Town of Yucca Valley

Transportation Study:

Recommendations and Impact Assessment

Prepared for:
Town of Yucca Valley

June 18, 2013

OC11-0177

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I. EXECUTIVE SUMMARY

This report summarizes an extensive amount of technical analysis and policy recommendations associated with the Town of Yucca Valley General Plan Update. As such, it documents the following information associated with this effort:

- Existing Conditions
- Travel Demand Forecasting Model Development
- Approach, Goals, and Policy Recommendations
- Transportation Impacts

Key recommendations are summarized below.

KEY RECOMMENDATIONS

Key components and results are summarized below:

1) Yucca Valley's transportation system includes roadways, bicycle facilities, pedestrian facilities, transit service, an airport, and designated truck routes within the Town.
2) Most facilities are operating at LOS C or better. The only evaluated facility that operates below LOS C is the SR-62/SR-247 intersection, which operates at LOS D during the morning peak hour.
3) A sub-area travel demand forecasting model, which exceeds Caltrans and FHWA validation criteria, was developed to ensure the highest level of confidence in the forecasting results.
4) A review of the best management practices for transportation was performed and identified the following areas as key for consideration in the Circulation Element:
    a) Consistency with the goals of the Global Warming Solutions Act (or AB 32) that identifies California's commitment to reduce Greenhouse Gas emissions to 1990 levels by year 2020.
    b) Consistency with SCAG's Regional Transportation Plan and Sustainable Communities Strategy.
    c) Compliance with the California Complete Street Act through implementation of a layered network approach (e.g. identify recommended facilities for implementation to ensure a network of complete streets for all modes).
    d) Implementation of a constraints based planning effort which recognizes a series of constraints and provides policy flexibility in accounting for those constraints.
    e) Implementation of Transit Services and Facilities through coordination with MBTA.

f) Implementation of a comprehensive bicycle network consistent with the SANBAG non-motorized plan and the Town's trails master plan effort.

g) Implementation of a comprehensive and connected pedestrian and trail network.

h) Movement of goods utilizing designated truck routes and protection of the Yucca Airport.

i) Utilization of transportation demand management, signal timing and coordination, and traffic calming to enhance the circulation experience where appropriate.

5) Recommended roadway classifications, roadway network, bicycle network, pedestrian network, designated truck routes, aviation facilities, and traffic management were documented.

6) The key transportation goals and recommended policies were recommended for inclusion in the Circulation Element.

7) An impact assessment was completed to identify potential impacts to the circulation system in a post-2035 build out scenario.

a) The only impact identified was an inconsistency with the CMP level of service requirement on CMP-designated facilities; the SR-62/SR-247 intersection is expected to operate at LOS D during the PM peak hour under future conditions with build out of the General Plan. However, it will operate below the "middle of LOS D" threshold set forth through the CMP guidelines. This inconsistency is identified as a significant and unavoidable impact based on the CEQA significance criteria identified.

(1) INTRODUCTION

Fehr & Peers has completed a transportation assessment to support the Town of Yucca Valley's General Plan Update. Yucca Valley's transportation network is multi-modal and consists of highways, streets, pedestrian paths, bicycle routes, and buses. The safe and efficient movement of goods and vehicles is a key element in Yucca Valley's future social and economic well-being.

The purpose of this study is twofold. First, it provides recommendations associated with maps and policies for the Circulation Element. Second, it provides an impact assessment for incorporation into the EIR prepared for the General Plan.

The remainder of this report is divided into the following key chapters:

- Chapter 2 – Existing Conditions
- Chapter 3 – Travel Demand Forecasting Model Development
- Chapter 4 – Approach, Goals, and Policy Recommendations
- Chapter 5 – Impact Assessment

(2) EXISTING CONDITIONS

This chapter describes the existing conditions associated with the Town of Yucca Valley. Please note that much of this information was developed and submitted in April of 2012 to assist in informing development of the General Plan.

ANALYSIS PARAMETERS

This section outlines the geographic scope of the traffic analysis, including the study intersections and roadways, and the analysis methodologies employed in this study.

PROJECT STUDY AREA

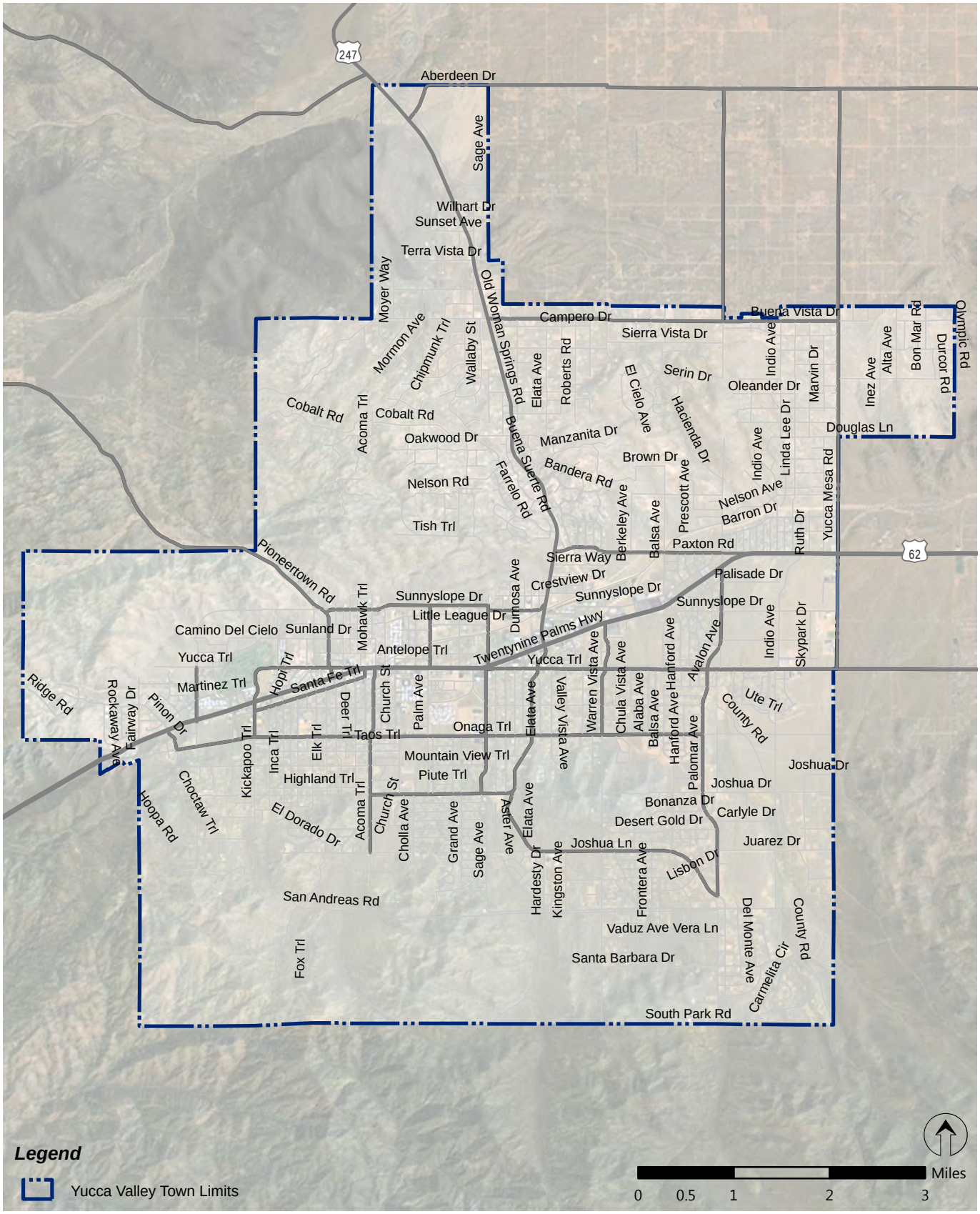
The Town of Yucca Valley is located in San Bernardino County, approximately 30 miles north of Palm Springs, in the Mojave Desert. The San Bernardino Mountains lie to the west, Joshua Tree National Park lies to the south, and the remainder of Yucca Valley is surrounded by unincorporated portions of San Bernardino County. State Route (SR) 62 and SR 247 are the primary roadway providing regional accessibility to Yucca Valley.

Figure 2-1 identifies the Town's boundaries and the general location of the Town.

The Town of Yucca Valley's roadway system includes a range of facilities including highways, arterials, collector streets, industrial streets and local streets. Two major functions of a roadway are to serve through traffic and provide access to adjacent property. Different facilities are intended to serve these purposes differently. For instance, arterials generally prioritize the movement of traffic over access to individual adjacent properties, while local streets prioritize access to private properties over through traffic.

Roadways are also intended to provide bicycle and pedestrian access and circulation and are the back bone of the bicycle and pedestrian network.

Yucca Valley has been developed in such a way that only roughly half of the roadways throughout the town are paved. Figure 2-2 illustrates the major routes in Yucca Valley's roadway system, and displays which roads throughout the Town are paved.



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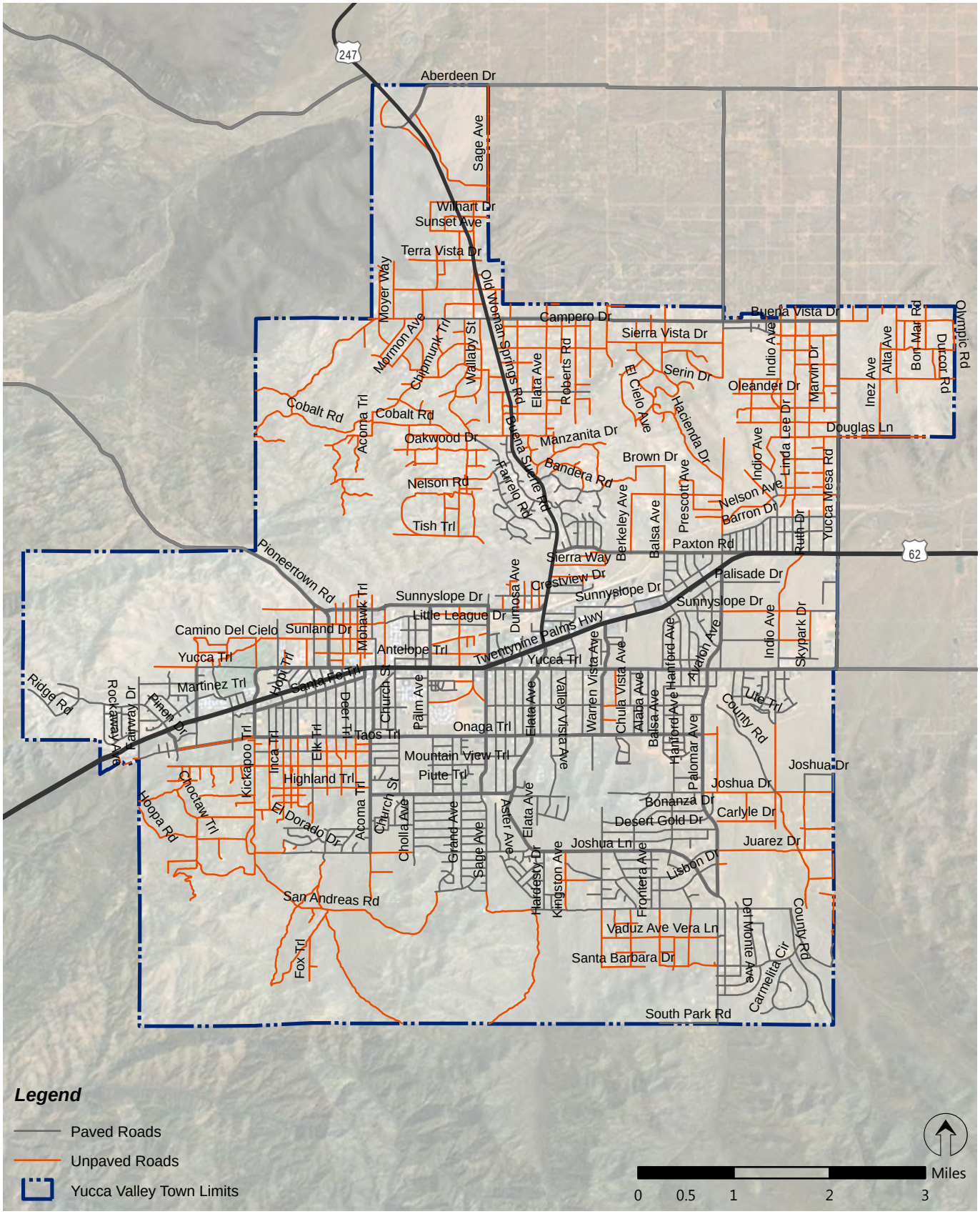
Yucca Valley Town Limits

Figure 2-1



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Existing Paved and Unpaved Roads

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Figure 2-2

STUDY ROADWAY SEGMENTS

Within the Town, 50 roadway segments and ten intersections were selected for analysis based on a review of the roadway network and circulation throughout Yucca Valley and are shown in Table 2-1 and Table 2-2, respectively.

TABLE 2-1
ANALYZED ROADWAY SEGMENTS

ROADWAY	SEGMENT
Acoma Trail	South of SR-62
	North of Mountain View
	South of Joshua Drive
Avalon Avenue/Palomar Avenue	South of SR-62
	North of SR-62
	South of Yucca Trail
	North of Joshua Lane
Balsa Avenue	North of Outer Highway
	South of SR-62
Buena Vista Drive	West of Yucca Mesa Road
	East of Balsa Avenue
	Between Roberts Road and Faith Lane
	Between Newton Lane and Rowell Road
Camino del Cielo Trail	North of SR-62
Joshua Drive	East of Acoma Trail
	West of Barberry Avenue
	East of Emerson Avenue
Joshua Lane	South of Joshua Drive
	North of Onaga Trail
	North of Pueblo Trail
	Between Yucca Trail and SR-62 Outer Highway
Kickapoo Trail	South of SR-62
La Contenta Road	South of SR-62
	North of Yucca Trail
Onaga Trail	East of Alaba Avenue
	East of Elata Avenue
	West of Joshua Lane
	West of Sage Avenue
	East of Acoma Trail
	East of Elk Trail
	West of Jemez Trail

TABLE 2-1
ANALYZED ROADWAY SEGMENTS

ROADWAY	SEGMENT
Palm Avenue	North of Pueblo Trail
Paxton Road	East of SR-247
Pioneertown Road/Deer Trail	North of SR-62
	South of Town Limits
Sage Avenue	North of SR-62
	South of SR-62
	North of Onaga Trail
Santa Fe Trail	West of Cherokee Trail
	East of Kickapoo Trail
Sunnyslope Avenue	West of SR-247
Warren Vista Avenue	South of SR-62
Yucca Trail	East of Cherokee Trail
	East of Miami Trail
	West of La Contenta Road
	East of Hanford Avenue
	West of Joshua View
	West of Condalia Avenue
Yucca Mesa Road	North of SR-62
	North of Buena Vista Drive

Notes:
Location naming convention consistent with count data received from Town staff.

TABLE 2-2
STUDY INTERSECTIONS

Twentynine Palms Highway (SR-62) at	Camino del Cielo
	Kickapoo Trail
	Pioneerrtown Road
	Acoma Trail
	Sage Avenue
	Old Woman Springs Road (SR-247)
	Airway Avenue
	Balsa Avenue
	Avalon Avenue
	Yucca Mesa Road

ANALYSIS METHODOLOGIES

Fehr & Peers analyzed the operation of the roadway system in the Town of Yucca Valley. Operations for these facilities are expressed in terms of level of service. Level of service is a general measure of traffic operating conditions whereby a letter grade, from Level of Service (LOS) A (no congestion) to F (high levels of congestion), is assigned. LOS E represents "at capacity" operations.

The flow of vehicles without significant impediments is considered "stable" whereas when traffic encounters interference that limits the capacity acutely, the flow becomes "unstable". These grades represent the perspective of drivers only and are an indication of the comfort and convenience associated with driving, as well as speed, travel time, traffic interruptions, and freedom to maneuver.

ROADWAY SEGMENT TRAFFIC OPERATIONS

A roadway operations analysis was performed at the study roadway segments to provide an evaluation of how the roadway network will perform. It also provides an idea of the amount of traffic that will utilize each roadway and if the existing or proposed lane configurations can adequately handle the volumes.

The level of service for roadway segments were calculated for key roadway segments in Yucca Valley's regional roadway system to evaluate existing traffic conditions. Daily capacity thresholds in accordance with the Town of Yucca Valley General Plan Circulation Element are shown in Table 2-3. This table establishes the maximum daily roadway capacities by street classifications.

INTERSECTION TRAFFIC OPERATIONS

Intersection operations are evaluated with the Synchro 6 level of service software, which is consistent with the methodologies identified in the *Highway Capacity Manual* (Transportation Research Board, 2000). Table 2-4 summarizes how the level of service corresponds to intersection delay at the signalized study intersections.

TABLE 2-3
MAXIMUM DAILY ROADWAY CAPACITIES

Classification	Typical Lane Configuration	Daily Volume Thresholds				
		LOS A	LOS B	LOS C	LOS D	LOS E
Unpaved Road	2 Lanes Undivided and Unpaved	-	-	-	500	-
Local Road	2 Lanes Undivided	-	-	-	1,500	2,000
Collector	2 Lanes Undivided	900	2,000	6,800	14,100	17,400
Industrial	2 Lanes Undivided	900	2,000	6,800	14,100	17,400
Arterial	2 Lanes Undivided	--	--	9,700	17,600	18,700
Arterial / Highway	4 Lanes Undivided	--	--	17,500	27,400	28,900
Arterial / Highway	4 Lanes Divided	--	--	19,200	35,400	37,400
Arterial / Highway	6 Lanes Divided	--	--	27,100	53,200	56,000

Source: Highway Capacity Manual (Transportation Research Board, 2000), FHWA Guidelines for Roadway Paving

TABLE 2-4
INTERSECTION LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service	Description	Signalized Intersection Delay (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	>10.0 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	>20.0 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	>35.0 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	>55.0 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	>80.0

Source:Highway Capacity Manual (Transportation Research Board, 2000).

EXISTING FACILITIES

ROADWAY FACILITIES

Major regional facilities within the Town include:

State Route 62 (SR-62), also known as Twentynine Palms Highway, provides primary regional access to the town and the rest of the Morongo Basin, including Joshua Tree National Park, the Marine Corps Air Ground Combat Center, the Colorado River, and the Mojave Desert. SR-62 is currently classified as a highway within Town limits and serves as the main roadway through the Town. It runs east/west through the center of the Town and has two lanes in each direction with a two-way left-turn lane.

State Route 247 (SR-247), also known as Old Woman Springs Road, is the second of two roadways providing regional access to Yucca Valley. Currrently classified as a highway within Town limits, SR-247 is a north/south undivided road with one to two travel lanes in each direction. SR-247 connects from the north to the center of town at SR-62, where it becomes Joshua Lane.

Major arterials within the Town include:

Joshua Lane is currently classified as an arterial roadway that extends north/south in the Town of Yucca Valley. It becomes SR-247 north of SR-62. Between SR-62 and Yucca Trail, Joshua Lane is a divided 4-lane roadway with a two-way left-turn lane. This section of roadway has some discontinuous sidewalks. Between Yucca Trail and Onaga Trail, Joshua Lane is an undivided two-lane roadway with some discontinuous sidewalks. Joshua Lane is also designated as a Class III bicycle route, as discussed later in this report, between Onaga Trail and Palomar Avenue. The posted speed limit on Joshua Lane is 40-45 miles per hour.

Onaga Trail between Kickapoo Trail and Palomar Avenue is an east/west roadway half a mile south of SR-62 and is currently classified as an arterial roadway. This roadway contains discontinuous sidewalks. A bike route is designated throughout the length of Onaga Trail. The most developed section of Onaga Trail lies west of Sage Avenue adjacent to Yucca Valley High School. The posted speed limit on Onaga Trail is 40-45 miles per hour.

Yucca Trail is currently classified as an arterial roadway that extends east/west between SR-62 eastbound to the eastern town limits, where it becomes Alta Loma Drive. This roadway contains discontinuous sidewalks. Yucca Trail is designated as a Class III bicycle route between Palomar Avenue and Yucca Mesa Road. The posted speed limit along Yucca Trail varies from 40 to 55 miles per hour.

Major collector roadways within the Town include:

Sage Avenue is currently as a collector roadway that extends from San Andreas Road north to Sunnyslope Drive. Sage Avenue is predominantly an undivided two-lane roadway with discontinuous sidewalks. The posted speed limit on Sage Avenue is 40 miles per hour.

Sunnyslope Drive is a collector roadway that extends from Shawnee Trail east to SR-247. Sunnyslope Drive is an undivided two-lane roadway with no pedestrian facilities. Sunnyslope Drive is a designated Class III bicycle route between Pioneertown Road and SR-247. The posted speed limit on Sage Avenue is 45 miles per hour.

Palomar Avenue/Avalon Avenue is currently classified as a collector roadway that extends from Joshua Lane north to Nelson Avenue, where it becomes Hacienda Drive. The roadway is named Palomar Avenue south of Lenox Avenue, and Avalon Avenue north of Lenox Avenue. South of Barron Drive, Palomar Avenue is a two-lane undivided roadway with no pedestrian facilities and a posted speed limit of 45 to 50 miles per hour. It is a designated Class III bicycle route between Joshua Lane and Yucca Trail.

Pioneertown Road is currently classified as a collector roadway that extends from SR-62 north to the unincorporated community of Pioneertown. Pioneertown Road is a two-lane undivided roadway with limited pedestrian facilities. Pioneertown Road is a Class III bicycle route from the Town limits to Sunnyslope Drive. The posted speed limit along Pioneertown Road is 40-50 miles per hour. South of SR-62 Pioneertown Road turns into Deer Trail.

Acoma Trail is currently classified as a collector roadway that extends from Golden Bee Drive north to SR-62. Acoma Trail is a two-lane undivided roadway with limited pedestrian facilities. It serves as a Class III bicycle route between Onaga Trail and SR-62. The posted speed limit along Acoma Trail is 40 miles per hour.

Santa Fe Trail is currently classified as a collector roadway that extends from Kickapoo Trail east to Apache Trail. It is a two-lane undivided roadway with a posted speed limit of 35 miles per hour. There are no pedestrian facilities along Santa Fe Trail.

Joshua Drive is currently classified as a collector roadway that extends from Acoma Trail east to Joshua Lane. It is a two-lane undivided roadway with a posted speed limit of 45-50 miles per hour. There are no pedestrian facilities along Joshua Drive. There are other un-connected sections of Joshua Drive, including one section running east/west from Palomar Avenue, one section west of La Contenta Road, and various small sections west of Acoma Trail.

Paxton Road is currently classified as a collector roadway that extends from SR-247 east to Avalon Avenue. Paxton Road is a two-lane undivided roadway with no pedestrian facilities. Paxton Road is a Class III Bicycle Route. The posted speed limit along Paxton Drive is 40 miles per hour.

Buena Vista Drive is currently classified as a collector roadway that extends from SR-247 east to Yucca Mesa Road. Buena Vista Drive is a two-lane undivided roadway without pedestrian facilities. The posted speed limit along Buena Vista Drive is 40-55 miles per hour.

Yucca Mesa Road is currently classified as a collector roadway that extends from SR-62 north to the Town's northern boundary. South of SR-62, Yucca Mesa Road is named La Contenta Road, which lies just east of the Town's eastern boundary. Yucca Mesa Road is a two-lane undivided roadway with no pedestrian facilities. It is classified as a Class III Bicycle Route from Yucca Trail to Buena Vista Drive. Yucca Mesa Road has a posted speed limit of 55 miles per hour.

Kickapoo Trail is currently classified as a collector roadway that extends from Hoopa Trail north to Yucca Trail. Kickapoo Trail, north of Navajo Trail, is a two-lane undivided roadway with discontinuous pedestrian facilities. Kickapoo Trail has a 40 mile per hour posted speed limit.

BICYCLE FACILITIES

Bicycle facilities are typically defined by the following classifications:

- **Class I**: Bike path providing a completely separated right-of-way designated for the exclusive use of bicycles and pedestrians with cross-flows by motorists minimized.
- **Class II:** Bikeway that provides a preferential right-of-way designated for the exclusive or semi-exclusive use of bicycles with through travel by motor vehicles or pedestrians prohibited, but with vehicle parking and cross flows by pedestrians and motorists minimized.
- **Class III:** Bikeways providing a route designation by signs or permanent pavement markings which are shared with either pedestrians or motorists.

The bicycle system in Yucca Valley includes on-street Class III bicycle routes that stretch along common arterials and collectors throughout the Town. The existing bicycle network allows for connectivity to and from the outskirts of the Town through mostly residential neighborhoods. However, Yucca Valley's central core around SR-62 has limited bicycle facilities to connect to main activity and business centers.

These facilities are along paved roads and designated by signage only. Many Class III routes available in Yucca Valley are shared with vehicles on a narrow roadway with a dirt shoulder.

Figure 2-3 identifies existing bicycle facilities within the Town.

PEDESTRIAN FACILITIES

Pedestrian facilities typically consist of sidewalks, pedestrian crossings (at intersections or mid-block), and off-street trails/paths. Currently, Yucca Valley's pedestrian system consists of limited pedestrian facilities including incomplete sidewalk facilities.

Figure 2-4 provides an overview of existing sidewalks in Yucca Valley.

TRANSIT FACILITIES

Providing public transit is beneficial to a town in a number of ways. It provides transportation for groups not having access to vehicles. Public transit also helps groups who choose not to drive and take non-automotive methods of travelling. Public transit also provides relief to a town's traffic network because people who are not driving their individual vehicles on the road are not contributing to traffic congestion.

Public transportation in Yucca Valley consists of the following services and facilities:

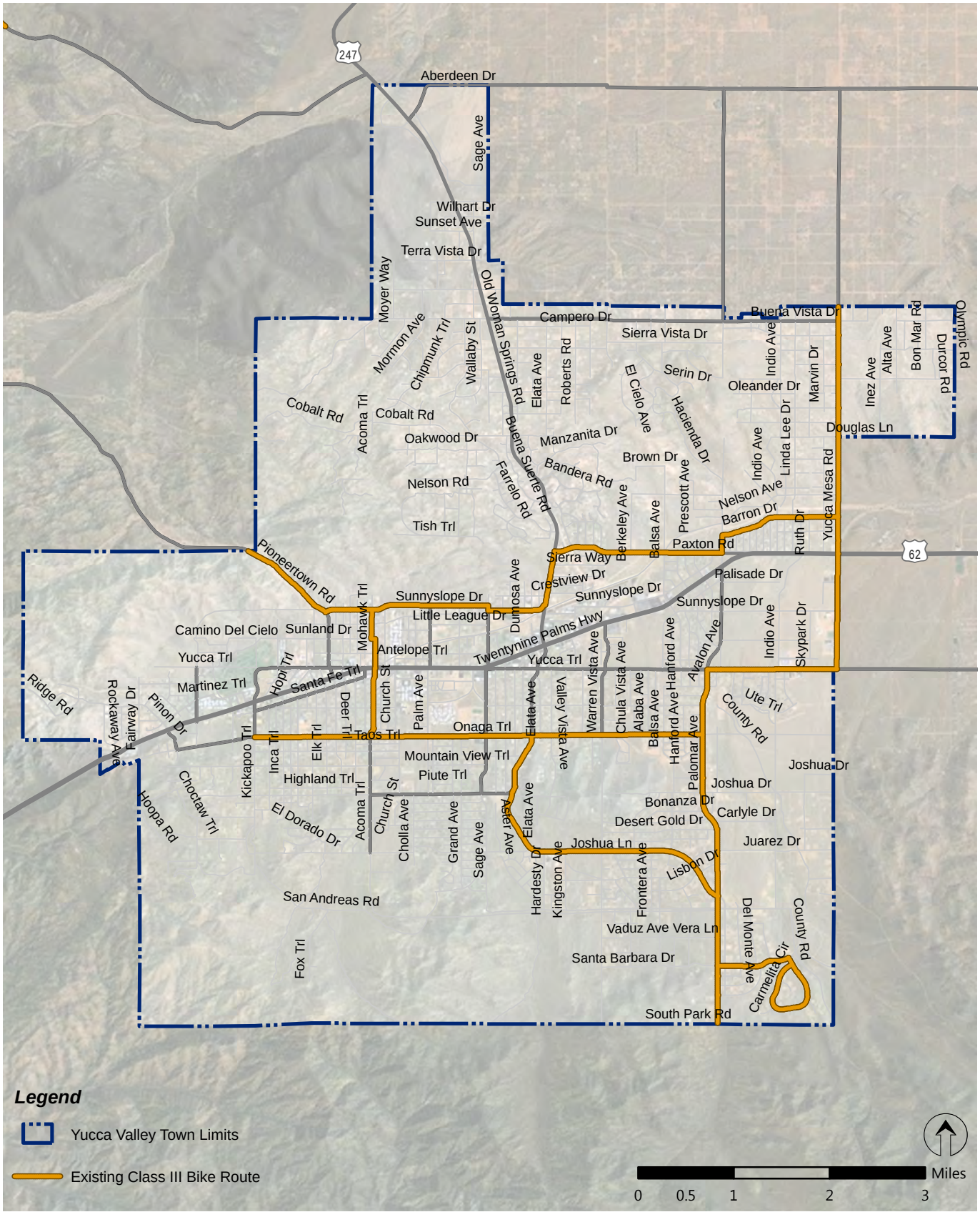
- Public bus
- Paratransit (Ready Ride)

Public Bus Service

Public transportation in Yucca Valley is operated by Morongo Basin Transit Authority (MBTA), which enables commuters to travel within the Town and adjacent cities with minimal transfers. All transit routes within Yucca Valley have a transfer point at the Yucca Valley Transit Center near the intersection of Yucca Trail & Valley Vista. Currently, MBTA operates buses on five routes, including Routes 1, 7A, 7B, 12/15 and 21.

Route 1 operates all Monday through Saturday and connects Yucca Valley to the cities of Joshua Tree and Twentynine Palms, with a terminus at the Twentynine Palms Marine Base. Route 1 primarily travels along SR-62 within the Town of Yucca Valley. On weekdays, Route 1 operates at approximately one-hour headways from 6:00 AM to 10:00 PM, with slightly longer headways after 6:00 PM. On Saturdays, Route 1 operates at one- to two-hour headways from approximately 7:00 AM to 10:00 PM. Weekday headways are approximately 60 minutes and Saturday headways are hourly.

Route 7A operates Monday through Friday and is predominantly a local collector route for Yucca Valley neighborhoods north of SR-62. Route 7A predominantly travels along Paxton Road, Sunnyslope Avenue, Pioneertown Road, Yucca Trail, and SR-62. Route 7A has hourly headways from 7:00 AM to 6:00 PM.



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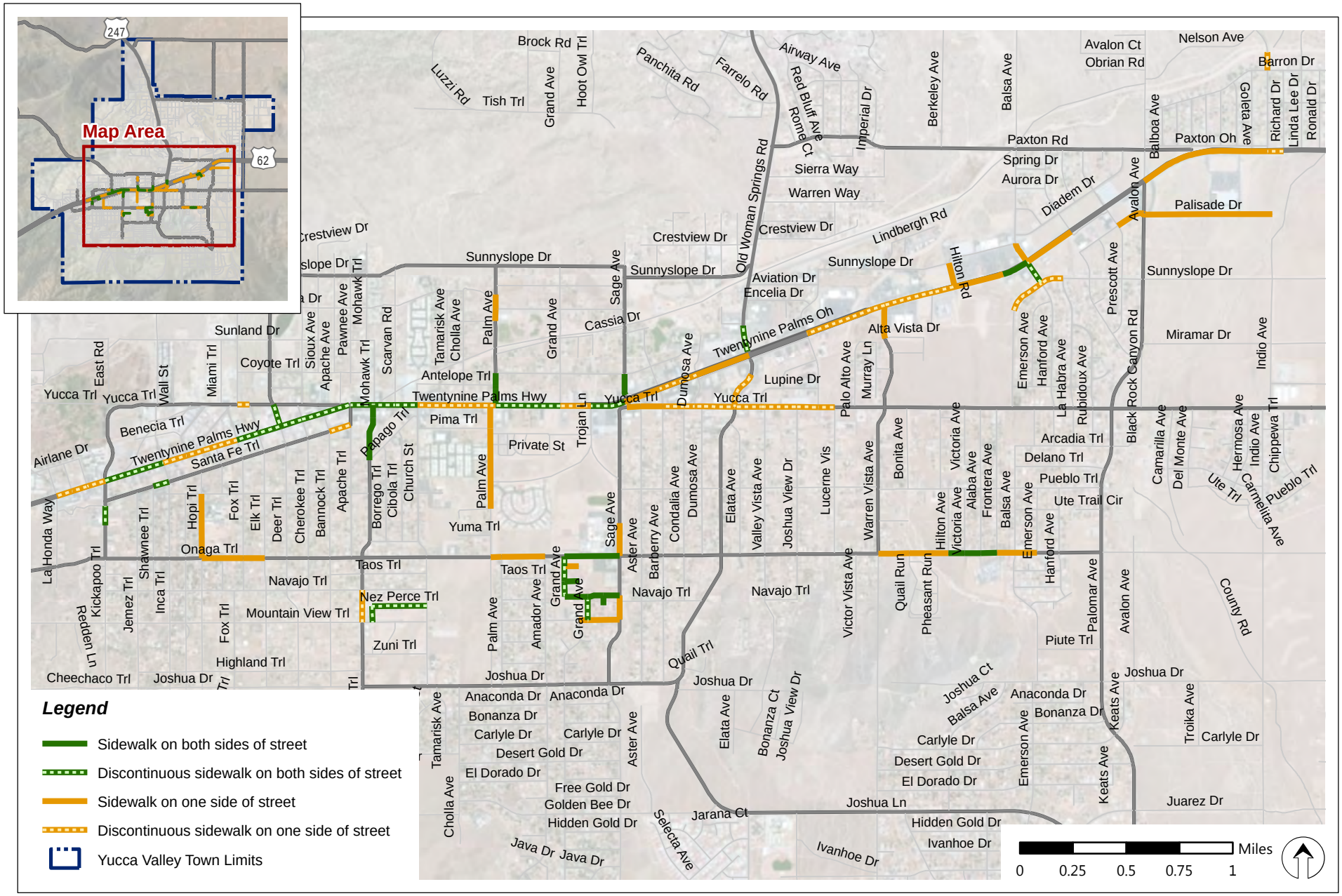
Existing Bicycle Facilities

Figure 2-3



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Existing Sidewalk Facilities

Figure 2-4

Route 7B operates Monday through Friday and is predominantly a local collector route for Yucca Valley neighborhoods south of SR-62. Route 7B predominantly travels along Onaga Trail, Palomar Road, Avalon Avenue, La Contenta Lane, and SR-62. Weekday frequency is 15 to 30 minutes, and weekend frequency is 30 minutes. Route 7B has hourly headways from 7:00 AM to 6:00 PM.

Route 12 operates Monday through Friday and connects Yucca Valley to the City of Palm Springs. Route 12 travels along SR-62 within the Town of Yucca Valley. Route 12 has three daily headways in each direction, departing Yucca Valley at 7:00 AM, 9:00 AM, and 4:00 PM, and departing Palm Springs at 7:50 AM, 10:10 AM, and 4:50 PM.

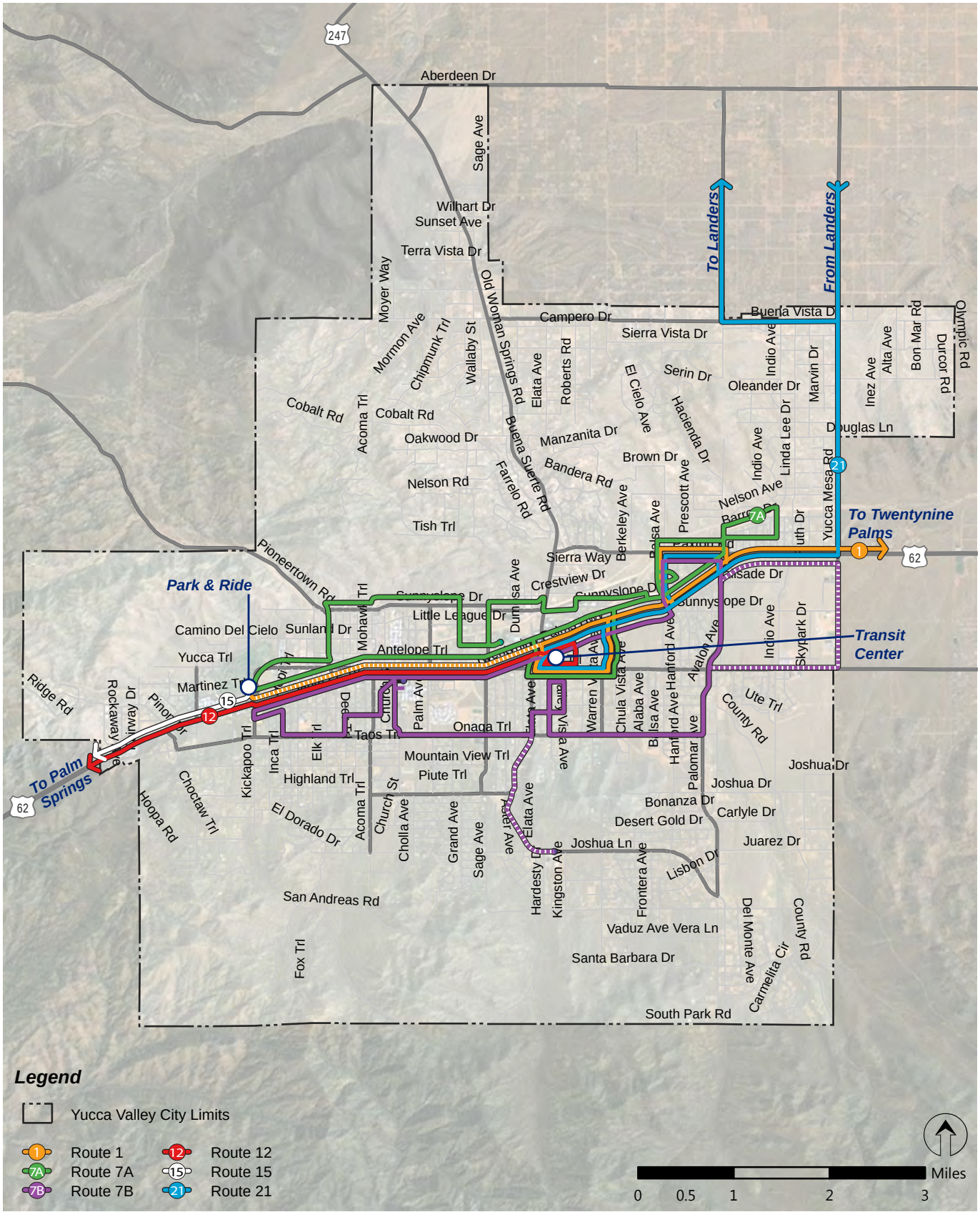
Route 15 operates on Fridays and weekends and connects Yucca Valley to the City of Palm Springs and the Twentynine Palms Marine Base. Route 15 travels along SR-62 within the Town of Yucca Valley. On Fridays, Route 15 makes one trip in each direction to and from Yucca Valley, with the bus leaving Yucca Valley at 6:10 PM en route to Palm Springs, and making a return trip from Palm Springs at 7:00 PM. On weekends, there are two daily trips along Route 15; buses depart Yucca Valley at 11:10 AM and 5:10 PM, and leave Palm Springs for Yucca Valley at 12:00 noon and 6:00 PM.

Route 21 operates Monday through Friday and connects Yucca Valley to the unincorporated community of Landers. Within Yucca Valley, Route 21 travels along SR-62, Yucca Mesa Road, and Buena Vista Drive. Route 21 operates on weekdays only with six headways between one and three hours apart between the hours of 6:45 AM and 5:55 PM.

Figure 2-5 identifies the existing transit network.

Paratransit

Paratransit is an alternative mode of flexible passenger transportation that does not follow fixed routes or schedules. Typically, vans or mini-buses are used to provide paratransit service, but share taxis and jitneys are also important providers. Paratransit services may vary considerably on the degree of flexibility they provide their customers. At their simplest, they may consist of a taxi or small bus that will run along a more or less defined route and then stop to pick up or discharge passengers on request. At the other end of the spectrum—fully demand-responsive transport—the most flexible paratransit systems offer on-demand call-up door-to-door service from any origin to any destination in a service area. Desert Communities Transportation Services currently provides private non-emergency paratransit services. Additionally, the Morongo Basin Transit Authority offers discounted transit aboard MBTA buses with proof of disability through the program "Ready Ride."



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Existing Transit Network

Figure 2-5

AVIATION FACILITIES

Yucca Valley is home to Yucca Valley Airport, a privately-owned public use airport for private aircraft and aircraft maintenance and flight training. The closest airport offering commercial flights is the Palm Springs International Airport, approximately 30 miles south of Yucca Valley. This airport provides nonstop service primarily to the Western United States and Canada. MBTA routes 12 and 15 have a stop at the Palm Springs International Airport.

FREIGHT SYSTEM

The goods or freight movement system in Yucca Valley consists of designated truck routes. The Yucca Valley Municipal Code (Chapter 12, Section 30) contains language relating to truck routes. This chapter of the municipal code defines weight restrictions, specifies the ability of trucks to enter areas not designated as truck routes, and defines the truck routes within the town. Roadways in the system that are not designated truck routes are restricted to trucks under five tons only, with the exception of vehicles when making pickups or deliveries within the town limits.

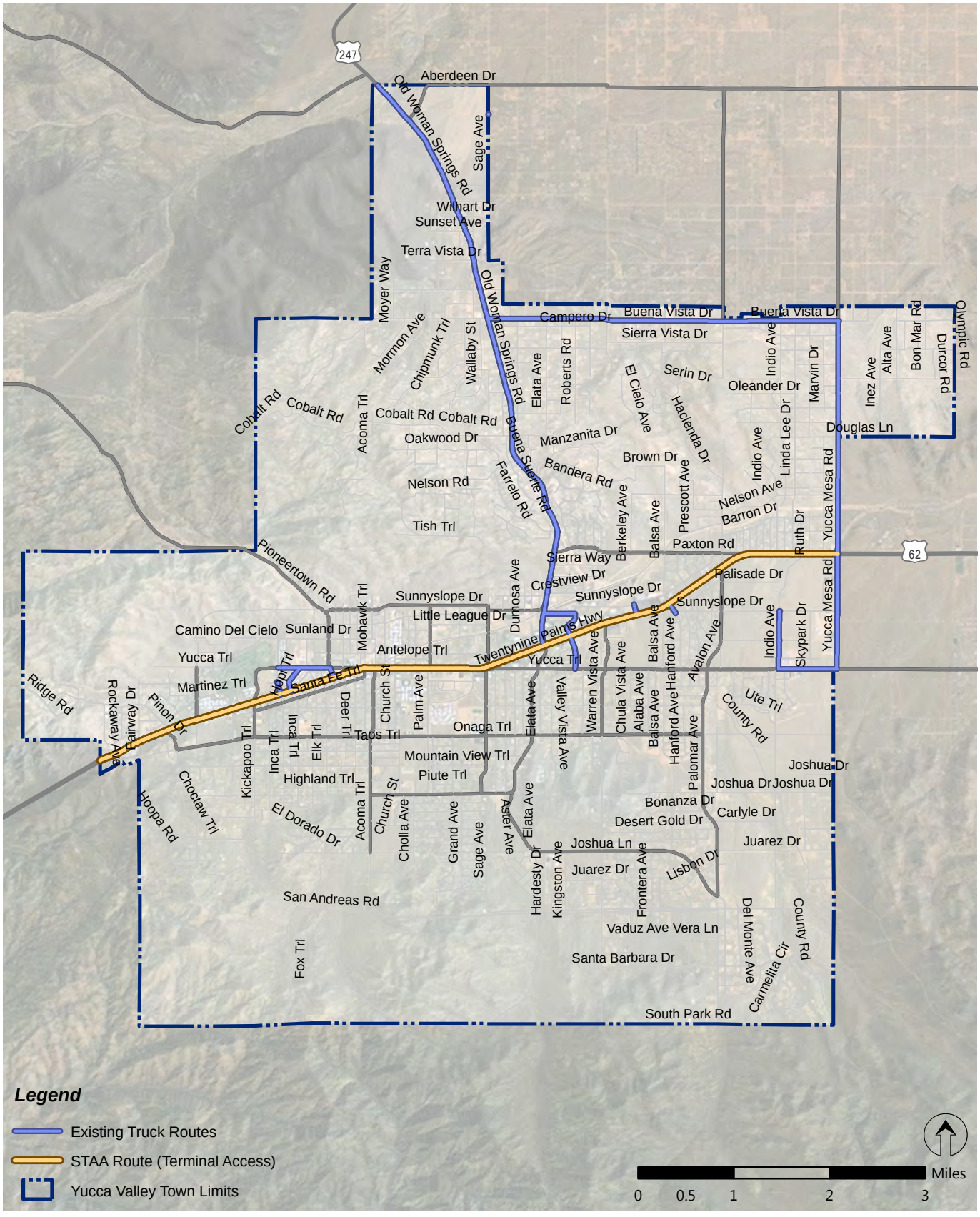
Figure 2-6 displays the designated truck routes in Yucca Valley.

TRAFFIC OPERATIONS ASSESSMENT

ROADWAY SEGMENT OPERATIONS

Table 2-5 presents the daily traffic volume and LOS operations on study roadway segments. As shown below, all of the existing roadway segments are currently operating at acceptable levels of service.

Figure 2-7 shows the average daily traffic of each roadway segment. Figure 2-8 shows the existing lane geometry on roadways throughout the Town.



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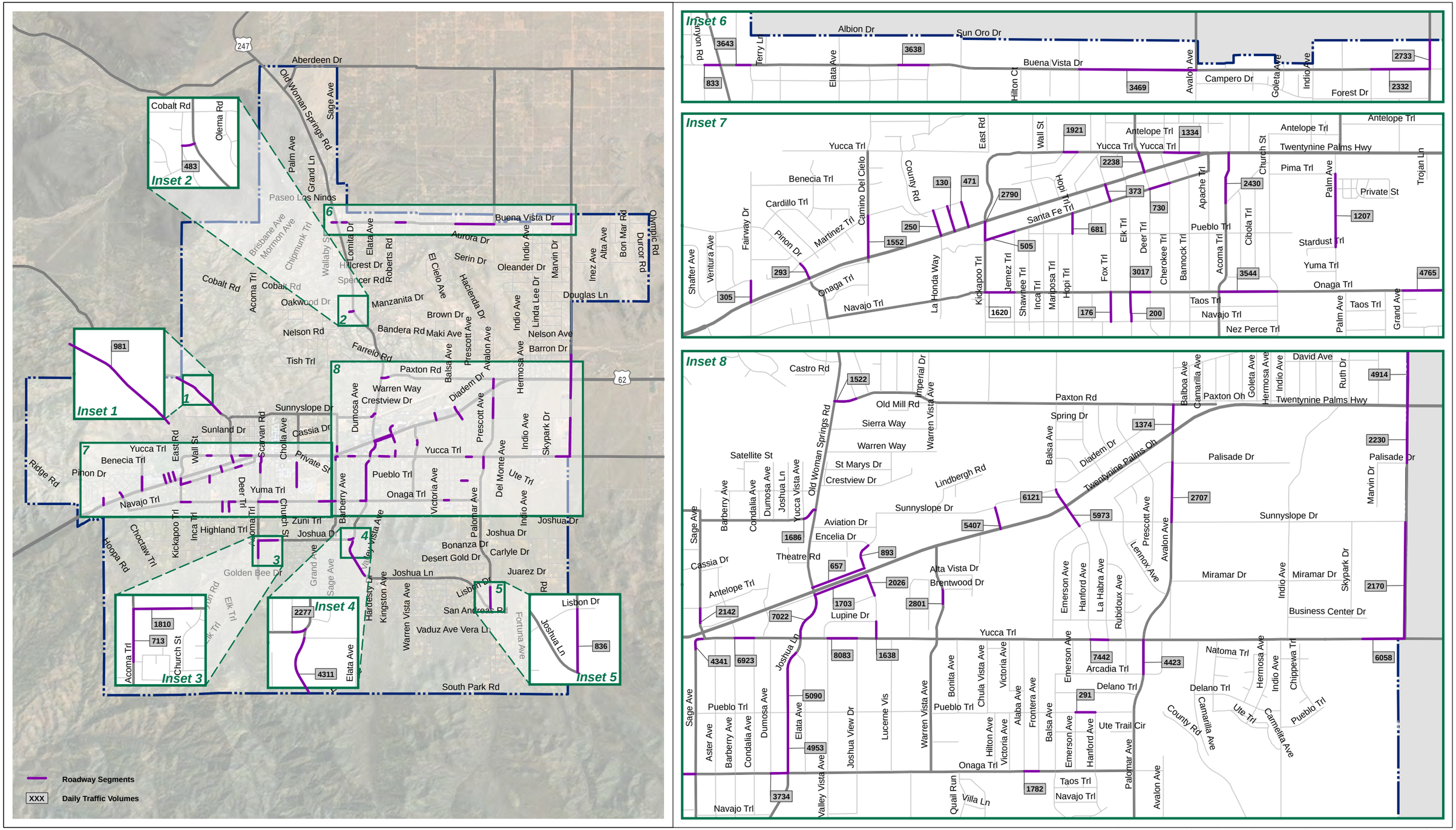
Existing Truck Routes

Figure 2-6



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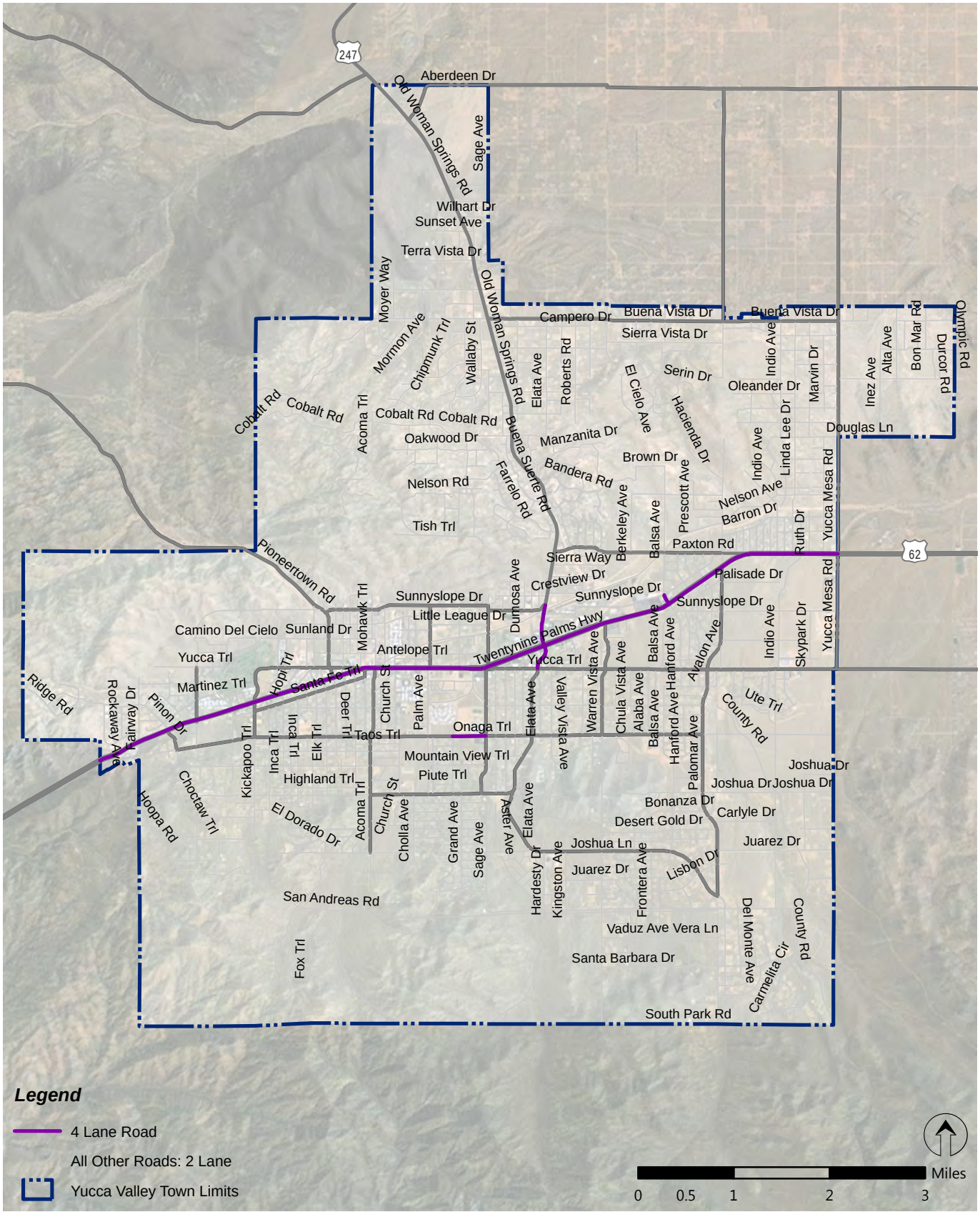
Existing Roadway Segment ADT

Figure 2-7



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Existing Condition Lane Geometry

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Figure 2-8

TABLE 2-5
EXISTING ROADWAY VOLUME AND LOS

Street Name and Segment	Current Classification	Traffic Volume	V/C	LOS
Acoma Trail				
South of SR-62	Collector	2,430	0.172	C or Better
North of Mountain View	Collector	2,357	0.167	C or Better
South of Joshua Drive	Collector	713	0.051	C or Better
Avalon Avenue				
North of Sunnyslope Drive	Collector	2,707	0.192	C or Better
North of SR-62	Collector	1,374	0.097	C or Better
Balsa Avenue				
North of Outer Highway	Collector	6,121	0.434	C or Better
South of SR-62	Collector	5,973	0.424	C or Better
Buena Vista Drive				
West of Yucca Mesa Road	Collector	2,332	0.165	C or Better
East of Balsa Avenue	Collector	3,469	0.246	C or Better
Between Roberts Road and Faith Lane	Collector	3,638	0.258	C or Better
Between Newton Lane and Rowell Road	Collector	3,643	0.258	C or Better
Camino del Cielo Trail				
North of SR-62	Collector	1,552	0.110	C or Better
Joshua Drive				
East of Acoma Trail	Collector	1,810	0.128	C or Better
West of Barberry Avenue	Collector	2,277	0.161	C or Better
East of Emerson Avenue	Collector	1,164	0.083	C or Better

TABLE 2-5
EXISTING ROADWAY VOLUME AND LOS

Street Name and Segment	Classification	Traffic Volume	V/C	LOS
Joshua Lane				
South of Joshua Drive	Collector	4,311	0.306	C or Better
North of Onaga Trail	2-Lane Arterial	4,953	0.281	C or Better
North of Pueblo Trail	2-Lane Arterial	5,090	0.289	C or Better
Between Yucca Trail and SR-62 Outer Highway	2-Lane Arterial	7,022	0.399	C or Better
Kickapoo Trail				
South of SR-62	Collector	2,790	0.198	C or Better
La Contenta Road				
South of SR-62	Collector	2,230	0.158	C or Better
North of Yucca Trail	Collector	2,170	0.154	C or Better
Onaga Trail				
East of Alaba Avenue	Collector	1,782	0.126	C or Better
East of Elata Avenue	Collector	2,966	0.210	C or Better
West of Joshua Lane	2-Lane Arterial	3,734	0.212	C or Better
West of Sage Avenue	2-Lane Arterial	4,765	0.271	C or Better
East of Acoma Trail	2-Lane Arterial	3,544	0.201	C or Better
East of Elk Trail	2-Lane Arterial	3,017	0.171	C or Better
West of Jemez Trail	2-Lane Arterial	1,620	0.092	C or Better
Palm Avenue				
North of Pueblo Trail	Collector	1,207	0.086	C or Better
Palomar Avenue				
South of Yucca Trail	Collector	4,423	0.314	C or Better
North of Joshua Lane	Collector	836	0.059	C or Better
Paxton Road				
East of SR-247	Collector	1,522	0.108	C or Better

TABLE 2-5
EXISTING ROADWAY VOLUME AND LOS

Street Name and Segment	Classification	Traffic Volume	V/C	LOS
Pioneertown Road				
North of SR-62	Collector	2,238	0.159	C or Better
South of Town Limits	Collector	981	0.070	C or Better
Sage Avenue				
North of SR-62	Collector	2,142	0.152	C or Better
South of SR-62	Collector	4,341	0.308	C or Better
North of Onaga Trail	Collector	4,122	0.292	C or Better
Santa Fe Trail				
West of Cherokee Trail	Collector	730	0.052	C or Better
East of Kickapoo Trail	Collector	505	0.036	C or Better
Sunnyslope Avenue				
West of SR-247	Collector	1,686	0.120	C or Better
Warren Vista Avenue				
South of SR-62	Collector	2,801	0.199	C or Better
Yucca Trail				
East of Cherokee Trail	Industrial	1,334	0.095	C or Better
East of Miami Trail	Industrial	1,921	0.136	C or Better
West of La Contenta Road	2-Lane Arterial	6,058	0.344	C or Better
East of Hanford Avenue	2-Lane Arterial	7,442	0.423	C or Better
West of Joshua View Drive	2-Lane Arterial	8,083	0.459	C or Better
West of Condalia Avenue	2-Lane Arterial	6,923	0.393	C or Better
Yucca Mesa Road				
North of SR-62	Collector	4,914	0.349	C or Better
North of Buena Vista Drive	Collector	2,733	0.194	C or Better

Notes:
1. LOS D Capacity for each roadway classification analyzed are as follows:
   - Collector – 14,100 vehicles per day (vpd)
   - Industrial – 14,100 vpd
   - 2-Lane Arterial – 17,600 vpd
2. V/C represents the volume to capacity ratio.

Source: Town of Yucca Valley Traffic Counts (2011), Caltrans Traffic Data (2010)

EXISTING INTERSECTION OPERATIONS

Table 2-6 presents the existing traffic volumes and lane configurations at the study intersections. Table 2-7 summarizes the exiting traffic operations at the ten study intersections during the morning (AM) and evening (PM) peak hours.

TABLE 2-6
EXISTING LANE CONFIGURATIONS AND TURNING MOVEMENT VOLUMES

Intersection		Northbound			Southbound			Eastbound			Westbound		
		L	T	R	L	T	R	L	T	R	L	T	R
1. SR-62 & Camino Del Cielo	Lanes	S	1	S	1+S	1	S	1	2	S	1	2	S
	AM Volume	3	0	3	75	0	5	2	592	0	4	633	18
	PM Volume	2	0	5	55	0	4	18	814	3	8	731	64
2. SR-62 & Kickapoo Trail	Lanes	1	1	1	1	1	S	1	2	S	1	2	S
	AM Volume	93	5	29	8	6	27	7	619	39	20	535	6
	PM Volume	63	4	36	10	6	20	17	769	89	39	789	9
3. SR-62 & Pioneertown Road/Deer Trail	Lanes	1	1	S	1	1	S	1	2	1	1	2	1
	AM Volume	13	13	24	67	13	20	14	712	8	10	627	12
	PM Volume	20	11	18	101	18	15	20	823	12	17	894	13
4. SR-62 & Acoma Trail	Lanes	1	1	1	1	1	1	1	2	S	1	2	1
	AM Volume	51	22	44	33	10	14	15	802	17	31	707	26
	PM Volume	62	7	39	54	11	19	17	953	33	44	981	25
5. SR-62 & Sage Avenue	Lanes	1	1	1	1	1	1	1	2	S	1	2	1
	AM Volume	186	18	17	39	31	36	16	733	113	32	682	13
	PM Volume	177	65	21	51	59	28	37	868	208	48	971	33
6. SR-62 & SR-247	Lanes	1	1	S	1	1	S	1	2	S	1	2	S
	AM Volume	69	86	53	111	96	226	121	603	18	39	504	61
	PM Volume	66	103	93	108	112	167	209	699	37	56	897	91
7. SR-62 & Airway Avenue	Lanes	1	1	S	1	1	S	1	2	S	1	2	S
	AM Volume	10	16	53	5	10	8	21	700	34	55	586	28
	PM Volume	14	16	82	39	21	41	46	830	29	69	999	42
8. SR-62 & Balsa Avenue	Lanes	1	2	S	1	1	1	1	2	S	1	2	S
	AM Volume	91	35	21	35	26	14	11	551	39	15	555	24
	PM Volume	122	64	29	161	114	26	18	645	96	41	844	54
9. SR-62 & Avalon Avenue	Lanes	2	1	1	1	1	1	1	2	S	1	2	S
	AM Volume	20	24	72	20	27	17	16	524	39	61	577	12
	PM Volume	58	33	50	13	13	23	24	726	39	66	933	25
10. SR-62 & Yucca Mesa Road/La Contenta Road	Lanes	1	1	S	1	1	S	1	2	S	1	2	S
	AM Volume	15	12	38	66	38	72	38	574	15	12	504	21
	PM Volume	16	38	6	35	29	60	121	620	23	28	893	77

Notes:
1. "S" represents a shared turn lane. "1+S" represents one turn lane with an additional shared turn lane.

TABLE 2-7
EXISTING (2013) CONDITIONS INTERSECTION LOS RESULTS

Intersection	Control	AM Peak		PM Peak	
		Delay	LOS	Delay	LOS
1. SR-62 & Camino Del Cielo	Signal	6.8	A	6.9	A
2. SR-62 & Kickapoo Trail	Signal	12.4	B	9.9	A
3. SR-62 & Pioneertown Road/Deer Trail	Signal	10.4	B	12.8	B
4. SR-62 & Acoma Trail	Signal	9.8	A	10	A
5. SR-62 & Sage Avenue	Signal	18.7	B	20.3	C
6. SR-62 & SR-247	Signal	35.2	D	33.6	C
7. SR-62 & Airway Avenue	Signal	11.3	B	17.4	B
8. SR-62 & Balsa Avenue	Signal	11.8	B	17	B
9. SR-62 & Avalon Avenue	Signal	16.9	B	15.6	B
10. SR-62 & Yucca Mesa Road/La Contenta Road	Signal	14.6	B	14.9	B

Notes:
1. Signalized intersection delay is reported as average delay.

Source: Fehr & Peers, April 2013

The results of the intersection assessment indicate that most of the study intersections are operating at LOS A or LOS B during one or both peak hours. Only the SR-62/SR-247 intersection operates below LOS C; operating at LOS D during the AM peak hour and LOS C during the PM peak hour.

(3) TRAVEL DEMAND MODEL DEVLEOPEMENT

One major component of this assessment was the development of a travel demand forecasting model. A travel demand forecasting model is a tool that incorporates land use and roadway network to "assign" traffic to the local roadway system. The model runs through numerous iterations during the traffic assignment procedure as the model also estimates traffic congestion on certain segments and reroutes traffic to other roadways that show a travel time savings for that trip.

As part of this General Plan Circulation Element, Fehr & Peers developed a sub-area Travel Demand Forecasting (TDF) model for the Town of Yucca Valley. This model was developed by modifying the 2008 San Bernardino County Transportation Analysis Model (SBTAM), which is a sub-regional model based on the Southern California Association of Governments (SCAG) TransCAD model. The SBTAM was built using the SCAG Sub regional Model Development Tool (SMDT) and validated against 2008 travel conditions. This chapter documents the development and validation of the sub-area travel demand model.

The remainder of this chapter summarizes key input data and modeling results associated with the Yucca Valley Transportation Analysis Model (YVTAM). Please note that the remainder of this chapter is intended to provide basic information to support the General Plan update process, but it also incorporates information that will be valuable to any travel demand forecasting expert utilizing the YVTAM model in the future.

BACKGROUND AND PURPOSE

The intent of developing a sub-area model for the Town of Yucca Valley was to create a travel demand model that can be used as a tool in the evaluation of land use scenarios and transportation system alternatives. The model provides the ability to evaluate the transportation system, use performance indicators for land use and transportation alternatives, provide information on regional pass through traffic versus locally generated trips and provide graphical displays of these results.

The SBTAM sub regional model provides a starting point for creating a locally valid sub-area model to which future roadway improvements and land use assumptions can be added. Starting with a regionally valid model ensures the sub-area model captures regional traffic flow patterns while the additional detail allows the sub-area model to capture local traffic patterns. The sub-area model can then be used to develop traffic volume forecasts to evaluate the transportation improvements needed to accommodate

the increase in land use associated with the Yucca Valley General Plan. Having a locally valid sub-area model is a critical step in ensuring a high level of confidence in these resulting traffic volume forecasts.

OVERVIEW OF THE MODEL

The sub-area model for Yucca Valley was developed using TransCAD Version 5.0 r4 Build 2025 modeling software. The model has been designed to produce AM, midday, PM, and nighttime vehicle flows within the town limits based on comprehensive land use and socioeconomic data (SED). The model utilizes a typical four-step process consisting of trip generation, trip distribution, modal split, and assignment. Detail regarding the 2008 SBTAM can be obtained in SBTAM Development and Validation Report and User's Guide (Parsons Brinckerhoff, May 2012). Information on the SMDT can be obtained in User's Guide for the SCAG Sub regional Planning Model in TransCAD 5.0 (Caliper Corporation, June 2010). The roadway network and traffic analysis zone (TAZ) structure were modified to ensure the model produced traffic forecasts that reasonably resemble observed traffic counts obtained within the Town of Yucca Valley in 2011.

Following validation of base year 2011 forecasts, the modifications to the base year SBTAM were applied to the future year 2035 SBTAM to produce forecasts of future vehicle flows within the town. These forecasts would then be used in the identification of system deficiencies and the development of transportation improvements needed to accommodate the increases in land use associated with the Yucca Valley General Plan.

BASE YEAR SUB-AREA MODEL DEVELOPMENT

To improve the model's forecasting ability and to incorporate the future land use data provided by The Planning Center, an increased level of detail was added to the SBTAM roadway network and TAZ structure. Substantial modifications were made within the Town of Yucca Valley that were necessary to validate the base year sub-area model to traffic counts collected in 2011.

ROADWAY NETWORK

The base year SBTAM roadway network was modified to include all arterials and collector roadways in order to facilitate the proper assignment of vehicles throughout the town. In addition, several unpaved roadways were included in the model to evaluate whether these facilities should be paved in the future. Finally, the roadway network was reviewed to ensure each roadway's facility type, free-flow speed, and

number of lanes matched data observed in aerial photography and field observations. A summary of the additional roadways coded into the model along with type (paved/unpaved) is summarized in Table 3-1. Exhibit 3-1 shows the existing SBTAM roadway network as well as the additional roadway segments that were added for the base year Yucca Valley sub-area model. SBTAM roadways are shown in green, additional paved roads are shown in red, and additional unpaved facilities are shown in blue.

TAZ STRUCTURE AND SED DATA

The SCAG regional and sub-regional models use a tiered TAZ structure to enhance the precision of the micro-level land use and smart growth analysis. The tiered zone structure consists of three levels, Tier 1 through Tier 3. The Tier 3 zone structure provides the highest precision and the most detailed zone information at the local level. The SBTAM adopts this tiered zone system so that a refined zone structure is used within the San Bernardino sub region while a much more aggregate zone structure is applied external to the sub region. TAZs within San Bernardino County are Tier 3 zones. The areas external to San Bernardino County and within an approximate five to ten mile buffer to the San Bernardino County border consist of Tier 2 zones. Beyond this Tier 2 buffer area is the Tier 1 area, with the farthest outlying areas aggregated to Combined Statistical Areas (CSAs).

The SBTAM divides the Town of Yucca Valley into 51 non-overlapping Tier 3 TAZs connected to the model roadway by centroid connectors. The existing TAZ structure was modified by moving 78 Tier 3 zones from outside the town into Yucca Valley. The new TAZ borders were drawn along major roadways and physical/man made boundaries. Exhibit 3-2 shows the SBTAM TAZ structure as well as the new TAZ structure for the Yucca Valley Sub-area Model. In total, the Town of Yucca Valley is divided into 129 TAZs in the new sub-area model, which increased the TAZ level of detail by 78 zones.

TABLE 3-1
BASE YEAR ADDITIONAL ROADWAY NETWORK ADDED

Roadway	Location	Type
Acoma Trail	between Golden Bee Drive and San Andreas Road	Unpaved
Acoma Trail	between Onaga Trail and Golden Bee Drive	Paved
Avalon Avenue	between Nelson Avenue and Barron Drive	Unpaved
Balsa Avenue	between Buena Vista Drive and Hilton Avenue	Unpaved
Balsa Avenue	between Hanford Avenue and Yucca Trail	Paved
Barron Drive	between Avalon Avenue and Yucca Mesa Road	Paved
Cactus Lane	between Carmelita Avenue and Linda Lee Drive	Unpaved
Church Street	between SR 62 and Onaga Trail	Paved
Cobalt Road	between Acoma Trail and SR 267	Unpaved
Golden Bee Drive	between Acoma Trail and Cholla Avenue	Unpaved
Golden Bee Drive	between Cholla Trail and Amador Avenue	Paved
Hacienda Drive	between Hilton Avenue and Nelson Avenue	Unpaved
Hilton Avenue	between Balsa Avenue and Hacienda Drive	Unpaved
Hilton Road	between Sunnyslope Drive and SR 62	Paved
Indio Avenue	between Barron Drive and SR 62	Paved
Indio Avenue	between Cactus Lane and Barron Drive	Unpaved
Indio Avenue	between Sunnyslope Drive and Yucca Trail	Unpaved
Joshua Drive	between Acoma Trail and Joshua Lane	Paved
Juarez Drive	between Joshua Lane Palomar Avenue and La Contenta Road	Unpaved
Kickapoo Trail	between Navajo Trail and San Andreas Road	Unpaved
Kickapoo Trail	between Onaga Trail and Navajo Trail	Paved
Kickapoo Trail	between Yucca Trail and SR 62	Paved
La Contenta Road	between SR 62 and Yucca Trail	Paved
La Contenta Road	between Yucca Trail and Juarez Drive	Unpaved
Linda Lee Drive	between Buena Vista Drive and Cactus Lane	Unpaved
Mohawk Trail	between Sunnyslope Drive and SR 62	Paved
Mountain View Trail	between Kickapoo Trail and Acoma Trail	Unpaved
Onaga Trail	between Pinon Drive and Kickapoo Trail	Unpaved
Palm Avenue	between Pima Trail and Onaga Trail	Paved
Sage Avenue	between Sunnyslope Drive and SR 62	Paved
San Andreas Road	between Kickapoo Trail and Acoma Trail	Unpaved
San Andreas Road	between Warren Vista Avenue and Joshua Lane	Paved
Santa Fe Trail	between Kickapoo Trail and Hopi Trail	Paved
Skyline Ranch Road	between Morman Avenue and SR 267	Paved
SR 62 Outer Highway N	between SR 267 and Airway Avenue	Paved
SR 62 Outer Highway S	between Joshua Lane and Airway Avenue	Paved
Sunnyslope Drive	between Avalon Avenue and La Contenta Road	Unpaved
Warren Vista Avenue	between Joshua Lane and San Andreas Road	Paved
Warren Vista Drive	between SR 62 and Yucca Trail	Paved
Yucca Trail	between Pioneertown Road and SR 62	Paved

Source: Fehr & Peers, 2012

Exhibit 3-1 Base Year Roadway Network

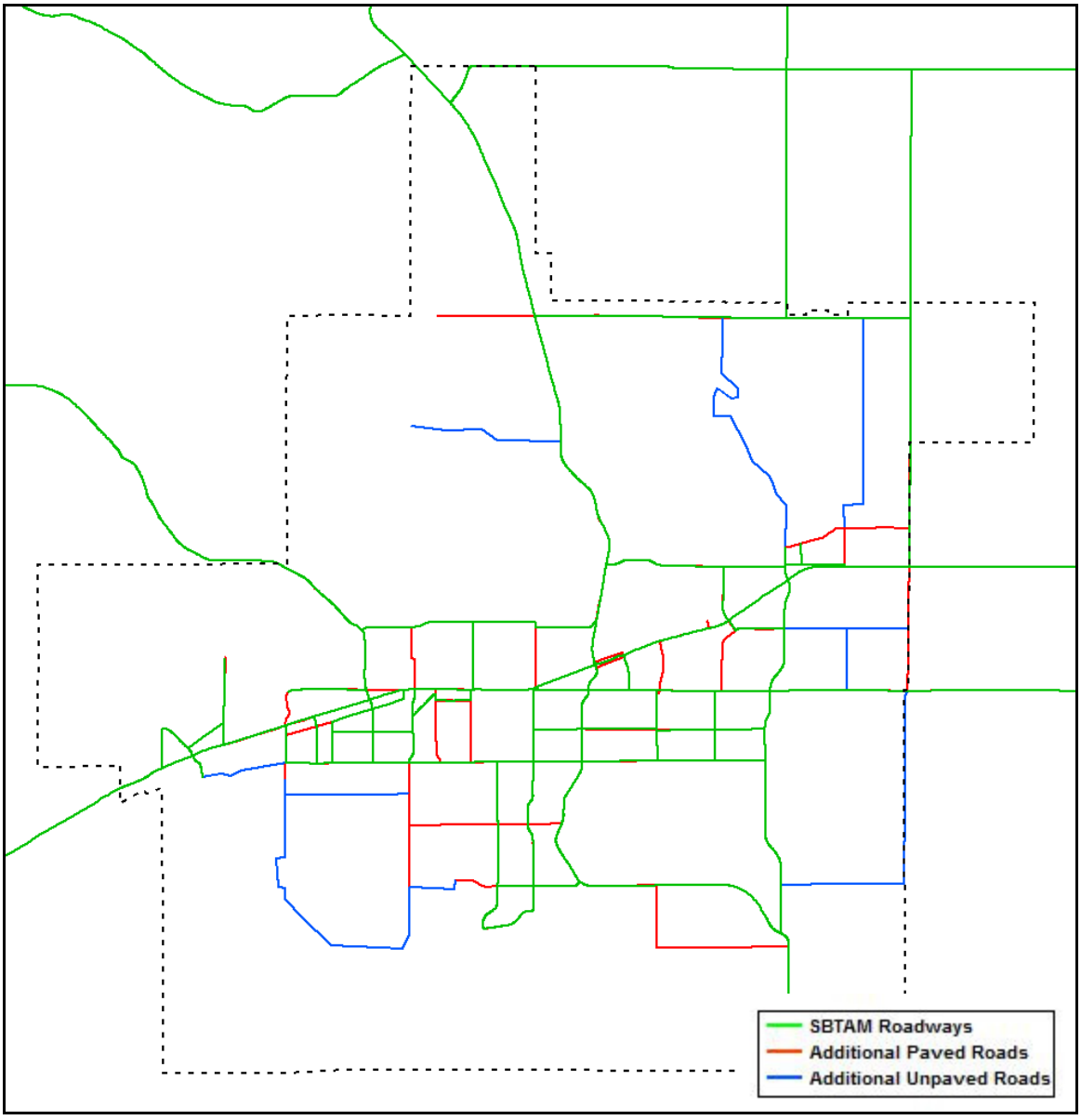
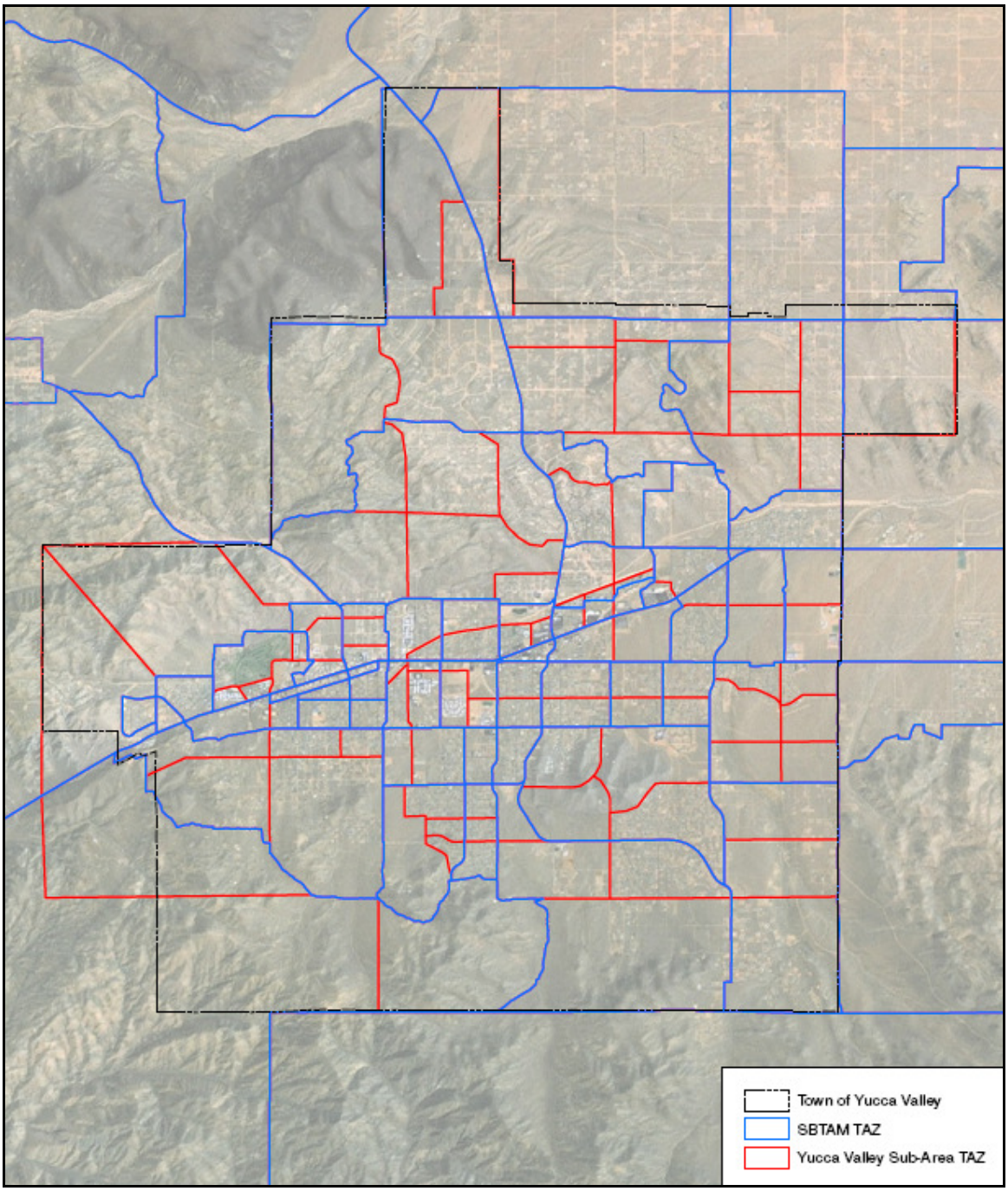


Exhibit 3-2 Base Year TAZ Structure



Since TAZs are used to tabulate demographic and employment data, the model SED files were then modified by reallocating demographic and employment assumptions from the original 51 TAZs to the new 129 TAZs. The data for each new Yucca Valley TAZ was allocated from its corresponding SBTAM TAZ based on aerial photography and field observations. The original socioeconomic data for TAZs that were moved into Yucca Valley were allocated to nearby TAZs so that the total land use was not affected.

The SBTAM allocates land using the following categories:

- Population
- Households
    - Single family
    - Multi-family
- Employment
    - Retail employment
    - Non-retail employment
- School Enrollment
    - K-12 enrollment
    - College/university enrollment

Base year demographic and employment assumptions within the Town of Yucca are summarized in Table 3-2. It should be noted that the model TAZ boundaries do not match the Town boundary, and therefore the demographic and employment associated with the Town was estimated for those TAZ not entirely within the Town limits, which may not match the values reported in the General Plan.

TABLE 3-2
BASE YEAR DEMOGRAPHIC AND EMPLOYMENT ASSUMPTIONS

Category	Quantity
Population	21,871
Households	8,952
Employment	4,699

Source: 2008 SBTAM

Using this basic Tier 3 level data, SBTAM further stratifies the data using Tier 2 socioeconomic data and allocation percentages uniquely defined for each Tier 3 TAZ within a Tier 2 TAZ. The following SED is automatically calculated each time the model is run.

- Population
  - By age
- Households
  - By size
  - By head of household age
  - By number of workers
  - By income
- Workers
  - By income level (low, medium, and high)
- Total employment
  - By income level (low, medium, and high)
  - By type (agriculture, construction, manufacturing, wholesale, retail, transportation, information services, financial/real estate, professional, educational, arts/entertainment, other services, and public administration)

The allocation percentages and Tier 2 reference TAZs were updated for each Tier 3 TAZ that was moved into Yucca Valley as well those that were disaggregated within the town.

The final step in modifying the SED for the Yucca Valley sub-area model was adjusting cross-classification tables based on income, earnings, number of workers, number of children, number of college students, head of household age, and household size. Except for one table, which is based on Tier 3 data, the tables only include information at the Tier 2 level. For this reason, only groups of Tier 3 TAZs that corresponded to a single Tier 2 TAZ were moved into Yucca Valley. These new TAZs were used to split a single existing Tier 2 TAZ in Yucca Valley. The cross-classification data for the Yucca Valley Tier 2 TAZ then replaced the data for the Tier 2 TAZ that was moved. The final step was scaling the data based on the new total number of households.

SBTAM contains other land use data but this was determined to have a limited effect on the model.

BASE YEAR SUB-AREA MODEL VALIDATION

The most critical measurement of the accuracy of any travel model is the degree to which it can approximate actual traffic counts in the base year. For a model to be considered accurate and appropriate for use in traffic forecasting, it must replicate actual conditions to within a certain level of accuracy. Traffic

forecasting models are typically calibrated by adjusting model parameters until they are validated by applying a set of criteria that compare model link volumes to actual counts.

For the Yucca Valley sub-area model, land use and roadway network modifications such as adjusting roadway speeds and capacities were made to the model and the resulting roadway link volumes were compared to 64 segment volumes collected during November and December 2011.

The California Transportation Commission has established guidelines for determining whether a model is valid and acceptable for forecasting future year traffic volumes. The sub-area validation results were compared to the following validation thresholds discussed in *2010 California Regional Transportation Plan Guidelines* (California Transportation Commission, April, 2010):

- The two-way sum of the volumes on all roadway links for which counts are available should be within 10 percent of the counts.
- At least 75 percent of the roadway links for which counts are available should be within the maximum desirable deviation, which ranges from approximately fifteen to sixty percent depending on total volume (for larger volumes, less deviation is permitted).
- The correlation coefficient between the actual ground counts and the estimated traffic volumes should be greater than 88 percent.
- The percent root mean square error (RMSE) should not exceed 40 percent.

The results for daily traffic volumes are summarized in Table 3-3 below, while the detailed spreadsheets are presented in the appendix.

TABLE 3-3
RESULTS OF YUCCA VALLEY SUB-AREA MODEL DAILY VOLUME VALIDATION

Validation Statistic	Criterion for Acceptance	Model Results
% of Links within Caltrans Standard Deviation	75% or greater	88%
2-way Sum of All Links Counted	10% or less	10%
Correlation Coefficient	88% or greater	98%
RMSE	40% or less	34%

Source: Fehr & Peers, 2012

As shown in Table 3-3, the Yucca Valley sub-area model meets or exceeds the guidelines for model accuracy for daily traffic volumes. Therefore, the base year model is considered to be valid to 2011 counts and appropriate for use in traffic forecasting.

FUTURE YEAR SUB-AREA MODEL DEVELOPMENT

The 2035 SBTAM was used to development future traffic land forecasts within the Town of Yucca Valley. The future land use information for TAZs within the Town of Yucca Valley was provided by The Planning Center. After the initial forecast was completed, suggested roadway improvements were incorporated into the network and final future year forecasts were generated.

ROADWAY NETWORK

The 2035 SBTAM roadway network includes all of the improvement assumed by SBTAM in their version of the model. These improvements include, but are not limited to, additional transit routes and facilities, new roadways, and added lanes.

Table 3-4 provides a list of roadway modifications that were included in the future year model within the Town of Yucca Valley. These improvements add capacity on roadways which are near capacity in the future. Also, unpaved roadway facilities that experienced a significant increase in traffic were assumed to be paved in the future.

TABLE 3-4
FUTURE YEAR ROADWAY NETWORK IMPROVEMENTS

Roadway	Location	Original	Change
Balsa Avenue	between SR 62 and Sunnyslope Drive	2 lanes	4 lanes
Indio Avenue	between Sunnyslope Drive and Yucca Trail	Unpaved	Paved
Indio Avenue	between south of SR-62	n/a	Paved
Onaga Trail	between Joshua Lane and Palomar Avenue	2 lanes	4 lanes
Onaga Trail	between Pinon Drive and Kickapoo Trail	2 lanes	4 lanes
SR 247	within Town of Yucca Valley Limits	2 lanes	4 lanes
SR 62	within Town of Yucca Valley Limits	4 lanes	6 lanes
Yucca Trail	between Indio Avenue and La Contenta Road	2 lanes	4 lanes

Source: Fehr & Peers, 2012

TAZ STRUCTURE AND SED DATA

The TAZ structure was not modified from the base year model. However, The Planning Center provided updated land use for the Town of Yucca Valley, and the Population value is a combination of SCAG data,

SBTAM data, census data, and data provide by The Planning Center. Table 3-5 summarizes the future land use within the town limits. As with the Base Year data, it should be noted that the model TAZ boundaries do not match the Town boundary, and therefore the demographic and employment associated with the Town was estimated for those TAZ not entirely within the Town limits, which may not match the values reported in the General Plan.

TABLE 3-5
FUTURE YEAR DEMOGRAPHIC AND EMPLOYMENT ASSUMPTIONS

Category	Quantity	Change
Population	63,839	41,968
Households	26,733	17,781
Employment	34,951	30,252

Source: Fehr & Peers, 2012

FORECASTING METHODOLOGY

Future volumes were developed by adding the difference between future year and base year traffic forecasts to the existing traffic count. This Difference Method is consistent with methodologies delineated in the National Cooperative Highway Research Program (NCHRP) 255 published by the Transportation Research Board (TRB). The resulting forecasts were then balanced where appropriate for use in the Circulation Element and for use in the General Plan EIR assessment.

(4) APPROACH, GOALS, AND POLICY RECOMMENDATIONS

In March of 2012, Fehr & Peers prepared a technical memorandum for the Town that summarized the Transportation Best Management Practices. Fehr & Peers then met with Town staff to go through the Best Management Practices and develop a list of items that were most appropriate for the goals and vision for the Town of Yucca Valley.

Fehr & Peers then utilized those best practices and the results of the travel demand forecasting effort described in Chapter 3 to develop the recommended goals and policy recommendations for the Circulation Element. This chapter summarizes the Transportation Best Management Practices that are appropriate for the Town of Yucca Valley, identifies the key circulation goal for the Town, and recommends policies that should be included in the Circulation Element.

TRANSPORTATION BEST MANAGEMENT PRACTICES OVERVIEW

The following practices are recommended for the Town of Yucca Valley and are recommended to be incorporated into the Circulation Element accordingly.

REGULATORY FRAMEWORK

The regulatory framework is used to inform decision makers about the regulatory agencies and policies that affect transportation in the Town. This enables them to make informed decisions about planning improvements to transportation systems in the Town.

Global Warming Solutions Act

The Global Warming Solutions Act (AB32) of 2006 was signed into law on September 27, 2006. AB32 established a comprehensive program to reduce greenhouse gas emissions to combat climate change. This bill requires the California Air Resources Board (CARB) to develop regulations to reduce greenhouse gas emissions to 1990 levels by 2020. January 1, 2012 the greenhouse gas rules and market mechanisms adopted by CARB take effect and are legally enforceable.

Source: NASA

The reduction goal for 2020 is to reduce greenhouse gas emissions by 25% of the current rate in order to meet 1990's level, and a reduction of 80% of current rates by 2050. The AB32 Scoping Plan contains the main strategies California will use to reduce the greenhouse gases. The scoping plan has a range of greenhouse gas reduction actions which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB32 program implementation regulation to fund the program.

The Town of Yucca Valley should strive to comply with AB32 and implement greenhouse gas reduction strategies.

Sustainable Communities and Climate Protection Act

The Sustainable Communities and Climate Protection Act (SB375) of 2008, also known as the California Anti-Sprawl Bill, was signed into law on September 30, 2008. The SB375 regulation provides incentives for cities and developers to bring housing and jobs closer together and to improve public transit. The goal behind SB375 is to reduce automobile commuting trips and thus help meet the statewide targets for reducing greenhouse gas emissions set by AB32. SB375 requires each Metropolitan Planning Organization to add a broader vision for growth, called a "Sustainable Communities Strategy" (SCS), to its transportation plan. The SCS must lay out a plan to meet the region's transportation, housing, economic, and environmental needs in a way that enables the area to lower greenhouse gas emissions. SCAG adopted the RTP and SCS in 2012 and the appropriate infrastructure and other recommendations in the document should be incorporated into the Circulation Element.

The Town of Yucca Valley should strive to comply with SB375 by incorporating the SCAG SCS into its transportation plan. Applicable components of SCAG's SCS include:

- *Encourage the implementation of a Complete Streets policy that meets the needs of all users of the streets, roads and highways – including bicyclists, children, persons with disabilities, motorists, neighborhood electric vehicle (NEVs) users, movers of commercial goods, pedestrians, users of public transportation and seniors – for safe and convenient travel in a manner that is suitable to the suburban and urban contexts within the region*
- *Support projects, programs, and policies that support active and healthy community environments that encourage safe walking, bicycling, and physical activity by children, including, but not limited to development of complete streets, school siting policies, joint use agreements, and bicycle and pedestrian safety education*
- *Update local zoning codes, General Plans, and other regulatory policies to promote a more balanced mix of residential, commercial, industrial, recreational and institutional uses located to provide options and to contribute to the resiliency and vitality of neighborhoods and districts*
- *Support projects, programs, policies and regulations that encourage the development of complete communities, which includes a diversity of housing choices and educational opportunities, jobs for a variety of skills and education, recreation and culture, and a full-range of shopping, entertainment and services all within a relatively short distance*
- *Expand the use of transit modes in our sub regions such as bus rapid transit or vanpooling*
- *Explore and implement innovative strategies and projects that enhance mobility and air quality, including those that increase the walkability of communities and accessibility to transit via non-auto modes, including walking, bicycling, and neighborhood electric vehicles (NEVs) or other alternative fueled vehicles*
- *Develop first-mile/last-mile strategies on a local level to provide an incentive for making trips by transit, bicycling, walking, or neighborhood electric vehicle or other zero-emission vehicle options*

California Complete Streets Act

The California Complete Streets Act (AB 1358) of 2008 was signed into law on September 30, 2008. Beginning January 1, 2011, AB 1358 requires circulations elements to address the transportation system from a multi-modal perspective. The bill states that streets, roads, and highways must "meet the needs of all users in a manner suitable to the rural, suburban, or urban context of the general plan." Essentially, this

bill requires a circulation element to plan for all modes of transportation where appropriate, including walking, biking, car travel, and transit.

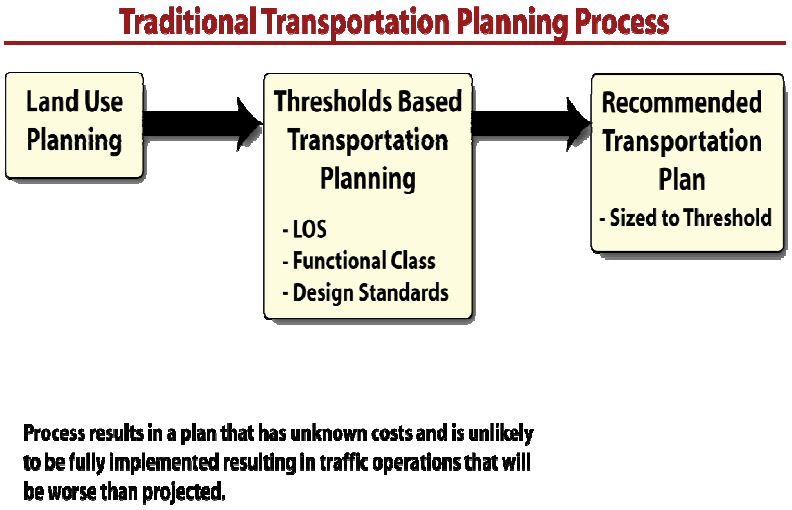
The Complete Streets Act also requires circulation elements to consider the multiple users of the transportation system, including children, adults, seniors, and the disabled. For further clarity, AB 1358 tasks the Governor's Office of Planning and Research to release guidelines for compliance with this legislation by January 1, 2014.

The Town of Yucca Valley should strive to comply with AB 1358 by addressing the transportation system from a multi-modal and multiple user perspective in its circulation element. For Yucca Valley, that should include:

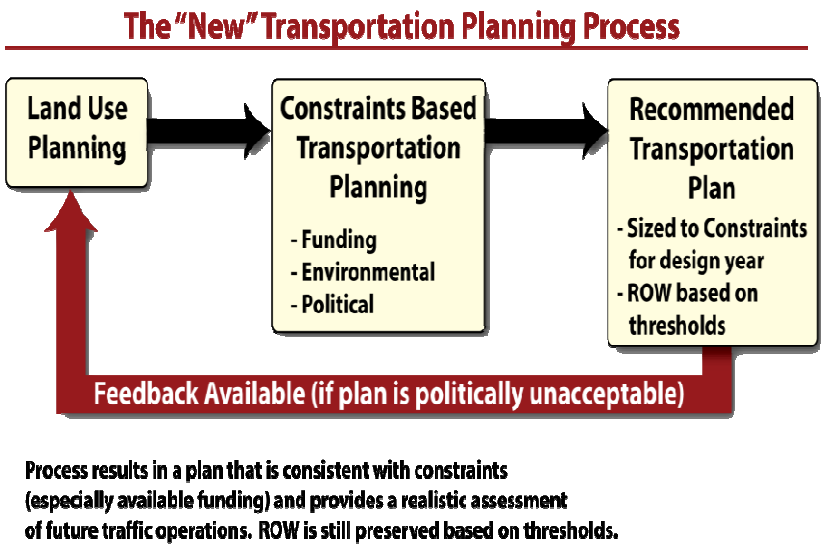
- *Developing a layered-networks approach to complete streets – this essentially identifies the network for all modes of travel and recommends appropriate implementation of those networks.*
- *Ensure that the complete streets network is feasible (fiscally and environmentally)*
- *Work to better integrate roadway network along SR-62 with the adjacent land uses*

Constraints Based Planning

In the past, planners would use threshold based policies to size town infrastructure. This process would result in a plan that has unknown costs and it would be unlikely that the plan could be fully implemented, resulting in worse traffic operations than projected. Planners could instead create policies that set realistic standards and that meet the unique needs of individual towns.



Constraints based planning considers funding, environmental and political constraints in order to recommend a transportation plan. Certain choices must be made that balance these constraints and community values of the Town. Constraints based planning will allow Yucca Valley to plan for realistic and feasible infrastructure that can be implemented and maintained in the future.



In Yucca Valley, Constraints Based Planning would result in a circulation element with realistic expectations that are feasible to implement. This strategy is recommended for incorporation into the process. It would effectively take the form in policy language that would allow flexibility in service standards to reflect the Town's ability to implement additional infrastructure.

Transit Services and Facilities

Public transportation provides mobility options for many residents that would otherwise struggle to get around the Town while also combining multiple trips. Mass transit options for Yucca Valley could promote less vehicle use and more shared trips. The progression of figures below shows how much space and energy can be saved by choosing the public transit alternative.



While Yucca Valley already utilizes Public Bus and Ready Ride, public transportation options for the Town could also include an express bus service or vanpooling. These four services are described in detail below:

- *Public Bus* – Morongo Basin Transit Authority (MBTA) currently offers nine deviated-fixed routes throughout the week. These routes have set schedules offering limited service throughout the day to multiple communities. Existing bus routes serving Yucca Valley are Route 1 (serving trips between Yucca Valley and 29 Palms), Route 7A (serving North Yucca Valley), Route 7B (serving South Yucca Valley), Route 12 (serving trips between Yucca Valley and Palm Springs), and Route 21 (serving trips between Landers and Yucca Valley). The Circulation element should consider enhancing this service to provide better mobility for the Town's residences.

- *Ready Ride* – An existing door-to-door service available primarily for Senior and Disabled passengers at a discounted rate, but is available for all passengers at a premium rate.

- *Express Bus Service* – Bus service that is intended to run faster than normal bus services between the same two commuter points. Express buses operate on a faster schedule by not making as many stops as normal bus services and often taking quicker routes, such as along freeways. Given the number of residences that commute far distances to employment centers outside of the town, this may be a transit option worth considering in the future.

- *Vanpooling* – Larger scale carpooling with concurrent savings in fuel and vehicle operating costs. Vehicles may be provided by individuals, by various public and private support programs, by an element of government, or a by an employer. The key concept is that people share the ride from home or one or more common meeting locations and travel together to a common destination or work center.

While Yucca Valley already utilizes public bus and MBTA's Ready Ride, additional transit facilities could be incorporated into the Town's transportation system, such as express bus service or vanpooling.

Bikeways

Bicycling is considered an environmentally friendly mode of transportation that enhances both personal and social wellbeing. In addition to transportation, this mode of travel provides many public access, health and economic benefits. Bicycling could be recognized as an integral component of Yucca Valley's transportation

Source: About Mountain Biking

system, currently and in the future. Safe, convenient, attractive, and well-designed bicycle facilities are essential if this mode is to be properly accommodated and encouraged. This mode could be integrated throughout the Town's Complete Streets vision, and a network of bicycle facilities linking all areas of the Town could be accommodated.

The existing bicycle system in Yucca Valley consists of on-street, shared roadways that create a loop around the Town. This system has many opportunities for improvement in the quality of bicycle facilities and the connectivity to main town areas. A major improvement to the bikeway system could be considered to connect people to key destinations in the town, especially employment centers, residential areas, and high use activity centers. This complete system could emphasize the following key components:

- Local and regional continuity and connectivity
- Increasing safety by focusing on visibility for cyclists
- Educating both cyclists and drivers to coexist with an awareness of each other
- Utilizing environmentally sensitive routing to minimize environmental impacts whenever possible
- Continued consideration of methods to promote the benefits of cycling

Yucca Valley's bicycle network could be expanded and improved to offer safer and more convenient routes that would increase connectivity and promote alternative modes of travel.

Pedestrian and Trails Facilities

Walking is another environmentally friendly mode of transportation that enhances both personal and social wellbeing. In addition to transportation, this mode of travel provides many public access, health and economic benefits. Well-designed pedestrian facilities are safe, attractive, convenient, and easy to use. Inadequate facilities discourage users and unnecessary facilities waste money and resources.

Pedestrian paths are primarily developed as part of the roadway and trail systems of a town and reflect the interconnected nature of circulation and transportation systems as a whole. Currently most major routes through the Town provide discontinuous or no sidewalks. Many opportunities exist to provide connectivity for pedestrians throughout the Town.

Even though bikeway master plans specifically address bicycle facilities on paved road-ways, community's trails are relevant and are critical to connecting people to places within the Town. This is especially true wherever connections can be made that enhance intra-community connectivity by linking the two systems. Therefore, these two non-motorized systems can be regarded as complementary extensions of each other.

Source: National Recreational Trails

The Town of Yucca Valley could implement a unique trail system that provides recreational access and alternative circulation for non-motorized users through an interlinked town-wide system of trails connecting neighborhoods to local parks and schools.

Goods Movement Facilities

The goods or freight movement system in Yucca Valley is crucial to the well-being of the residents of the Town. Identifying and prioritizing facilities for goods movement is a vital portion of effective planning.

Facilities that prioritize goods movement over other modes must be integrated into the transportation system. The Surface Transportation Assistance Act (STAA) of 1982 defines state truck routes and key freight corridors. Regional access to Yucca Valley is accommodated by STAA designated State Routes 62 and 247. In a reciprocal fashion, other modes of travel must not impede with the goods movement, either, to ensure efficient delivery.

In Yucca Valley, managing the goods movement demands along roadway corridors that provide economic and cultural services for the Town will be a critical component of this transportation element. Options, such as the Twentynine Palms Highway bypass, could be considered to increase the connectivity and ease of access to provide for crucial goods movement.

Aviation Facilities

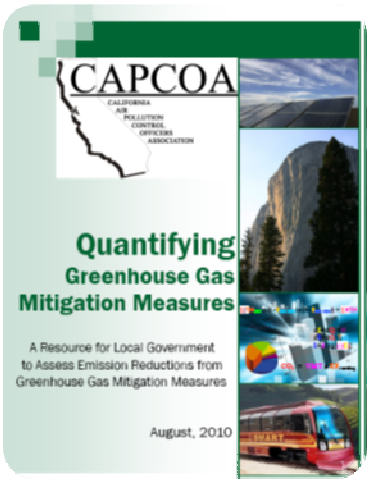
Aviation facilities can provide regional access that far outweighs the constraints of conventional roadways. Providing transportation of both goods and people, effective aviation planning can provide Yucca Valley opportunities that surrounding Town's will lack. Integrating the airport with the surrounding land uses will be an item the Land Use Plan should consider.

Source: Airplanepicture.org

The Yucca Valley Airport is a small facility that does not offer commercial flight services. Primary regional access by aviation is required through the Palm Springs International Airport, located approximately 30 miles south of Yucca Valley.

Appropriate land use and transportation planning should be considered in areas surrounding the Yucca Valley Airport in order to expand or maintain the existing aviation facilities.

Transportation Demand Management



As identified in the Ds of smart growth, one component of reducing the reliance of the single occupant vehicle is to implement a comprehensive Transportation Demand Management (TDM) program. TDM consists of measures and policies to promote alternative modes of travel. Standard measures that have been implemented statewide include employers providing commuter checks to employees, developers providing secure bicycle parking and showers at key employment centers, preferred parking for carpools, or reduced parking supply to encourage alternative travel modes.

Since a large percentage of Yucca Valley Residents commute long distances in order to get to work, focused transportation demand management incentives could help decrease the amount of commuting vehicles.

Potential TDM strategies that could be considered for Yucca Valley include carpooling, ride sharing and park and ride lots.

Signal Timing and Coordination

Signal timing refers to the phasing plans of signalized intersections that define when and how much green time is allowed for each direction. Signal coordination refers to groups of two or more signalized intersections with strategically planned signal timing to move vehicles efficiently with as few stops as possible. Benefits of effective signal coordination include shorter travel times, reduced stops and delay, reduced idling, reduced congestion and collisions, increased response time for emergency vehicles, and a reduction in fuel consumption and greenhouse gas emissions.

Similar signal coordination systems have been implemented throughout the state. A recent signal coordination study completed in the Coachella Valley found that the project resulted in a 25% decrease in travel times during peak periods, fuel consumption and greenhouse gas emissions reduction of approximately 5%, and improved pedestrian crossing times at intersections was provided.

Other traffic management strategies include speed management techniques, Intelligent Transportation Systems (ITS), and traffic management centers (TMC's). Speed management techniques reduce the existing speed limit to control traffic in a desired manner. ITS can provide real-time information regarding road conditions and directions and can be utilized by drivers to avoid congestion and reduce travel time. TMC's can remotely control the traffic signals and provide real-time video feeds from traffic cameras strategically located at the Town's busiest intersections. Traffic engineers staffing the TMC can check signal operations, adjust signal synchronization timing and monitor traffic progression throughout the Town. TMC's are a critical part of an advanced traffic management system that manages traffic flow in a town.

The Town is currently in the process of installing signal timing/synchronization between Camino del Cielo and Acoma Trail through the application of regional air quality grants.

Properly implemented traffic management strategies can maximize the efficiency of Yucca Valley's transportation system.

Traffic Calming

Traffic calming is a series of methods to reduce vehicle speeds, improve safety, and enhance quality of life. Although traffic calming includes traffic education, enforcement, and engineering (the three E's), most traffic calming applications focus on engineering measures to change driver behavior (such as encouraging vehicles to travel at a lower rate of speed).

Specific engineering applications of traffic calming include:

- Horizontal deflection of the roadway, such as bulbouts, chicanes, or roadway narrowing
- Vertical deflection of the roadway, including raised crosswalks, raised or textured intersections, or speed tables
- Traffic control devices, such as roundabouts or traffic circles

Traffic calming could be encouraged within Yucca Valley on neighborhood streets and other areas where high levels of pedestrian activity and use of alternative modes of travel are envisioned.

CIRCULATION ELEMENT RECOMMENDATIONS

The information presented above and in Chapter 3 was utilized to develop a series of recommendations for incorporation into the Town of Yucca Valley's Circulation Element as part of the General Plan effort. These recommendations are summarized below:

CONSTRAINTS BASED PLANNING

This will be a key approach for the Town, as the Town does not have significant funding to implement extensive infrastructure in the future. As such, this will provide the Town flexibility in identifying desired service levels, but provide "protection" for locations that may not be able to maintain acceptable service levels until appropriate funding is available. Additionally, it will allow for flexible service level standards when there is limited right of way, where a local plan may have more pressing needs, where there are environmental constraints, or when other factors make implementing infrastructure infeasible or undesirable. It is recommended that the Circulation Element incorporate policies and standards that support constraints based planning efforts.

COMPLETE STREETS

Based on state law, the Town is required to implement complete streets as part of the general plan update. It is recommended that the Town implement complete streets through a layered networks approach. Layered networks identify where infrastructure should go to serve the needs of the community. As such, not every street serves every mode; rather each mode has a network of connectivity that serves the users of the system.

Using the layered network approach, the General Plan should identify roadway infrastructure, the bicycle infrastructure, the pedestrian infrastructure, and the transit infrastructure to facilitate those primary users. These are described below:

Roadway Classifications

The following roadway classifications were developed for the Town of Yucca Valley. It is recommended that the roadway infrastructure be implemented using these roadway classifications, as shown in Figure 4-1a. Recommended roadway cross-sections are shown in Figure 4-1b through Figure 4-1d.

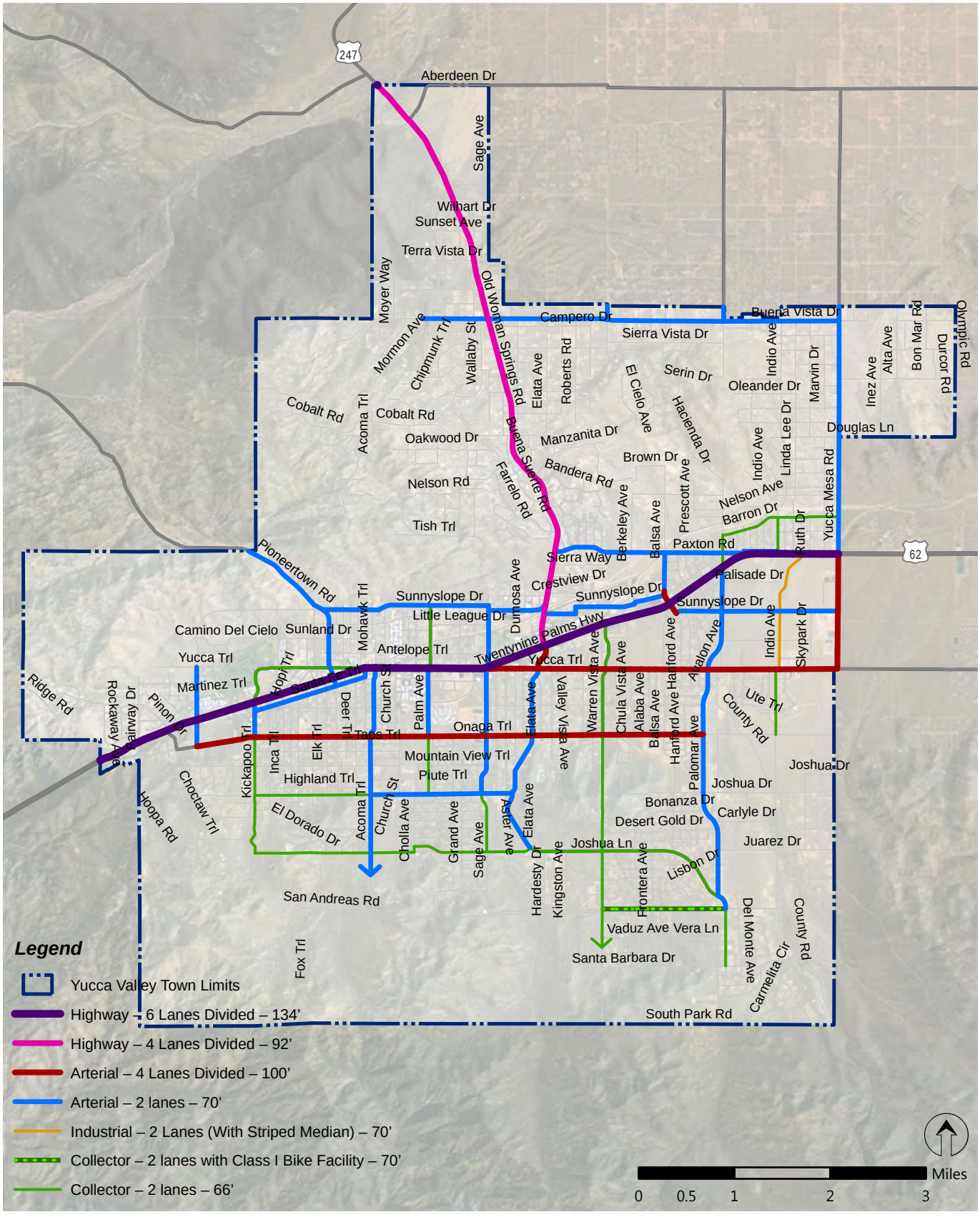
Please note that the roadway cross-sections identified on Figure 4-1a were developed as part of an iterative approach. First, the future year YVTAM model was reviewed to identify where traffic volumes increased such that they would warrant widening based on the volume thresholds for that facility. Then, the intersection assessment along SR-62 was reviewed to identify intersection needs along that facility. Finally, potential new connections were tested in the model to ensure that the facility was sized appropriately.

Figure 4-1b through Figure 4.1d show the recommended Town cross-sections. Although these are not recommended to be included in the General Plan Circulation Element, they are presented as recommendations to the Town specifically to reflect the State's complete streets requirement. Specifically, Fehr & Peers recommended several new cross-sections that would provide a median refuge for pedestrians or sections that provide a Class I bicycle pathway adjacent to the travel way.

Comparisons of the previous General Plan roadway network to the proposed network are summarized in Table 4-1 below.

TABLE 4-1
ROADWAY CLASSIFICATION CHANGES COMPARED TO THE EXISTING GENERAL PLAN

Facility/Segment	Existing General Plan	Proposed General Plan	Justification
SR-247, between SR-62 and Buena Vista Drive	6-Lane Highway	4-Lane Highway	Volumes do not warrant a 6-lane facility
Buena Vista Drive	4-Lane Collector	2-Lane Arterial	Volumes do not warrant a 4-lane facility
Yucca Mesa Road	4-Lane Collector	2-Lane Arterial	Volumes do not warrant a 4-lane facility
Paxton Road	4-Lane Collector	2-Lane Arterial	Volumes do not warrant a 4-lane facility
Sunnyslope Drive	4-Lane Collector	2-Lane Arterial (except adjacent to SR-62, where it is a 4-Lane Arterial)	Except adjacent to SR-62, volumes do not warrant a 4-lane facility
Pioneer Town Road	4-Lane Collector	2-Lane Arterial	Volumes do not warrant a 4-lane facility
Camino del Cielo	4-Lane Collector	2-Lane Arterial	Volumes do not warrant a 4-lane facility
Kickapoo Trail	4-Lane Collector	2-Lane Arterial or Collector	Volumes do not warrant a 4-lane facility
Acoma Trail	4-Lane Collector	2-Lane Arterial	Volumes do not warrant a 4-lane facility
Palm Avenue	2-Lane Collector	2-Lane Arterial or Collector	Additional capacity needed near SR-62
Sage Avenue	4-Lane Collector	2-Lane Arterial or Collector	Volumes do not warrant a 4-lane facility
Joshua Lane	4-Lane Arterial	4-Lane Arterial or 2-Lane Arterial	Volumes do not warrant a 4-lane facility south of Yucca Trail
Avalon Avenue/ Palomar Avenue	4-Lane Collector	2-Lane Arterial	Volumes do not warrant a 4-lane facility
La Contenta Road	4-Lane Collector	4-Lane Arterial	Volumes warrant additional capacity
Santa Fe Trail	4-Lane Collector	2-Lane Arterial	Volumes do not warrant a 4-lane facility
Yucca Trail, west of SR-62	2-Lane Industrial	4-Lane Arterial	Volumes warranted a 4-lane facility
Yucca Trail, east of Indio Avenue	4-Lane Collector	4-Lane Arterial	Volumes warranted additional capacity
Connectivity to Sections 13 and 15	2-Lane Collector	N/A	Connectivity addressed in the policy section of the element



Yucca Valley Circulation Element - Transportation Impact Study

FEHR PEERS

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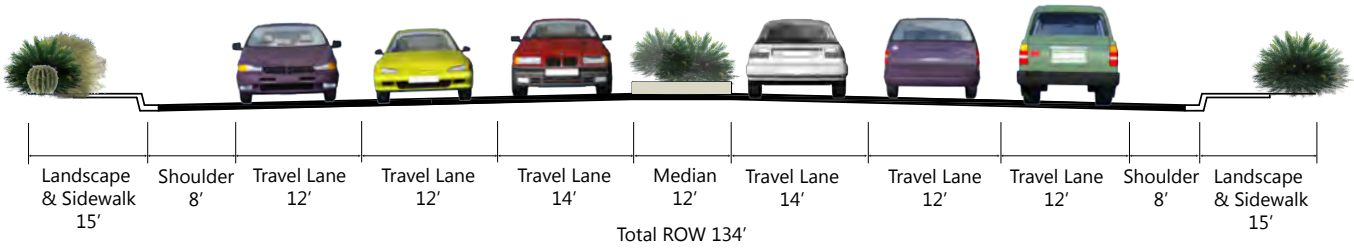
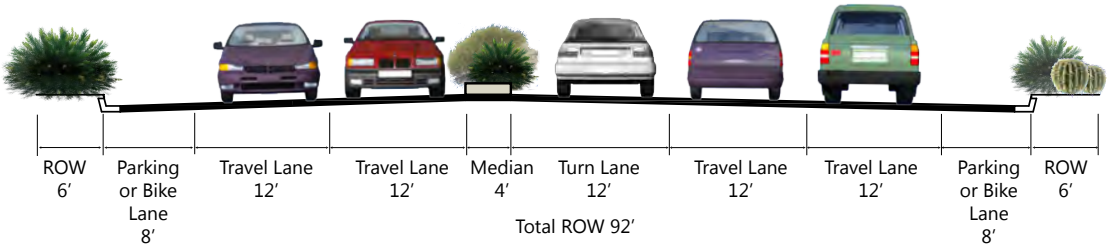
Proposed Roadway System

Figure 4-1

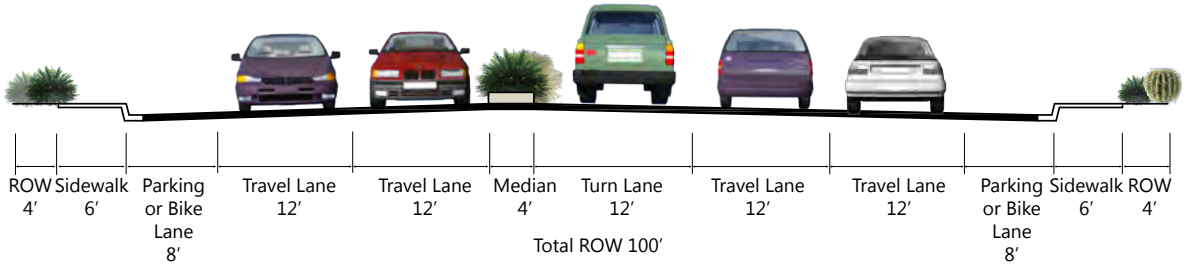
HIGHWAY - 6 LANES DIVIDED



HIGHWAY - 4 LANES DIVIDED



ARTERIAL- 4 LANES DIVIDED



FEHR PEERS

Proposed Roadway Network - Cross-Sections

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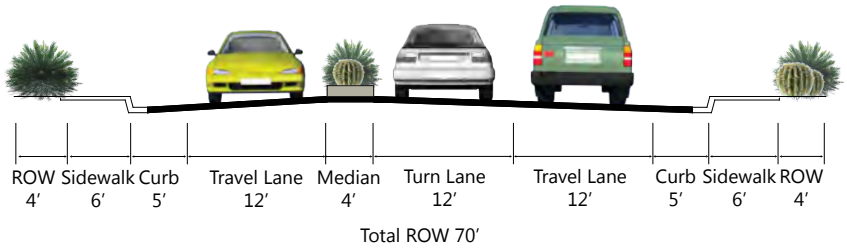
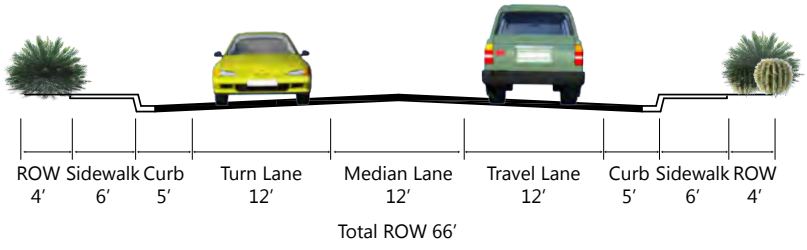
Figure 4-1b

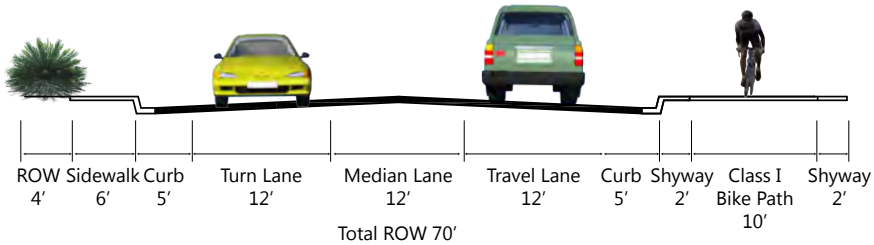
ARTERIAL - 2 LANES DIVIDED



COLLECTOR - 2 LANES (WITH OPTIONAL STRIPED MEDIAN LANE)



COLLECTOR WITH CLASS I BIKE PATH - 2 LANES (WITH OPTIONAL STRIPED MEDIAN LANE)



FEHR PEERS

Proposed Roadway Network - Cross-Sections

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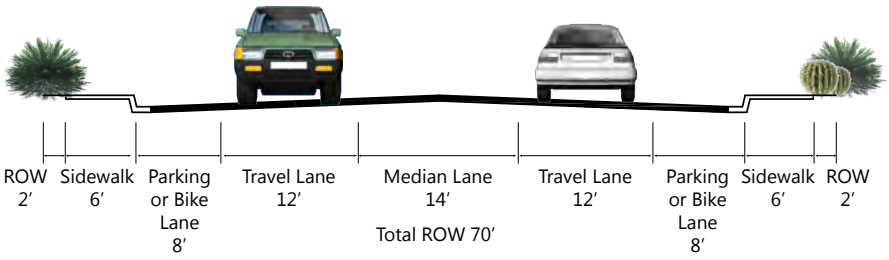
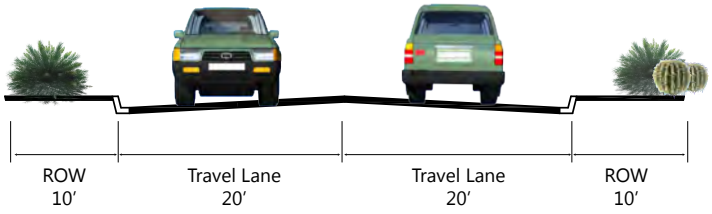
Figure 4-1c

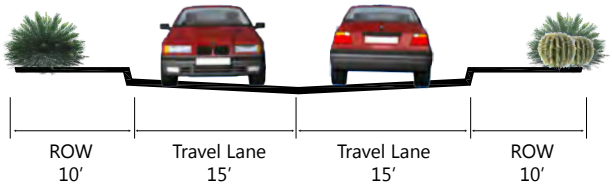
INDUSTRIAL - 2 LANES (WITH STRIPED MEDIAN LANE)



LOCAL



RURAL LOCAL



FEHR PEERS

Proposed Roadway Network - Cross-Sections

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Figure 4-1d

Arterial Roadways / Highways (Two, Four, or Six Lanes)

Paved roadways that are designed to move large volumes of traffic and provide a high level of mobility between major residential, employment, and activity centers. These facilities also provide regional mobility, connecting different portions of the region to each other through the Town of Yucca Valley. These roadways may or may not include a Class II bicycle lanes.

Collector Roadways (Two Lanes)

Paved roadways intended to "collect" traffic and people from local roadways and carry them to arterial roadways and highways. These roadways may or may not include a Class II bicycle lanes.

Collector Roadways With Class I Bicycle Lane (Two Lanes)

Paved roadways intended to "collect" traffic and people from local roadways and carry them to arterial roadways and highways. This Roadway classification also includes a Class I bicycle facility along the route.

Industrial Roadways

Function similarly to Collector Roadways, but they serve industrial areas. As such, they need to be paved and designed to accommodate larger vehicles and larger vehicle turning radii.

Local Streets

Serve predominantly residential adjacent properties and should enhance community livability. Speeds should be low and these facilities should discourage through traffic use. Local streets can be either paved or unpaved, depending on the type of development they serve, the amount of development they serve, and the total traffic volumes expected on these facilities.

Unpaved (Rural Local) Roadways

Low volume roadways that serve limited development in low density areas of the Town.

The above roadways should be evaluated using state-of-the-practice techniques to evaluate the capacity of each facility. The actual operations of these facilities are identified using the terminology "Level of Service."

Level of service is a general measure of traffic operating conditions whereby a letter grade, from Level of Service (LOS) A (no congestion) to F (high levels of congestion), is assigned. LOS E represents "at capacity" operations.

These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving as well as speed, travel time, traffic interruptions, and freedom to maneuver. The level of service grades are generally defined as follows:

- LOS A represents free flow travel for vehicles. Individual users are virtually unaffected by others in the traffic stream.

- LOS B represents stable flow, but the presence of other users in the traffic stream begins to be noticeable.

- LOS C represents a range in which the influence of traffic density on operations becomes noticeable. The ability to maneuver within the traffic stream and to select an operating speed is now clearly affected by the presence of other vehicles.

- LOS D borders on unstable flow. Speeds and ability to maneuver are severely restricted because of traffic congestion.

- LOS E represents unstable operating conditions at or near the capacity level where maneuverability is severely limited.

- LOS F is used to define forced or a breakdown traffic flow where unsignalized and signalized intersections exceed 50 and 80 seconds of delay, respectively.

Table 4-2 identifies the LOS thresholds for each roadway classification for the Town of Yucca Valley. The capacities in the table are consistent with the *Highway Capacity Manual* (Transportation Research Board, 2000) and are considered state of the practice for identifying capacity of facilities. It should be noted the threshold for identifying the capacity of an unpaved road is based on the Federal Highway Aministration's recommendations for when facilities should be paved.

Bicycle Network

Bicycle facilities consist of Class I, Class II, and Class III facilities. Currently, the Town only has Class III facilities as summarized in the *Existing Conditions Report - Yucca Valley General Plan Update (*April 2012, Fehr & Peers).

Recommended bicycle facilities are shown on Figure 4-2. Please note that bicycle routes should be updated as part of a master plan effort and the proposed network may change with future master plans.

Class I

Bike path providing completely separated right-of-way designated to the exclusive use of bicycles and pedestrians.

In Yucca Valley, Class I facilities will primarily be implemented through the Parks and Recreation Master Plan (2008). Future bicycle facilities have also been identified through SANBAG's Non-Motorized Transportation Plan (2011).

Class II

Bikeway that provides designated lanes for the use of bicycles through the use of striping on the roadway and signage designations for the facility.

In Yucca Valley, this General Plan and the San Bernardino County Non-Motorized Transportation Plan envision a system of bicycle lanes on roadways that will connect the activity centers of the Town to the Town's residents as shown on Figure 4-2.

TABLE 4-2
DAILY ROADWAY SEGMENT CAPACITY

Facility Type	LOS A	LOS B	LOS C	LOS D	LOS E
Unpaved Road	-	-	-	500	-
Local Road	-	-	-	1,500	2,000
Collector	900	2,000	6,800	14,100	17,400
Industrial	900	2,000	6,800	14,100	17,400
Arterial (2-lanes, undivided)	-	-	9,700	17,600	18,700
Arterial / Highway (4-lanes, undivided)	-	-	17,500	27,400	28,900
Arterial / Highway (4-lanes, divided)	-	-	19,200	35,400	37,400
Arterial / Highway (6-lanes, divided)	-	-	27,100	53,200	56,000

Source: 2000 Highway Capacity Manual, FHWA Guidelines for Roadway Paving.

Class III

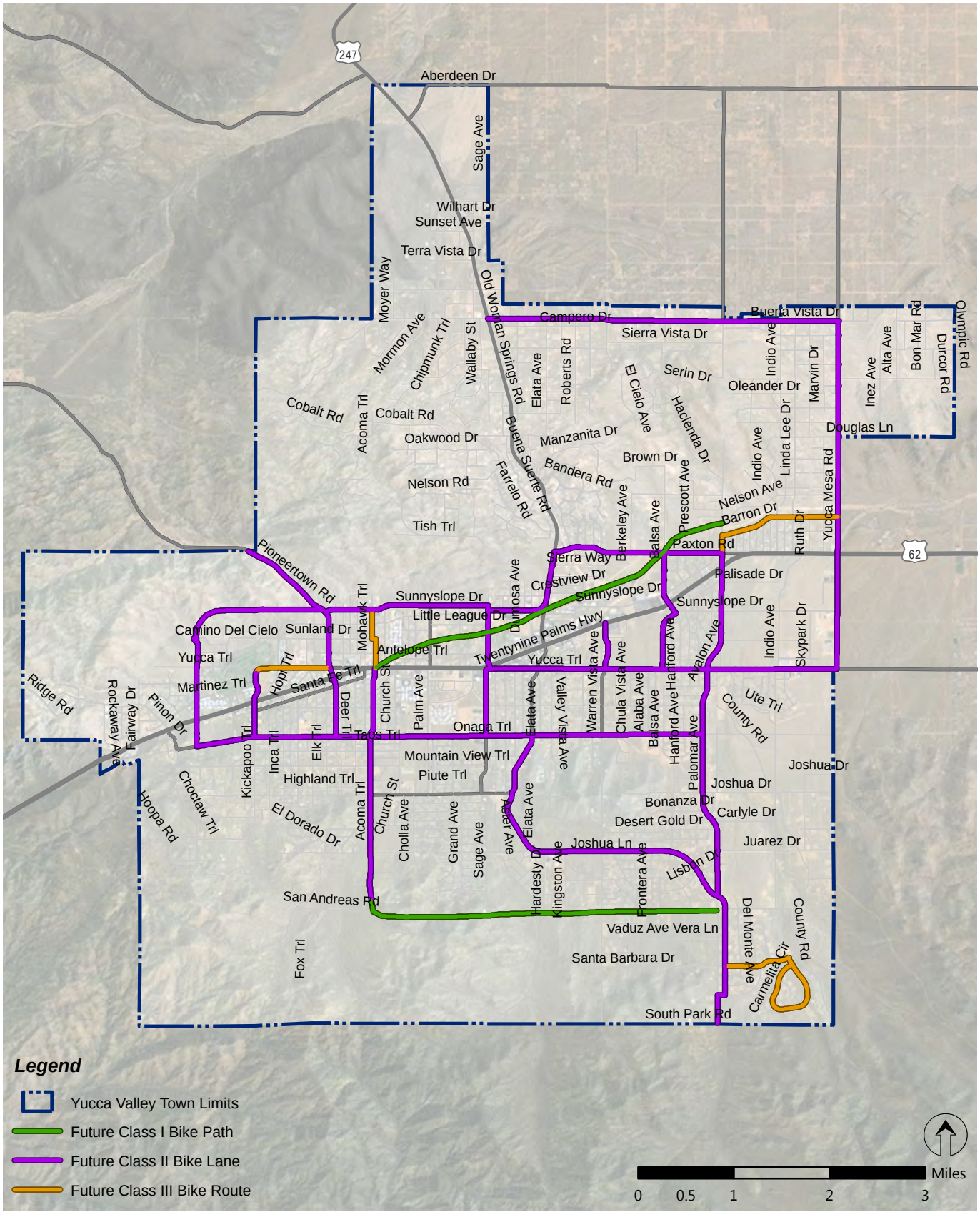
Bikeway providing route designation by signage. Roadways are shared between the bicycle and the motorists.

In Yucca Valley, Class III facilities are envisioned to be implemented on small segments of roadway that bridge gaps in the Class II and Class I roadway network. This includes Class III facilities on Yucca Trail, Baron Drive, and several other roadways as shown on Figure 4-2

PEDESTRIAN NETWORK

The pedestrian network is primarily developed as part of the roadway and trail systems of a town and reflects the interconnected nature of circulation and transportation systems as a whole. Constructing big, wide streets increases the distance a pedestrian must travel to cross a street, thereby making it inconvenient for public use. This inhibits pedestrian circulation in the Town. Currently, limited continuous sidewalks are provided along major routes in the Town. Sections of discontinuous sidewalks exist, but most roads throughout Yucca Valley lack sidewalks.

The Parks and Recreation Master Plan (2008) identified future recreational and bike trails within the Town that would not only provide recreation opportunities but could also be used to connect the pedestrian network throughout Town. In addition to connecting available pedestrian resources the Town should also prioritize the completion of sidewalks along retail land uses to better provide accessibility for pedestrians.



Yucca Valley Circulation Element - Transportation Impact Study

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Proposed Bicycle Network

Figure 4-2

Enhanced pedestrian crossings and sidewalks should also be considered in areas where high pedestrian demand occurs (such as schools) and pedestrians should be prioritized in the Old Town Specific Plan Area.

Multi-use trails are primarily identified in the Town's Trails Master Plan. Multi-use trails are facilities that can be used by bicycles, pedestrians, equestrians, and other recreational users within the Town.

Figure 4-3 identifies recommended improvements to the pedestrian system in the Town. Please note that, if the Town ever completes a pedestrian master plan, that effort would supercede the improvement noted on Figure 4-3.

TRANSIT NETWORK

As described above, the Town's transit network is primarily serviced by MBTA. It is recommended that the Circulation Element identify policies that are consistent with MBTA direction and that the Town support MBTA's transit projects in the future.

EFFICIENT GOODS SERVICES AND MOVEMENT

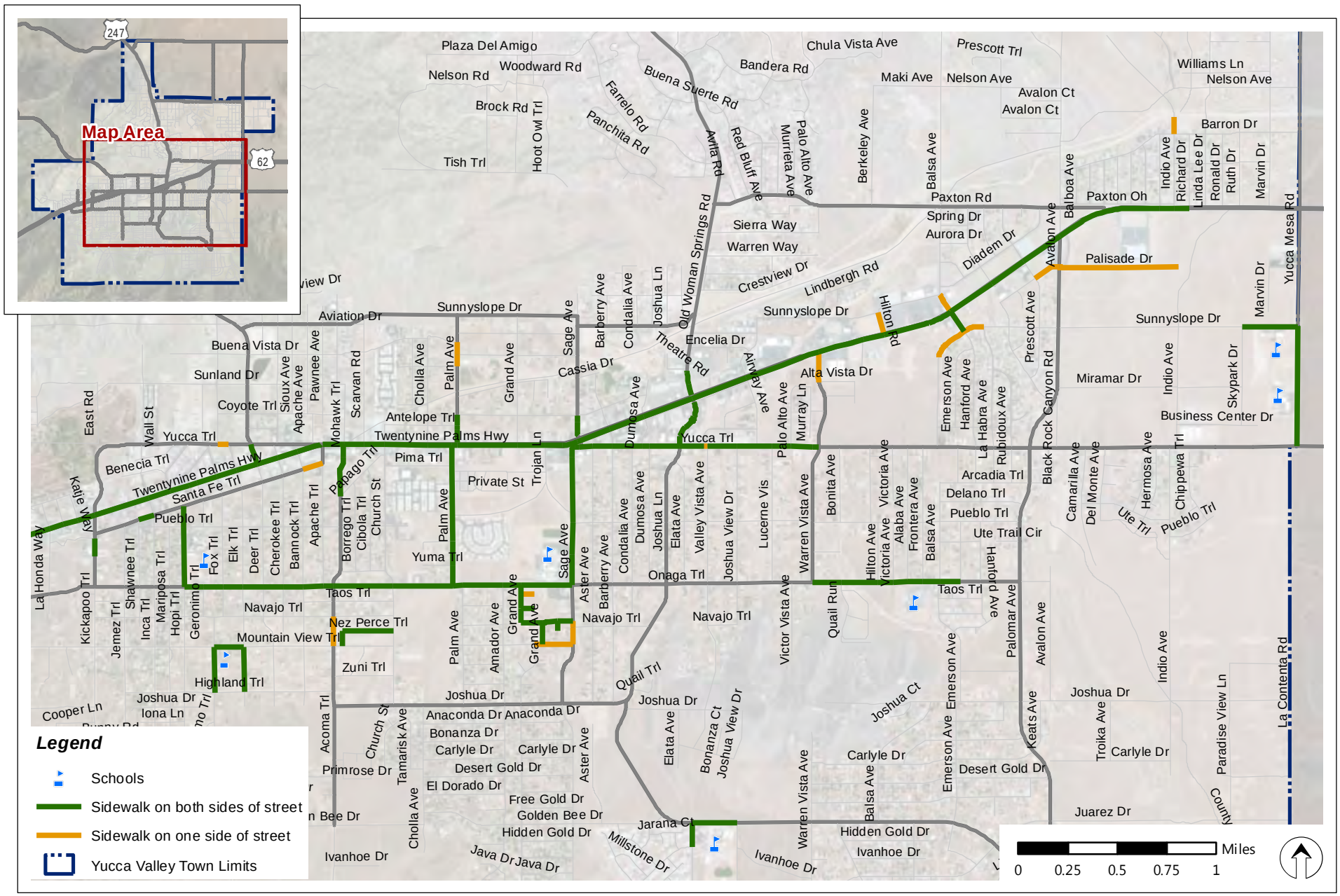
The goods or freight movement system in Yucca Valley consists of designated truck routes. Additionally, the local airport provides opportunities for additional services to be accommodated. Each system is discussed below as it relates to the operation and service of these facilities.

Please note that the movement of goods and services is also addressed in some of the discussions above. For example, specific roadway classifications have been developed for areas served by truck traffic. Additionally, when considering complete streets, truck traffic should also be considered along key corridors where truck traffic is expected.

Additionally, the Town is located near a Marine Base located just north of Twentynine Palms. As such, many of the state routes serve for the movement of military goods through the town.

Truck Routes

The Yucca Valley Municipal Code (Chapter 12, Section 30) regulates truck routes within the Town. The Municipal Code defines truck routes within the Town, weight restrictions, and specifies the ability of trucks to enter areas not designated as truck routes. Roadways in the system that are not designated truck routes are restricted to trucks under five tons only, with the exception of vehicles when making pickups or deliveries within the Town limits. Truck route, primarily on SR-62 and SR-247, in Town are shown on Figure 4-4.



Yucca Valley Circulation Element - TIA

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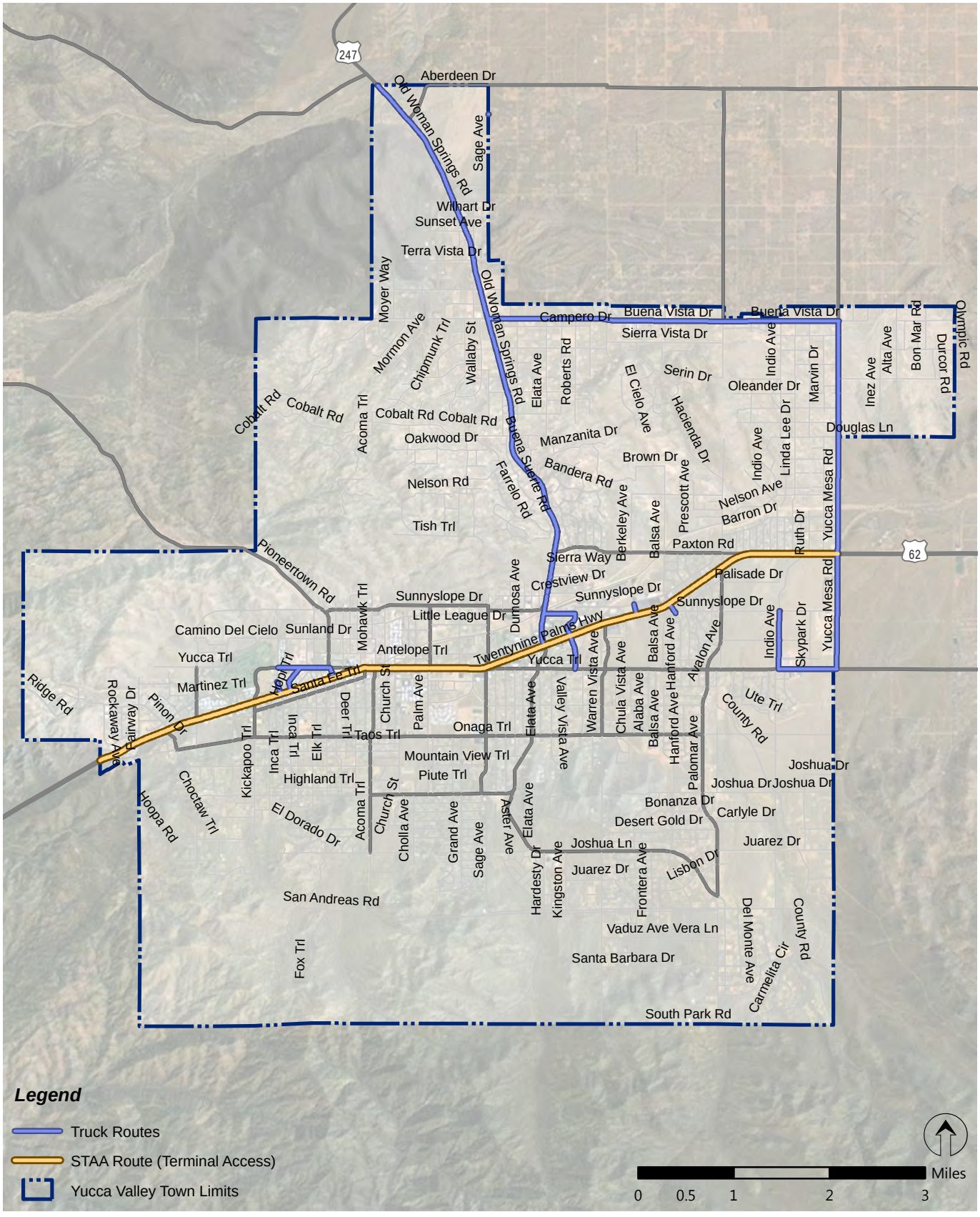
Future Sidewalk Facilities

Figure 4-3



Yucca Valley Circulation Element - Transportation Impact Study

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Designated Truck Routes

Figure 4-4

Aviation Facilities

Yucca Valley is home to Yucca Valley Airport, a privately-owned airport available to the public for private aircraft and aircraft maintenance and flight training. The closest airport offering commercial flights is the Palm Springs International Airport, approximately 30 miles south of Yucca Valley. This airport provides nonstop service primarily to the Western United States and Canada. MBTA routes 12 and 15 have a stop at the Palm Springs International Airport.

It is recommended that various elements in the General Plan reflect the continued use of the airport and that planning does not conflict with future uses at the airport.

TRAFFIC MANAGEMENT

There are three common ways for cities and towns to better manage traffic:

- Traffic Calming on Neighborhood Streets;
- Traffic Signal Coordination; and
- Paving Non-Paved Roadways.

Currently, the Town has implemented signal timing improvements to improve the efficiency of their system. Effectively, signal timing improvements consists of retiming the traffic signals to improve vehicle progression through the Town (e.g. drivers will encounter few stops and will experience a more consistent speed). However, the Town has limited traffic calming applications on public streets, and the Town has a significant amount of unpaved roadways that will require paving if future development is to occur.

Traffic Calming

Traffic calming includes traffic education, enforcement, and engineering (the three E's), in an effort to reduce vehicle speeds, improve safety, and enhance quality of life. Although traffic calming does include education and enforcement, most traffic calming applications focus on engineering measures to change driver behavior (such as encouraging vehicles to travel at a lower rate of speed).

Applications of traffic calming include:

- Improvements to the roadway, such as curb extensions (e.g. extending the curb at intersections to reduce the pedestrian crossing distance and narrow the roadway), chicanes (mid-block curb extensions to narrow the roadway), raised crosswalks, raised or textured intersections, or speed humps; and
- Modifying appropriate intersections to remove traffic signals or stop signs and construct roundabouts or traffic circles.

Traffic calming should be encouraged within the Town on local and paved neighborhood streets and other areas where high levels of pedestrian activity take place (such as the Civic Center, schools, parks, and Old Town). This will assist the Town on improving the quality of life for its residents by managing the speed of traffic in appropriate areas.

Traffic Signal Coordination

One of the most cost-effective means to enhance traffic flow, improve safety, improve air quality, and manage traffic speeds is through signal coordination. This approach develops specific signal timings and implements appropriate signal control infrastructure to reduce the number of stops and improve vehicle progression through a corridor.

Paving Non-Paved Roadways

Using the capacities identified in Table 4-2, the Town should work with future development to identify appropriate roadways that should be paved. Paving roadways will reduce air-particulates, reduce noise, and improve mobility for the Town.

RECOMMENDED GOALS AND POLICIES

The following goals and policies are recommended for the Town of Yucca Valley. They reflect the information described above and the information described in previous chapters. The implementation of these goals and policies will provide direction and form the key implementation approach for implementing the Circulation Element within the Town.

Please note that one item identified during the modeling for this effort was the increase in traffic, both local and regional in nature, on SR-62. Although not identified in the Circulation element or the policies below, the Town may want to consider future investigationof a Town bypass to remove regional traffic from the local transportation system.

KEY TRANSPORTATION GOAL

Balance the needs for goods movement, non-automotive use, and complete streets to implement a constraints-based circulation system.

RECOMMENDED TRANSPORTATION POLICIES

Policy C 1-1 Utilize constraints based process to evaluate future transportation improvements.

Policy C1-2 Update the transportation impact mitigation fee program to assist in implementing the transportation system for expanding its roadway capacity, pedestrian sidewalk facilities, bicycle facilities, and trail facilities as appropriate.

Policy C 1-3 Strive to maintain vehicle level of service (LOS) D on all roadways within the Town. The Town will utilize the roadway capacities, as identified in Table 4-2, to evaluate roadway operations.

Policy C 1-4 Develop and maintain a list of protected intersections and roadways, adopted by Town Council, where the Town will not implement vehicle capacity to maintain the service goal outlined in Table 4-2 in support of Policy C 1-1.

Policy C 1-5 Coordinate with regional agencies to pursue additional funding to improve the Town's circulation infrastructure.

Policy C 1-6 Prioritize low-cost transportation enhancements, such as signal timing improvements, to maximize the Town's return on infrastructure investment related to the efficiency of the transportation system.

Policy C 1-7 Protect right of ways for SR-62 and SR-247, major arterials, collectors, residential streets, and for all other planned infrastructure as shown on the figures above.

Policy C 1-8 The Town shall implement a layered network of complete streets by working with adjacent land owners, regional agencies, and the public to implement the following:

- The Town Trails Master Plan
- Pedestrian network gap closures
- Bicycle infrastructure
- Or as updated by future Planning Documents related to pedestrians or bicycles

Policy C 1-9 Pursue outside funding opportunities to improve pedestrian facilities near schools (such as Safe-Routes-To-School (SR2S) funding).

Policy C 1-10 Encourage MBTA to provide enhanced bus service to employment areas outside of the Town, such as the Coachella Valley or the rest of the Inland Empire.

Policy C 1-11 Coordinate with MBTA and area religious facilities to consider opportunities for implementing park-and-ride facilities.

Policy C 1-12 Encourage MBTA to implement regional transportation solutions that will reduce vehicle miles traveled and greenhouse gas emissions.

Policy C 1-13 Work with new development to implement MBTA's *Transit Guidelines in Project Development* (MBTA, 2005) as appropriate.

Policy C 1-14 Encourage development designs that integrate multiple modes of access including pedestrian, cyclist, and public transportation.

Policy C 1-15 Encourage employers to support Transportation Demand Management techniques, such as bus transit passes or other measures that reduce the reliance of the single occupant vehicle.

Policy C 1-16 Maintain truck route designations to support heavy vehicle use to and from the Yucca Valley Airport.

Policy C 1-17 Design designated truck routes such that the pavement, roadway width, and curb return radii support anticipated heavy vehicle use.

Policy C 1-18 Coordinate with the Yucca Valley Airport District to provide appropriate level of supporting transportation infrastructure connecting to the Yucca Valley Airport.

Policy C 1-19 Support and work with Caltrans to coordinate signals along SR-62 and SR-247 in Town.

Policy C 1-20 Pursue funding to implement and maintain signal coordination through SANBAG, the Air Quality Management District, or other potential funding sources.

Policy C 1-21 Consider traffic calming techniques in residential neighborhoods and in the Old Town Specific Plan Area to slow and manage traffic volumes and speeds as deemed appropriate by the Town Engineer.

Policy C 1-22 Require future development to pave roadways that will serve 500 or more daily trips as noted in Table 4-2 unless paving of that facility is infeasible, there is no funding for the improvement, or when the majority of the residents on that facility desire it to be unpaved.

Policy C 1-23 Pursue funding to pave un-paved roadways where the traffic volume exceeds 500 daily trips unless paving of that facility is infeasible or when the majority of the residents on that facility desire it to be unpaved.

Policy C 1-24 Maintain truck route designations to support heavy vehicle use as noted on Figure 4-4.

Policy C 1-25 Work with future development and increased traffic in Sections 5, 13, and 15 of the Town to implement appropriate roadway, bicycle, and pedestrian connectivity to these areas based on the proposed land uses.

Policy C 1-26 Implent sidewalks concurrent with new development where commercial uses are planned, school uses are planned, where residential densities exceed two units per acre, or where required by the Town engineer.

Policy C 1-27 Investigate utilization of a non-toxic soil stabilizer on unpaved facilities to minimize dust emissions.

(5) IMPACT ASSESSMENT

This chapter is intended to document the results of the environmental impacts associated with the General Plan on the circulation system. It builds off of the existing conditions described earlier in this report, but also includes a regulatory framework, future conditions operations assessment, identified environmental impacts, and mitigation measures recommended for the project.

REGULATORY FRAMEWORK

The regulatory framework is used to inform decision makers about the regulatory agencies/policies that affect transportation in the Town. This enables them to make informed decisions about planning improvements to transportation systems in the Town. This document includes a discussion of funding as well as regulation. Major policy documents impacting the transportation system in the Town of Yucca Valley include laws at the federal and state level, and planning documents at a regional level.

FEDERAL REGULATIONS

In 1982, the federal government passed the Surface Transportation Assistance Act (STAA). This act requires states to allow larger trucks on the "National Network", which is comprised of the Interstate System plus the non-Interstate Federal-Aid Primary System. "Larger trucks" include (1) doubles with 28.5 foot trailers, (2) singles with 48-foot semi-trailers and unlimited kingpin-to-rear axle (KPRA) distance, (3) unlimited length for both vehicle combinations, and (4) widths up to 102 inches. State Route 62 and State Route 247 in the Town of Yucca valley are defined as STAA routes.

STATE REGULATIONS

AB 1358 – Complete Streets Act

The California Complete Streets Act of 2008 was signed into law on September 30, 2008. Beginning January 1, 2011, AB 1358 required circulation elements to address the transportation system from a multi-modal perspective. The bill states that streets, roads, and highways must "meet the needs of all users…in a manner suitable to the rural, suburban, or urban context of the general plan." Essentially, this bill requires a circulation element to plan for all modes of transportation where appropriate – including walking, biking, car travel, and transit.

The Complete Streets Act also requires circulation elements to consider the multiple users of the transportation system, including children, adults, seniors, and the disabled. For further clarity, AB 1358 tasks the Governor's Office of Planning and Research to release guidelines for compliance with this legislation by January 1, 2014.

AB 32 – Global Warming Solutions Act

With the passage of the Global Warming Solutions Act of 2006, the State of California committed itself to reducing greenhouse gas (GHG) emissions to 1990 levels by 2020. The California Air Resource Board (ARB), which is coordinating the response to comply with AB 32, is currently on schedule to meet this deadline.

In 2007, ARB adopted a list of early action programs that could be put in place by January 1, 2010. In 2008, ARB defined its 1990 baseline level of emissions, and by 2011 it completed its major rule making for reducing GHG emissions. Rules on emissions, as well as market-based mechanisms like the proposed cap and trade program, came into effect January 1, 2012. The cap and trade program controls pollution by a governing agency selling permits on the amount of pollutants a firm can emit. A firm's pollutants cannot exceed the limit. Firms requiring the need to increase their emissions must purchase permits from other firms requiring fewer permits.

SB 375

On December 11, 2008, the ARB adopted its Proposed Scoping Plan for AB 32. This scoping plan included the approval of SB 375 as the means for achieving regional transportation-related GHG targets. SB 375 provides guidance on how curbing emissions from cars and light trucks can help the state comply with AB 32.

There are five major components to SB 375. First, SB 375 will address regional GHG emission targets. ARB's Regional Targets Advisory Committee will guide the adoption of targets to be met by 2020 and 2035 for each Metropolitan Planning Organization (MPO) in the State. These targets, which MPOs may propose themselves, will be updated every eight years in conjunction with the revision schedule of housing and transportation elements.

Second, MPOs will be required to create a Sustainable Communities Strategy (SCS) that provides a plan for meeting regional targets. The SCS and the Regional Transportation Plan (RTP) must be consistent with each other, including action items and financing decisions. If the SCS does not meet the regional target, the MPO must produce an Alternative Planning Strategy that details an alternative plan to meet the target.

Third, SB 375 requires that regional housing elements and transportation plans be synchronized on eight-year schedules. In addition, Regional Housing Needs Assessment (RHNA) allocation numbers must conform to the SCS. If local jurisdictions are required to rezone land as a result of changes in the housing element, rezoning must take place within three years.

Fourth, SB 375 provides CEQA streamlining incentives for preferred development types. Residential or mixed-use projects qualify if they conform to the SCS. Transit oriented developments (TODs) also qualify if they 1) are at least 50% residential, 2) meet density requirements, and 3) are within one-half mile of a transit stop. The degree of CEQA streamlining is based on the degree of compliance with these development preferences.

Finally, MPOs must use transportation and air emission modeling techniques consistent with guidelines prepared by the California Transportation Commission (CTC). Regional Transportation Planning Agencies, cities, and counties are encouraged, but not required, to use travel demand models consistent with the CTC guidelines.

REGIONAL REGULATIONS

Southern California Association of Governments Regional Transportation Plan/Sustainable Communities Strategy

The Southern California Association of Governments (SCAG) Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) provides a regional transportation plan for five counties in Southern California: San Bernardino, Riverside, Los Angeles, Ventura and Imperial. The primary goal of the RTP is to increase mobility for the region. With recent legislation, this plan also encompasses sustainability as a key principle in future development.

San Bernardino Congestion Management Program

The Congestion Management Program (CMP) defines a network of state highways and arterials, level of service standards and related procedures, and provides technical justification for the approach. The CMP for San Bernardino County was originally adopted in 1992 and updated most recently in 2007.

For consistency with the CMP, CMP designated roadways in the Town (SR-62 and SR-247) should operate at "the middle of LOS D or better". Additionally, during the CMP monitoring process, if any CMP facility is identified as operating at a deficient level, a deficiency plan would be required to restore operations back to an acceptable level.

Traffic Impact Analysis Requirements

A key element of the current Land Use/Transportation Analysis Program of the CMP is the Traffic Impact Analysis Report (TIA Report), to be prepared by local jurisdictions. The TIA Reports are designed to provide an improved basis for assessing the impacts of land use decisions on the regional transportation system, both within and outside the permitting jurisdictions, by providing a consistent format to identify impacts and mitigations, and to evaluate mitigation costs. All TIA Reports prepared by local jurisdictions shall be copied to the CMA. TIA reports shall be prepared for projects when required by local thresholds and criteria, but must be prepared for land use decisions that are equal to or greater than half the thresholds for regional review defined by the California Environmental Quality Act (CEQA). If it is determined that a CMP TIA Report is required, the entity with local land use authority shall prepare or cause to be prepared a Traffic Impact Analysis Report consistent with the procedure and methodology specified in Appendix C of CMP and the local jurisdiction's Land Use/Transportation Analysis Program.

If it is determined that a project qualified for the preparation of a TIA Report but no report was prepared, adjacent potentially impacted jurisdictions, SANBAG, or Caltrans may request that such a report be prepared, even though it may be after-the-fact. The permitting jurisdiction shall prepare, or cause to be prepared, a TIA Report in order to determine appropriate mitigation measures and financial responsibilities for resolution of the ongoing CMP system impacts and for developing appropriate mitigations for future development projects.

In Yucca Valley, two roadways are designated by CMP as part of regional transportation system. These include:

- SR-62
- SR-247

San Bernardino County Non-Motorized Transportation Plan

SANBAG developed the Non-Motorized Transportation Plan (NMTP) in 2001, with the latest update in 2011. The plan is intended to be cohesive and integrated, with a comprehensive pedestrian and bicycle system. The 2011 update is also a response to California Senate Bill 375 (SB 375). The NMTP identifies the following future facilities in Yucca Valley:

- Class I Bicycle Trails
    - San Andreas Trail
    - Yucca Wash Trail

- Class II Bicycle Lanes
    - Acoma Trail, south of SR-62
    - Avalon Avenue
    - Balsa Avenue
    - Black Rock Canyon Road
    - Buena Vista Drive
    - Camino Del Cielo Trail
    - Joshua Lane
    - Kickapoo Trail
    - Onaga Trail
    - Palomar Avenue
    - Paxton Road
    - Pioneertown Road
    - Sage Avenue
    - San Marino Drive
    - SR-247
    - Sunnyslope Drive, west of Avalon Avenue
    - Warren Vista Avenue
    - Yucca Mesa Road
    - Yucca Trail, east of SR-62
- Class III Bicycle Routes
    - Sunnyslope Drive, east of Avalon Avenue
    - Acoma Trail, north of SR-62
    - Yucca Trail, west of SR-62
    - Carmelita Circle

The proposed bicycle network would have connections to the Yucca Valley Bus Transfer Center, Park & Ride Facility, and town-wide bus stops.

Measure I

Measure I is a 30-year program that provides funding for roadway resurfacing, rehabilitation and widening projects, as well as providing funds for elderly and handicap transit services. The original source of funding was a countywide half-cent sales tax that was passed by the voters in November 1989. In November 2004, the voters of San Bernardino County approved the extension of this program for 30 years starting in 2010 and extending until 2040 (www.sbcounty.gov). The new measure is referred to as Measure I 2010-2040 to distinguish it from the first Measure I.

The Measure I program also provides a framework for funding various roadway and transit improvement projects that are listed under the Nexus Study and Capital Improvement Program.

LOCAL REGULATIONS AND PLANS

Old Town Yucca Valley Specific Plan

The Town of Yucca Valley approved the Old Town Yucca Valley Specific Plan in December 2007. With this Specific Plan, the Town of Yucca Valley intends to improve the economic vitality and livability of the Old Town area by establishing comprehensive strategy to attract and expand economic activity and commerce. The purpose of the Old Town Yucca Valley Specific Plan is to identify key opportunities to enhance the Town's overall economic base and the historic Old Town area.

This plan outlines a new alignment of SR-62 to create a downtown along the existing alignment of SR-62. The proposed new street, Main Street, would replace the existing alignment of SR-62 between Yucca Trail and Kickapoo Trail, in which the proposed SR-62 alignment would follow. The improvements to the 250 acre plan area include the mentioned road improvements as well as providing a diversity of housing opportunities, high-quality architectural design of surrounding buildings, and a pedestrian focused environment along Main Street.

Please note that, given the desire to implement only feasible infrastructure, implementation of the SR-62 realignment is not included in this Circulation Element given the extensive cost of this infrastructure and the limited funding to implement the infrastructure.

Parks and Recreation Master Plan Update

The Town of Yucca Valley adopted a Parks and Recreation Master Plan Update in October 2008. While this plan predominantly focuses on parks and other recreational facilities, it also includes a trails plan for bicyclists and pedestrians, which are generally consistent with the SANBAG NMTP. In Yucca Valley, the following trails and bicycle facilities are proposed:

- Class I Equestrian Trails and Multi-Use Trails
    - Skyline Ranch Trail
    - Chipmunk Trail
    - Hacienda Trail
    - Yucca Wash Trail
    - Marvin Trail
    - Covington Wash Trail
    - Carmelita Wash Trail
    - Black Rock Wash Trial
    - San Andreas Trail
    - Kickapoo Trail
    - Hoopa Trail
    - Royal Springs Wash Trial
    - Little Morongo Canyon Trail
    - East Burnt Mountain Wash Trail

- Class I Bicycle and Pedestrian Trails
    - Yucca Wash Trail
- Class II Bicycle Lanes
    - Acoma Trail
    - Avalon Avenue
    - Balsa Avenue
    - Black Rock Canyon Road
    - Buena Vista Drive
    - Camino Del Cielo Trail
    - Joshua Lane
    - Kickapoo Trail
    - Onaga Trail
    - Palomar Avenue
    - Paxton Road
    - Pioneertown Road
    - Sage Avenue
    - San Marino Drive
    - SR-247
    - Sunnyslope Drive
    - Warren Vista Avenue
    - Yucca Mesa Road
    - Yucca Trail
- Class III Bicycle Routes
    - Avalon Avenue
    - Barron Drive
    - Carmelita Circle
    - Mohawk Trail
    - Santa Barbara Drive
    - Yucca Trail

As previously discussed, the Trails Master Plan (and other Master Planning efforts) occur more frequently than General Plan updates and, if revised, would provide more recent information than what is summarized above.

FUTURE YEAR (POST-2035) LEVEL OF SERVICE CONDITONS

This section outlines the geographic scope of the traffic impact analysis, including the study roadways, and the analysis methodologies employed in this study.

FUTURE FORECASTING

A detailed travel demand model was used to evaluate growth within the Town of Yucca Valley and the region. The San Bernardino Traffic Analysis Model (SBTAM) utilizes inputs such as land use, travel

behavior, and roadway network characteristics (number of lanes, speed, etc.) to estimate traffic demand on area roadways. The model is calibrated specifically to evaluate San Bernardino County and meets state and federal guidelines for model calibration. The Yucca Valley Traffic Analysis Model (YVTAM) was developed by modifying the 2008 SBTAM, which is a sub-regional model based on the Southern California Association of Governments (SCAG) TransCAD model.

The intent of developing a sub-area model for the Town of Yucca Valley was to create a travel demand model that can be used as a tool in the evaluation of land use scenarios and transportation system alternatives. The model provides the ability to evaluate the transportation system, use performance indicators for land use and transportation alternatives, provide information on regional pass through traffic versus locally generated trips and provide graphical displays of these results.

The SBTAM sub regional model provided a starting point for creating a locally valid sub-area model to which future roadway improvements and land use assumptions can be added. Starting with a regionally valid model ensures the sub-area YVTAM model captures regional traffic flow patterns while the additional detail allows the sub-area model to capture local traffic patterns. YVTAM can then be used to develop traffic volume forecasts to evaluate the transportation improvements needed to accommodate the increase in land use associated with the Yucca Valley General Plan. Having a locally valid sub-area model is a critical step in ensuring a high level of confidence in these resulting traffic volume forecasts.

Future Roadway Network

The future network assumptions incorporated into the travel demand model are consistent with the SCAG RTP funded roadway projects list, the needs identified by comparing the model results to the capacity tables referenced above, and the roadway network identified in the figures above.

As shown, SR-62 is planned to operate as a six lane facility. Other major roads are assumed to be improved and/or paved to provide more connectivity and capacity throughout the network, as shown on the Roadway Classifications map from the proposed General Plan Circulation Element.

Specific roadway improvements that were assumed include:

- SR-62: 6 Lanes though the Town Limits
- SR-247: 4 Lanes north of SR-62 to the Town Limits
- Onaga Trail: 4 lanes from Camino del Cielo to Palomar Avenue
- Yucca Trail: 4 lanes from Sage Avenue to La Contenta Road/Yucca Mesa Road
- Balsa Avenue: 4 lanes from SR-62 to Sunnyslope Drive
- Indio Avenue: Extended from Sunnyslope Drive to Yucca Trail

FUTURE BICYCLE NETWORK

Future bike routes and bike lanes are proposed on major arterials and collectors throughout Yucca Valley according to the *San Bernardino County Non-Motorized Transportation Plan* and the *Yucca Valley Parks and Recreation Master Plan Update*. These plans identify current bicycle facilities throughout the Town and provide policy and implementation strategies for enhancing the networks. The plans are intended to be cohesive and integrated, with a comprehensive pedestrian and bicycle system.

The Town proposes to enhance the bicycle network by upgrading nine existing bike routes to bike lanes and by implementing two new bike paths, nine new segments of bike lanes, and five bike routes to provide connectivity between key uses and destinations. The proposed bicycle network would have connections to the Yucca Valley Bus Transfer Center, Park & Ride Facility, and town-wide bus stops.

FUTURE PEDESTRIAN NETWORK

The *San Bernardino County Non-Motorized Transportation Plan* and the *Yucca Valley Parks and Recreation Master Plan Update* outline several trails available and proposed to the Yucca Valley community. Currently, limited continuous sidewalks are provided along major routes in the Town. Sections of discontinuous sidewalks exist, but most roads throughout Yucca Valley lack sidewalks. It is recommended in the Town General Plan Circulation Element to improve the sidewalk network by providing more connectivity through new sidewalk routes and by making the existing sidewalk network smooth and continuous.

ROADWAY SEGMENT TRAFFIC OPERATIONS

The level of service was calculated for key roadway segments in Yucca Valley's regional roadway system to evaluate General Plan traffic conditions. Daily capacity thresholds in accordance with those described in this document.

According to the Town's recommended circulation policies, LOS "D" is the minimum acceptable level of congestion that should be maintained on a daily basis for any classified roadway within Yucca Valley.

Figure 5-1 shows the forecasted ADT volumes on the Yucca Valley future roadway network. Table 5-1 shows the forecasted traffic volumes, proposed general plan roadway classifications and respective level of service.

TABLE 5-1
FUTURE YEAR (POST-2035) ROADWAY VOLUME AND LOS

Street Name and Segment	Classification	Traffic Volume	V/C	LOS
Acoma Trail				
South of SR-62	2-Lane Arterial	3,530	0.201	C or Better
North of Mountain View	2-Lane Arterial	10,570	0.601	D
South of Joshua Drive	2-Lane Arterial	3,300	0.188	C or Better
Avalon Avenue				
North of Sunnyslope Drive	2-Lane Arterial	5,870	0.334	C or Better
North of SR-62	Collector	10,970	0.778	D
Balsa Avenue				
North of Outer Highway	4-Lane Arterial	11,640	0.329	C or Better
South of SR-62	4-Lane Arterial	23,400	0.661	C or Better
Buena Vista Drive				
West of Yucca Mesa Road	2-Lane Arterial	7,240	0.411	C or Better
East of Balsa Avenue	2-Lane Arterial	7,960	0.452	C or Better
Between Roberts Road and Faith Lane	2-Lane Arterial	10,350	0.588	D
Between Newton Lane and Rowell Road	2-Lane Arterial	13,520	0.768	D
Camino del Cielo Trail				
North of SR-62	2-Lane Arterial	6,870	0.390	C or Better
Joshua Drive				
East of Acoma Trail	2-Lane Arterial	7,860	0.447	C or Better
West of Barberry Avenue	2-Lane Arterial	6,740	0.383	C or Better
East of Emerson Avenue	2-Lane Arterial	2,830	0.161	C or Better
Joshua Lane				
South of Joshua Drive	2-Lane Arterial	10,890	0.619	D
North of Onaga Trail	2-Lane Arterial	9,660	0.549	C or Better
North of Pueblo Trail	2-Lane Arterial	10,580	0.601	D
Between Yucca Trail and SR-62 Outer Highway	2-Lane Arterial	14,070	0.799	D
Kickapoo Trail				
South of SR-62	2-Lane Arterial	6,620	0.376	C or Better

TABLE 5-2
FUTURE YEAR (POST-2035) ROADWAY VOLUME AND LOS

Street Name and Segment	Classification	Traffic Volume	V/C	LOS
La Contenta Road				
South of SR-62	4-Lane Arterial	18,660	0.527	D
North of Yucca Trail	4-Lane Arterial	8,430	0.238	C or Better
Main Street (Proposed)				
East of Cherokee Trail	Collector	7,290	0.517	D
Onaga Trail				
East of Alaba Avenue	4-Lane Arterial, Divided	3,860	0.109	C or Better
East of Elata Avenue	4-Lane Arterial, Divided	6,290	0.178	C or Better
West of Joshua Lane	4-Lane Arterial, Divided	5,380	0.152	C or Better
West of Sage Avenue	4-Lane Arterial, Divided	6,540	0.185	C or Better
East of Acoma Trail	4-Lane Arterial, Divided	3,550	0.100	C or Better
East of Elk Trail	4-Lane Arterial, Divided	5,080	0.144	C or Better
West of Jemez Trail	4-Lane Arterial, Divided	4,370	0.123	C or Better
Palm Avenue				
North of Pueblo Trail	2-Lane Arterial	3,890	0.221	C or Better
Palomar Avenue				
South of Yucca Trail	2-Lane Arterial	14,720	0.836	D
North of Joshua Lane	2-Lane Arterial	5,080	0.289	C or Better
Paxton Road				
East of SR-247	2-Lane Arterial	8,810	0.501	C or Better
Pioneertown Road				
North of SR-62	2-Lane Arterial	9,120	0.518	C or Better
South of the Northern Town Limit	2-Lane Arterial	2,670	0.152	C or Better
Sage Avenue				
North of SR-62	2-Lane Arterial	6,020	0.342	C or Better
South of SR-62	2-Lane Arterial	7,480	0.425	C or Better
North of Onaga Trail	2-Lane Arterial	7,720	0.439	C or Better
Santa Fe Trail				
West of Cherokee Trail	2-Lane Arterial	4,290	0.244	C or Better
East of Kickapoo Trail	2-Lane Arterial	1,660	0.094	C or Better

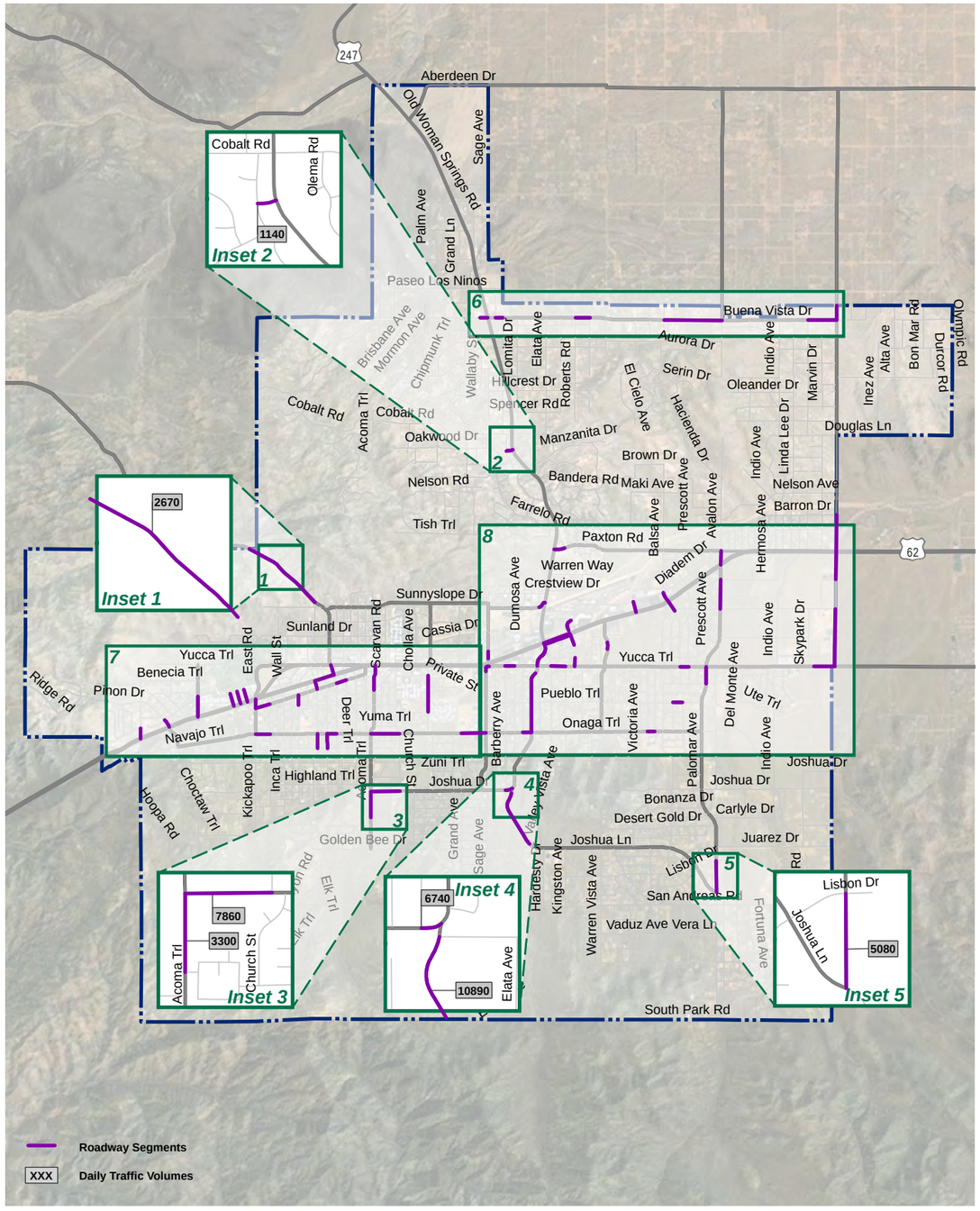
TABLE 5-3
FUTURE YEAR (POST-2035) ROADWAY VOLUME AND LOS

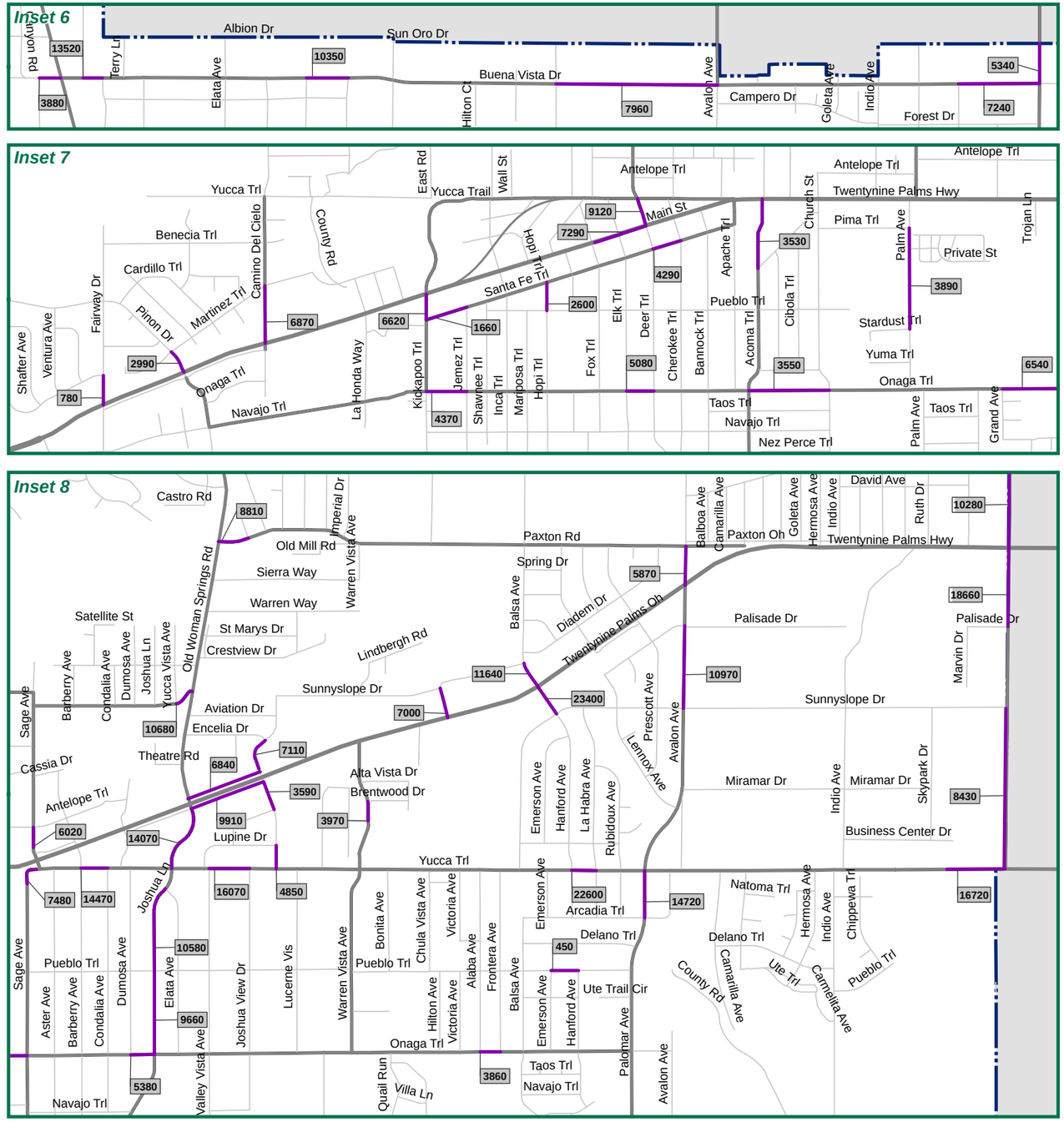
Street Name and Segment	Classification	Traffic Volume	V/C	LOS
Sunnyslope Avenue				
West of SR-247	2-Lane Arterial	10,680	0.607	C or Better
Warren Vista Avenue				
South of SR-62	Collector	3,970	0.282	C or Better
Yucca Trail				
West of La Contenta Road	4-Lane Arterial, Divided	16,720	0.472	C or Better
East of Hanford Avenue	4-Lane Arterial, Divided	22,600	0.638	D
West of Joshua View Drive	4-Lane Arterial, Divided	16,070	0.454	C or Better
West of Condalia Avenue	4-Lane Arterial, Divided	14,470	0.409	C or Better
Yucca Mesa Road				
North of SR-62	2-Lane Arterial	10,280	0.584	C or Better
North of Buena Vista Drive	2-Lane Arterial	5,340	0.303	C or Better

Notes:
1. LOS D Capacity for each roadway classification analyzed are as follows:
   - Collector – 14,100 vehicles per day (vpd)
   - Industrial – 14,100 vpd
   - 2-Lane Arterial – 17,600 vpd
   - 4-Lane Arterial – 35,400 vpd
2. V/C represents the volume to capacity ratio.

Source: Fehr & Peers, 2013.

As shown in Table 5-1, all of the roadways within the Town of Yucca Valley are forecasted to operate at LOS D or better.





Yucca Valley Circulation Element - Transportation Impact Study

FEHR PEERS

Path: N:\Projects\Non_SanJose_Projects\OC Projects\OC11_0177_Yucca_Valley\Fig_2-5_ADT.ai

Future Roadway Segment ADT

Figure 5-1

GENERAL PLAN (2035) CONDITIONS INTERSECTION OPERATIONS

The level of service was calculated for the study intersections to evaluate General Plan traffic conditions. As previously described, LOS D is the maximum acceptable level of congestion that should be maintained at any intersection in Yucca Valley – this is the Town's level of service standards. However, as previously described, the San Bernardino County CMP has its own level of service standards on CMP-designated facilities, which include SR-62 and SR-247. Since CEQA requires consistency with adopted plans and policies (e.g. the Town's proposed policies) and adopted CMP thresholds (e.g. the CMP threshold), but need to be evaluated. Please note that that the CMP threshold in San Bernardino County has been identified as "the middle of LOS D", or 45 seconds of delay. Therefore, intersection on SR-62 mush be consistent with the adopted CMP threshold, which is more stringent that the adopted Town threshold.

Table 5-4 summarizes the lane configurations and traffic volume projections at the study intersections. Table 5-5 summarizes the LOS results at the study intersections.

The results of the intersection assessment indicate that all of the study intersections operate at the Town's LOS D target or better. However, SR-62/SR-247 is projected to operate in excess of 45 seconds of delay in the PM peak hour, which is inconsistent with the CMP guidance for that facility.

The proposed intersection improvements required to meet acceptable level of service standards may be difficult to achieve due to right-of-way acquisitions at the intersections of SR-62 and SR-247.

TRANSPORTATION IMPACTS

This section discusses relevant General Plan Circulation Element Policies and their relation to the resulting Future Year (Post-2035) Conditions transportation impacts.

CEQA TRANSPORTATION IMPACT ANALYSIS

To determine significant impacts, the CEQA guidelines were combined with the CMP impact criteria. This information and the resulting impacts are described below.

First, the CEQA guidelines question for identifying impacts is identified. Then, the threshold of significance is defined for identifying a significant impact. Finally, an impact determination is made and mitigation is recommended, where required.

TABLE 5-4
FUTURE LANE CONFIGURATIONS AND TURNING MOVEMENT VOLUME FORECASTS

Intersection		Northbound			Southbound			Eastbound			Westbound		
		L	T	R	L	T	R	L	T	R	L	T	R
1. SR-62 & Camino Del Cielo	Lanes	S	1	S	1+S	1	S	1	3	S	1	3	S
	AM Volume	10	0	10	230	0	20	10	2460	10	10	920	40
	PM Volume	20	0	10	240	0	40	70	1170	10	20	2620	250
2. SR-62 & Kickapoo Trail	Lanes	1	1	1	1	1	1	1	3	S	1	3	S
	AM Volume	50	40	80	20	20	40	30	2380	100	60	990	20
	PM Volume	250	20	60	130	40	260	200	1450	300	70	2600	30
3. SR-62 & Pioneertown Road/Deer Trail	Lanes	1	1	S	1	1	S	1	3	S	1	3	S
	AM Volume	40	40	60	190	50	70	120	2140	40	20	1050	50
	PM Volume	40	50	50	200	90	90	160	1650	60	40	2610	90
4. SR-62 & Acoma Trail	Lanes	1	1	1	1	1	1	1	3	S	1	3	S
	AM Volume	100	40	40	120	50	100	60	2300	60	30	1060	60
	PM Volume	100	20	80	160	30	110	60	2190	60	70	3120	80
5. SR-62 & Sage Avenue	Lanes	1	1	1	1	1	1	1	3	S	1	3	S
	AM Volume	250	40	50	70	60	50	40	2460	300	80	1200	30
	PM Volume	240	90	40	120	70	40	60	2240	250	80	3070	130
6. SR-62 & SR-247	Lanes	1	2	1	1	2	2+O	2	3	1	1	3	1
	AM Volume	120	320	110	300	130	460	530	1760	30	60	850	230
	PM Volume	190	180	130	140	330	670	670	1370	170	100	2240	120
7. SR-62 & Airway Avenue	Lanes	1	1	S	1	1	S	1	3	S	1	3	S
	AM Volume	40	40	140	130	50	70	60	2080	80	80	1030	130
	PM Volume	30	40	140	330	50	70	60	1510	50	80	2040	60
8. SR-62 & Balsa Avenue	Lanes	1	2	S	1	1	1	1	3	S	1	3	S
	AM Volume	140	160	210	90	110	50	50	1420	120	160	760	100
	PM Volume	150	100	180	290	90	50	50	1110	150	160	1860	190
9. SR-62 & Avalon Avenue	Lanes	2	1	1	1	1	1	1	3	S	1	3	S
	AM Volume	60	80	110	60	90	60	90	1440	100	100	880	40
	PM Volume	320	70	120	40	70	100	60	1290	120	110	1690	50
10. SR-62 & Yucca Mesa Road/La Contenta Road	Lanes	2	1	S	1	1	S	1	3	1	1	3	1
	AM Volume	120	50	90	40	300	100	80	1080	340	110	880	50
	PM Volume	410	370	90	70	90	100	160	1140	280	120	1310	110

Notes:
1. "S" represents a shared turn lane. "1+S" represents one turn lane with an additional shared turn lane. "2+O" represents two turn lanes with a permissive overlap phase.
2. Shaded cells identify lane configurations that have changed from existing.

TABLE 5-5
GENERAL PLAN (2035) CONDITIONS INTERSECTION LOS RESULTS

Intersection	Control	AM Peak		PM Peak	
		Delay	LOS	Delay	LOS
1. SR-62 & Camino Del Cielo	Signal	13.8	B	23.8	C
2. SR-62 & Kickapoo Trail	Signal	10.1	B	34.9	C
3. SR-62 & Pioneertown Road/Deer Trail	Signal	16.4	B	34.2	C
4. SR-62 & Acoma Trail	Signal	12.3	B	22.6	C
5. SR-62 & Sage Avenue	Signal	26.1	C	38.3	D
6. SR-62 & SR-247	Signal	25.7	C	51.7	D
7. SR-62 & Airway Avenue	Signal	14.8	B	28	C
8. SR-62 & Balsa Avenue	Signal	15.4	B	27.6	C
9. SR-62 & Avalon Avenue	Signal	19.4	B	29.6	C
10. SR-62 & Yucca Mesa Road/La Contenta Road	Signal	24.8	C	36.9	D

Notes:
1. Signalized intersection delay is reported as average delay.
2. Shaded cells represent intersections operating in excess of "middle of LOS D" or in excess of 45 seconds.

Source: Fehr & Peers, April 2013

a) Does the proposed project conflict with an applicable plan, ordinance or policy?

Threshold: Would the project conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

For the purposes of this project, the following traffic components would result in a traffic impact based on Policies C 1-3, C 1-4, and C 1-5:

- Degradation from and acceptable LOS D or better on collectors and local streets (that are not considered protected) to an unacceptable LOS E or F.

The results of the analysis indicate that implementation of the General Plan and expected increases in regional traffic would result in a ***less-than-significant impact*** to the study roadway segments and intersections. As such, no mitigation is necessary.

b) Would the project conflict with an applicable congestion management program (CMP), including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Threshold: For the purposes of this project, the following traffic components would result in a traffic impact based on the San Bernardino CMP significance criteria:

- Implementation of the plan degrades operations for CMP facilities from an acceptable LOS E or better to LOS F, or
- Implementation of the plan degrades operations on Caltrans' facilities below the "middle of LOS D." "Middle of LOS D" is defined to be 45 seconds of delay at the study intersections.

The results of the assessment indicate that plans would result in a ***significant impact*** at the following location due to growth identified in the General Plan and regional growth predicted in the SBTAM model:

  - SR-62/SR-247 Intersection

Please note that, although this intersection would operate acceptably based on the Town's policy requirements, it will operate below the "middle of LOS D" as defined in the CMP requirements. Additionally approximately 20% of the total volume is anticipated to be regional in nature based on model runs completed as part of this project - these trips are outside of the Town's land use control. Finally, it should be noted that the growth projection assumed in the model will take many years to achieve, and the intersection will likely satisfy the CMP operating requirements well beyond Year 2035, depending on the ultimate absorption of the land use plan. However, since this is identified as a significant impact, it is subject to mitigation.

Mitigation:

There are no additional physical improvements that are feasible at this location. Even with dual left-turn lanes, three through lanes, and a dedicated right turn lane on the eastbound and westbound approaches; and with dual left-turn lanes, two through lanes, and dedicated right-turn lanes with overlap phasing; the intersection will operate at LOS D with more than 45 seconds of delay. Without a grade separation (which is fiscally infeasible) or additional widening for through traffic on SR-62 (which is also infeasible due to

limited right-of-way), the intersection would operate with more than 45 seconds of delay. As such, this impact is considered ***significant and unavoidable.***

c) Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

Policy C 3-3 identifies that the Town shall coordinate with the Yucca Valley Airport District. Additionally, the General Plan does not identify any modification to existing operations at the airport. As such, this impact is considered ***less-than-significant.***

d) Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The plan will not increase these hazards since this is a planning document and no civil engineering designs are being proposed. All future roadways would be designed by a professional civil engineer, would be required to satisfy current roadway design requirements (national, regional, and/or local). These design plans are where any hazards would be addressed. As such, this impact is considered ***less-than-significant.***

e) Would the project result in inadequate emergency access?

The General Plan is a planning document and does not inherently represent project-specific components. As such, the plans do not result in inadequate emergency access. However, any development or improvement processed under this plan should be reviewed by the Town Emergency Services Departments to ensure adequate emergency access. As such, this impact is considered ***less-than-significant.***

f) Would the project conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

The Circulation Element policies support public transit, bicycle improvements, and improvements to the pedestrian facilities by closing gaps in the network, expanding the network, and coordinating with regional agencies (such as MBTA). They are also consistent with regional plans, such as the SANBAG Non-Motorized Plan and goals identified by MBTA. Additionally, these policies support implementation of Complete Streets, through a layered network approach, consistent with the State's Complete Streets Act. As such, they are consistent with the existing adopted policies, plans and programs regarding public transit, bicycle, or pedestrian facilities. Therefore, this impact is considered ***less-than-significant.***

APPENDIX A
YUCCA VALLEY MODEL VALIDATION TABLES

SBTAM Yucca Valley Link Volume Validation (ADT)										
Sheet Link	**Map #**	**SBTAM**	**Roadway**	**Segment**	**Count**	**Model**	**Dev**	**Max**	**Result**	**Diff^2**
YCV001	1	2661560	Acoma Trail	S/ State Route 62	2,430	776	-68%	63%	FAIL	2,736,722
YCV002	2	2743189	Acoma Trail	N/ Mountain View	2,357	2,265	-4%	63%	PASS	8,480
YCV003	3	2743304	Acoma Trail	S/ Joshua Drive	713	1,037	45%	68%	PASS	105,128
YCV004	4	2743339	Airway Avenue	N/ Outer Highway	893	966	8%	68%	PASS	5,330
YCV005	5	2743216	Airway Avenue	S/ State Route 62	2,026	2,306	14%	63%	PASS	78,309
YCV006	6	152781	Airway Avenue	N/ Yucca Trail	1,638	1,882	15%	63%	PASS	59,438
YCV007	7	123065	Avalon Avenue	N/ Sunnyslope Drive	2,707	1,904	-30%	58%	PASS	645,202
YCV066	66	123062	Avalon Avenue	N/ State Route 62	1,374	2,196	60%	63%	PASS	676,020
YCV008	8		Balsa Avenue	N/ Outer Highway	6,121					
YCV009	9		Balsa Avenue	S/ State Route 62	5,973					
YCV010	10	2743167	Buena Vista Drive	W/ Yucca Mesa	2,332	3,145	35%	63%	PASS	660,235
YCV011	11	2743160	Buena Vista Drive	E/ Balsa Avenue	3,469	4,135	19%	58%	PASS	443,570
YCV012	12	2743202	Buena Vista Drive	B/ Roberts Road - Faith Lane	3,638	5,206	43%	58%	PASS	2,458,001
YCV013	13	2743158	Buena Vista Drive	B/ Newton Lane - Rowell Road	3,643	5,335	46%	58%	PASS	2,864,336
YCV014	14	123051	Camino del Cielo Trail	N/ State Route 62	1,552	1,403	-10%	63%	PASS	22,156
YCV015	15		Chemehuevi Trail	N/ State Route 62	130					
YCV016	16	2743259	El Cortez Road	W/ State Route 247	483	1,193	147%	68%	FAIL	503,929
YCV061	61		Elk Trail	S/ Onaga Trail	200					
YCV017	17	133012	Fairview Drive	N/ State Route 62	305	772	153%	68%	FAIL	218,542
YCV018	18		Fox Trail	S/ State Route 62	373					
YCV060	60		Fox Trail	S/ Onaga Trail	176					
YCV019	19		Hilton Avenue	N/ State Route 62	5,407					
YCV020	20	2743196	Hopi Trail	S/ Santa Fe Trail	681	3,078	352%	68%	FAIL	5,745,882
YCV021	21	2743139	Joshua Lane	E/ Acoma Trail	1,810	1,182	-35%	63%	PASS	394,566
YCV022	22	2743229	Joshua Lane	W/ Barberry Avenue	2,277	3,293	45%	63%	PASS	1,032,625
YCV023	23	2740637	Joshua Lane	E/ Emerson Avenue	1,164	692	-41%	68%	PASS	223,013
YCV024	24	122981	Joshua Lane	S/ Joshua Drive	4,311	3,133	-27%	52%	PASS	1,387,165
YCV025	25	122972	Joshua Lane	N/ Onaga Trail	4,953	3,710	-25%	52%	PASS	1,545,018
YCV026	26	122978	Joshua Lane	N/ Pueblo Trail	5,090	4,131	-19%	48%	PASS	918,895
YCV063	63	2743336	Joshua Lane	B/ Yucca Trail - State Route 62 Outer Highway	7,022	4,930	-30%	44%	PASS	4,376,949
YCV027	27		Katje Way	N/ State Route 62	471					
YCV028	28	2743201	Kickapoo Trail	S/ State Route 62	2,790	3,115	12%	58%	PASS	105,671
YCV029	29	2743210	La Contenta Road	S/ State Route 62	2,230	1,041	-53%	63%	PASS	1,413,314
YCV065	65	2743156	La Contenta Road	N/ Yucca Trail	2,170	951	-56%	63%	PASS	1,485,132
YCV030	30		La Honda Way	N/ State Route 62	250					
YCV031	31	2701736	Onaga Trail	E/ Alaba Avenue	1,782	2,157	21%	63%	PASS	140,904
YCV032	32	122979	Onaga Trail	E/ Elata Avenue	2,966	3,048	3%	58%	PASS	6,741
YCV033	33	2740670	Onaga Trail	W/ Joshua Lane	3,734	3,059	-18%	58%	PASS	455,299
YCV034	34	2743276	Onaga Trail	W/ Sage Avenue	4,765	3,318	-30%	52%	PASS	2,095,103
YCV035	35	123002	Onaga Trail	E/ Acoma Trail	3,544	4,859	37%	58%	PASS	1,729,107
YCV036	36	2740545	Onaga Trail	E/ Elk Trail	3,017	2,834	-6%	58%	PASS	33,409
YCV037	37	144946	Onaga Trail	W/ Jemez Trail	1,620	2,261	40%	63%	PASS	410,760
YCV038	38	2743273	Palm Drive	N/ Pueblo Trail	1,207	1,576	31%	68%	PASS	136,434
YCV039	39	123043	Palomar Avenue	S/ Yucca Trail	4,423	4,150	-6%	52%	PASS	74,753
YCV040	40	123057	Palomar Avenue	N/ Joshua Lane	836	1,319	58%	68%	PASS	233,382
YCV041	41	122966	Paxton Drive	E/ State Route 247	1,522	2,092	37%	63%	PASS	325,344
YCV042	42	123054	Pinon Drive	N/ State Route 62	293	502	71%	68%	FAIL	43,726
YCV043	43	123030	Pioneertown Road	N/ State Route 62	2,238	1,389	-38%	63%	PASS	720,309
YCV044	44	2743069	Pioneertown Road	S/ Town Limits	981	784	-20%	68%	PASS	38,951
YCV045	45	123010	Pueblo Trail	W/ Hanford Avenue	291	633	118%	68%	FAIL	117,076
YCV046	46	2743147	Sage Avenue	N/ State Route 62	2,142	1,274	-41%	63%	PASS	753,400
YCV047	47	122993	Sage Avenue	W/ Yucca Trail	4,341	1,374	-68%	52%	FAIL	8,800,715
YCV062	62	122994	Sage Avenue	N/ Onaga Trail	4,122	1,532	-63%	52%	FAIL	6,708,601
YCV048	48	133016	Santa Fe Trail	W/ Cherokee Trail	730	429	-41%	68%	PASS	90,851
YCV049	49	2743199	Santa Fe Trail	E/ Kickapoo Trail	505	232	-54%	68%	PASS	74,552
YCV050	50	2743258	Skyline Ranch Road	W/ State Route 247	833	679	-19%	68%	PASS	23,843
YCV067	67	2743334	State Route 62 Outer Highway	B/ Joshua Lane - Airway Avenue	1,703	1,457	-14%	63%	PASS	60,630
YCV068	68	2743333	State Route 62 Outer Highway	B/ State Route 247 - Airway Avenue	657	728	11%	68%	PASS	4,974
YCV064	64	2743218	Sunnyslope Avenue	W/ State Route 247	1,686	1,595	-5%	63%	PASS	8,333
YCV051	51	2743192	Warren Vista Avenue	1000' S/ State Route 62	2,801	622	-78%	58%	FAIL	4,745,935
YCV058	58	100761	Yucca Mesa Road	N/ State Route 62	4,914	3,640	-26%	52%	PASS	1,622,249
YCV059	59	100762	Yucca Mesa Road	N/ Buena Vista Drive	2,733	2,782	2%	58%	PASS	2,396
YCV052	52	2743148	Yucca Trail	E/ Cherokee Trail	1,334	1,833	37%	63%	PASS	249,405
YCV053	53	2740565	Yucca Trail	E/ Miami Trail	1,921	1,786	-7%	63%	PASS	18,205
YCV054	54	2743023	Yucca Trail	W/ La Contenta Road	6,058	4,604	-24%	48%	PASS	2,112,947
YCV055	55	2743131	Yucca Trail	E/ Hanford Avenue	7,442	6,380	-14%	44%	PASS	1,127,327
YCV056	56	122976	Yucca Trail	W/ Joshua View Drive	8,083	5,029	-38%	41%	PASS	9,325,848
YCV057	57	2701724	Yucca Trail	W/ Condalia Avenue	6,923	5,030	-27%	44%	PASS	3,584,447
1	-	123050	State Route 62	W/ Camino del Cielo	25,500	32,023	26%	26%	FAIL	42,545,924
2	-	2701712	State Route 62	W/ Pioneertown Road	28,500	26,449	-7%	25%	PASS	4,204,997
3	-	2740593	State Route 62	W/ Joshua Lane	28,500	25,348	-11%	25%	PASS	9,934,701
4	-	144950	State Route 62	W/ Yucca Mesa Road	21,000	19,509	-7%	28%	PASS	2,221,733
5	-	122967	State Route 247	N/ Twentynine Palms Highway	12,000	10,282	-14%	34%	PASS	2,950,717
TOTAL LINKS		**64**		**SUM OF LINK VOLUMES**	**271,705**	**252,378**		**SUM OF DIFF^2**		**137,847,658**
				TOTAL LINK VOLUME DEVIATION			**-7%**	**+/- 10%**		**PASS**
				PERCENT WITHIN MAXIMUM DEVIATION			**84%**	**> 75%**		**PASS**
				PERCENT ROOT MEAN SQUARE ERROR (RMSE)			**35%**	**< 40%**		**PASS**
				CORRELATION COEFFICIENT			**0.97**	**0.88**		**PASS**

APPENDIX B
EXISTING INTERSECTION COUNTS

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_001 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Camino del Cielo			Camino del Cielo			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1.3	.3	.3	1	2	0	1	2	0	
7:00 AM	1	0	1	11		2	2	105	0	0	219	3	344
7:15 AM	0	0	0	16		2	1	88	0	1	173	3	284
7:30 AM	0	0	0	21		2	0	139	0	0	142	5	309
7:45 AM	0	0	0	22		1	0	156	0	1	141	5	326
8:00 AM	1	0	2	11		1	1	126	0	0	160	1	303
8:15 AM	0	0	1	22		1	1	136	0	1	163	6	331
8:30 AM	2	0	0	20		2	0	174	0	2	169	6	375
8:45 AM	0	1	1	17		1	1	154	1	1	133	5	315
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	4	1	5	140	0	12	6	1078	1	6	1300	34	2587
APPROACH %'s :	40.00%	10.00%	50.00%	92.11%	0.00%	7.89%	0.55%	99.35%	0.09%	0.45%	97.01%	2.54%	
PEAK HR START TIME :	745 AM												TOTAL
PEAK HR VOL :	3	0	3	75	0	5	2	592	0	4	633	18	1335
PEAK HR FACTOR :		0.500			0.870			0.853			0.925		0.890

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_001 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Camino del Cielo			Camino del Cielo			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1.3	.3	.3	1	2	0	1	2	0	
4:00 PM	0		2	11	2	4	7	207	0	2	171	12	418
4:15 PM	0		1	13	1	0	4	184	0	3	183	13	402
4:30 PM	0		0	14	1	1	4	193	0	3	163	14	393
4:45 PM	1		1	12	0	0	4	206	0	1	198	13	436
5:00 PM	0		1	13	0	3	11	180	0	2	206	18	434
5:15 PM	1		1	13	0	1	2	199	1	3	176	18	415
5:30 PM	0		2	17	0	0	1	229	2	2	151	15	419
5:45 PM	0		1	17	0	1	7	216	0	4	147	16	409
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	2	0	9	110	4	10	40	1614	3	20	1395	119	3326
APPROACH %'s :	18.18%	0.00%	81.82%	88.71%	3.23%	8.06%	2.41%	97.40%	0.18%	1.30%	90.94%	7.76%	
PEAK HR START TIME :	445 PM												TOTAL
PEAK HR VOL :	2	0	5	55	0	4	18	814	3	8	731	64	1704
PEAK HR FACTOR :		0.875			0.868			0.900			0.888		0.977

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_002 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Kickapoo Trail			Kickapoo Trail			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	1	1	2	0	1	2	0	
7:00 AM	43	2	4	0	1	12	2	111	4	0	175	5	359
7:15 AM	30	0	7	1	2	8	1	107	5	2	149	1	313
7:30 AM	31	1	7	1	1	10	1	142	7	6	118	0	325
7:45 AM	31	1	6	1	0	7	3	169	4	5	115	1	343
8:00 AM	22	2	7	4	0	4	3	128	10	5	151	1	337
8:15 AM	27	2	6	1	2	8	1	143	7	5	129	1	332
8:30 AM	20	1	3	2	2	8	1	181	10	3	144	3	378
8:45 AM	24	0	13	1	2	7	2	167	12	7	111	1	347
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	228	9	53	11	10	64	14	1148	59	33	1092	13	2734
APPROACH %'s :	78.62%	3.10%	18.28%	12.94%	11.76%	75.29%	1.15%	94.02%	4.83%	2.90%	95.96%	1.14%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	93	5	29	8	6	27	7	619	39	20	535	6	1394
PEAK HR FACTOR :		0.858			0.854			0.866			0.893		0.922

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_002 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Kickapoo Trail			Kickapoo Trail			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	1	1	2	0	1	2	0	
4:00 PM	18	3	7	4	3	6	11	207	21	8	173	1	462
4:15 PM	23	2	9	6	4	6	5	171	19	10	170	6	431
4:30 PM	15	1	8	0	0	8	5	189	23	6	184	1	440
4:45 PM	12	0	8	4	2	3	3	207	22	10	195	4	470
5:00 PM	21	2	7	2	1	4	1	183	23	13	218	1	476
5:15 PM	15	1	13	4	3	5	8	190	21	10	192	3	465
5:30 PM	17	1	6	6	1	1	9	207	28	4	153	0	433
5:45 PM	5	2	12	3	3	6	6	214	25	2	159	2	439
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	126	12	70	29	17	39	48	1568	182	63	1444	18	3616
APPROACH %'s :	60.58%	5.77%	33.65%	34.12%	20.00%	45.88%	2.67%	87.21%	10.12%	4.13%	94.69%	1.18%	

PEAK HR START TIME :	430 PM												TOTAL
PEAK HR VOL :	63	4	36	10	6	20	17	769	89	39	789	9	1851
PEAK HR FACTOR :		0.858			0.750			0.943			0.902		0.972

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_003 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Pioneertown Rd			Pioneertown Rd			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	1	1	2	1	
7:00 AM	6	4	4	5	1	4	1	113	1	3	173	0	315
7:15 AM	3	2	4	9	0	4	0	116	2	4	160	1	305
7:30 AM	5	5	3	14	0	3	0	155	3	0	122	2	312
7:45 AM	9	5	4	8	3	5	1	173	1	2	154	2	367
8:00 AM	4	5	5	15	0	5	1	164	0	0	160	7	366
8:15 AM	3	3	7	12	4	7	3	165	2	1	156	0	363
8:30 AM	2	3	7	20	2	5	3	194	2	4	160	2	404
8:45 AM	4	2	5	20	7	3	7	189	4	5	151	3	400
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	36	29	39	103	17	36	16	1269	15	19	1236	17	2832
APPROACH %'s :	34.62%	27.88%	37.50%	66.03%	10.90%	23.08%	1.23%	97.62%	1.15%	1.49%	97.17%	1.34%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	13	13	24	67	13	20	14	712	8	10	627	12	1533
PEAK HR FACTOR :		0.893			0.833			0.918			0.972		0.949

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_003 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Pioneertown Rd			Pioneertown Rd			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	1	1	2	1	
4:00 PM	4	2	5	31	4	5	1	231	3	8	216	1	511
4:15 PM	2	4	4	23	3	5	8	197	4	4	203	1	458
4:30 PM	8	5	3	33	3	0	3	199	3	7	208	3	475
4:45 PM	7	1	7	26	4	3	5	214	3	2	221	4	497
5:00 PM	3	1	4	19	8	7	4	213	2	4	262	5	532
5:15 PM	5	3	11	18	5	4	1	203	3	2	184	4	443
5:30 PM	5	7	3	22	6	6	4	230	6	0	181	3	473
5:45 PM	2	4	2	18	5	4	2	231	3	0	160	1	432
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	36	27	39	190	38	34	28	1718	27	27	1635	22	3821
APPROACH %'s :	35.29%	26.47%	38.24%	72.52%	14.50%	12.98%	1.58%	96.90%	1.52%	1.60%	97.09%	1.31%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	20	11	18	101	18	15	20	823	12	17	894	13	1962
PEAK HR FACTOR :		0.766			0.931			0.963			0.852		0.922

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_004 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Acoma Trail			Acoma Trail			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	1	1	2	0	1	2	1	
7:00 AM	13	2	8	4	0	1	0	120	4	4	192	1	349
7:15 AM	15	3	5	4	0	0	0	133	0	3	164	3	330
7:30 AM	9	0	6	6	0	1	3	169	4	3	132	3	336
7:45 AM	12	2	8	8	0	1	2	195	1	5	188	15	437
8:00 AM	12	6	13	6	2	1	1	185	6	9	184	6	431
8:15 AM	12	6	11	7	3	4	3	192	4	8	171	9	430
8:30 AM	12	8	10	6	2	6	3	199	2	6	172	3	429
8:45 AM	15	2	10	14	3	3	8	226	5	8	180	8	482
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	100	29	71	55	10	17	20	1419	26	46	1383	48	3224
APPROACH %'s :	50.00%	14.50%	35.50%	67.07%	12.20%	20.73%	1.37%	96.86%	1.77%	3.11%	93.64%	3.25%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	51	22	44	33	10	14	15	802	17	31	707	26	1772
PEAK HR FACTOR :		0.944			0.713			0.872			0.960		0.919

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_004 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Acoma Trail			Acoma Trail			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	1	1	2	0	1	2	1	
4:00 PM	9	8	12	12	2	6	6	265	11	13	237	8	589
4:15 PM	16	1	8	14	2	4	3	234	5	6	228	7	528
4:30 PM	14	1	9	15	2	3	3	227	11	7	233	5	530
4:45 PM	12	1	11	14	3	8	7	247	12	12	253	7	587
5:00 PM	20	4	11	11	4	4	4	245	5	19	267	6	600
5:15 PM	10	1	7	8	4	7	0	230	6	7	229	7	516
5:30 PM	9	2	11	9	2	1	1	257	4	8	190	6	500
5:45 PM	3	2	6	3	1	2	1	253	7	11	206	9	504
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	93	20	75	86	20	35	25	1958	61	83	1843	55	4354
APPROACH %'s :	49.47%	10.64%	39.89%	60.99%	14.18%	24.82%	1.22%	95.79%	2.98%	4.19%	93.03%	2.78%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	62	7	39	54	11	19	17	953	33	44	981	25	2245
PEAK HR FACTOR :		0.771			0.840			0.943			0.899		0.935

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_005 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Sage Ave			Sage Ave			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	.5	.5	1	1	0	1	2	0	1	2	0	
7:00 AM	53	2	3	6	3	2	2	109	20	14	171	3	388
7:15 AM	47	3	3	7	1	3	0	125	18	5	127	2	341
7:30 AM	45	2	2	7	5	5	5	143	28	5	145	4	396
7:45 AM	64	0	1	5	6	8	6	159	34	5	184	0	472
8:00 AM	39	10	6	8	3	9	3	172	26	6	179	2	463
8:15 AM	41	0	3	4	11	7	0	180	25	7	170	2	450
8:30 AM	55	7	0	10	4	12	5	192	30	3	163	4	485
8:45 AM	51	1	8	17	13	8	8	189	32	16	170	5	518
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	395	25	26	64	46	54	29	1269	213	61	1309	22	3513
APPROACH %'s :	88.57%	5.61%	5.83%	39.02%	28.05%	32.93%	1.92%	83.98%	14.10%	4.38%	94.04%	1.58%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	186	18	17	39	31	36	16	733	113	32	682	13	1916
PEAK HR FACTOR :		0.891			0.697			0.941			0.952		0.925

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_005 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Sage Ave			Sage Ave			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	.5	.5	1	1	0	1	2	0	1	2	0	
4:00 PM	45	4	8	11	19	3	8	244	53	7	231	10	643
4:15 PM	39	13	2	13	15	8	13	221	44	10	236	2	616
4:30 PM	46	11	2	13	19	5	10	206	54	15	223	9	613
4:45 PM	46	23	8	8	15	6	3	226	53	12	257	8	665
5:00 PM	46	18	9	17	10	9	11	215	57	11	255	14	672
5:15 PM	42	19	6	18	9	5	11	209	33	7	220	12	591
5:30 PM	38	20	10	5	19	2	11	248	63	5	202	11	634
5:45 PM	31	15	8	16	24	6	8	220	42	9	197	7	583
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	333	123	53	101	130	44	75	1789	399	76	1821	73	5017
APPROACH %'s :	65.42%	24.17%	10.41%	36.73%	47.27%	16.00%	3.31%	79.05%	17.63%	3.86%	92.44%	3.71%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	177	65	21	51	59	28	37	868	208	48	971	33	2566
PEAK HR FACTOR :		0.854			0.932			0.983			0.939		0.955

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_006 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Old Woman Springs Rd			Old Woman Springs Rd			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	1	2	0	1	2	0	
7:00 AM	14	24	17	31	14	56	25	102	1	6	110	8	408
7:15 AM	4	12	6	10	12	58	10	114	5	5	87	7	330
7:30 AM	14	19	11	25	24	38	17	115	5	9	100	17	394
7:45 AM	17	24	19	26	27	63	21	136	5	9	109	17	473
8:00 AM	14	17	14	31	14	70	28	160	5	7	116	12	488
8:15 AM	13	23	12	24	26	54	27	137	3	9	127	12	467
8:30 AM	18	20	12	23	27	56	30	156	4	8	124	16	494
8:45 AM	24	26	15	33	29	46	36	150	6	15	137	21	538
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	118	165	106	203	173	441	194	1070	34	68	910	110	3592
APPROACH %'s :	30.33%	42.42%	27.25%	24.85%	21.18%	53.98%	14.95%	82.43%	2.62%	6.25%	83.64%	10.11%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	69	86	53	111	96	226	121	603	18	39	504	61	1987
PEAK HR FACTOR :		0.800			0.941			0.961			0.873		0.923

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_006 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Old Woman Springs Rd			Old Woman Springs Rd			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	1	2	0	1	2	0	
4:00 PM	12	23	26	37	35	47	59	181	13	26	202	19	680
4:15 PM	19	18	18	24	24	51	57	176	11	4	219	23	644
4:30 PM	20	35	23	27	31	33	47	174	6	9	229	21	655
4:45 PM	15	27	26	20	22	36	46	168	7	17	247	28	659
5:00 PM	21	31	15	34	35	41	62	150	9	24	235	12	669
5:15 PM	18	19	22	38	18	37	59	156	4	25	206	19	621
5:30 PM	14	18	23	34	27	23	60	186	7	11	189	16	608
5:45 PM	25	19	10	34	17	25	63	151	5	17	178	22	566
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	144	190	163	248	209	293	453	1342	62	133	1705	160	5102
APPROACH %'s :	28.97%	38.23%	32.80%	33.07%	27.87%	39.07%	24.39%	72.27%	3.34%	6.66%	85.34%	8.01%	
PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	66	103	93	108	112	167	209	699	37	56	897	91	2638
PEAK HR FACTOR :		0.840			0.813			0.934			0.894		0.970

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_007 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Airway Ave			Airway Ave			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
7:00 AM	1	2	7	1	3	3	2	153	1	4	118	2	297
7:15 AM	0	1	5	1	1	2	0	122	2	5	95	1	235
7:30 AM	3	3	5	1	0	7	5	139	9	5	108	3	288
7:45 AM	0	1	8	1	1	4	4	168	7	6	124	3	327
8:00 AM	3	4	12	0	0	2	5	194	14	15	130	7	386
8:15 AM	3	3	13	2	1	1	3	155	8	9	144	4	346
8:30 AM	2	6	14	1	2	3	9	168	8	20	149	11	393
8:45 AM	2	3	14	2	7	2	4	183	4	11	163	6	401
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	14	23	78	9	15	24	32	1282	53	75	1031	37	2673
APPROACH %'s :	12.17%	20.00%	67.83%	18.75%	31.25%	50.00%	2.34%	93.78%	3.88%	6.56%	90.20%	3.24%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	10	16	53	5	10	8	21	700	34	55	586	28	1526
PEAK HR FACTOR :		0.898			0.523			0.886			0.929		0.951

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_007 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Airway Ave			Airway Ave			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
4:00 PM	1	5	23	8	4	8	11	229	9	19	240	8	565
4:15 PM	5	3	21	7	2	11	10	198	5	20	229	12	523
4:30 PM	5	4	18	12	4	11	15	206	8	19	245	11	558
4:45 PM	3	4	20	12	11	11	10	197	7	11	285	11	582
5:00 PM	4	5	30	6	9	8	9	177	14	15	252	11	540
5:15 PM	6	1	16	4	2	4	6	199	5	8	244	7	502
5:30 PM	3	4	12	8	8	13	10	219	8	14	196	8	503
5:45 PM	2	1	13	3	4	9	6	189	4	14	209	9	463
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	29	27	153	60	44	75	77	1614	60	120	1900	77	4236
APPROACH %'s :	13.88%	12.92%	73.21%	33.52%	24.58%	41.90%	4.40%	92.18%	3.43%	5.72%	90.61%	3.67%	
PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	14	16	82	39	21	41	46	830	29	69	999	42	2228
PEAK HR FACTOR :		0.966			0.743			0.909			0.904		0.957

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_008 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Balsa Ave			Balsa Ave			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	1	1	1	2	0	1	2	0	
7:00 AM	21	5	4	5	2	5	2	144	5	4	106	6	309
7:15 AM	12	4	3	11	2	2	0	106	7	3	82	6	238
7:30 AM	16	4	2	9	6	2	3	127	4	5	105	5	288
7:45 AM	19	2	1	12	5	1	1	136	7	6	138	3	331
8:00 AM	19	8	3	3	3	3	4	145	11	5	126	4	334
8:15 AM	19	2	5	12	8	2	0	137	5	3	122	2	317
8:30 AM	27	13	9	11	7	5	3	127	16	2	143	11	374
8:45 AM	26	12	4	9	8	4	4	142	7	5	164	7	392
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	159	50	31	72	41	24	17	1064	62	33	986	44	2583
APPROACH %'s :	66.25%	20.83%	12.92%	52.55%	29.93%	17.52%	1.49%	93.09%	5.42%	3.10%	92.76%	4.14%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	91	35	21	35	26	14	11	551	39	15	555	24	1417
PEAK HR FACTOR :		0.750			0.815			0.939			0.844		0.904

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_008 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Balsa Ave			Balsa Ave			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	1	1	1	2	0	1	2	0	
4:00 PM	32	19	7	46	28	6	5	168	26	10	184	20	551
4:15 PM	21	14	10	48	23	6	9	166	32	9	190	10	538
4:30 PM	38	9	7	31	30	13	1	168	23	11	239	14	584
4:45 PM	31	22	5	36	33	1	3	143	15	11	231	10	541
5:00 PM	33	16	8	29	30	9	4	149	22	17	210	17	544
5:15 PM	34	17	6	28	36	7	6	151	17	10	200	21	533
5:30 PM	24	8	3	29	28	8	4	147	24	6	182	10	473
5:45 PM	33	20	5	27	28	6	7	152	15	8	152	8	461
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	246	125	51	274	236	56	39	1244	174	82	1588	110	4225
APPROACH %'s :	58.29%	29.62%	12.09%	48.41%	41.70%	9.89%	2.68%	85.38%	11.94%	4.61%	89.21%	6.18%	
PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	122	64	29	161	114	26	18	645	96	41	844	54	2214
PEAK HR FACTOR :		0.927			0.941			0.917			0.889		0.948

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_009 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Avalon Ave			Avalon Ave			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	1	1	1	1	1	1	2	0	1	2	0	
7:00 AM	7	4	25	3	2	1	0	142	7	11	105	1	308
7:15 AM	4	1	15	5	1	5	0	118	12	8	90	1	260
7:30 AM	2	0	14	4	1	6	1	114	13	10	107	2	274
7:45 AM	4	0	13	6	3	12	5	140	12	11	138	2	346
8:00 AM	8	4	17	4	4	3	5	121	10	14	128	1	319
8:15 AM	4	3	21	4	14	5	5	139	10	16	129	3	353
8:30 AM	3	9	25	8	7	5	1	138	9	18	154	4	381
8:45 AM	5	8	9	4	2	4	5	126	10	13	166	4	356
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	37	29	139	38	34	41	22	1038	83	101	1017	18	2597
APPROACH %'s :	18.05%	14.15%	67.80%	33.63%	30.09%	36.28%	1.92%	90.81%	7.26%	8.89%	89.52%	1.58%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	20	24	72	20	27	17	16	524	39	61	577	12	1409
PEAK HR FACTOR :		0.784			0.696			0.940			0.888		0.925

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_009 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Avalon Ave			Avalon Ave			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	1	1	1	1	1	1	2	0	1	2	0	
4:00 PM	14	5	9	4	3	6	10	193	16	11	185	5	461
4:15 PM	18	4	17	2	3	10	6	184	11	14	202	7	478
4:30 PM	22	12	12	2	3	6	9	199	11	18	247	6	547
4:45 PM	11	4	6	5	1	6	3	174	11	16	248	7	492
5:00 PM	7	13	15	4	6	1	6	169	6	18	236	5	486
5:15 PM	10	2	6	0	1	6	11	179	5	21	217	11	469
5:30 PM	6	3	12	4	4	5	6	176	4	10	180	9	419
5:45 PM	6	4	8	2	2	6	7	171	6	14	169	4	399
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	94	47	85	23	23	46	58	1445	70	122	1684	54	3751
APPROACH %'s :	41.59%	20.80%	37.61%	25.00%	25.00%	50.00%	3.69%	91.86%	4.45%	6.56%	90.54%	2.90%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	58	33	50	13	13	23	24	726	39	66	933	25	2003
PEAK HR FACTOR :		0.766			0.817			0.901			0.945		0.915

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_010 **Day:** TUESDAY

City: City of Yucca Valley **Date:** 4/16/2013

AM

NS/EW Streets:	Yucca Mesa Rd			Yucca Mesa Rd			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
7:00 AM	18	10	11	17	18	17	10	143	17	5	77	6	349
7:15 AM	6	0	3	12	4	12	4	143	8	4	80	7	283
7:30 AM	8	0	6	20	4	12	7	119	6	9	115	0	306
7:45 AM	5	6	0	21	7	12	13	101	7	4	113	5	294
8:00 AM	4	3	8	15	7	17	8	150	4	1	111	5	333
8:15 AM	2	5	7	10	9	13	7	140	6	0	110	4	313
8:30 AM	4	2	11	19	11	22	7	152	5	6	140	5	384
8:45 AM	5	2	12	22	11	20	16	132	0	5	143	7	375
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	52	28	58	136	71	125	72	1080	53	34	889	39	2637
APPROACH %'s :	37.68%	20.29%	42.03%	40.96%	21.39%	37.65%	5.98%	89.63%	4.40%	3.53%	92.41%	4.05%	
PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	15	12	38	66	38	72	38	574	15	12	504	21	1405
PEAK HR FACTOR :		0.855			0.830			0.956			0.866		0.915

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_6076_010 **Day:** TUESDAY

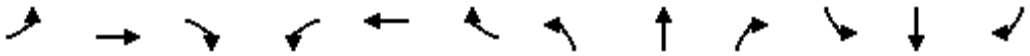
City: City of Yucca Valley **Date:** 4/16/2013

PM

NS/EW Streets:	Yucca Mesa Rd			Yucca Mesa Rd			Twentynine Palms Hwy			Twentynine Palms Hwy			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
4:00 PM	7	7	1	16	1	10	20	149	7	4	170	17	409
4:15 PM	5	8	0	10	10	14	35	168	4	2	191	21	468
4:30 PM	3	6	1	9	6	19	25	147	8	7	232	23	486
4:45 PM	5	12	4	4	11	12	42	136	7	12	241	19	505
5:00 PM	3	12	1	12	2	15	19	169	4	7	229	14	487
5:15 PM	5	7	2	8	5	11	28	129	6	4	213	15	433
5:30 PM	1	9	3	11	6	13	32	157	5	8	172	21	438
5:45 PM	4	4	1	7	7	13	26	144	7	5	168	14	400
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	33	65	13	77	48	107	227	1199	48	49	1616	144	3626
APPROACH %'s :	29.73%	58.56%	11.71%	33.19%	20.69%	46.12%	15.40%	81.34%	3.26%	2.71%	89.33%	7.96%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	16	38	6	35	29	60	121	620	23	28	893	77	1946
PEAK HR FACTOR :		0.714			0.912			0.923			0.917		0.963

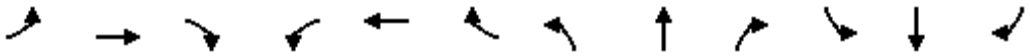
CONTROL : Signalized

APPENDIX C
EXISTING (2013) CONDITIONS LOS RESULTS



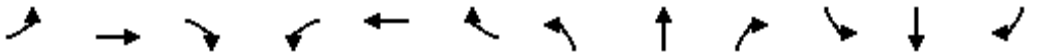
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	592	0	4	633	18	3	0	3	75	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00			0.93		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	0.96	
Satd. Flow (prot)	1770	3539		1770	3525			1695		1681	1662	
Flt Permitted	0.95	1.00		0.95	1.00			0.98		0.95	0.96	
Satd. Flow (perm)	1770	3539		1770	3525			1695		1681	1662	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	2	665	0	4	711	20	3	0	3	84	0	6
RTOR Reduction (vph)	0	0	0	0	1	0	0	3	0	0	6	0
Lane Group Flow (vph)	2	665	0	4	730	0	0	3	0	45	39	0
Turn Type	Prot			Prot			Split			Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	1.2	90.3		1.3	90.4			1.4		7.5	7.5	
Effective Green, g (s)	1.7	92.3		1.8	92.4			1.9		8.0	8.0	
Actuated g/C Ratio	0.01	0.77		0.02	0.77			0.02		0.07	0.07	
Clearance Time (s)	4.5	6.0		4.5	6.0			4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	25	2722		27	2714			27		112	111	
v/s Ratio Prot	0.00	0.19		c0.00	c0.21			c0.00		c0.03	0.02	
v/s Ratio Perm												
v/c Ratio	0.08	0.24		0.15	0.27			0.11		0.40	0.35	
Uniform Delay, d1	58.4	3.9		58.3	4.0			58.2		53.7	53.5	
Progression Factor	1.00	1.00		1.12	0.51			1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.2		2.5	0.2			1.9		2.4	2.0	
Delay (s)	59.8	4.2		67.7	2.3			60.1		56.1	55.5	
Level of Service	E	A		E	A			E		E	E	
Approach Delay (s)		4.3			2.7			60.1			55.8	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM Average Control Delay	6.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



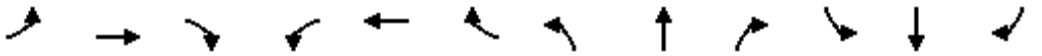
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	619	39	20	535	6	93	5	29	8	6	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3508		1770	3533		1770	1863	1583	1770	1638	
Flt Permitted	0.95	1.00		0.95	1.00		0.73	1.00	1.00	0.75	1.00	
Satd. Flow (perm)	1770	3508		1770	3533		1367	1863	1583	1405	1638	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	673	42	22	582	7	101	5	32	9	7	29
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	28	0	25	0
Lane Group Flow (vph)	8	713	0	22	589	0	101	5	4	9	11	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)	1.5	86.5		4.8	89.8		14.2	14.2	14.2	14.2	14.2	
Effective Green, g (s)	2.0	87.5		5.3	90.8		15.2	15.2	15.2	15.2	15.2	
Actuated g/C Ratio	0.02	0.73		0.04	0.76		0.13	0.13	0.13	0.13	0.13	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	30	2558		78	2673		173	236	201	178	207	
v/s Ratio Prot	0.00	c0.20		c0.01	c0.17			0.00			0.01	
v/s Ratio Perm							c0.07		0.00	0.01		
v/c Ratio	0.27	0.28		0.28	0.22		0.58	0.02	0.02	0.05	0.05	
Uniform Delay, d1	58.3	5.5		55.5	4.3		49.4	45.9	45.9	46.1	46.1	
Progression Factor	0.96	0.86		0.81	1.72		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.7	0.3		2.0	0.2		4.9	0.0	0.0	0.1	0.1	
Delay (s)	60.7	5.0		46.7	7.5		54.4	45.9	45.9	46.2	46.2	
Level of Service	E	A		D	A		D	D	D	D	D	
Approach Delay (s)		5.6			8.9			52.1			46.2	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



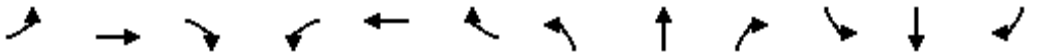
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	712	8	10	627	12	13	13	24	67	13	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1684		1770	1695	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.73	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1368	1684		1363	1695	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	15	749	8	11	660	13	14	14	25	71	14	21
RTOR Reduction (vph)	0	0	2	0	0	3	0	23	0	0	19	0
Lane Group Flow (vph)	15	749	6	11	660	10	14	16	0	71	16	0
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.1	95.2	95.2	1.5	93.6	93.6	10.3	10.3		10.3	10.3	
Effective Green, g (s)	3.1	96.2	96.2	1.5	94.6	94.6	10.3	10.3		10.3	10.3	
Actuated g/C Ratio	0.03	0.80	0.80	0.01	0.79	0.79	0.09	0.09		0.09	0.09	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	46	2837	1269	22	2790	1248	117	145		117	145	
v/s Ratio Prot	c0.01	c0.21		0.01	0.19			0.01			0.01	
v/s Ratio Perm			0.00			0.01	0.01			c0.05		
v/c Ratio	0.33	0.26	0.01	0.50	0.24	0.01	0.12	0.11		0.61	0.11	
Uniform Delay, d1	57.4	3.0	2.4	58.9	3.3	2.7	50.7	50.6		52.9	50.6	
Progression Factor	0.89	1.83	2.33	0.90	0.82	0.90	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.0	0.2	0.0	16.5	0.2	0.0	0.5	0.3		8.6	0.3	
Delay (s)	55.3	5.7	5.5	69.2	2.9	2.4	51.1	51.0		61.5	50.9	
Level of Service	E	A	A	E	A	A	D	D		E	D	
Approach Delay (s)		6.7			4.0			51.0			58.0	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



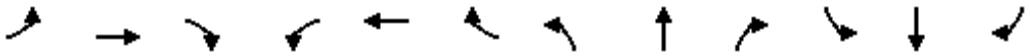
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	802	17	31	707	26	51	22	44	33	10	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3528		1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.75	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)	1770	3528		1770	3539	1583	1398	1863	1583	1381	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	872	18	34	768	28	55	24	48	36	11	15
RTOR Reduction (vph)	0	0	0	0	0	6	0	0	44	0	0	14
Lane Group Flow (vph)	16	890	0	34	768	22	55	24	4	36	11	1
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2		2	6		6
Actuated Green, G (s)	3.1	92.1		5.4	94.9	94.9	9.0	9.0	9.0	9.0	9.0	9.0
Effective Green, g (s)	2.6	93.1		5.4	95.9	95.9	9.5	9.5	9.5	9.5	9.5	9.5
Actuated g/C Ratio	0.02	0.78		0.05	0.80	0.80	0.08	0.08	0.08	0.08	0.08	0.08
Clearance Time (s)	3.5	5.0		4.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	38	2737		80	2828	1265	111	147	125	109	147	125
v/s Ratio Prot	0.01	c0.25		c0.02	c0.22			0.01			0.01	
v/s Ratio Perm						0.01	c0.04		0.00	0.03		0.00
v/c Ratio	0.42	0.33		0.42	0.27	0.02	0.50	0.16	0.03	0.33	0.07	0.01
Uniform Delay, d1	58.0	4.0		55.8	3.1	2.5	53.0	51.5	51.0	52.2	51.2	50.9
Progression Factor	1.22	0.77		1.20	0.82	0.44	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.3	0.3		3.5	0.2	0.0	3.5	0.5	0.1	1.8	0.2	0.0
Delay (s)	78.2	3.4		70.5	2.8	1.1	56.4	52.1	51.1	54.0	51.4	50.9
Level of Service	E	A		E	A	A	E	D	D	D	D	D
Approach Delay (s)		4.7			5.5			53.6			52.8	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



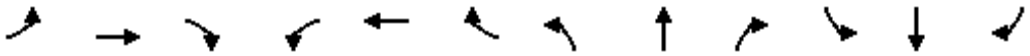
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	733	113	32	682	13	186	18	17	39	31	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3468		1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.74	1.00	1.00	0.75	1.00	1.00
Satd. Flow (perm)	1770	3468		1770	3539	1583	1370	1863	1583	1388	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	788	122	34	733	14	200	19	18	42	33	39
RTOR Reduction (vph)	0	7	0	0	0	5	0	0	14	0	0	31
Lane Group Flow (vph)	17	903	0	34	733	9	200	19	4	42	33	8
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2		2	6		6
Actuated Green, G (s)	3.2	77.9		5.4	80.1	80.1	23.2	23.2	23.2	23.2	23.2	23.2
Effective Green, g (s)	3.2	78.9		5.4	81.1	81.1	23.7	23.7	23.7	23.7	23.7	23.7
Actuated g/C Ratio	0.03	0.66		0.05	0.68	0.68	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	47	2280		80	2392	1070	271	368	313	274	368	313
v/s Ratio Prot	0.01	c0.26		c0.02	0.21			0.01			0.02	
v/s Ratio Perm						0.01	c0.15		0.00	0.03		0.00
v/c Ratio	0.36	0.40		0.42	0.31	0.01	0.74	0.05	0.01	0.15	0.09	0.02
Uniform Delay, d1	57.4	9.5		55.8	8.0	6.3	45.2	39.0	38.7	39.8	39.3	38.8
Progression Factor	0.81	1.38		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.6	0.5		3.6	0.3	0.0	10.0	0.1	0.0	0.3	0.1	0.0
Delay (s)	51.3	13.6		59.4	8.3	6.4	55.3	39.1	38.7	40.1	39.4	38.9
Level of Service	D	B		E	A	A	E	D	D	D	D	D
Approach Delay (s)		14.3			10.5			52.7			39.5	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



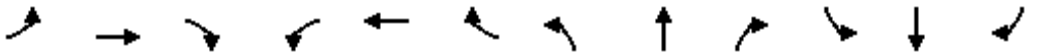
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	121	603	18	39	504	61	69	86	53	111	96	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00		1.00	0.98		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3523		1770	3482		1770	3539	1583	1770	3166	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3523		1770	3482		1770	3539	1583	1770	3166	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	655	20	42	548	66	75	93	58	121	104	246
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	54	0	225	0
Lane Group Flow (vph)	132	674	0	42	610	0	75	93	4	121	125	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	16.5	95.7		9.1	88.3		13.1	9.3	9.3	15.9	12.1	
Effective Green, g (s)	17.0	97.7		9.6	90.3		13.6	10.3	10.3	16.4	13.1	
Actuated g/C Ratio	0.11	0.65		0.06	0.60		0.09	0.07	0.07	0.11	0.09	
Clearance Time (s)	4.5	6.0		4.5	6.0		4.5	5.0	5.0	4.5	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	201	2295		113	2096		160	243	109	194	276	
v/s Ratio Prot	c0.07	c0.19		0.02	0.18		0.04	0.03		c0.07	c0.04	
v/s Ratio Perm									0.00			
v/c Ratio	0.66	0.29		0.37	0.29		0.47	0.38	0.04	0.62	0.45	
Uniform Delay, d1	63.7	11.3		67.3	14.4		64.8	66.8	65.2	63.9	65.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.5	0.3		2.1	0.4		2.2	1.0	0.1	6.1	1.2	
Delay (s)	71.2	11.6		69.4	14.8		66.9	67.8	65.4	70.0	66.2	
Level of Service	E	B		E	B		E	E	E	E	E	
Approach Delay (s)		21.4			18.3			66.9			67.2	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM Average Control Delay	35.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



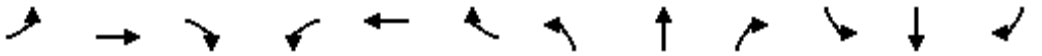
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	700	34	55	586	28	10	16	53	5	10	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.88		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3514		1770	3515		1770	1648		1770	1745	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3514		1770	3515		1770	1648		1770	1745	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	22	737	36	58	617	29	11	17	56	5	11	8
RTOR Reduction (vph)	0	2	0	0	2	0	0	52	0	0	7	0
Lane Group Flow (vph)	22	771	0	58	644	0	11	21	0	5	12	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	4.8	83.8		8.1	87.1		1.5	8.2		1.4	8.1	
Effective Green, g (s)	5.3	84.8		8.6	88.1		2.0	8.7		1.9	8.6	
Actuated g/C Ratio	0.04	0.71		0.07	0.73		0.02	0.07		0.02	0.07	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	78	2483		127	2581		30	119		28	125	
v/s Ratio Prot	0.01	c0.22		c0.03	c0.18		c0.01	c0.01		0.00	0.01	
v/s Ratio Perm												
v/c Ratio	0.28	0.31		0.46	0.25		0.37	0.18		0.18	0.09	
Uniform Delay, d1	55.5	6.6		53.5	5.2		58.4	52.3		58.3	52.1	
Progression Factor	1.00	1.00		0.95	0.70		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	0.3		2.5	0.2		7.4	0.7		3.0	0.3	
Delay (s)	57.5	6.9		53.3	3.9		65.8	53.0		61.3	52.4	
Level of Service	E	A		D	A		E	D		E	D	
Approach Delay (s)		8.3			7.9			54.7			54.2	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



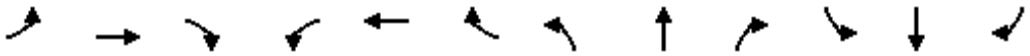
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	551	39	15	555	24	91	35	21	35	26	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3504		1770	3517		1770	3342		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.71	1.00	1.00
Satd. Flow (perm)	1770	3504		1770	3517		1375	3342		1331	1863	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	12	612	43	17	617	27	101	39	23	39	29	16
RTOR Reduction (vph)	0	2	0	0	1	0	0	20	0	0	0	14
Lane Group Flow (vph)	12	653	0	17	643	0	101	42	0	39	29	2
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	2.9	87.8		3.2	88.1		14.5	14.5		14.5	14.5	14.5
Effective Green, g (s)	3.4	89.8		3.7	90.1		14.5	14.5		14.5	14.5	14.5
Actuated g/C Ratio	0.03	0.75		0.03	0.75		0.12	0.12		0.12	0.12	0.12
Clearance Time (s)	4.5	6.0		4.5	6.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	50	2622		55	2641		166	404		161	225	191
v/s Ratio Prot	0.01	c0.19		c0.01	0.18			0.01			0.02	
v/s Ratio Perm							c0.07			0.03		0.00
v/c Ratio	0.24	0.25		0.31	0.24		0.61	0.10		0.24	0.13	0.01
Uniform Delay, d1	57.0	4.7		56.9	4.6		50.1	47.0		47.8	47.1	46.4
Progression Factor	1.04	0.74		1.23	0.49		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.4	0.2		3.1	0.2		6.2	0.1		0.8	0.3	0.0
Delay (s)	62.0	3.7		73.4	2.5		56.2	47.1		48.6	47.4	46.5
Level of Service	E	A		E	A		E	D		D	D	D
Approach Delay (s)		4.7			4.3			52.8			47.7	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



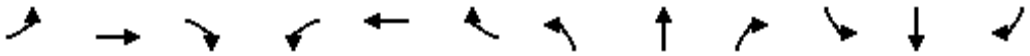
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	524	39	61	577	12	20	24	72	20	27	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3502		1770	3528		3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3502		1770	3528		3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	563	42	66	620	13	22	26	77	22	29	18
RTOR Reduction (vph)	0	3	0	0	1	0	0	0	71	0	0	17
Lane Group Flow (vph)	17	602	0	66	632	0	22	26	6	22	29	1
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	3.2	78.0		8.6	83.4		4.0	8.1	8.1	4.8	8.9	8.9
Effective Green, g (s)	4.2	80.0		9.6	85.4		4.5	9.1	9.1	5.3	9.9	9.9
Actuated g/C Ratio	0.04	0.67		0.08	0.71		0.04	0.08	0.08	0.04	0.08	0.08
Clearance Time (s)	5.0	6.0		5.0	6.0		4.5	5.0	5.0	4.5	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	62	2335		142	2511		129	141	120	78	154	131
v/s Ratio Prot	0.01	0.17		c0.04	c0.18		0.01	0.01		c0.01	c0.02	
v/s Ratio Perm									0.00			0.00
v/c Ratio	0.27	0.26		0.46	0.25		0.17	0.18	0.05	0.28	0.19	0.01
Uniform Delay, d1	56.4	8.1		52.7	6.1		55.9	52.0	51.4	55.5	51.3	50.6
Progression Factor	0.80	1.69		0.89	0.72		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.4	0.3		2.4	0.2		0.6	0.6	0.2	2.0	0.6	0.0
Delay (s)	47.3	13.9		49.4	4.6		56.6	52.6	51.6	57.5	51.9	50.6
Level of Service	D	B		D	A		E	D	D	E	D	D
Approach Delay (s)		14.8			8.9			52.7			53.3	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



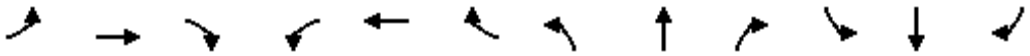
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	574	15	12	504	21	15	12	38	66	38	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.89		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3526		1770	3518		1770	1651		1770	1680	
Flt Permitted	0.95	1.00		0.95	1.00		0.50	1.00		0.72	1.00	
Satd. Flow (perm)	1770	3526		1770	3518		938	1651		1345	1680	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	624	16	13	548	23	16	13	41	72	41	78
RTOR Reduction (vph)	0	1	0	0	1	0	0	36	0	0	68	0
Lane Group Flow (vph)	41	639	0	13	570	0	16	18	0	72	51	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	7.1	88.9		3.0	84.8		12.6	12.6		12.6	12.6	
Effective Green, g (s)	7.6	90.9		3.5	86.8		13.6	13.6		13.6	13.6	
Actuated g/C Ratio	0.06	0.76		0.03	0.72		0.11	0.11		0.11	0.11	
Clearance Time (s)	4.5	6.0		4.5	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	112	2671		52	2545		106	187		152	190	
v/s Ratio Prot	c0.02	c0.18		0.01	0.16			0.01			0.03	
v/s Ratio Perm							0.02			c0.05		
v/c Ratio	0.37	0.24		0.25	0.22		0.15	0.09		0.47	0.27	
Uniform Delay, d1	53.9	4.3		57.0	5.5		48.0	47.7		49.8	48.6	
Progression Factor	1.01	1.04		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	0.2		2.5	0.2		0.7	0.2		2.3	0.8	
Delay (s)	56.6	4.7		59.5	5.7		48.7	47.9		52.2	49.4	
Level of Service	E	A		E	A		D	D		D	D	
Approach Delay (s)		7.8			6.9			48.1			50.4	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



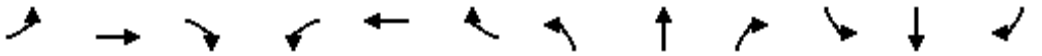
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	814	3	8	731	64	2	0	5	55	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		0.95	0.95	
Frt	1.00	1.00		1.00	0.99			0.90		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	0.96	
Satd. Flow (prot)	1770	3537		1770	3497			1659		1681	1662	
Flt Permitted	0.95	1.00		0.95	1.00			0.99		0.95	0.96	
Satd. Flow (perm)	1770	3537		1770	3497			1659		1681	1662	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	18	831	3	8	746	65	2	0	5	56	0	4
RTOR Reduction (vph)	0	0	0	0	2	0	0	5	0	0	4	0
Lane Group Flow (vph)	18	834	0	8	809	0	0	2	0	30	26	0
Turn Type	Prot			Prot			Split			Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	3.2	90.9		1.5	89.2			1.4		6.7	6.7	
Effective Green, g (s)	3.7	92.9		2.0	91.2			1.9		7.2	7.2	
Actuated g/C Ratio	0.03	0.77		0.02	0.76			0.02		0.06	0.06	
Clearance Time (s)	4.5	6.0		4.5	6.0			4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	55	2738		30	2658			26		101	100	
v/s Ratio Prot	c0.01	c0.24		0.00	0.23			c0.00		c0.02	0.02	
v/s Ratio Perm												
v/c Ratio	0.33	0.30		0.27	0.30			0.08		0.30	0.26	
Uniform Delay, d1	56.9	4.0		58.3	4.5			58.2		54.0	53.9	
Progression Factor	1.00	1.00		0.95	0.79			1.00		1.00	1.00	
Incremental Delay, d2	3.5	0.3		4.6	0.3			1.3		1.6	1.4	
Delay (s)	60.4	4.3		59.9	3.8			59.5		55.6	55.3	
Level of Service	E	A		E	A			E		E	E	
Approach Delay (s)		5.5			4.4			59.5			55.4	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM Average Control Delay	6.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	35.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



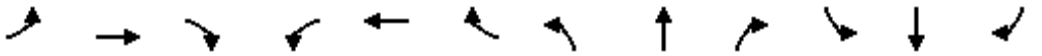
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	769	89	39	789	9	63	4	36	10	6	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3484		1770	3533		1770	1863	1583	1770	1645	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00	1.00	0.76	1.00	
Satd. Flow (perm)	1770	3484		1770	3533		1378	1863	1583	1407	1645	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	18	793	92	40	813	9	65	4	37	10	6	21
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	34	0	19	0
Lane Group Flow (vph)	18	882	0	40	822	0	65	4	3	10	8	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)	3.2	88.6		7.1	92.5		9.8	9.8	9.8	9.8	9.8	
Effective Green, g (s)	3.7	89.6		7.6	93.5		10.8	10.8	10.8	10.8	10.8	
Actuated g/C Ratio	0.03	0.75		0.06	0.78		0.09	0.09	0.09	0.09	0.09	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	55	2601		112	2753		124	168	142	127	148	
v/s Ratio Prot	0.01	c0.25		c0.02	c0.23			0.00			0.00	
v/s Ratio Perm							c0.05		0.00	0.01		
v/c Ratio	0.33	0.34		0.36	0.30		0.52	0.02	0.02	0.08	0.05	
Uniform Delay, d1	56.9	5.2		53.9	3.8		52.1	49.8	49.8	50.0	49.9	
Progression Factor	0.94	0.90		0.77	1.28		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.4	0.3		1.9	0.3		4.0	0.1	0.1	0.3	0.2	
Delay (s)	56.8	5.0		43.3	5.2		56.1	49.9	49.9	50.3	50.1	
Level of Service	E	A		D	A		E	D	D	D	D	
Approach Delay (s)		6.0			6.9			53.7			50.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



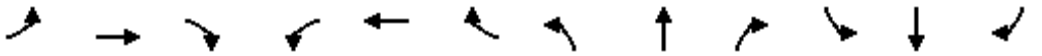
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	823	12	17	894	13	20	11	18	101	18	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1688		1770	1739	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.74	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1367	1688		1372	1739	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	895	13	18	972	14	22	12	20	110	20	16
RTOR Reduction (vph)	0	0	3	0	0	4	0	18	0	0	14	0
Lane Group Flow (vph)	22	895	10	18	972	10	22	15	0	110	22	0
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	3.4	88.7	88.7	3.3	88.6	88.6	15.0	15.0		15.0	15.0	
Effective Green, g (s)	3.4	89.7	89.7	3.3	89.6	89.6	15.0	15.0		15.0	15.0	
Actuated g/C Ratio	0.03	0.75	0.75	0.03	0.75	0.75	0.12	0.12		0.12	0.12	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	50	2645	1183	49	2642	1182	171	211		172	217	
v/s Ratio Prot	c0.01	0.25		0.01	c0.27			0.01			0.01	
v/s Ratio Perm			0.01			0.01	0.02			c0.08		
v/c Ratio	0.44	0.34	0.01	0.37	0.37	0.01	0.13	0.07		0.64	0.10	
Uniform Delay, d1	57.4	5.1	3.8	57.3	5.3	3.9	46.7	46.3		49.9	46.5	
Progression Factor	1.01	1.62	2.04	0.84	1.18	1.69	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.9	0.3	0.0	4.4	0.4	0.0	0.3	0.1		7.6	0.2	
Delay (s)	63.7	8.6	7.9	52.5	6.6	6.6	47.0	46.5		57.5	46.7	
Level of Service	E	A	A	D	A	A	D	D		E	D	
Approach Delay (s)		9.9			7.5			46.7			54.9	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



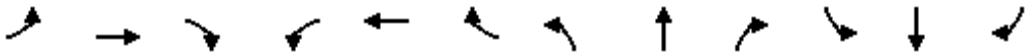
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	953	33	44	981	25	62	7	39	54	11	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3522		1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.75	1.00	1.00	0.75	1.00	1.00
Satd. Flow (perm)	1770	3522		1770	3539	1583	1397	1863	1583	1403	1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	18	1014	35	47	1044	27	66	7	41	57	12	20
RTOR Reduction (vph)	0	1	0	0	0	6	0	0	37	0	0	18
Lane Group Flow (vph)	18	1048	0	47	1044	21	66	7	4	57	12	2
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2		2	6		6
Actuated Green, G (s)	3.2	89.2		7.5	94.0	94.0	9.8	9.8	9.8	9.8	9.8	9.8
Effective Green, g (s)	2.7	90.2		7.5	95.0	95.0	10.3	10.3	10.3	10.3	10.3	10.3
Actuated g/C Ratio	0.02	0.75		0.06	0.79	0.79	0.09	0.09	0.09	0.09	0.09	0.09
Clearance Time (s)	3.5	5.0		4.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	40	2647		111	2802	1253	120	160	136	120	160	136
v/s Ratio Prot	0.01	c0.30		c0.03	0.29			0.00			0.01	
v/s Ratio Perm						0.01	c0.05		0.00	0.04		0.00
v/c Ratio	0.45	0.40		0.42	0.37	0.02	0.55	0.04	0.03	0.48	0.08	0.01
Uniform Delay, d1	57.9	5.3		54.2	3.7	2.6	52.6	50.3	50.3	52.3	50.5	50.2
Progression Factor	1.10	0.97		1.31	0.48	0.23	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.6	0.4		2.4	0.4	0.0	5.4	0.1	0.1	2.9	0.2	0.0
Delay (s)	71.2	5.6		73.2	2.1	0.6	58.0	50.4	50.3	55.2	50.7	50.2
Level of Service	E	A		E	A	A	E	D	D	E	D	D
Approach Delay (s)		6.7			5.1			54.8			53.5	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



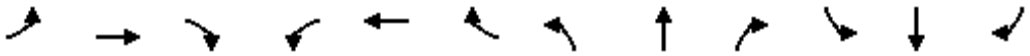
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	868	208	48	971	33	177	65	21	51	59	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3436		1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.72	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1770	3436		1770	3539	1583	1336	1863	1583	1328	1863	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	39	904	217	50	1011	34	184	68	22	53	61	29
RTOR Reduction (vph)	0	12	0	0	0	11	0	0	18	0	0	24
Lane Group Flow (vph)	39	1109	0	50	1011	23	184	68	4	53	61	5
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2		2	6		6
Actuated Green, G (s)	5.6	76.8		7.7	78.9	78.9	22.0	22.0	22.0	22.0	22.0	22.0
Effective Green, g (s)	5.6	77.8		7.7	79.9	79.9	22.5	22.5	22.5	22.5	22.5	22.5
Actuated g/C Ratio	0.05	0.65		0.06	0.67	0.67	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	83	2228		114	2356	1054	251	349	297	249	349	297
v/s Ratio Prot	0.02	c0.32		c0.03	0.29			0.04			0.03	
v/s Ratio Perm						0.01	c0.14		0.00	0.04		0.00
v/c Ratio	0.47	0.50		0.44	0.43	0.02	0.73	0.19	0.01	0.21	0.17	0.02
Uniform Delay, d1	55.8	11.0		54.1	9.4	6.8	45.9	41.1	39.7	41.3	41.0	39.7
Progression Factor	0.94	1.47		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	0.8		2.7	0.6	0.0	10.5	0.3	0.0	0.4	0.2	0.0
Delay (s)	56.5	16.9		56.8	10.0	6.8	56.5	41.4	39.7	41.7	41.2	39.8
Level of Service	E	B		E	A	A	E	D	D	D	D	D
Approach Delay (s)		18.2			12.0			51.4			41.1	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



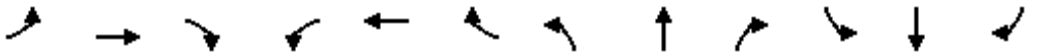
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	209	699	37	56	897	91	66	103	93	108	112	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3513		1770	3490		1770	3539	1583	1770	3221	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3513		1770	3490		1770	3539	1583	1770	3221	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	215	721	38	58	925	94	68	106	96	111	115	172
RTOR Reduction (vph)	0	2	0	0	4	0	0	0	88	0	153	0
Lane Group Flow (vph)	215	757	0	58	1015	0	68	106	8	111	134	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	22.7	85.4		9.5	72.2		10.3	11.1	11.1	14.0	14.8	
Effective Green, g (s)	23.2	87.4		10.0	74.2		10.8	12.1	12.1	14.5	15.8	
Actuated g/C Ratio	0.17	0.62		0.07	0.53		0.08	0.09	0.09	0.10	0.11	
Clearance Time (s)	4.5	6.0		4.5	6.0		4.5	5.0	5.0	4.5	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	293	2193		126	1850		137	306	137	183	364	
v/s Ratio Prot	c0.12	0.22		0.03	c0.29		0.04	0.03		c0.06	c0.04	
v/s Ratio Perm									0.01			
v/c Ratio	0.73	0.35		0.46	0.55		0.50	0.35	0.06	0.61	0.37	
Uniform Delay, d1	55.5	12.6		62.4	21.8		62.0	60.2	58.7	60.0	57.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.2	0.4		2.7	1.2		2.8	0.7	0.2	5.6	0.6	
Delay (s)	64.6	13.0		65.1	23.0		64.8	60.9	58.9	65.6	58.1	
Level of Service	E	B		E	C		E	E	E	E	E	
Approach Delay (s)		24.4			25.2			61.2			60.2	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM Average Control Delay	33.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



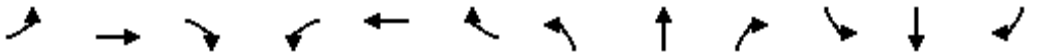
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	830	29	69	999	42	14	16	82	39	21	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.88		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3521		1770	3518		1770	1630		1770	1678	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3521		1770	3518		1770	1630		1770	1678	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	48	865	30	72	1041	44	15	17	85	41	22	43
RTOR Reduction (vph)	0	2	0	0	2	0	0	76	0	0	37	0
Lane Group Flow (vph)	48	893	0	72	1083	0	15	26	0	41	28	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	7.5	73.2		8.9	74.6		3.1	12.3		7.1	16.3	
Effective Green, g (s)	8.0	74.2		9.4	75.6		3.6	12.8		7.6	16.8	
Actuated g/C Ratio	0.07	0.62		0.08	0.63		0.03	0.11		0.06	0.14	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	2177		139	2216		53	174		112	235	
v/s Ratio Prot	0.03	0.25		c0.04	c0.31		0.01	c0.02		c0.02	c0.02	
v/s Ratio Perm												
v/c Ratio	0.41	0.41		0.52	0.49		0.28	0.15		0.37	0.12	
Uniform Delay, d1	53.7	11.7		53.1	11.9		56.9	48.7		53.9	45.1	
Progression Factor	1.00	1.00		0.94	0.86		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	0.6		3.1	0.7		2.9	0.4		2.0	0.2	
Delay (s)	56.0	12.3		52.9	10.9		59.9	49.1		55.9	45.4	
Level of Service	E	B		D	B		E	D		E	D	
Approach Delay (s)		14.5			13.5			50.4			49.4	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



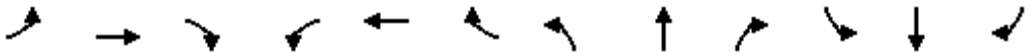
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	645	96	41	844	54	122	64	29	161	114	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3470		1770	3507		1770	3371		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.58	1.00		0.69	1.00	1.00
Satd. Flow (perm)	1770	3470		1770	3507		1083	3371		1286	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	19	679	101	43	888	57	128	67	31	169	120	27
RTOR Reduction (vph)	0	7	0	0	2	0	0	26	0	0	0	22
Lane Group Flow (vph)	19	773	0	43	943	0	128	72	0	169	120	5
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	3.3	77.2		7.2	81.1		21.1	21.1		21.1	21.1	21.1
Effective Green, g (s)	3.8	79.2		7.7	83.1		21.1	21.1		21.1	21.1	21.1
Actuated g/C Ratio	0.03	0.66		0.06	0.69		0.18	0.18		0.18	0.18	0.18
Clearance Time (s)	4.5	6.0		4.5	6.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	56	2290		114	2429		190	593		226	328	278
v/s Ratio Prot	0.01	0.22		c0.02	c0.27			0.02			0.06	
v/s Ratio Perm							0.12			c0.13		0.00
v/c Ratio	0.34	0.34		0.38	0.39		0.67	0.12		0.75	0.37	0.02
Uniform Delay, d1	56.9	8.9		53.9	7.8		46.2	41.6		46.9	43.6	40.9
Progression Factor	1.07	0.62		1.42	0.32		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.4	0.4		2.0	0.4		9.1	0.1		12.7	0.7	0.0
Delay (s)	64.0	5.9		78.3	2.9		55.3	41.7		59.6	44.3	40.9
Level of Service	E	A		E	A		E	D		E	D	D
Approach Delay (s)		7.3			6.2			49.4			52.2	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	726	39	66	933	25	58	33	50	13	13	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3512		1770	3525		3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3512		1770	3525		3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	789	42	72	1014	27	63	36	54	14	14	25
RTOR Reduction (vph)	0	2	0	0	1	0	0	0	49	0	0	23
Lane Group Flow (vph)	26	829	0	72	1040	0	63	36	5	14	14	2
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	5.0	76.5		9.0	80.5		7.2	11.0	11.0	3.0	6.8	6.8
Effective Green, g (s)	6.0	78.5		10.0	82.5		7.7	12.0	12.0	3.5	7.8	7.8
Actuated g/C Ratio	0.05	0.65		0.08	0.69		0.06	0.10	0.10	0.03	0.06	0.06
Clearance Time (s)	5.0	6.0		5.0	6.0		4.5	5.0	5.0	4.5	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	89	2297		148	2423		220	186	158	52	121	103
v/s Ratio Prot	0.01	0.24		c0.04	c0.30		c0.02	c0.02		0.01	0.01	
v/s Ratio Perm									0.00			0.00
v/c Ratio	0.29	0.36		0.49	0.43		0.29	0.19	0.03	0.27	0.12	0.02
Uniform Delay, d1	55.0	9.4		52.5	8.3		53.5	49.6	48.8	57.0	52.9	52.5
Progression Factor	0.89	1.41		1.21	0.60		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.4		2.4	0.5		0.7	0.5	0.1	2.8	0.4	0.1
Delay (s)	50.4	13.6		65.7	5.5		54.3	50.1	48.9	59.8	53.3	52.6
Level of Service	D	B		E	A		D	D	D	E	D	D
Approach Delay (s)		14.7			9.4			51.4			54.7	
Approach LOS		B			A			D			D	

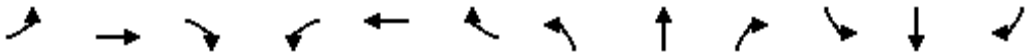
Intersection Summary			
HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	121	620	23	28	893	77	16	38	6	35	29	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3520		1770	3497		1770	1826		1770	1674	
Flt Permitted	0.95	1.00		0.95	1.00		0.59	1.00		0.73	1.00	
Satd. Flow (perm)	1770	3520		1770	3497		1091	1826		1354	1674	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	126	646	24	29	930	80	17	40	6	36	30	62
RTOR Reduction (vph)	0	1	0	0	3	0	0	5	0	0	56	0
Lane Group Flow (vph)	126	669	0	29	1007	0	17	41	0	36	36	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	13.8	88.9		5.1	80.2		10.5	10.5		10.5	10.5	
Effective Green, g (s)	14.3	90.9		5.6	82.2		11.5	11.5		11.5	11.5	
Actuated g/C Ratio	0.12	0.76		0.05	0.68		0.10	0.10		0.10	0.10	
Clearance Time (s)	4.5	6.0		4.5	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	211	2666		83	2395		105	175		130	160	
v/s Ratio Prot	c0.07	0.19		0.02	c0.29			0.02			0.02	
v/s Ratio Perm							0.02			c0.03		
v/c Ratio	0.60	0.25		0.35	0.42		0.16	0.23		0.28	0.22	
Uniform Delay, d1	50.1	4.4		55.4	8.4		49.8	50.2		50.4	50.1	
Progression Factor	1.04	0.88		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	0.2		2.5	0.5		0.7	0.7		1.2	0.7	
Delay (s)	56.6	4.1		58.0	8.9		50.6	50.8		51.6	50.8	
Level of Service	E	A		E	A		D	D		D	D	
Approach Delay (s)		12.4			10.3			50.8			51.0	
Approach LOS		B			B			D			D	

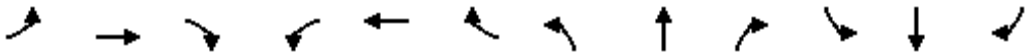
Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX D
GENERAL PLAN (2035) CONDITIONS LOS RESULTS



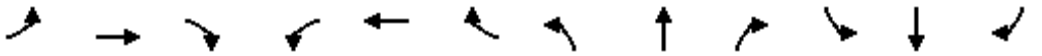
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	2160	40	10	2450	10	10	10	10	230	10	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00			0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	0.96	
Satd. Flow (prot)	1770	5071		1770	5082			1750		1681	1665	
Flt Permitted	0.95	1.00		0.95	1.00			0.98		0.95	0.96	
Satd. Flow (perm)	1770	5071		1770	5082			1750		1681	1665	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	11	2427	45	11	2753	11	11	11	11	258	11	22
RTOR Reduction (vph)	0	1	0	0	0	0	0	10	0	0	4	0
Lane Group Flow (vph)	11	2471	0	11	2764	0	0	23	0	147	140	0
Turn Type	Prot			Prot			Split			Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	0.7	69.9		0.7	69.9			4.6		13.6	13.6	
Effective Green, g (s)	1.2	71.9		1.2	71.9			5.1		14.1	14.1	
Actuated g/C Ratio	0.01	0.66		0.01	0.66			0.05		0.13	0.13	
Clearance Time (s)	4.5	6.0		4.5	6.0			4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	20	3367		20	3374			82		219	217	
v/s Ratio Prot	c0.01	0.49		0.01	c0.54			c0.01		c0.09	0.08	
v/s Ratio Perm												
v/c Ratio	0.55	0.73		0.55	0.82			0.27		0.67	0.64	
Uniform Delay, d1	53.3	11.9		53.3	13.4			49.8		44.9	44.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	28.9	0.9		28.9	1.6			1.8		7.8	6.4	
Delay (s)	82.2	12.8		82.2	15.1			51.6		52.7	51.1	
Level of Service	F	B		F	B			D		D	D	
Approach Delay (s)		13.1			15.3			51.6			51.9	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	108.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	2380	100	60	2300	20	50	30	70	20	20	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5054		1770	5079		1770	1863	1583	1770	1678	
Flt Permitted	0.95	1.00		0.95	1.00		0.71	1.00	1.00	0.74	1.00	
Satd. Flow (perm)	1770	5054		1770	5079		1331	1863	1583	1370	1678	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	2587	109	65	2500	22	54	33	76	22	22	43
RTOR Reduction (vph)	0	6	0	0	1	0	0	0	69	0	39	0
Lane Group Flow (vph)	33	2690	0	65	2521	0	54	33	7	22	26	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)	2.6	41.3		4.0	42.7		5.3	5.3	5.3	5.3	5.3	
Effective Green, g (s)	3.1	42.3		4.5	43.7		6.3	6.3	6.3	6.3	6.3	
Actuated g/C Ratio	0.05	0.65		0.07	0.67		0.10	0.10	0.10	0.10	0.10	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	84	3284		122	3409		129	180	153	133	162	
v/s Ratio Prot	0.02	c0.53		c0.04	0.50			0.02			0.02	
v/s Ratio Perm							c0.04		0.00	0.02		
v/c Ratio	0.39	0.82		0.53	0.74		0.42	0.18	0.05	0.17	0.16	
Uniform Delay, d1	30.1	8.5		29.3	7.0		27.7	27.0	26.7	27.0	27.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	1.7		4.4	0.9		2.2	0.5	0.1	0.6	0.5	
Delay (s)	33.1	10.2		33.7	7.9		29.9	27.5	26.8	27.6	27.4	
Level of Service	C	B		C	A		C	C	C	C	C	
Approach Delay (s)		10.5			8.5			28.0			27.5	
Approach LOS		B			A			C			C	

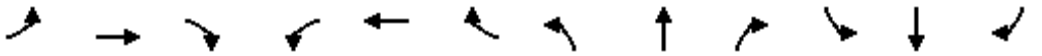
Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	65.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	2300	40	110	2130	30	40	40	60	180	50	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1695		1770	1711	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.67	1.00		0.69	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1246	1695		1284	1711	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	2421	42	116	2242	32	42	42	63	189	53	63
RTOR Reduction (vph)	0	0	17	0	0	12	0	50	0	0	50	0
Lane Group Flow (vph)	21	2421	25	116	2242	20	42	55	0	189	66	0
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	1.9	43.8	43.8	6.0	47.9	47.9	16.5	16.5		16.5	16.5	
Effective Green, g (s)	1.9	44.8	44.8	6.0	48.9	48.9	16.5	16.5		16.5	16.5	
Actuated g/C Ratio	0.02	0.56	0.56	0.08	0.62	0.62	0.21	0.21		0.21	0.21	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	42	2873	894	134	3136	976	259	353		267	356	
v/s Ratio Prot	0.01	c0.48		0.07	c0.44			0.03			0.04	
v/s Ratio Perm			0.02			0.01	0.03			c0.15		
v/c Ratio	0.50	0.84	0.03	0.87	0.71	0.02	0.16	0.16		0.71	0.19	
Uniform Delay, d1	38.2	14.3	7.6	36.3	10.4	5.9	25.7	25.7		29.2	25.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.1	2.4	0.0	40.3	0.8	0.0	0.3	0.2		8.3	0.3	
Delay (s)	47.3	16.7	7.6	76.6	11.2	5.9	26.0	25.9		37.5	26.1	
Level of Service	D	B	A	E	B	A	C	C		D	C	
Approach Delay (s)		16.8			14.3			25.9			33.1	
Approach LOS		B			B			C			C	

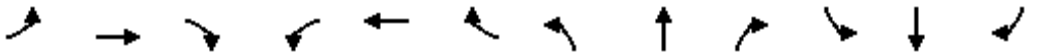
Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



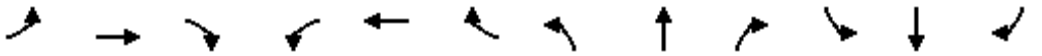
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	2400	40	60	2130	30	40	40	60	180	50	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5073		1770	5085	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.72	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)	1770	5073		1770	5085	1583	1345	1863	1583	1358	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	2609	43	65	2315	33	43	43	65	196	54	65
RTOR Reduction (vph)	0	2	0	0	0	12	0	0	52	0	0	52
Lane Group Flow (vph)	22	2650	0	65	2315	21	43	43	13	196	54	13
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2		2	6		6
Actuated Green, G (s)	1.8	52.1		5.1	55.9	55.9	17.7	17.7	17.7	17.7	17.7	17.7
Effective Green, g (s)	1.3	53.1		5.1	56.9	56.9	18.2	18.2	18.2	18.2	18.2	18.2
Actuated g/C Ratio	0.01	0.60		0.06	0.64	0.64	0.21	0.21	0.21	0.21	0.21	0.21
Clearance Time (s)	3.5	5.0		4.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	26	3047		102	3273	1019	277	384	326	280	384	326
v/s Ratio Prot	0.01	c0.52		c0.04	0.46			0.02			0.03	
v/s Ratio Perm						0.01	0.03		0.01	c0.14		0.01
v/c Ratio	0.85	0.87		0.64	0.71	0.02	0.16	0.11	0.04	0.70	0.14	0.04
Uniform Delay, d1	43.5	14.8		40.7	10.3	5.7	28.8	28.5	28.1	32.6	28.7	28.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	109.6	2.9		12.3	0.7	0.0	0.3	0.1	0.1	7.7	0.2	0.1
Delay (s)	153.1	17.7		53.1	11.0	5.7	29.1	28.7	28.2	40.2	28.9	28.2
Level of Service	F	B		D	B	A	C	C	C	D	C	C
Approach Delay (s)		18.8			12.1			28.6			35.8	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	88.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



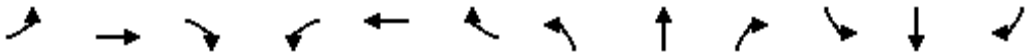
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	1100	20	40	2060	300	250	30	40	70	60	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5071		1770	5085	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.71	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)	1770	5071		1770	5085	1583	1331	1863	1583	1372	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	86	1183	22	43	2215	323	269	32	43	75	65	54
RTOR Reduction (vph)	0	2	0	0	0	159	0	0	31	0	0	39
Lane Group Flow (vph)	86	1203	0	43	2215	164	269	32	12	75	65	15
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2		2	6		6
Actuated Green, G (s)	4.9	38.9		3.5	37.5	37.5	19.9	19.9	19.9	19.9	19.9	19.9
Effective Green, g (s)	4.9	39.9		3.5	38.5	38.5	20.4	20.4	20.4	20.4	20.4	20.4
Actuated g/C Ratio	0.06	0.53		0.05	0.51	0.51	0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	114	2669		82	2583	804	358	501	426	369	501	426
v/s Ratio Prot	c0.05	0.24		0.02	c0.44			0.02			0.03	
v/s Ratio Perm						0.10	c0.20		0.01	0.05		0.01
v/c Ratio	0.75	0.45		0.52	0.86	0.20	0.75	0.06	0.03	0.20	0.13	0.03
Uniform Delay, d1	34.9	11.1		35.3	16.3	10.2	25.4	20.6	20.4	21.4	21.0	20.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		5.9	3.0	0.1	8.6	0.1	0.0	0.3	0.1	0.0
Delay (s)	59.1	11.3		41.3	19.3	10.4	34.0	20.7	20.4	21.7	21.1	20.5
Level of Service	E	B		D	B	B	C	C	C	C	C	C
Approach Delay (s)		14.5			18.5			31.0			21.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	75.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



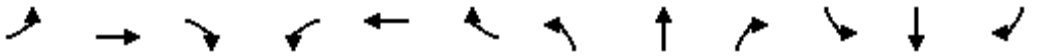
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	750	230	530	1760	30	120	320	110	300	120	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5072		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5072		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	815	250	576	1913	33	130	348	120	326	130	500
RTOR Reduction (vph)	0	0	185	0	1	0	0	0	101	0	0	197
Lane Group Flow (vph)	65	815	65	576	1945	0	130	348	19	326	130	303
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	8.8	29.0	29.0	30.2	50.4		13.9	17.6	17.6	23.2	26.9	26.9
Effective Green, g (s)	9.3	31.0	31.0	30.7	52.4		14.4	18.6	18.6	23.7	27.9	27.9
Actuated g/C Ratio	0.08	0.26	0.26	0.26	0.44		0.12	0.16	0.16	0.20	0.23	0.23
Clearance Time (s)	4.5	6.0	6.0	4.5	6.0		4.5	5.0	5.0	4.5	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	137	1314	409	878	2215		212	549	245	350	823	368
v/s Ratio Prot	0.04	c0.16		0.17	c0.38		0.07	0.10		c0.18	0.04	
v/s Ratio Perm			0.04						0.01			c0.19
v/c Ratio	0.47	0.62	0.16	0.66	0.88		0.61	0.63	0.08	0.93	0.16	0.82
Uniform Delay, d1	53.0	39.3	34.4	39.9	30.9		50.2	47.5	43.4	47.4	36.7	43.7
Progression Factor	1.00	1.00	1.00	0.56	0.43		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	2.2	0.8	1.3	4.0		5.2	2.4	0.1	31.0	0.1	13.8
Delay (s)	55.6	41.5	35.2	23.7	17.3		55.3	49.9	43.5	78.3	36.8	57.5
Level of Service	E	D	D	C	B		E	D	D	E	D	E
Approach Delay (s)		40.9			18.8			49.8			61.8	
Approach LOS		D			B			D			E	

Intersection Summary			
HCM Average Control Delay	35.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



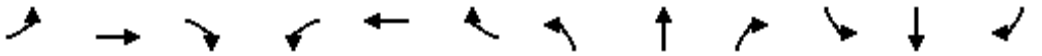
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	930	130	50	2070	80	40	30	140	130	50	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.88		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4992		1770	5057		1770	1633		1770	1700	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4992		1770	5057		1770	1633		1770	1700	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	74	979	137	53	2179	84	42	32	147	137	53	74
RTOR Reduction (vph)	0	14	0	0	3	0	0	133	0	0	43	0
Lane Group Flow (vph)	74	1102	0	53	2260	0	42	46	0	137	84	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.8	69.6		6.2	69.0		5.6	11.3		14.4	20.1	
Effective Green, g (s)	7.3	70.6		6.7	70.0		6.1	11.8		14.9	20.6	
Actuated g/C Ratio	0.06	0.59		0.06	0.58		0.05	0.10		0.12	0.17	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	108	2937		99	2950		90	161		220	292	
v/s Ratio Prot	c0.04	0.22		0.03	c0.45		c0.02	c0.03		c0.08	0.05	
v/s Ratio Perm												
v/c Ratio	0.69	0.38		0.54	0.77		0.47	0.29		0.62	0.29	
Uniform Delay, d1	55.2	13.0		55.1	18.8		55.4	50.2		49.9	43.3	
Progression Factor	0.67	0.32		0.89	0.62		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.2	0.3		2.6	0.9		3.8	1.0		5.4	0.5	
Delay (s)	50.3	4.4		51.5	12.6		59.2	51.2		55.3	43.9	
Level of Service	D	A		D	B		E	D		E	D	
Approach Delay (s)		7.3			13.5			52.7			49.8	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



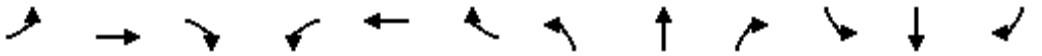
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	870	90	40	2000	110	130	160	200	80	100	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5014		1770	5046		1770	3245		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.69	1.00		0.40	1.00	1.00
Satd. Flow (perm)	1770	5014		1770	5046		1277	3245		745	1863	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	178	967	100	44	2222	122	144	178	222	89	111	44
RTOR Reduction (vph)	0	18	0	0	11	0	0	185	0	0	0	37
Lane Group Flow (vph)	178	1049	0	44	2333	0	144	215	0	89	111	7
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	9.2	33.4		2.1	26.3		10.0	10.0		10.0	10.0	10.0
Effective Green, g (s)	9.7	35.4		2.6	28.3		10.0	10.0		10.0	10.0	10.0
Actuated g/C Ratio	0.16	0.59		0.04	0.47		0.17	0.17		0.17	0.17	0.17
Clearance Time (s)	4.5	6.0		4.5	6.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	286	2958		77	2380		213	541		124	311	264
v/s Ratio Prot	c0.10	0.21		0.02	c0.46			0.07			0.06	
v/s Ratio Perm							0.11			c0.12		0.00
v/c Ratio	0.62	0.35		0.57	0.98		0.68	0.40		0.72	0.36	0.03
Uniform Delay, d1	23.4	6.4		28.2	15.6		23.5	22.3		23.7	22.2	20.9
Progression Factor	1.36	0.93		1.04	1.07		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.9	0.3		7.1	11.5		8.2	0.5		17.9	0.7	0.0
Delay (s)	35.7	6.2		36.2	28.3		31.7	22.8		41.6	22.9	21.0
Level of Service	D	A		D	C		C	C		D	C	C
Approach Delay (s)		10.4			28.4			25.1			29.3	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



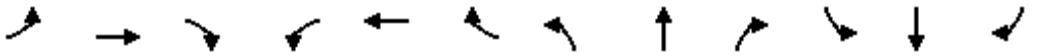
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	970	30	90	2030	100	60	70	100	50	90	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91		0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5063		1770	5049		3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5063		1770	5049		3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	108	1043	32	97	2183	108	65	75	108	54	97	65
RTOR Reduction (vph)	0	2	0	0	4	0	0	0	97	0	0	57
Lane Group Flow (vph)	108	1073	0	97	2287	0	65	75	11	54	97	8
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	11.4	71.1		10.7	70.4		4.5	10.9	10.9	6.8	13.2	13.2
Effective Green, g (s)	12.4	73.1		11.7	72.4		5.0	11.9	11.9	7.3	14.2	14.2
Actuated g/C Ratio	0.10	0.61		0.10	0.60		0.04	0.10	0.10	0.06	0.12	0.12
Clearance Time (s)	5.0	6.0		5.0	6.0		4.5	5.0	5.0	4.5	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	183	3084		173	3046		143	185	157	108	220	187
v/s Ratio Prot	c0.06	0.21		0.05	c0.45		0.02	0.04		c0.03	c0.05	
v/s Ratio Perm									0.01			0.00
v/c Ratio	0.59	0.35		0.56	0.75		0.45	0.41	0.07	0.50	0.44	0.04
Uniform Delay, d1	51.4	11.6		51.7	17.3		56.2	50.7	49.0	54.6	49.2	46.9
Progression Factor	0.91	0.62		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.7	0.3		4.1	1.8		2.3	1.5	0.2	3.6	1.4	0.1
Delay (s)	51.2	7.5		55.8	19.0		58.5	52.2	49.2	58.2	50.6	47.0
Level of Service	D	A		E	B		E	D	D	E	D	D
Approach Delay (s)		11.5			20.5			52.5			51.4	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM Average Control Delay	21.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



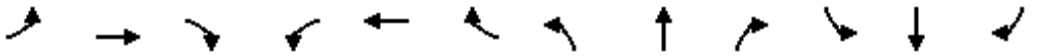
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	780	40	80	1980	340	120	50	90	40	290	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	1683		1770	1791	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.19	1.00		0.61	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	690	1683		1142	1791	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	848	43	87	2152	370	130	54	98	43	315	109
RTOR Reduction (vph)	0	0	22	0	0	189	0	71	0	0	14	0
Lane Group Flow (vph)	120	848	21	87	2152	181	130	81	0	43	410	0
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	7.5	40.7	40.7	7.0	40.2	40.2	23.1	23.1		23.1	23.1	
Effective Green, g (s)	8.0	42.7	42.7	7.5	42.2	42.2	24.1	24.1		24.1	24.1	
Actuated g/C Ratio	0.09	0.49	0.49	0.09	0.49	0.49	0.28	0.28		0.28	0.28	
Clearance Time (s)	4.5	6.0	6.0	4.5	6.0	6.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	164	2516	783	154	2487	774	193	470		319	500	
v/s Ratio Prot	c0.07	0.17		0.05	c0.42			0.05			c0.23	
v/s Ratio Perm			0.01			0.11	0.19			0.04		
v/c Ratio	0.73	0.34	0.03	0.56	0.87	0.23	0.67	0.17		0.13	0.82	
Uniform Delay, d1	38.1	13.2	11.2	37.8	19.5	12.7	27.6	23.6		23.3	29.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.4	0.1	0.0	4.7	3.4	0.2	8.9	0.2		0.2	10.1	
Delay (s)	53.6	13.3	11.2	42.5	22.9	12.9	36.5	23.7		23.5	39.2	
Level of Service	D	B	B	D	C	B	D	C		C	D	
Approach Delay (s)		18.0			22.2			29.6			37.7	
Approach LOS		B			C			C			D	

Intersection Summary			
HCM Average Control Delay	23.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	86.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



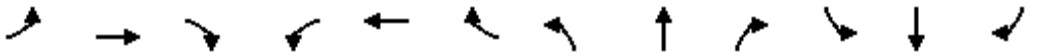
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	2230	250	60	2070	10	10	10	10	240	10	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00		0.95	0.95	
Frt	1.00	0.98		1.00	1.00			0.96		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	0.97	
Satd. Flow (prot)	1770	5008		1770	5082			1750		1681	1642	
Flt Permitted	0.95	1.00		0.95	1.00			0.98		0.95	0.97	
Satd. Flow (perm)	1770	5008		1770	5082			1750		1681	1642	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	20	2276	255	61	2112	10	10	10	10	245	10	41
RTOR Reduction (vph)	0	8	0	0	0	0	0	10	0	0	11	0
Lane Group Flow (vph)	20	2523	0	61	2122	0	0	20	0	149	136	0
Turn Type	Prot			Prot			Split			Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	3.3	73.0		6.7	76.4			4.9		15.9	15.9	
Effective Green, g (s)	3.8	75.0		7.2	78.4			5.4		16.4	16.4	
Actuated g/C Ratio	0.03	0.62		0.06	0.65			0.05		0.14	0.14	
Clearance Time (s)	4.5	6.0		4.5	6.0			4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	56	3130		106	3320			79		230	224	
v/s Ratio Prot	0.01	c0.50		0.03	c0.42			c0.01		c0.09	0.08	
v/s Ratio Perm												
v/c Ratio	0.36	0.81		0.58	0.64			0.26		0.65	0.61	
Uniform Delay, d1	56.9	17.0		54.9	12.4			55.4		49.1	48.8	
Progression Factor	1.00	1.00		0.87	0.66			1.00		1.00	1.00	
Incremental Delay, d2	3.9	2.3		5.9	0.8			1.7		6.2	4.6	
Delay (s)	60.8	19.3		53.4	8.9			57.1		55.2	53.3	
Level of Service	E	B		D	A			E		E	D	
Approach Delay (s)		19.7			10.1			57.1			54.3	
Approach LOS		B			B			E			D	

Intersection Summary			
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



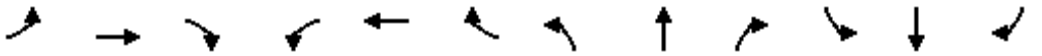
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	2300	60	90	2110	70	20	20	70	130	20	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5066		1770	5061		1770	1863	1583	1770	1664	
Flt Permitted	0.95	1.00		0.95	1.00		0.71	1.00	1.00	0.74	1.00	
Satd. Flow (perm)	1770	5066		1770	5061		1322	1863	1583	1385	1664	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	41	2371	62	93	2175	72	21	21	72	134	21	52
RTOR Reduction (vph)	0	4	0	0	5	0	0	0	64	0	46	0
Lane Group Flow (vph)	41	2429	0	93	2242	0	21	21	8	134	27	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)	2.8	32.5		7.4	37.1		5.6	5.6	5.6	5.6	5.6	
Effective Green, g (s)	3.3	33.5		7.9	38.1		6.6	6.6	6.6	6.6	6.6	
Actuated g/C Ratio	0.06	0.56		0.13	0.64		0.11	0.11	0.11	0.11	0.11	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	97	2829		233	3214		145	205	174	152	183	
v/s Ratio Prot	0.02	c0.48		c0.05	c0.44			0.01			0.02	
v/s Ratio Perm							0.02		0.01	c0.10		
v/c Ratio	0.42	0.86		0.40	0.70		0.14	0.10	0.05	0.88	0.15	
Uniform Delay, d1	27.4	11.2		23.9	7.2		24.1	24.0	23.9	26.3	24.2	
Progression Factor	1.00	1.52		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.9	2.4		1.1	1.3		0.5	0.2	0.1	40.5	0.4	
Delay (s)	29.3	19.5		25.0	8.5		24.6	24.3	24.0	66.8	24.5	
Level of Service	C	B		C	A		C	C	C	E	C	
Approach Delay (s)		19.6			9.1			24.2			51.9	
Approach LOS		B			A			C			D	

Intersection Summary			
HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



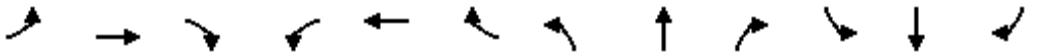
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	2450	90	160	2140	60	40	50	40	200	90	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1739		1770	1723	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.46	1.00		0.67	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	861	1739		1254	1723	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	2663	98	174	2326	65	43	54	43	217	98	98
RTOR Reduction (vph)	0	0	33	0	0	22	0	28	0	0	35	0
Lane Group Flow (vph)	43	2663	65	174	2326	43	43	69	0	217	161	0
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Actuated Green, G (s)	4.6	57.9	57.9	11.0	64.3	64.3	22.1	22.1		22.1	22.1	
Effective Green, g (s)	4.6	58.9	58.9	11.0	65.3	65.3	22.1	22.1		22.1	22.1	
Actuated g/C Ratio	0.04	0.57	0.57	0.11	0.63	0.63	0.21	0.21		0.21	0.21	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	78	2880	897	187	3193	994	183	370		266	366	
v/s Ratio Prot	0.02	c0.52		c0.10	0.46			0.04			0.09	
v/s Ratio Perm			0.04			0.03	0.05			c0.17		
v/c Ratio	0.55	0.92	0.07	0.93	0.73	0.04	0.23	0.19		0.82	0.44	
Uniform Delay, d1	48.7	20.5	10.2	46.1	13.3	7.4	33.9	33.6		39.0	35.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.2	5.7	0.0	46.2	0.9	0.0	0.7	0.2		17.3	0.8	
Delay (s)	56.9	26.3	10.2	92.3	14.1	7.4	34.6	33.8		56.3	36.4	
Level of Service	E	C	B	F	B	A	C	C		E	D	
Approach Delay (s)		26.2			19.3			34.1			46.8	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	104.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



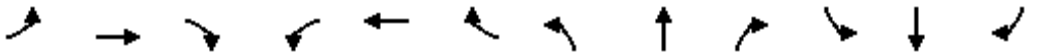
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	2440	80	60	2180	50	100	10	80	160	30	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5061		1770	5085	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.74	1.00	1.00	0.75	1.00	1.00
Satd. Flow (perm)	1770	5061		1770	5085	1583	1372	1863	1583	1398	1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	74	2596	85	64	2319	53	106	11	85	170	32	106
RTOR Reduction (vph)	0	4	0	0	0	20	0	0	73	0	0	91
Lane Group Flow (vph)	74	2677	0	64	2319	33	106	11	12	170	32	15
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2		2	6		6
Actuated Green, G (s)	5.6	44.1		4.2	43.2	43.2	9.5	9.5	9.5	9.5	9.5	9.5
Effective Green, g (s)	5.1	45.1		4.2	44.2	44.2	10.0	10.0	10.0	10.0	10.0	10.0
Actuated g/C Ratio	0.07	0.63		0.06	0.62	0.62	0.14	0.14	0.14	0.14	0.14	0.14
Clearance Time (s)	3.5	5.0		4.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	127	3201		104	3152	981	192	261	222	196	261	222
v/s Ratio Prot	c0.04	c0.53		0.04	0.46			0.01			0.02	
v/s Ratio Perm						0.02	0.08		0.01	c0.12		0.01
v/c Ratio	0.58	0.84		0.62	0.74	0.03	0.55	0.04	0.05	0.87	0.12	0.07
Uniform Delay, d1	32.1	10.2		32.8	9.5	5.3	28.6	26.5	26.6	30.0	26.8	26.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.7	2.0		10.3	0.9	0.0	3.4	0.1	0.1	30.8	0.2	0.1
Delay (s)	38.7	12.3		43.1	10.4	5.3	32.0	26.6	26.7	60.8	27.0	26.7
Level of Service	D	B		D	B	A	C	C	C	E	C	C
Approach Delay (s)		13.0			11.1			29.4			45.5	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



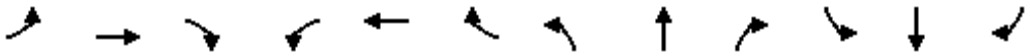
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	2370	120	60	1930	250	240	80	30	110	60	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5049		1770	5085	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.72	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	1770	5049		1770	5085	1583	1335	1863	1583	1310	1863	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	83	2469	125	62	2010	260	250	83	31	115	62	42
RTOR Reduction (vph)	0	6	0	0	0	116	0	0	23	0	0	32
Lane Group Flow (vph)	83	2588	0	62	2010	144	250	83	8	115	62	10
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2		2	6		6
Actuated Green, G (s)	4.7	47.0		3.9	46.2	46.2	20.6	20.6	20.6	20.6	20.6	20.6
Effective Green, g (s)	4.7	48.0		3.9	47.2	47.2	21.1	21.1	21.1	21.1	21.1	21.1
Actuated g/C Ratio	0.06	0.56		0.05	0.56	0.56	0.25	0.25	0.25	0.25	0.25	0.25
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	98	2851		81	2824	879	331	462	393	325	462	393
v/s Ratio Prot	c0.05	c0.51		0.04	0.40			0.04			0.03	
v/s Ratio Perm						0.09	c0.19		0.00	0.09		0.01
v/c Ratio	0.85	0.91		0.77	0.71	0.16	0.76	0.18	0.02	0.35	0.13	0.03
Uniform Delay, d1	39.8	16.5		40.1	13.9	9.2	29.6	25.1	24.1	26.3	24.8	24.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	45.5	4.7		34.2	0.9	0.1	9.4	0.2	0.0	0.7	0.1	0.0
Delay (s)	85.3	21.2		74.3	14.8	9.3	39.0	25.3	24.2	27.0	25.0	24.2
Level of Service	F	C		E	B	A	D	C	C	C	C	C
Approach Delay (s)		23.2			15.7			34.6			25.9	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



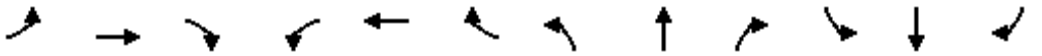
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	2240	120	660	1370	160	190	170	130	140	320	670
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5005		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5005		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	103	2309	124	680	1412	165	196	175	134	144	330	691
RTOR Reduction (vph)	0	0	46	0	12	0	0	0	120	0	0	15
Lane Group Flow (vph)	103	2309	78	680	1565	0	196	175	14	144	330	676
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4						2			6
Actuated Green, G (s)	31.6	51.1	51.1	20.5	40.0		12.0	11.3	11.3	17.1	16.4	48.0
Effective Green, g (s)	32.1	53.1	53.1	21.0	42.0		12.5	12.3	12.3	17.6	17.4	49.0
Actuated g/C Ratio	0.27	0.44	0.44	0.18	0.35		0.10	0.10	0.10	0.15	0.14	0.41
Clearance Time (s)	4.5	6.0	6.0	4.5	6.0		4.5	5.0	5.0	4.5	5.0	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	473	2250	700	601	1752		184	363	162	260	513	646
v/s Ratio Prot	0.06	c0.45		c0.20	0.31		c0.11	0.05		0.08	0.09	c0.28
v/s Ratio Perm			0.05						0.01			0.15
v/c Ratio	0.22	1.03	0.11	1.13	0.89		1.07	0.48	0.08	0.55	0.64	1.05
Uniform Delay, d1	34.2	33.4	19.6	49.5	36.9		53.8	50.8	48.8	47.6	48.4	35.5
Progression Factor	1.00	1.00	1.00	0.55	0.38		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	26.0	0.3	74.1	5.6		84.7	1.0	0.2	2.5	2.8	48.0
Delay (s)	34.4	59.5	19.9	101.2	19.7		138.5	51.9	49.0	50.1	51.1	83.5
Level of Service	C	E	B	F	B		F	D	D	D	D	F
Approach Delay (s)		56.5			44.3			84.7			70.2	
Approach LOS		E			D			F			E	

Intersection Summary			
HCM Average Control Delay	56.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



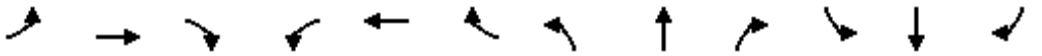
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	2300	60	70	2050	40	20	20	120	90	40	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5066		1770	5071		1770	1624		1770	1708	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5066		1770	5071		1770	1624		1770	1708	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	83	2396	62	73	2135	42	21	21	125	94	42	52
RTOR Reduction (vph)	0	2	0	0	2	0	0	114	0	0	36	0
Lane Group Flow (vph)	83	2456	0	73	2175	0	21	32	0	94	58	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	10.1	70.3		7.6	67.8		4.2	10.3		13.3	19.4	
Effective Green, g (s)	10.6	71.3		8.1	68.8		4.7	10.8		13.8	19.9	
Actuated g/C Ratio	0.09	0.59		0.07	0.57		0.04	0.09		0.12	0.17	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	156	3010		119	2907		69	146		204	283	
v/s Ratio Prot	0.05	c0.48		0.04	c0.43		0.01	0.02		c0.05	c0.03	
v/s Ratio Perm												
v/c Ratio	0.53	0.82		0.61	0.75		0.30	0.22		0.46	0.21	
Uniform Delay, d1	52.3	19.2		54.4	19.1		56.1	50.7		49.6	43.2	
Progression Factor	0.57	0.20		1.10	0.52		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.8		4.3	0.8		2.5	0.8		1.6	0.4	
Delay (s)	30.6	4.6		64.4	10.8		58.6	51.5		51.3	43.6	
Level of Service	C	A		E	B		E	D		D	D	
Approach Delay (s)		5.4			12.5			52.4			47.4	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



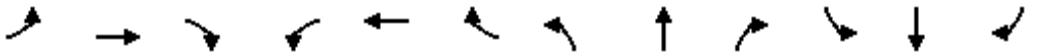
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	2160	190	40	1970	140	140	90	180	290	80	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5024		1770	5035		1770	3186		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.70	1.00		0.53	1.00	1.00
Satd. Flow (perm)	1770	5024		1770	5035		1308	3186		980	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	168	2274	200	42	2074	147	147	95	189	305	84	53
RTOR Reduction (vph)	0	8	0	0	6	0	0	45	0	0	0	36
Lane Group Flow (vph)	168	2466	0	42	2215	0	147	239	0	305	84	17
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	12.5	63.3		4.0	54.8		38.2	38.2		38.2	38.2	38.2
Effective Green, g (s)	13.0	65.3		4.5	56.8		38.2	38.2		38.2	38.2	38.2
Actuated g/C Ratio	0.11	0.54		0.04	0.47		0.32	0.32		0.32	0.32	0.32
Clearance Time (s)	4.5	6.0		4.5	6.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	192	2734		66	2383		416	1014		312	593	504
v/s Ratio Prot	0.09	c0.49		0.02	c0.44			0.08			0.05	
v/s Ratio Perm							0.11			c0.31		0.01
v/c Ratio	0.88	0.90		0.64	0.93		0.35	0.24		0.98	0.14	0.03
Uniform Delay, d1	52.7	24.5		56.9	29.7		31.4	30.1		40.5	29.2	28.2
Progression Factor	1.23	0.33		0.84	0.65		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	23.5	3.6		12.4	5.5		0.5	0.1		44.4	0.1	0.0
Delay (s)	88.5	11.7		60.5	24.9		31.9	30.3		84.8	29.3	28.2
Level of Service	F	B		E	C		C	C		F	C	C
Approach Delay (s)		16.6			25.6			30.8			67.5	
Approach LOS		B			C			C			E	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	2400	40	50	1730	120	320	70	120	30	70	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91		0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5073		1770	5036		3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5073		1770	5036		3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	2609	43	54	1880	130	348	76	130	33	76	109
RTOR Reduction (vph)	0	1	0	0	7	0	0	0	99	0	0	96
Lane Group Flow (vph)	109	2651	0	54	2003	0	348	76	31	33	76	13
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	13.7	66.2		6.7	59.2		13.6	22.9	22.9	3.7	13.0	13.0
Effective Green, g (s)	14.7	68.2		7.7	61.2		14.1	23.9	23.9	4.2	14.0	14.0
Actuated g/C Ratio	0.12	0.57		0.06	0.51		0.12	0.20	0.20	0.04	0.12	0.12
Clearance Time (s)	5.0	6.0		5.0	6.0		4.5	5.0	5.0	4.5	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	217	2883		114	2568		403	371	315	62	217	185
v/s Ratio Prot	0.06	c0.52		0.03	c0.40		c0.10	0.04		0.02	c0.04	
v/s Ratio Perm									0.02			0.01
v/c Ratio	0.50	0.92		0.47	0.78		0.86	0.20	0.10	0.53	0.35	0.07
Uniform Delay, d1	49.2	23.4		54.2	23.9		52.0	40.1	39.3	56.9	48.8	47.2
Progression Factor	0.84	0.70		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	3.2		3.1	2.4		17.1	0.3	0.1	8.5	1.0	0.2
Delay (s)	42.1	19.5		57.3	26.3		69.1	40.4	39.4	65.4	49.8	47.4
Level of Service	D	B		E	C		E	D	D	E	D	D
Approach Delay (s)		20.4			27.2			58.2			50.9	
Approach LOS		C			C			E			D	

Intersection Summary			
HCM Average Control Delay	27.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	2300	100	150	1400	280	400	360	80	70	90	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	1812		1770	1716	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	1812		1770	1716	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	125	2396	104	156	1458	292	417	375	83	73	94	104
RTOR Reduction (vph)	0	0	35	0	0	108	0	6	0	0	30	0
Lane Group Flow (vph)	125	2396	69	156	1458	184	417	452	0	73	168	0
Turn Type	Prot		Perm	Prot		pm+ov	Prot			Prot		
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	14.1	62.6	62.6	11.9	60.4	66.4	16.0	34.3		6.0	24.3	
Effective Green, g (s)	14.6	64.6	64.6	12.4	62.4	66.4	16.0	35.3		6.0	25.3	
Actuated g/C Ratio	0.11	0.48	0.48	0.09	0.46	0.49	0.12	0.26		0.04	0.19	
Clearance Time (s)	4.5	6.0	6.0	4.5	6.0	4.0	4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	192	2446	761	163	2363	783	409	476		79	323	
v/s Ratio Prot	0.07	c0.47		c0.09	0.29	0.01	c0.12	c0.25		0.04	0.10	
v/s Ratio Perm			0.04			0.11						
v/c Ratio	0.65	0.98	0.09	0.96	0.62	0.23	1.02	0.95		0.92	0.52	
Uniform Delay, d1	57.4	34.2	18.9	60.7	27.0	19.4	59.2	48.6		63.9	49.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.7	13.6	0.1	57.2	0.5	0.2	49.6	28.6		75.4	1.5	
Delay (s)	65.1	47.8	19.0	117.9	27.5	19.6	108.7	77.2		139.3	50.5	
Level of Service	E	D	B	F	C	B	F	E		F	D	
Approach Delay (s)		47.5			33.7			92.2			74.5	
Approach LOS		D			C			F			E	

Intersection Summary			
HCM Average Control Delay	51.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	134.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX E

EXISTING AND FUTURE TRAFFIC MODEL ADT VOLUMES

EXISTING ROADWAY VOLUME

Street Name and Segment	Classification	Traffic Volume
Acoma Trail		
South of SR-62	Collector	2,430
North of Mountain View	Collector	2,357
South of Joshua Drive	Collector	713
Avalon Avenue		
North of Sunnyslope Drive	Collector	2,707
North of SR-62	Collector	1,374
Balsa Avenue		
North of Outer Highway	Collector	6,121
South of SR-62	Collector	5,973
Buena Vista Drive		
West of Yucca Mesa Road	Collector	2,332
East of Balsa Avenue	Collector	3,469
Between Roberts Road and Faith Lane	Collector	3,638
Between Newton Lane and Rowell Road	Collector	3,643
Camino del Cielo Trail		
North of SR-62	Collector	1,552
Joshua Drive		
East of Acoma Trail	Collector	1,810
West of Barberry Avenue	Collector	2,277
East of Emerson Avenue	Collector	1,164

EXISTING ROADWAY VOLUME

Street Name and Segment	Classification	Traffic Volume
Joshua Lane		
South of Joshua Drive	Collector	4,311
North of Onaga Trail	2-Lane Arterial	4,953
North of Pueblo Trail	2-Lane Arterial	5,090
Between Yucca Trail and Outer Highway	2-Lane Arterial	7,022
Kickapoo Trail		
South of SR-62	Collector	2,790
La Contenta Road		
South of SR-62	Collector	2,230
North of Yucca Trail	Collector	2,170
Onaga Trail		
East of Alaba Avenue	Collector	1,782
East of Elata Avenue	Collector	2,966
West of Joshua Lane	2-Lane Arterial	3,734
West of Sage Avenue	2-Lane Arterial	4,765
East of Acoma Trail	2-Lane Arterial	3,544
East of Elk Trail	2-Lane Arterial	3,017
West of Jemez Trail	2-Lane Arterial	1,620
Palm Avenue		
North of Pueblo Trail	Collector	1,207
Palomar Avenue		
South of Yucca Trail	Collector	4,423
North of Joshua Lane	Collector	836
Paxton Road		
East of SR-247	Collector	1,522
Pioneertown Road		
North of SR-62	Collector	2,238
South of Town Limits	Collector	981

EXISTING ROADWAY VOLUME

Street Name and Segment	Classification	Traffic Volume
Sage Avenue		
North of SR-62	Collector	2,142
West of Yucca Trail	Collector	4,341
North of Onaga Trail	Collector	4,122
Santa Fe Trail		
West of Cherokee Trail	Collector	730
East of Kickapoo Trail	Collector	505
SR-62/Twentynine Palms Road		
West of Camino Del Cielo	4-Lane Arterial, Divided	25,500
West of Pioneertown Road	4-Lane Arterial, Divided	28,500
West of SR-247	4-Lane Arterial, Divided	28,500
West of Yucca Mesa Road	4-Lane Arterial, Divided	21,000
SR-247/Old Woman Springs Rd		
North of SR-62	2-Lane Arterial	12,000
Sunnyslope Avenue		
West of SR-247	Collector	1,686
Warren Vista Avenue		
South of SR-62	Collector	2,801
Yucca Trail		
East of Cherokee Trail	Industrial	1,334
East of Miami Trail	Industrial	1,921
West of La Contenta Road	2-Lane Arterial	6,058
East of Hanford Avenue	2-Lane Arterial	7,442
West of Joshua View Drive	2-Lane Arterial	8,083
West of Condalia Avenue	2-Lane Arterial	6,923
Yucca Mesa Road		
North of SR-62	Collector	4,914
North of Buena Vista Drive	Collector	2,733

Source: Town of Yucca Valley Traffic Counts (2011), Caltrans Traffic Data (2010)

FUTURE YEAR (2035) ROADWAY VOLUME

Street Name and Segment	Classification	Traffic Volume
Acoma Trail		
South of SR-62	2-Lane Arterial	3,530
North of Mountain View	2-Lane Arterial	10,570
South of Joshua Drive	2-Lane Arterial	3,300
Avalon Avenue		
North of Sunnyslope Drive	2-Lane Arterial	5,870
North of SR-62	Collector	10,970
Balsa Avenue		
North of Outer Highway	4-Lane Arterial	11,640
South of SR-62	4-Lane Arterial	23,400
Buena Vista Drive		
West of Yucca Mesa Road	2-Lane Arterial	7,240
East of Balsa Avenue	2-Lane Arterial	7,960
Between Roberts Road and Faith Lane	2-Lane Arterial	10,350
Between Newton Lane and Rowell Road	2-Lane Arterial	13,520
Camino del Cielo Trail		
North of SR-62	2-Lane Arterial	6,870
Joshua Drive		
East of Acoma Trail	2-Lane Arterial	7,860
West of Barberry Avenue	2-Lane Arterial	6,740
East of Emerson Avenue	2-Lane Arterial	2,830
Joshua Lane		
South of Joshua Drive	2-Lane Arterial	10,890
North of Onaga Trail	2-Lane Arterial	9,660
North of Pueblo Trail	2-Lane Arterial	10,580
Between Yucca Trail and Outer Highway	2-Lane Arterial	14,070
Kickapoo Trail		
South of SR-62	2-Lane Arterial	6,620

FUTURE YEAR (2035) ROADWAY VOLUME

Street Name and Segment	Classification	Traffic Volume
La Contenta Road		
South of SR-62	4-Lane Arterial	18,660
North of Yucca Trail	4-Lane Arterial	8,430
Main Street (Proposed)		
East of Cherokee Trail	Collector	7,290
Onaga Trail		
East of Alaba Avenue	4-Lane Arterial, Divided	3,860
East of Elata Avenue	4-Lane Arterial, Divided	6,290
West of Joshua Lane	4-Lane Arterial, Divided	5,380
West of Sage Avenue	4-Lane Arterial, Divided	6,540
East of Acoma Trail	4-Lane Arterial, Divided	3,550
East of Elk Trail	4-Lane Arterial, Divided	5,080
West of Jemez Trail	4-Lane Arterial, Divided	4,370
Palm Avenue		
North of Pueblo Trail	2-Lane Arterial	3,890
Palomar Avenue		
South of Yucca Trail	2-Lane Arterial	14,720
North of Joshua Lane	2-Lane Arterial	5,080
Paxton Road		
East of SR-247	2-Lane Arterial	8,810
Pioneertown Road		
North of SR-62	2-Lane Arterial	9,120
South of Town Limits	2-Lane Arterial	2,670
Sage Avenue		
North of SR-62	2-Lane Arterial	6,020
West of Yucca Trail	2-Lane Arterial	7,480
North of Onaga Trail	2-Lane Arterial	7,720
Santa Fe Trail		
West of Cherokee Trail	2-Lane Arterial	4,290
East of Kickapoo Trail	2-Lane Arterial	1,660
SR-62/Twentynine Palms Road		

FUTURE YEAR (2035) ROADWAY VOLUME

Street Name and Segment	Classification	Traffic Volume
West of Camino Del Cielo	6-Lane Arterial, Divided	53,330
West of Pioneertown Road (Proposed)	6-Lane Arterial, Divided	65,610
West of SR-247	6-Lane Arterial, Divided	70,440
West of Yucca Mesa Road	6-Lane Arterial, Divided	40,580
SR-247/Old Woman Springs Rd		
North of SR-62	4-Lane Highway	31,.230
Sunnyslope Avenue		
West of SR-247	2-Lane Arterial	10,680
Warren Vista Avenue		
South of SR-62	Collector	3,970
Yucca Trail		
West of La Contenta Road	4-Lane Arterial, Divided	16,720
East of Hanford Avenue	4-Lane Arterial, Divided	22,600
West of Joshua View Drive	4-Lane Arterial, Divided	16,070
West of Condalia Avenue	4-Lane Arterial, Divided	14,470
Yucca Mesa Road		
North of SR-62	2-Lane Arterial	10,280
North of Buena Vista Drive	2-Lane Arterial	5,340

Source: Fehr & Peers, 2013.