have one of the future FBO's located on the west side of the airport (the No-Project and Project Alternatives 2 and 3 retain the FBO's on the east side). The result is an increase in trips generated on the west side and a decrease on the east side.

This east side/west trip allocation can be seen in Table A-5 on the next page. Shown here is the 2026 trip generation for the Proposed Project and Project Alternative 1, together with the No-Project trip generation for comparison purposes. From this information, changes in trip generation compared to existing can be derived, and also the difference in trip generation for the Proposed Project and Project Alternative 1 compared to the No-Project Alternative. These difference results for the 2026 forecast year are given in Table 4-1 in Chapter 4 of this report, and represent the project volumes used in the impact analysis.

Table A-5. East Side/West Side Traffic Allocations

ALT.*	YEAR	ANNUAL GA OPERATIONS	Location	AM PEAK HOUR			PM PEAK HOUR			ADT
				In	Out	Total	In	Out	Total	
NP	2016	192,800	West side	4	2	6	3	3	6	82
			East side	73	46	119	53	61	114	1,566
			Total	77	48	125	56	64	120	1,648
	2021	193,300	West side	4	3	7	3	3	6	86
			East side	77	47	124	55	64	119	1,638
			Total	81	50	131	58	67	125	1,724
	2026	198,200	West side	4	3	7	3	3	6	90
			East side	80	50	130	58	66	124	1,706
			Total	84	53	137	61	69	130	1,796
PP	2016	192,800	West side	4	2	6	3	3	6	82
			East side	73	46	119	53	61	114	1,566
			Total	77	48	125	56	64	120	1,648
	2021	184,400	West side	39	25	64	28	32	60	831
			East side	39	24	63	28	32	60	830
			Total	78	49	127	56	64	120	1,661
	2026	167,900	West side	39	24	63	28	32	60	820
			East side	38	24	62	28	31	59	818
			Total	77	48	125	56	63	119	1,638
Alt. 1	2016	192,800	West side	4	2	6	3	3	6	82
			East side	73	46	119	53	61	114	1,566
			Total	77	48	125	56	64	120	1,648
	2021	184,600	West side	31	20	51	23	26	49	666
			East side	47	29	76	34	38	72	998
			Total	78	49	127	57	64	121	1,664
	2026	168,600	West side	31	19	50	22	26	48	660
			East side	46	29	75	34	38	72	989
			Total	77	48	125	56	64	120	1,649

* **NP** - No-Project, **PP** - Proposed Project, **Alt. 1** - Project Alternative 1

Appendix B

Peak Hour Intersection Data

This appendix gives the peak hour intersection volumes used in the impact analysis together with the corresponding intersection capacity utilization (ICU) values.

B.1. Intersection Lane Assumptions

The existing and future traffic volumes plus the intersection geometry for the intersections addressed in the impact analysis were taken from the traffic study carried out for the City of Costa Mesa General Plan Update (reference 4 in Chapter 1). The traffic forecasts represent long range cumulative conditions, and in that traffic study, some of these intersections were shown to have long range improvements in the form of additional lanes for selected traffic movements through the intersection. Because those improvements are noted as being in place by 2035, but the implementation time frame is unknown, they have not been assumed in this analysis. Hence the future with and without project ICU's are based on existing intersection lane configurations in all cases.

B.2. Levels of Service

The ICU and level of service (LOS) equivalencies are as follows:

ICU	LOS
0 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
>1.00	F

For the City of Costa Mesa, LOS D is the maximum LOS for acceptable intersection performance (ICU to not exceed .90).

B.3. ICU Calculations

The tables that follow contain the ICU calculations for the with and without project volumes. Values used here for settings such as lane capacity, clearance interval, etc. are those used by the City of Costa Mesa. The shaded cells show the turn movements with added traffic due to the project.

SR-55 SB Ramps & Baker

Existing

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL								
NBT								
NBR								
SBL	0.5		430	0.25		80		
SBT	1.5	1700	140	0.25	*	400	0.28	*
SBR	0	1700	280			520	0.31	
EBL								
EBT	2	3400	1050	0.31	*	500	0.15	*
EBR	1	1700	220	0.06		330	0.10	
WBL	1	1700	80	0.05	*	280	0.16	*
WBT	2	3400	420	0.12		960	0.28	
WBR								
Right Turn Adjustment						Multi	0.05	*
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.66**			**0.69**	

SR-55 SB Ramps & Baker

Existing plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL								
NBT								
NBR								
SBL	0.5		430	0.25		80		
SBT	1.5	1700	140	0.25	*	400	0.28	*
SBR	0	1700	280			520	0.31	
EBL								
EBT	2	3400	1050	0.31	*	500	0.15	*
EBR	1	1700	220	0.06		330	0.10	
WBL	1	1700	84	0.05	*	285	0.17	*
WBT	2	3400	420	0.12		960	0.28	
WBR								
Right Turn Adjustment						Multi	0.05	*
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.66**			**0.70**	

SR-55 SB Ramps & Baker

Existing plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL								
NBT								
NBR								
SBL	0.5		430	0.25		80		
SBT	1.5	1700	140	0.25	*	400	0.28	*
SBR	0	1700	280			520	0.31	
EBL								
EBT	2	3400	1050	0.31	*	500	0.15	*
EBR	1	1700	220	0.06		330	0.10	
WBL	1	1700	83	0.05	*	285	0.17	*
WBT	2	3400	420	0.12		960	0.28	
WBR								
Right Turn Adjustment						Multi	0.05	*
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.66**			**0.70**	

SR-55 SB Ramps & Baker

Future

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL								
NBT								
NBR								
SBL	0.5		430	0.25	*	90		
SBT	1.5	3400	130	0.08		480	0.17	*
SBR	1	1700	280	0.16		630	0.37	
EBL								
EBT	2	3400	1290	0.38	*	650	0.19	*
EBR	1	1700	280	0.08		390	0.11	
WBL	1	1700	80	0.05	*	310	0.18	*
WBT	2	3400	640	0.19		1100	0.32	
WBR								
Right Turn Adjustment						Multi	0.20	*
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.73**			**0.79**	

SR-55 SB Ramps & Baker

Future plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL								
NBT								
NBR								
SBL	0.5		430	0.25	*	90		
SBT	1.5	3400	130	0.08		480	0.17	*
SBR	1	1700	280	0.16		630	0.37	
EBL								
EBT	2	3400	1290	0.38	*	650	0.19	*
EBR	1	1700	280	0.08		390	0.11	
WBL	1	1700	83	0.05	*	314	0.18	*
WBT	2	3400	640	0.19		1100	0.32	
WBR								
Right Turn Adjustment						Multi	0.20	*
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.73**			**0.79**	

SR-55 SB Ramps & Baker

Future plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL								
NBT								
NBR								
SBL	0.5		430	0.25	*	90		
SBT	1.5	3400	130	0.08		480	0.17	*
SBR	1	1700	280	0.16		630	0.37	
EBL								
EBT	2	3400	1290	0.38	*	650	0.19	*
EBR	1	1700	280	0.08		390	0.11	
WBL	1	1700	82	0.05	*	314	0.18	*
WBT	2	3400	640	0.19		1100	0.32	
WBR								
Right Turn Adjustment						Multi	0.20	*
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.73**			**0.79**	

SR-55 NB Ramps & Baker

Existing

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	0.5		270			260		
NBT	1.5	3400	320	0.28	*	310	0.24	*
NBR	0		360			230		
SBL								
SBT								*
SBR								
EBL	1	1700	460	0.27	*	290	0.17	*
EBT	2	3400	1010	0.30		320	0.09	
EBR								
WBL								
WBT	2	3400	240	0.07	*	970	0.29	*
WBR	1	1700	120	0.07		260	0.15	
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.67**			**0.75**	

SR-55 NB Ramps & Baker

Existing plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	0.5		270			260		
NBT	1.5	3400	320	0.28	*	310	0.24	*
NBR	0		367			235		
SBL								
SBT								*
SBR								
EBL	1	1700	460	0.27	*	290	0.17	*
EBT	2	3400	1010	0.30		320	0.09	
EBR								
WBL								
WBT	2	3400	244	0.07	*	975	0.29	*
WBR	1	1700	120	0.07		260	0.15	
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.67**			**0.75**	

SR-55 NB Ramps & Baker

Existing plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	0.5		270			260		
NBT	1.5	3400	320	0.28	*	310	0.24	*
NBR	0		366			234		
SBL								
SBT								*
SBR								
EBL	1	1700	460	0.27	*	290	0.17	*
EBT	2	3400	1010	0.30		320	0.09	
EBR								
WBL								
WBT	2	3400	243	0.07	*	974	0.29	*
WBR	1	1700	120	0.07		260	0.15	
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.67**			**0.75**	

SR-55 NB Ramps & Baker

Future

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	0.5		410			280		
NBT	1.5	3400	360	0.35	*	300	0.24	*
NBR	0		420			230		
SBL								
SBT								*
SBR								
EBL	1	1700	580	0.34	*	420	0.25	*
EBT	2	3400	1120	0.33		360	0.11	
EBR								
WBL								
WBT	2	3400	320	0.09	*	1110	0.33	*
WBR	1	1700	190	0.11		280	0.16	
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.83**			**0.87**	

SR-55 NB Ramps & Baker

Future plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	0.5		410			280		
NBT	1.5	3400	360	0.35	*	300	0.24	*
NBR	0		426			234		
SBL								
SBT								*
SBR								
EBL	1	1700	580	0.34	*	420	0.25	*
EBT	2	3400	1120	0.33		360	0.11	
EBR								
WBL								
WBT	2	3400	322	0.09	*	1114	0.33	*
WBR	1	1700	190	0.11		280	0.16	
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.83**			**0.87**	

SR-55 NB Ramps & Baker

Future plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	0.5		410			280		
NBT	1.5	3400	360	0.35	*	300	0.24	*
NBR	0		426			234		
SBL								
SBT								*
SBR								
EBL	1	1700	580	0.34	*	420	0.25	*
EBT	2	3400	1120	0.33		360	0.11	
EBR								
WBL								
WBT	2	3400	322	0.09	*	1113	0.33	*
WBR	1	1700	190	0.11		280	0.16	
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.83**			**0.87**	

RedHill & Baker

Existing

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	1	1700	60	0.04		250	0.15	*
NBT	2	3400	490	0.16	*	570	0.17	
NBR	0	0	40			20		
SBL	1	1700	20	0.01	*	20	0.01	
SBT	2	3400	360	0.12		500	0.24	*
SBR	0	0	60			310		
EBL	1.5		370			310	0.09	*
EBT	1.5	5100	210	0.11	*	60		
EBR	1	1700	150	0.09		80	0.05	
WBL	1	1700	10	0.01		30	0.02	
WBT	2	3400	40	0.01	*	300	0.10	*
WBR	0	0	10			40		
Note: Assumes E/W Split Phasing								
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.34**			**0.63**	

RedHill & Baker

Existing plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	1	1700	60	0.04		250	0.15	*
NBT	2	3400	490	0.16	*	570	0.17	
NBR	0	0	43			22		
SBL	1	1700	20	0.01	*	20	0.01	
SBT	2	3400	360	0.12		500	0.24	*
SBR	0	0	60			310		
EBL	1.5		370			310	0.09	*
EBT	1.5	5100	216	0.11	*	64		
EBR	1	1700	150	0.09		80	0.05	
WBL	1	1700	12	0.01		33	0.02	
WBT	2	3400	43	0.02	*	304	0.10	*
WBR	0	0	10			40		
Note: Assumes E/W Split Phasing								
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.35**			**0.63**	

RedHill & Baker

Existing plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	1	1700	60	0.04		250	0.15	*
NBT	2	3400	490	0.16	*	570	0.17	
NBR	0	0	42			22		
SBL	1	1700	20	0.01	*	20	0.01	
SBT	2	3400	360	0.12		500	0.24	*
SBR	0	0	60			310		
EBL	1.5		370			310	0.09	*
EBT	1.5	5100	216	0.11	*	64		
EBR	1	1700	150	0.09		80	0.05	
WBL	1	1700	12	0.01		33	0.02	
WBT	2	3400	43	0.02	*	304	0.10	*
WBR	0	0	10			40		
Note: Assumes E/W Split Phasing								
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.35**			**0.63**	

RedHill & Baker

Future

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	1	1700	120	0.07		270	0.16	*
NBT	2	3400	650	0.21	*	650	0.20	
NBR	0	0	50			20		
SBL	1	1700	20	0.01	*	20	0.01	
SBT	2	3400	390	0.14		640	0.30	*
SBR	0	0	80			370		
EBL	1.5		440			350	0.10	*
EBT	1.5	5100	260	0.14	*	50		
EBR	1	1700	170	0.10		90	0.05	
WBL	1	1700	10	0.01		40	0.02	
WBT	2	3400	40	0.02	*	340	0.11	*
WBR	0	0	20			40		
Note: Assumes E/W Split Phasing								
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.43**			**0.72**	

RedHill & Baker

Future plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	1	1700	120	0.07		270	0.16	*
NBT	2	3400	650	0.21	*	650	0.20	
NBR	0	0	53			22		
SBL	1	1700	20	0.01	*	20	0.01	
SBT	2	3400	390	0.14		640	0.30	*
SBR	0	0	80			370		
EBL	1.5		440			350	0.10	*
EBT	1.5	5100	267	0.14	*	55		
EBR	1	1700	170	0.10		90	0.05	
WBL	1	1700	13	0.01		44	0.03	
WBT	2	3400	43	0.02	*	344	0.11	*
WBR	0	0	20			40		
Note: Assumes E/W Split Phasing								
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.43**			**0.72**	

RedHill & Baker

Future plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C		PM PEAK HOUR VOLUME	PM PEAK HOUR V/C	
NBL	1	1700	120	0.07		270	0.16	*
NBT	2	3400	650	0.21	*	650	0.20	
NBR	0	0	52			22		
SBL	1	1700	20	0.01	*	20	0.01	
SBT	2	3400	390	0.14		640	0.30	*
SBR	0	0	80			370		
EBL	1.5		440			350	0.10	*
EBT	1.5	5100	266	0.14	*	54		
EBR	1	1700	170	0.10		90	0.05	
WBL	1	1700	12	0.01		43	0.03	
WBT	2	3400	42	0.02	*	344	0.11	*
WBR	0	0	20			40		
Note: Assumes E/W Split Phasing								
Clearance Interval				0.05			0.05	
TOTAL CAPACITY UTILIZATION				**0.43**			**0.72**	

SR-55 SB Ramps & Paularino

Existing

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL						
NBT						
NBR						
SBL	0	0	400		130	
SBT	2	3400	670	0.38 *	620	0.31 *
SBR	0	0	210		290	
EBL						
EBT	2	3400	770	0.26 *	400	0.17 *
EBR	0	0	130	0.04	170	0.05
WBL	1	1700	40	0.02 *	180	0.11 *
WBT	2	3400	180	0.05	690	0.20
WBR						
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.71**		**0.64**

SR-55 SB Ramps & Paularino

Existing plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL						
NBT						
NBR						
SBL	0	0	420		145	
SBT	2	3400	670	0.38 *	620	0.31 *
SBR	0	0	210		290	
EBL						
EBT	2	3400	773	0.27 *	402	0.17 *
EBR	0	0	130	0.04	170	0.05
WBL	1	1700	40	0.02 *	180	0.11 *
WBT	2	3400	182	0.05	693	0.20
WBR						
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.72**		**0.64**

SR-55 SB Ramps & Paularino

Existing plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL						
NBT						
NBR						
SBL	0	0	416		141	
SBT	2	3400	670	0.38 *	620	0.31 *
SBR	0	0	210		290	
EBL						
EBT	2	3400	772	0.27 *	401	0.17 *
EBR	0	0	130	0.04	170	0.05
WBL	1	1700	40	0.02 *	180	0.11 *
WBT	2	3400	182	0.05	692	0.20
WBR						
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.72**		**0.64**

SR-55 SB Ramps & Paularino

Future

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL						
NBT						
NBR						
SBL	0	0	470		160	
SBT	2	3400	670	0.41 *	710	0.39 *
SBR	0	0	260		450	
EBL						
EBT	2	3400	900	0.30 *	430	0.18 *
EBR	0	0	130	0.04	190	0.06
WBL	1	1700	30	0.02 *	260	0.15 *
WBT	2	3400	190	0.06	810	0.24
WBR						
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.78**		**0.77**

SR-55 SB Ramps & Paularino

Future plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL						
NBT						
NBR						
SBL	0	0	490		175	
SBT	2	3400	670	0.42 *	710	0.39 *
SBR	0	0	260		450	
EBL						
EBT	2	3400	903	0.30 *	432	0.18 *
EBR	0	0	130	0.04	190	0.06
WBL	1	1700	30	0.02 *	260	0.15 *
WBT	2	3400	192	0.06	813	0.24
WBR						
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.79**		**0.77**

SR-55 SB Ramps & Paularino

Future plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL						
NBT						
NBR						
SBL	0	0	486		171	
SBT	2	3400	670	0.42 *	710	0.39 *
SBR	0	0	260		450	
EBL						
EBT	2	3400	902	0.30 *	431	0.18 *
EBR	0	0	130	0.04	190	0.06
WBL	1	1700	30	0.02 *	260	0.15 *
WBT	2	3400	192	0.06	812	0.24
WBR						
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.79**		**0.77**

SR-55 NB Ramps & Paularino

Existing

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	0.5	0	120		150	
NBT	1.5	3400	870	0.34 *	580	0.24 *
NBR	0	0	160		80	
SBL						
SBT						*
SBR						
EBL	1	1700	350	0.21 *	220	0.13 *
EBT	2	3400	830	0.24	340	0.10
EBR						
WBL						
WBT	2	3400	110	0.07 *	700	0.29 *
WBR	0	0	120	0.04	280	0.08
Right Turn Adjustment		WBR		0.01 *		
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.68**		**0.71**

SR-55 NB Ramps & Paularino

Existing plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	0.5	0	120		150	
NBT	1.5	3400	870	0.34 *	580	0.24 *
NBR	0	0	160		80	
SBL						
SBT						*
SBR						
EBL	1	1700	350	0.21 *	220	0.13 *
EBT	2	3400	853	0.25	357	0.11
EBR						
WBL						
WBT	2	3400	112	0.07 *	703	0.29 *
WBR	0	0	132	0.04	296	0.09
Right Turn Adjustment		WBR		0.01 *		
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.68**		**0.71**

SR-55 NB Ramps & Paularino

Existing plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	0.5	0	120		150	
NBT	1.5	3400	870	0.34 *	580	0.24 *
NBR	0	0	160		80	
SBL						
SBT						*
SBR						
EBL	1	1700	350	0.21 *	220	0.13 *
EBT	2	3400	848	0.25	352	0.10
EBR						
WBL						
WBT	2	3400	112	0.07 *	702	0.29 *
WBR	0	0	129	0.04	293	0.09
Right Turn Adjustment		WBR		0.01 *		
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.68**		**0.71**

SR-55 NB Ramps & Paularino

Future

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	0.5	0	120		160	
NBT	1.5	3400	1080	0.41 *	710	0.28 *
NBR	0	0	180		80	
SBL						
SBT						*
SBR						
EBL	1	1700	340	0.20 *	250	0.15 *
EBT	2	3400	1050	0.31	380	0.11
EBR						
WBL						
WBT	2	3400	120	0.07 *	910	0.35 *
WBR	0	0	130		290	
Right Turn Adjustment		WBR		0.01 *		
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.74**		**0.83**

SR-55 NB Ramps & Paularino

Future plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	0.5	0	120		160	
NBT	1.5	3400	1080	0.41 *	710	0.28 *
NBR	0	0	180		80	
SBL						
SBT						*
SBR						
EBL	1	1700	340	0.20 *	250	0.15 *
EBT	2	3400	1073	0.32	397	0.12
EBR						
WBL						
WBT	2	3400	122	0.08 *	913	0.36 *
WBR	0	0	142		306	
Right Turn Adjustment		WBR		0.01 *		
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.75**		**0.84**

SR-55 NB Ramps & Paularino

Future plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	0.5	0	120		160	
NBT	1.5	3400	1080	0.41 *	710	0.28 *
NBR	0	0	180		80	
SBL						
SBT						*
SBR						
EBL	1	1700	340	0.20 *	250	0.15 *
EBT	2	3400	1068	0.31	392	0.12
EBR						
WBL						
WBT	2	3400	122	0.08 *	912	0.36 *
WBR	0	0	139		303	
Right Turn Adjustment		WBR		0.01 *		
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.75**		**0.84**

RedHill & Paularino

Existing

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	2	3400	80	0.02	130	0.04 *
NBT	2	3400	800	0.24 *	790	0.24
NBR	0	0	20		10	
SBL	1	1700	30	0.02 *	20	0.01
SBT	2	3400	340	0.12	830	0.31 *
SBR	0	0	60		220	
EBL	1	1700	180	0.11 *	120	0.07 *
EBT	2	3400	240	0.10	70	0.07
EBR	0	1700	110		60	
WBL	1	1700	10	0.01	20	0.01
WBT	2	3400	30	0.01 *	280	0.09 *
WBR	0	0	10		40	
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.43**		**0.56**

RedHill & Paularino

Existing plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	2	3400	80	0.02	130	0.04 *
NBT	2	3400	800	0.24 *	790	0.24
NBR	0	0	20		10	
SBL	1	1700	32	0.02 *	21	0.01
SBT	2	3400	340	0.12	830	0.31 *
SBR	0	0	60		220	
EBL	1	1700	180	0.11 *	120	0.07 *
EBT	2	3400	263	0.11	87	0.08
EBR	0	1700	110		60	
WBL	1	1700	10	0.01	20	0.01
WBT	2	3400	44	0.02 *	299	0.10 *
WBR	0	0	11		41	
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.44**		**0.57**

RedHill & Paularino

Existing plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	2	3400	80	0.02	130	0.04 *
NBT	2	3400	800	0.24 *	790	0.24
NBR	0	0	20		10	
SBL	1	1700	31	0.02 *	21	0.01
SBT	2	3400	340	0.12	830	0.31 *
SBR	0	0	60		220	
EBL	1	1700	180	0.11 *	120	0.07 *
EBT	2	3400	258	0.11	82	0.08
EBR	0	1700	110		60	
WBL	1	1700	10	0.01	20	0.01
WBT	2	3400	41	0.02 *	295	0.10 *
WBR	0	0	11		41	
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.44**		**0.57**

RedHill & Paularino

Future

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	2	3400	90	0.03	130	0.04 *
NBT	2	3400	1040	0.31 *	910	0.27
NBR	0	0	20		10	
SBL	1	1700	30	0.02 *	10	0.01
SBT	2	3400	370	0.13	1000	0.36 *
SBR	0	0	80		240	
EBL	1	1700	290	0.17 *	140	0.08 *
EBT	2	3400	270	0.12	60	0.08
EBR	0	1700	140		80	
WBL	1	1700	10	0.01	50	0.03
WBT	2	3400	40	0.01 *	460	0.15 *
WBR	0	0	10		50	
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.56**		**0.68**

RedHill & Paularino

Future plus Proposed Project

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	2	3400	90	0.03	130	0.04 *
NBT	2	3400	1040	0.31 *	910	0.27
NBR	0	0	20		10	
SBL	1	1700	32	0.02 *	11	0.01
SBT	2	3400	370	0.13	1000	0.36 *
SBR	0	0	80		240	
EBL	1	1700	290	0.17 *	140	0.08 *
EBT	2	3400	293	0.13	77	0.09
EBR	0	1700	140		80	
WBL	1	1700	10	0.01	50	0.03
WBT	2	3400	54	0.02 *	479	0.16 *
WBR	0	0	11		51	
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.57**		**0.69**

RedHill & Paularino

Future plus Project Alternative 1

MOVEMENT	LANES	CAPACITY	AM PEAK HOUR VOLUME	AM PEAK HOUR V/C	PM PEAK HOUR VOLUME	PM PEAK HOUR V/C
NBL	2	3400	90	0.03	130	0.04 *
NBT	2	3400	1040	0.31 *	910	0.27
NBR	0	0	20		10	
SBL	1	1700	31	0.02 *	11	0.01
SBT	2	3400	370	0.13	1000	0.36 *
SBR	0	0	80		240	
EBL	1	1700	290	0.17 *	140	0.08 *
EBT	2	3400	288	0.13	72	0.09
EBR	0	1700	140		80	
WBL	1	1700	10	0.01	50	0.03
WBT	2	3400	51	0.02 *	475	0.15 *
WBR	0	0	11		51	
Clearance Interval				0.05		0.05
TOTAL CAPACITY UTILIZATION				**0.57**		**0.68**

Appendix C
Campus Drive FBO Access

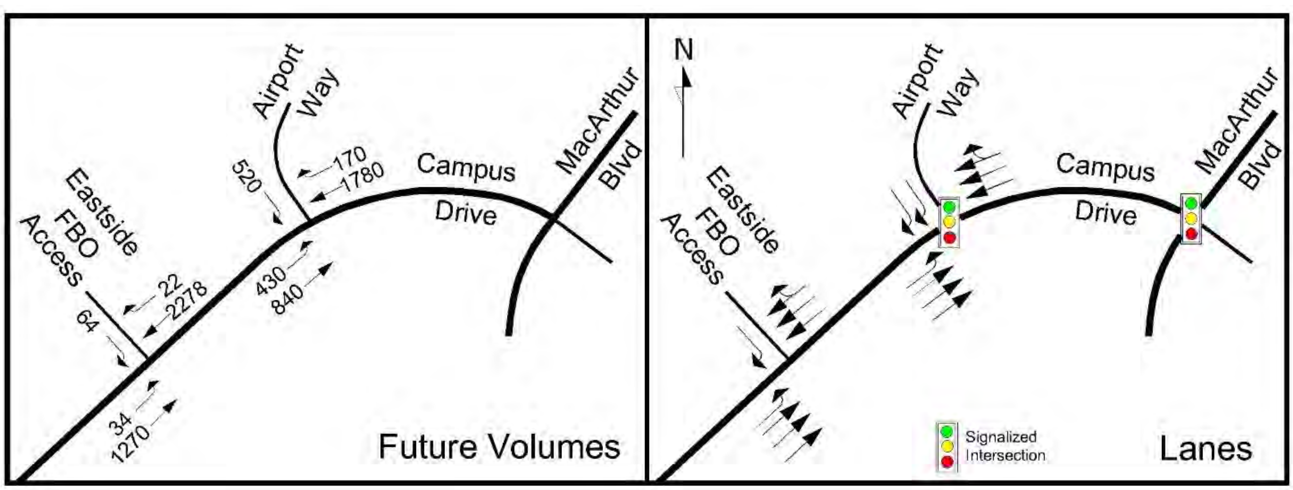
This appendix discusses the access to the eastside FBO(s) (one or two FBO's, depending on alternative) off Campus Drive. It shows the potential delay to entering and exiting vehicles via a non-signalized intersection at this location.

C.1. Traffic Volumes

The highest entering and exiting volumes at the Campus Drive FBO is for Project Alternative 2. This has two FBO's on the east side, consolidated in the northeast GA area, and no FBO's on the west side. While it is possible that two access points may be provided (e.g. one opposite Dove Street and another to the north), this analysis considers a single unsignalized access point south of Airport Way. Allowed turn movements would be right-in, right-out and left-in (i.e. no left-out).

The highest delay to traffic entering and exiting the FBO would be in the PM peak hour when the opposing through traffic (southwest on Campus Drive) is highest. The following Figure C-1 shows the future volumes.

Figure C-1. Northeast FBO Access Volumes (PM Peak Hour)



Also shown here for informational purposes are the corresponding future volumes for the intersection of Airport Way and Campus Drive. This signalized intersection influences the gaps in the opposing traffic stream for left turns into and right turns out of the FBO, and is thereby considered in the delay estimation.

C.2. Delay Analysis

The delay analysis uses the SimTraffic simulation software to estimate average delay to vehicles using the FBO access drive. The results are as follows.

SimTraffic Performance Report — PM Peak Hour, Future with Project

9: Campus & FBO Performance by movement

Movement	SER	NEL	NET	SWT	SWR	All
Stop Del/Veh (s)	14.8	11.8	0.1	0.2	0.2	0.6

Queuing and Blocking Report — PM Peak Hour, Future with Project

Intersection: 9: Campus & FBO

Movement	SE	NE	NE
Directions Served	R	L	T
Maximum Queue (ft)	78	51	94
Average Queue (ft)	44	22	9
95th Queue (ft)	81	49	56
Link Distance (ft)	280		1283
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		100	
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

The estimated average vehicle delay for right turn exiting traffic is 14.8 seconds, and for left turn entering traffic is 11.8 seconds. For the exiting vehicles this is equivalent to level of service (LOS) A, based on Highway Capacity Manual stop controlled intersection performance. While there is no equivalent standard for the entering volumes, application of the same delay standard would also give LOS A for this movement.

For the left turn entering traffic, the 95th percentile queue length is 56 feet, with a maximum during the simulation of 94 feet. It can thereby be concluded that a 150 foot left turn pocket would provide more than adequate storage for this movement.