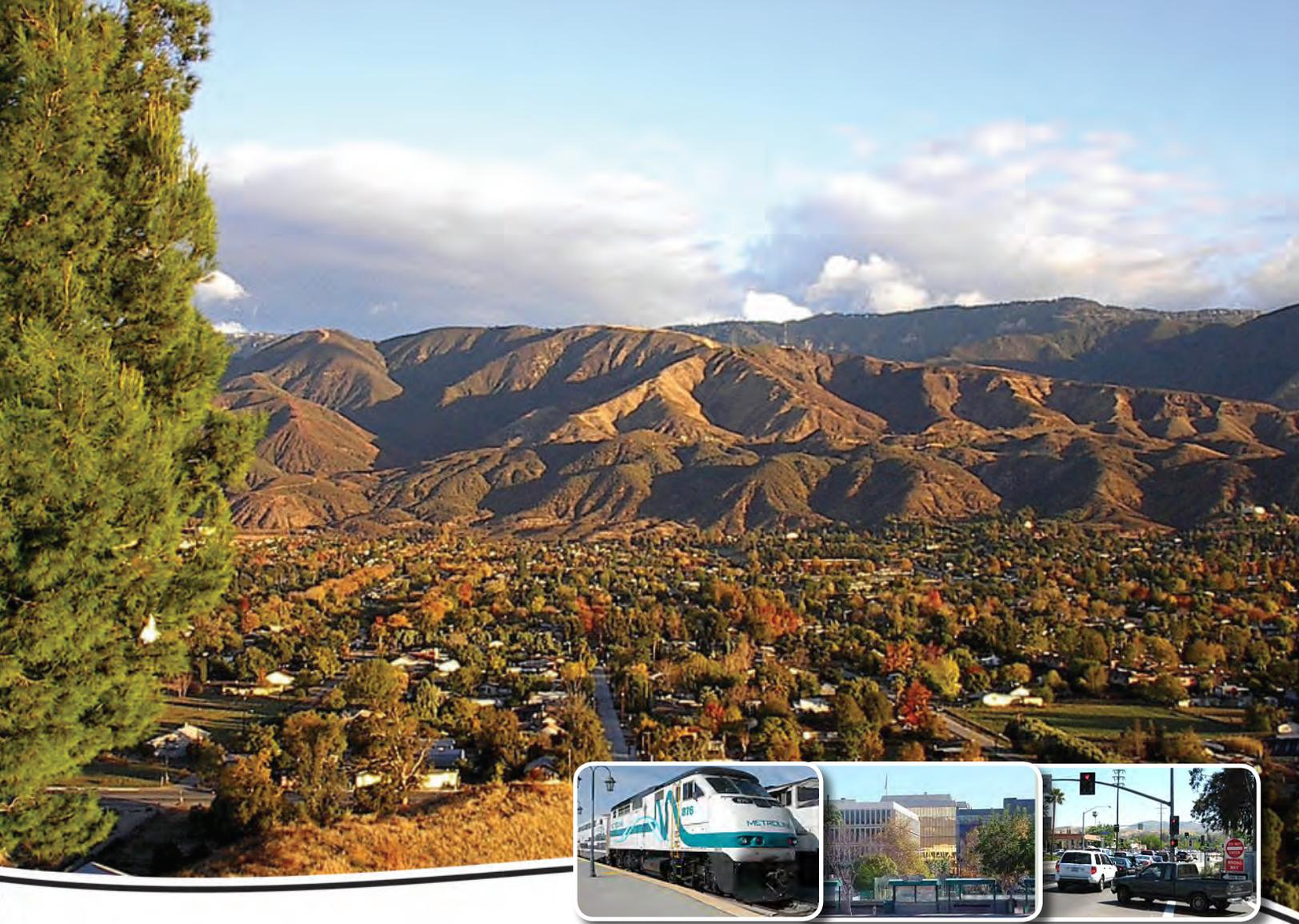


A P P E N D I X G

T R A F F I C I M P A C T A N A L Y S I S





DRAFT

WATERMAN GARDENS MASTER PLAN TRAFFIC IMPACT STUDY

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EXECUTIVE SUMMARY

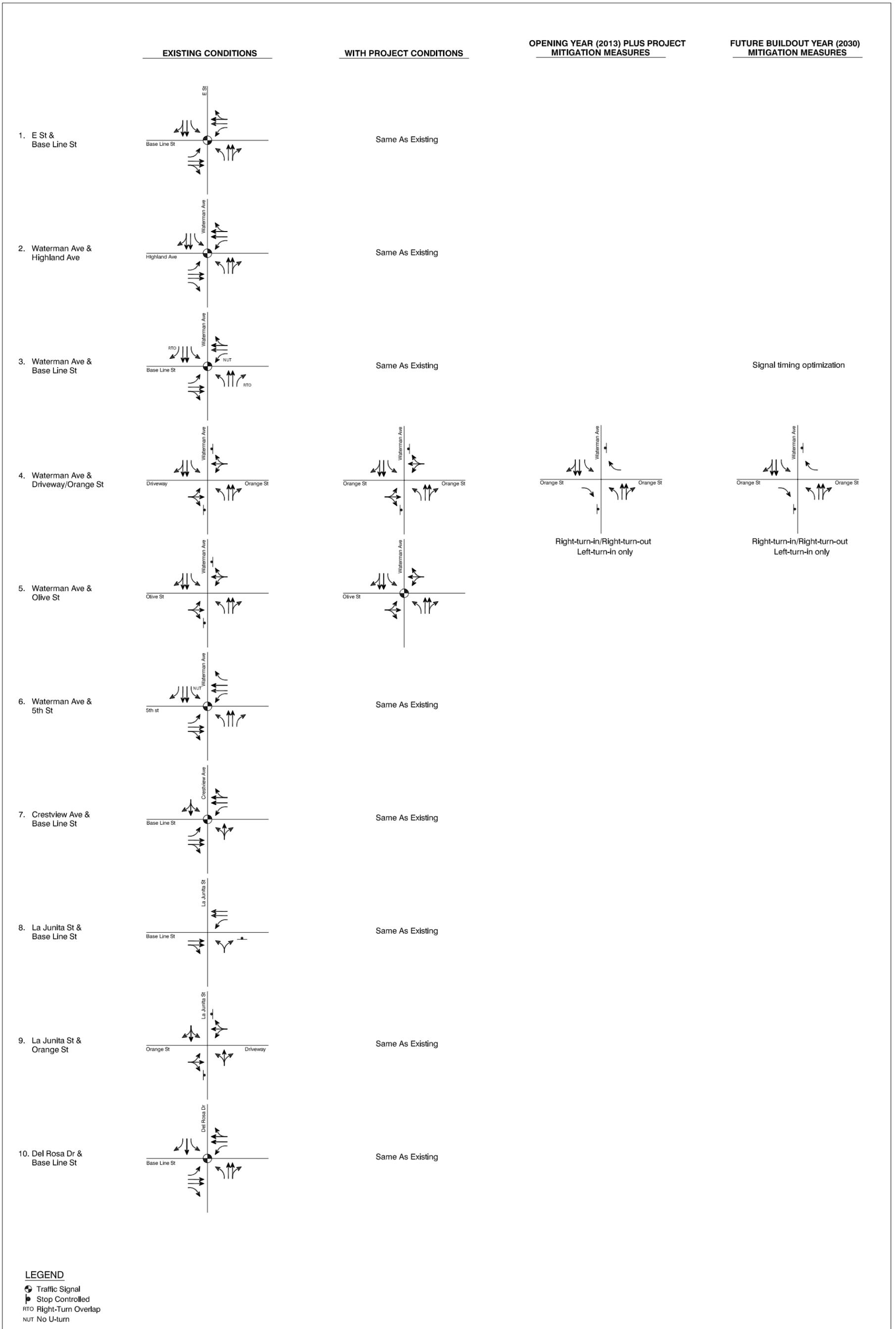
Fehr & Peers has completed an assessment for the proposed Waterman Gardens Master Plan project proposing to demolish an existing 252 multi-family community and construct 411 new multi-family dwelling units with a recreational facility, community support center, community care facility, administration and community room, recycling facility, and shop and youth/jobs training facility. The project is bounded by Base Line Street to the north, La Junita Street to the east, Olive Street to the south and Waterman Avenue to the west in the City of San Bernardino. Six access driveways are proposed for the site. Additional pedestrian and bicycle access will be provided throughout the site.

The project proposes to also install traffic signals at the intersections of the Stater Bros. lot north of the site at Base Line Street and extend it into the project site (proposed Alder Street). A traffic signal is also proposed at the intersection of Waterman Avenue at Olive Street. The driveways along La Junita Street and Olive Street will be side-street stop-controlled. Signal modifications have been proposed for the Waterman Avenue at Base Line Street and Crestview Avenue at Base Line intersection. All of the project driveways are full-access with one entrance and one exit lane. The project will realign Crestview Avenue south of Base Line Street to directly oppose Crestview Avenue north of Base Line Street. Orange Street at Waterman Avenue will also be realigned approximately 200 feet north to directly oppose Orange Street west of Waterman Avenue and remain side-street stop-controlled on Orange Street. Internally, Orange Street, portions of Crestview Avenue, and portions of Alder Street will remain, but several street name changes are proposed for the project site. Elm Circle and Sycamore Circle will be demolished.

As part of Fehr & Peers' assessment and consistent with City Traffic Study Guidelines, the following scenarios were evaluated:

- Existing Conditions (2011) – Consists of existing counts collected in the study area.
- Opening Year (2013) Conditions – Applies an ambient growth rate of 3% per year to existing traffic volumes. This assessment provides an estimate of traffic conditions in the project's proposed opening year of 2013.
- Opening Year (2013) Plus Project Conditions – Applies traffic generated from the proposed project to Opening Year (2013) volumes.
- Future Buildout No Project (2033) Conditions – Applies an ambient growth of 3% per year to existing traffic volumes in addition to traffic generated from pending and approved projects in the vicinity of the proposed project.
- Future Buildout (2033) plus Project Conditions – Applies traffic generated from the proposed project to Cumulative Base (2033) traffic volumes.

Significant impacts were identified and measures to mitigate impacts were recommended. These recommendations are summarized on Figure I.



LEGEND
 Traffic Signal
 Stop Controlled
 RTO Right-Turn Overlap
 NUT No U-turn

1. ANALYSIS PARAMETERS

This chapter outlines the geographic scope of the traffic impact analysis, including study intersections and roadways, and analysis methodologies and significance criteria employed in this study.

PROPOSED PROJECT

Project Description

The Waterman Gardens Master Plan project proposes to redevelop an existing 252-residential community at the southeast corner of Waterman Avenue and Base Line Street in the City of San Bernardino and construct a comprehensive mixed-use development with residential and community recreational uses. The Waterman Gardens site is a public housing development owned by the Housing Authority of the County of San Bernardino aimed at providing affordable housing. Proposed for the site are 411 multi-family dwelling units and a 114,000 square feet community center that will include a recycling facility and youth/job training facility. Completion of the project is expected in 2013.

Interstate 210 (I-210) runs east-west approximately two miles north of the project site, the I-10 freeway runs east west approximately four miles south of the project site, and the I-215 freeway runs north-south approximately one and a half miles west of the project site. Directly north of the project are a shopping center and residential land uses. Directly south of the project site are a shopping center, Neal Roberts Elementary School, Sierra High School, and a church. Directly east of the project is an industrial land use and directly west of the project are a fast-food restaurant and residential land uses.

Parking

The project proposes to provide on and off-street parking for members living in the community and patrons using the community center.

Access

There are six access points for the proposed Waterman Gardens project, as described below. The project site plan is shown on Figure 1.

- Base Line Street access – There are two proposed access driveways on the northern border of the project site at Base Line Street. One driveway (to be Alder Street) will be located mid-block of the project, directly across from the Stater Bros. shopping center driveway north of the site. This driveway will be signalized. The second driveway will be realigned directly across from Crestview Avenue and signalized. Both driveways will be full-access with one entrance and one exit lane. It is recommended in the design of the Alder Street driveway, however, that one left turn lane and one shared through-right turn lane be provided on the north-south driveways.
- La Junita Street access – There is one access driveway on the eastern border of the project site at La Junita Street and Orange Street. This driveway is currently facing the driveway of the industrial land use east of the site with one entrance and one exit lane. The driveway will be stop-controlled on the proposed Elm Street.
- Olive Street access – There are two access driveways on the southern border of the project site on Olive Street. The most eastern driveway will face Neal Roberts Elementary school, and the most western driveway will face the shopping center. Both driveways will be side-street stop controlled, full-access with one entrance and one exit lane.

- Waterman Avenue access – Currently, the driveway on Orange Street and Waterman Avenue faces an opposing driveway at the Wienerschnitzel fast-food restaurant. This driveway will be realigned with Orange Street, approximately 200 feet north of its current location. The driveway will be stop-controlled on Orange Street, full-access with one entrance and one exit lane.

In addition, a pedestrian signal separated by a raised median is proposed on Waterman Avenue, between Orange Street and 11th Street. This signal will only be accessible to pedestrians and bicyclists and only flash when triggered by a non-motorist traveller. Pedestrian sidewalks are provided along all borders around and throughout the project site. Striped bicycle lanes are also proposed in both directions of travel along project boundaries on Waterman Avenue and Base Line Street.

PROJECT STUDY AREA

Ten study intersections were selected for evaluation in this study in collaboration with City staff, as documented in the Project Scoping Form attached to this document. The project site and study intersections are identified below and shown on Figure 2.

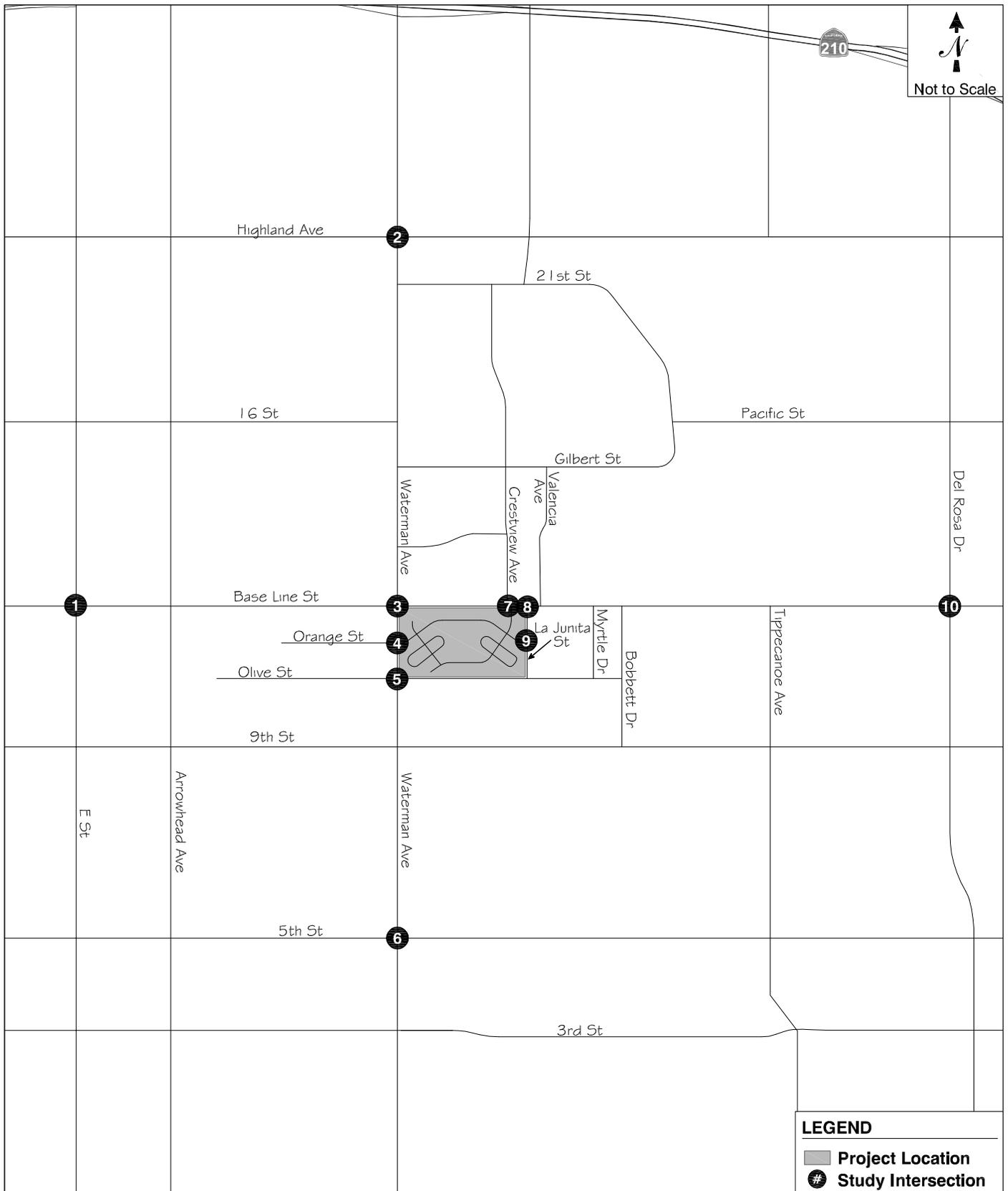
1. E Street at Base Line Street
2. Waterman Avenue at Highland Avenue
3. Waterman Avenue at Base Line Street
4. Waterman Avenue at Orange Street
5. Waterman Avenue at Olive Street
6. Waterman Avenue at 5th Street
7. Crestview Avenue at Base Line Street
8. La Junita Street at Base Line Street
9. La Junita Street at Orange Street
10. Del Rosa Drive at Base Line Street

ANALYSIS SCENARIOS

To identify significant project impacts, Fehr & Peers evaluated the following scenarios as part of the proposed project consistent with the City of San Bernardino Traffic Impact Analysis Guidelines and the requirements set forth in the San Bernardino County Congestion Management Program (CMP):

- Existing Conditions – Consists of existing (May 2011) counts collected at the study intersection locations. Existing counts were conducted on May 4, 2011 from 7:00 to 9:00 AM for the morning peak hour and from 4:00 to 6:00 PM for the evening peak hour.
- Project Opening Year (2013) Base Conditions – Consists of the Existing Conditions traffic volumes plus an annual growth factor of three percent per year over the two-year period between the existing counts and the project opening year.
- Project Opening Year (2013) plus Project Conditions – Consists of Project Opening Year (2013) Base Conditions plus traffic generated from the proposed project.
- Future Build-Out Year (2033) Base Conditions – Consists of Existing Conditions traffic volumes plus a three percent per year growth factor plus traffic generated from approved and pending projects in the proposed project's vicinity.
- Future Build-Out Year (2033) plus Project Conditions – Consists of Future Build-Out Year (2033) Base Conditions plus traffic generated from the proposed project.

The scenarios described above were evaluated during the weekday morning and evening peak hours. Appendix A provides the intersection counts sheets for all analyzed intersections.



ANALYSIS METHODOLOGIES

Fehr & Peers' analysis of intersections employs a methodology based on empirical research conducted by the Transportation Research Board and other authorities. Signalized and unsignalized intersection operations were evaluated using methodologies provided in *Highway Capacity Manual* (HCM 2000) (Transportation Research Board), are considered the state-of-the-practice methodologies for evaluating intersection operations, and are consistent with the City of San Bernardino and CMP analysis requirements.

The HCM 2000 methodology for signalized and all-way stop-controlled intersections estimates the average control delay for the vehicle at the intersection. For side-street stop-controlled intersections, the methodology estimates the control delays for each turning movement and identifies the delay for the longest delayed approach (if there is a shared lane, delay is averaged for all turning movements from that lane). After the quantitative delay estimates are complete, the methodology assigns a qualitative letter grade that represents the operations of the intersection. These grades range from level of service (LOS) A (minimal delay) to LOS F (excessive congestion). LOS E represents at-capacity operations. Descriptions of the LOS letter grades for signalized and unsignalized intersections are provided in Table 1.

TABLE 1 - INTERSECTION LOS CRITERIA				
Level of Service	Description	Signalized Delay (Seconds)	Unsignalized Delay (Seconds)	Volume-to-Capacity (V/C) Ratio
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 15.0	≤ 10.0	0.000-0.600
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 15.0 to 25.0	>10.0 to 15.0	0.601-0.700
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 25.0 to 35.0	>15.0 to 25.0	0.701-0.800
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	>25.0 to 35.0	0.801-0.900
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	>35.0 to 50.0	0.901-1.000
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80.0	>50.0	Greater than 1.000

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

For all of the signalized and unsignalized intersections, Synchro software version 6.14 was used to calculate delays and associated levels of service.

Per the County CMP requirements, the following assumptions were included in the level of service assessment:

- 2% heavy vehicles at the study intersections
- Existing and Opening Year peak hour factor (PHF) was based on the counts collected

- Future Build-Out Year PHF is 0.95
- Existing and Opening Year saturation flow rates assumed to be:
 - 1800 for exclusive through and exclusive right
 - 1700 for exclusive left
 - 1600 for dual lefts
- Future Build-Out Year saturation flow rates assumed to be:
 - 1900 for exclusive through and exclusive right
 - 1800 for exclusive left
 - 1700 for dual lefts
- Existing signal timings based on timing data received from City staff
- For Future Build-Out Year, timing splits were optimized for uncoordinated intersections and a maximum cycle length of 130 seconds was utilized

TRAVEL DEMAND FORECASTING

The City of San Bernardino Traffic Study guidelines contain the following language:

Use of the City's East Valley Travel Forecast Model or other approved model may be required to determine the future traffic volumes and growth. In the absence of traffic model information, the future build-out year base traffic volumes shall be estimated using an annual growth factor of 3 percent per year, unless a different rate can be justified and is approved and/or required by the City Engineer.

The use of a locally valid Travel Demand Forecasting (TDF) model generally provides the most accurate results as the purpose of a TDF model is to accurately estimate the change in volume of a roadway given changes in land use and changes in the transportation network. For this project, Fehr & Peers reviewed the model developed for the City of San Bernardino's general plan, the East Valley travel forecasting model, and the Southern California Association of Governments (SCAG) model; all of which include the San Bernardino area.

Additionally, SANBAG is currently developing a focused travel demand model for San Bernardino County, which should be completed later this year, and would supersede use of the East Valley or SCAG models in San Bernardino County. Once completed, that model should incorporate the most up to date information for the City of San Bernardino and would be a more appropriate tool to utilize for the assessment.

Therefore, in conformance with the City's guidelines, we applied a 3% per year growth rate to existing volumes to develop future conditions. To develop a conservative assessment of future conditions, manual assignment of trips from approved and pending projects in the project study area were also applied to future year forecasts.

CUMULATIVE PROJECTS

Cumulative projects are defined as all projects that were pending, approved, or under construction in the City of San Bernardino as of May 2011. This list was supplied by the City of San Bernardino planning staff. The 2033 scenario therefore analyzes the cumulative conditions impacts from nearby projects expected to influence the study area.

Fehr & Peers estimated the number of trips generated from each project using *Trip Generation, 8th Edition* (Institute of Transportation Engineers (ITE), 2008). Figure 3 shows a map of pending and approved projects in the study area. Appendix H provides a list of all cumulative projects, as well as the number of trips generated from each project.

SIGNIFICANCE CRITERIA

The following significance criteria were employed to determine if the project causes significant traffic impacts. The criteria are based on the City of San Bernardino's General Plan, the City's Traffic Impact Analysis Guidelines, and the County's CMP.

Traffic Impacts

The City of San Bernardino considers traffic impacts at intersections to be "significant" if the following volume-to-capacity (V/C) ratios occur between the "without project" and "with project" conditions shown in Table 2.

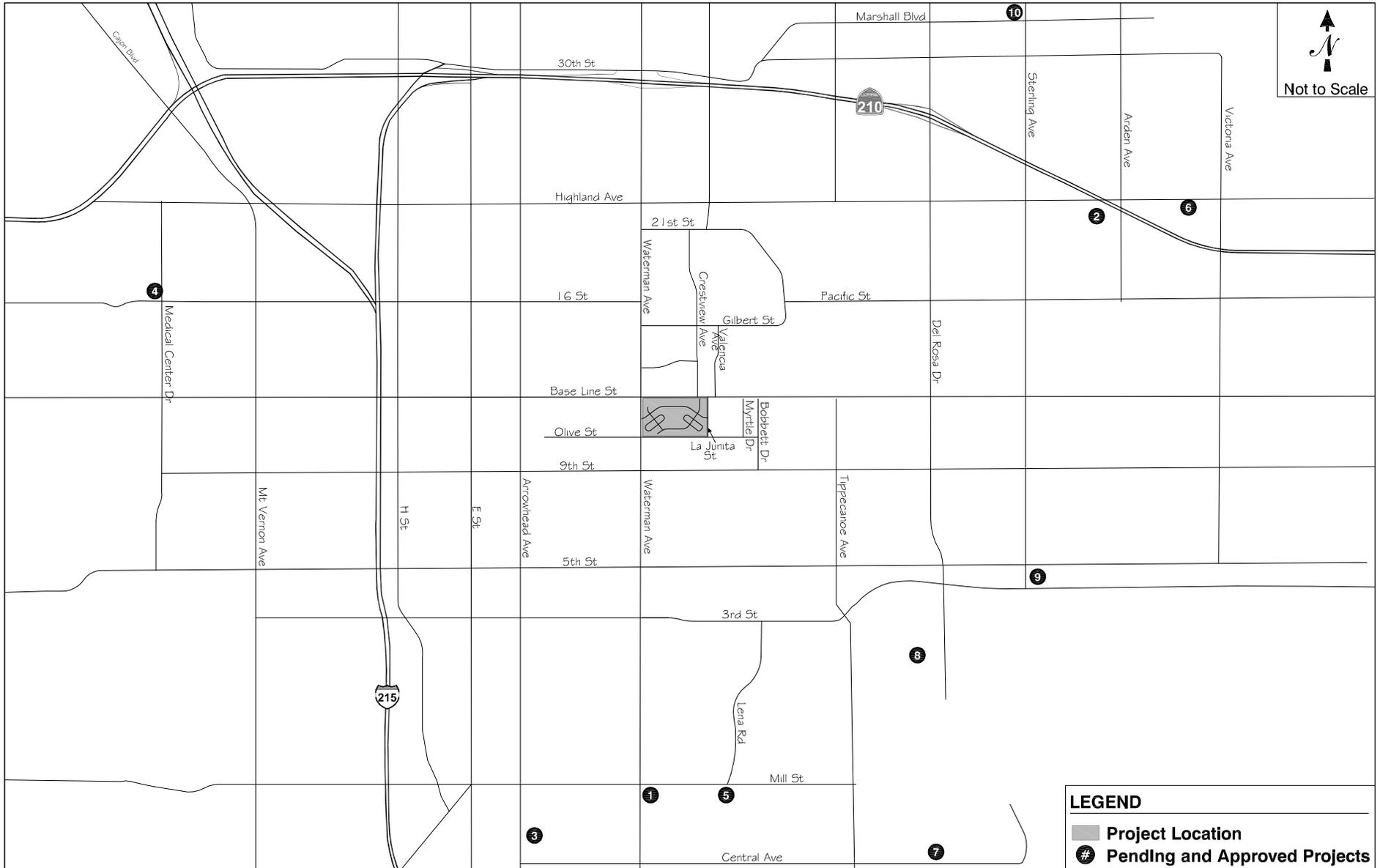
TABLE 2 - SIGNIFICANCE CRITERIA	
Level of Service	V/C Difference
C	> 0.0400
D	> 0.0200
E,F	> 0.0100

Source: City of San Bernardino Traffic Impact Study Guidelines (2004) and
Highway Capacity Manual (Transportation Research Board, 2000).

For unsignalized intersections, a traffic impact is considered to be "significant" if the addition of project-generated traffic degrades operations below LOS D and the project adds traffic such that it satisfies the Peak Hour Signal Warrant.

Mitigation Requirements

The City of San Bernardino requires that any intersections with significant impacts be mitigated to improved LOS D or better for intersections and LOS C or better for roadway segments.



Note: Additional Information regarding pending and approved projects provided In Chapter 1 and Appendix H

2. EXISTING CONDITIONS

This chapter discusses the existing transportation conditions in the project study area. This discussion addresses the roadway, transit network, and pedestrian networks.

EXISTING ROADWAY FACILITIES

Regional access to the project site is provided by State Route 210 (SR-210), Interstate 10 (I-10), and Interstate 215 (I-215). Local access is provided by Highland Avenue, Base Line Street, Olive Street, 5th Street, E Street, Waterman Avenue, La Junita Street, and Del Rosa Drive. These roadways are described in detail below.

Regional Roads

- SR-210 Freeway – The SR-210 begins in Pasadena to the west and extends east toward San Bernardino and curves south where it ends at the I-10 in Redlands. The SR-210 is generally a two- to three-lane freeway. Access to the project site is provided via the Highland Avenue interchange.
- I-10 Freeway – The I-10 is an east-west freeway that extends from the west coast in Santa Monica to Jacksonville, Florida to the east. The I-10 is generally a four-lane freeway. Access to the project site is provided via the Waterman Avenue interchange.
- I-215 Freeway – The I-215 is a north-south freeway that extends from the I-15 to the north to where it turns into the SR-91 to the south. The I-215 is generally a three-lane freeway and connects the SR-210 and I-10 freeways.

Local Access Roads

- Highland Avenue – Highland Avenue is an east-west divided road with two lanes in each direction. It extends from Easton Street to the west and curves south, east of SR-210 where it turns into Weaver Street and ends at Greenspot Road. Highland Avenue is a direct connector to the SR-210 freeway. The posted speed limit on Highland Avenue is 40 miles per hour (mph). Highland Avenue is classified as a Major Arterial in the City of San Bernardino General Plan.
- Waterman Avenue – Waterman Avenue is a north-south divided road with two lanes in each direction. It extends into the mountains where it becomes SR-18 to the north and ends south of Barton Road to the south. Waterman Avenue is a direct connector to the SR-210 north of the project site and I-10 south of the project site. The posted speed limit on Waterman Avenue ranges from 35 to 40 miles per hour next to the project site. Waterman Avenue is classified as a Major Arterial in the City of San Bernardino General Plan.
- Del Rosa Drive – Del Rosa Drive is a north-south divided road with two lanes in each direction. It extends from the mountains to the north and ends at Harry Shepard Boulevard to the south. Del Rosa Drive is a direct connector to the SR-210 northwest of the project site. The posted speed limit on Del Rosa Drive is 45 miles per hour. Del Rosa Drive is classified as a Major Arterial in the City of San Bernardino General Plan.
- Base Line Street – Base Line Street is an east-west divided road with two lanes in each direction. It extends from the City of San Dimas to the west and ends at Alta Vista to the east. Base Line Street is a direct connector to the SR-210 east of the project site. Currently, the project site has one driveway leading to Base Line Street on Crestview Avenue. The project proposes to construct another driveway to

Base Line Street, opposing the shopping center to the north. The posted speed limit on Base Line Street is 40 mph. Base Line Street is classified as a Major Arterial in the City of San Bernardino General Plan.

- Orange Street – Orange Street is an undivided east-west residential road with one lane in each direction. Orange Street runs through the project site from Waterman Avenue to the west and La Junita Street to the east. Currently, the Orange Street at Waterman Avenue driveway directly opposes a fast-food restaurant driveway. The project proposes to realign Orange Street within the project site to meet Orange Street west of Waterman Avenue, approximately 200 feet north of the current intersection location. The posted speed limit on Orange Street is 25 mph. Orange Street is classified as Residential in the City of San Bernardino General Plan.
- Crestview Avenue – Crestview Avenue is an undivided north-south residential road with one lane in each direction. It extends from 21st Street to the north and ends before Olive Street within the project site. Currently, at Base Line Street, the Crestview Avenue driveways are offset approximately 25 feet from each other. The project proposes to realign Crestview Avenue, south of Base Line Street to directly oppose the north Crestview Avenue driveway. The posted speed limit on Crestview Avenue is 25 mph. Crestview Avenue is classified as Residential in the City of San Bernardino General Plan.
- La Junita Street – La Junita Street is an undivided north-south residential road that stretches from Base Line Street to the north and Olive Street to the south.. Date Street is an east-west divided road with two lanes in each direction. The posted speed limit on La Junita Street is 25 mph. La Junita Street is classified as a Local Street in the City of San Bernardino General Plan.
- Olive Street – Olive Street is an east-west undivided residential road with one lane in each direction. It extends from Mountain View Avenue to the west and ends past Belvan Avenue to the east. Currently, there are no driveways from the project site onto Olive Street. The project proposes to construct two driveways leading to Olive Street, one across from the shopping center and the other across from Neal Roberts Elementary School. The posted speed limit on Olive Street is 25 mph. Olive Street is classified as a Local Street in the City of San Bernardino General Plan.
- E Street – E Street is generally a north-south undivided street with two lanes in each direction. It turns into Kendall Drive north of SR-210 and continues northwest and merges with Hunts Lane just before the I-10 to the south. The posted speed limit on E Street is 35 mph. E Street is classified as a Secondary Arterial in the City of San Bernardino General Plan.
- 5th Street – 5th Street is an east-west undivided road with one lane in each direction east of Waterman Avenue and divided with two lanes in each direction west of Waterman Avenue. To the west, 5th Street turns into Foothill Blvd/SR-66 then Huntington Drive then Mission Road before ending in downtown Los Angeles at Jesse Street. To the east, 5th Street turns into Greenspot Road, turns south and turns into Florida Street then Garnet Avenue before ending at Zanja Villa Drive just south of Mill Creek Road/SR-38. The posted speed limit on 5th Street is 40 mph. 5th Street is classified as a Major Arterial in the City of San Bernardino General Plan.

EXISTING BUS TRANSIT FACILITIES

There are three transit lines that currently operate in the study area. The lines, operated by Omnitrans, are described in detail below. There are currently three bus lines along the project site perimeter that provide access from the project site to Routes 1, 4 and 5. Route 1 and 5 are accessible via transit stops at the Waterman Avenue and Base Line Street intersection and the Waterman Avenue and Olive Street intersection. Route 3 is accessible via a transit stop at the Crestview Avenue and Base line Street intersection. Route 4 is accessible via transit stops at the Waterman Avenue and Base Line intersection and Pepper Tree Lane and Base Line Street intersection.

- **Bus Route 1** – Bus Route 1 (ARMC-San Bernardino-Del Rosa Route) provides service from Lynwood Drive diagonally southwest past the I-215 freeway to Valley Boulevard along various roads, connecting the City of San Bernardino and City of Colton. Within the project study area, Bus Route 1 travels from along Waterman Avenue from 5th Street to the south to 21st Street to the north. Service is provided at 15- and 30-minute headways on weekdays and at 30-minute headways on weekends. Service runs from 4:50 AM to 10:49 PM in the southbound direction and from 5:45 AM to 10:09 PM in the northbound direction on weekdays. On Saturdays, service runs from 7:07 AM to 7:30 PM in the southbound direction and from 6:07 AM to 7:30 PM in the northbound direction. On Sundays, service runs from 7:07 AM to 7:25 PM in the southbound direction and from 6:07 AM to 7:25 PM in the northbound direction.
- **Bus Route 3/4** – Bus Routes 3/4 (Baseline – Highland-San Bernardino) run almost identical routes, but in the counter-clockwise direction on Route 3 and in the clockwise direction on Route 4. The bus route provides round-trip service along various roads in the City of San Bernardino that include Highland Avenue to the north, 2nd Street and Baseline Street to the south, Medical Center Drive to the west and Boulder Avenue to the east. In the project study area, the bus route travels along Base Line Street from Arrowhead Avenue to Boulder Avenue. Service is provided at 20-minute headways every day. Bus Route 3, service runs from 4:36 AM to 11:13 PM in the counter-clockwise direction and Bus Route 4 runs from 4:32 AM to 10:56 PM in the clockwise direction on weekdays. On Saturdays, Bus Route 3 runs from 6:01 AM to 7:06 PM in the counter-clockwise direction and Bus Route 4 runs from 6:22 AM to 7:42 PM in the clockwise direction. On Sundays, Bus Route 3 runs from 6:01 AM to 7:06 PM in the counter-clockwise direction and Bus Route 4 runs from 6:22 AM to 7:24 PM in the clockwise direction.
- **Bus Route 5** – Bus Route 5 (San Bernardino-Del Rosa-Cal State) provides service from Cal State University of San Bernardino diagonally southeast to Del Rosa Drive then southwest toward the Carousel Mall on E Street along various roads. Within the project study area, Bus Route 5 travels along Waterman Avenue from Gilbert Street to the north and 4th Street to the south. Service is provided at 30-minute headways on weekdays and 60-minute headways on weekends. Service runs from 4:51 AM to 10:08 PM in the southbound direction and from 5:45 AM to 10:24 PM in the northbound direction on weekdays. On Saturdays, service runs from 6:54 AM to 6:38 PM in the southbound direction and from 7:50 AM to 6:38 PM in the northbound direction. On Sundays, service runs from 6:39 AM to 6:28 PM in the southbound direction and from 7:35 AM to 7:28 PM in the northbound direction.

The City of San Bernardino General Plan contains several references to public transit in the policy statements including:

Policy 6.6.1: Support the efforts of regional, state, and federal agencies to provide additional local and express bus service in the City.

Policy 6.6.2: In cooperation with Omnitrans, require new development to provide transit facilities, such as bus shelters and turnouts, as necessary and warranted by the scale of the development.

Policy 6.6.3: Encourage measures that will reduce the number of vehicle-miles traveled during peak periods, including the following examples of these types of measures:

- Incentives for car-pooling and vanpools
- Preferential parking for car-pools and vanpools
- An adequate, safe, and interconnected system of pedestrian and bicycle paths

The project is consistent with these policy statements through existing bus stops located along Waterman Avenue and Base Line Street, listed above.

BICYCLE NETWORK

The City of San Bernardino General Plan has the following three classifications for its bicycle facilities:

- Class I Bikeway – Dedicated travel-way for bicyclists. Most common application of Class I Bikeways are along rivers, canals, and utility right-of-ways, college campuses or within and between parks.
- Class II Bikeways – Delineated right-of-way assigned to bicyclists along roadways. Signs and pavement markings help define bike lanes.
- Class III Bikeways – Shared facilities that serve either to provide continuity to other bicycle facilities, or designate preferred routes through high demand corridors. Bicycle use is secondary and normally shared with motor vehicles on the street or with pedestrians on sidewalks.

Existing bicycle routes in the project study area are located along Highland Avenue and Baseline Street. Proposed bicycle routes in the project study are planned on Waterman Avenue.

PEDESTRIAN NETWORK

The pedestrian network in the study area consists of sidewalks and pedestrian crosswalks, with appropriate pedestrian crossing controls at signalized intersections. Fifty foot pedestrian-only greenways with natural bioswales and walking paths are planned throughout the project.

The City of San Bernardino General Plan contains several references to pedestrian bicycle activity in the policy statements including:

Policy 8.3: Develop a well-designed system of interconnected multi-purpose trails, bikeways, and pedestrian paths.

Policy 8.3.8: Install sidewalks and wheelchair ramps in existing neighborhoods.

The project is consistent with these policy statements through planned sidewalks and crosswalks throughout and around the project. The project also proposes to increase sidewalk widths and raise curb bulb-outs and crosswalks, promoting pedestrian safety and the accessibility of pedestrian routes. Narrow travel lanes throughout the site will also decrease travel speeds to provide pedestrian and bicycle safety.

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

Fehr & Peers collected existing traffic counts at the study intersections in May 2011 during the morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak hours. Figure 4 shows the existing lane configurations and traffic volumes. Existing traffic counts are provided in Appendix A.

At the time that existing traffic volumes were collected, ramp closures on I-215 at 3rd Street, 27th Street, and Highland Avenue (in the northbound direction) were closed. Waterman Avenue at Highland Avenue was also reduced to one-lane traffic in each direction. These temporary ramp and lane closures could have possibly affected the existing count volumes.

EXISTING INTERSECTION OPERATIONS

Fehr & Peers utilized the existing traffic volumes, lane configurations, and signal timing information to evaluate operations at the study intersections for the existing AM and PM peak hour conditions. The results are summarized in Table 3. The technical calculations are presented in Appendix B.

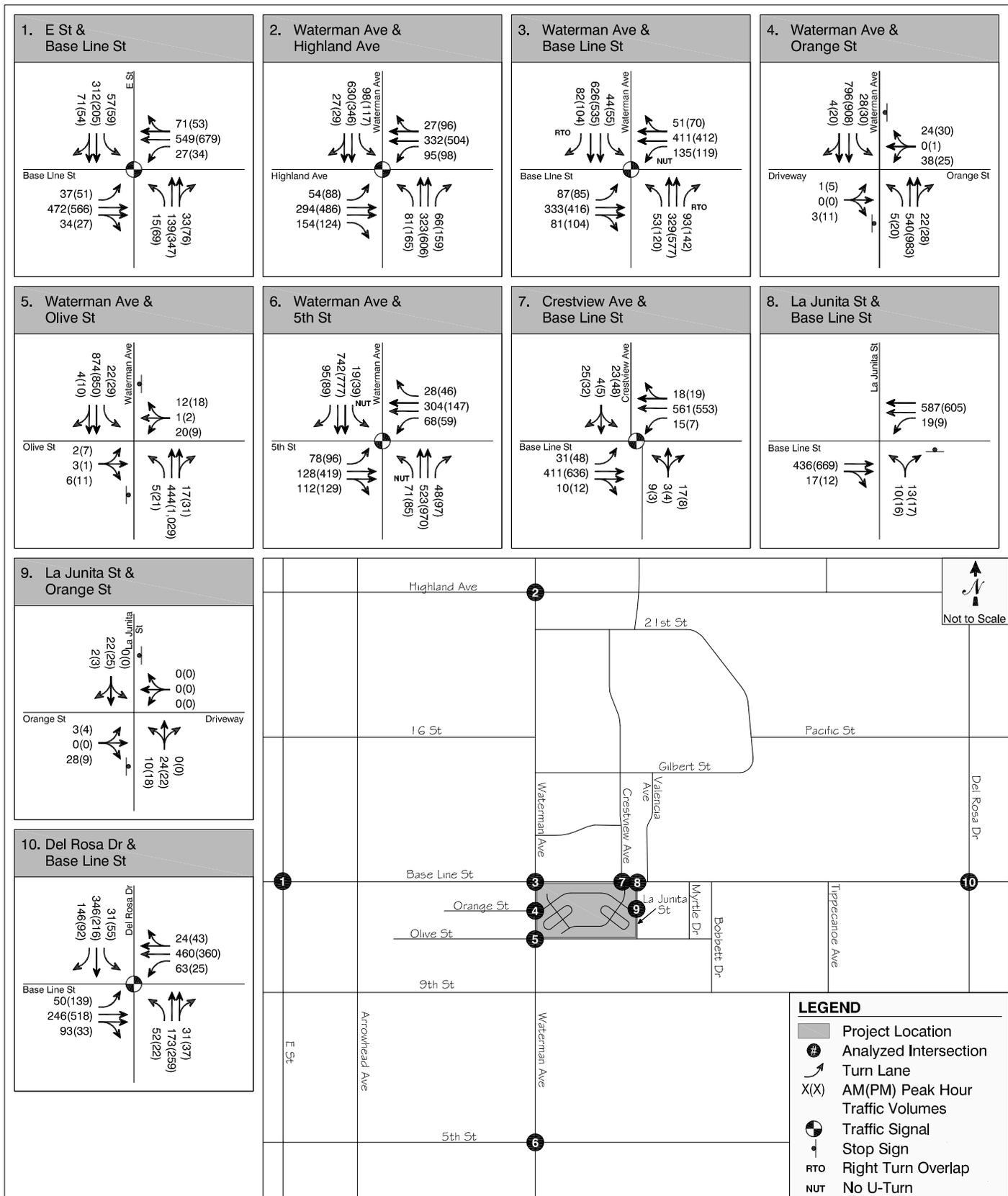


TABLE 3 - INTERSECTION LEVELS OF SERVICE: EXISTING CONDITIONS					
Intersection	Control	AM Peak Hour		PM Peak Hour	
		Delay ¹	LOS	Delay	LOS
1. E Street/Base Line Street	Signalized	14.2	B	15.3	B
2. Waterman Avenue/Highland Avenue ²	Signalized	26.7	C	28.2	C
3. Waterman Avenue/Base Line Street ²	Signalized	28.0	C	29.2	C
4. Waterman Avenue/Orange Street	SSSC ⁴	32.9	D	127.6	F
5. Waterman Avenue/Olive Street	SSSC ⁴	30.2	D	48.3	E
6. Waterman Avenue/5 th Street ²	Signalized	17.4	B	20.3	C
7. Crestview Avenue/Base Line Street	Signalized	3.4	A	3.3	A
8. La Junita Street/Base Line Street	SSSC ⁴	15.2	C	18.0	C
9. La Junita Street/Orange Street	SSSC ⁴	8.7	A	8.8	A
10. Del Rosa Drive/Base Line Street	Signalized	25.3	C	23.1	C

Notes:
 1- Delay for intersections based on application of *2000 Highway Capacity Manual* Methodology. Delay was calculated using Synchro 6.0 software.
 2- CMP intersection
 3- V/C = Volume to Capacity ratio. Note – V/C is not calculated for unsignalized intersections.
 4- SSSC= Side Street Stop Sign Controlled
 Source: Fehr & Peers, 2011

As shown in Table 3, all of the signalized intersections operate at LOS C or better during the peak hours. This determination is consistent with our fieldwork which noted that these signalized intersections appeared to operate at an acceptable level during the peak hours.

For unsignalized intersections, the following two intersections operate at LOS D or worse during the peak hours:

- Waterman Avenue/Orange Street – LOS D during the AM peak hour and LOS F during the PM peak hour
- Waterman Avenue/Olive Street – LOS D during the AM peak hour and LOS E during the PM peak hour

Please note that this determination of deficient conditions occurs because of delays occurring on the side streets connecting to Waterman Avenue, in that vehicles turning onto Waterman Avenue may have to wait for gaps in incoming traffic.

3. PROJECT OPENING YEAR (2013) NO PROJECT TRAFFIC CONDITIONS

This section documents the conditions in the Opening Year (2013) scenario. This scenario analyzes the intersection conditions with the addition of ambient growth per year from the existing volumes to 2013 (the opening year for the proposed project).

TRAFFIC VOLUMES

A 3% ambient growth per year, over the two year period between the existing and opening year scenario (equal to 6.09%) was applied to the existing conditions volumes per City of San Bernardino Traffic Impact Study Guidelines. Opening year (2013) peak hour traffic volumes for the study intersections are shown on Figure 5.

ROADWAY IMPROVEMENTS

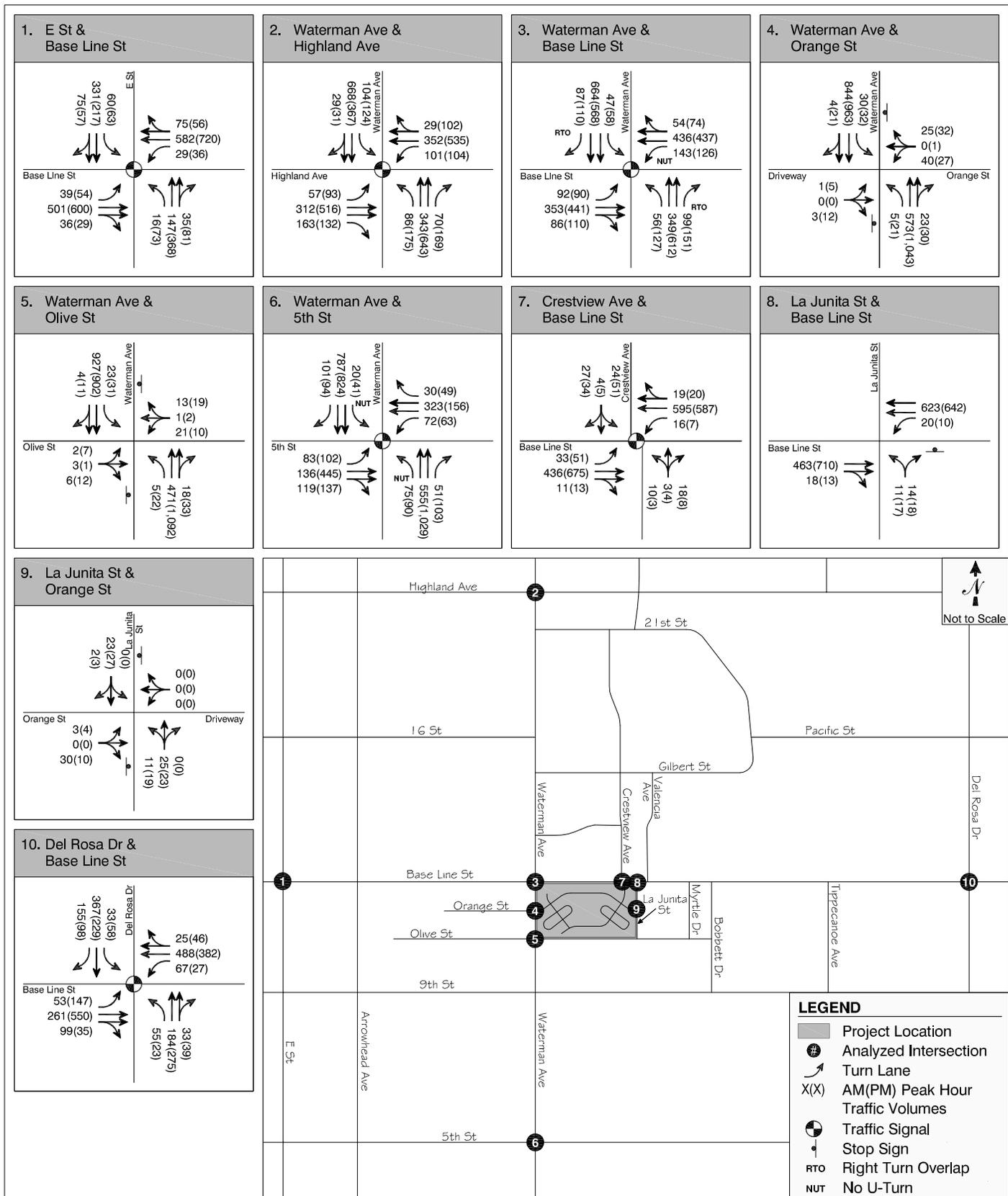
There are no roadway improvements planned and funded at the study intersections that will be completed by 2013.

INTERSECTION OPERATIONS

Intersection level of service analysis results for opening year (2013) are summarized in Table 4. Analysis sheets are provided in Appendix C. As shown in this table, with the application of ambient growth, most of the study intersections will continue to operate at LOS C or better, with the exception of the following two intersections:

- Waterman Avenue/Orange Street – LOS E during the AM peak hour and LOS F during the PM peak hour
- Waterman Avenue/Olive Street – LOS E during the AM peak hour and LOS F during the PM peak hour

Please note that this determination of deficient conditions occurs because of delays occurring on the side streets connecting to Waterman Avenue, in that vehicles turning onto Waterman Avenue may have to wait for gaps in incoming traffic.



**OPENING YEAR (2013) NO PROJECT
LANE CONFIGURATIONS AND
PEAK HOUR TRAFFIC VOLUMES**

TABLE 4 - INTERSECTION LEVELS OF SERVICE: OPENING YEAR (2013) NO PROJECT

Intersection	Control	AM Peak Hour			PM Peak Hour		
		Delay ¹	LOS	V/C ³	Delay ¹	LOS	V/C ³
1. E Street/Base Line Street	Signalized	14.5	B	0.41	15.5	B	0.43
2. Waterman Avenue/Highland Avenue ²	Signalized	27.1	C	0.48	28.9	C	0.59
3. Waterman Avenue/Base Line Street ²	Signalized	28.3	C	0.56	30.0	C	0.60
4. Waterman Avenue/Orange Street	SSSC ⁴	41.0	E	n/a	224.8	F	n/s
5. Waterman Avenue/Olive Street	SSSC ⁴	35.0	E	n/a	65.4	F	n/a
6. Waterman Avenue/5 th Street ²	Signalized	18.1	B	0.57	21.5	C	0.69
7. Crestview Avenue/Base Line Street	Signalized	3.4	A	0.29	3.4	A	0.28
8. La Junita Street/Base Line Street	SSSC ⁴	16.2	C	n/a	19.5	C	n/a
9. La Junita Street/Orange Street	SSSC ⁴	8.7	A	n/a	8.8	A	n/a
10. Del Rosa Drive/Base Line Street	Signalized	25.8	C	0.54	23.5	C	0.47

Notes:
 1- Delay for intersections based on application of *2000 Highway Capacity Manual* Methodology. Delay was calculated using Synchro 6.0 software.
 2- CMP intersection
 3- V/C = Volume to Capacity ratio. Note – V/C is not calculated for unsignalized intersections.
 4- SSSC= Side Street Stop Sign Controlled
 Source: Fehr & Peers, 2011

4. PROJECT OPENING YEAR (2013) PLUS PROJECT TRAFFIC CONDITIONS

This section documents the conditions in the Opening Year (2013) plus Project scenario. This scenario analyzes the opening year (2013) conditions plus the project. This condition is used to evaluate the net change in traffic conditions and to identify potential traffic impacts associated with the proposed project.

TRAFFIC VOLUMES

Traffic was estimated for the proposed project using a three step process: Trip Generation, Trip Distribution, and Trip Assignment. In the first step, the numbers of trips generated by the project are estimated. Then, the directions from which these trips approach and depart the site are projected. Finally, the project trips are assigned to the roadway system and the study intersections. Each of these steps is described in detail below.

Please note that all of these assumptions were circulated to City staff and as part of the scoping form prior to initiating any assessment for the site.

Project Trip Generation

Fehr & Peers estimated the project trip generation by applying standard trip generation rates, based on ITE's *Trip Generation, 8th Edition, 2008*. Project trips were estimated using the trip generation rates for land use code 220 for multi-family dwelling units and land use code 495 for the community center, which includes the recreational facility, community support center, community care facility, administration and community room. Existing 24-hour street segment counts were conducted on May 4, 2011 to determine the number of trips currently using the site. These trips are applied as a negative credit toward the trips generated by the project to give a more realistic number of how many additional trips the project will attract. Table 5 summarizes the trip generation estimates for the proposed project.

The proposed project was assumed to consist of the following land uses:

- Multi-family dwelling units – The existing 252 family units spanning 114 buildings will be demolished. The new development will include 411 dwelling units. Because 252 dwelling units of livable space currently exists at the site, the project trips generated for 411 dwelling units can be reduced.
- Community Center – The community center is a new construction that will include 45,835 sq. ft. of recreational facility, 58,200 sq. ft. of community support center, 4,000 sq. ft. of community care facility, and 6,000 sq. ft. of administration and community room. The community center will be open to Waterman Gardens Master Plan project residents as well as to the public. The assumption is that community center patrons will walk versus drive to the community center so the trip generation rates and estimates of the community center can be reduced to reflect this internalized travel.

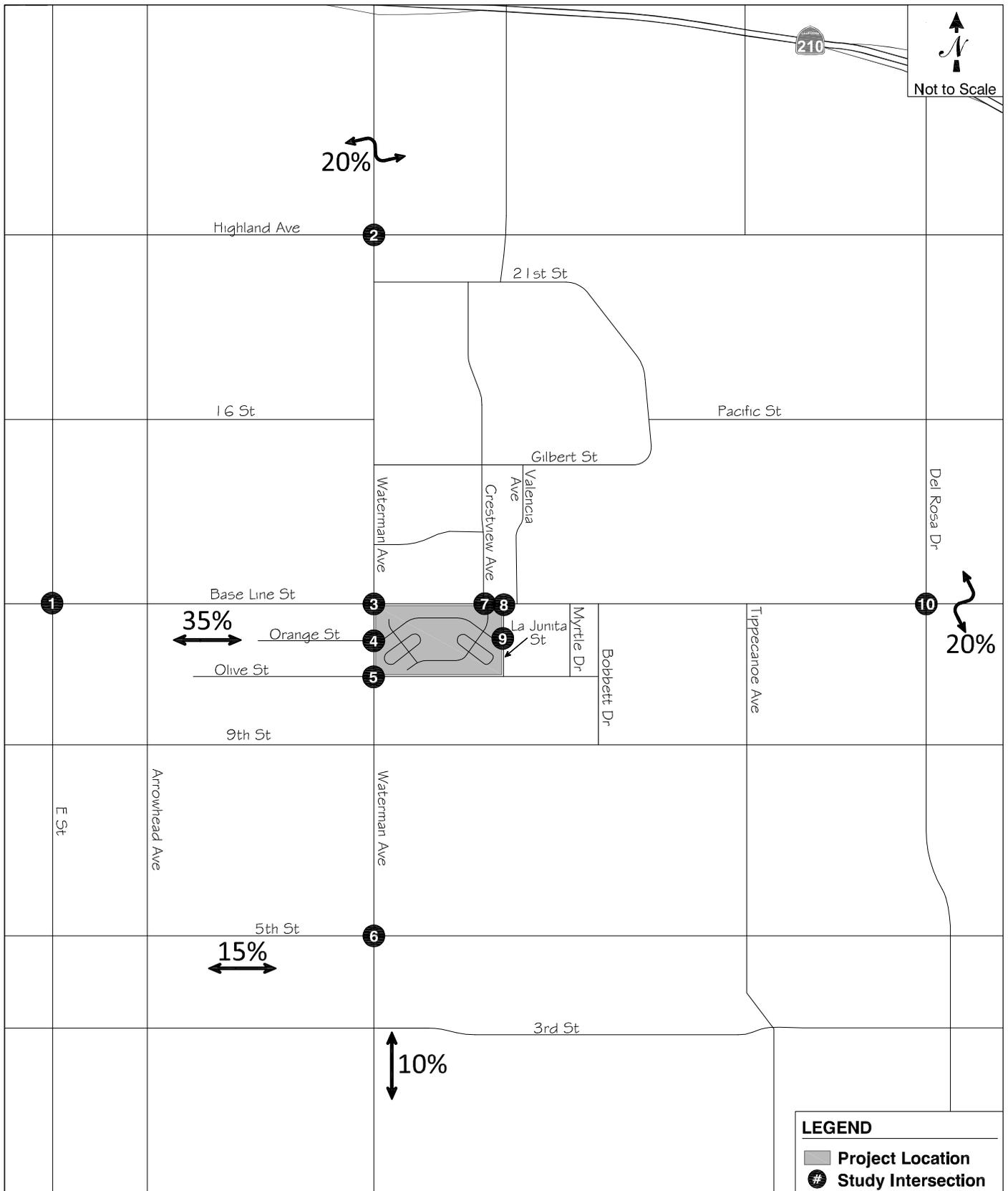
Combining all of the information above, the project (for transportation assessment) consists of the following:

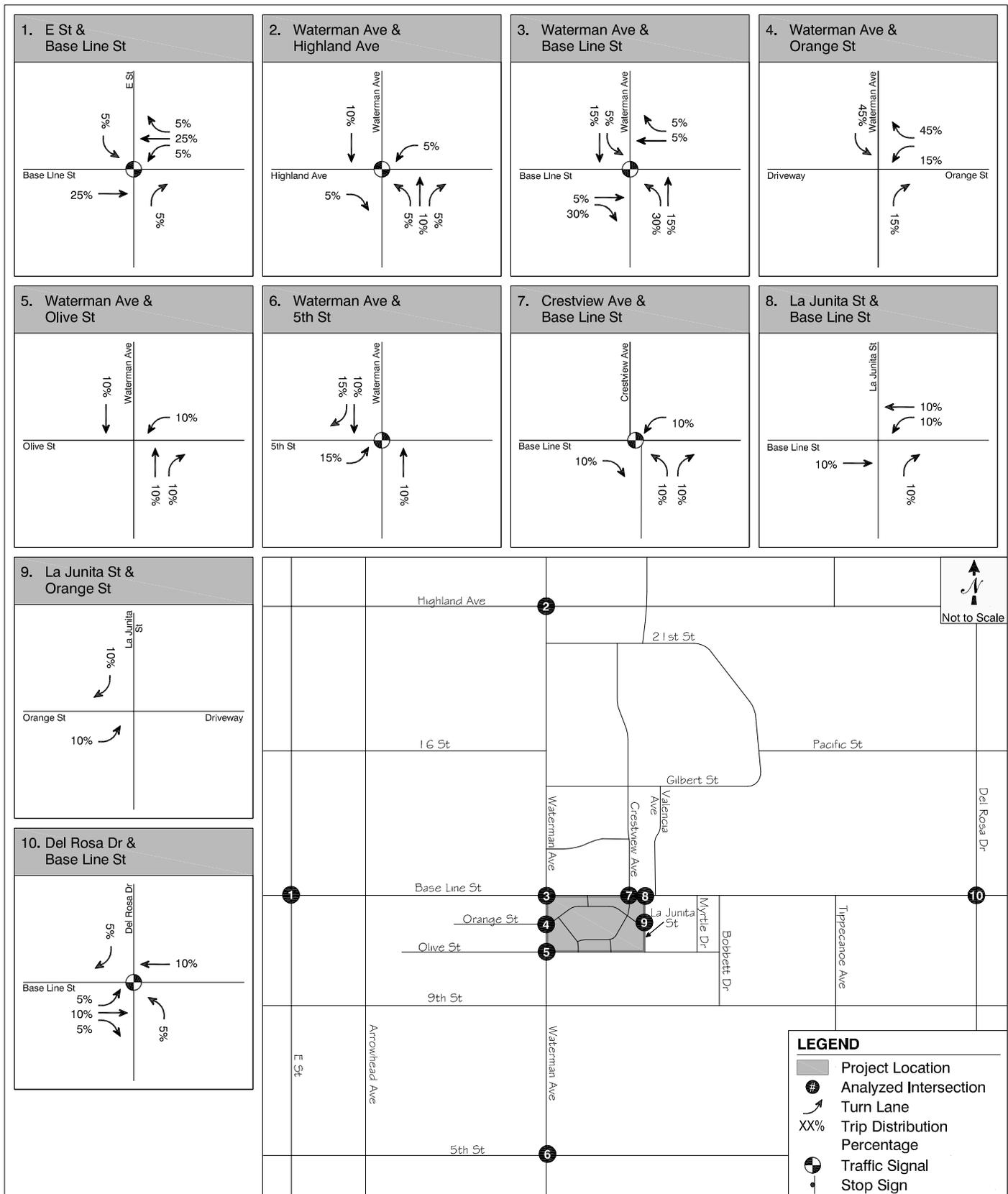
- 411 new multi-family dwelling units
- 114,035 sq. ft. of community center

TABLE 5 - PROJECT TRIP GENERATION									
Land Use	Size	Unit	Trip Generation ¹						
			Daily	AM Peak Hour			PM Peak Hour		
				Inbound	Outbound	Total	Inbound	Outbound	Total
New Multi Family Dwelling Units	411	Du	2,733	42	168	210	166	90	256
<i>Existing 252 Multi-Family Dwelling Units²</i>			-2,598	-26	-88	-114	-105	-55	-160
Subtotal			135	16	80	96	61	35	96
Community Center	114	ksf	2,609	113	73	186	62	105	167
<i>Internalized Trips from Residents³</i>			-1,305	-57	-36	-93	-31	-52	-84
Subtotal			1,305	57	37	93	31	53	84
ITE Trip Generation Subtotal:			5,342	155	241	396	228	195	423
<i>Existing Trip Credits</i>			-2,598	-26	-88	-114	-105	-55	-160
<i>Internalized Trip Credits</i>			-1,305	-57	-36	-93	-31	-52	-84
Project Trip Generation Total			1,440	72	117	189	92	88	180
Notes:									
1- Trip generations and pass-by rates calculated from ITE Trip Generation (8th edition, 2008) and Trip Generation Handbook (2nd edition, 2004) Categories 220 and 495.									
2- Credits calculated from existing counts conducted on April 28, 2011 at inlet/outlet locations to project site. Proportion of existing land use units over proposed land use units (252/411=61.3%) is credited for counts exceeding ITE trip generation values.									
3- Community Center is assumed to be primarily used by residents of the project.									
Source: Fehr & Peers, 2011									

Trip Distribution

The project trip distributions reflect the likely approach and departure routes to the project site, as determined through multiple sources such as the location of complementary land uses and existing traffic volumes on study area roadways. General distributions for the project trips are shown on Figure 6. Project trip distributions by intersection are shown on Figure 7.





Trip Assignment

Based on the trip distribution, project trips were assigned to the study area roadways and intersections. The assignment of these trips is shown on Figure 8. The assignment of trips at project site-access driveways is shown on Figure 9.

The project-related trips described above were added to the Opening Year No Project volumes shown on Figure 5 to develop Opening Year with Project volumes. These volumes are shown on Figure 10.

ROADWAY IMPROVEMENTS

At the study intersections, the proposed project includes the following intersection improvements shown on the project site plan:

- Waterman Avenue/Base Line Street – Signal modification.
- Proposed Alder Street/Base Line Street – Install traffic signal.
- Crestview Avenue/Base Line Street – Intersection realignment to connect Crestview Avenue and signal modification.
- Waterman Avenue/Orange Street – Intersection realignment to connect Orange Street and side-street stop controlled.
- Waterman Avenue/Olive Street – Install traffic signal.
- La Junita Street/Orange Street – All-way stop controlled.

The above referenced improvements were included in the “With Project” conditions assessment.

Since signal timing sheets are not available for these future intersections, Fehr & Peers’ staff have made the following assumptions at each intersection listed above in evaluating “Opening Year (2013) plus Project” and “Future Buildout Year (2033) plus Project” conditions.

- Lane configurations at each intersection were not changed from existing conditions.
- Crestview Avenue/Base Line Street – Optimize cycle length for the AM and PM peak hour.
- Waterman Avenue/Olive Street – Optimize cycle length for the AM and PM peak hour. Protected north-south left turns. Permitted east-west approaches. Signal and phasing timing assumptions are shown in Appendix.

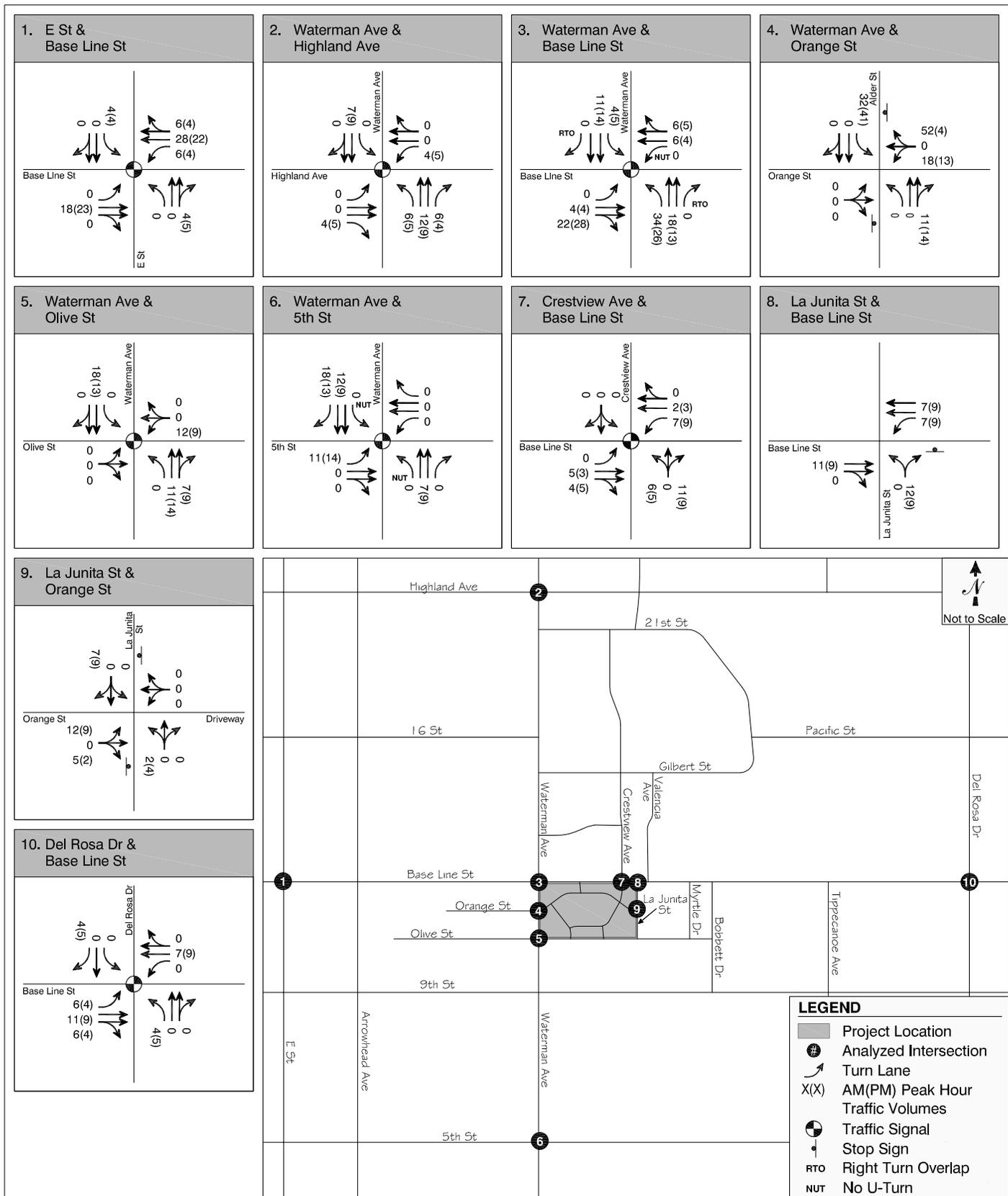
INTERSECTION OPERATIONS

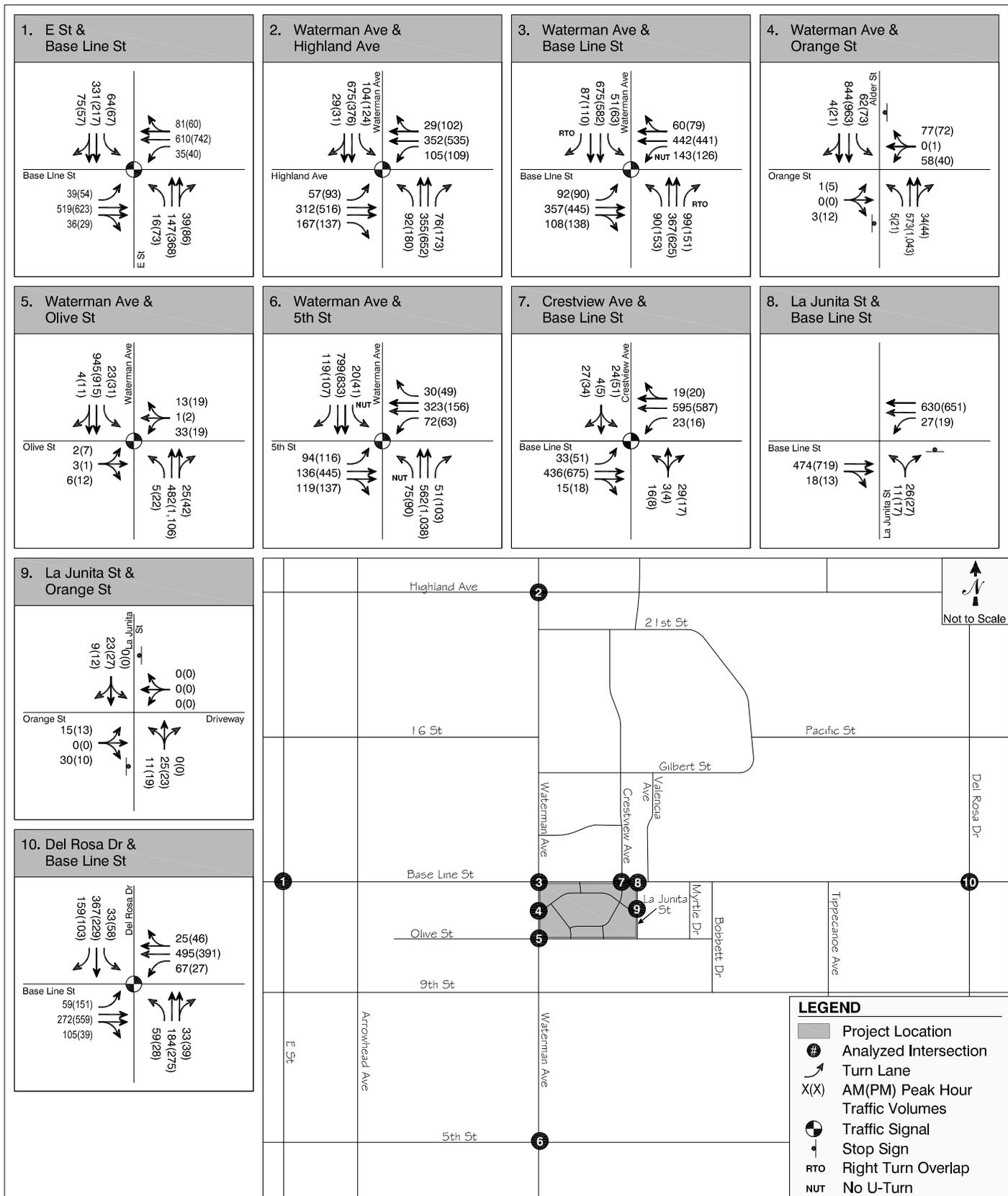
Intersection level of service results for Opening Year (2013) plus Project are summarized in Table 6 and calculations are provided in Appendix D.

TABLE 6 - INTERSECTION LEVELS OF SERVICE: OPENING YEAR (2013) PLUS PROJECT

Intersection	Control	AM Peak Hour			PM Peak Hour		
		Delay ¹	LOS	V/C ³	Delay ¹	LOS	V/C ³
1. E Street/Base Line Street	Signalized	14.4	B	0.41	15.6	B	0.45
2. Waterman Avenue/Highland Avenue ²	Signalized	27.2	C	0.49	29.3	C	0.61
3. Waterman Avenue/Base Line Street ²	Signalized	29.9	C	0.60	31.1	C	0.63
4. Waterman Avenue/Orange Street	SSSC ⁴	95.8	F	n/a	110.0	F	n/a
5. Waterman Avenue/Olive Street	Signalized	6.8	A	0.42	6.8	A	0.43
6. Waterman Avenue/5 th Street ²	Signalized	18.4	B	0.58	21.6	C	0.69
7. Crestview Avenue/Base Line Street	Signalized	4.9	A	0.28	4.5	A	0.28
8. La Junita Street/Base Line Street	SSSC ⁴	15.1	C	n/a	18.8	C	n/a
9. La Junita Street/Orange Street	SSSC ⁴	9.0	A	n/a	9.1	A	n/a
10. Del Rosa Drive/Base Line Street	Signalized	26.1	C	0.57	23.7	C	0.48

Notes:
 1- Delay for intersections based on application of *2000 Highway Capacity Manual* Methodology. Delay was calculated using Synchro 6.0 software.
 2- CMP intersection
 3- V/C = Volume to Capacity ratio. Note – V/C is not calculated for unsignalized intersections.
 4- SSSC= Side street stop controlled
 Source: Fehr & Peers, May 2012





OPENING YEAR (2013) PLUS PROJECT LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES

IMPACT ASSESSMENT

Table 7 compares the change in volume-to-capacity ratios at intersections that operate at LOS C, D, E, or F to determine project impacts. These V/C changes are compared to the allowable change shown in Table 2.

TABLE 7 - IMPACTS FOR SIGNALIZED INTERSECTIONS: OPENING YEAR (2013) PLUS PROJECT								
Intersection	LOS AM (PM)	Allowable Δ V/C AM (PM)	AM Peak Hour			PM Peak Hour		
			No Project	With Project	Δ V/C	No Project	With Project	Δ V/C
1. E Street/Base Line Street	B(B)							
2. Waterman Avenue/Highland Avenue	C(C)	0.04(0.04)	0.48	0.49	0.01	0.59	0.61	0.02
3. Waterman Avenue/Base Line Street	C(C)	0.04(0.04)	0.56	0.60	0.04	0.60	0.63	0.03
4. Waterman Avenue/Orange Street	F(F)							
5. Waterman Avenue/Olive Street	A(A)							
6. Waterman Avenue/5 th Street	B(C)	n/a(0.04)				0.69	0.69	0.00
7. Crestview Avenue/Base Line Street	A(A)							
8. La Junita Street/Base Line Street	C(C)							
9. La Junita Street/Orange Street	A(A)							
10. Del Rosa Drive/Base Line Street	C(C)	0.04(0.04)	0.54	0.57	0.03	0.47	0.48	0.01

Notes:
1- V/C = Volume to Capacity ratio. Calculated using the Synchro 6 software package.
Shaded cells indicate where intersections operate at LOS A or B.
Bold-Italicized type indicates project impact.
Source: Fehr & Peers, 2011.

As shown in Table 7, the proposed project will not impact signalized intersections in the study area.

For unsignalized intersections operating below LOS C with the project in place, traffic volumes for the following intersection was tested and met signal warrants, creating a significant project impact at:

- Waterman Avenue/Orange Street

Please note that this determination of deficient conditions for unsignalized intersections occurs because of delays occurring on the side streets connecting to Waterman Avenue, in that vehicles turning onto Waterman Avenue may have to wait for gaps in incoming traffic.

Measures to mitigate the identified impacts are discussed in detail in Chapter 6.

5. FUTURE BUILDOUT YEAR (2033) TRAFFIC CONDITIONS

This section documents the conditions in the 2033 scenario.

TRAFFIC VOLUMES

The Southern California Association of Governments (SCAG) Travel Demand Model was not used to evaluate the project and forecast volumes due to several reasons. The SCAG Model lacks sufficient roadway network detail and does not include all of the roadway facilities analyzed within this study. Also, the most current version of the SCAG Model has a 2003 Base Year and does not provide information for a year which is close to the Existing Conditions analyzed in this study.

Unlike the SCAG Model, the EVTm provides an appropriate level of detail for this study. However, this model is based on Existing Conditions at the time of the model development (2006), which significantly predates the year of analysis for this project. Additionally, although the model was validated to Year 2006 conditions, it was based off of an earlier version of the SCAG model, on an outdated software platform, and is based on an outdated RTP.

Fehr & Peers understands that SANBAG is currently finishing a countywide model for the local region (SBTAM); but it is not available at this time and could not be used in this assessment. Our concern with using either model to forecast future traffic relates more to the level of detail (SCAG) and the Base Year of the model (SCAG and EVTm).

The preferred and approved method of forecasting volumes used is to apply an annual growth rate to existing volumes. A 3% annual growth rate was applied to existing traffic counts to develop 2033 traffic volumes. A list of pending and approved projects was also used to determine the amount of traffic generated from related projects which were added to the traffic volumes in addition to the 3% growth factor. These projects are shown on Figure 3.

The Future Year Buildout (2033) No Project peak hour traffic volumes for the study intersections are shown on Figure 11. Traffic generated by the proposed project, shown on Figures 8 and 9, were added to these volumes to develop Future Year Buildout (2033) With Project peak hour volumes shown on Figure 12.

ROADWAY IMPROVEMENTS

Fehr & Peers reviewed the SCAG 2008 RTP to identify any programmed roadway improvements in the study area. No improvements were identified and therefore no improvements were assumed in this analysis.

INTERSECTION OPERATIONS

The LOS results are summarized in Table 8 for the Future Buildout Year (2033) No Project Condition. Table 9 summarizes the results for the Future Buildout Year (2033) With Project Conditions. The analysis sheets are provided in Appendix E and F.

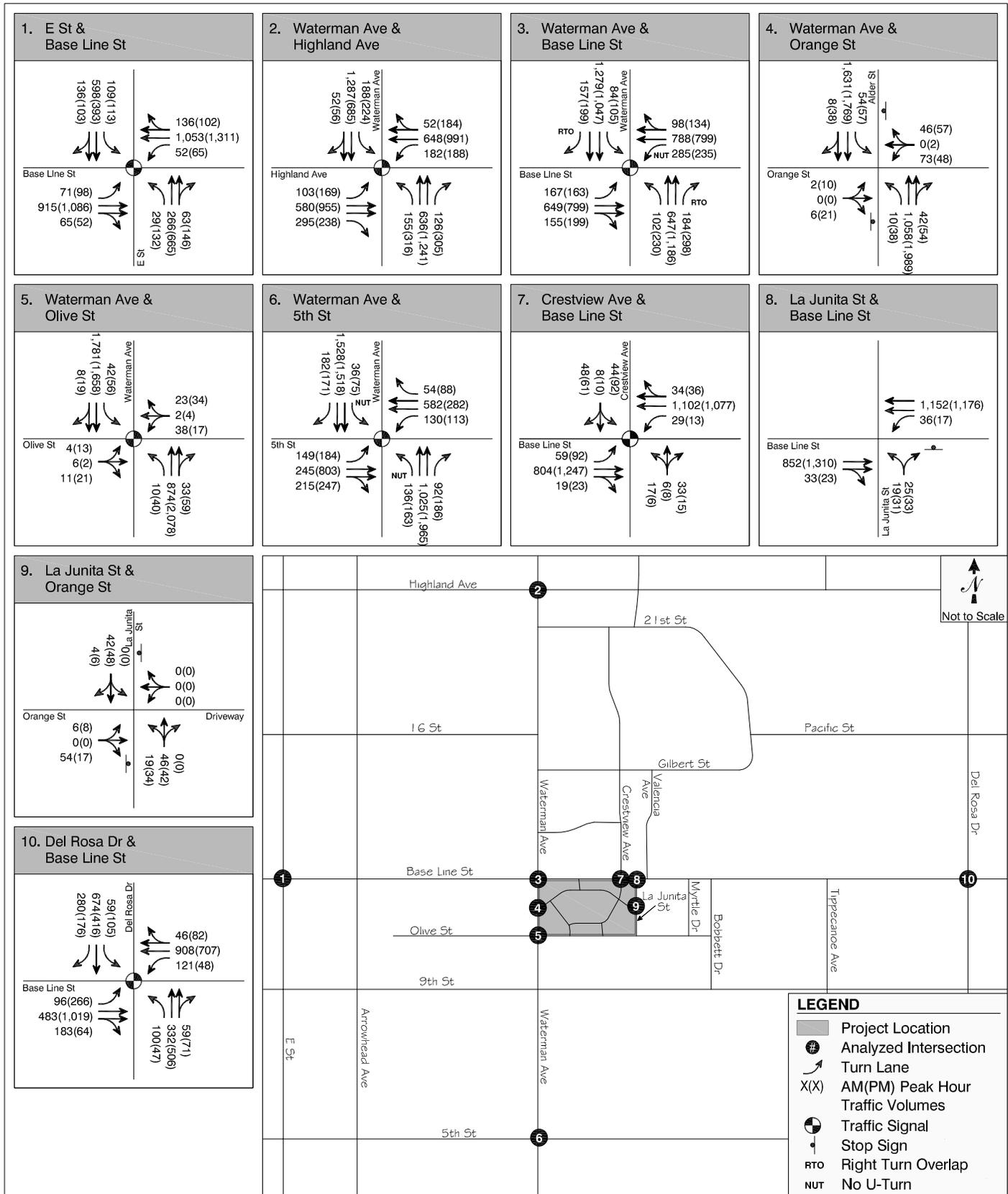
TABLE 8 - INTERSECTION LEVELS OF SERVICE: FUTURE BUILDOUT YEAR (2033) NO PROJECT							
Intersection	Control	AM Peak Hour			PM Peak Hour		
		Delay ¹	LOS	V/C ³	Delay ¹	LOS	V/C ³
1. E Street/Base Line Street	Signalized	18.0	B	0.65	27.9	C	1.01
2. Waterman Avenue/Highland Avenue ²	Signalized	54.1	D	0.84	91.7	F	1.14
3. Waterman Avenue/Base Line Street ²	Signalized	53.0	D	0.91	50.5	D	0.97
4. Waterman Avenue/Orange Street	SSSC ⁴	267.9	F	n/a	ERR	F	n/a
5. Waterman Avenue/Olive Street	SSSC ⁴	1589.8	F	n/a	ERR	F	n/a
6. Waterman Avenue/5 th Street ²	Signalized	31.7	C	0.85	170.9	F	1.16
7. Crestview Avenue/Base Line Street	Signalized	3.5	A	0.40	4.8	A	0.49
8. La Junita Street/Base Line Street	SSSC ⁴	33.0	D	n/a	190.0	F	n/a
9. La Junita Street/Orange Street	SSSC ⁴	8.8	A	n/a	9.0	A	n/a
10. Del Rosa Drive/Base Line Street	Signalized	39.1	D	0.84	30.8	C	0.73

Notes:
 1- Delay for intersections based on application of *2000 Highway Capacity Manual* Methodology. Delay was calculated using Synchro 6 software.
 2- CMP intersection
 3- V/C = Volume to Capacity ratio. Note – V/C is not calculated for unsignalized intersections.
 4- SSSC= Side Street Stop Sign Controlled
 Source: Fehr & Peers, May 2012

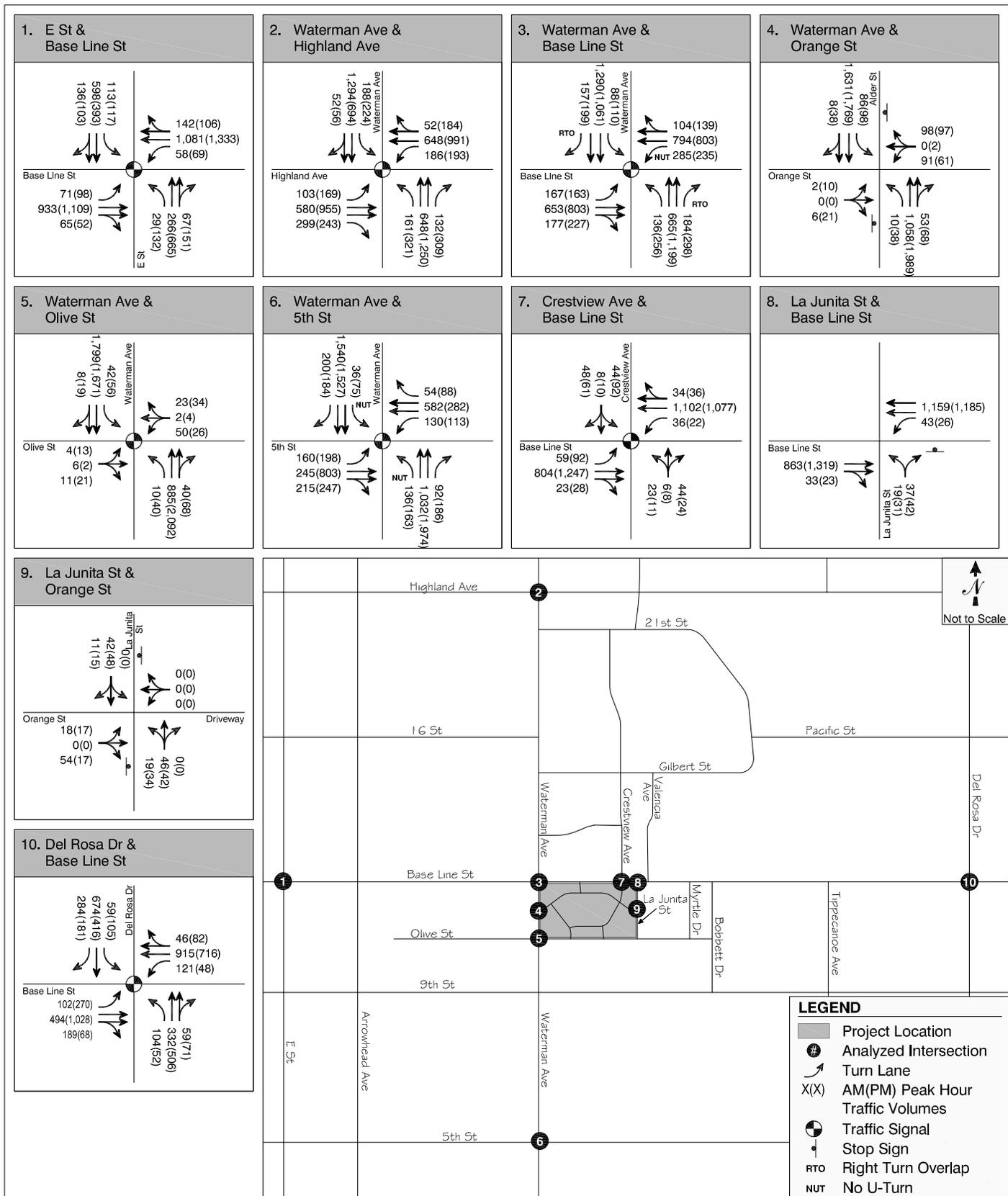
Intersection level of service analysis results for opening year (2013) are summarized in Table 8. Analysis sheets are provided in Appendix E. As shown in this table, with the application of ambient growth and related projects, most of the study intersections will continue to operate at LOS C or better, with the exception of the following intersections:

- Waterman Avenue/Highland Avenue – LOS D during the AM peak hour and LOS F during the PM peak hour
- Waterman Avenue/Base Line Street – LOS D during the AM peak hour and LOS D during the PM peak hour
- Waterman Avenue/Orange Street – LOS F during the AM peak hour and LOS F during the PM peak hour
- Waterman Avenue/Olive Street – LOS F during the AM peak hour and LOS F during the PM peak hour
- La Junita Street/Base Line Street – LOS D during the AM peak hour and LOS F during the PM peak hour
- Del Rosa Drive/Base Line Street – LOS D during the AM peak hour

Please note that this determination of deficient conditions at unsignalized intersections occurs because of delays occurring on the side streets connecting to Waterman Avenue, in that vehicles turning onto Waterman Avenue may have to wait for gaps in incoming traffic.



**FUTURE BUILDOUT YEAR (2033)
LANE CONFIGURATIONS AND
PEAK HOUR TRAFFIC VOLUMES**



FUTURE BUILDOUT YEAR (2033) PLUS PROJECT LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES

TABLE 9 - INTERSECTION LEVELS OF SERVICE: FUTURE BUILDOUT YEAR (2033) PLUS PROJECT							
Intersection	Control	AM Peak Hour			PM Peak Hour		
		Delay ¹	LOS	V/C ³	Delay ¹	LOS	V/C ³
1. E Street/Base Line Street	Signalized	18.1	B	0.67	28.8	C	1.03
2. Waterman Avenue/Highland Avenue ²	Signalized	56.7	E	0.84	93.4	F	1.15
3. Waterman Avenue/Base Line Street ²	Signalized	55.2	E	0.96	55.6	E	1.00
4. Waterman Avenue/Orange Street	SSSC ⁴	132.1	F	n/a	ERR	F	n/a
5. Waterman Avenue/Olive Street	Signalized	9.5	A	0.65	16.1	B	0.76
6. Waterman Avenue/5 th Street ²	Signalized	43.6	D	0.85	104.5	F	1.09
7. Crestview Avenue/Base Line Street	Signalized	5.1	A	0.41	6.3	A	0.50
8. La Junita Street/Base Line Street	SSSC ⁴	31.2	D	n/a	207.5	F	n/a
9. La Junita Street/Orange Street	SSSC ⁴	9.1	A	n/a	9.3	A	n/a
10. Del Rosa Drive/Base Line Street	Signalized	39.7	D	0.85	31.3	C	0.74

Notes:
Notes:
1- Delay for intersections based on application of *2000 Highway Capacity Manual* Methodology. Delay was calculated using Synchro 6.0 software.
2- CMP intersection
3- V/C = Volume to Capacity ratio. Note – V/C is not calculated for unsignalized intersections.
4- SSSC= Side street stop controlled
Source: Fehr & Peers, 2011

IMPACT ASSESSMENT

Please note that this determination of deficient conditions for unsignalized intersections occurs because of delays occurring on the side streets connecting to Waterman Avenue, in that vehicles turning onto Waterman Avenue may have to wait for gaps in incoming traffic.

Measures to mitigate the identified impacts are discussed in detail in Chapter 6.

Table 10 compares the change in volume-to-capacity ratios at intersections that operate at LOS C, D, E, or F to determine project impacts. These V/C changes are compared to the allowable change shown in Table 2.

As shown in Table 10, the proposed project will impact the following signalized intersections:

- Waterman Avenue/Base Line Street – AM and PM Peak Hour

For unsignalized intersections operating below LOS C with the project in place, traffic volumes for the following intersection was tested and met signal warrants, creating a significant project impact at:

- Waterman Avenue/Orange Street

Please note that this determination of deficient conditions for unsignalized intersections occurs because of delays occurring on the side streets connecting to Waterman Avenue, in that vehicles turning onto Waterman Avenue may have to wait for gaps in incoming traffic.

Several intersections have deficient operations in either the AM or PM Peak Hour but do not exceed City of San Bernardino thresholds as described below:

- Waterman Avenue/Highland Avenue – AM and PM Peak Hour: The intersection operates at LOS E in the AM peak hour and LOS F in the PM peak hour with a V/C ratio difference of 0.00 in the AM and 0.01 in the PM from the “without project” scenario. The V/C ratio, not delay, is the controlling factor of significant impacts in the City of San Bernardino. The V/C ratio difference for this intersection falls within the allowable difference in V/C ratios. Therefore, mitigation measures are not required for this location.
- Waterman Avenue/5th Street – AM and PM Peak Hour: The intersection operates at LOS D in the AM peak hour and LOS F in the PM peak hour with a V/C ratio difference of 0.00 in the AM and -0.07 in the PM from the “without project” scenario. The V/C ratio, not delay, is the controlling factor of significant impacts in the City of San Bernardino. The V/C ratio difference for this intersection falls within the allowable difference in V/C ratios. Therefore, this location does not need to be mitigated and no mitigation is required for this scenario.
- La Junita Street/Base Line Street – AM and PM Peak Hour: The intersection operates as LOS D in the AM peak hour and LOS F in the PM peak hour. Although the “with project” scenario surpasses the LOS C minimum requirement for unsignalized intersections, it does not satisfy the peak hour signal warrant requirements to install a traffic signal. Therefore, mitigation measures are not required for this location since the City requires that an unsignalized intersection exceed both the LOS threshold and meet with peak hour signal warrant.
- Del Rosa Drive/La Junita Street – AM Peak Hour: The intersection operates at LOS D in the AM peak hour with a V/C ratio difference of 0.01 in the AM from the “without project” scenario. The V/C ratio, not delay, is the controlling factor of significant impacts in the City of San Bernardino. The V/C ratio difference for this intersection falls within the allowable difference in V/C ratios. Therefore, this location does not need to be mitigated and no mitigation is required for this scenario.

Measures to mitigate the identified impacts are discussed in detail in Chapter 6.

TABLE 10 - IMPACTS FOR SIGNALIZED INTERSECTIONS: FUTURE BUILDOUT YEAR (2033) PLUS PROJECT

Intersection	LOS AM (PM)	Allowable ΔV/C AM (PM)	AM Peak Hour			PM Peak Hour		
			No Project	With Project	ΔV/C	No Project	With Project	ΔV/C
1. E Street/Base Line Street	B(C)	n/a(0.04)				1.01	1.03	0.02
2. Waterman Avenue/Highland Avenue ²	D(F)	0.02 (0.01)	0.84	0.84	0.00	1.14	1.15	0.01
3. Waterman Avenue/Base Line Street ²	D(D)	0.02 (0.02)	0.91	0.96	0.05	0.97	1.00	0.03
4. Waterman Avenue/Orange Street	F(F)							
5. Waterman Avenue/Olive Street	A(B)							
6. Waterman Avenue/5 th Street ²	C(F)	0.04(0.01)	0.85	0.85	0.00	1.16	1.09	-0.07
7. Crestview Avenue/Base Line Street	A(A)							
8. La Junita Street/Base Line Street	D(F)							
9. La Junita Street/Orange Street	A(A)							
10. Del Rosa Drive/Base Line Street	D(C)	0.02(0.04)	0.84	0.85	0.01	0.73	0.74	0.01

Notes:
1- V/C = Volume to Capacity ratio. Calculated using the Synchro 6 software package.
Shaded cells indicate where intersections operate at LOS A or B.
Bold-Italicized type indicates project impact.
Source: Fehr & Peers, May 2012.

6. FINDINGS AND MITIGATION MEASURES

This chapter provides a summary of the key findings and project impacts for each scenario analyzed, and recommended mitigation measures to mitigate these impacts. Significant project impacts were identified based upon significance criteria outlined in Chapter 1.

SUMMARY OF PROJECT IMPACTS

The addition of the project will significantly impact the following locations under the following analyzed scenario:

Opening Year (2013) Plus Project Conditions

- Waterman Avenue/Orange Street – AM and PM Peak Hour

Future Buildout Year (2033) Plus Project Conditions

- Waterman Avenue/Base Line Street – AM and PM Peak Hour
- Waterman Avenue/Orange Street – AM and PM Peak Hour

A description of each project impact and potential mitigation measures are provided below. The proposed project would be responsible for a fair-share contribution toward the Waterman Avenue and Base Line Street intersection mitigation. The project would be fully responsible for mitigations at the intersection of Waterman Avenue, therefore fair share contributions are not calculated for improvements at this location.

RECOMMENDED MITIGATION MEASURES

A description of each project impact and potential mitigation measures are proposed below. Improvement measures are implemented to minimize the impact of a project on the study area. With implemented improvements, “with project” scenarios must fall within the significance criteria outlined in Chapter 1. The proposed project would be responsible for a fair-share contribution toward the identified improvements. Level of service reports for mitigated intersections are provided in Appendix G.

Waterman Avenue/Base Line Street (AM and PM Peak Hour)

Impact

The intersection operates at LOS E during the AM and PM peak hour with the addition of project-generated traffic. It will increase the V/C ratio by 0.05 in the AM peak hour and 0.03 in the PM peak hour, creating a project impact at the intersection.

Mitigation

The intersection of Waterman Avenue/Base Line Street is coordinated along Waterman Avenue. For the intersection to operate at an acceptable level of service, signal modification and optimization would be needed. With the improvement, the intersection would operate at LOS D with a V/C ratio increase of 0.02 in the AM peak hour and at LOS D with a V/C ratio increase of 0.00 in the PM peak hour from “without project” conditions. Signal timing sheets for this mitigated intersection are provided in Appendix G.

Waterman Avenue/Orange Street (AM and PM Peak Hour)

Impact

Deficient conditions for this intersection occurs because of delays occurring on the side streets (Orange Street) connecting to Waterman Avenue, in that vehicles turning onto Waterman Avenue may have to wait for gaps in incoming traffic.

Mitigation

It is recommended that the project implement a right-turn-in/right-turn-out,/left-turn-in rule at this intersection. This measure will drastically alleviate delay experienced by drivers wanting to turn left out of the Orange Street driveway. Although this intersection is warranted for a signal, it is not recommended given the intersection's close proximity (~350 feet) to the Waterman Avenue and Base Line Street intersection.

FAIR SHARE CONTRIBUTIONS

The project is responsible for a portion of each mitigation measure proposed under Future Buildout Year (2033) Conditions. Project fair share contributions are calculated by comparing the project's peak hour traffic generated against future growth.

Waterman Avenue at Base Line Street

It is recommended that the intersection implement signal optimization to bring LOS delay to within allowable limits. From past experiences implementing signal optimizations, the typical cost of this mitigation would be approximately \$5,000 to \$10,000. To be conservative, this mitigation is estimated to cost \$10,000. The project generates 99 PM peak hour trips at this location, resulting in a 3.6% fair share cost of the proposed mitigation ($99/(5,493-2,739)$). This would equate to \$360.

PROJECT IMPROVEMENTS

The project proposes to install a traffic signal at Base Line Street and the proposed Alder Street driveway (opposing commercial driveway on Base Line Street just west of Pepper Tree Lane). It is recommended in the design of the driveway that one left turn lane and one shared through-right turn lane be provided on the north-south driveways. Updated signal timing plans are provided for study intersections affected by the project. Signal timing sheets for the intersections of Waterman Avenue at Base Line Street, Olive Street at Base Line Street, proposed Alder Street at Baseline Street, and Crestview Avenue at Base Line Street are provided in Appendix G.

7. PROJECT SITE PLAN REVIEW

This chapter reviews the project site plan and considers on-site circulation and access in the context of two items:

- First, it considers whether the proposed roadway system, both on-site and adjacent to the site, are consistent with City of San Bernardino Standards and Guidelines
- Second, it considers whether these improvements are consistent with standardized roadway design standards such as those promulgated by AASHTO or other standard traffic engineering guidelines and procedures

This review ultimately is oriented towards whether a project's design elements conflicts with the CEQA Guidelines which state that a significant traffic impact could occur if "the project substantially increases hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?"

PROJECT OVERVIEW

The project is proposing both on-site and off-site improvements. The on-site improvements include the reconstruction of new roadways within the project site, as shown on Figure 1. It is anticipated that these on-site roadways will be constructed as private streets instead of public streets.

Concurrent with these on-site improvements, a series of off-site improvements will be constructed concurrently along several roadways adjacent to the project site including Base Line Street, Waterman Avenue, Olive Street, and La Junita Street. These proposed improvements include:

- Narrow travel lanes, to slow down traffic and decrease the permeable surface area.
- On-street parallel and diagonal parking, to decrease the needed travel surface area to parking spaces and decrease traffic speeds.
- Raised crosswalks and curb bulb outs, to increase pedestrian safety.
- Increased sidewalk width, to promote walking and the accessibility of pedestrian routes.
- Addition of street trees
- Under-grounding of existing electrical lines

With these proposed improvements, the number of existing travel lanes on Base Line Street and Waterman Avenue would be maintained to preserve roadway and intersection capacity.

PROJECT IMPACT

This review considers the following items:

- Are all areas of the project accessible to/from each other?
- Do designs of roadway features meet or exceed accepted standards?
- Does the project provide sufficient on-site traffic control devices?
- Is there adequate access for emergency vehicles?
- Is the traffic signal spacing adequate?

Each of these items are discussed in further detail below.

Are All Areas of the Project Accessible To Each Other?

This evaluation criterion considers whether the project has sufficient internal accessibility to limit the need to travel on external roadways to reach various locations within the site. Our review of the site plan indicates that the project has a high level of internal accessibility. The various project driveways connect into the site terminating at an internal ring roadway which provides access to individual properties within the site. It is therefore considered that the internal project accessibility is more than adequate.

Do Designs of Roadway Features Meet or Exceed Accepted Standards?

Our review of the proposed roadways indicates that there are on-site and off-site roadways proposed for the project. The on-site roadways are proposed to be private streets and therefore City of San Bernardino Street design standards do not apply. In the absence of City Standards, we would consider generalized standards related to lane width, curb radii, and other related items. Our review indicates that these internal roadways are consistent with general standards for roadways and are sufficient for internal circulation.

The project is also proposing to conduct a series of public street improvements described above. The ones which are potentially problematic are those proposed for Base Line Street and Waterman Avenue. While no reduction in the number of lanes is proposed, some reduction in lane width is being proposed along with parking on one side of each roadway. Our review of the City's roadway widths as provided in the City's General Plan indicates that the curb-to-curb width may be insufficient as compared to these standards. We would note that this potential inconsistency is limited by the following language in the City's General Plan:

Unique street cross-sections, median designs, and street widths may be considered for each development in order to create distinction and identity as long as function, capacity, and safety are maintained to the City's satisfaction. (Page 6-6 of the Circulation Element)

Given the language above, it is therefore concluded that the roadway features are compliant with City policy statements and therefore acceptable.

Does the Project Provide Sufficient On-Site Traffic Control Devices?

The project is not proposed to construct any internal traffic signals or install other on-site traffic control devices. The need for traffic control devices is considered to be minimal given the extensive use of on-site traffic control devices, the prevalence of on-street parking, and other related measures. It is therefore concluded that the site plan to be adequate with respect to this item.

Is there Adequate Access for Emergency Vehicles?

Emergency vehicle access considers two items. First, this analysis considers whether emergency vehicles can access the site from a regional perspective. A review of the project location indicates that it is located at the corner of two major roadways and is several miles from several regional freeways (I-10, I-215). The regional access is therefore considered to be more than adequate. The second topic considered is whether emergency vehicles can travel into the site. As noted above, the project has a high level of internal accessibility, therefore, it is considered that emergency vehicles can easily travel while inside the project boundary using the internal ring road previously discussed.

Does the Project Provide Sufficient Pedestrian and Bicyclist On-Site and Off-Site Connectivity?

The project has a very high level of pedestrian connectivity within the site with an extensive network of pedestrian-only trails and sidewalks connecting all areas of the project. This internal pedestrian network is complemented through additional pedestrian facilities on the boundary of the project including sidewalks on Olive Street, Waterman Avenue, and Base Line Street.

The project also proposes to install a pedestrian signal separated by a raised median on Waterman Avenue, between Orange Street and 11th Street. In the southbound direction, the crosswalk will be located approximately 90 feet north of 11th Street, and approximately 35' wide. In the northbound direction, the crosswalk will be located approximately 75 feet north of 11th Street, and approximately 30' wide. The signal is only accessible to pedestrians and bicyclists and a pedestrian signal will only flash when triggered by a non-motorist traveler.

Striped bicycle lanes in both directions of travel at project boundaries are also proposed on Waterman Avenue and Base Line Street. The bicycle lanes will be located on-street and will share right-of-way with motor vehicles.

It is concluded that the project has more than sufficient on-site and off-site pedestrian and bicyclist connectivity.

Is the Traffic Signal Spacing Adequate?

A review of City of San Bernardino documents indicates that the City does not have formal traffic signal spacing requirements. In the absence of specific direction, it is noted that one standard traffic engineering principle is that traffic signals should generally be spaced at least 800 feet. A review of the proposed traffic signals at the various locations along the project frontage indicates that a majority of the traffic signals meet this general spacing standard.

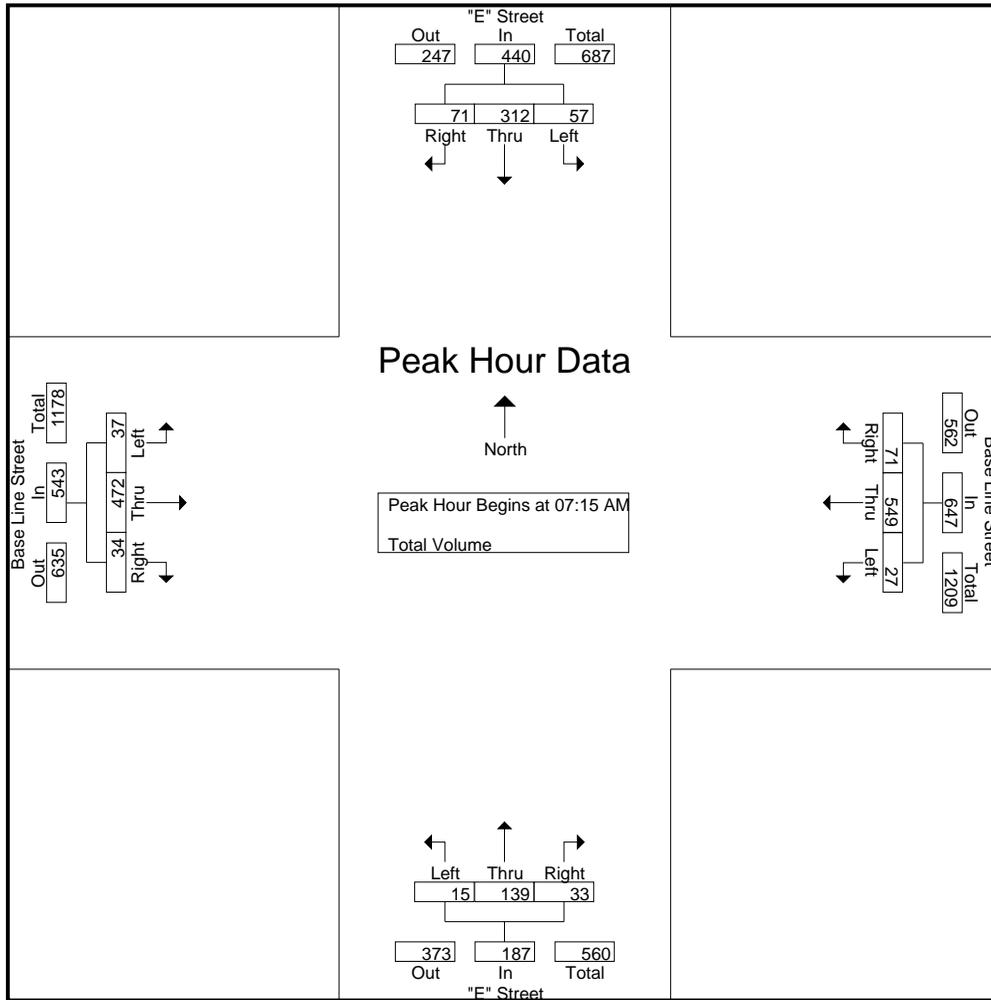
Based on the considerations above, it can be concluded that the traffic signal spacing is therefore adequate.

**APPENDIX A:
EXISTING TRAFFIC COUNTS**

Groups Printed- Total Volume

Start Time	"E" Street Southbound				Base Line Street Westbound				"E" Street Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	7	38	11	56	5	114	12	131	1	19	2	22	8	78	2	88	297
07:15 AM	17	71	22	110	4	119	27	150	2	42	13	57	8	103	12	123	440
07:30 AM	19	90	18	127	6	158	26	190	2	28	6	36	12	120	4	136	489
07:45 AM	12	87	14	113	12	137	9	158	5	39	3	47	9	130	8	147	465
Total	55	286	65	406	27	528	74	629	10	128	24	162	37	431	26	494	1691
08:00 AM	9	64	17	90	5	135	9	149	6	30	11	47	8	119	10	137	423
08:15 AM	10	51	10	71	5	116	15	136	3	38	9	50	10	123	7	140	397
08:30 AM	13	51	8	72	9	139	11	159	3	28	8	39	8	140	7	155	425
08:45 AM	23	58	11	92	12	145	24	181	9	37	8	54	14	141	13	168	495
Total	55	224	46	325	31	535	59	625	21	133	36	190	40	523	37	600	1740
Grand Total	110	510	111	731	58	1063	133	1254	31	261	60	352	77	954	63	1094	3431
Apprch %	15	69.8	15.2		4.6	84.8	10.6		8.8	74.1	17		7	87.2	5.8		
Total %	3.2	14.9	3.2	21.3	1.7	31	3.9	36.5	0.9	7.6	1.7	10.3	2.2	27.8	1.8	31.9	

Start Time	"E" Street Southbound				Base Line Street Westbound				"E" Street Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	17	71	22	110	4	119	27	150	2	42	13	57	8	103	12	123	440
07:30 AM	19	90	18	127	6	158	26	190	2	28	6	36	12	120	4	136	489
07:45 AM	12	87	14	113	12	137	9	158	5	39	3	47	9	130	8	147	465
08:00 AM	9	64	17	90	5	135	9	149	6	30	11	47	8	119	10	137	423
Total Volume	57	312	71	440	27	549	71	647	15	139	33	187	37	472	34	543	1817
% App. Total	13	70.9	16.1		4.2	84.9	11		8	74.3	17.6		6.8	86.9	6.3		
PHF	.750	.867	.807	.866	.563	.869	.657	.851	.625	.827	.635	.820	.771	.908	.708	.923	.929



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:15 AM				07:15 AM				08:00 AM				08:00 AM			
+0 mins.	17	71	22	110	4	119	27	150	6	30	11	47	8	119	10	137
+15 mins.	19	90	18	127	6	158	26	190	3	38	9	50	10	123	7	140
+30 mins.	12	87	14	113	12	137	9	158	3	28	8	39	8	140	7	155
+45 mins.	9	64	17	90	5	135	9	149	9	37	8	54	14	141	13	168
Total Volume	57	312	71	440	27	549	71	647	21	133	36	190	40	523	37	600
% App. Total	13	70.9	16.1		4.2	84.9	11		11.1	70	18.9		6.7	87.2	6.2	
PHF	.750	.867	.807	.866	.563	.869	.657	.851	.583	.875	.818	.880	.714	.927	.712	.893

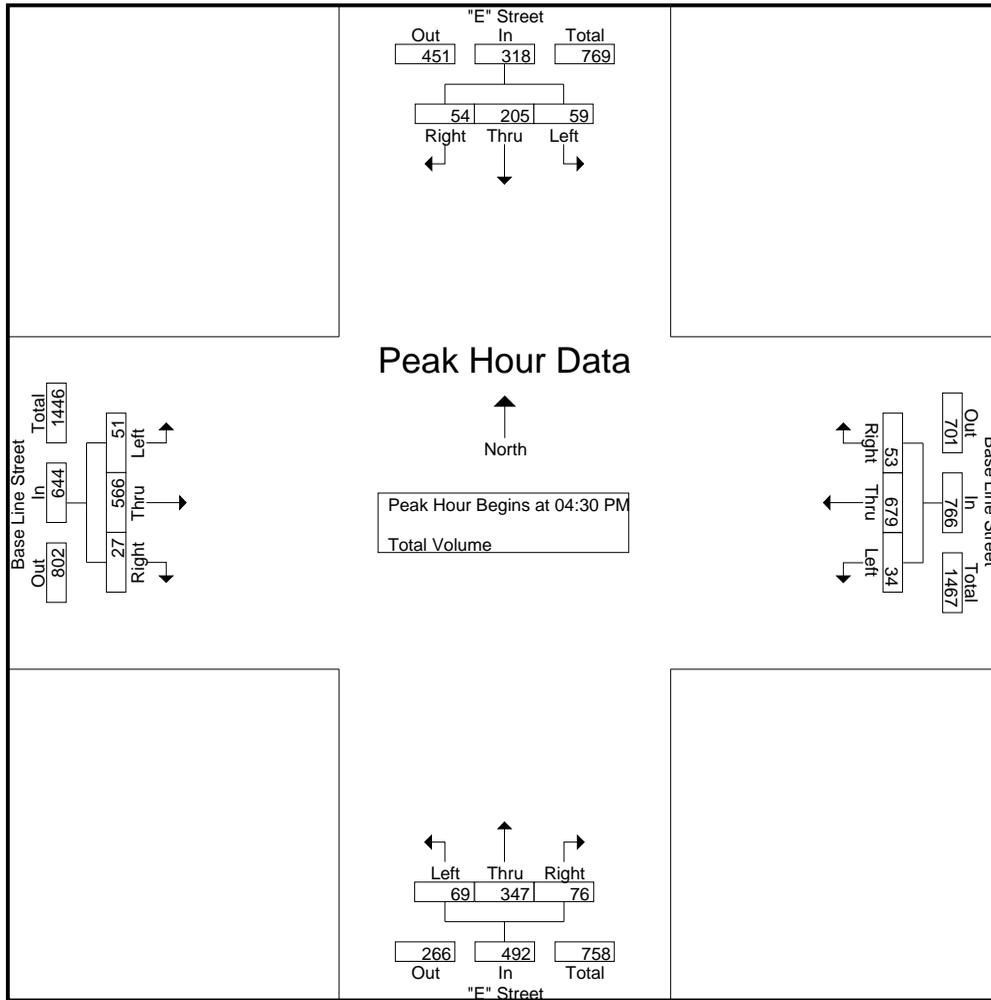
City of San Bernardino
 N/S: "E" Street
 E/W: Base Line Street
 Weather: Sunny

File Name : SBCEBLPM
 Site Code : 00000139
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	"E" Street Southbound				Base Line Street Westbound				"E" Street Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	10	42	14	66	14	168	16	198	7	73	20	100	10	168	9	187	551
04:15 PM	16	40	10	66	15	184	10	209	7	75	16	98	6	141	6	153	526
04:30 PM	12	66	8	86	8	176	10	194	17	87	14	118	16	134	8	158	556
04:45 PM	13	57	17	87	12	159	14	185	17	84	17	118	14	149	6	169	559
Total	51	205	49	305	49	687	50	786	48	319	67	434	46	592	29	667	2192
05:00 PM	20	39	16	75	5	171	15	191	20	86	15	121	10	153	5	168	555
05:15 PM	14	43	13	70	9	173	14	196	15	90	30	135	11	130	8	149	550
05:30 PM	3	41	11	55	17	172	17	206	13	57	18	88	10	155	13	178	527
05:45 PM	8	44	7	59	8	153	10	171	15	57	17	89	8	142	11	161	480
Total	45	167	47	259	39	669	56	764	63	290	80	433	39	580	37	656	2112
Grand Total	96	372	96	564	88	1356	106	1550	111	609	147	867	85	1172	66	1323	4304
Apprch %	17	66	17		5.7	87.5	6.8		12.8	70.2	17		6.4	88.6	5		
Total %	2.2	8.6	2.2	13.1	2	31.5	2.5	36	2.6	14.1	3.4	20.1	2	27.2	1.5	30.7	

Start Time	"E" Street Southbound				Base Line Street Westbound				"E" Street Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	12	66	8	86	8	176	10	194	17	87	14	118	16	134	8	158	556
04:45 PM	13	57	17	87	12	159	14	185	17	84	17	118	14	149	6	169	559
05:00 PM	20	39	16	75	5	171	15	191	20	86	15	121	10	153	5	168	555
05:15 PM	14	43	13	70	9	173	14	196	15	90	30	135	11	130	8	149	550
Total Volume	59	205	54	318	34	679	53	766	69	347	76	492	51	566	27	644	2220
% App. Total	18.6	64.5	17		4.4	88.6	6.9		14	70.5	15.4		7.9	87.9	4.2		
PHF	.738	.777	.794	.914	.708	.964	.883	.977	.863	.964	.633	.911	.797	.925	.844	.953	.993



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:30 PM				04:00 PM				04:30 PM				04:00 PM			
+0 mins.	12	66	8	86	14	168	16	198	17	87	14	118	10	168	9	187
+15 mins.	13	57	17	87	15	184	10	209	17	84	17	118	6	141	6	153
+30 mins.	20	39	16	75	8	176	10	194	20	86	15	121	16	134	8	158
+45 mins.	14	43	13	70	12	159	14	185	15	90	30	135	14	149	6	169
Total Volume	59	205	54	318	49	687	50	786	69	347	76	492	46	592	29	667
% App. Total	18.6	64.5	17		6.2	87.4	6.4		14	70.5	15.4		6.9	88.8	4.3	
PHF	.738	.777	.794	.914	.817	.933	.781	.940	.863	.964	.633	.911	.719	.881	.806	.892

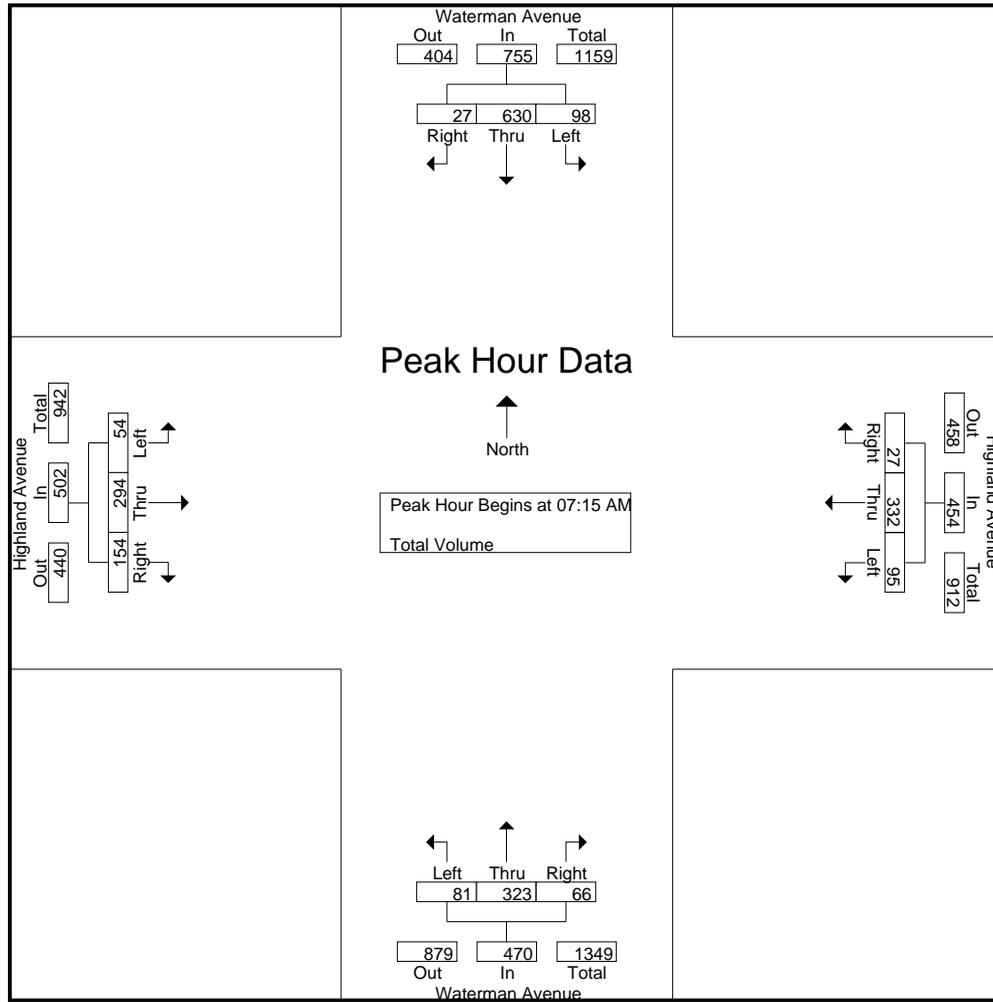
City of San Bernardino
 N/S: Waterman Avenue
 E/W: Highland Avenue
 Weather: Sunny

File Name : SBCWAHIAM
 Site Code : 00000159
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Waterman Avenue Southbound				Highland Avenue Westbound				Waterman Avenue Northbound				Highland Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	50	158	5	213	10	62	11	83	11	77	10	98	7	64	20	91	485
07:15 AM	17	157	4	178	21	93	11	125	21	80	12	113	12	77	39	128	544
07:30 AM	19	176	4	199	23	96	5	124	22	85	11	118	21	59	30	110	551
07:45 AM	31	157	8	196	24	78	7	109	19	78	25	122	12	84	36	132	559
Total	117	648	21	786	78	329	34	441	73	320	58	451	52	284	125	461	2139
08:00 AM	31	140	11	182	27	65	4	96	19	80	18	117	9	74	49	132	527
08:15 AM	45	134	10	189	14	47	13	74	20	60	23	103	6	74	30	110	476
08:30 AM	35	129	3	167	24	81	3	108	14	66	23	103	15	75	29	119	497
08:45 AM	34	132	5	171	19	74	7	100	24	74	27	125	9	82	40	131	527
Total	145	535	29	709	84	267	27	378	77	280	91	448	39	305	148	492	2027
Grand Total	262	1183	50	1495	162	596	61	819	150	600	149	899	91	589	273	953	4166
Apprch %	17.5	79.1	3.3		19.8	72.8	7.4		16.7	66.7	16.6		9.5	61.8	28.6		
Total %	6.3	28.4	1.2	35.9	3.9	14.3	1.5	19.7	3.6	14.4	3.6	21.6	2.2	14.1	6.6	22.9	

Start Time	Waterman Avenue Southbound				Highland Avenue Westbound				Waterman Avenue Northbound				Highland Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	17	157	4	178	21	93	11	125	21	80	12	113	12	77	39	128	544
07:30 AM	19	176	4	199	23	96	5	124	22	85	11	118	21	59	30	110	551
07:45 AM	31	157	8	196	24	78	7	109	19	78	25	122	12	84	36	132	559
08:00 AM	31	140	11	182	27	65	4	96	19	80	18	117	9	74	49	132	527
Total Volume	98	630	27	755	95	332	27	454	81	323	66	470	54	294	154	502	2181
% App. Total	13	83.4	3.6		20.9	73.1	5.9		17.2	68.7	14		10.8	58.6	30.7		
PHF	.790	.895	.614	.948	.880	.865	.614	.908	.920	.950	.660	.963	.643	.875	.786	.951	.975



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:00 AM				07:15 AM				07:15 AM				07:15 AM			
+0 mins.	50	158	5	213	21	93	11	125	21	80	12	113	12	77	39	128
+15 mins.	17	157	4	178	23	96	5	124	22	85	11	118	21	59	30	110
+30 mins.	19	176	4	199	24	78	7	109	19	78	25	122	12	84	36	132
+45 mins.	31	157	8	196	27	65	4	96	19	80	18	117	9	74	49	132
Total Volume	117	648	21	786	95	332	27	454	81	323	66	470	54	294	154	502
% App. Total	14.9	82.4	2.7		20.9	73.1	5.9		17.2	68.7	14		10.8	58.6	30.7	
PHF	.585	.920	.656	.923	.880	.865	.614	.908	.920	.950	.660	.963	.643	.875	.786	.951

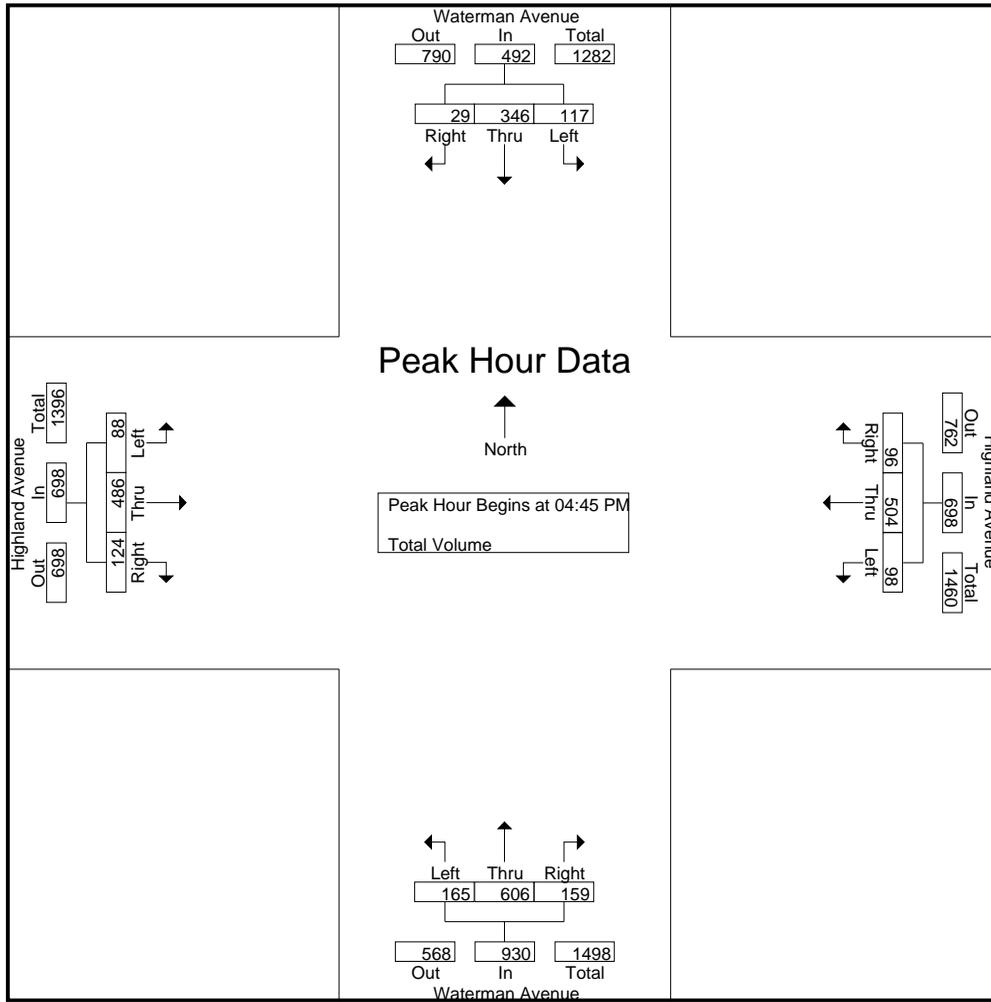
City of San Bernardino
 N/S: Waterman Avenue
 E/W: Highland Avenue
 Weather: Sunny

File Name : SBCWAHIPM
 Site Code : 00000159
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Waterman Avenue Southbound				Highland Avenue Westbound				Waterman Avenue Northbound				Highland Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	42	114	4	160	30	110	19	159	41	128	30	199	23	139	26	188	706
04:15 PM	38	115	8	161	22	106	16	144	42	143	34	219	19	108	32	159	683
04:30 PM	39	99	12	150	30	116	23	169	46	128	35	209	20	92	24	136	664
04:45 PM	33	90	10	133	25	121	27	173	44	155	37	236	25	122	27	174	716
Total	152	418	34	604	107	453	85	645	173	554	136	863	87	461	109	657	2769
05:00 PM	37	81	2	120	21	136	18	175	38	154	50	242	28	122	30	180	717
05:15 PM	24	89	4	117	23	118	24	165	48	139	36	223	13	112	32	157	662
05:30 PM	23	86	13	122	29	129	27	185	35	158	36	229	22	130	35	187	723
05:45 PM	38	85	10	133	31	94	7	132	40	97	28	165	21	87	30	138	568
Total	122	341	29	492	104	477	76	657	161	548	150	859	84	451	127	662	2670
Grand Total	274	759	63	1096	211	930	161	1302	334	1102	286	1722	171	912	236	1319	5439
Apprch %	25	69.3	5.7		16.2	71.4	12.4		19.4	64	16.6		13	69.1	17.9		
Total %	5	14	1.2	20.2	3.9	17.1	3	23.9	6.1	20.3	5.3	31.7	3.1	16.8	4.3	24.3	

Start Time	Waterman Avenue Southbound				Highland Avenue Westbound				Waterman Avenue Northbound				Highland Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	33	90	10	133	25	121	27	173	44	155	37	236	25	122	27	174	716
05:00 PM	37	81	2	120	21	136	18	175	38	154	50	242	28	122	30	180	717
05:15 PM	24	89	4	117	23	118	24	165	48	139	36	223	13	112	32	157	662
05:30 PM	23	86	13	122	29	129	27	185	35	158	36	229	22	130	35	187	723
Total Volume	117	346	29	492	98	504	96	698	165	606	159	930	88	486	124	698	2818
% App. Total	23.8	70.3	5.9		14	72.2	13.8		17.7	65.2	17.1		12.6	69.6	17.8		
PHF	.791	.961	.558	.925	.845	.926	.889	.943	.859	.959	.795	.961	.786	.935	.886	.933	.974



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:00 PM				04:45 PM				04:45 PM				04:45 PM			
+0 mins.	42	114	4	160	25	121	27	173	44	155	37	236	25	122	27	174
+15 mins.	38	115	8	161	21	136	18	175	38	154	50	242	28	122	30	180
+30 mins.	39	99	12	150	23	118	24	165	48	139	36	223	13	112	32	157
+45 mins.	33	90	10	133	29	129	27	185	35	158	36	229	22	130	35	187
Total Volume	152	418	34	604	98	504	96	698	165	606	159	930	88	486	124	698
% App. Total	25.2	69.2	5.6		14	72.2	13.8		17.7	65.2	17.1		12.6	69.6	17.8	
PHF	.905	.909	.708	.938	.845	.926	.889	.943	.859	.959	.795	.961	.786	.935	.886	.933

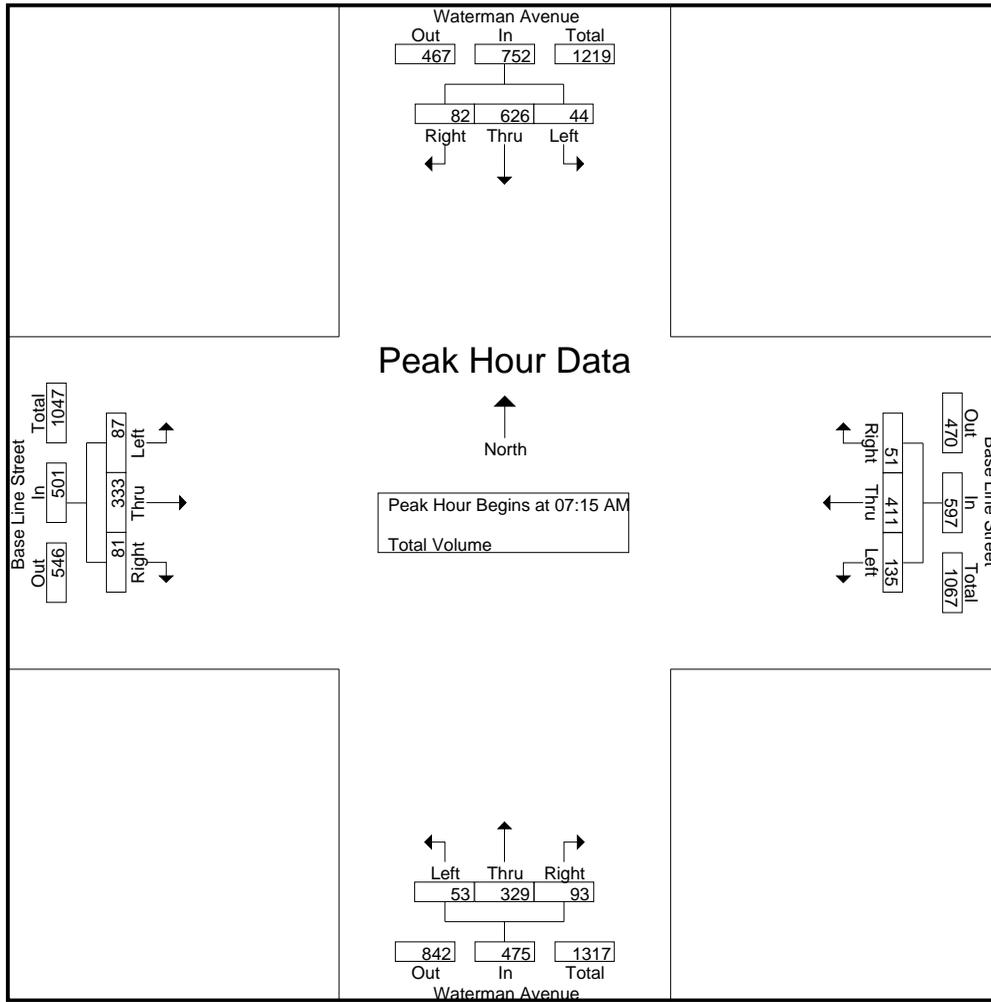
City of San Bernardino
 N/S: Waterman Avenue
 E/W: Base Line Street
 Weather: Sunny

File Name : SBCWABLAM
 Site Code : 00000063
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Waterman Avenue Southbound				Base Line Street Westbound				Waterman Avenue Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	15	109	15	139	29	76	14	119	11	67	22	100	16	63	16	95	453
07:15 AM	11	160	23	194	34	97	10	141	11	57	29	97	18	89	17	124	556
07:30 AM	12	182	20	214	44	126	11	181	8	74	17	99	20	85	23	128	622
07:45 AM	8	152	22	182	37	96	17	150	16	112	21	149	27	79	20	126	607
Total	46	603	80	729	144	395	52	591	46	310	89	445	81	316	76	473	2238
08:00 AM	13	132	17	162	20	92	13	125	18	86	26	130	22	80	21	123	540
08:15 AM	13	111	21	145	22	71	13	106	11	85	22	118	16	82	13	111	480
08:30 AM	13	103	20	136	27	102	10	139	21	86	26	133	17	73	16	106	514
08:45 AM	4	123	24	151	28	105	12	145	12	93	15	120	31	86	28	145	561
Total	43	469	82	594	97	370	48	515	62	350	89	501	86	321	78	485	2095
Grand Total	89	1072	162	1323	241	765	100	1106	108	660	178	946	167	637	154	958	4333
Apprch %	6.7	81	12.2		21.8	69.2	9		11.4	69.8	18.8		17.4	66.5	16.1		
Total %	2.1	24.7	3.7	30.5	5.6	17.7	2.3	25.5	2.5	15.2	4.1	21.8	3.9	14.7	3.6	22.1	

Start Time	Waterman Avenue Southbound				Base Line Street Westbound				Waterman Avenue Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	11	160	23	194	34	97	10	141	11	57	29	97	18	89	17	124	556
07:30 AM	12	182	20	214	44	126	11	181	8	74	17	99	20	85	23	128	622
07:45 AM	8	152	22	182	37	96	17	150	16	112	21	149	27	79	20	126	607
08:00 AM	13	132	17	162	20	92	13	125	18	86	26	130	22	80	21	123	540
Total Volume	44	626	82	752	135	411	51	597	53	329	93	475	87	333	81	501	2325
% App. Total	5.9	83.2	10.9		22.6	68.8	8.5		11.2	69.3	19.6		17.4	66.5	16.2		
PHF	.846	.860	.891	.879	.767	.815	.750	.825	.736	.734	.802	.797	.806	.935	.880	.979	.934



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:15 AM				07:15 AM				07:45 AM				07:15 AM			
+0 mins.	11	160	23	194	34	97	10	141	16	112	21	149	18	89	17	124
+15 mins.	12	182	20	214	44	126	11	181	18	86	26	130	20	85	23	128
+30 mins.	8	152	22	182	37	96	17	150	11	85	22	118	27	79	20	126
+45 mins.	13	132	17	162	20	92	13	125	21	86	26	133	22	80	21	123
Total Volume	44	626	82	752	135	411	51	597	66	369	95	530	87	333	81	501
% App. Total	5.9	83.2	10.9		22.6	68.8	8.5		12.5	69.6	17.9		17.4	66.5	16.2	
PHF	.846	.860	.891	.879	.767	.815	.750	.825	.786	.824	.913	.889	.806	.935	.880	.979

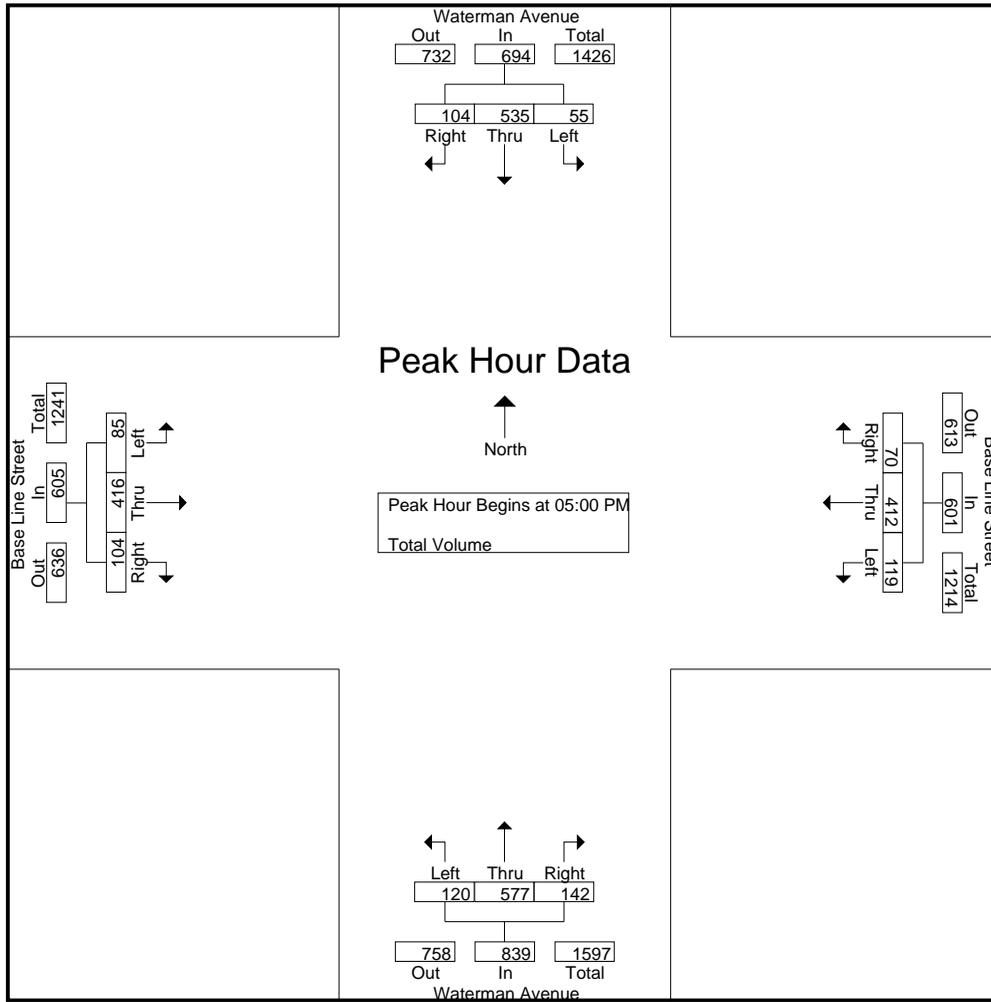
City of San Bernardino
 N/S: Waterman Avenue
 E/W: Base Line Street
 Weather: Sunny

File Name : SBCWABLPM
 Site Code : 00000063
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Waterman Avenue Southbound				Base Line Street Westbound				Waterman Avenue Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	16	152	29	197	30	106	15	151	35	138	28	201	25	105	34	164	713
04:15 PM	16	145	34	195	33	109	19	161	15	110	46	171	23	110	31	164	691
04:30 PM	15	155	25	195	23	100	14	137	11	148	31	190	25	86	24	135	657
04:45 PM	15	129	20	164	28	84	14	126	23	139	36	198	29	88	24	141	629
Total	62	581	108	751	114	399	62	575	84	535	141	760	102	389	113	604	2690
05:00 PM	3	129	22	154	27	82	12	121	26	136	27	189	18	112	19	149	613
05:15 PM	21	150	26	197	33	129	22	184	29	170	43	242	23	85	25	133	756
05:30 PM	16	131	26	173	23	92	18	133	32	161	40	233	18	114	36	168	707
05:45 PM	15	125	30	170	36	109	18	163	33	110	32	175	26	105	24	155	663
Total	55	535	104	694	119	412	70	601	120	577	142	839	85	416	104	605	2739
Grand Total	117	1116	212	1445	233	811	132	1176	204	1112	283	1599	187	805	217	1209	5429
Apprch %	8.1	77.2	14.7		19.8	69	11.2		12.8	69.5	17.7		15.5	66.6	17.9		
Total %	2.2	20.6	3.9	26.6	4.3	14.9	2.4	21.7	3.8	20.5	5.2	29.5	3.4	14.8	4	22.3	

Start Time	Waterman Avenue Southbound				Base Line Street Westbound				Waterman Avenue Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	3	129	22	154	27	82	12	121	26	136	27	189	18	112	19	149	613
05:15 PM	21	150	26	197	33	129	22	184	29	170	43	242	23	85	25	133	756
05:30 PM	16	131	26	173	23	92	18	133	32	161	40	233	18	114	36	168	707
05:45 PM	15	125	30	170	36	109	18	163	33	110	32	175	26	105	24	155	663
Total Volume	55	535	104	694	119	412	70	601	120	577	142	839	85	416	104	605	2739
% App. Total	7.9	77.1	15		19.8	68.6	11.6		14.3	68.8	16.9		14	68.8	17.2		
PHF	.655	.892	.867	.881	.826	.798	.795	.817	.909	.849	.826	.867	.817	.912	.722	.900	.906



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:00 PM				05:00 PM				04:45 PM				05:00 PM			
+0 mins.	16	152	29	197	27	82	12	121	23	139	36	198	18	112	19	149
+15 mins.	16	145	34	195	33	129	22	184	26	136	27	189	23	85	25	133
+30 mins.	15	155	25	195	23	92	18	133	29	170	43	242	18	114	36	168
+45 mins.	15	129	20	164	36	109	18	163	32	161	40	233	26	105	24	155
Total Volume	62	581	108	751	119	412	70	601	110	606	146	862	85	416	104	605
% App. Total	8.3	77.4	14.4		19.8	68.6	11.6		12.8	70.3	16.9		14	68.8	17.2	
PHF	.969	.937	.794	.953	.826	.798	.795	.817	.859	.891	.849	.890	.817	.912	.722	.900

City of San Bernardino
 N/S: Waterman Avenue
 E/W: Orange Street
 Weather: Sunny

File Name : SBCWAORAM
 Site Code : 00000051
 Start Date : 5/4/2011
 Page No : 1

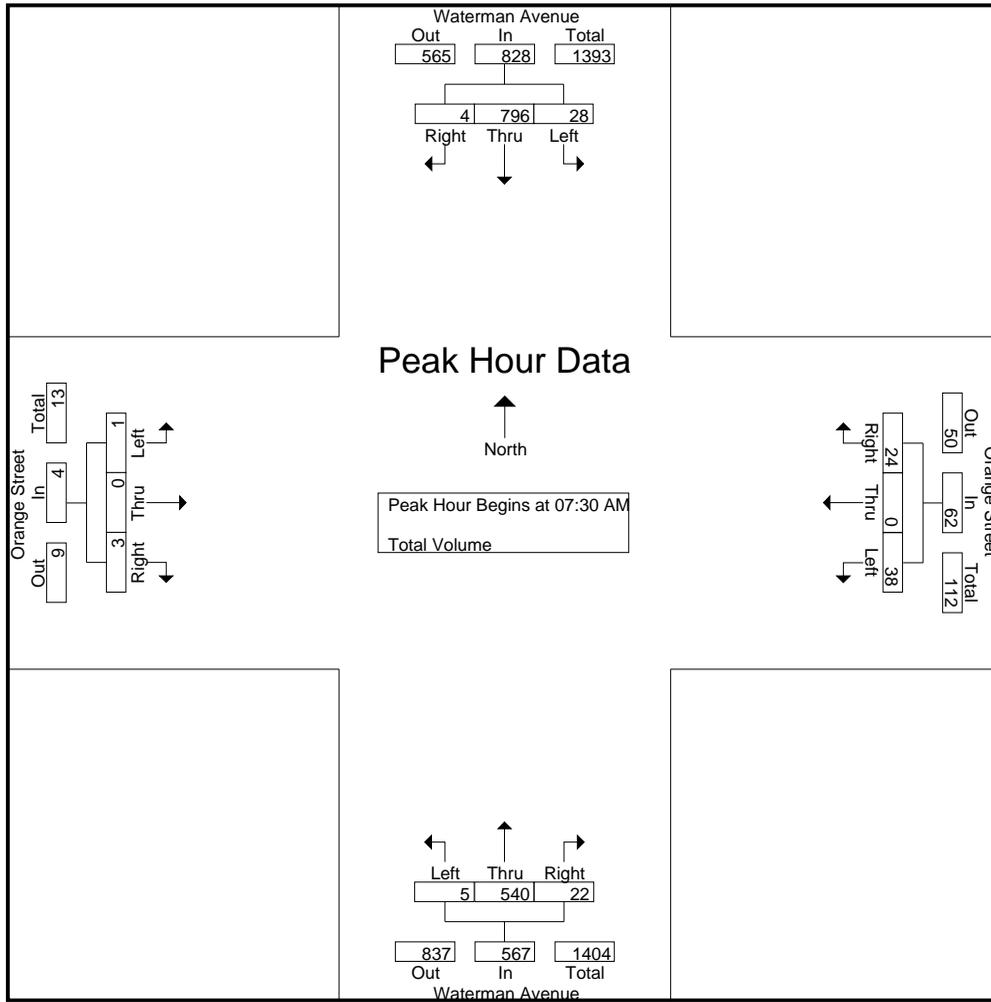
Groups Printed- Total Volume

Start Time	Waterman Avenue Southbound				Orange Street Westbound				Waterman Avenue Northbound				Orange Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	4	170	0	174	4	0	12	16	2	93	2	97	1	0	1	2	289
07:15 AM	7	214	0	221	7	0	4	11	1	96	3	100	1	0	2	3	335
07:30 AM	8	249	0	257	5	0	4	9	0	109	5	114	0	0	1	1	381
07:45 AM	8	213	2	223	12	0	4	16	0	150	5	155	1	0	1	2	396
Total	27	846	2	875	28	0	24	52	3	448	15	466	3	0	5	8	1401
08:00 AM	6	167	0	173	12	0	11	23	2	136	9	147	0	0	1	1	344
08:15 AM	6	167	2	175	9	0	5	14	3	145	3	151	0	0	0	0	340
08:30 AM	3	168	1	172	3	0	6	9	1	141	5	147	0	0	1	1	329
08:45 AM	6	200	0	206	6	0	2	8	2	164	4	170	1	0	1	2	386
Total	21	702	3	726	30	0	24	54	8	586	21	615	1	0	3	4	1399
Grand Total	48	1548	5	1601	58	0	48	106	11	1034	36	1081	4	0	8	12	2800
Apprch %	3	96.7	0.3		54.7	0	45.3		1	95.7	3.3		33.3	0	66.7		
Total %	1.7	55.3	0.2	57.2	2.1	0	1.7	3.8	0.4	36.9	1.3	38.6	0.1	0	0.3	0.4	

Start Time	Waterman Avenue Southbound				Orange Street Westbound				Waterman Avenue Northbound				Orange Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:30 AM	8	249	0	257	5	0	4	9	0	109	5	114	0	0	1	1	381
07:45 AM	8	213	2	223	12	0	4	16	0	150	5	155	1	0	1	2	396
08:00 AM	6	167	0	173	12	0	11	23	2	136	9	147	0	0	1	1	344
08:15 AM	6	167	2	175	9	0	5	14	3	145	3	151	0	0	0	0	340
Total Volume	28	796	4	828	38	0	24	62	5	540	22	567	1	0	3	4	1461
% App. Total	3.4	96.1	0.5		61.3	0	38.7		0.9	95.2	3.9		25	0	75		
PHF	.875	.799	.500	.805	.792	.000	.545	.674	.417	.900	.611	.915	.250	.000	.750	.500	.922

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:30 AM



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:00 AM				07:30 AM				08:00 AM				07:00 AM			
+0 mins.	4	170	0	174	5	0	4	9	2	136	9	147	1	0	1	2
+15 mins.	7	214	0	221	12	0	4	16	3	145	3	151	1	0	2	3
+30 mins.	8	249	0	257	12	0	11	23	1	141	5	147	0	0	1	1
+45 mins.	8	213	2	223	9	0	5	14	2	164	4	170	1	0	1	2
Total Volume	27	846	2	875	38	0	24	62	8	586	21	615	3	0	5	8
% App. Total	3.1	96.7	0.2		61.3	0	38.7		1.3	95.3	3.4		37.5	0	62.5	
PHF	.844	.849	.250	.851	.792	.000	.545	.674	.667	.893	.583	.904	.750	.000	.625	.667

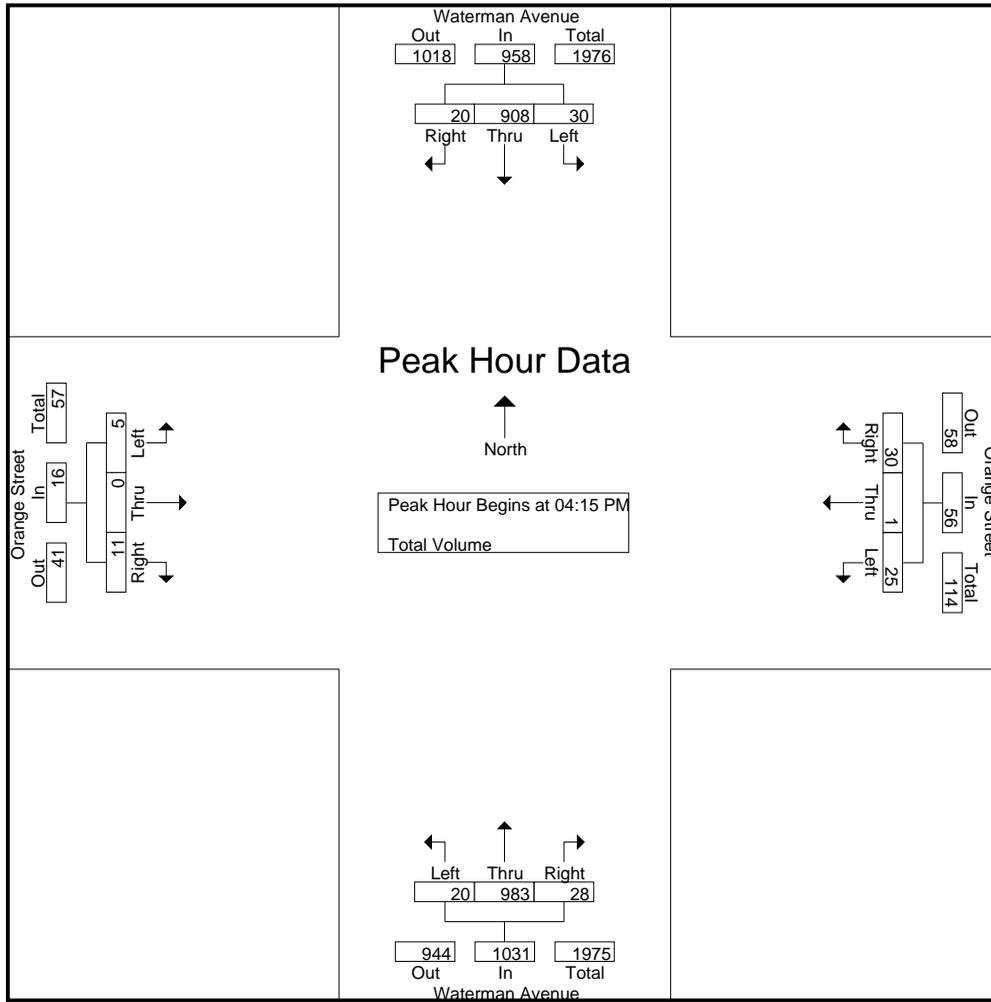
City of San Bernardino
 N/S: Waterman Avenue
 E/W: Orange Street
 Weather: Sunny

File Name : SBCWAORPM
 Site Code : 00000051
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Waterman Avenue Southbound				Orange Street Westbound				Waterman Avenue Northbound				Orange Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	7	218	8	233	6	0	4	10	3	218	6	227	2	0	0	2	472
04:15 PM	8	242	4	254	9	1	5	15	7	217	7	231	3	0	6	9	509
04:30 PM	4	227	10	241	7	0	11	18	8	229	10	247	0	0	3	3	509
04:45 PM	9	221	3	233	5	0	4	9	1	258	5	264	2	0	2	4	510
Total	28	908	25	961	27	1	24	52	19	922	28	969	7	0	11	18	2000
05:00 PM	9	218	3	230	4	0	10	14	4	279	6	289	0	0	0	0	533
05:15 PM	9	209	4	222	5	0	5	10	4	250	5	259	2	0	3	5	496
05:30 PM	4	192	6	202	7	0	5	12	5	248	6	259	3	0	2	5	478
05:45 PM	5	194	0	199	3	0	4	7	4	200	4	208	0	1	1	2	416
Total	27	813	13	853	19	0	24	43	17	977	21	1015	5	1	6	12	1923
Grand Total	55	1721	38	1814	46	1	48	95	36	1899	49	1984	12	1	17	30	3923
Apprch %	3	94.9	2.1		48.4	1.1	50.5		1.8	95.7	2.5		40	3.3	56.7		
Total %	1.4	43.9	1	46.2	1.2	0	1.2	2.4	0.9	48.4	1.2	50.6	0.3	0	0.4	0.8	

Start Time	Waterman Avenue Southbound				Orange Street Westbound				Waterman Avenue Northbound				Orange Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	8	242	4	254	9	1	5	15	7	217	7	231	3	0	6	9	509
04:30 PM	4	227	10	241	7	0	11	18	8	229	10	247	0	0	3	3	509
04:45 PM	9	221	3	233	5	0	4	9	1	258	5	264	2	0	2	4	510
05:00 PM	9	218	3	230	4	0	10	14	4	279	6	289	0	0	0	0	533
Total Volume	30	908	20	958	25	1	30	56	20	983	28	1031	5	0	11	16	2061
% App. Total	3.1	94.8	2.1		44.6	1.8	53.6		1.9	95.3	2.7		31.2	0	68.8		
PHF	.833	.938	.500	.943	.694	.250	.682	.778	.625	.881	.700	.892	.417	.000	.458	.444	.967



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

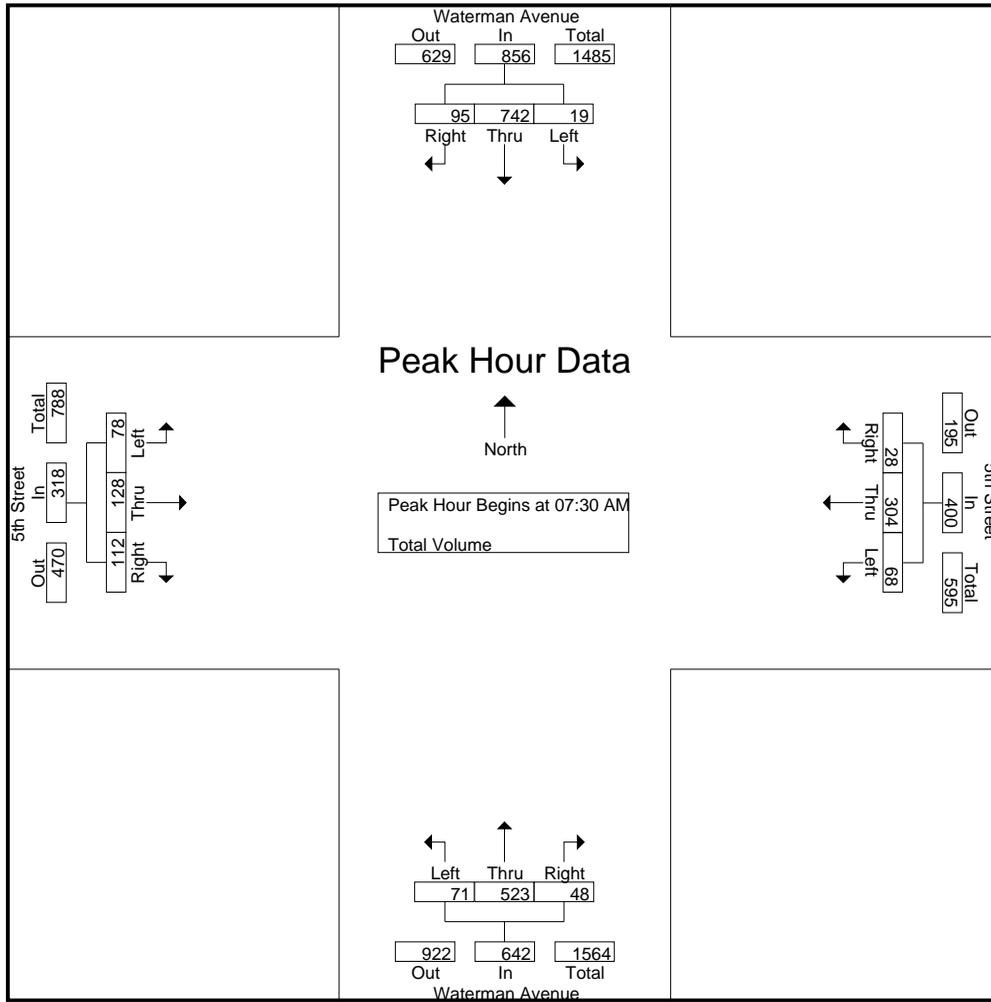
Peak Hour for Each Approach Begins at:

	04:00 PM				04:15 PM				04:45 PM				05:00 PM			
+0 mins.	7	218	8	233	9	1	5	15	1	258	5	264	2	0	0	2
+15 mins.	8	242	4	254	7	0	11	18	4	279	6	289	3	0	6	9
+30 mins.	4	227	10	241	5	0	4	9	4	250	5	259	0	0	3	3
+45 mins.	9	221	3	233	4	0	10	14	5	248	6	259	2	0	2	4
Total Volume	28	908	25	961	25	1	30	56	14	1035	22	1071	7	0	11	18
% App. Total	2.9	94.5	2.6		44.6	1.8	53.6		1.3	96.6	2.1		38.9	0	61.1	
PHF	.778	.938	.625	.946	.694	.250	.682	.778	.700	.927	.917	.926	.583	.000	.458	.500

Groups Printed- Total Volume

Start Time	Waterman Avenue Southbound				5th Street Westbound				Waterman Avenue Northbound				5th Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	2	133	14	149	10	62	2	74	22	81	10	113	9	19	23	51	387
07:15 AM	4	176	28	208	24	75	2	101	11	88	8	107	18	27	27	72	488
07:30 AM	8	225	29	262	11	92	7	110	9	120	7	136	15	30	38	83	591
07:45 AM	3	215	30	248	23	98	6	127	22	120	7	149	22	49	24	95	619
Total	17	749	101	867	68	327	17	412	64	409	32	505	64	125	112	301	2085
08:00 AM	1	154	18	173	15	57	10	82	18	141	15	174	17	22	22	61	490
08:15 AM	7	148	18	173	19	57	5	81	22	142	19	183	24	27	28	79	516
08:30 AM	9	156	22	187	9	51	10	70	18	150	12	180	20	30	34	84	521
08:45 AM	4	175	21	200	12	55	15	82	23	152	15	190	15	27	34	76	548
Total	21	633	79	733	55	220	40	315	81	585	61	727	76	106	118	300	2075
Grand Total	38	1382	180	1600	123	547	57	727	145	994	93	1232	140	231	230	601	4160
Apprch %	2.4	86.4	11.2		16.9	75.2	7.8		11.8	80.7	7.5		23.3	38.4	38.3		
Total %	0.9	33.2	4.3	38.5	3	13.1	1.4	17.5	3.5	23.9	2.2	29.6	3.4	5.6	5.5	14.4	

Start Time	Waterman Avenue Southbound				5th Street Westbound				Waterman Avenue Northbound				5th Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	8	225	29	262	11	92	7	110	9	120	7	136	15	30	38	83	591
07:45 AM	3	215	30	248	23	98	6	127	22	120	7	149	22	49	24	95	619
08:00 AM	1	154	18	173	15	57	10	82	18	141	15	174	17	22	22	61	490
08:15 AM	7	148	18	173	19	57	5	81	22	142	19	183	24	27	28	79	516
Total Volume	19	742	95	856	68	304	28	400	71	523	48	642	78	128	112	318	2216
% App. Total	2.2	86.7	11.1		17	76	7		11.1	81.5	7.5		24.5	40.3	35.2		
PHF	.594	.824	.792	.817	.739	.776	.700	.787	.807	.921	.632	.877	.813	.653	.737	.837	.895



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:15 AM				07:15 AM				08:00 AM				07:45 AM			
+0 mins.	4	176	28	208	24	75	2	101	18	141	15	174	22	49	24	95
+15 mins.	8	225	29	262	11	92	7	110	22	142	19	183	17	22	22	61
+30 mins.	3	215	30	248	23	98	6	127	18	150	12	180	24	27	28	79
+45 mins.	1	154	18	173	15	57	10	82	23	152	15	190	20	30	34	84
Total Volume	16	770	105	891	73	322	25	420	81	585	61	727	83	128	108	319
% App. Total	1.8	86.4	11.8		17.4	76.7	6		11.1	80.5	8.4		26	40.1	33.9	
PHF	.500	.856	.875	.850	.760	.821	.625	.827	.880	.962	.803	.957	.865	.653	.794	.839

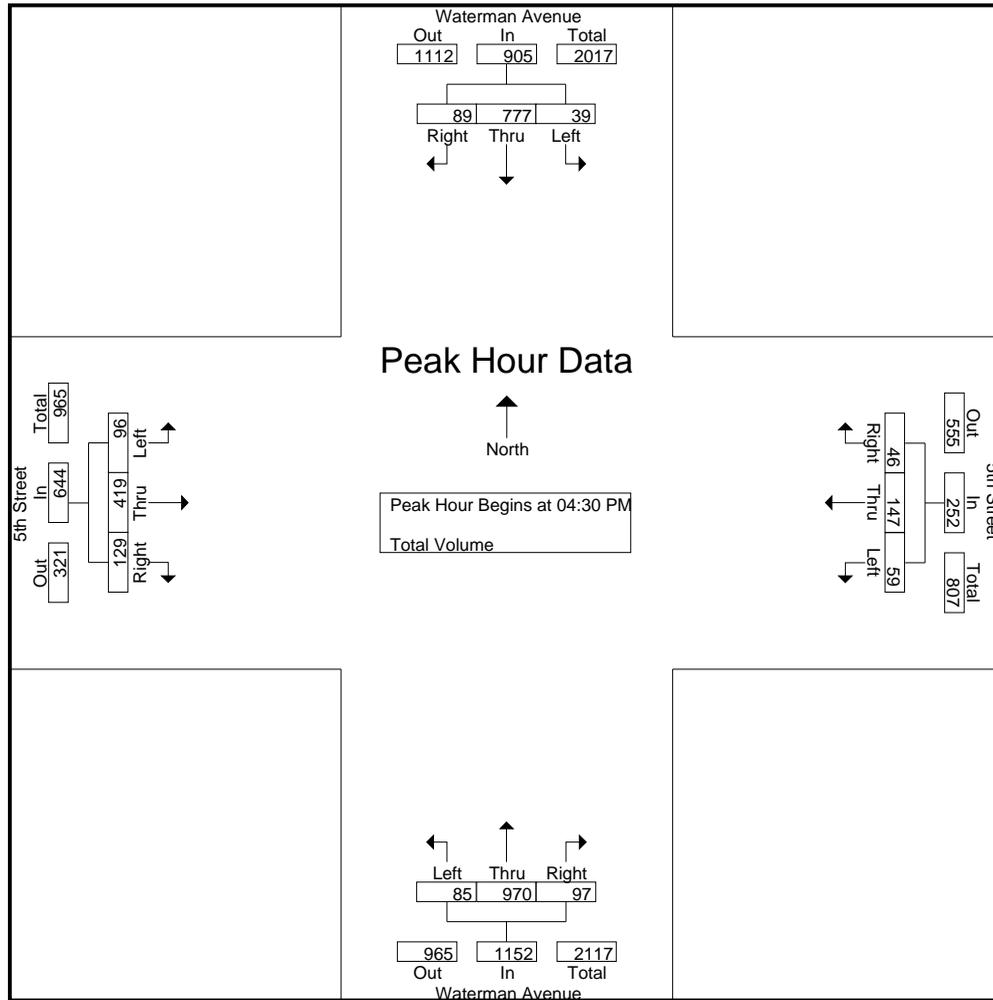
City of San Bernardino
 N/S: Waterman Avenue
 E/W: 5th Street
 Weather: Sunny

File Name : SBCWA5PM
 Site Code : 00000022
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Waterman Avenue Southbound				5th Street Westbound				Waterman Avenue Northbound				5th Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	14	171	21	206	20	31	12	63	25	214	22	261	25	74	41	140	670
04:15 PM	5	178	22	205	13	37	11	61	20	198	16	234	37	63	29	129	629
04:30 PM	13	193	26	232	10	27	13	50	18	254	15	287	24	88	32	144	713
04:45 PM	4	204	20	228	13	38	6	57	24	226	11	261	23	85	31	139	685
Total	36	746	89	871	56	133	42	231	87	892	64	1043	109	310	133	552	2697
05:00 PM	10	192	16	218	22	44	14	80	23	256	39	318	23	132	34	189	805
05:15 PM	12	188	27	227	14	38	13	65	20	234	32	286	26	114	32	172	750
05:30 PM	5	138	20	163	13	28	9	50	23	191	20	234	27	81	27	135	582
05:45 PM	12	143	27	182	14	32	9	55	14	201	21	236	22	54	25	101	574
Total	39	661	90	790	63	142	45	250	80	882	112	1074	98	381	118	597	2711
Grand Total	75	1407	179	1661	119	275	87	481	167	1774	176	2117	207	691	251	1149	5408
Apprch %	4.5	84.7	10.8		24.7	57.2	18.1		7.9	83.8	8.3		18	60.1	21.8		
Total %	1.4	26	3.3	30.7	2.2	5.1	1.6	8.9	3.1	32.8	3.3	39.1	3.8	12.8	4.6	21.2	

Start Time	Waterman Avenue Southbound				5th Street Westbound				Waterman Avenue Northbound				5th Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	13	193	26	232	10	27	13	50	18	254	15	287	24	88	32	144	713
04:45 PM	4	204	20	228	13	38	6	57	24	226	11	261	23	85	31	139	685
05:00 PM	10	192	16	218	22	44	14	80	23	256	39	318	23	132	34	189	805
05:15 PM	12	188	27	227	14	38	13	65	20	234	32	286	26	114	32	172	750
Total Volume	39	777	89	905	59	147	46	252	85	970	97	1152	96	419	129	644	2953
% App. Total	4.3	85.9	9.8		23.4	58.3	18.3		7.4	84.2	8.4		14.9	65.1	20		
PHF	.750	.952	.824	.975	.670	.835	.821	.788	.885	.947	.622	.906	.923	.794	.949	.852	.917



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:30 PM				04:30 PM				04:30 PM				04:30 PM			
+0 mins.	13	193	26	232	10	27	13	50	18	254	15	287	24	88	32	144
+15 mins.	4	204	20	228	13	38	6	57	24	226	11	261	23	85	31	139
+30 mins.	10	192	16	218	22	44	14	80	23	256	39	318	23	132	34	189
+45 mins.	12	188	27	227	14	38	13	65	20	234	32	286	26	114	32	172
Total Volume	39	777	89	905	59	147	46	252	85	970	97	1152	96	419	129	644
% App. Total	4.3	85.9	9.8		23.4	58.3	18.3		7.4	84.2	8.4		14.9	65.1	20	
PHF	.750	.952	.824	.975	.670	.835	.821	.788	.885	.947	.622	.906	.923	.794	.949	.852

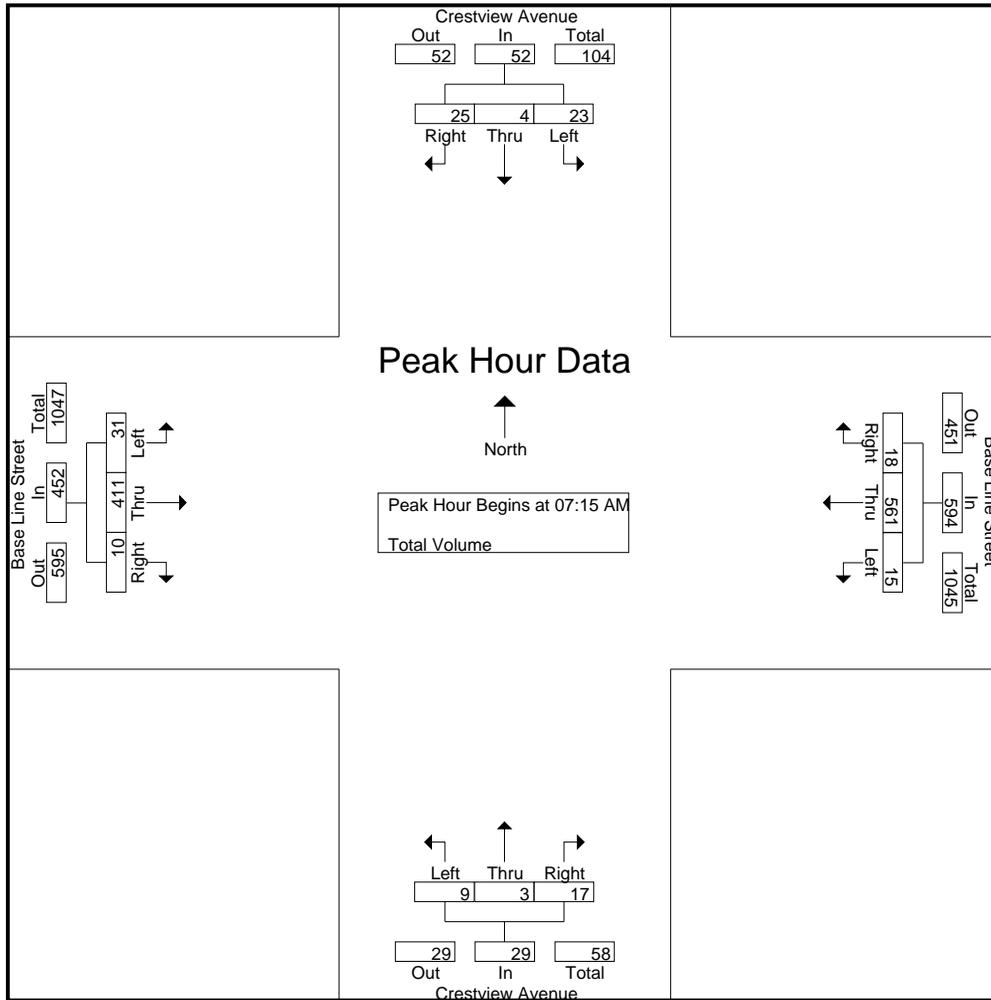
City of San Bernardino
 N/S: Crestview Avenue
 E/W: Base Line Street
 Weather: Sunny

File Name : SBCCRBLAM
 Site Code : 00000035
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Crestview Avenue Southbound				Base Line Street Westbound				Crestview Avenue Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	7	0	9	16	0	113	1	114	5	1	5	11	4	85	2	91	232
07:15 AM	3	2	5	10	4	125	7	136	3	1	8	12	3	121	2	126	284
07:30 AM	11	0	8	19	5	184	4	193	1	0	4	5	6	101	3	110	327
07:45 AM	5	2	5	12	3	135	2	140	2	0	2	4	11	94	4	109	265
Total	26	4	27	57	12	557	14	583	11	2	19	32	24	401	11	436	1108
08:00 AM	4	0	7	11	3	117	5	125	3	2	3	8	11	95	1	107	251
08:15 AM	6	0	10	16	0	107	8	115	1	0	1	2	11	106	1	118	251
08:30 AM	8	0	15	23	4	142	7	153	3	0	1	4	9	95	4	108	288
08:45 AM	9	1	22	32	1	158	9	168	1	2	2	5	12	97	4	113	318
Total	27	1	54	82	8	524	29	561	8	4	7	19	43	393	10	446	1108
Grand Total	53	5	81	139	20	1081	43	1144	19	6	26	51	67	794	21	882	2216
Apprch %	38.1	3.6	58.3		1.7	94.5	3.8		37.3	11.8	51		7.6	90	2.4		
Total %	2.4	0.2	3.7	6.3	0.9	48.8	1.9	51.6	0.9	0.3	1.2	2.3	3	35.8	0.9	39.8	

Start Time	Crestview Avenue Southbound				Base Line Street Westbound				Crestview Avenue Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	3	2	5	10	4	125	7	136	3	1	8	12	3	121	2	126	284
07:30 AM	11	0	8	19	5	184	4	193	1	0	4	5	6	101	3	110	327
07:45 AM	5	2	5	12	3	135	2	140	2	0	2	4	11	94	4	109	265
08:00 AM	4	0	7	11	3	117	5	125	3	2	3	8	11	95	1	107	251
Total Volume	23	4	25	52	15	561	18	594	9	3	17	29	31	411	10	452	1127
% App. Total	44.2	7.7	48.1		2.5	94.4	3		31	10.3	58.6		6.9	90.9	2.2		
PHF	.523	.500	.781	.684	.750	.762	.643	.769	.750	.375	.531	.604	.705	.849	.625	.897	.862



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	08:00 AM				07:15 AM				07:00 AM				07:15 AM			
+0 mins.	4	0	7	11	4	125	7	136	5	1	5	11	3	121	2	126
+15 mins.	6	0	10	16	5	184	4	193	3	1	8	12	6	101	3	110
+30 mins.	8	0	15	23	3	135	2	140	1	0	4	5	11	94	4	109
+45 mins.	9	1	22	32	3	117	5	125	2	0	2	4	11	95	1	107
Total Volume	27	1	54	82	15	561	18	594	11	2	19	32	31	411	10	452
% App. Total	32.9	1.2	65.9		2.5	94.4	3		34.4	6.2	59.4		6.9	90.9	2.2	
PHF	.750	.250	.614	.641	.750	.762	.643	.769	.550	.500	.594	.667	.705	.849	.625	.897

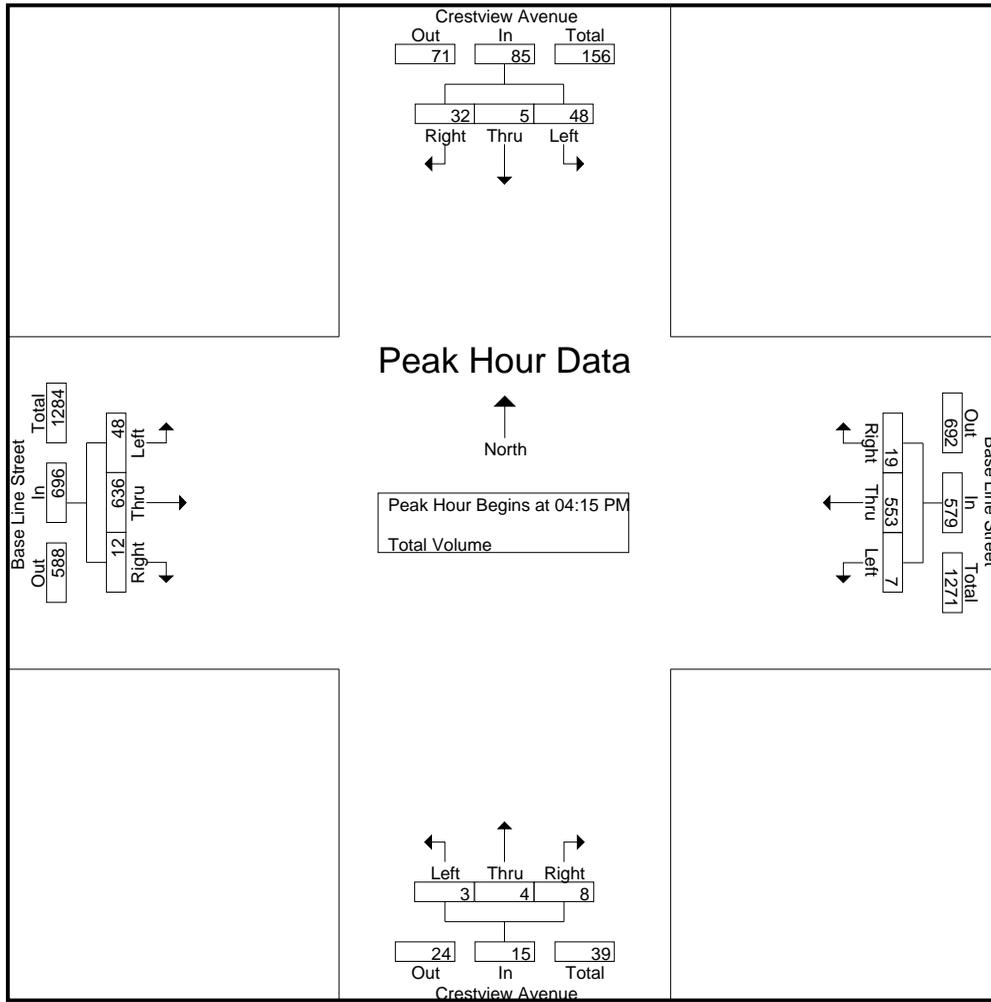
City of San Bernardino
 N/S: Crestview Avenue
 E/W: Base Line Street
 Weather: Sunny

File Name : SBCCRBLPM
 Site Code : 00000035
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Crestview Avenue Southbound				Base Line Street Westbound				Crestview Avenue Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	4	0	7	11	1	141	8	150	5	3	1	9	3	158	3	164	334
04:15 PM	10	0	10	20	3	135	4	142	0	2	4	6	19	152	9	180	348
04:30 PM	14	0	7	21	0	143	4	147	1	1	0	2	8	150	1	159	329
04:45 PM	11	3	7	21	3	125	7	135	1	0	2	3	12	172	2	186	345
Total	39	3	31	73	7	544	23	574	7	6	7	20	42	632	15	689	1356
05:00 PM	13	2	8	23	1	150	4	155	1	1	2	4	9	162	0	171	353
05:15 PM	3	0	7	10	1	151	6	158	2	1	3	6	8	158	0	166	340
05:30 PM	9	0	9	18	1	134	3	138	2	3	2	7	13	153	1	167	330
05:45 PM	12	1	3	16	4	150	5	159	6	1	4	11	11	137	0	148	334
Total	37	3	27	67	7	585	18	610	11	6	11	28	41	610	1	652	1357
Grand Total	76	6	58	140	14	1129	41	1184	18	12	18	48	83	1242	16	1341	2713
Apprch %	54.3	4.3	41.4		1.2	95.4	3.5		37.5	25	37.5		6.2	92.6	1.2		
Total %	2.8	0.2	2.1	5.2	0.5	41.6	1.5	43.6	0.7	0.4	0.7	1.8	3.1	45.8	0.6	49.4	

Start Time	Crestview Avenue Southbound				Base Line Street Westbound				Crestview Avenue Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	10	0	10	20	3	135	4	142	0	2	4	6	19	152	9	180	348
04:30 PM	14	0	7	21	0	143	4	147	1	1	0	2	8	150	1	159	329
04:45 PM	11	3	7	21	3	125	7	135	1	0	2	3	12	172	2	186	345
05:00 PM	13	2	8	23	1	150	4	155	1	1	2	4	9	162	0	171	353
Total Volume	48	5	32	85	7	553	19	579	3	4	8	15	48	636	12	696	1375
% App. Total	56.5	5.9	37.6		1.2	95.5	3.3		20	26.7	53.3		6.9	91.4	1.7		
PHF	.857	.417	.800	.924	.583	.922	.679	.934	.750	.500	.500	.625	.632	.924	.333	.935	.974



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:15 PM				05:00 PM				05:00 PM				04:15 PM			
+0 mins.	10	0	10	20	1	150	4	155	1	1	2	4	19	152	9	180
+15 mins.	14	0	7	21	1	151	6	158	2	1	3	6	8	150	1	159
+30 mins.	11	3	7	21	1	134	3	138	2	3	2	7	12	172	2	186
+45 mins.	13	2	8	23	4	150	5	159	6	1	4	11	9	162	0	171
Total Volume	48	5	32	85	7	585	18	610	11	6	11	28	48	636	12	696
% App. Total	56.5	5.9	37.6		1.1	95.9	3		39.3	21.4	39.3		6.9	91.4	1.7	
PHF	.857	.417	.800	.924	.438	.969	.750	.959	.458	.500	.688	.636	.632	.924	.333	.935

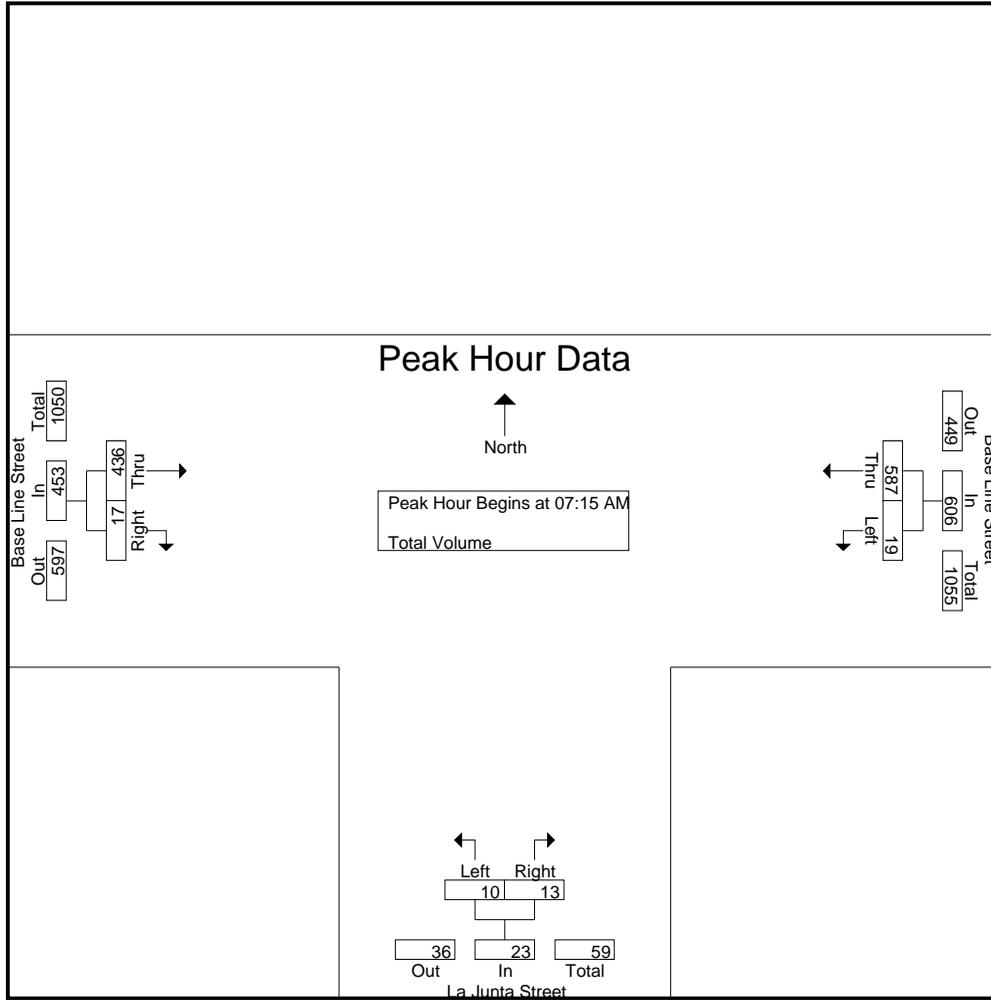
City of San Bernardino
 N/S: La Junta Street
 E/W: Base Line Street
 Weather: Sunny

File Name : SBCLJBLAM
 Site Code : 00000061
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Base Line Street Westbound			La Junta Street Northbound			Base Line Street Eastbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
07:00 AM	2	113	115	1	4	5	95	0	95	215
07:15 AM	9	137	146	2	7	9	134	3	137	292
07:30 AM	3	197	200	1	4	5	106	8	114	319
07:45 AM	4	135	139	1	1	2	95	5	100	241
Total	18	582	600	5	16	21	430	16	446	1067
08:00 AM	3	118	121	6	1	7	101	1	102	230
08:15 AM	3	114	117	1	4	5	108	1	109	231
08:30 AM	6	158	164	2	12	14	100	7	107	285
08:45 AM	5	170	175	2	5	7	103	3	106	288
Total	17	560	577	11	22	33	412	12	424	1034
Grand Total	35	1142	1177	16	38	54	842	28	870	2101
Apprch %	3	97		29.6	70.4		96.8	3.2		
Total %	1.7	54.4	56	0.8	1.8	2.6	40.1	1.3	41.4	

Start Time	Base Line Street Westbound			La Junta Street Northbound			Base Line Street Eastbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	9	137	146	2	7	9	134	3	137	292
07:30 AM	3	197	200	1	4	5	106	8	114	319
07:45 AM	4	135	139	1	1	2	95	5	100	241
08:00 AM	3	118	121	6	1	7	101	1	102	230
Total Volume	19	587	606	10	13	23	436	17	453	1082
% App. Total	3.1	96.9		43.5	56.5		96.2	3.8		
PHF	.528	.745	.758	.417	.464	.639	.813	.531	.827	.848



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:15 AM			08:00 AM			07:15 AM		
+0 mins.	9	137	146	6	1	7	134	3	137
+15 mins.	3	197	200	1	4	5	106	8	114
+30 mins.	4	135	139	2	12	14	95	5	100
+45 mins.	3	118	121	2	5	7	101	1	102
Total Volume	19	587	606	11	22	33	436	17	453
% App. Total	3.1	96.9		33.3	66.7		96.2	3.8	
PHF	.528	.745	.758	.458	.458	.589	.813	.531	.827

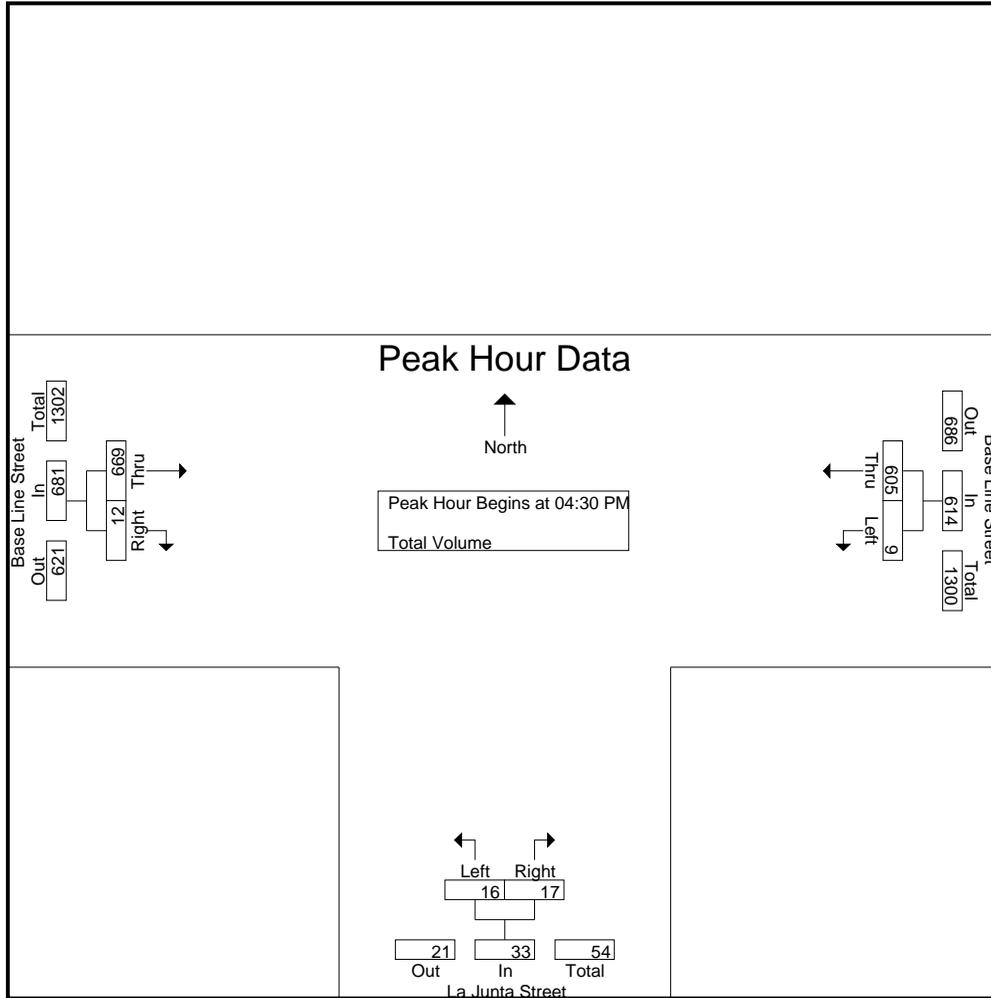
Groups Printed- Total Volume

Start Time	Base Line Street Westbound			La Junta Street Northbound			Base Line Street Eastbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
04:00 PM	1	149	150	0	2	2	151	2	153	305
04:15 PM	2	144	146	1	5	6	164	1	165	317
04:30 PM	5	152	157	3	4	7	161	2	163	327
04:45 PM	0	137	137	8	3	11	184	5	189	337
Total	8	582	590	12	14	26	660	10	670	1286
05:00 PM	1	156	157	3	5	8	172	2	174	339
05:15 PM	3	160	163	2	5	7	152	3	155	325
05:30 PM	4	141	145	1	1	2	166	3	169	316
05:45 PM	3	165	168	1	8	9	149	6	155	332
Total	11	622	633	7	19	26	639	14	653	1312
Grand Total	19	1204	1223	19	33	52	1299	24	1323	2598
Apprch %	1.6	98.4		36.5	63.5		98.2	1.8		
Total %	0.7	46.3	47.1	0.7	1.3	2	50	0.9	50.9	

Start Time	Base Line Street Westbound			La Junta Street Northbound			Base Line Street Eastbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
04:30 PM	5	152	157	3	4	7	161	2	163	327
04:45 PM	0	137	137	8	3	11	184	5	189	337
05:00 PM	1	156	157	3	5	8	172	2	174	339
05:15 PM	3	160	163	2	5	7	152	3	155	325
Total Volume	9	605	614	16	17	33	669	12	681	1328
% App. Total	1.5	98.5		48.5	51.5		98.2	1.8		
PHF	.450	.945	.942	.500	.850	.750	.909	.600	.901	.979

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:30 PM



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM			04:30 PM			04:15 PM		
+0 mins.	1	156	157	3	4	7	164	1	165
+15 mins.	3	160	163	8	3	11	161	2	163
+30 mins.	4	141	145	3	5	8	184	5	189
+45 mins.	3	165	168	2	5	7	172	2	174
Total Volume	11	622	633	16	17	33	681	10	691
% App. Total	1.7	98.3		48.5	51.5		98.6	1.4	
PHF	.688	.942	.942	.500	.850	.750	.925	.500	.914

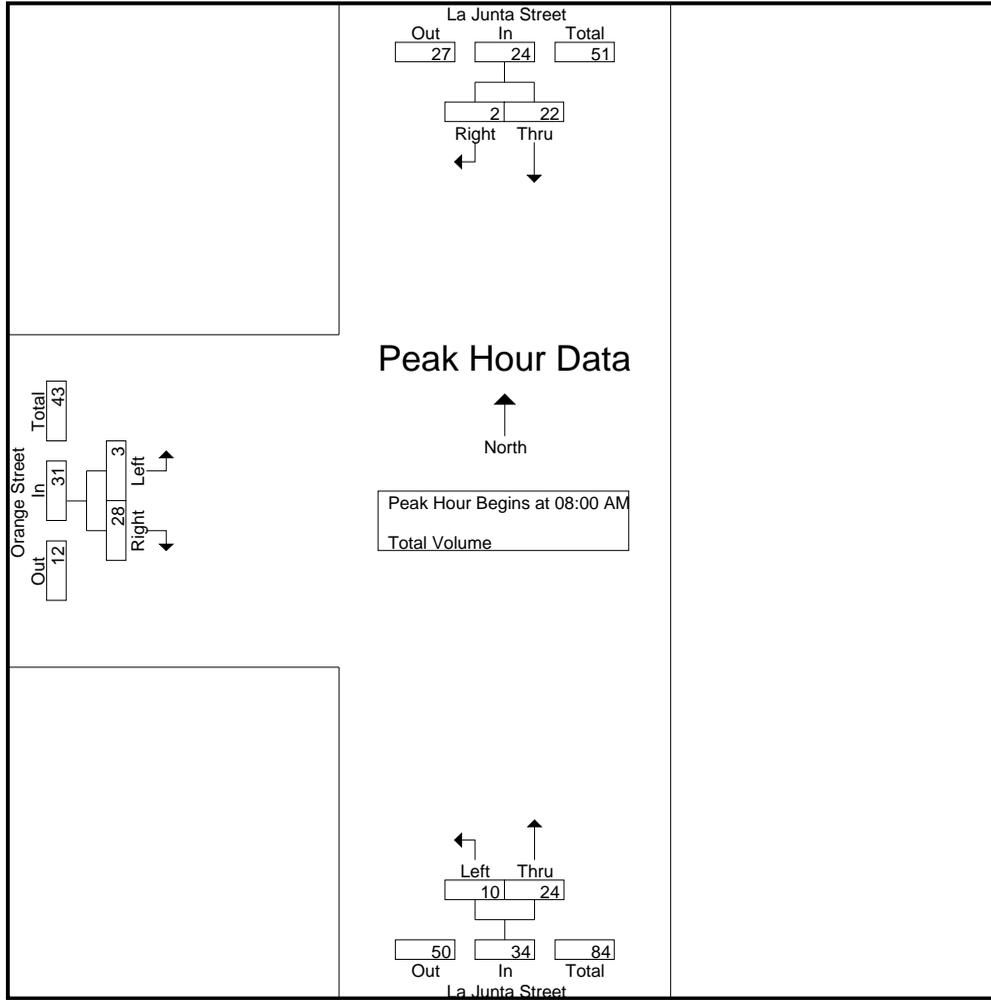
City of San Bernardino
 N/S: La Junta Street
 E/W: Orange Street
 Weather: Sunny

File Name : SBCLJORAM
 Site Code : 0000066
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	La Junta Street Southbound			La Junta Street Northbound			Orange Street Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
07:00 AM	1	0	1	0	2	2	2	2	4	7
07:15 AM	5	7	12	1	2	3	6	2	8	23
07:30 AM	10	1	11	3	3	6	2	2	4	21
07:45 AM	4	1	5	2	3	5	0	4	4	14
Total	20	9	29	6	10	16	10	10	20	65
08:00 AM	3	1	4	5	7	12	0	6	6	22
08:15 AM	3	1	4	2	3	5	0	5	5	14
08:30 AM	9	0	9	1	9	10	3	9	12	31
08:45 AM	7	0	7	2	5	7	0	8	8	22
Total	22	2	24	10	24	34	3	28	31	89
Grand Total	42	11	53	16	34	50	13	38	51	154
Apprch %	79.2	20.8		32	68		25.5	74.5		
Total %	27.3	7.1	34.4	10.4	22.1	32.5	8.4	24.7	33.1	

Start Time	La Junta Street Southbound			La Junta Street Northbound			Orange Street Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	3	1	4	5	7	12	0	6	6	22
08:15 AM	3	1	4	2	3	5	0	5	5	14
08:30 AM	9	0	9	1	9	10	3	9	12	31
08:45 AM	7	0	7	2	5	7	0	8	8	22
Total Volume	22	2	24	10	24	34	3	28	31	89
% App. Total	91.7	8.3		29.4	70.6		9.7	90.3		
PHF	.611	.500	.667	.500	.667	.708	.250	.778	.646	.718



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:15 AM			08:00 AM			08:00 AM		
+0 mins.	5	7	12	5	7	12	0	6	6
+15 mins.	10	1	11	2	3	5	0	5	5
+30 mins.	4	1	5	1	9	10	3	9	12
+45 mins.	3	1	4	2	5	7	0	8	8
Total Volume	22	10	32	10	24	34	3	28	31
% App. Total	68.8	31.2		29.4	70.6		9.7	90.3	
PHF	.550	.357	.667	.500	.667	.708	.250	.778	.646

City of San Bernardino
 N/S: La Junta Street
 E/W: Orange Street
 Weather: Sunny

File Name : SBCLJORPM
 Site Code : 0000066
 Start Date : 5/4/2011
 Page No : 1

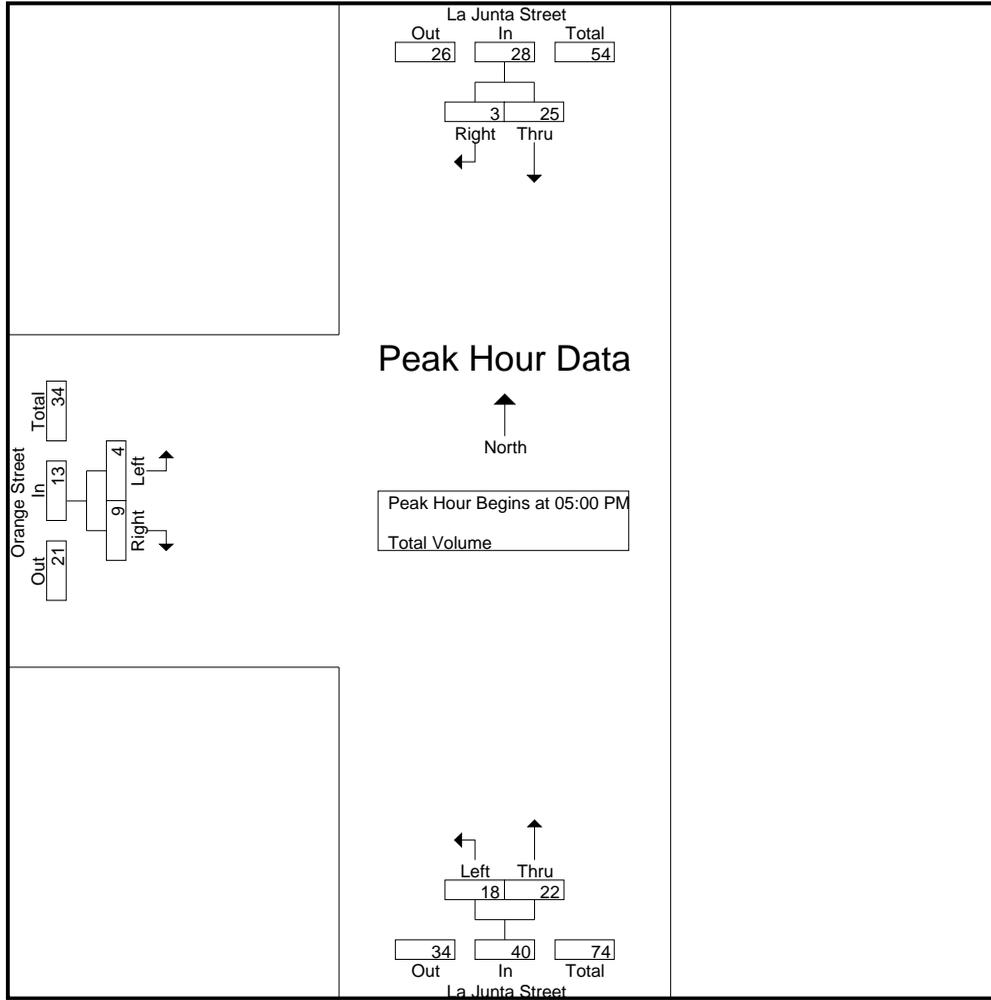
Groups Printed- Total Volume

Start Time	La Junta Street Southbound			La Junta Street Northbound			Orange Street Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
04:00 PM	3	2	5	1	2	3	0	2	2	10
04:15 PM	3	0	3	3	5	8	2	2	4	15
04:30 PM	5	1	6	1	5	6	3	4	7	19
04:45 PM	5	0	5	3	7	10	2	3	5	20
Total	16	3	19	8	19	27	7	11	18	64
05:00 PM	5	1	6	6	6	12	1	1	2	20
05:15 PM	6	1	7	5	3	8	3	3	6	21
05:30 PM	6	0	6	5	2	7	0	3	3	16
05:45 PM	8	1	9	2	11	13	0	2	2	24
Total	25	3	28	18	22	40	4	9	13	81
Grand Total	41	6	47	26	41	67	11	20	31	145
Apprch %	87.2	12.8		38.8	61.2		35.5	64.5		
Total %	28.3	4.1	32.4	17.9	28.3	46.2	7.6	13.8	21.4	

Start Time	La Junta Street Southbound			La Junta Street Northbound			Orange Street Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
05:00 PM	5	1	6	6	6	12	1	1	2	20
05:15 PM	6	1	7	5	3	8	3	3	6	21
05:30 PM	6	0	6	5	2	7	0	3	3	16
05:45 PM	8	1	9	2	11	13	0	2	2	24
Total Volume	25	3	28	18	22	40	4	9	13	81
% App. Total	89.3	10.7		45	55		30.8	69.2		
PHF	.781	.750	.778	.750	.500	.769	.333	.750	.542	.844

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM			05:00 PM			04:30 PM		
+0 mins.	5	1	6	6	6	12	3	4	7
+15 mins.	6	1	7	5	3	8	2	3	5
+30 mins.	6	0	6	5	2	7	1	1	2
+45 mins.	8	1	9	2	11	13	3	3	6
Total Volume	25	3	28	18	22	40	9	11	20
% App. Total	89.3	10.7		45	55		45	55	
PHF	.781	.750	.778	.750	.500	.769	.750	.688	.714

City of San Bernardino
 N/S: Del Rosa Drive
 E/W: Base Line Street
 Weather: Sunny

File Name : SBDRBLAM
 Site Code : 0000098
 Start Date : 5/4/2011
 Page No : 1

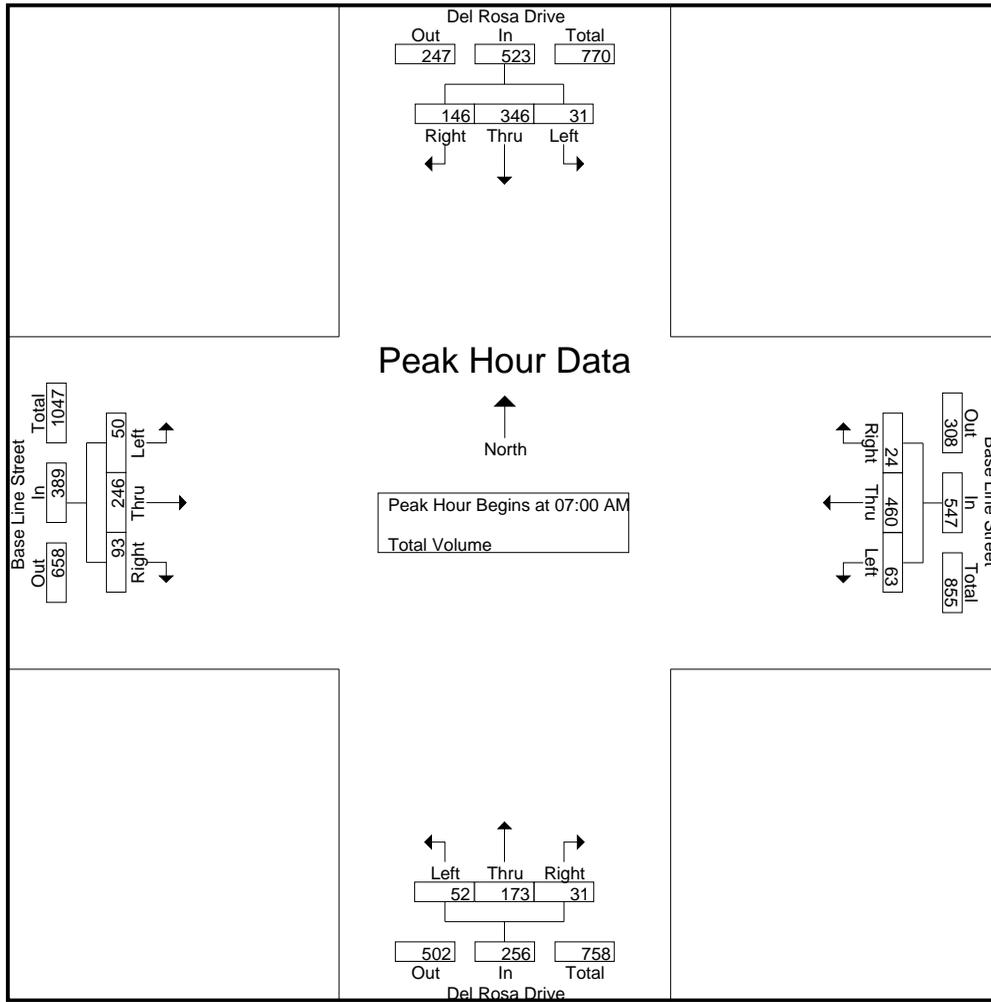
Groups Printed- Total Volume

Start Time	Del Rosa Drive Southbound				Base Line Street Westbound				Del Rosa Drive Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	5	63	19	87	14	82	7	103	18	36	6	60	11	43	16	70	320
07:15 AM	7	89	39	135	16	124	7	147	17	60	10	87	14	70	46	130	499
07:30 AM	7	101	48	156	24	129	4	157	12	43	12	67	10	79	29	118	498
07:45 AM	12	93	40	145	9	125	6	140	5	34	3	42	15	54	2	71	398
Total	31	346	146	523	63	460	24	547	52	173	31	256	50	246	93	389	1715
08:00 AM	6	49	27	82	4	92	6	102	6	29	2	37	19	60	1	80	301
08:15 AM	12	55	21	88	4	96	6	106	8	32	3	43	13	89	8	110	347
08:30 AM	12	59	24	95	12	102	10	124	7	25	6	38	8	92	9	109	366
08:45 AM	16	43	25	84	3	103	10	116	10	26	2	38	19	69	5	93	331
Total	46	206	97	349	23	393	32	448	31	112	13	156	59	310	23	392	1345
Grand Total	77	552	243	872	86	853	56	995	83	285	44	412	109	556	116	781	3060
Apprch %	8.8	63.3	27.9		8.6	85.7	5.6		20.1	69.2	10.7		14	71.2	14.9		
Total %	2.5	18	7.9	28.5	2.8	27.9	1.8	32.5	2.7	9.3	1.4	13.5	3.6	18.2	3.8	25.5	

Start Time	Del Rosa Drive Southbound				Base Line Street Westbound				Del Rosa Drive Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	5	63	19	87	14	82	7	103	18	36	6	60	11	43	16	70	320
07:15 AM	7	89	39	135	16	124	7	147	17	60	10	87	14	70	46	130	499
07:30 AM	7	101	48	156	24	129	4	157	12	43	12	67	10	79	29	118	498
07:45 AM	12	93	40	145	9	125	6	140	5	34	3	42	15	54	2	71	398
Total Volume	31	346	146	523	63	460	24	547	52	173	31	256	50	246	93	389	1715
% App. Total	5.9	66.2	27.9		11.5	84.1	4.4		20.3	67.6	12.1		12.9	63.2	23.9		
PHF	.646	.856	.760	.838	.656	.891	.857	.871	.722	.721	.646	.736	.833	.778	.505	.748	.859

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:00 AM



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:00 AM				07:15 AM			
+0 mins.	5	63	19	87	14	82	7	103	18	36	6	60	14	70	46	130
+15 mins.	7	89	39	135	16	124	7	147	17	60	10	87	10	79	29	118
+30 mins.	7	101	48	156	24	129	4	157	12	43	12	67	15	54	2	71
+45 mins.	12	93	40	145	9	125	6	140	5	34	3	42	19	60	1	80
Total Volume	31	346	146	523	63	460	24	547	52	173	31	256	58	263	78	399
% App. Total	5.9	66.2	27.9		11.5	84.1	4.4		20.3	67.6	12.1		14.5	65.9	19.5	
PHF	.646	.856	.760	.838	.656	.891	.857	.871	.722	.721	.646	.736	.763	.832	.424	.767

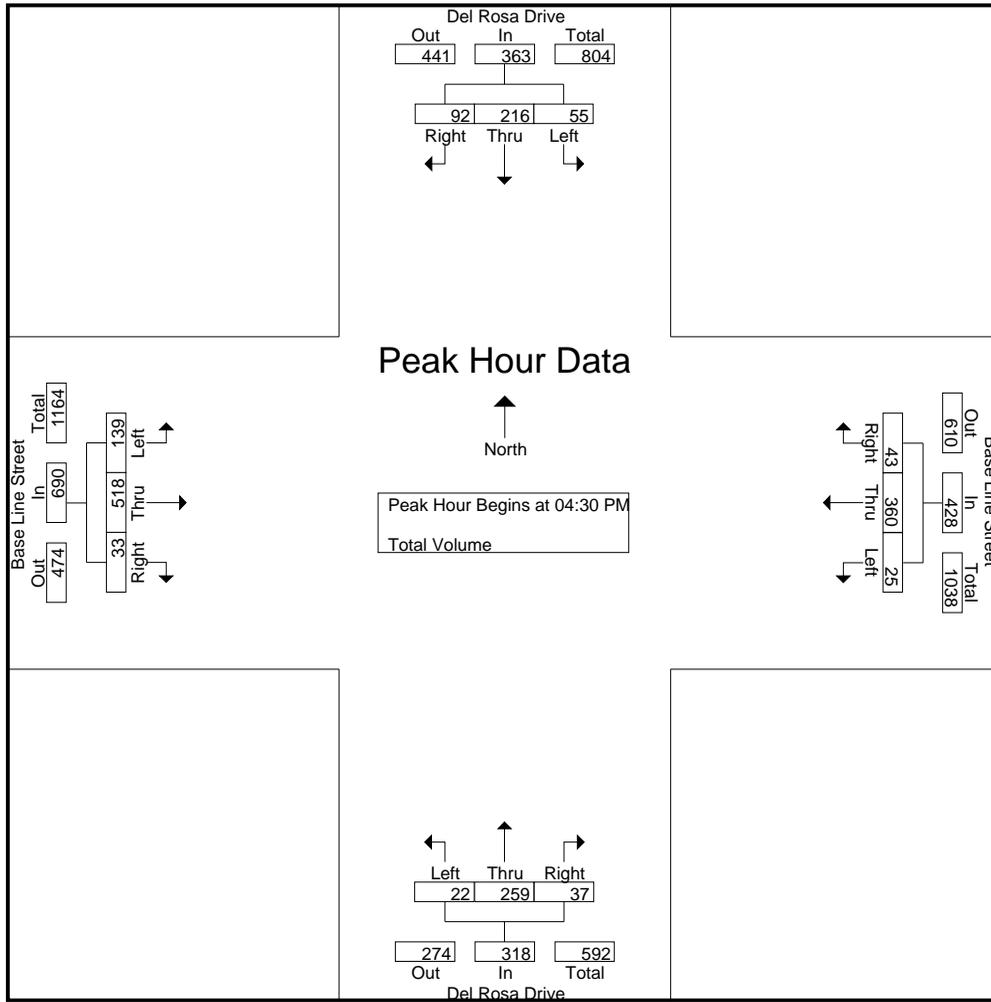
City of San Bernardino
 N/S: Del Rosa Drive
 E/W: Base Line Street
 Weather: Sunny

File Name : SBDRBLPM
 Site Code : 0000098
 Start Date : 5/4/2011
 Page No : 1

Groups Printed- Total Volume

Start Time	Del Rosa Drive Southbound				Base Line Street Westbound				Del Rosa Drive Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	22	59	25	106	4	111	7	122	6	65	2	73	38	108	6	152	453
04:15 PM	13	54	21	88	4	97	15	116	5	57	5	67	24	149	6	179	450
04:30 PM	17	71	24	112	3	83	12	98	4	59	16	79	28	116	11	155	444
04:45 PM	14	47	13	74	8	75	11	94	6	63	7	76	32	136	4	172	416
Total	66	231	83	380	19	366	45	430	21	244	30	295	122	509	27	658	1763
05:00 PM	15	53	23	91	7	89	10	106	7	71	9	87	31	132	8	171	455
05:15 PM	9	45	32	86	7	113	10	130	5	66	5	76	48	134	10	192	484
05:30 PM	10	52	18	80	5	93	14	112	6	73	11	90	36	108	5	149	431
05:45 PM	11	53	25	89	9	94	11	114	7	41	9	57	29	121	7	157	417
Total	45	203	98	346	28	389	45	462	25	251	34	310	144	495	30	669	1787
Grand Total	111	434	181	726	47	755	90	892	46	495	64	605	266	1004	57	1327	3550
Apprch %	15.3	59.8	24.9		5.3	84.6	10.1		7.6	81.8	10.6		20	75.7	4.3		
Total %	3.1	12.2	5.1	20.5	1.3	21.3	2.5	25.1	1.3	13.9	1.8	17	7.5	28.3	1.6	37.4	

Start Time	Del Rosa Drive Southbound				Base Line Street Westbound				Del Rosa Drive Northbound				Base Line Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	17	71	24	112	3	83	12	98	4	59	16	79	28	116	11	155	444
04:45 PM	14	47	13	74	8	75	11	94	6	63	7	76	32	136	4	172	416
05:00 PM	15	53	23	91	7	89	10	106	7	71	9	87	31	132	8	171	455
05:15 PM	9	45	32	86	7	113	10	130	5	66	5	76	48	134	10	192	484
Total Volume	55	216	92	363	25	360	43	428	22	259	37	318	139	518	33	690	1799
% App. Total	15.2	59.5	25.3		5.8	84.1	10		6.9	81.4	11.6		20.1	75.1	4.8		
PHF	.809	.761	.719	.810	.781	.796	.896	.823	.786	.912	.578	.914	.724	.952	.750	.898	.929



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				05:00 PM				04:45 PM				04:30 PM			
+0 mins.	22	59	25	106	7	89	10	106	6	63	7	76	28	116	11	155
+15 mins.	13	54	21	88	7	113	10	130	7	71	9	87	32	136	4	172
+30 mins.	17	71	24	112	5	93	14	112	5	66	5	76	31	132	8	171
+45 mins.	14	47	13	74	9	94	11	114	6	73	11	90	48	134	10	192
Total Volume	66	231	83	380	28	389	45	462	24	273	32	329	139	518	33	690
% App. Total	17.4	60.8	21.8		6.1	84.2	9.7		7.3	83	9.7		20.1	75.1	4.8	
PHF	.750	.813	.830	.848	.778	.861	.804	.888	.857	.935	.727	.914	.724	.952	.750	.898

City of Corona
 Orange Street
 E/ Waterman Avenue

SBCOREWA
 Site Code: 056-11112
 Date Start: 28-Apr-11
 Date End: 28-Apr-11

24 Hour Directional Volume Count

Start Time	28-Apr-11 Thu	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		5	14			2	11				
12:15		0	23			0	16				
12:30		1	14			5	19				
12:45		2	13	8	64	2	19	9	65	17	129
01:00		0	8			1	8				
01:15		1	13			0	9				
01:30		1	16			2	12				
01:45		0	10	2	47	0	10	3	39	5	86
02:00		3	11			0	14				
02:15		0	10			2	13				
02:30		0	7			3	13				
02:45		0	13	3	41	0	8	5	48	8	89
03:00		0	15			0	11				
03:15		2	12			3	9				
03:30		1	13			2	14				
03:45		0	14	3	54	0	12	5	46	8	100
04:00		0	10			3	16				
04:15		3	13			0	13				
04:30		0	14			2	19				
04:45		1	9	4	46	0	12	5	60	9	106
05:00		0	8			0	5				
05:15		1	16			1	14				
05:30		0	17			1	22				
05:45		1	14	2	55	0	9	2	50	4	105
06:00		0	9			2	11				
06:15		2	12			2	12				
06:30		0	10			4	12				
06:45		1	14	3	45	3	13	11	48	14	93
07:00		4	5			7	7				
07:15		5	7			11	5				
07:30		13	9			13	6				
07:45		10	9	32	30	13	12	44	30	76	60
08:00		12	12			8	8				
08:15		9	10			15	12				
08:30		11	8			11	11				
08:45		10	7	42	37	7	5	41	36	83	73
09:00		9	11			11	4				
09:15		5	6			19	5				
09:30		10	10			6	4				
09:45		13	5	37	32	4	4	40	17	77	49
10:00		5	10			10	5				
10:15		7	1			9	3				
10:30		6	8			7	1				
10:45		12	5	30	24	8	1	34	10	64	34
11:00		15	3			6	6				
11:15		8	3			13	2				
11:30		18	2			19	2				
11:45		8	2	49	10	5	2	43	12	92	22
Total		215	485	215	485	242	461	242	461	457	946
Combined Total		700		700		703		703		1403	
AM Peak		10:45				07:30					
Vol.		53				49					
P.H.F.		0.736				0.817					
PM Peak			12:00				12:00				
Vol.			64				65				
P.H.F.			0.696				0.855				
Percentage		30.7%	69.3%			34.4%	65.6%				
ADT/AADT		ADT 1,403		AADT 1,403							

City of Corona
 Crestview Avenue
 S/ Base Line Street
 24 Hour Directional Volume Count

SBCCRSBL
 Site Code: 080-11112
 Date Start: 28-Apr-11
 Date End: 28-Apr-11

Start Time	28-Apr-11 Thu	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		2	5			1	7				
12:15		1	8			1	5				
12:30		0	4			1	7				
12:45		0	7	3	24	0	5	3	24	6	48
01:00		0	5			0	5				
01:15		1	3			0	5				
01:30		0	5			1	3				
01:45		0	4	1	17	0	2	1	15	2	32
02:00		0	6			1	3				
02:15		0	9			0	3				
02:30		0	11			1	3				
02:45		0	10	0	36	0	16	2	25	2	61
03:00		0	8			0	12				
03:15		1	4			2	8				
03:30		0	11			0	13				
03:45		0	7	1	30	1	7	3	40	4	70
04:00		0	8			0	5				
04:15		1	5			0	7				
04:30		0	5			1	9				
04:45		1	10	2	28	0	11	1	32	3	60
05:00		1	7			0	10				
05:15		0	7			0	3				
05:30		2	8			0	8				
05:45		0	10	3	32	2	2	2	23	5	55
06:00		0	8			1	2				
06:15		3	4			2	2				
06:30		2	1			3	3				
06:45		4	4	9	17	1	6	7	13	16	30
07:00		6	7			2	5				
07:15		9	3			9	7				
07:30		4	7			3	3				
07:45		5	2	24	19	3	6	17	21	41	40
08:00		3	4			2	9				
08:15		5	5			6	3				
08:30		1	2			4	5				
08:45		5	1	14	12	3	4	15	21	29	33
09:00		7	7			3	5				
09:15		2	5			2	4				
09:30		1	2			5	3				
09:45		7	2	17	16	5	2	15	14	32	30
10:00		3	0			4	2				
10:15		5	0			4	1				
10:30		4	1			5	4				
10:45		4	2	16	3	4	1	17	8	33	11
11:00		2	1			4	1				
11:15		4	1			6	1				
11:30		8	2			6	3				
11:45		3	1	17	5	2	1	18	6	35	11
Total		107	239	107	239	101	242	101	242	208	481
Combined Total		346		346		343		343		689	
AM Peak		07:00				10:45					
Vol.		24				20					
P.H.F.		0.667				0.833					
PM Peak		02:15				02:45					
Vol.		38				49					
P.H.F.		0.864				0.766					
Percentage		30.9%	69.1%			29.4%	70.6%				
ADT/AADT		ADT 689		AADT 689							

City of San Bernardino
 Orange Street
 W/ La Juanita Street
 24 Hour Directional Volume Count

SBCORWLJ
 Site Code: 080-11112
 Date Start: 28-Apr-11
 Date End: 28-Apr-11

Start Time	28-Apr-11 Thu	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		1	4			1	2				
12:15		2	5			1	5				
12:30		0	10			1	9				
12:45		0	6	3	25	0	13	3	29	6	54
01:00		0	1			0	7				
01:15		0	3			0	2				
01:30		0	5			0	2				
01:45		2	4	2	13	1	4	1	15	3	28
02:00		0	2			0	8				
02:15		0	1			0	1				
02:30		0	3			0	2				
02:45		0	4	0	10	1	4	1	15	1	25
03:00		0	4			0	6				
03:15		1	5			0	5				
03:30		0	12			0	16				
03:45		0	3	1	24	0	4	0	31	1	55
04:00		0	4			0	8				
04:15		1	4			0	6				
04:30		0	7			0	4				
04:45		2	4	3	19	0	7	0	25	3	44
05:00		0	5			0	7				
05:15		0	7			0	5				
05:30		1	4			1	4				
05:45		0	3	1	19	0	1	1	17	2	36
06:00		0	4			0	3				
06:15		0	4			0	3				
06:30		2	0			1	6				
06:45		0	2	2	10	2	3	3	15	5	25
07:00		6	2			4	3				
07:15		3	1			6	2				
07:30		4	1			6	1				
07:45		5	2	18	6	4	2	20	8	38	14
08:00		2	1			3	2				
08:15		11	1			6	1				
08:30		7	3			2	0				
08:45		5	0	25	5	5	1	16	4	41	9
09:00		2	0			5	6				
09:15		5	3			4	2				
09:30		4	1			2	0				
09:45		5	1	16	5	4	2	15	10	31	15
10:00		4	1			3	0				
10:15		3	0			2	0				
10:30		6	0			4	0				
10:45		5	0	18	1	8	1	17	1	35	2
11:00		1	0			5	1				
11:15		1	1			2	0				
11:30		7	0			5	0				
11:45		5	0	14	1	5	0	17	1	31	2
Total		103	138	103	138	94	171	94	171	197	309
Combined Total		241		241		265		265		506	
AM Peak		07:45				07:00					
Vol.		25				20					
P.H.F.		0.568				0.833					
PM Peak			12:00				00:15				
Vol.			25				34				
P.H.F.			0.625				0.654				
Percentage		42.7%	57.3%			35.5%	64.5%				
ADT/AADT		ADT 506		AADT 506							

**APPENDIX B:
EXISTING LOS RESULTS**

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1900	1700	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1583	3319		1583	3295		1583	3257		1583	3259	
Flt Permitted	0.32	1.00		0.43	1.00		0.30	1.00		0.55	1.00	
Satd. Flow (perm)	534	3319		709	3295		502	3257		918	3259	
Volume (vph)	37	472	34	27	549	71	15	139	33	57	312	71
Peak-hour factor, PHF	0.92	0.92	0.92	0.85	0.85	0.85	0.82	0.82	0.82	0.87	0.87	0.87
Adj. Flow (vph)	40	513	37	32	646	84	18	170	40	66	359	82
RTOR Reduction (vph)	0	5	0	0	9	0	0	29	0	0	29	0
Lane Group Flow (vph)	40	545	0	32	721	0	18	181	0	66	412	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6		8			8		4
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	52.0	48.1		49.6	46.9		15.2	15.2		15.2	15.2	
Effective Green, g (s)	57.0	51.1		54.6	49.9		18.2	18.2		18.2	18.2	
Actuated g/C Ratio	0.71	0.64		0.68	0.62		0.23	0.23		0.23	0.23	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	458	2120		535	2055		114	741		209	741	
v/s Ratio Prot	c0.01	0.16		0.00	c0.22		0.06			c0.13		
v/s Ratio Perm	0.06			0.04			0.04			0.07		
v/c Ratio	0.09	0.26		0.06	0.35		0.16	0.24		0.32	0.56	
Uniform Delay, d1	3.8	6.2		4.2	7.2		24.8	25.3		25.7	27.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3		0.0	0.5		0.7	0.2		0.9	0.9	
Delay (s)	3.8	6.5		4.2	7.7		25.4	25.4		26.6	28.2	
Level of Service	A			A			C			C		
Approach Delay (s)	6.4			7.6			25.4			28.0		
Approach LOS	A			A			C			C		
Intersection Summary												
HCM Average Control Delay			14.2			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			55.7%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Highland Avenue & Waterman Avenue

6/6/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1900	1700	1800	1800	1700	1800	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1583	3353	1500	1583	3315		1583	3353	1500	1583	3333	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1583	3353	1500	1583	3315		1583	3353	1500	1583	3333	
Volume (vph)	54	294	154	95	332	27	81	323	66	98	630	27
Peak-hour factor, PHF	0.95	0.95	0.95	0.91	0.91	0.91	0.96	0.96	0.96	0.95	0.95	0.95
Adj. Flow (vph)	57	309	162	104	365	30	84	336	69	103	663	28
RTOR Reduction (vph)	0	0	96	0	6	0	0	0	50	0	4	0
Lane Group Flow (vph)	57	309	66	104	389	0	84	336	19	103	687	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	7.5	33.7	33.7	8.8	35.0		8.6	22.3	22.3	9.2	22.9	
Effective Green, g (s)	8.5	36.7	36.7	9.8	38.0		9.6	25.3	25.3	10.2	25.9	
Actuated g/C Ratio	0.09	0.41	0.41	0.11	0.42		0.11	0.28	0.28	0.11	0.29	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	150	1367	612	172	1400		169	943	422	179	959	
v/s Ratio Prot	0.04	0.09		c0.07	c0.12		0.05	0.10		c0.07	c0.21	
v/s Ratio Perm			0.04						0.01			
v/c Ratio	0.38	0.23	0.11	0.60	0.28		0.50	0.36	0.05	0.58	0.72	
Uniform Delay, d1	38.3	17.4	16.5	38.3	17.0		37.9	25.8	23.6	37.8	28.8	
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	1.6	0.4	0.4	5.9	0.5		2.3	0.2	0.0	4.4	2.6	
Delay (s)	39.9	17.8	16.9	44.1	17.5		40.2	26.1	23.6	42.3	31.3	
Level of Service	D	B	B	D	B		D	C	C	D	C	
Approach Delay (s)		19.9			23.1			28.2			32.8	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM Average Control Delay			26.7			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			52.1%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Base Line Street & Waterman Avenue

6/13/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1583	3254		1583	3298		1583	3353	1500	1583	3353	1500
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)	1583	3254		1583	3298		1583	3353	1500	1583	3353	1500
Volume (vph)	87	333	81	135	411	51	53	329	93	44	626	82
Peak-hour factor, PHF	0.98	0.98	0.98	0.83	0.83	0.83	0.80	0.80	0.80	0.88	0.88	0.88
Adj. Flow (vph)	89	340	83	163	495	61	66	411	116	50	711	93
RTOR Reduction (vph)	0	24	0	0	11	0	0	0	47	0	0	37
Lane Group Flow (vph)	89	399	0	163	545	0	66	411	69	50	711	56
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	10.2	20.0		10.8	20.6		5.7	42.6	53.4	6.6	43.5	53.7
Effective Green, g (s)	13.2	23.0		13.8	23.6		8.7	45.6	59.4	9.6	46.5	59.7
Actuated g/C Ratio	0.13	0.23		0.14	0.24		0.09	0.46	0.59	0.10	0.46	0.60
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	209	748		218	778		138	1529	921	152	1559	926
v/s Ratio Prot	0.06	c0.12		c0.10	c0.17		c0.04	0.12	0.01	0.03	c0.21	0.01
v/s Ratio Perm									0.04			0.03
v/c Ratio	0.43	0.53		0.75	0.70		0.48	0.27	0.07	0.33	0.46	0.06
Uniform Delay, d1	39.9	33.8		41.4	35.0		43.5	16.9	8.6	42.2	18.2	8.4
Progression Factor	1.00	1.00		1.05	0.93		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.7		12.8	2.8		2.6	0.4	0.0	1.3	1.0	0.0
Delay (s)	41.3	34.5		56.2	35.5		46.1	17.3	8.7	43.5	19.1	8.5
Level of Service	D	C		E	D		D	B	A	D	B	A
Approach Delay (s)		35.7			40.2			18.8			19.4	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM Average Control Delay			28.0	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.53									
Actuated Cycle Length (s)			100.0	Sum of lost time (s)				6.0				
Intersection Capacity Utilization			56.6%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 4: Driveway & Waterman Avenue

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	0	3	38	0	24	5	540	22	28	796	4
Peak Hour Factor	0.50	0.50	0.50	0.67	0.67	0.67	0.92	0.92	0.92	0.81	0.81	0.81
Hourly flow rate (vph)	2	0	6	57	0	36	5	587	24	35	983	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)											526	
pX, platoon unblocked	0.84	0.84	0.84	0.84	0.84		0.84					
vC, conflicting volume	1394	1676	494	1176	1667	305	988			611		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	1281	1615	211	1022	1604	305	798			611		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	99	63	100	95	99			96		
cM capacity (veh/h)	94	83	669	153	84	691	786			879		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	8	93	5	391	220	35	655	333				
Volume Left	2	57	5	0	0	35	0	0				
Volume Right	6	36	0	0	24	0	0	5				
cSH	265	219	786	1700	1700	879	1700	1700				
Volume to Capacity	0.03	0.42	0.01	0.23	0.13	0.04	0.39	0.20				
Queue Length 95th (ft)	2	49	1	0	0	3	0	0				
Control Delay (s)	19.0	32.9	9.6	0.0	0.0	9.3	0.0	0.0				
Lane LOS	C	D	A			A						
Approach Delay (s)	19.0	32.9	0.1			0.3						
Approach LOS	C	D										
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			37.6%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕		↗	↕↕		↗	↕↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	3	6	20	1	12	5	444	17	22	874	4
Peak Hour Factor	0.46	0.46	0.46	0.83	0.83	0.83	0.87	0.87	0.87	0.82	0.82	0.82
Hourly flow rate (vph)	4	7	13	24	1	14	6	510	20	27	1066	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)											1013	
pX, platoon unblocked	0.90	0.90	0.90	0.90	0.90		0.90					
vC, conflicting volume	1404	1663	535	1134	1656	265	1071			530		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	1338	1626	374	1039	1618	265	969			530		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	93	98	84	99	98	99			97		
cM capacity (veh/h)	94	88	561	149	89	733	768			903		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	24	40	6	340	190	27	711	360
Volume Left	4	24	6	0	0	27	0	0
Volume Right	13	14	0	0	20	0	0	5
cSH	167	204	768	1700	1700	903	1700	1700
Volume to Capacity	0.14	0.19	0.01	0.20	0.11	0.03	0.42	0.21
Queue Length 95th (ft)	12	18	1	0	0	2	0	0
Control Delay (s)	30.2	26.9	9.7	0.0	0.0	9.1	0.0	0.0
Lane LOS	D	D	A			A		
Approach Delay (s)	30.2	26.9	0.1			0.2		
Approach LOS	D	D						

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

6/6/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1800	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		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)	1583	3118		1583	3353	1500	1583	3353	1500	1583	3353	1500
Flt Permitted	0.40	1.00		0.50	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	664	3118		829	3353	1500	1583	3353	1500	1583	3353	1500
Volume (vph)	78	128	112	68	304	28	71	523	48	19	742	95
Peak-hour factor, PHF	0.84	0.84	0.84	0.79	0.79	0.79	0.88	0.88	0.88	0.82	0.82	0.82
Adj. Flow (vph)	93	152	133	86	385	35	81	594	55	23	905	116
RTOR Reduction (vph)	0	98	0	0	0	21	0	0	24	0	0	44
Lane Group Flow (vph)	93	187	0	86	385	14	81	594	31	23	905	72
Turn Type	pm+pt			pm+pt		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)	19.6	13.7		19.6	13.7	13.7	8.0	24.9	24.9	2.5	19.4	19.4
Effective Green, g (s)	23.6	16.7		23.6	16.7	16.7	9.0	28.9	28.9	3.5	23.4	23.4
Actuated g/C Ratio	0.37	0.26		0.37	0.26	0.26	0.14	0.45	0.45	0.05	0.37	0.37
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	344	814		387	875	391	223	1514	677	87	1226	548
v/s Ratio Prot	c0.03	0.06		0.02	c0.11		0.05	c0.18		0.01	c0.27	
v/s Ratio Perm	0.07			0.06		0.01			0.02			0.05
v/c Ratio	0.27	0.23		0.22	0.44	0.04	0.36	0.39	0.05	0.26	0.74	0.13
Uniform Delay, d1	13.7	18.6		13.5	19.7	17.6	24.9	11.7	9.8	29.0	17.6	13.5
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	0.4	0.1		0.3	0.4	0.0	1.0	0.2	0.0	1.6	2.4	0.1
Delay (s)	14.1	18.7		13.8	20.1	17.7	25.9	11.9	9.9	30.6	20.0	13.6
Level of Service	B	B		B	C	B	C	B	A	C	C	B
Approach Delay (s)		17.6			18.9			13.3			19.5	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM Average Control Delay			17.4				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			64.0				Sum of lost time (s)				6.0	
Intersection Capacity Utilization			53.1%				ICU Level of Service				A	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕			↕	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1900	1800	1900	1900	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.92			0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1583	3341		1583	3338			1601			1615	
Flt Permitted	0.35	1.00		0.48	1.00			0.91			0.87	
Satd. Flow (perm)	589	3341		806	3338			1478			1428	
Volume (vph)	31	411	10	15	561	18	9	3	17	23	4	25
Peak-hour factor, PHF	0.90	0.90	0.90	0.77	0.77	0.77	0.60	0.60	0.60	0.68	0.68	0.68
Adj. Flow (vph)	34	457	11	19	729	23	15	5	28	34	6	37
RTOR Reduction (vph)	0	2	0	0	3	0	0	24	0	0	31	0
Lane Group Flow (vph)	34	466	0	19	749	0	0	24	0	0	46	0
Turn Type	Perm		Perm		Perm		Perm		Perm			
Protected Phases	2		6		6		8		4			
Permitted Phases	2		6		8		8		4			
Actuated Green, G (s)	35.1	35.1		35.1	35.1			5.9			5.9	
Effective Green, g (s)	38.1	38.1		38.1	38.1			7.9			7.9	
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.16			0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	449	2546		614	2544			234			226	
v/s Ratio Prot	0.14		c0.22									
v/s Ratio Perm	0.06			0.02				0.02			c0.03	
v/c Ratio	0.08	0.18		0.03	0.29			0.10			0.20	
Uniform Delay, d1	1.5	1.6		1.5	1.8			18.0			18.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.3	0.2		0.0	0.1			0.1			0.4	
Delay (s)	1.8	1.8		1.5	1.9			18.2			18.8	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)	1.8		1.9		18.2		18.8					
Approach LOS	A		A		B		B					

Intersection Summary

HCM Average Control Delay	3.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 8: Base Line Street & La Junita Street

6/6/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↖	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	436	17	19	587	10	13
Peak Hour Factor	0.83	0.83	0.76	0.76	0.64	0.64
Hourly flow rate (vph)	525	20	25	772	16	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)	270					
pX, platoon unblocked						
vC, conflicting volume			546		972	273
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			546		972	273
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		94	97
cM capacity (veh/h)			1020		244	725
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	350	196	25	386	386	36
Volume Left	0	0	25	0	0	16
Volume Right	0	20	0	0	0	20
cSH	1700	1700	1020	1700	1700	390
Volume to Capacity	0.21	0.12	0.02	0.23	0.23	0.09
Queue Length 95th (ft)	0	0	2	0	0	8
Control Delay (s)	0.0	0.0	8.6	0.0	0.0	15.2
Lane LOS	A			C		
Approach Delay (s)	0.0		0.3			15.2
Approach LOS						C
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			26.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 9: Driveway & La Junita Street

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	0	28	0	0	0	10	24	0	0	22	2
Peak Hour Factor	0.65	0.92	0.65	0.92	0.92	0.92	0.71	0.71	0.92	0.92	0.67	0.67
Hourly flow rate (vph)	5	0	43	0	0	0	14	34	0	0	33	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	96	96	34	139	98	34	36			34		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	96	96	34	139	98	34	36			34		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	96	100	100	100	99			100		
cM capacity (veh/h)	880	787	1039	791	785	1039	1575			1578		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	48	0	48	36								
Volume Left	5	0	14	0								
Volume Right	43	0	0	3								
cSH	1021	1700	1575	1578								
Volume to Capacity	0.05	0.00	0.01	0.00								
Queue Length 95th (ft)	4	0	1	0								
Control Delay (s)	8.7	0.0	2.2	0.0								
Lane LOS	A	A	A									
Approach Delay (s)	8.7	0.0	2.2	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.0									
Intersection Capacity Utilization			18.5%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 10: Base Line Street & Del Rosa Drive

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1600	1700	1800	1900	1700	1800	1900	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.98		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)	1583	3215		1583	3328		1583	3276		1583	1765	1500
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1583	3215		1583	3328		1583	3276		1583	1765	1500
Volume (vph)	50	246	93	63	460	24	52	173	31	31	346	146
Peak-hour factor, PHF	0.75	0.75	0.75	0.87	0.87	0.87	0.74	0.74	0.74	0.84	0.84	0.84
Adj. Flow (vph)	67	328	124	72	529	28	70	234	42	37	412	174
RTOR Reduction (vph)	0	39	0	0	4	0	0	15	0	0	0	83
Lane Group Flow (vph)	67	413	0	72	553	0	70	261	0	37	412	91
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	8.0	33.3		7.8	33.1		7.9	27.7		5.2	25.0	25.0
Effective Green, g (s)	9.0	36.3		8.8	36.1		8.9	30.7		6.2	28.0	28.0
Actuated g/C Ratio	0.10	0.40		0.10	0.40		0.10	0.34		0.07	0.31	0.31
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	158	1297		155	1335		157	1117		109	549	467
v/s Ratio Prot	c0.04	0.13		c0.05	c0.17		c0.04	0.08		0.02	c0.23	
v/s Ratio Perm												0.06
v/c Ratio	0.42	0.32		0.46	0.41		0.45	0.23		0.34	0.75	0.19
Uniform Delay, d1	38.1	18.4		38.4	19.4		38.2	21.2		39.9	27.9	22.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.8	0.6		2.2	1.0		2.0	0.1		1.9	5.7	0.2
Delay (s)	39.9	19.0		40.6	20.3		40.2	21.3		41.8	33.6	22.9
Level of Service	D	B		D	C		D	C		D	C	C
Approach Delay (s)		21.7			22.6			25.2			31.1	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			25.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.53									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			55.1%			ICU Level of Service				B		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1900	1700	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1583	3330		1583	3317		1583	3262		1583	3248	
Flt Permitted	0.32	1.00		0.38	1.00		0.47	1.00		0.29	1.00	
Satd. Flow (perm)	528	3330		627	3317		781	3262		480	3248	
Volume (vph)	51	566	27	34	679	53	69	347	76	59	205	54
Peak-hour factor, PHF	0.95	0.95	0.95	0.98	0.98	0.98	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	54	596	28	35	693	54	76	381	84	65	225	59
RTOR Reduction (vph)	0	3	0	0	5	0	0	27	0	0	34	0
Lane Group Flow (vph)	54	621	0	35	742	0	76	438	0	65	250	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	50.4	46.3		50.0	46.1		15.8	15.8		15.8	15.8	
Effective Green, g (s)	55.4	49.3		55.0	49.1		18.8	18.8		18.8	18.8	
Actuated g/C Ratio	0.69	0.62		0.69	0.61		0.24	0.24		0.24	0.24	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	446	2052		502	2036		184	767		113	763	
v/s Ratio Prot	c0.01	0.19		0.01	c0.22		0.13	0.13		0.08	0.08	
v/s Ratio Perm	0.07			0.04			0.10			c0.14		
v/c Ratio	0.12	0.30		0.07	0.36		0.41	0.57		0.58	0.33	
Uniform Delay, d1	4.2	7.2		4.1	7.7		25.9	27.0		27.1	25.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.1	0.5		1.5	1.0		6.9	0.3	
Delay (s)	4.4	7.6		4.2	8.2		27.4	28.1		34.0	25.6	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		7.4			8.0			28.0			27.2	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM Average Control Delay			15.3			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			60.1%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Highland Avenue & Waterman Avenue

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1900	1700	1800	1800	1700	1800	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1583	3353	1500	1583	3273		1583	3353	1500	1583	3314	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1583	3353	1500	1583	3273		1583	3353	1500	1583	3314	
Volume (vph)	88	486	124	98	504	96	165	606	159	117	346	29
Peak-hour factor, PHF	0.93	0.93	0.93	0.94	0.94	0.94	0.96	0.96	0.96	0.93	0.93	0.93
Adj. Flow (vph)	95	523	133	104	536	102	172	631	166	126	372	31
RTOR Reduction (vph)	0	0	82	0	15	0	0	0	103	0	8	0
Lane Group Flow (vph)	95	523	51	104	623	0	172	631	63	126	395	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	9.1	31.7	31.7	10.2	32.8		13.0	21.0	21.0	11.1	19.1	
Effective Green, g (s)	10.1	34.7	34.7	11.2	35.8		14.0	24.0	24.0	12.1	22.1	
Actuated g/C Ratio	0.11	0.39	0.39	0.12	0.40		0.16	0.27	0.27	0.13	0.25	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	178	1293	578	197	1302		246	894	400	213	814	
v/s Ratio Prot	0.06	0.16		c0.07	c0.19		c0.11	c0.19		0.08	0.12	
v/s Ratio Perm			0.03						0.04			
v/c Ratio	0.53	0.40	0.09	0.53	0.48		0.70	0.71	0.16	0.59	0.49	
Uniform Delay, d1	37.7	20.1	17.6	36.9	20.2		36.0	29.8	25.3	36.6	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	3.1	0.9	0.3	2.5	1.3		8.4	2.6	0.2	4.4	0.5	
Delay (s)	40.8	21.1	17.9	39.5	21.4		44.4	32.4	25.4	41.0	29.5	
Level of Service	D	C	B	D	C		D	C	C	D	C	
Approach Delay (s)		23.0			23.9			33.3			32.3	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			28.2			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			61.6%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

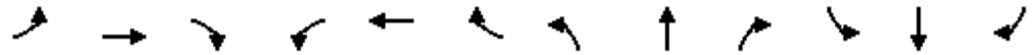
HCM Signalized Intersection Capacity Analysis
3: Base Line Street & Waterman Avenue

6/13/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1583	3252		1583	3280		1583	3353	1500	1583	3353	1500
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)	1583	3252		1583	3280		1583	3353	1500	1583	3353	1500
Volume (vph)	85	416	104	119	412	70	120	577	142	55	535	104
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.87	0.87	0.87	0.88	0.88	0.88
Adj. Flow (vph)	94	462	116	145	502	85	138	663	163	62	608	118
RTOR Reduction (vph)	0	24	0	0	15	0	0	0	43	0	0	56
Lane Group Flow (vph)	94	554	0	145	572	0	138	663	120	62	608	62
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	10.8	22.8		9.8	21.8		11.3	41.8	51.6	5.6	36.1	46.9
Effective Green, g (s)	13.8	25.8		12.8	24.8		14.3	44.8	57.6	8.6	39.1	52.9
Actuated g/C Ratio	0.14	0.26		0.13	0.25		0.14	0.45	0.58	0.09	0.39	0.53
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	218	839		203	813		226	1502	864	136	1311	794
v/s Ratio Prot	0.06	c0.17		c0.09	c0.17		c0.09	c0.20	0.02	0.04	c0.18	0.01
v/s Ratio Perm									0.06			0.03
v/c Ratio	0.43	0.66		0.71	0.70		0.61	0.44	0.14	0.46	0.46	0.08
Uniform Delay, d1	39.5	33.2		41.8	34.3		40.2	19.0	9.8	43.5	22.7	11.6
Progression Factor	1.00	1.00		1.05	0.94		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	1.9		11.2	2.8		4.8	0.9	0.1	2.4	1.2	0.0
Delay (s)	40.9	35.1		55.1	34.9		45.0	19.9	9.8	45.9	23.8	11.6
Level of Service	D	D		E	C		D	B	A	D	C	B
Approach Delay (s)		35.9			38.9			21.8			23.7	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM Average Control Delay			29.2	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			100.0	Sum of lost time (s)				4.0				
Intersection Capacity Utilization			59.4%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 4: Orange Street Driveway & Waterman Avenue

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	0	11	25	1	30	20	983	28	30	908	20
Peak Hour Factor	0.44	0.44	0.44	0.78	0.78	0.78	0.89	0.89	0.89	0.94	0.94	0.94
Hourly flow rate (vph)	11	0	25	32	1	38	22	1104	31	32	966	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)											526	
pX, platoon unblocked	0.87	0.87	0.87	0.87	0.87		0.87					
vC, conflicting volume	1677	2221	494	1737	2216	568	987			1136		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	1628	2254	268	1698	2249	568	836			1136		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	77	100	96	32	96	92	97			96		
cM capacity (veh/h)	50	33	635	47	33	466	786			759		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	36	72	22	736	400	32	644	343
Volume Left	11	32	22	0	0	32	0	0
Volume Right	25	38	0	0	31	0	0	21
cSH	135	90	786	1700	1700	759	1700	1700
Volume to Capacity	0.27	0.80	0.03	0.43	0.24	0.04	0.38	0.20
Queue Length 95th (ft)	25	104	2	0	0	3	0	0
Control Delay (s)	41.1	127.6	9.7	0.0	0.0	10.0	0.0	0.0
Lane LOS	E	F	A			A		
Approach Delay (s)	41.1	127.6	0.2			0.3		
Approach LOS	E	F						

Intersection Summary			
Average Delay		4.9	
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	1	11	9	2	18	21	1029	31	29	850	10
Peak Hour Factor	0.59	0.59	0.59	0.81	0.81	0.81	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	2	19	11	2	22	22	1083	33	31	895	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)											1013	
pX, platoon unblocked	0.96	0.96	0.96	0.96	0.96		0.96					
vC, conflicting volume	1570	2121	453	1672	2110	558	905			1116		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	1555	2125	396	1660	2114	558	865			1116		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	82	96	97	80	95	95	97			96		
cM capacity (veh/h)	64	44	582	55	45	473	805			763		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	32	36	22	722	394	31	596	309
Volume Left	12	11	22	0	0	31	0	0
Volume Right	19	22	0	0	33	0	0	11
cSH	126	118	805	1700	1700	763	1700	1700
Volume to Capacity	0.26	0.30	0.03	0.42	0.23	0.04	0.35	0.18
Queue Length 95th (ft)	24	29	2	0	0	3	0	0
Control Delay (s)	43.0	48.3	9.6	0.0	0.0	9.9	0.0	0.0
Lane LOS	E	E	A			A		
Approach Delay (s)	43.0	48.3	0.2			0.3		
Approach LOS	E	E						

Intersection Summary			
Average Delay		1.7	
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1800	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		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)	1583	3234		1583	3353	1500	1583	3353	1500	1583	3353	1500
Flt Permitted	0.59	1.00		0.22	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	990	3234		363	3353	1500	1583	3353	1500	1583	3353	1500
Volume (vph)	96	419	129	59	147	46	85	970	97	39	777	89
Peak-hour factor, PHF	0.85	0.85	0.85	0.79	0.79	0.79	0.91	0.91	0.91	0.98	0.98	0.98
Adj. Flow (vph)	113	493	152	75	186	58	93	1066	107	40	793	91
RTOR Reduction (vph)	0	36	0	0	0	42	0	0	27	0	0	39
Lane Group Flow (vph)	113	609	0	75	186	16	93	1066	80	40	793	52
Turn Type	pm+pt			pm+pt		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)	23.8	17.3		23.0	16.9	16.9	8.4	25.5	25.5	4.5	21.6	21.6
Effective Green, g (s)	27.8	20.3		27.0	19.9	19.9	9.4	29.5	29.5	5.5	25.6	25.6
Actuated g/C Ratio	0.39	0.29		0.38	0.28	0.28	0.13	0.42	0.42	0.08	0.36	0.36
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	454	933		262	948	424	211	1405	629	124	1219	545
v/s Ratio Prot	c0.03	c0.19		c0.03	0.06		0.06	c0.32		0.03	c0.24	
v/s Ratio Perm	0.07			0.08		0.01			0.05			0.03
v/c Ratio	0.25	0.65		0.29	0.20	0.04	0.44	0.76	0.13	0.32	0.65	0.09
Uniform Delay, d1	13.9	22.0		14.7	19.2	18.3	28.1	17.4	12.5	30.7	18.7	14.8
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	0.3	1.7		0.6	0.1	0.0	1.5	2.4	0.1	1.5	1.3	0.1
Delay (s)	14.2	23.6		15.3	19.3	18.4	29.6	19.8	12.6	32.2	19.9	14.8
Level of Service	B	C		B	B	B	C	B	B	C	B	B
Approach Delay (s)		22.2			18.2			19.9			20.0	
Approach LOS		C			B			B			B	
Intersection Summary												
HCM Average Control Delay			20.3				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			70.4				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			65.2%				ICU Level of Service				C	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

6/6/2011



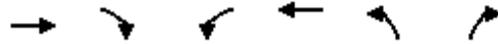
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕			↕			↕	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1900	1800	1900	1900	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	
Satd. Flow (prot)	1583	3343		1583	3337			1619			1628	
Flt Permitted	0.41	1.00		0.38	1.00			0.94			0.84	
Satd. Flow (perm)	685	3343		630	3337			1541			1401	
Volume (vph)	48	636	12	7	553	19	3	4	8	48	5	32
Peak-hour factor, PHF	0.94	0.94	0.94	0.93	0.93	0.93	0.63	0.63	0.63	0.92	0.92	0.92
Adj. Flow (vph)	51	677	13	8	595	20	5	6	13	52	5	35
RTOR Reduction (vph)	0	1	0	0	3	0	0	11	0	0	29	0
Lane Group Flow (vph)	51	689	0	8	612	0	0	13	0	0	63	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	34.7	34.7		34.7	34.7			6.3			6.3	
Effective Green, g (s)	37.7	37.7		37.7	37.7			8.3			8.3	
Actuated g/C Ratio	0.75	0.75		0.75	0.75			0.17			0.17	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	516	2521		475	2516			256			233	
v/s Ratio Prot	c0.21				0.18							
v/s Ratio Perm	0.07			0.01				0.01			c0.04	
v/c Ratio	0.10	0.27		0.02	0.24			0.05			0.27	
Uniform Delay, d1	1.6	1.9		1.5	1.9			17.5			18.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.3		0.0	0.1			0.1			0.6	
Delay (s)	2.0	2.2		1.6	1.9			17.6			18.8	
Level of Service	A		A		A		B		B		B	
Approach Delay (s)	2.2		1.9		1.9		17.6		17.6		18.8	
Approach LOS	A		A		A		B		B		B	

Intersection Summary

HCM Average Control Delay	3.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 8: Base Line Street & La Junita Street

6/6/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	669	12	9	605	16	17
Peak Hour Factor	0.90	0.90	0.94	0.94	0.75	0.75
Hourly flow rate (vph)	743	13	10	644	21	23
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)	270					
pX, platoon unblocked			0.97		0.97	0.97
vC, conflicting volume			757		1091	378
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			719		1064	330
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		90	96
cM capacity (veh/h)			852		209	647

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	496	261	10	322	322	44
Volume Left	0	0	10	0	0	21
Volume Right	0	13	0	0	0	23
cSH	1700	1700	852	1700	1700	321
Volume to Capacity	0.29	0.15	0.01	0.19	0.19	0.14
Queue Length 95th (ft)	0	0	1	0	0	12
Control Delay (s)	0.0	0.0	9.3	0.0	0.0	18.0
Lane LOS			A			C
Approach Delay (s)	0.0		0.1			18.0
Approach LOS						C

Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			28.9%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 9: Orange Street Driveway & La Junita Street

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	0	9	0	0	0	18	22	0	0	25	3
Peak Hour Factor	0.54	0.92	0.54	0.92	0.92	0.92	0.77	0.77	0.92	0.92	0.78	0.78
Hourly flow rate (vph)	7	0	17	0	0	0	23	29	0	0	32	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	109	109	34	126	111	29	36			29		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	109	109	34	126	111	29	36			29		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	98	100	100	100	99			100		
cM capacity (veh/h)	859	769	1039	825	767	1046	1575			1585		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	24	0	52	36								
Volume Left	7	0	23	0								
Volume Right	17	0	0	4								
cSH	976	1700	1575	1585								
Volume to Capacity	0.02	0.00	0.01	0.00								
Queue Length 95th (ft)	2	0	1	0								
Control Delay (s)	8.8	0.0	3.4	0.0								
Lane LOS	A	A	A									
Approach Delay (s)	8.8	0.0	3.4	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			18.8%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
10: Base Line Street & Del Rosa Drive

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1600	1700	1800	1900	1700	1800	1900	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
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	0.98		1.00	0.98		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)	1583	3323		1583	3300		1583	3290		1583	1765	1500
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1583	3323		1583	3300		1583	3290		1583	1765	1500
Volume (vph)	139	518	33	25	360	43	22	259	37	55	216	92
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.91	0.91	0.91	0.81	0.81	0.81
Adj. Flow (vph)	154	576	37	30	439	52	24	285	41	68	267	114
RTOR Reduction (vph)	0	4	0	0	9	0	0	14	0	0	0	83
Lane Group Flow (vph)	154	609	0	30	482	0	24	312	0	68	267	31
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	14.8	44.7		4.6	34.5		3.3	16.8		7.9	21.4	21.4
Effective Green, g (s)	15.8	47.7		5.6	37.5		4.3	19.8		8.9	24.4	24.4
Actuated g/C Ratio	0.18	0.53		0.06	0.42		0.05	0.22		0.10	0.27	0.27
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	278	1761		98	1375		76	724		157	479	407
v/s Ratio Prot	c0.10	0.18		0.02	c0.15		0.02	0.09		c0.04	c0.15	
v/s Ratio Perm												0.02
v/c Ratio	0.55	0.35		0.31	0.35		0.32	0.43		0.43	0.56	0.08
Uniform Delay, d1	33.9	12.2		40.3	17.9		41.4	30.2		38.2	28.2	24.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.4	0.5		1.8	0.7		2.4	0.4		1.9	1.4	0.1
Delay (s)	36.3	12.7		42.1	18.6		43.8	30.7		40.1	29.6	24.5
Level of Service	D	B		D	B		D	C		D	C	C
Approach Delay (s)		17.4			20.0			31.6			29.9	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM Average Control Delay			23.1	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.44									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)				6.0				
Intersection Capacity Utilization			50.9%	ICU Level of Service				A				
Analysis Period (min)			15									
c Critical Lane Group												

**APPENDIX C:
OPENING YEAR (2013) LOS RESULTS**

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1900	1700	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1583	3319		1583	3296		1583	3256		1583	3260	
Flt Permitted	0.31	1.00		0.40	1.00		0.29	1.00		0.54	1.00	
Satd. Flow (perm)	511	3319		660	3296		476	3256		899	3260	
Volume (vph)	39	501	36	29	582	75	16	147	35	60	331	75
Peak-hour factor, PHF	0.92	0.92	0.92	0.85	0.85	0.85	0.82	0.82	0.82	0.87	0.87	0.87
Adj. Flow (vph)	42	545	39	34	685	88	20	179	43	69	380	86
RTOR Reduction (vph)	0	5	0	0	9	0	0	30	0	0	28	0
Lane Group Flow (vph)	42	579	0	34	764	0	20	192	0	69	438	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	50.5	46.5		50.1	46.3		15.7	15.7		15.7	15.7	
Effective Green, g (s)	55.5	49.5		55.1	49.3		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.69	0.62		0.69	0.62		0.23	0.23		0.23	0.23	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	435	2054		521	2031		111	761		210	762	
v/s Ratio Prot	c0.01	0.17		0.00	c0.23			0.06			c0.13	
v/s Ratio Perm	0.06			0.04			0.04			0.08		
v/c Ratio	0.10	0.28		0.07	0.38		0.18	0.25		0.33	0.57	
Uniform Delay, d1	4.2	7.0		4.1	7.7		24.5	25.0		25.4	27.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3		0.1	0.5		0.8	0.2		0.9	1.1	
Delay (s)	4.3	7.4		4.1	8.2		25.3	25.1		26.4	28.2	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		7.2			8.0			25.1			27.9	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM Average Control Delay			14.5			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			57.5%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Highland Avenue & Waterman Avenue

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1900	1700	1800	1800	1700	1800	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1583	3353	1500	1583	3315		1583	3353	1500	1583	3332	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1583	3353	1500	1583	3315		1583	3353	1500	1583	3332	
Volume (vph)	57	312	163	101	352	29	86	343	70	104	668	29
Peak-hour factor, PHF	0.95	0.95	0.95	0.91	0.91	0.91	0.96	0.96	0.96	0.95	0.95	0.95
Adj. Flow (vph)	60	328	172	111	387	32	90	357	73	109	703	31
RTOR Reduction (vph)	0	0	105	0	6	0	0	0	52	0	4	0
Lane Group Flow (vph)	60	328	67	111	413	0	90	357	21	109	731	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	7.7	32.1	32.1	9.1	33.5		8.8	23.4	23.4	9.4	24.0	
Effective Green, g (s)	8.7	35.1	35.1	10.1	36.5		9.8	26.4	26.4	10.4	27.0	
Actuated g/C Ratio	0.10	0.39	0.39	0.11	0.41		0.11	0.29	0.29	0.12	0.30	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	153	1308	585	178	1344		172	984	440	183	1000	
v/s Ratio Prot	0.04	0.10		c0.07	c0.12		0.06	0.11		c0.07	c0.22	
v/s Ratio Perm			0.04						0.01			
v/c Ratio	0.39	0.25	0.11	0.62	0.31		0.52	0.36	0.05	0.60	0.73	
Uniform Delay, d1	38.2	18.6	17.5	38.1	18.2		37.9	25.1	22.8	37.8	28.2	
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	1.7	0.5	0.4	6.6	0.6		2.9	0.2	0.0	5.1	2.8	
Delay (s)	39.8	19.0	17.9	44.8	18.8		40.7	25.4	22.8	42.9	31.0	
Level of Service	D	B	B	D	B		D	C	C	D	C	
Approach Delay (s)		20.9			24.2			27.7			32.6	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			27.1			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			54.5%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 3: Base Line Street & Waterman Avenue

6/13/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1583	3254		1583	3298		1583	3353	1500	1583	3353	1500
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)	1583	3254		1583	3298		1583	3353	1500	1583	3353	1500
Volume (vph)	92	353	86	143	436	54	56	349	99	47	664	87
Peak-hour factor, PHF	0.98	0.98	0.98	0.83	0.83	0.83	0.80	0.80	0.80	0.88	0.88	0.88
Adj. Flow (vph)	94	360	88	172	525	65	70	436	124	53	755	99
RTOR Reduction (vph)	0	23	0	0	10	0	0	0	51	0	0	38
Lane Group Flow (vph)	94	425	0	172	580	0	70	436	73	53	755	61
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	10.0	21.2		10.9	22.1		5.6	41.7	52.6	6.2	42.3	52.3
Effective Green, g (s)	13.0	24.2		13.9	25.1		8.6	44.7	58.6	9.2	45.3	58.3
Actuated g/C Ratio	0.13	0.24		0.14	0.25		0.09	0.45	0.59	0.09	0.45	0.58
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	206	787		220	828		136	1499	909	146	1519	905
v/s Ratio Prot	0.06	c0.13		c0.11	c0.18		c0.04	0.13	0.01	0.03	c0.23	0.01
v/s Ratio Perm									0.04			0.03
v/c Ratio	0.46	0.54		0.78	0.70		0.51	0.29	0.08	0.36	0.50	0.07
Uniform Delay, d1	40.2	33.0		41.6	34.0		43.7	17.6	9.0	42.6	19.3	9.0
Progression Factor	1.00	1.00		1.04	0.93		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.7		16.0	2.5		3.3	0.5	0.0	1.5	1.2	0.0
Delay (s)	41.8	33.8		59.3	34.3		47.0	18.1	9.0	44.2	20.5	9.1
Level of Service	D	C		E	C		D	B	A	D	C	A
Approach Delay (s)		35.2			39.9			19.5			20.6	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM Average Control Delay			28.3	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			100.0	Sum of lost time (s)				6.0				
Intersection Capacity Utilization			58.9%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
4: Driveway & Waterman Avenue

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	1	0	3	40	0	25	5	573	23	30	844	4
Peak Hour Factor	0.50	0.50	0.50	0.67	0.67	0.67	0.92	0.92	0.92	0.81	0.81	0.81
Hourly flow rate (vph)	2	0	6	60	0	37	5	623	25	37	1042	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (ft)											526	
pX, platoon unblocked	0.83	0.83	0.83	0.83	0.83		0.83					
vC, conflicting volume	1478	1777	523	1247	1767	324	1047			648		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	1368	1730	211	1088	1718	324	846			648		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	99	55	100	94	99			96		
cM capacity (veh/h)	79	69	655	134	70	672	772			869		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	8	97	5	415	233	37	695	352				
Volume Left	2	60	5	0	0	37	0	0				
Volume Right	6	37	0	0	25	0	0	5				
cSH	233	193	772	1700	1700	869	1700	1700				
Volume to Capacity	0.03	0.50	0.01	0.24	0.14	0.04	0.41	0.21				
Queue Length 95th (ft)	3	62	1	0	0	3	0	0				
Control Delay (s)	21.0	41.0	9.7	0.0	0.0	9.3	0.0	0.0				
Lane LOS	C	E	A			A						
Approach Delay (s)	21.0	41.0	0.1			0.3						
Approach LOS	C	E										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			39.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	3	6	21	1	13	5	471	18	23	927	4
Peak Hour Factor	0.46	0.46	0.46	0.83	0.83	0.83	0.87	0.87	0.87	0.82	0.82	0.82
Hourly flow rate (vph)	4	7	13	25	1	16	6	541	21	28	1130	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)											1013	
pX, platoon unblocked	0.87	0.87	0.87	0.87	0.87		0.87					
vC, conflicting volume	1487	1763	568	1201	1755	281	1135			562		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	1412	1728	357	1083	1719	281	1008			562		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	91	98	81	98	98	99			97		
cM capacity (veh/h)	80	73	557	132	74	716	754			893		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	24	42	6	361	201	28	754	382
Volume Left	4	25	6	0	0	28	0	0
Volume Right	13	16	0	0	21	0	0	5
cSH	144	184	754	1700	1700	893	1700	1700
Volume to Capacity	0.17	0.23	0.01	0.21	0.12	0.03	0.44	0.22
Queue Length 95th (ft)	14	21	1	0	0	2	0	0
Control Delay (s)	35.0	30.3	9.8	0.0	0.0	9.2	0.0	0.0
Lane LOS	E	D	A			A		
Approach Delay (s)	35.0	30.3	0.1			0.2		
Approach LOS	E	D						

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗	↗	↖	↗	↗
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1800	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		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)	1583	3118		1583	3353	1500	1583	3353	1500	1583	3353	1500
Flt Permitted	0.37	1.00		0.48	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	615	3118		796	3353	1500	1583	3353	1500	1583	3353	1500
Volume (vph)	83	136	119	72	323	30	75	555	51	20	787	101
Peak-hour factor, PHF	0.84	0.84	0.84	0.79	0.79	0.79	0.88	0.88	0.88	0.82	0.82	0.82
Adj. Flow (vph)	99	162	142	91	409	38	85	631	58	24	960	123
RTOR Reduction (vph)	0	105	0	0	0	22	0	0	23	0	0	44
Lane Group Flow (vph)	99	199	0	91	409	16	85	631	35	24	960	79
Turn Type	pm+pt			pm+pt		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)	20.1	14.0		19.9	13.9	13.9	8.3	26.2	26.2	2.6	20.5	20.5
Effective Green, g (s)	24.1	17.0		23.9	16.9	16.9	9.3	30.2	30.2	3.6	24.5	24.5
Actuated g/C Ratio	0.37	0.26		0.36	0.26	0.26	0.14	0.46	0.46	0.05	0.37	0.37
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	330	806		373	861	385	224	1539	688	87	1248	559
v/s Ratio Prot	c0.03	0.06		0.03	c0.12		0.05	c0.19		0.02	c0.29	
v/s Ratio Perm	0.08			0.06		0.01			0.02			0.05
v/c Ratio	0.30	0.25		0.24	0.48	0.04	0.38	0.41	0.05	0.28	0.77	0.14
Uniform Delay, d1	14.3	19.3		14.2	20.7	18.4	25.6	11.9	9.9	29.8	18.2	13.7
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	0.5	0.2		0.3	0.4	0.0	1.1	0.2	0.0	1.7	2.9	0.1
Delay (s)	14.8	19.5		14.6	21.1	18.4	26.7	12.0	9.9	31.6	21.1	13.8
Level of Service	B	B		B	C	B	C	B	A	C	C	B
Approach Delay (s)		18.3			19.8			13.5			20.5	
Approach LOS		B			B			B			C	

Intersection Summary

HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	65.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕			↕	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1900	1800	1900	1900	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.92			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1583	3341		1583	3337			1601			1612	
Flt Permitted	0.34	1.00		0.47	1.00			0.92			0.87	
Satd. Flow (perm)	559	3341		784	3337			1495			1425	
Volume (vph)	33	436	11	16	595	19	10	3	18	24	4	27
Peak-hour factor, PHF	0.90	0.90	0.90	0.77	0.77	0.77	0.60	0.60	0.60	0.68	0.68	0.68
Adj. Flow (vph)	37	484	12	21	773	25	17	5	30	35	6	40
RTOR Reduction (vph)	0	2	0	0	3	0	0	25	0	0	34	0
Lane Group Flow (vph)	37	494	0	21	795	0	0	27	0	0	47	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	35.1	35.1		35.1	35.1			5.9			5.9	
Effective Green, g (s)	38.1	38.1		38.1	38.1			7.9			7.9	
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.16			0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	426	2546		597	2543			236			225	
v/s Ratio Prot	0.15		c0.24		c0.24		0.02		0.02		c0.03	
v/s Ratio Perm	0.07		0.03		0.03		0.02		0.02		c0.03	
v/c Ratio	0.09	0.19		0.04	0.31			0.11			0.21	
Uniform Delay, d1	1.5	1.7		1.5	1.9			18.0			18.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.2		0.0	0.1			0.2			0.5	
Delay (s)	1.9	1.8		1.5	2.0			18.2			18.8	
Level of Service	A		A		A		B		B		B	
Approach Delay (s)	1.8		1.9		1.9		18.2		18.2		18.8	
Approach LOS	A		A		A		B		B		B	

Intersection Summary

HCM Average Control Delay	3.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

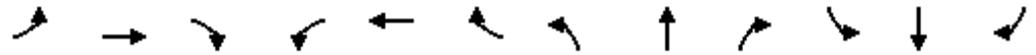
HCM Unsignalized Intersection Capacity Analysis
 8: Base Line Street & La Junita Street

6/6/2011

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑↑		↙	↑↑	↖		
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	463	18	20	623	11	14	
Peak Hour Factor	0.83	0.83	0.76	0.76	0.64	0.64	
Hourly flow rate (vph)	558	22	26	820	17	22	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (ft)	270						
pX, platoon unblocked							
vC, conflicting volume			580		1031	290	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			580		1031	290	
tC, single (s)			4.1		6.8	6.9	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			97		92	97	
cM capacity (veh/h)			990		223	707	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	
Volume Total	372	208	26	410	410	39	
Volume Left	0	0	26	0	0	17	
Volume Right	0	22	0	0	0	22	
cSH	1700	1700	990	1700	1700	361	
Volume to Capacity	0.22	0.12	0.03	0.24	0.24	0.11	
Queue Length 95th (ft)	0	0	2	0	0	9	
Control Delay (s)	0.0	0.0	8.7	0.0	0.0	16.2	
Lane LOS	A			C			
Approach Delay (s)	0.0		0.3		16.2		
Approach LOS						C	
Intersection Summary							
Average Delay			0.6				
Intersection Capacity Utilization			27.2%		ICU Level of Service		A
Analysis Period (min)	15						

HCM Unsignalized Intersection Capacity Analysis
 9: Driveway & La Junita Street

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	0	30	0	0	0	11	25	0	0	23	2
Peak Hour Factor	0.65	0.92	0.65	0.92	0.92	0.92	0.71	0.71	0.92	0.92	0.67	0.67
Hourly flow rate (vph)	5	0	46	0	0	0	15	35	0	0	34	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	102	102	36	148	104	35	37			35		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	102	102	36	148	104	35	37			35		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	96	100	100	100	99			100		
cM capacity (veh/h)	872	780	1037	778	779	1038	1573			1576		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	51	0	51	37
Volume Left	5	0	15	0
Volume Right	46	0	0	3
cSH	1019	1700	1573	1576
Volume to Capacity	0.05	0.00	0.01	0.00
Queue Length 95th (ft)	4	0	1	0
Control Delay (s)	8.7	0.0	2.3	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.7	0.0	2.3	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay		4.0	
Intersection Capacity Utilization	18.6%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
 10: Base Line Street & Del Rosa Drive

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Ideal Flow (vphpl)	1700	1800	1600	1700	1800	1900	1700	1800	1900	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.98		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)	1583	3215		1583	3328		1583	3276		1583	1765	1500
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1583	3215		1583	3328		1583	3276		1583	1765	1500
Volume (vph)	53	261	99	67	488	25	55	184	33	33	367	155
Peak-hour factor, PHF	0.75	0.75	0.75	0.87	0.87	0.87	0.74	0.74	0.74	0.84	0.84	0.84
Adj. Flow (vph)	71	348	132	77	561	29	74	249	45	39	437	185
RTOR Reduction (vph)	0	40	0	0	4	0	0	15	0	0	0	82
Lane Group Flow (vph)	71	440	0	77	586	0	74	279	0	39	437	103
Turn Type	Prot		Prot			Prot			Prot		Perm	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	7.9	32.0		7.9	32.0		8.1	28.8		5.3	26.0	26.0
Effective Green, g (s)	8.9	35.0		8.9	35.0		9.1	31.8		6.3	29.0	29.0
Actuated g/C Ratio	0.10	0.39		0.10	0.39		0.10	0.35		0.07	0.32	0.32
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	157	1250		157	1294		160	1158		111	569	483
v/s Ratio Prot	0.04	c0.14		c0.05	c0.18		c0.05	0.09		0.02	c0.25	
v/s Ratio Perm												0.07
v/c Ratio	0.45	0.35		0.49	0.45		0.46	0.24		0.35	0.77	0.21
Uniform Delay, d1	38.3	19.5		38.4	20.4		38.1	20.6		39.9	27.5	22.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.1	0.8		2.4	1.1		2.1	0.1		1.9	6.2	0.2
Delay (s)	40.3	20.3		40.8	21.5		40.3	20.7		41.8	33.6	22.4
Level of Service	D	C		D	C		D	C		D	C	C
Approach Delay (s)		22.8			23.8			24.6			31.0	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			25.8	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)				6.0				
Intersection Capacity Utilization			57.1%	ICU Level of Service				B				
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↕		↰	↕		↰	↕		↰	↕	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1900	1700	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1583	3329		1583	3317		1583	3262		1583	3248	
Flt Permitted	0.29	1.00		0.36	1.00		0.46	1.00		0.28	1.00	
Satd. Flow (perm)	491	3329		593	3317		763	3262		461	3248	
Volume (vph)	54	600	29	36	720	56	73	368	81	63	217	57
Peak-hour factor, PHF	0.95	0.95	0.95	0.98	0.98	0.98	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	57	632	31	37	735	57	80	404	89	69	238	63
RTOR Reduction (vph)	0	3	0	0	6	0	0	27	0	0	34	0
Lane Group Flow (vph)	57	660	0	37	786	0	80	466	0	69	267	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	49.6	45.4		49.0	45.1		16.7	16.7		16.7	16.7	
Effective Green, g (s)	54.6	48.4		54.0	48.1		19.7	19.7		19.7	19.7	
Actuated g/C Ratio	0.68	0.60		0.68	0.60		0.25	0.25		0.25	0.25	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	420	2014		473	1994		188	803		114	800	
v/s Ratio Prot	c0.01	0.20		0.01	c0.24			0.14			0.08	
v/s Ratio Perm	0.08			0.05			0.10			c0.15		
v/c Ratio	0.14	0.33		0.08	0.39		0.43	0.58		0.61	0.33	
Uniform Delay, d1	4.6	7.8		4.5	8.3		25.4	26.5		26.7	24.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.1	0.6		1.6	1.1		8.8	0.2	
Delay (s)	4.8	8.2		4.6	8.9		26.9	27.6		35.5	25.0	
Level of Service	A	A		A	A		C	C		D	C	
Approach Delay (s)		7.9			8.7			27.5			27.0	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	15.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Highland Avenue & Waterman Avenue

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1900	1700	1800	1800	1700	1800	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1583	3353	1500	1583	3272		1583	3353	1500	1583	3314	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1583	3353	1500	1583	3272		1583	3353	1500	1583	3314	
Volume (vph)	93	516	132	104	535	102	175	643	169	124	367	31
Peak-hour factor, PHF	0.93	0.93	0.93	0.94	0.94	0.94	0.96	0.96	0.96	0.93	0.93	0.93
Adj. Flow (vph)	100	555	142	111	569	109	182	670	176	133	395	33
RTOR Reduction (vph)	0	0	89	0	16	0	0	0	101	0	7	0
Lane Group Flow (vph)	100	555	53	111	662	0	182	670	75	133	421	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	9.3	30.6	30.6	10.4	31.7		13.4	21.8	21.8	11.2	19.6	
Effective Green, g (s)	10.3	33.6	33.6	11.4	34.7		14.4	24.8	24.8	12.2	22.6	
Actuated g/C Ratio	0.11	0.37	0.37	0.13	0.39		0.16	0.28	0.28	0.14	0.25	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	181	1252	560	201	1262		253	924	413	215	832	
v/s Ratio Prot	0.06	0.17		c0.07	c0.20		c0.11	c0.20		0.08	0.13	
v/s Ratio Perm			0.04						0.05			
v/c Ratio	0.55	0.44	0.09	0.55	0.52		0.72	0.73	0.18	0.62	0.51	
Uniform Delay, d1	37.7	21.2	18.3	36.9	21.3		35.9	29.5	24.9	36.7	28.9	
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	3.6	1.1	0.3	3.3	1.6		9.4	2.9	0.2	5.2	0.5	
Delay (s)	41.3	22.3	18.7	40.2	22.9		45.3	32.4	25.1	41.9	29.4	
Level of Service	D	C	B	D	C		D	C	C	D	C	
Approach Delay (s)		24.0			25.3			33.4			32.4	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			28.9			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			64.6%			ICU Level of Service			C			
Analysis Period (min)			15									
c	Critical Lane Group											

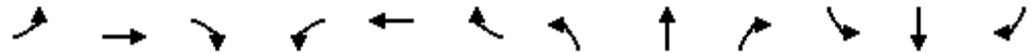
HCM Signalized Intersection Capacity Analysis
 3: Base Line Street & Waterman Avenue

6/13/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1583	3253		1583	3280		1583	3353	1500	1583	3353	1500
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)	1583	3253		1583	3280		1583	3353	1500	1583	3353	1500
Volume (vph)	90	441	110	126	437	74	127	612	151	58	568	110
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.87	0.87	0.87	0.88	0.88	0.88
Adj. Flow (vph)	100	490	122	154	533	90	146	703	174	66	645	125
RTOR Reduction (vph)	0	23	0	0	15	0	0	0	44	0	0	60
Lane Group Flow (vph)	100	589	0	154	608	0	146	703	130	66	645	65
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	10.9	23.7		9.9	22.7		11.4	40.8	50.7	5.6	35.0	45.9
Effective Green, g (s)	13.9	26.7		12.9	25.7		14.4	43.8	56.7	8.6	38.0	51.9
Actuated g/C Ratio	0.14	0.27		0.13	0.26		0.14	0.44	0.57	0.09	0.38	0.52
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	220	869		204	843		228	1469	851	136	1274	779
v/s Ratio Prot	0.06	c0.18		c0.10	c0.19		c0.09	c0.21	0.02	0.04	c0.19	0.01
v/s Ratio Perm									0.07			0.03
v/c Ratio	0.45	0.68		0.75	0.72		0.64	0.48	0.15	0.49	0.51	0.08
Uniform Delay, d1	39.6	32.8		42.0	33.9		40.4	20.0	10.3	43.6	23.8	12.1
Progression Factor	1.00	1.00		1.04	0.94		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	2.1		14.5	3.0		6.0	1.1	0.1	2.7	1.4	0.0
Delay (s)	41.1	34.9		58.3	34.7		46.4	21.1	10.3	46.3	25.2	12.1
Level of Service	D	C		E	C		D	C	B	D	C	B
Approach Delay (s)		35.8			39.4			22.9			24.9	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM Average Control Delay			30.0	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			100.0	Sum of lost time (s)				4.0				
Intersection Capacity Utilization			62.1%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 4: Orange Street Driveway & Waterman Avenue

6/6/2011



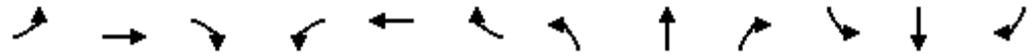
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	0	12	27	1	32	21	1043	30	32	963	21
Peak Hour Factor	0.44	0.44	0.44	0.78	0.78	0.78	0.89	0.89	0.89	0.94	0.94	0.94
Hourly flow rate (vph)	11	0	27	35	1	41	24	1172	34	34	1024	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)											526	
pX, platoon unblocked	0.86	0.86	0.86	0.86	0.86		0.86					
vC, conflicting volume	1779	2357	523	1844	2351	603	1047			1206		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	1741	2417	275	1817	2410	603	886			1206		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	71	100	96	8	95	91	97			95		
cM capacity (veh/h)	39	25	618	38	26	442	772			747		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	39	77	24	781	424	34	683	364
Volume Left	11	35	24	0	0	34	0	0
Volume Right	27	41	0	0	34	0	0	22
cSH	115	72	772	1700	1700	747	1700	1700
Volume to Capacity	0.33	1.07	0.03	0.46	0.25	0.05	0.40	0.21
Queue Length 95th (ft)	33	142	2	0	0	4	0	0
Control Delay (s)	51.1	224.8	9.8	0.0	0.0	10.1	0.0	0.0
Lane LOS	F	F	A			B		
Approach Delay (s)	51.1	224.8	0.2			0.3		
Approach LOS	F	F						

Intersection Summary		
Average Delay		8.2
Intersection Capacity Utilization	42.1%	ICU Level of Service A
Analysis Period (min)		15

HCM Unsignalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	1	12	10	2	19	22	1092	33	31	902	11
Peak Hour Factor	0.59	0.59	0.59	0.81	0.81	0.81	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	2	20	12	2	23	23	1149	35	33	949	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)											1013	
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	1666	2251	481	1774	2239	592	961			1184		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	1647	2266	391	1761	2254	592	900			1184		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	77	95	96	72	93	95	97			96		
cM capacity (veh/h)	52	35	574	44	36	449	792			750		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	34	38	23	766	418	33	633	328
Volume Left	12	12	23	0	0	33	0	0
Volume Right	20	23	0	0	35	0	0	12
cSH	109	96	792	1700	1700	750	1700	1700
Volume to Capacity	0.31	0.40	0.03	0.45	0.25	0.04	0.37	0.19
Queue Length 95th (ft)	30	41	2	0	0	3	0	0
Control Delay (s)	52.0	65.4	9.7	0.0	0.0	10.0	0.0	0.0
Lane LOS	F	F	A			B		
Approach Delay (s)	52.0	65.4	0.2			0.3		
Approach LOS	F	F						

Intersection Summary		
Average Delay		2.1
Intersection Capacity Utilization	41.2%	ICU Level of Service A
Analysis Period (min)		15

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

6/6/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1800	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		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)	1583	3235		1583	3353	1500	1583	3353	1500	1583	3353	1500
Flt Permitted	0.58	1.00		0.20	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	971	3235		327	3353	1500	1583	3353	1500	1583	3353	1500
Volume (vph)	102	445	137	63	156	49	90	1029	103	41	824	94
Peak-hour factor, PHF	0.85	0.85	0.85	0.79	0.79	0.79	0.91	0.91	0.91	0.98	0.98	0.98
Adj. Flow (vph)	120	524	161	80	197	62	99	1131	113	42	841	96
RTOR Reduction (vph)	0	35	0	0	0	44	0	0	27	0	0	40
Lane Group Flow (vph)	120	650	0	80	197	18	99	1131	86	42	841	56
Turn Type	pm+pt			pm+pt		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)	24.4	17.8		23.6	17.4	17.4	8.6	25.7	25.7	4.6	21.7	21.7
Effective Green, g (s)	28.4	20.8		27.6	20.4	20.4	9.6	29.7	29.7	5.6	25.7	25.7
Actuated g/C Ratio	0.40	0.29		0.39	0.29	0.29	0.13	0.42	0.42	0.08	0.36	0.36
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	452	944		253	959	429	213	1397	625	124	1209	541
v/s Ratio Prot	c0.03	c0.20		c0.03	0.06		0.06	c0.34		0.03	c0.25	
v/s Ratio Perm	0.08			0.09		0.01			0.06			0.04
v/c Ratio	0.27	0.69		0.32	0.21	0.04	0.46	0.81	0.14	0.34	0.70	0.10
Uniform Delay, d1	14.0	22.4		14.9	19.3	18.4	28.5	18.3	12.9	31.1	19.5	15.2
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	0.3	2.1		0.7	0.1	0.0	1.6	3.6	0.1	1.6	1.8	0.1
Delay (s)	14.3	24.5		15.7	19.4	18.4	30.1	21.9	13.0	32.7	21.2	15.2
Level of Service	B	C		B	B	B	C	C	B	C	C	B
Approach Delay (s)		23.0			18.3			21.7			21.1	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM Average Control Delay			21.5				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			71.3				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			68.2%				ICU Level of Service				C	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

6/6/2011



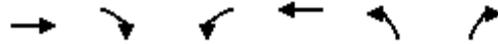
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕			↕			↕	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1900	1800	1900	1900	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.93			0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	
Satd. Flow (prot)	1583	3343		1583	3336			1619			1628	
Flt Permitted	0.39	1.00		0.36	1.00			0.94			0.84	
Satd. Flow (perm)	656	3343		600	3336			1541			1399	
Volume (vph)	51	675	13	7	587	20	3	4	8	51	5	34
Peak-hour factor, PHF	0.94	0.94	0.94	0.93	0.93	0.93	0.63	0.63	0.63	0.92	0.92	0.92
Adj. Flow (vph)	54	718	14	8	631	22	5	6	13	55	5	37
RTOR Reduction (vph)	0	1	0	0	3	0	0	11	0	0	31	0
Lane Group Flow (vph)	54	731	0	8	650	0	0	13	0	0	66	0
Turn Type	Perm		Perm		Perm		Perm		Perm			
Protected Phases	2		6		6		8		4			
Permitted Phases	2		6		8		4					
Actuated Green, G (s)	34.6	34.6		34.6	34.6			6.4			6.4	
Effective Green, g (s)	37.6	37.6		37.6	37.6			8.4			8.4	
Actuated g/C Ratio	0.75	0.75		0.75	0.75			0.17			0.17	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	493	2514		451	2509			259			235	
v/s Ratio Prot	c0.22		0.19									
v/s Ratio Perm	0.08			0.01				0.01			c0.05	
v/c Ratio	0.11	0.29		0.02	0.26			0.05			0.28	
Uniform Delay, d1	1.7	2.0		1.6	1.9			17.5			18.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.3		0.0	0.1			0.1			0.7	
Delay (s)	2.1	2.3		1.6	2.0			17.5			18.8	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)	2.3		2.0		17.5		18.8					
Approach LOS	A		A		B		B					

Intersection Summary

HCM Average Control Delay	3.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 8: Base Line Street & La Junita Street

6/6/2011



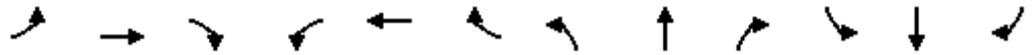
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	710	13	10	642	17	18
Peak Hour Factor	0.90	0.90	0.94	0.94	0.75	0.75
Hourly flow rate (vph)	789	14	11	683	23	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)	270					
pX, platoon unblocked			0.96		0.96	0.96
vC, conflicting volume			803		1159	402
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			756		1126	339
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		88	96
cM capacity (veh/h)			818		189	632

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	526	277	11	341	341	47
Volume Left	0	0	11	0	0	23
Volume Right	0	14	0	0	0	24
cSH	1700	1700	818	1700	1700	295
Volume to Capacity	0.31	0.16	0.01	0.20	0.20	0.16
Queue Length 95th (ft)	0	0	1	0	0	14
Control Delay (s)	0.0	0.0	9.5	0.0	0.0	19.5
Lane LOS			A			C
Approach Delay (s)	0.0		0.1			19.5
Approach LOS						C

Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			30.0%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 9: Orange Street Driveway & La Junita Street

6/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	0	10	0	0	0	19	23	0	0	27	3
Peak Hour Factor	0.54	0.92	0.54	0.92	0.92	0.92	0.77	0.77	0.92	0.92	0.78	0.78
Hourly flow rate (vph)	7	0	19	0	0	0	25	30	0	0	35	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	116	116	37	134	118	30	38			30		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	116	116	37	134	118	30	38			30		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	98	100	100	100	98			100		
cM capacity (veh/h)	851	762	1036	812	760	1045	1572			1583		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	26	0	55	38
Volume Left	7	0	25	0
Volume Right	19	0	0	4
cSH	975	1700	1572	1583
Volume to Capacity	0.03	0.00	0.02	0.00
Queue Length 95th (ft)	2	0	1	0
Control Delay (s)	8.8	0.0	3.4	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.8	0.0	3.4	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
 10: Base Line Street & Del Rosa Drive

6/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Ideal Flow (vphpl)	1700	1800	1600	1700	1800	1900	1700	1800	1900	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
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	0.98		1.00	0.98		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)	1583	3323		1583	3299		1583	3290		1583	1765	1500
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1583	3323		1583	3299		1583	3290		1583	1765	1500
Volume (vph)	147	550	35	27	382	46	23	275	39	58	229	98
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.91	0.91	0.91	0.81	0.81	0.81
Adj. Flow (vph)	163	611	39	33	466	56	25	302	43	72	283	121
RTOR Reduction (vph)	0	4	0	0	9	0	0	14	0	0	0	88
Lane Group Flow (vph)	163	646	0	33	513	0	25	331	0	72	283	33
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	14.9	44.1		4.7	33.9		3.3	17.2		8.0	21.9	21.9
Effective Green, g (s)	15.9	47.1		5.7	36.9		4.3	20.2		9.0	24.9	24.9
Actuated g/C Ratio	0.18	0.52		0.06	0.41		0.05	0.22		0.10	0.28	0.28
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	280	1739		100	1353		76	738		158	488	415
v/s Ratio Prot	c0.10	0.19		0.02	c0.16		0.02	0.10		c0.05	c0.16	
v/s Ratio Perm												0.02
v/c Ratio	0.58	0.37		0.33	0.38		0.33	0.45		0.46	0.58	0.08
Uniform Delay, d1	34.0	12.7		40.3	18.5		41.5	30.1		38.2	28.0	24.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.1	0.6		1.9	0.8		2.5	0.4		2.1	1.7	0.1
Delay (s)	37.1	13.3		42.3	19.4		44.0	30.5		40.3	29.7	24.2
Level of Service	D	B		D	B		D	C		D	C	C
Approach Delay (s)		18.1			20.7			31.4			29.9	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM Average Control Delay			23.5			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				6.0		
Intersection Capacity Utilization			52.9%			ICU Level of Service				A		
Analysis Period (min)			15									
c	Critical Lane Group											

**APPENDIX D:
OPENING YEAR (2013) PLUS PROJECT LOS RESULTS**

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1900	1700	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1583	3320		1583	3294		1583	3247		1583	3260	
Flt Permitted	0.29	1.00		0.38	1.00		0.29	1.00		0.53	1.00	
Satd. Flow (perm)	487	3320		641	3294		476	3247		889	3260	
Volume (vph)	39	519	36	35	610	81	16	147	39	64	331	75
Peak-hour factor, PHF	0.92	0.92	0.92	0.85	0.85	0.85	0.82	0.82	0.82	0.87	0.87	0.87
Adj. Flow (vph)	42	564	39	41	718	95	20	179	48	74	380	86
RTOR Reduction (vph)	0	5	0	0	9	0	0	35	0	0	28	0
Lane Group Flow (vph)	42	598	0	41	804	0	20	192	0	74	438	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	50.3	46.3		50.3	46.3		15.7	15.7		15.7	15.7	
Effective Green, g (s)	55.3	49.3		55.3	49.3		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.69	0.62		0.69	0.62		0.23	0.23		0.23	0.23	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	419	2046		514	2030		111	759		208	762	
v/s Ratio Prot	c0.01	0.18		0.01	c0.24			0.06			c0.13	
v/s Ratio Perm	0.06			0.05			0.04			0.08		
v/c Ratio	0.10	0.29		0.08	0.40		0.18	0.25		0.36	0.57	
Uniform Delay, d1	4.3	7.2		4.1	7.8		24.5	25.0		25.6	27.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.1	0.6		0.8	0.2		1.0	1.1	
Delay (s)	4.4	7.5		4.1	8.4		25.3	25.1		26.7	28.2	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		7.3			8.2			25.1			28.0	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM Average Control Delay			14.4				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			80.0				Sum of lost time (s)				6.0	
Intersection Capacity Utilization			58.5%				ICU Level of Service				B	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Highland Avenue & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1900	1700	1800	1800	1700	1800	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1583	3353	1500	1583	3315		1583	3353	1500	1583	3332	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1583	3353	1500	1583	3315		1583	3353	1500	1583	3332	
Volume (vph)	57	312	167	105	352	29	92	355	76	104	675	29
Peak-hour factor, PHF	0.95	0.95	0.95	0.91	0.91	0.91	0.96	0.96	0.96	0.95	0.95	0.95
Adj. Flow (vph)	60	328	176	115	387	32	96	370	79	109	711	31
RTOR Reduction (vph)	0	0	109	0	6	0	0	0	55	0	3	0
Lane Group Flow (vph)	60	328	67	115	413	0	96	370	24	109	739	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	8.1	31.4	31.4	9.3	32.6		9.0	23.9	23.9	9.4	24.3	
Effective Green, g (s)	9.1	34.4	34.4	10.3	35.6		10.0	26.9	26.9	10.4	27.3	
Actuated g/C Ratio	0.10	0.38	0.38	0.11	0.40		0.11	0.30	0.30	0.12	0.30	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	160	1282	573	181	1311		176	1002	448	183	1011	
v/s Ratio Prot	0.04	0.10		c0.07	c0.12		0.06	0.11		c0.07	c0.22	
v/s Ratio Perm			0.04						0.02			
v/c Ratio	0.38	0.26	0.12	0.64	0.31		0.55	0.37	0.05	0.60	0.73	
Uniform Delay, d1	37.8	19.0	18.0	38.1	18.8		37.8	24.9	22.5	37.8	28.1	
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	1.5	0.5	0.4	7.1	0.6		3.4	0.2	0.0	5.1	2.7	
Delay (s)	39.3	19.5	18.4	45.2	19.4		41.3	25.1	22.5	42.9	30.8	
Level of Service	D	B	B	D	B		D	C	C	D	C	
Approach Delay (s)		21.3			25.0			27.6			32.4	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			27.2			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			55.3%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 3: Base Line Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1583	3236		1583	3293		1583	3353	1500	1583	3353	1500
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)	1583	3236		1583	3293		1583	3353	1500	1583	3353	1500
Volume (vph)	92	357	108	143	442	60	90	367	99	51	675	87
Peak-hour factor, PHF	0.98	0.98	0.98	0.83	0.83	0.83	0.80	0.80	0.80	0.88	0.88	0.88
Adj. Flow (vph)	94	364	110	172	533	72	112	459	124	58	767	99
RTOR Reduction (vph)	0	31	0	0	12	0	0	0	50	0	0	40
Lane Group Flow (vph)	94	443	0	172	593	0	112	459	74	58	767	59
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	10.2	22.0		10.9	22.7		8.0	41.0	51.9	6.1	39.1	49.3
Effective Green, g (s)	13.2	25.0		13.9	25.7		11.0	44.0	57.9	9.1	42.1	55.3
Actuated g/C Ratio	0.13	0.25		0.14	0.26		0.11	0.44	0.58	0.09	0.42	0.55
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	209	809		220	846		174	1475	899	144	1412	860
v/s Ratio Prot	0.06	c0.14		c0.11	c0.18		c0.07	0.14	0.01	0.04	c0.23	0.01
v/s Ratio Perm									0.04			0.03
v/c Ratio	0.45	0.55		0.78	0.70		0.64	0.31	0.08	0.40	0.54	0.07
Uniform Delay, d1	40.0	32.6		41.6	33.7		42.6	18.2	9.3	42.9	21.7	10.4
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	1.5	0.8		16.4	2.6		7.9	0.6	0.0	1.8	1.5	0.0
Delay (s)	41.6	33.4		58.0	36.3		50.5	18.7	9.3	44.7	23.2	10.4
Level of Service	D	C		E	D		D	B	A	D	C	B
Approach Delay (s)		34.7		41.1			22.2			23.2		
Approach LOS		C		D			C			C		
Intersection Summary												
HCM Average Control Delay			29.9	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			100.0	Sum of lost time (s)				6.0				
Intersection Capacity Utilization			61.5%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 4: Driveway & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	0	3	58	0	77	5	573	34	62	844	4
Peak Hour Factor	0.50	0.50	0.50	0.67	0.67	0.67	0.92	0.92	0.92	0.81	0.81	0.81
Hourly flow rate (vph)	2	0	6	87	0	115	5	623	37	77	1042	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)								487			526	
pX, platoon unblocked	0.84	0.84	0.84	0.84	0.84	0.99	0.84			0.99		
vC, conflicting volume	1635	1868	523	1332	1852	330	1047			660		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1546	1824	236	1186	1805	321	862			653		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	99	22	100	83	99			92		
cM capacity (veh/h)	50	58	641	112	60	671	650			925		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	8	201	5	415	245	77	695	352				
Volume Left	2	87	5	0	0	77	0	0				
Volume Right	6	115	0	0	37	0	0	5				
cSH	163	213	650	1700	1700	925	1700	1700				
Volume to Capacity	0.05	0.95	0.01	0.24	0.14	0.08	0.41	0.21				
Queue Length 95th (ft)	4	200	1	0	0	7	0	0				
Control Delay (s)	28.2	95.8	10.6	0.0	0.0	9.2	0.0	0.0				
Lane LOS	D	F	B			A						
Approach Delay (s)	28.2	95.8	0.1			0.6						
Approach LOS	D	F										
Intersection Summary												
Average Delay			10.2									
Intersection Capacity Utilization		52.4%		ICU Level of Service	A							
Analysis Period (min)		15										

HCM Signalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1800	1900	1900	1800	1900	1700	1800	1900	1000	1800	1900
Total Lost time (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.93			0.96		1.00	0.99		1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1622			1640		1583	3328		931	3351	
Flt Permitted		0.96			0.82		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1570			1384		1583	3328		931	3351	
Volume (vph)	2	3	6	33	1	13	5	482	25	23	945	4
Peak-hour factor, PHF	0.46	0.46	0.46	0.83	0.83	0.83	0.87	0.87	0.87	0.82	0.82	0.82
Adj. Flow (vph)	4	7	13	40	1	16	6	554	29	28	1152	5
RTOR Reduction (vph)	0	11	0	0	13	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	13	0	0	44	0	6	580	0	28	1157	0
Turn Type	Perm		Perm			Prot		Prot				
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		8.3			8.3		0.8	43.7		3.0	45.9	
Effective Green, g (s)		11.3			11.3		3.8	46.7		6.0	48.9	
Actuated g/C Ratio		0.16			0.16		0.05	0.67		0.09	0.70	
Clearance Time (s)		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	
Lane Grp Cap (vph)		253			223		86	2220		80	2341	
v/s Ratio Prot							0.00	0.17		c0.03	c0.35	
v/s Ratio Perm		0.01			c0.03							
v/c Ratio		0.05			0.20		0.07	0.26		0.35	0.49	
Uniform Delay, d1		24.8			25.4		31.4	4.7		30.2	4.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.4		0.3	0.3		2.6	0.7	
Delay (s)		24.9			25.8		31.8	5.0		32.8	5.6	
Level of Service		C			C		C	A		C	A	
Approach Delay (s)		24.9			25.8			5.3			6.2	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM Average Control Delay			6.8				HCM Level of Service			A		
HCM Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			70.0				Sum of lost time (s)			4.0		
Intersection Capacity Utilization			49.5%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

5/31/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1800	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		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)	1583	3118		1583	3353	1500	1583	3353	1500	1583	3353	1500
Flt Permitted	0.36	1.00		0.49	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	598	3118		809	3353	1500	1583	3353	1500	1583	3353	1500
Volume (vph)	94	136	119	72	323	30	75	562	51	20	799	119
Peak-hour factor, PHF	0.84	0.84	0.84	0.79	0.79	0.79	0.88	0.88	0.88	0.82	0.82	0.82
Adj. Flow (vph)	112	162	142	91	409	38	85	639	58	24	974	145
RTOR Reduction (vph)	0	105	0	0	0	22	0	0	23	0	0	51
Lane Group Flow (vph)	112	199	0	91	409	16	85	639	35	24	974	94
Turn Type	pm+pt			pm+pt		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4		6				2
Actuated Green, G (s)	20.7	14.3		19.9	13.9	13.9	8.4	26.8	26.8	2.6	21.0	21.0
Effective Green, g (s)	24.7	17.3		23.9	16.9	16.9	9.4	30.8	30.8	3.6	25.0	25.0
Actuated g/C Ratio	0.37	0.26		0.36	0.25	0.25	0.14	0.46	0.46	0.05	0.37	0.37
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	331	809		371	850	380	223	1548	693	85	1257	562
v/s Ratio Prot	c0.04	0.06		0.03	c0.12		0.05	c0.19		0.02	c0.29	
v/s Ratio Perm	0.09			0.06		0.01			0.02			0.06
v/c Ratio	0.34	0.25		0.25	0.48	0.04	0.38	0.41	0.05	0.28	0.77	0.17
Uniform Delay, d1	14.5	19.5		14.6	21.2	18.8	26.0	11.9	9.9	30.3	18.4	13.9
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	0.6	0.2		0.3	0.4	0.0	1.1	0.2	0.0	1.8	3.1	0.1
Delay (s)	15.1	19.7		15.0	21.6	18.8	27.1	12.1	9.9	32.1	21.4	14.1
Level of Service	B	B		B	C	B	C	B	A	C	C	B
Approach Delay (s)		18.5			20.3			13.6			20.7	
Approach LOS		B			C			B			C	
Intersection Summary												
HCM Average Control Delay			18.4				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			66.7				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			56.5%				ICU Level of Service				B	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

7/16/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1900	1800	1900	1900	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.92			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1583	3336		1583	3337			1595			1612	
Flt Permitted	0.33	1.00		0.46	1.00			0.92			0.90	
Satd. Flow (perm)	555	3336		770	3337			1489			1485	
Volume (vph)	33	436	15	23	595	19	16	3	29	24	4	27
Peak-hour factor, PHF	0.90	0.90	0.90	0.77	0.77	0.77	0.60	0.60	0.60	0.68	0.68	0.68
Adj. Flow (vph)	37	484	17	30	773	25	27	5	48	35	6	40
RTOR Reduction (vph)	0	1	0	0	1	0	0	40	0	0	34	0
Lane Group Flow (vph)	37	500	0	30	797	0	0	40	0	0	47	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	55.9	55.9		55.9	55.9			10.1			10.1	
Effective Green, g (s)	58.9	58.9		58.9	58.9			12.1			12.1	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.16			0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	436	2620		605	2621			240			240	
v/s Ratio Prot	0.15		c0.24		c0.24		0.03		0.03		c0.03	
v/s Ratio Perm	0.07		0.04		0.04		0.03		0.03		c0.03	
v/c Ratio	0.08	0.19		0.05	0.30			0.17			0.20	
Uniform Delay, d1	1.9	2.0		1.8	2.3			27.1			27.2	
Progression Factor	0.82	0.83		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.2		0.0	0.1			0.2			0.4	
Delay (s)	1.9	1.8		1.8	2.4			27.3			27.7	
Level of Service	A		A		A		C		C		C	
Approach Delay (s)	1.8		2.3		2.3		27.3		27.3		27.7	
Approach LOS	A		A		A		C		C		C	
Intersection Summary												
HCM Average Control Delay	4.8		HCM Level of Service		A							
HCM Volume to Capacity ratio	0.28											
Actuated Cycle Length (s)	75.0		Sum of lost time (s)		4.0							
Intersection Capacity Utilization	42.3%		ICU Level of Service		A							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 8: Base Line Street & La Junita Street

5/31/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	474	18	27	630	11	26
Peak Hour Factor	0.83	0.83	0.76	0.76	0.64	0.64
Hourly flow rate (vph)	571	22	36	829	17	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)	270					
pX, platoon unblocked			0.99		0.99	0.99
vC, conflicting volume			593		1067	296
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			579		1058	280
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		92	94
cM capacity (veh/h)			981		210	710

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	381	212	36	414	414	58
Volume Left	0	0	36	0	0	17
Volume Right	0	22	0	0	0	41
cSH	1700	1700	981	1700	1700	416
Volume to Capacity	0.22	0.12	0.04	0.24	0.24	0.14
Queue Length 95th (ft)	0	0	3	0	0	12
Control Delay (s)	0.0	0.0	8.8	0.0	0.0	15.1
Lane LOS			A			C
Approach Delay (s)	0.0		0.4			15.1
Approach LOS						C

Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			30.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Driveway & La Junita Street

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	15	0	30	0	0	0	11	25	0	0	23	9
Peak Hour Factor	0.65	0.92	0.65	0.92	0.92	0.92	0.71	0.71	0.92	0.92	0.67	0.67
Hourly flow rate (vph)	23	0	46	0	0	0	15	35	0	0	34	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	107	107	41	153	114	35	48			35		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	107	107	41	153	114	35	48			35		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	96	100	100	100	99			100		
cM capacity (veh/h)	865	775	1030	771	769	1038	1559			1576		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	69	0	51	48								
Volume Left	23	0	15	0								
Volume Right	46	0	0	13								
cSH	969	1700	1559	1576								
Volume to Capacity	0.07	0.00	0.01	0.00								
Queue Length 95th (ft)	6	0	1	0								
Control Delay (s)	9.0	0.0	2.3	0.0								
Lane LOS	A	A	A									
Approach Delay (s)	9.0	0.0	2.3	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			18.6%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 10: Base Line Street & Del Rosa Drive

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1900	1700	1800	1900	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.98		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)	1583	3213		1583	3329		1583	3276		1583	1765	1500
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1583	3213		1583	3329		1583	3276		1583	1765	1500
Volume (vph)	59	272	105	67	495	25	59	184	33	33	367	159
Peak-hour factor, PHF	0.75	0.75	0.75	0.87	0.87	0.87	0.74	0.74	0.74	0.84	0.84	0.84
Adj. Flow (vph)	79	363	140	77	569	29	80	249	45	39	437	189
RTOR Reduction (vph)	0	41	0	0	4	0	0	15	0	0	0	84
Lane Group Flow (vph)	79	462	0	77	594	0	80	279	0	39	437	105
Turn Type	Prot		Prot			Prot			Prot		Perm	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	8.1	32.0		7.9	31.8		8.3	28.8		5.3	25.8	25.8
Effective Green, g (s)	9.1	35.0		8.9	34.8		9.3	31.8		6.3	28.8	28.8
Actuated g/C Ratio	0.10	0.39		0.10	0.39		0.10	0.35		0.07	0.32	0.32
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	160	1250		157	1287		164	1158		111	565	480
v/s Ratio Prot	c0.05	0.14		c0.05	c0.18		c0.05	0.09		0.02	c0.25	
v/s Ratio Perm												0.07
v/c Ratio	0.49	0.37		0.49	0.46		0.49	0.24		0.35	0.77	0.22
Uniform Delay, d1	38.3	19.6		38.4	20.6		38.1	20.6		39.9	27.7	22.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.4	0.8		2.4	1.2		2.3	0.1		1.9	6.5	0.2
Delay (s)	40.7	20.5		40.8	21.8		40.4	20.7		41.8	34.2	22.6
Level of Service	D	C		D	C		D	C		D	C	C
Approach Delay (s)		23.2			24.0			24.9			31.3	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			26.1	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)				8.0				
Intersection Capacity Utilization			57.7%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1900	1700	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1583	3330		1583	3315		1583	3257		1583	3248	
Flt Permitted	0.28	1.00		0.34	1.00		0.46	1.00		0.28	1.00	
Satd. Flow (perm)	470	3330		571	3315		770	3257		464	3248	
Volume (vph)	54	623	29	40	742	60	73	368	86	67	217	57
Peak-hour factor, PHF	0.95	0.95	0.95	0.98	0.98	0.98	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	57	656	31	41	757	61	80	404	95	74	238	63
RTOR Reduction (vph)	0	3	0	0	6	0	0	28	0	0	34	0
Lane Group Flow (vph)	57	684	0	41	812	0	80	471	0	74	267	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6			8				4
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	49.1	44.8		48.5	44.5		17.2	17.2		17.2	17.2	
Effective Green, g (s)	54.1	47.8		53.5	47.5		20.2	20.2		20.2	20.2	
Actuated g/C Ratio	0.68	0.60		0.67	0.59		0.25	0.25		0.25	0.25	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	405	1990		458	1968		194	822		117	820	
v/s Ratio Prot	c0.01	0.21		0.01	c0.25			0.14			0.08	
v/s Ratio Perm	0.08			0.05			0.10			c0.16		
v/c Ratio	0.14	0.34		0.09	0.41		0.41	0.57		0.63	0.33	
Uniform Delay, d1	4.9	8.2		4.7	8.7		24.9	26.1		26.6	24.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.5		0.1	0.6		1.4	1.0		10.6	0.2	
Delay (s)	5.0	8.6		4.8	9.4		26.4	27.1		37.2	24.6	
Level of Service	A	A		A	A		C	C		D	C	
Approach Delay (s)		8.4			9.2			27.0			27.1	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM Average Control Delay			15.6			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			63.1%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 2: Highland Avenue & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1900	1700	1800	1800	1700	1800	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1583	3353	1500	1583	3272		1583	3353	1500	1583	3315	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1583	3353	1500	1583	3272		1583	3353	1500	1583	3315	
Volume (vph)	93	516	137	109	535	102	180	652	173	124	376	31
Peak-hour factor, PHF	0.93	0.93	0.93	0.94	0.94	0.94	0.96	0.96	0.96	0.93	0.93	0.93
Adj. Flow (vph)	100	555	147	116	569	109	188	679	180	133	404	33
RTOR Reduction (vph)	0	0	96	0	16	0	0	0	103	0	7	0
Lane Group Flow (vph)	100	555	51	116	662	0	188	679	77	133	430	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	9.3	28.5	28.5	12.4	31.6		13.6	21.9	21.9	11.2	19.5	
Effective Green, g (s)	10.3	31.5	31.5	13.4	34.6		14.6	24.9	24.9	12.2	22.5	
Actuated g/C Ratio	0.11	0.35	0.35	0.15	0.38		0.16	0.28	0.28	0.14	0.25	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	181	1174	525	236	1258		257	928	415	215	829	
v/s Ratio Prot	0.06	0.17		c0.07	c0.20		c0.12	c0.20		0.08	0.13	
v/s Ratio Perm			0.03						0.05			
v/c Ratio	0.55	0.47	0.10	0.49	0.53		0.73	0.73	0.19	0.62	0.52	
Uniform Delay, d1	37.7	22.8	19.7	35.2	21.4		35.8	29.5	24.8	36.7	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	3.6	1.4	0.4	1.6	1.6		10.2	3.0	0.2	5.2	0.6	
Delay (s)	41.3	24.1	20.1	36.8	23.0		46.1	32.5	25.0	41.9	29.6	
Level of Service	D	C	C	D	C		D	C	C	D	C	
Approach Delay (s)		25.5			25.0			33.7			32.5	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			29.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			64.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis
 3: Base Line Street & Waterman Avenue

7/16/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	0.98		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)	1583	3234		1583	3277		1583	3353	1500	1583	3353	1500
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)	1583	3234		1583	3277		1583	3353	1500	1583	3353	1500
Volume (vph)	90	445	138	126	441	79	153	625	151	63	582	110
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.87	0.87	0.87	0.88	0.88	0.88
Adj. Flow (vph)	100	494	153	154	538	96	176	718	174	72	661	125
RTOR Reduction (vph)	0	31	0	0	15	0	0	0	44	0	0	62
Lane Group Flow (vph)	100	616	0	154	619	0	176	718	130	72	661	63
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	10.9	24.4		9.9	23.4		12.2	40.1	50.0	5.6	33.5	44.4
Effective Green, g (s)	13.9	27.4		12.9	26.4		15.2	43.1	56.0	8.6	36.5	50.4
Actuated g/C Ratio	0.14	0.27		0.13	0.26		0.15	0.43	0.56	0.09	0.36	0.50
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	220	886		204	865		241	1445	840	136	1224	756
v/s Ratio Prot	0.06	c0.19		c0.10	c0.19		c0.11	c0.21	0.02	0.05	c0.20	0.01
v/s Ratio Perm									0.07			0.03
v/c Ratio	0.45	0.70		0.75	0.72		0.73	0.50	0.16	0.53	0.54	0.08
Uniform Delay, d1	39.6	32.6		42.0	33.4		40.4	20.6	10.6	43.8	25.1	12.8
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	1.5	2.4		14.6	2.8		10.8	1.2	0.1	3.7	1.7	0.0
Delay (s)	41.1	34.9		56.7	36.2		51.3	21.8	10.7	47.5	26.8	12.9
Level of Service	D	C		E	D		D	C	B	D	C	B
Approach Delay (s)		35.8			40.2			24.9			26.5	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM Average Control Delay			31.1	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			100.0	Sum of lost time (s)				4.0				
Intersection Capacity Utilization			65.2%	ICU Level of Service				C				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Orange Street Driveway & Waterman Avenue

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	0	12	40	1	72	21	1043	44	73	963	21
Peak Hour Factor	0.44	0.44	0.44	0.78	0.78	0.78	0.89	0.89	0.89	0.94	0.94	0.94
Hourly flow rate (vph)	11	0	27	51	1	92	24	1172	49	78	1024	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)								487			526	
pX, platoon unblocked	0.92	0.92	0.85	0.92	0.92	0.85	0.85			0.85		
vC, conflicting volume	1917	2459	523	1939	2446	611	1047			1221		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1422	2010	262	1445	1995	361	878			1081		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	82	100	96	28	97	83	96			86		
cM capacity (veh/h)	63	44	626	71	45	539	650			543		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	39	145	24	781	440	78	683	364				
Volume Left	11	51	24	0	0	78	0	0				
Volume Right	27	92	0	0	49	0	0	22				
cSH	171	157	650	1700	1700	543	1700	1700				
Volume to Capacity	0.23	0.92	0.04	0.46	0.26	0.14	0.40	0.21				
Queue Length 95th (ft)	21	167	3	0	0	12	0	0				
Control Delay (s)	32.0	110.0	10.7	0.0	0.0	12.7	0.0	0.0				
Lane LOS	D	F	B			B						
Approach Delay (s)	32.0	110.0	0.2			0.9						
Approach LOS	D	F										
Intersection Summary												
Average Delay			7.2									
Intersection Capacity Utilization			56.5%	ICU Level of Service	B							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1800	1900	1900	1800	1900	1700	1800	1900	1700	1800	1900
Total Lost time (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.92			0.94		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1596			1612		1583	3335		1583	3347	
Flt Permitted		0.90			0.87		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1466			1428		1583	3335		1583	3347	
Volume (vph)	7	1	12	19	2	19	22	1106	42	31	915	11
Peak-hour factor, PHF	0.59	0.59	0.59	0.81	0.81	0.81	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	12	2	20	23	2	23	23	1164	44	33	963	12
RTOR Reduction (vph)	0	17	0	0	20	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	17	0	0	28	0	23	1206	0	33	974	0
Turn Type	Perm		Perm			Prot		Prot				
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		6.7			6.7		2.3	45.9		2.4	46.0	
Effective Green, g (s)		9.7			9.7		5.3	48.9		5.4	49.0	
Actuated g/C Ratio		0.14			0.14		0.08	0.70		0.08	0.70	
Clearance Time (s)		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	
Lane Grp Cap (vph)		203			198		120	2330		122	2343	
v/s Ratio Prot							0.01	c0.36		c0.02	0.29	
v/s Ratio Perm		0.01			c0.02							
v/c Ratio		0.08			0.14		0.19	0.52		0.27	0.42	
Uniform Delay, d1		26.3			26.5		30.3	5.0		30.4	4.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.3		0.8	0.8		1.2	0.5	
Delay (s)		26.4			26.8		31.1	5.8		31.6	5.0	
Level of Service		C			C		C	A		C	A	
Approach Delay (s)		26.4			26.8			6.3			5.9	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM Average Control Delay			6.8				HCM Level of Service			A		
HCM Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			70.0				Sum of lost time (s)			6.0		
Intersection Capacity Utilization			44.0%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1800	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		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)	1583	3235		1583	3353	1500	1583	3353	1500	1583	3353	1500
Flt Permitted	0.58	1.00		0.20	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	965	3235		330	3353	1500	1583	3353	1500	1583	3353	1500
Volume (vph)	116	445	137	63	156	49	90	1038	103	41	833	107
Peak-hour factor, PHF	0.85	0.85	0.85	0.79	0.79	0.79	0.91	0.91	0.91	0.98	0.98	0.98
Adj. Flow (vph)	136	524	161	80	197	62	99	1141	113	42	850	109
RTOR Reduction (vph)	0	35	0	0	0	44	0	0	27	0	0	45
Lane Group Flow (vph)	136	650	0	80	197	18	99	1141	86	42	850	64
Turn Type	pm+pt			pm+pt		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)	24.4	17.7		23.4	17.2	17.2	8.6	25.7	25.7	4.6	21.7	21.7
Effective Green, g (s)	28.4	20.7		27.4	20.2	20.2	9.6	29.7	29.7	5.6	25.7	25.7
Actuated g/C Ratio	0.40	0.29		0.38	0.28	0.28	0.13	0.42	0.42	0.08	0.36	0.36
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	452	941		254	951	426	213	1399	626	125	1210	541
v/s Ratio Prot	c0.03	c0.20		c0.03	0.06		0.06	c0.34		0.03	c0.25	
v/s Ratio Perm	0.09			0.09		0.01			0.06			0.04
v/c Ratio	0.30	0.69		0.31	0.21	0.04	0.46	0.82	0.14	0.34	0.70	0.12
Uniform Delay, d1	14.1	22.4		15.0	19.4	18.5	28.4	18.3	12.8	31.0	19.5	15.2
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	0.4	2.2		0.7	0.1	0.0	1.6	3.8	0.1	1.6	1.9	0.1
Delay (s)	14.5	24.6		15.7	19.5	18.5	30.0	22.1	12.9	32.6	21.3	15.3
Level of Service	B	C		B	B	B	C	C	B	C	C	B
Approach Delay (s)		22.9			18.4			21.9			21.2	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM Average Control Delay			21.6				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			71.2				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			68.5%				ICU Level of Service				C	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1900	1800	1900	1900	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.92			0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	
Satd. Flow (prot)	1583	3340		1583	3336			1602			1628	
Flt Permitted	0.39	1.00		0.35	1.00			0.93			0.84	
Satd. Flow (perm)	647	3340		588	3336			1508			1401	
Volume (vph)	51	675	18	16	587	20	8	4	17	51	5	34
Peak-hour factor, PHF	0.94	0.94	0.94	0.93	0.93	0.93	0.63	0.63	0.63	0.92	0.92	0.92
Adj. Flow (vph)	54	718	19	17	631	22	13	6	27	55	5	37
RTOR Reduction (vph)	0	1	0	0	1	0	0	22	0	0	30	0
Lane Group Flow (vph)	54	736	0	17	652	0	0	24	0	0	67	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	54.2	54.2		54.2	54.2			11.8			11.8	
Effective Green, g (s)	57.2	57.2		57.2	57.2			13.8			13.8	
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.18			0.18	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	493	2547		448	2544			277			258	
v/s Ratio Prot	c0.22		0.20		0.20		0.02		0.02		c0.05	
v/s Ratio Perm	0.08		0.03		0.03		0.02		0.02		c0.05	
v/c Ratio	0.11	0.29		0.04	0.26			0.09			0.26	
Uniform Delay, d1	2.3	2.7		2.2	2.6			25.4			26.2	
Progression Factor	0.67	0.66		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.3		0.0	0.1			0.1			0.5	
Delay (s)	2.0	2.1		2.2	2.7			25.5			26.8	
Level of Service	A	A		A	A			C			C	
Approach Delay (s)	2.1		2.7		2.7		25.5		25.5		26.8	
Approach LOS	A		A		A		C		C		C	
Intersection Summary												
HCM Average Control Delay	4.5		HCM Level of Service		A							
HCM Volume to Capacity ratio	0.28											
Actuated Cycle Length (s)	75.0		Sum of lost time (s)		4.0							
Intersection Capacity Utilization	63.2%		ICU Level of Service		B							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 8: Base Line Street & La Junita Street

5/31/2012

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑↑		↙	↑↑	↖		
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	719	13	19	651	17	27	
Peak Hour Factor	0.90	0.90	0.94	0.94	0.75	0.75	
Hourly flow rate (vph)	799	14	20	693	23	36	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (ft)	270						
pX, platoon unblocked			0.95		0.95	0.95	
vC, conflicting volume			813		1193	407	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			748		1149	319	
tC, single (s)			4.1		6.8	6.9	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			98		87	94	
cM capacity (veh/h)			812		177	641	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	
Volume Total	533	281	20	346	346	59	
Volume Left	0	0	20	0	0	23	
Volume Right	0	14	0	0	0	36	
cSH	1700	1700	812	1700	1700	319	
Volume to Capacity	0.31	0.17	0.02	0.20	0.20	0.18	
Queue Length 95th (ft)	0	0	2	0	0	17	
Control Delay (s)	0.0	0.0	9.5	0.0	0.0	18.8	
Lane LOS	A			C			
Approach Delay (s)	0.0		0.3		18.8		
Approach LOS						C	
Intersection Summary							
Average Delay			0.8				
Intersection Capacity Utilization			30.3%		ICU Level of Service		A
Analysis Period (min)	15						

HCM Unsignalized Intersection Capacity Analysis
 9: Orange Street Driveway & La Junita Street

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	13	0	10	0	0	0	19	23	0	0	27	12
Peak Hour Factor	0.54	0.92	0.54	0.92	0.92	0.92	0.77	0.77	0.92	0.92	0.78	0.78
Hourly flow rate (vph)	24	0	19	0	0	0	25	30	0	0	35	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	122	122	42	140	129	30	50			30		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	122	122	42	140	129	30	50			30		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	98	100	100	100	98			100		
cM capacity (veh/h)	843	757	1028	805	749	1045	1557			1583		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	43	0	55	50								
Volume Left	24	0	25	0								
Volume Right	19	0	0	15								
cSH	915	1700	1557	1583								
Volume to Capacity	0.05	0.00	0.02	0.00								
Queue Length 95th (ft)	4	0	1	0								
Control Delay (s)	9.1	0.0	3.4	0.0								
Lane LOS	A	A	A									
Approach Delay (s)	9.1	0.0	3.4	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			3.9									
Intersection Capacity Utilization			18.9%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 10: Base Line Street & Del Rosa Drive

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1900	1700	1800	1900	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
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	0.98		1.00	0.98		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)	1583	3320		1583	3300		1583	3290		1583	1765	1500
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1583	3320		1583	3300		1583	3290		1583	1765	1500
Volume (vph)	151	559	39	27	391	46	28	275	39	58	229	103
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.91	0.91	0.91	0.81	0.81	0.81
Adj. Flow (vph)	168	621	43	33	477	56	31	302	43	72	283	127
RTOR Reduction (vph)	0	4	0	0	8	0	0	14	0	0	0	92
Lane Group Flow (vph)	168	660	0	33	525	0	31	331	0	72	283	35
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	14.9	44.0		4.7	33.8		3.5	17.3		8.0	21.8	21.8
Effective Green, g (s)	15.9	47.0		5.7	36.8		4.5	20.3		9.0	24.8	24.8
Actuated g/C Ratio	0.18	0.52		0.06	0.41		0.05	0.23		0.10	0.28	0.28
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	280	1734		100	1349		79	742		158	486	413
v/s Ratio Prot	c0.11	0.20		0.02	c0.16		0.02	0.10		c0.05	c0.16	
v/s Ratio Perm												0.02
v/c Ratio	0.60	0.38		0.33	0.39		0.39	0.45		0.46	0.58	0.08
Uniform Delay, d1	34.1	12.8		40.3	18.7		41.4	30.0		38.2	28.1	24.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.4	0.6		1.9	0.8		3.2	0.4		2.1	1.8	0.1
Delay (s)	37.6	13.5		42.3	19.5		44.6	30.4		40.3	29.9	24.3
Level of Service	D	B		D	B		D	C		D	C	C
Approach Delay (s)		18.3			20.9			31.6			30.0	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM Average Control Delay			23.7			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			6.0			
Intersection Capacity Utilization			53.4%			ICU Level of Service				A		
Analysis Period (min)			15									
c Critical Lane Group												

**APPENDIX E:
CUMULATIVE BASE (2033) LOS RESULTS**

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	3504		1676	3479		1676	3438		1676	3441	
Flt Permitted	0.11	1.00		0.19	1.00		0.16	1.00		0.45	1.00	
Satd. Flow (perm)	201	3504		344	3479		287	3438		795	3441	
Volume (vph)	71	915	65	52	1053	136	29	266	63	109	598	136
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)	75	963	68	55	1108	143	31	280	66	115	629	143
RTOR Reduction (vph)	0	6	0	0	11	0	0	27	0	0	26	0
Lane Group Flow (vph)	75	1025	0	55	1240	0	31	319	0	115	746	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6		8			8		4
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	45.7	40.3		43.1	39.0		21.6	21.6		21.6	21.6	
Effective Green, g (s)	50.7	43.3		48.1	42.0		24.6	24.6		24.6	24.6	
Actuated g/C Ratio	0.63	0.54		0.60	0.52		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	264	1897		308	1826		88	1057		244	1058	
v/s Ratio Prot	c0.03	0.29		0.01	c0.36		0.09			c0.22		
v/s Ratio Perm	0.15			0.09			0.11			0.14		
v/c Ratio	0.28	0.54		0.18	0.68		0.35	0.30		0.47	0.71	
Uniform Delay, d1	9.1	11.9		7.7	14.0		21.5	21.1		22.4	24.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.1		0.3	2.1		2.4	0.2		1.4	2.2	
Delay (s)	9.7	13.0		8.0	16.1		23.9	21.3		23.9	26.7	
Level of Service	A	B		A	B		C	C		C	C	
Approach Delay (s)	12.8			15.7			21.5			26.3		
Approach LOS	B			B			C			C		
Intersection Summary												
HCM Average Control Delay	18.0			HCM Level of Service			B					
HCM Volume to Capacity ratio	0.65											
Actuated Cycle Length (s)	80.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	80.1%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Highland Avenue & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1676	3539	1583	1676	3500		1676	3539	1583	1676	3519	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1676	3539	1583	1676	3500		1676	3539	1583	1676	3519	
Volume (vph)	103	580	295	182	648	52	155	636	126	188	1287	52
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)	108	611	311	192	682	55	163	669	133	198	1355	55
RTOR Reduction (vph)	0	0	207	0	7	0	0	0	73	0	3	0
Lane Group Flow (vph)	108	611	104	192	730	0	163	669	60	198	1407	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	8.9	20.5	20.5	13.1	24.7		11.8	27.9	27.9	12.5	28.6	
Effective Green, g (s)	9.9	23.5	23.5	14.1	27.7		12.8	30.9	30.9	13.5	31.6	
Actuated g/C Ratio	0.11	0.26	0.26	0.16	0.31		0.14	0.34	0.34	0.15	0.35	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	184	924	413	263	1077		238	1215	543	251	1236	
v/s Ratio Prot	0.06	0.17		c0.11	c0.21		0.10	0.19		c0.12	c0.40	
v/s Ratio Perm			0.07						0.04			
v/c Ratio	0.59	0.66	0.25	0.73	0.68		0.68	0.55	0.11	0.79	1.14	
Uniform Delay, d1	38.1	29.7	26.3	36.1	27.2		36.7	23.9	20.2	36.9	29.2	
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	4.7	3.7	1.5	10.0	3.4		7.9	0.5	0.1	15.1	72.5	
Delay (s)	42.8	33.4	27.8	46.1	30.7		44.6	24.5	20.3	52.0	101.7	
Level of Service	D	C	C	D	C		D	C	C	D	F	
Approach Delay (s)		32.7			33.9			27.3			95.5	
Approach LOS		C			C			C			F	
Intersection Summary												
HCM Average Control Delay			54.1			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			86.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Base Line Street & Waterman Avenue

6/13/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1676	3437		1676	3481		1676	3539	1583	1676	3539	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)	1676	3437		1676	3481		1676	3539	1583	1676	3539	1583
Volume (vph)	167	649	155	285	788	98	102	647	184	84	1279	157
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)	176	683	163	300	829	103	107	681	194	88	1346	165
RTOR Reduction (vph)	0	21	0	0	10	0	0	0	59	0	0	44
Lane Group Flow (vph)	176	825	0	300	922	0	107	681	135	88	1346	121
Turn Type	Prot			Prot			Prot	pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases								8				4
Actuated Green, G (s)	9.6	27.6		11.0	29.0		8.0	35.8	46.8	5.6	33.4	43.0
Effective Green, g (s)	12.6	30.6		14.0	32.0		11.0	38.8	52.8	8.6	36.4	49.0
Actuated g/C Ratio	0.13	0.31		0.14	0.32		0.11	0.39	0.53	0.09	0.36	0.49
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	211	1052		235	1114		184	1373	867	144	1288	807
v/s Ratio Prot	0.10	c0.24		c0.18	c0.27		0.06	c0.19	0.02	0.05	c0.38	0.02
v/s Ratio Perm									0.06			0.06
v/c Ratio	0.83	0.78		1.28	0.83		0.58	0.50	0.16	0.61	1.05	0.15
Uniform Delay, d1	42.7	31.7		43.0	31.5		42.3	23.2	12.1	44.1	31.8	14.0
Progression Factor	1.00	1.00		1.05	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.7	3.9		151.4	4.8		4.6	1.3	0.1	7.5	37.7	0.1
Delay (s)	66.4	35.6		196.8	33.5		46.9	24.5	12.2	51.5	69.5	14.1
Level of Service	E	D		F	C		D	C	B	D	E	B
Approach Delay (s)		40.9			73.2			24.5			62.8	
Approach LOS		D			E			C			E	
Intersection Summary												
HCM Average Control Delay			53.0			HCM Level of Service					D	
HCM Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)					4.0	
Intersection Capacity Utilization			94.2%			ICU Level of Service					F	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 4: Driveway & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	0	6	73	0	46	10	1058	42	54	1631	8
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	2	0	6	77	0	48	11	1114	44	57	1717	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)											526	
pX, platoon unblocked	0.65	0.65	0.65	0.65	0.65		0.65					
vC, conflicting volume	2461	3014	863	2135	2996	579	1725			1158		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	2713	3568	241	2209	3540	579	1575			1158		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	61	100	99	0	100	89	98			92		
cM capacity (veh/h)	5	3	491	15	3	458	642			755		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	8	125	11	742	415	57	1145	581				
Volume Left	2	77	11	0	0	57	0	0				
Volume Right	6	48	0	0	44	0	0	8				
cSH	21	23	642	1700	1700	755	1700	1700				
Volume to Capacity	0.41	5.40	0.02	0.44	0.24	0.08	0.67	0.34				
Queue Length 95th (ft)	29	Err	1	0	0	6	0	0				
Control Delay (s)	267.9	Err	10.7	0.0	0.0	10.2	0.0	0.0				
Lane LOS	F	F	B			B						
Approach Delay (s)	267.9	Err	0.1			0.3						
Approach LOS	F	F										
Intersection Summary												
Average Delay			407.1									
Intersection Capacity Utilization			65.5%	ICU Level of Service	C							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

5: Olive Street & Waterman Avenue

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	6	11	38	2	23	10	874	33	42	1781	8
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	6	12	40	2	24	11	920	35	44	1875	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)											1013	
pX, platoon unblocked	0.66	0.66	0.66	0.66	0.66		0.66					
vC, conflicting volume	2474	2943	942	1999	2930	477	1883			955		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	2714	3421	406	1998	3401	477	1824			955		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	97	0	53	95	98			94		
cM capacity (veh/h)	4	4	395	0	4	534	626			795		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	22	66	11	613	341	44	1250	633
Volume Left	4	40	11	0	0	44	0	0
Volume Right	12	24	0	0	35	0	0	8
cSH	8	0	626	1700	1700	795	1700	1700
Volume to Capacity	2.61	Err	0.02	0.36	0.20	0.06	0.74	0.37
Queue Length 95th (ft)	96	Err	1	0	0	4	0	0
Control Delay (s)	1589.8	Err	10.8	0.0	0.0	9.8	0.0	0.0
Lane LOS	F	F	B			A		
Approach Delay (s)	1589.8	Err	0.1			0.2		
Approach LOS	F	F						

Intersection Summary			
Average Delay		Err	
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		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)	1676	3291		1676	3539	1583	1676	3539	1583	1676	3539	1583
Flt Permitted	0.21	1.00		0.35	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	376	3291		611	3539	1583	1676	3539	1583	1676	3539	1583
Volume (vph)	149	245	215	130	582	54	136	1025	92	36	1528	182
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)	157	258	226	137	613	57	143	1079	97	38	1608	192
RTOR Reduction (vph)	0	92	0	0	0	22	0	0	26	0	0	44
Lane Group Flow (vph)	157	392	0	137	613	35	143	1079	71	38	1608	148
Turn Type	pm+pt			pm+pt			Perm	Prot		Perm	Prot	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4		6				2
Actuated Green, G (s)	25.2	20.2		23.0	19.1	19.1	6.3	34.5	34.5	2.9	31.1	31.1
Effective Green, g (s)	29.2	23.2		27.0	22.1	22.1	7.3	38.5	38.5	3.9	35.1	35.1
Actuated g/C Ratio	0.37	0.30		0.34	0.28	0.28	0.09	0.49	0.49	0.05	0.45	0.45
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	239	973		277	996	446	156	1736	776	83	1582	708
v/s Ratio Prot	c0.05	0.12		0.03	c0.17		c0.09	0.30		0.02	c0.45	
v/s Ratio Perm	0.19			0.14		0.02		0.04				0.09
v/c Ratio	0.66	0.40		0.49	0.62	0.08	0.92	0.62	0.09	0.46	1.02	0.21
Uniform Delay, d1	18.1	22.1		18.7	24.5	20.7	35.3	14.7	10.7	36.3	21.7	13.2
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	6.4	0.3		1.4	1.1	0.1	47.8	0.7	0.1	4.0	26.8	0.1
Delay (s)	24.5	22.4		20.1	25.6	20.8	83.1	15.4	10.7	40.2	48.5	13.4
Level of Service	C	C		C	C	C	F	B	B	D	D	B
Approach Delay (s)		22.9			24.4			22.4			44.7	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM Average Control Delay			31.7				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			78.5				Sum of lost time (s)				10.0	
Intersection Capacity Utilization			88.3%				ICU Level of Service				E	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷			↷			↷	↶
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.92			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1676	3527		1676	3523			1688			1703	
Flt Permitted	0.21	1.00		0.31	1.00			0.94			0.89	
Satd. Flow (perm)	366	3527		546	3523			1604			1541	
Volume (vph)	59	804	19	29	1102	34	17	6	33	44	8	48
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)	62	846	20	31	1160	36	18	6	35	46	8	51
RTOR Reduction (vph)	0	2	0	0	2	0	0	29	0	0	43	0
Lane Group Flow (vph)	62	864	0	31	1194	0	0	30	0	0	62	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	34.9	34.9		34.9	34.9			6.1			6.1	
Effective Green, g (s)	37.9	37.9		37.9	37.9			8.1			8.1	
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.16			0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	277	2673		414	2670			260			250	
v/s Ratio Prot	0.24		c0.34		c0.34		0.02		0.02		c0.04	
v/s Ratio Perm	0.17		0.06		0.06		0.11		0.11		0.25	
v/c Ratio	0.22	0.32		0.07	0.45			0.11			0.25	
Uniform Delay, d1	1.8	1.9		1.6	2.2			17.9			18.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.9	0.3		0.1	0.2			0.1			0.5	
Delay (s)	3.6	2.3		1.7	2.4			18.0			18.8	
Level of Service	A		A		A		B		B		B	
Approach Delay (s)	2.4		2.4		2.4		18.0		18.0		18.8	
Approach LOS	A		A		A		B		B		B	

Intersection Summary

HCM Average Control Delay	3.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Base Line Street & La Junita Street

5/31/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	852	33	36	1152	19	25
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	897	35	38	1213	20	26
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)	270					
pX, platoon unblocked			0.94		0.94	0.94
vC, conflicting volume			932		1596	466
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			864		1571	368
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		78	96
cM capacity (veh/h)			728		90	591
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	598	334	38	606	606	46
Volume Left	0	0	38	0	0	20
Volume Right	0	35	0	0	0	26
cSH	1700	1700	728	1700	1700	174
Volume to Capacity	0.35	0.20	0.05	0.36	0.36	0.27
Queue Length 95th (ft)	0	0	4	0	0	26
Control Delay (s)	0.0	0.0	10.2	0.0	0.0	33.0
Lane LOS			B			D
Approach Delay (s)	0.0		0.3			33.0
Approach LOS						D
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			41.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 9: Driveway & La Junita Street

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	0	54	0	0	0	19	46	0	0	42	4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	6	0	57	0	0	0	20	48	0	0	44	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	135	135	46	192	137	48	48			48		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	135	135	46	192	137	48	48			48		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	94	100	100	100	99			100		
cM capacity (veh/h)	828	746	1023	718	744	1020	1559			1559		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	63	0	68	48								
Volume Left	6	0	20	0								
Volume Right	57	0	0	4								
cSH	1000	1700	1559	1559								
Volume to Capacity	0.06	0.00	0.01	0.00								
Queue Length 95th (ft)	5	0	1	0								
Control Delay (s)	8.8	0.0	2.2	0.0								
Lane LOS	A	A	A									
Approach Delay (s)	8.8	0.0	2.2	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			3.9									
Intersection Capacity Utilization			20.5%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 10: Base Line Street & Del Rosa Drive

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1900	1600	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.98		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)	1676	3393		1676	3514		1676	3459		1676	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1676	3393		1676	3514		1676	3459		1676	1863	1583
Volume (vph)	96	483	183	121	908	46	100	332	59	59	674	280
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)	101	508	193	127	956	48	105	349	62	62	709	295
RTOR Reduction (vph)	0	46	0	0	4	0	0	14	0	0	0	75
Lane Group Flow (vph)	101	655	0	127	1000	0	105	397	0	62	709	220
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	8.3	24.5		10.1	26.3		8.8	31.9		7.5	30.6	30.6
Effective Green, g (s)	9.3	27.5		11.1	29.3		9.8	34.9		8.5	33.6	33.6
Actuated g/C Ratio	0.10	0.31		0.12	0.33		0.11	0.39		0.09	0.37	0.37
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	173	1037		207	1144		182	1341		158	696	591
v/s Ratio Prot	0.06	c0.19		0.08	c0.28		c0.06	0.11		0.04	c0.38	
v/s Ratio Perm												0.14
v/c Ratio	0.58	0.63		0.61	0.87		0.58	0.30		0.39	1.02	0.37
Uniform Delay, d1	38.5	26.9		37.4	28.6		38.1	19.1		38.3	28.2	20.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.9	2.9		5.3	9.4		4.4	0.1		1.6	38.9	0.4
Delay (s)	43.5	29.8		42.7	38.0		42.5	19.2		39.9	67.1	20.9
Level of Service	D	C		D	D		D	B		D	E	C
Approach Delay (s)		31.5			38.5			23.9			52.7	
Approach LOS		C			D			C			D	
Intersection Summary												
HCM Average Control Delay			39.1			HCM Level of Service					D	
HCM Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			6.0			
Intersection Capacity Utilization			86.8%			ICU Level of Service					E	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	3515		1676	3501		1676	3443		1676	3429	
Flt Permitted	0.10	1.00		0.12	1.00		0.33	1.00		0.15	1.00	
Satd. Flow (perm)	180	3515		204	3501		589	3443		258	3429	
Volume (vph)	98	1086	52	65	1311	102	132	665	146	113	393	103
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)	103	1143	55	68	1380	107	139	700	154	119	414	108
RTOR Reduction (vph)	0	4	0	0	7	0	0	23	0	0	29	0
Lane Group Flow (vph)	103	1194	0	68	1480	0	139	831	0	119	493	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	41.7	36.2		41.5	36.1		24.4	24.4		24.4	24.4	
Effective Green, g (s)	46.7	39.2		46.5	39.1		27.4	27.4		27.4	27.4	
Actuated g/C Ratio	0.58	0.49		0.58	0.49		0.34	0.34		0.34	0.34	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	245	1722		255	1711		202	1179		88	1174	
v/s Ratio Prot	c0.04	0.34		0.02	c0.42			0.24			0.14	
v/s Ratio Perm	0.21			0.13			0.24			c0.46		
v/c Ratio	0.42	0.69		0.27	0.86		0.69	0.70		1.35	0.42	
Uniform Delay, d1	13.7	15.8		10.3	18.1		22.6	22.8		26.3	20.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	2.3		0.6	6.1		9.4	1.9		216.1	0.2	
Delay (s)	14.9	18.1		10.8	24.2		32.0	24.7		242.4	20.4	
Level of Service	B	B		B	C		C	C		F	C	
Approach Delay (s)		17.8			23.6			25.8			61.7	
Approach LOS		B			C			C			E	
Intersection Summary												
HCM Average Control Delay			27.9			HCM Level of Service				C		
HCM Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			89.9%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Highland Avenue & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1676	3539	1583	1676	3456		1676	3539	1583	1676	3499	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1676	3539	1583	1676	3456		1676	3539	1583	1676	3499	
Volume (vph)	169	955	238	188	991	184	316	1241	305	224	685	56
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)	178	1005	251	198	1043	194	333	1306	321	236	721	59
RTOR Reduction (vph)	0	0	96	0	17	0	0	0	93	0	6	0
Lane Group Flow (vph)	178	1005	155	198	1220	0	333	1306	228	236	774	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	14.0	28.2	28.2	10.8	25.0		12.0	23.0	23.0	12.0	23.0	
Effective Green, g (s)	15.0	31.2	31.2	11.8	28.0		13.0	26.0	26.0	13.0	26.0	
Actuated g/C Ratio	0.17	0.35	0.35	0.13	0.31		0.14	0.29	0.29	0.14	0.29	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	279	1227	549	220	1075		242	1022	457	242	1011	
v/s Ratio Prot	0.11	c0.28		c0.12	c0.35		c0.20	c0.37		0.14	0.22	
v/s Ratio Perm			0.10						0.14			
v/c Ratio	0.64	0.82	0.28	0.90	1.13		1.38	1.28	0.50	0.98	0.77	
Uniform Delay, d1	35.0	26.8	21.3	38.5	31.0		38.5	32.0	26.6	38.3	29.2	
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	4.7	6.2	1.3	34.9	72.4		193.1	132.7	0.9	50.4	3.5	
Delay (s)	39.7	33.0	22.6	73.4	103.4		231.6	164.7	27.4	88.8	32.7	
Level of Service	D	C	C	E	F		F	F	C	F	C	
Approach Delay (s)		32.0			99.3			153.6			45.7	
Approach LOS		C			F			F			D	
Intersection Summary												
HCM Average Control Delay			91.7			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			103.9%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Base Line Street & Waterman Avenue

6/13/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1676	3434		1676	3463		1676	3539	1583	1676	3539	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)	1676	3434		1676	3463		1676	3539	1583	1676	3539	1583
Volume (vph)	163	799	199	235	799	134	230	1186	298	105	1047	199
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)	172	841	209	247	841	141	242	1248	314	111	1102	209
RTOR Reduction (vph)	0	22	0	0	14	0	0	0	41	0	0	24
Lane Group Flow (vph)	172	1028	0	247	968	0	242	1248	273	111	1102	185
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	11.0	29.0		10.0	28.0		10.0	34.0	44.0	7.0	31.0	42.0
Effective Green, g (s)	14.0	32.0		13.0	31.0		13.0	37.0	50.0	10.0	34.0	48.0
Actuated g/C Ratio	0.14	0.32		0.13	0.31		0.13	0.37	0.50	0.10	0.34	0.48
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	235	1099		218	1074		218	1309	792	168	1203	760
v/s Ratio Prot	0.10	c0.30		c0.15	c0.28		c0.14	c0.35	0.04	0.07	c0.31	0.03
v/s Ratio Perm									0.13			0.08
v/c Ratio	0.73	0.94		1.13	0.90		1.11	0.95	0.34	0.66	0.92	0.24
Uniform Delay, d1	41.2	33.0		43.5	33.0		43.5	30.7	15.1	43.4	31.6	15.3
Progression Factor	1.00	1.00		1.07	0.90		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.1	14.2		98.8	9.7		93.6	16.0	0.3	9.4	12.3	0.2
Delay (s)	52.3	47.2		145.4	39.4		137.1	46.6	15.4	52.7	43.9	15.5
Level of Service	D	D		F	D		F	D	B	D	D	B
Approach Delay (s)		47.9			60.7			53.3			40.4	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM Average Control Delay			50.5	HCM Level of Service				D				
HCM Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			100.0	Sum of lost time (s)				4.0				
Intersection Capacity Utilization			97.9%	ICU Level of Service				F				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 4: Orange Street Driveway & Waterman Avenue

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕↗		↗	↕↗	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	0	21	48	2	57	38	1989	54	57	1769	38
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	0	22	51	2	60	40	2094	57	60	1862	40
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)											526	
pX, platoon unblocked	0.73	0.73	0.73	0.73	0.73		0.73					
vC, conflicting volume	3190	4233	951	3275	4224	1075	1902			2151		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	3630	5058	563	3747	5046	1075	1866			2151		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	94	0	0	72	94			91		
cM capacity (veh/h)	0	0	343	1	0	215	631			635		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	33	113	40	1396	755	60	1241	661
Volume Left	11	51	40	0	0	60	0	0
Volume Right	22	60	0	0	57	0	0	40
cSH	0	2	631	1700	1700	635	1700	1700
Volume to Capacity	Err	62.43	0.06	0.82	0.44	0.09	0.73	0.39
Queue Length 95th (ft)	Err	Err	5	0	0	8	0	0
Control Delay (s)	Err	Err	11.1	0.0	0.0	11.3	0.0	0.0
Lane LOS	F	F	B			B		
Approach Delay (s)	Err	Err	0.2			0.3		
Approach LOS	F	F						

Intersection Summary		
Average Delay		Err
Intersection Capacity Utilization	72.9%	ICU Level of Service C
Analysis Period (min)	15	

HCM Unsignalized Intersection Capacity Analysis

5: Olive Street & Waterman Avenue

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	13	2	21	17	4	34	40	2078	59	56	1658	19
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	14	2	22	18	4	36	42	2187	62	59	1745	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)											1013	
pX, platoon unblocked	0.75	0.75	0.75	0.75	0.75		0.75					
vC, conflicting volume	3089	4207	883	3316	4186	1125	1765			2249		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	3450	4939	512	3753	4911	1125	1687			2249		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)							3.1			3.1		
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	94	0	0	82	93			91		
cM capacity (veh/h)	0	0	381	0	0	199	647			628		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	38	58	42	1458	791	59	1164	602
Volume Left	14	18	42	0	0	59	0	0
Volume Right	22	36	0	0	62	0	0	20
cSH	0	0	647	1700	1700	628	1700	1700
Volume to Capacity	Err	Err	0.07	0.86	0.47	0.09	0.68	0.35
Queue Length 95th (ft)	Err	Err	5	0	0	8	0	0
Control Delay (s)	Err	Err	11.0	0.0	0.0	11.3	0.0	0.0
Lane LOS	F	F	B			B		
Approach Delay (s)	Err	Err	0.2			0.4		
Approach LOS	F	F						

Intersection Summary		
Average Delay		Err
Intersection Capacity Utilization	70.0%	ICU Level of Service C
Analysis Period (min)	15	

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		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)	1676	3414		1676	3539	1583	1676	3539	1583	1676	3539	1583
Flt Permitted	0.49	1.00		0.17	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	868	3414		293	3539	1583	1676	3539	1583	1676	3539	1583
Volume (vph)	184	803	247	113	282	88	163	1965	186	75	1518	171
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)	194	845	260	119	297	93	172	2068	196	79	1598	180
RTOR Reduction (vph)	0	33	0	0	0	64	0	0	29	0	0	41
Lane Group Flow (vph)	194	1072	0	119	297	29	172	2068	167	79	1598	139
Turn Type	pm+pt			pm+pt		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)	28.8	21.5		28.0	21.1	21.1	10.0	23.5	23.5	7.4	20.9	20.9
Effective Green, g (s)	32.8	24.5		32.0	24.1	24.1	11.0	27.5	27.5	8.4	24.9	24.9
Actuated g/C Ratio	0.43	0.32		0.42	0.32	0.32	0.14	0.36	0.36	0.11	0.33	0.33
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	461	1096		266	1118	500	242	1276	571	185	1155	517
v/s Ratio Prot	c0.05	c0.31		c0.05	0.08		0.10	c0.58		0.05	c0.45	
v/s Ratio Perm	0.14			0.14		0.02			0.11			0.09
v/c Ratio	0.42	0.98		0.45	0.27	0.06	0.71	1.62	0.29	0.43	1.38	0.27
Uniform Delay, d1	14.1	25.6		17.2	19.5	18.2	31.1	24.4	17.4	31.7	25.7	19.0
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	0.6	21.7		1.2	0.1	0.0	9.4	282.9	0.3	1.6	178.0	0.3
Delay (s)	14.7	47.3		18.4	19.6	18.2	40.6	307.3	17.7	33.3	203.7	19.3
Level of Service	B	D		B	B	B	D	F	B	C	F	B
Approach Delay (s)		42.5			19.1			265.2			178.6	
Approach LOS		D			B			F			F	
Intersection Summary												
HCM Average Control Delay	170.9		HCM Level of Service				F					
HCM Volume to Capacity ratio	1.16											
Actuated Cycle Length (s)	76.3		Sum of lost time (s)				6.0					
Intersection Capacity Utilization	108.7%		ICU Level of Service				G					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↕		↖	↕			↕			↕	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	
Satd. Flow (prot)	1676	3530		1676	3522			1712			1721	
Flt Permitted	0.20	1.00		0.16	1.00			0.95			0.83	
Satd. Flow (perm)	360	3530		287	3522			1647			1462	
Volume (vph)	92	1247	23	13	1077	36	6	8	15	92	10	61
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)	97	1313	24	14	1134	38	6	8	16	97	11	64
RTOR Reduction (vph)	0	2	0	0	3	0	0	13	0	0	51	0
Lane Group Flow (vph)	97	1335	0	14	1169	0	0	17	0	0	121	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	32.6	32.6		32.6	32.6			8.4			8.4	
Effective Green, g (s)	35.6	35.6		35.6	35.6			10.4			10.4	
Actuated g/C Ratio	0.71	0.71		0.71	0.71			0.21			0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	256	2513		204	2508			343			304	
v/s Ratio Prot	c0.38		0.33		0.33		0.33		0.33		0.33	
v/s Ratio Perm	0.27			0.05				0.01			c0.08	
v/c Ratio	0.38	0.53		0.07	0.47			0.05			0.40	
Uniform Delay, d1	2.8	3.3		2.2	3.1			15.8			17.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.2	0.8		0.2	0.2			0.0			0.9	
Delay (s)	7.1	4.1		2.4	3.3			15.9			18.0	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)	4.3		3.3		3.3		15.9		15.9		18.0	
Approach LOS	A		A		A		B		B		B	

Intersection Summary

HCM Average Control Delay	4.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 8: Base Line Street & La Junita Street

5/31/2012

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑↑		↙	↑↑	↖		
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	1310	23	17	1176	31	33	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly flow rate (vph)	1379	24	18	1238	33	35	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (ft)	270						
pX, platoon unblocked			0.82		0.82	0.82	
vC, conflicting volume			1403		2046	702	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			1269		2056	409	
tC, single (s)			4.1		6.8	6.9	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			96		13	93	
cM capacity (veh/h)			444		37	483	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	
Volume Total	919	484	18	619	619	67	
Volume Left	0	0	18	0	0	33	
Volume Right	0	24	0	0	0	35	
cSH	1700	1700	444	1700	1700	71	
Volume to Capacity	0.54	0.28	0.04	0.36	0.36	0.94	
Queue Length 95th (ft)	0	0	3	0	0	120	
Control Delay (s)	0.0	0.0	13.5	0.0	0.0	190.0	
Lane LOS	B			F			
Approach Delay (s)	0.0		0.2			190.0	
Approach LOS						F	
Intersection Summary							
Average Delay			4.8				
Intersection Capacity Utilization			47.4%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis
 9: Orange Street Driveway & La Junita Street

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	8	0	17	0	0	0	34	42	0	0	48	6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	8	0	18	0	0	0	36	44	0	0	51	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	169	169	54	187	173	44	57			44		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	169	169	54	187	173	44	57			44		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	98	100	100	100	98			100		
cM capacity (veh/h)	780	707	1014	746	704	1026	1548			1564		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	26	0	80	57
Volume Left	8	0	36	0
Volume Right	18	0	0	6
cSH	925	1700	1548	1564
Volume to Capacity	0.03	0.00	0.02	0.00
Queue Length 95th (ft)	2	0	2	0
Control Delay (s)	9.0	0.0	3.4	0.0
Lane LOS	A	A	A	
Approach Delay (s)	9.0	0.0	3.4	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay		3.1	
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
 10: Base Line Street & Del Rosa Drive

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1900	1600	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
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	0.98		1.00	0.98		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)	1676	3508		1676	3484		1676	3474		1676	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1676	3508		1676	3484		1676	3474		1676	1863	1583
Volume (vph)	266	1019	64	48	707	82	47	506	71	105	416	176
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)	280	1073	67	51	744	86	49	533	75	111	438	185
RTOR Reduction (vph)	0	4	0	0	9	0	0	12	0	0	0	82
Lane Group Flow (vph)	280	1136	0	51	821	0	49	596	0	111	438	103
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	15.4	37.9		4.8	27.3		5.6	22.4		8.9	25.7	25.7
Effective Green, g (s)	16.4	40.9		5.8	30.3		6.6	25.4		9.9	28.7	28.7
Actuated g/C Ratio	0.18	0.45		0.06	0.34		0.07	0.28		0.11	0.32	0.32
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	305	1594		108	1173		123	980		184	594	505
v/s Ratio Prot	c0.17	0.32		0.03	c0.24		0.03	0.17		c0.07	c0.24	
v/s Ratio Perm												0.06
v/c Ratio	0.92	0.71		0.47	0.70		0.40	0.61		0.60	0.74	0.20
Uniform Delay, d1	36.1	19.8		40.6	25.9		39.8	28.0		38.2	27.3	22.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	30.8	2.7		3.2	3.5		2.1	1.1		5.5	4.8	0.2
Delay (s)	67.0	22.5		43.9	29.4		41.9	29.1		43.7	32.1	22.5
Level of Service	E	C		D	C		D	C		D	C	C
Approach Delay (s)		31.3			30.2			30.0			31.4	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			30.8			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			6.0			
Intersection Capacity Utilization			77.9%			ICU Level of Service					D	
Analysis Period (min)			15									
c	Critical Lane Group											

**APPENDIX F:
CUMULATIVE (2033) PLUS PROJECT LOS RESULTS**

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	3505		1676	3478		1676	3432		1676	3441	
Flt Permitted	0.10	1.00		0.19	1.00		0.16	1.00		0.45	1.00	
Satd. Flow (perm)	185	3505		333	3478		287	3432		787	3441	
Volume (vph)	71	933	65	58	1081	142	29	266	67	113	598	136
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)	75	982	68	61	1138	149	31	280	71	119	629	143
RTOR Reduction (vph)	0	6	0	0	11	0	0	29	0	0	26	0
Lane Group Flow (vph)	75	1044	0	61	1276	0	31	322	0	119	746	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6		8			4		
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	45.7	40.3		43.1	39.0		21.6	21.6		21.6	21.6	
Effective Green, g (s)	50.7	43.3		48.1	42.0		24.6	24.6		24.6	24.6	
Actuated g/C Ratio	0.63	0.54		0.60	0.52		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	255	1897		303	1826		88	1055		242	1058	
v/s Ratio Prot	c0.03	0.30		0.02	c0.37		0.09			c0.22		
v/s Ratio Perm	0.16			0.11			0.11			0.15		
v/c Ratio	0.29	0.55		0.20	0.70		0.35	0.31		0.49	0.71	
Uniform Delay, d1	9.5	12.0		7.8	14.3		21.5	21.2		22.6	24.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.2		0.3	2.2		2.4	0.2		1.6	2.2	
Delay (s)	10.1	13.1		8.1	16.5		23.9	21.3		24.2	26.7	
Level of Service	B			A			C			C		
Approach Delay (s)	12.9			16.1			21.5			26.3		
Approach LOS	B			B			C			C		
Intersection Summary												
HCM Average Control Delay			18.1			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			80.0				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			81.1%				ICU Level of Service				D	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Highland Avenue & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1676	3539	1583	1676	3500		1676	3539	1583	1676	3519	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1676	3539	1583	1676	3500		1676	3539	1583	1676	3519	
Volume (vph)	103	580	299	186	648	52	161	648	132	188	1294	52
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)	108	611	315	196	682	55	169	682	139	198	1362	55
RTOR Reduction (vph)	0	0	210	0	7	0	0	0	75	0	3	0
Lane Group Flow (vph)	108	611	105	196	730	0	169	682	64	198	1414	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	8.9	20.4	20.4	13.4	24.9		12.0	27.7	27.7	12.5	28.2	
Effective Green, g (s)	9.9	23.4	23.4	14.4	27.9		13.0	30.7	30.7	13.5	31.2	
Actuated g/C Ratio	0.11	0.26	0.26	0.16	0.31		0.14	0.34	0.34	0.15	0.35	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	184	920	412	268	1085		242	1207	540	251	1220	
v/s Ratio Prot	0.06	0.17		c0.12	c0.21		0.10	0.19		c0.12	c0.40	
v/s Ratio Perm			0.07						0.04			
v/c Ratio	0.59	0.66	0.25	0.73	0.67		0.70	0.57	0.12	0.79	1.16	
Uniform Delay, d1	38.1	29.8	26.4	36.0	27.1		36.6	24.2	20.4	36.9	29.4	
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	4.7	3.8	1.5	9.8	3.3		8.5	0.6	0.1	15.1	81.0	
Delay (s)	42.8	33.6	27.9	45.8	30.4		45.1	24.8	20.5	52.0	110.4	
Level of Service	D	C	C	D	C		D	C	C	D	F	
Approach Delay (s)		32.8			33.6			27.7			103.2	
Approach LOS		C			C			C			F	
Intersection Summary												
HCM Average Control Delay			56.7			HCM Level of Service				E		
HCM Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			87.1%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 3: Base Line Street & Waterman Avenue

6/13/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1676	3426		1676	3478		1676	3539	1583	1676	3539	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)	1676	3426		1676	3478		1676	3539	1583	1676	3539	1583
Volume (vph)	167	653	177	285	794	104	136	665	184	88	1290	157
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)	176	687	186	300	836	109	143	700	194	93	1358	165
RTOR Reduction (vph)	0	25	0	0	10	0	0	0	56	0	0	33
Lane Group Flow (vph)	176	848	0	300	935	0	143	700	138	93	1358	132
Turn Type	Prot			Prot			Prot	pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases								8				4
Actuated Green, G (s)	9.6	27.7		11.0	29.1		8.0	35.7	46.7	5.6	33.3	42.9
Effective Green, g (s)	12.6	30.7		14.0	32.1		11.0	38.7	52.7	8.6	36.3	48.9
Actuated g/C Ratio	0.13	0.31		0.14	0.32		0.11	0.39	0.53	0.09	0.36	0.49
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	211	1052		235	1116		184	1370	866	144	1285	806
v/s Ratio Prot	0.10	c0.25		c0.18	c0.27		c0.09	0.20	0.02	0.06	c0.38	0.02
v/s Ratio Perm								0.06				0.06
v/c Ratio	0.83	0.81		1.28	0.84		0.78	0.51	0.16	0.65	1.06	0.16
Uniform Delay, d1	42.7	31.9		43.0	31.5		43.3	23.4	12.2	44.2	31.9	14.2
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	23.7	4.6		153.2	5.6		18.4	1.4	0.1	9.5	41.6	0.1
Delay (s)	66.4	36.5		196.2	37.2		61.7	24.8	12.3	53.8	73.4	14.3
Level of Service	E	D		F	D		E	C	B	D	E	B
Approach Delay (s)		41.5			75.5			27.5			66.3	
Approach LOS		D			E			C			E	
Intersection Summary												
HCM Average Control Delay			55.2			HCM Level of Service				E		
HCM Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			6.0			
Intersection Capacity Utilization			97.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
4: Driveway & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	0	6	91	0	98	10	1058	53	86	1631	8
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	2	0	6	96	0	103	11	1114	56	91	1717	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)								487			526	
pX, platoon unblocked	0.73	0.73	0.67	0.73	0.73	0.89	0.67			0.89		
vC, conflicting volume	2583	3093	863	2208	3069	585	1725			1169		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2343	3044	306	1827	3011	407	1591			1065		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	78	100	99	0	100	80	96			84		
cM capacity (veh/h)	10	7	463	29	8	527	274			577		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	8	199	11	742	427	91	1145	581				
Volume Left	2	96	11	0	0	91	0	0				
Volume Right	6	103	0	0	56	0	0	8				
cSH	36	57	274	1700	1700	577	1700	1700				
Volume to Capacity	0.23	3.47	0.04	0.44	0.25	0.16	0.67	0.34				
Queue Length 95th (ft)	19	Err	3	0	0	14	0	0				
Control Delay (s)	132.1	Err	18.6	0.0	0.0	12.4	0.0	0.0				
Lane LOS	F	F	C			B						
Approach Delay (s)	132.1	Err	0.2			0.6						
Approach LOS	F	F										
Intersection Summary												
Average Delay			621.8									
Intersection Capacity Utilization			76.4%	ICU Level of Service	D							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.93			0.96		1.00	0.99		1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1710			1728		1676	3516		1676	3537	
Flt Permitted		0.95			0.81		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1647			1454		1676	3516		1676	3537	
Volume (vph)	4	6	11	50	2	23	10	885	40	42	1799	8
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)	4	6	12	53	2	24	11	932	42	44	1894	8
RTOR Reduction (vph)	0	10	0	0	20	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	12	0	0	59	0	11	971	0	44	1902	0
Turn Type	Perm		Perm			Prot		Prot				
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		8.5			8.5		0.8	42.1		4.4	45.7	
Effective Green, g (s)		11.5			11.5		3.8	45.1		7.4	48.7	
Actuated g/C Ratio		0.16			0.16		0.05	0.64		0.11	0.70	
Clearance Time (s)		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	
Lane Grp Cap (vph)		271			239		91	2265		177	2461	
v/s Ratio Prot							0.01	c0.28		0.03	c0.54	
v/s Ratio Perm		0.01			c0.04							
v/c Ratio		0.04			0.25		0.12	0.43		0.25	0.77	
Uniform Delay, d1		24.6			25.5		31.5	6.1		28.7	7.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.5		0.6	0.6		0.7	2.4	
Delay (s)		24.7			26.0		32.1	6.7		29.5	9.4	
Level of Service		C			C		C	A		C	A	
Approach Delay (s)		24.7			26.0			7.0			9.9	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM Average Control Delay			9.5				HCM Level of Service			A		
HCM Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			70.0				Sum of lost time (s)			6.0		
Intersection Capacity Utilization			67.6%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		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)	1676	3291		1676	3539	1583	1676	3539	1583	1676	3539	1583
Flt Permitted	0.21	1.00		0.35	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	377	3291		612	3539	1583	1676	3539	1583	1676	3539	1583
Volume (vph)	160	245	215	130	582	54	136	1032	92	36	1540	200
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	258	226	137	613	57	143	1086	97	38	1621	211
RTOR Reduction (vph)	0	156	0	0	0	22	0	0	27	0	0	48
Lane Group Flow (vph)	168	328	0	137	613	35	143	1086	70	38	1621	163
Turn Type	pm+pt			pm+pt			Perm	Prot		Perm	Prot	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4		6				2
Actuated Green, G (s)	25.2	20.2		23.0	19.1	19.1	9.2	34.4	34.4	2.9	28.1	28.1
Effective Green, g (s)	29.2	23.2		27.0	22.1	22.1	10.2	38.4	38.4	3.9	32.1	32.1
Actuated g/C Ratio	0.37	0.30		0.34	0.28	0.28	0.13	0.49	0.49	0.05	0.41	0.41
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	240	974		277	998	446	218	1733	775	83	1449	648
v/s Ratio Prot	c0.05	0.10		0.03	c0.17		0.09	c0.31		0.02	c0.46	
v/s Ratio Perm	0.21			0.14		0.02			0.04			0.10
v/c Ratio	0.70	0.34		0.49	0.61	0.08	0.66	0.63	0.09	0.46	1.12	0.25
Uniform Delay, d1	18.2	21.6		18.6	24.4	20.7	32.4	14.7	10.7	36.2	23.2	15.2
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	8.6	0.2		1.4	1.1	0.1	6.9	0.7	0.1	4.0	63.3	0.2
Delay (s)	26.8	21.8		20.0	25.6	20.7	39.4	15.4	10.7	40.2	86.4	15.4
Level of Service	C	C		C	C	C	D	B	B	D	F	B
Approach Delay (s)		23.1			24.3			17.7			77.5	
Approach LOS		C			C			B			E	
Intersection Summary												
HCM Average Control Delay			43.6				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			78.4				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			89.3%				ICU Level of Service				E	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕			↕	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.92			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1676	3525		1676	3523			1684			1703	
Flt Permitted	0.20	1.00		0.30	1.00			0.92			0.89	
Satd. Flow (perm)	360	3525		534	3523			1571			1541	
Volume (vph)	59	804	23	36	1102	34	23	6	44	44	8	48
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)	62	846	24	38	1160	36	24	6	46	46	8	51
RTOR Reduction (vph)	0	1	0	0	1	0	0	37	0	0	29	0
Lane Group Flow (vph)	62	869	0	38	1195	0	0	39	0	0	76	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	54.1	54.1		54.1	54.1			11.9			11.9	
Effective Green, g (s)	57.1	57.1		57.1	57.1			13.9			13.9	
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.19			0.19	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	274	2684		407	2682			291			286	
v/s Ratio Prot		0.25			c0.34							
v/s Ratio Perm	0.17			0.07				0.02			c0.05	
v/c Ratio	0.23	0.32		0.09	0.45			0.13			0.27	
Uniform Delay, d1	2.6	2.8		2.3	3.2			25.5			26.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.9	0.3		0.1	0.2			0.2			0.5	
Delay (s)	4.5	3.2		2.4	3.4			25.7			26.7	
Level of Service	A	A		A	A			C			C	
Approach Delay (s)		3.2			3.4			25.7			26.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	5.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 8: Base Line Street & La Junita Street

5/31/2012

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↖	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	863	33	43	1159	19	37
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	908	35	45	1220	20	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)	270					
pX, platoon unblocked			0.93		0.93	0.93
vC, conflicting volume			943		1626	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			862		1598	354
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		76	93
cM capacity (veh/h)			720		85	596
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	606	338	45	610	610	59
Volume Left	0	0	45	0	0	20
Volume Right	0	35	0	0	0	39
cSH	1700	1700	720	1700	1700	195
Volume to Capacity	0.36	0.20	0.06	0.36	0.36	0.30
Queue Length 95th (ft)	0	0	5	0	0	30
Control Delay (s)	0.0	0.0	10.3	0.0	0.0	31.2
Lane LOS			B			D
Approach Delay (s)	0.0		0.4			31.2
Approach LOS						D
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			42.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 9: Driveway & La Junita Street

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	18	0	54	0	0	0	19	46	0	0	42	11
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	19	0	57	0	0	0	20	48	0	0	44	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	138	138	50	195	144	48	56			48		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	138	138	50	195	144	48	56			48		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	94	100	100	100	99			100		
cM capacity (veh/h)	824	743	1018	714	737	1020	1549			1559		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	76	0	68	56								
Volume Left	19	0	20	0								
Volume Right	57	0	0	12								
cSH	962	1700	1549	1559								
Volume to Capacity	0.08	0.00	0.01	0.00								
Queue Length 95th (ft)	6	0	1	0								
Control Delay (s)	9.1	0.0	2.2	0.0								
Lane LOS	A	A	A									
Approach Delay (s)	9.1	0.0	2.2	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.2									
Intersection Capacity Utilization			21.1%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 10: Base Line Street & Del Rosa Drive

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Ideal Flow (vphpl)	1800	1900	1600	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.98		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)	1676	3392		1676	3514		1676	3459		1676	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1676	3392		1676	3514		1676	3459		1676	1863	1583
Volume (vph)	102	494	189	121	915	46	104	332	59	59	674	284
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)	107	520	199	127	963	48	109	349	62	62	709	299
RTOR Reduction (vph)	0	46	0	0	4	0	0	14	0	0	0	76
Lane Group Flow (vph)	107	673	0	127	1007	0	109	397	0	62	709	223
Turn Type	Prot		Prot			Prot			Prot		Perm	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	8.4	24.8		10.1	26.5		8.8	31.6		7.5	30.3	30.3
Effective Green, g (s)	9.4	27.8		11.1	29.5		9.8	34.6		8.5	33.3	33.3
Actuated g/C Ratio	0.10	0.31		0.12	0.33		0.11	0.38		0.09	0.37	0.37
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	175	1048		207	1152		182	1330		158	689	586
v/s Ratio Prot	0.06	c0.20		0.08	c0.29		c0.07	0.11		0.04	c0.38	
v/s Ratio Perm												0.14
v/c Ratio	0.61	0.64		0.61	0.87		0.60	0.30		0.39	1.03	0.38
Uniform Delay, d1	38.6	26.8		37.4	28.5		38.2	19.3		38.3	28.4	20.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.2	3.0		5.3	9.3		5.2	0.1		1.6	41.9	0.4
Delay (s)	44.7	29.8		42.7	37.8		43.5	19.4		39.9	70.3	21.2
Level of Service	D	C		D	D		D	B		D	E	C
Approach Delay (s)		31.8			38.4			24.4			54.8	
Approach LOS		C			D			C			D	
Intersection Summary												
HCM Average Control Delay			39.7	HCM Level of Service				D				
HCM Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)				6.0				
Intersection Capacity Utilization			87.6%	ICU Level of Service				E				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Base Line Street & E Street

5/31/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	3515		1676	3500		1676	3441		1676	3429	
Flt Permitted	0.10	1.00		0.11	1.00		0.33	1.00		0.15	1.00	
Satd. Flow (perm)	179	3515		194	3500		586	3441		260	3429	
Volume (vph)	98	1109	52	69	1333	106	132	665	151	117	393	103
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)	103	1167	55	73	1403	112	139	700	159	123	414	108
RTOR Reduction (vph)	0	4	0	0	7	0	0	24	0	0	29	0
Lane Group Flow (vph)	103	1218	0	73	1508	0	139	835	0	123	493	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	41.9	36.4		41.7	36.3		24.2	24.2		24.2	24.2	
Effective Green, g (s)	46.9	39.4		46.7	39.3		27.2	27.2		27.2	27.2	
Actuated g/C Ratio	0.59	0.49		0.58	0.49		0.34	0.34		0.34	0.34	
Clearance Time (s)	4.0	5.0		4.0	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	
Lane Grp Cap (vph)	245	1731		250	1719		199	1170		88	1166	
v/s Ratio Prot	c0.04	0.35		0.03	c0.43		0.24	0.24		0.14	0.14	
v/s Ratio Perm	0.21			0.14			0.24			c0.47		
v/c Ratio	0.42	0.70		0.29	0.88		0.70	0.71		1.40	0.42	
Uniform Delay, d1	14.0	15.8		10.4	18.2		22.9	23.0		26.4	20.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	2.4		0.7	6.7		10.2	2.1		234.0	0.2	
Delay (s)	15.1	18.2		11.1	24.9		33.1	25.1		260.4	20.6	
Level of Service	B	B		B	C		C	C		F	C	
Approach Delay (s)		18.0			24.2			26.2			66.3	
Approach LOS		B			C			C			E	
Intersection Summary												
HCM Average Control Delay			28.8			HCM Level of Service				C		
HCM Volume to Capacity ratio			1.03									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			90.8%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
2: Highland Avenue & Waterman Avenue

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1676	3539	1583	1676	3456		1676	3539	1583	1676	3500	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1676	3539	1583	1676	3456		1676	3539	1583	1676	3500	
Volume (vph)	169	955	243	193	991	184	321	1250	309	224	694	56
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)	178	1005	256	203	1043	194	338	1316	325	236	731	59
RTOR Reduction (vph)	0	0	98	0	17	0	0	0	94	0	6	0
Lane Group Flow (vph)	178	1005	158	203	1220	0	338	1316	231	236	784	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	14.0	28.2	28.2	10.8	25.0		12.0	23.0	23.0	12.0	23.0	
Effective Green, g (s)	15.0	31.2	31.2	11.8	28.0		13.0	26.0	26.0	13.0	26.0	
Actuated g/C Ratio	0.17	0.35	0.35	0.13	0.31		0.14	0.29	0.29	0.14	0.29	
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	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)	279	1227	549	220	1075		242	1022	457	242	1011	
v/s Ratio Prot	0.11	c0.28		c0.12	c0.35		c0.20	c0.37		0.14	0.22	
v/s Ratio Perm			0.10						0.15			
v/c Ratio	0.64	0.82	0.29	0.92	1.13		1.40	1.29	0.51	0.98	0.78	
Uniform Delay, d1	35.0	26.8	21.3	38.6	31.0		38.5	32.0	26.6	38.3	29.3	
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	4.7	6.2	1.3	39.8	72.4		201.7	136.9	0.9	50.4	3.8	
Delay (s)	39.7	33.0	22.7	78.4	103.4		240.2	168.9	27.5	88.8	33.1	
Level of Service	D	C	C	E	F		F	F	C	F	C	
Approach Delay (s)		32.0			99.9			157.9			45.9	
Approach LOS		C			F			F			D	
Intersection Summary												
HCM Average Control Delay			93.4			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.15									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			104.1%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Base Line Street & Waterman Avenue

6/13/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1676	3422		1676	3461		1676	3539	1583	1676	3539	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)	1676	3422		1676	3461		1676	3539	1583	1676	3539	1583
Volume (vph)	163	803	227	235	803	139	256	1199	298	110	1061	199
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)	172	845	239	247	845	146	269	1262	314	116	1117	209
RTOR Reduction (vph)	0	26	0	0	14	0	0	0	39	0	0	19
Lane Group Flow (vph)	172	1058	0	247	977	0	269	1262	275	116	1117	190
Turn Type	Prot			Prot			Prot		pm+ov	Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	11.0	29.0		10.0	28.0		10.0	34.0	44.0	7.0	31.0	42.0
Effective Green, g (s)	14.0	32.0		13.0	31.0		13.0	37.0	50.0	10.0	34.0	48.0
Actuated g/C Ratio	0.14	0.32		0.13	0.31		0.13	0.37	0.50	0.10	0.34	0.48
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	235	1095		218	1073		218	1309	823	168	1203	760
v/s Ratio Prot	0.10	c0.31		c0.15	c0.28		c0.16	c0.36	0.04	0.07	0.32	0.03
v/s Ratio Perm									0.13			0.08
v/c Ratio	0.73	0.97		1.13	0.91		1.23	0.96	0.33	0.69	0.93	0.25
Uniform Delay, d1	41.2	33.5		43.5	33.2		43.5	30.8	15.0	43.5	31.8	15.4
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	11.1	19.4		101.4	11.4		138.4	17.6	0.2	11.6	13.6	0.2
Delay (s)	52.3	52.9		144.9	44.6		181.9	48.5	15.2	55.1	45.5	15.5
Level of Service	D	D		F	D		F	D	B	E	D	B
Approach Delay (s)		52.8			64.6			62.3			41.9	
Approach LOS		D			E			E			D	
Intersection Summary												
HCM Average Control Delay			55.6			HCM Level of Service				E		
HCM Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			100.8%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 4: Orange Street Driveway & Waterman Avenue

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	0	21	61	2	97	38	1989	68	98	1769	38
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	0	22	64	2	102	40	2094	72	103	1862	40
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)								487			526	
pX, platoon unblocked	0.52	0.52	0.72	0.52	0.52	0.38	0.72			0.38		
vC, conflicting volume	3318	4334	951	3369	4318	1083	1902			2165		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2930	4881	547	3027	4851	0	1864			2434		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	94	0	0	75	83			0		
cM capacity (veh/h)	0	0	347	0	0	413	231			73		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	33	168	40	1396	769	103	1241	661
Volume Left	11	64	40	0	0	103	0	0
Volume Right	22	102	0	0	72	0	0	40
cSH	0	0	231	1700	1700	73	1700	1700
Volume to Capacity	Err	Err	0.17	0.82	0.45	1.42	0.73	0.39
Queue Length 95th (ft)	Err	Err	15	0	0	210	0	0
Control Delay (s)	Err	Err	23.8	0.0	0.0	349.9	0.0	0.0
Lane LOS	F	F	C			F		
Approach Delay (s)	Err	Err	0.4			18.0		
Approach LOS	F	F						

Intersection Summary			
Average Delay		Err	
Intersection Capacity Utilization	86.2%	ICU Level of Service	E
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.92			0.93		1.00	1.00		1.00	1.00	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1686			1694		1676	3522		1676	3533	
Flt Permitted		0.90			0.89		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1542			1531		1676	3522		1676	3533	
Volume (vph)	13	2	21	26	4	34	40	2092	68	56	1671	19
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)	14	2	22	27	4	36	42	2202	72	59	1759	20
RTOR Reduction (vph)	0	19	0	0	30	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	19	0	0	37	0	42	2272	0	59	1778	0
Turn Type	Perm		Perm			Prot		Prot				
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		8.1			8.1		2.4	44.5		2.4	44.5	
Effective Green, g (s)		11.1			11.1		5.4	47.5		5.4	47.5	
Actuated g/C Ratio		0.16			0.16		0.08	0.68		0.08	0.68	
Clearance Time (s)		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	
Lane Grp Cap (vph)		245			243		129	2390		129	2397	
v/s Ratio Prot							0.03	c0.65		c0.04	0.50	
v/s Ratio Perm		0.01			c0.02							
v/c Ratio		0.08			0.15		0.33	0.95		0.46	0.74	
Uniform Delay, d1		25.1			25.4		30.6	10.2		30.9	7.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.3		1.5	10.0		2.6	2.1	
Delay (s)		25.2			25.7		32.1	20.2		33.5	9.4	
Level of Service		C			C		C	C		C	A	
Approach Delay (s)		25.2			25.7		20.4				10.2	
Approach LOS		C			C		C				B	
Intersection Summary												
HCM Average Control Delay			16.1				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			70.0				Sum of lost time (s)				6.0	
Intersection Capacity Utilization			71.8%				ICU Level of Service				C	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis
6: 5th Street & Waterman Avenue

5/31/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		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)	1676	3414		1676	3539	1583	1676	3539	1583	1676	3539	1583
Flt Permitted	0.48	1.00		0.15	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	844	3414		271	3539	1583	1676	3539	1583	1676	3539	1583
Volume (vph)	198	803	247	113	282	88	163	1974	186	75	1527	184
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)	208	845	260	119	297	93	172	2078	196	79	1607	194
RTOR Reduction (vph)	0	35	0	0	0	63	0	0	30	0	0	46
Lane Group Flow (vph)	208	1070	0	119	297	30	172	2078	166	79	1607	148
Turn Type	pm+pt			pm+pt		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)	29.1	24.1		26.9	23.0	23.0	10.3	32.5	32.5	3.9	26.1	26.1
Effective Green, g (s)	33.1	27.1		30.9	26.0	26.0	11.3	36.5	36.5	4.9	30.1	30.1
Actuated g/C Ratio	0.41	0.33		0.38	0.32	0.32	0.14	0.45	0.45	0.06	0.37	0.37
Clearance Time (s)	3.0	5.0		3.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0	6.0
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)	405	1137		187	1130	506	233	1587	710	101	1309	585
v/s Ratio Prot	c0.04	c0.31		c0.04	0.08		0.10	c0.59		0.05	c0.45	
v/s Ratio Perm	0.17			0.20		0.02			0.10			0.09
v/c Ratio	0.51	0.94		0.64	0.26	0.06	0.74	1.31	0.23	0.78	1.23	0.25
Uniform Delay, d1	16.9	26.4		20.2	20.6	19.2	33.6	22.5	13.8	37.7	25.7	17.8
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	1.1	14.7		6.9	0.1	0.0	11.5	143.9	0.2	31.6	109.4	0.2
Delay (s)	18.0	41.0		27.2	20.7	19.3	45.2	166.3	14.0	69.3	135.0	18.1
Level of Service	B	D		C	C	B	D	F	B	E	F	B
Approach Delay (s)		37.4			22.0			145.6			120.2	
Approach LOS		D			C			F			F	

Intersection Summary

HCM Average Control Delay	104.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	81.4	Sum of lost time (s)	6.0
Intersection Capacity Utilization	109.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↕		↖	↕			↕			↕	↘
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	
Satd. Flow (prot)	1676	3528		1676	3522			1700			1721	
Flt Permitted	0.21	1.00		0.16	1.00			0.94			0.83	
Satd. Flow (perm)	362	3528		289	3522			1614			1463	
Volume (vph)	92	1247	28	22	1077	36	11	8	24	92	10	61
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)	97	1313	29	23	1134	38	12	8	25	97	11	64
RTOR Reduction (vph)	0	1	0	0	2	0	0	17	0	0	29	0
Lane Group Flow (vph)	97	1341	0	23	1170	0	0	28	0	0	143	0
Turn Type	Perm		Perm		Perm			Perm				
Protected Phases	2		6		6			8				
Permitted Phases	2		6		8			4				
Actuated Green, G (s)	52.3	52.3		52.3	52.3			13.7			13.7	
Effective Green, g (s)	55.3	55.3		55.3	55.3			15.7			15.7	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.21			0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	267	2601		213	2597			338			306	
v/s Ratio Prot	c0.38				0.33							
v/s Ratio Perm	0.27			0.08			0.02				c0.10	
v/c Ratio	0.36	0.52		0.11	0.45			0.08			0.47	
Uniform Delay, d1	3.5	4.2		2.8	3.9			23.9			26.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	3.8	0.7		0.3	0.2			0.1			1.1	
Delay (s)	7.3	4.9		3.1	4.0			23.9			27.1	
Level of Service	A	A		A	A			C			C	
Approach Delay (s)	5.1		4.0		23.9			27.1				
Approach LOS	A		A		C			C				

Intersection Summary

HCM Average Control Delay	6.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 8: Base Line Street & La Junita Street

5/31/2012

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↖	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1319	23	26	1185	31	42
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1388	24	27	1247	33	44
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)	270					
pX, platoon unblocked			0.83		0.83	0.83
vC, conflicting volume			1413		2079	706
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1294		2095	446
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		7	91
cM capacity (veh/h)			442		35	466
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	926	487	27	624	624	77
Volume Left	0	0	27	0	0	33
Volume Right	0	24	0	0	0	44
cSH	1700	1700	442	1700	1700	75
Volume to Capacity	0.54	0.29	0.06	0.37	0.37	1.02
Queue Length 95th (ft)	0	0	5	0	0	137
Control Delay (s)	0.0	0.0	13.7	0.0	0.0	207.5
Lane LOS	B			F		
Approach Delay (s)	0.0		0.3			207.5
Approach LOS						F
Intersection Summary						
Average Delay			5.9			
Intersection Capacity Utilization			48.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 9: Orange Street Driveway & La Junita Street

5/31/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	17	0	17	0	0	0	34	42	0	0	48	15
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	18	0	18	0	0	0	36	44	0	0	51	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	174	174	58	192	182	44	66			44		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	174	174	58	192	182	44	66			44		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	98	100	100	100	98			100		
cM capacity (veh/h)	774	702	1007	741	695	1026	1535			1564		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	36	0	80	66								
Volume Left	18	0	36	0								
Volume Right	18	0	0	16								
cSH	876	1700	1535	1564								
Volume to Capacity	0.04	0.00	0.02	0.00								
Queue Length 95th (ft)	3	0	2	0								
Control Delay (s)	9.3	0.0	3.4	0.0								
Lane LOS	A	A	A									
Approach Delay (s)	9.3	0.0	3.4	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			20.8%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 10: Base Line Street & Del Rosa Drive

5/31/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1600	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
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	0.98		1.00	0.98		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)	1676	3506		1676	3485		1676	3474		1676	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1676	3506		1676	3485		1676	3474		1676	1863	1583
Volume (vph)	270	1028	68	48	716	82	52	506	71	105	416	181
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)	284	1082	72	51	754	86	55	533	75	111	438	191
RTOR Reduction (vph)	0	4	0	0	9	0	0	12	0	0	0	85
Lane Group Flow (vph)	284	1150	0	51	831	0	55	596	0	111	438	106
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	15.3	37.9		4.8	27.4		5.8	22.4		8.9	25.5	25.5
Effective Green, g (s)	16.3	40.9		5.8	30.4		6.8	25.4		9.9	28.5	28.5
Actuated g/C Ratio	0.18	0.45		0.06	0.34		0.08	0.28		0.11	0.32	0.32
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	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)	304	1593		108	1177		127	980		184	590	501
v/s Ratio Prot	c0.17	0.33		0.03	c0.24		0.03	0.17		c0.07	c0.24	
v/s Ratio Perm												0.07
v/c Ratio	0.93	0.72		0.47	0.71		0.43	0.61		0.60	0.74	0.21
Uniform Delay, d1	36.3	19.9		40.6	25.9		39.8	28.0		38.2	27.5	22.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	34.5	2.9		3.2	3.6		2.4	1.1		5.5	5.0	0.2
Delay (s)	70.8	22.8		43.9	29.5		42.1	29.1		43.7	32.5	22.7
Level of Service	E	C		D	C		D	C		D	C	C
Approach Delay (s)		32.3			30.3			30.1			31.6	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			31.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			6.0			
Intersection Capacity Utilization			78.4%			ICU Level of Service				D		
Analysis Period (min)			15									
c	Critical Lane Group											

**APPENDIX G:
MITIGATION AND NEW SIGNAL LOS RESULTS**

HCM Signalized Intersection Capacity Analysis
 3: Base Line Street & Waterman Avenue

7/16/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1676	3426		1676	3478		1676	3539	1583	1676	3539	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)	1676	3426		1676	3478		1676	3539	1583	1676	3539	1583
Volume (vph)	167	653	177	285	794	104	136	665	184	88	1290	157
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)	176	687	186	300	836	109	143	700	194	93	1358	165
RTOR Reduction (vph)	0	25	0	0	10	0	0	0	52	0	0	25
Lane Group Flow (vph)	176	848	0	300	935	0	143	700	142	93	1358	140
Turn Type	Prot			Prot			Prot	pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases								8				4
Actuated Green, G (s)	10.9	27.0		14.0	30.1		6.0	31.8	45.8	7.2	33.0	43.9
Effective Green, g (s)	13.9	30.0		17.0	33.1		9.0	34.8	51.8	10.2	36.0	49.9
Actuated g/C Ratio	0.14	0.30		0.17	0.33		0.09	0.35	0.52	0.10	0.36	0.50
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	233	1028		285	1151		151	1232	852	171	1274	822
v/s Ratio Prot	0.10	0.25		c0.18	c0.27		c0.09	0.20	0.03	0.06	c0.38	0.02
v/s Ratio Perm								0.06				0.06
v/c Ratio	0.76	0.82		1.05	0.81		0.95	0.57	0.17	0.54	1.07	0.17
Uniform Delay, d1	41.4	32.6		41.5	30.6		45.3	26.5	12.7	42.7	32.0	13.7
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	13.0	5.5		67.8	4.5		56.9	1.9	0.1	3.5	44.8	0.1
Delay (s)	54.4	38.0		109.3	35.1		102.1	28.4	12.8	46.2	76.8	13.8
Level of Service	D	D		F	D		F	C	B	D	E	B
Approach Delay (s)		40.8			53.0			35.7			68.6	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM Average Control Delay			51.9			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			97.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
3: Base Line Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1900	1900	1800	1900	1900	1800	1900	1900	1800	1900	1900
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1676	3422		1676	3461		1676	3539	1583	1676	3539	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)	1676	3422		1676	3461		1676	3539	1583	1676	3539	1583
Volume (vph)	163	803	227	235	803	139	256	1199	298	110	1061	199
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)	172	845	239	247	845	146	269	1262	314	116	1117	209
RTOR Reduction (vph)	0	26	0	0	14	0	0	0	23	0	0	29
Lane Group Flow (vph)	172	1058	0	247	977	0	269	1262	291	116	1117	180
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	8.0	28.0		11.0	31.0		12.0	36.0	47.0	5.0	29.0	37.0
Effective Green, g (s)	11.0	31.0		14.0	34.0		15.0	39.0	53.0	8.0	32.0	43.0
Actuated g/C Ratio	0.11	0.31		0.14	0.34		0.15	0.39	0.53	0.08	0.32	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	184	1061		235	1177		251	1380	871	134	1132	712
v/s Ratio Prot	0.10	c0.31		c0.15	0.28		c0.16	c0.36	0.05	0.07	0.32	0.03
v/s Ratio Perm									0.14			0.09
v/c Ratio	0.93	1.00		1.05	0.83		1.07	0.91	0.33	0.87	0.99	0.25
Uniform Delay, d1	44.1	34.5		43.0	30.3		42.5	28.9	13.4	45.5	33.8	18.2
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	47.5	26.7		72.8	5.1		77.1	10.9	0.2	40.3	23.8	0.2
Delay (s)	91.7	61.1		115.8	35.4		119.6	39.8	13.7	85.8	57.5	18.4
Level of Service	F	E		F	D		F	D	B	F	E	B
Approach Delay (s)		65.3			51.5			47.0			54.1	
Approach LOS		E			D			D			D	
Intersection Summary												
HCM Average Control Delay	53.7			HCM Level of Service				D				
HCM Volume to Capacity ratio	0.97											
Actuated Cycle Length (s)	100.0			Sum of lost time (s)				6.0				
Intersection Capacity Utilization	100.8%			ICU Level of Service				G				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 3: Base Line Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		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)	1583	3236		1583	3293		1583	3353	1500	1583	3353	1500
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)	1583	3236		1583	3293		1583	3353	1500	1583	3353	1500
Volume (vph)	92	357	108	143	442	60	90	367	99	51	675	87
Peak-hour factor, PHF	0.98	0.98	0.98	0.83	0.83	0.83	0.80	0.80	0.80	0.88	0.88	0.88
Adj. Flow (vph)	94	364	110	172	533	72	112	459	124	58	767	99
RTOR Reduction (vph)	0	31	0	0	12	0	0	0	50	0	0	40
Lane Group Flow (vph)	94	443	0	172	593	0	112	459	74	58	767	59
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	10.2	22.0		10.9	22.7		8.0	41.0	51.9	6.1	39.1	49.3
Effective Green, g (s)	13.2	25.0		13.9	25.7		11.0	44.0	57.9	9.1	42.1	55.3
Actuated g/C Ratio	0.13	0.25		0.14	0.26		0.11	0.44	0.58	0.09	0.42	0.55
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	209	809		220	846		174	1475	899	144	1412	860
v/s Ratio Prot	0.06	c0.14		c0.11	c0.18		c0.07	0.14	0.01	0.04	c0.23	0.01
v/s Ratio Perm									0.04			0.03
v/c Ratio	0.45	0.55		0.78	0.70		0.64	0.31	0.08	0.40	0.54	0.07
Uniform Delay, d1	40.0	32.6		41.6	33.7		42.6	18.2	9.3	42.9	21.7	10.4
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	1.5	0.8		16.4	2.6		7.9	0.6	0.0	1.8	1.5	0.0
Delay (s)	41.6	33.4		58.0	36.3		50.5	18.7	9.3	44.7	23.2	10.4
Level of Service	D	C		E	D		D	B	A	D	C	B
Approach Delay (s)		34.7		41.1			22.2			23.2		
Approach LOS		C		D			C			C		
Intersection Summary												
HCM Average Control Delay			29.9	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			100.0	Sum of lost time (s)				6.0				
Intersection Capacity Utilization			61.5%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 3: Base Line Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	0.98		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)	1583	3234		1583	3277		1583	3353	1500	1583	3353	1500
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)	1583	3234		1583	3277		1583	3353	1500	1583	3353	1500
Volume (vph)	90	445	138	126	441	79	153	625	151	63	582	110
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.87	0.87	0.87	0.88	0.88	0.88
Adj. Flow (vph)	100	494	153	154	538	96	176	718	174	72	661	125
RTOR Reduction (vph)	0	31	0	0	15	0	0	0	44	0	0	62
Lane Group Flow (vph)	100	616	0	154	619	0	176	718	130	72	661	63
Turn Type	Prot		Prot			Prot		pm+ov		Prot		pm+ov
Protected Phases	5	2		1	6		3	8	1	7	4	5
Permitted Phases									8			4
Actuated Green, G (s)	10.9	24.4		9.9	23.4		12.2	40.1	50.0	5.6	33.5	44.4
Effective Green, g (s)	13.9	27.4		12.9	26.4		15.2	43.1	56.0	8.6	36.5	50.4
Actuated g/C Ratio	0.14	0.27		0.13	0.26		0.15	0.43	0.56	0.09	0.36	0.50
Clearance Time (s)	5.0	5.0		5.0	5.0		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	3.0
Lane Grp Cap (vph)	220	886		204	865		241	1445	840	136	1224	756
v/s Ratio Prot	0.06	c0.19		c0.10	c0.19		c0.11	c0.21	0.02	0.05	c0.20	0.01
v/s Ratio Perm									0.07			0.03
v/c Ratio	0.45	0.70		0.75	0.72		0.73	0.50	0.16	0.53	0.54	0.08
Uniform Delay, d1	39.6	32.6		42.0	33.4		40.4	20.6	10.6	43.8	25.1	12.8
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	1.5	2.4		14.6	2.8		10.8	1.2	0.1	3.7	1.7	0.0
Delay (s)	41.1	34.9		56.7	36.2		51.3	21.8	10.7	47.5	26.8	12.9
Level of Service	D	C		E	D		D	C	B	D	C	B
Approach Delay (s)		35.8			40.2			24.9			26.5	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM Average Control Delay			31.1			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			4.0			
Intersection Capacity Utilization			65.2%			ICU Level of Service					C	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1800	1900	1900	1800	1900	1700	1800	1900	1000	1800	1900
Total Lost time (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.93			0.96		1.00	0.99		1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1622			1640		1583	3328		931	3351	
Flt Permitted		0.96			0.82		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1570			1384		1583	3328		931	3351	
Volume (vph)	2	3	6	33	1	13	5	482	25	23	945	4
Peak-hour factor, PHF	0.46	0.46	0.46	0.83	0.83	0.83	0.87	0.87	0.87	0.82	0.82	0.82
Adj. Flow (vph)	4	7	13	40	1	16	6	554	29	28	1152	5
RTOR Reduction (vph)	0	11	0	0	13	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	13	0	0	44	0	6	580	0	28	1157	0
Turn Type	Perm		Perm			Prot		Prot				
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		8.3			8.3		0.8	43.7		3.0	45.9	
Effective Green, g (s)		11.3			11.3		3.8	46.7		6.0	48.9	
Actuated g/C Ratio		0.16			0.16		0.05	0.67		0.09	0.70	
Clearance Time (s)		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	
Lane Grp Cap (vph)		253			223		86	2220		80	2341	
v/s Ratio Prot							0.00	0.17		c0.03	c0.35	
v/s Ratio Perm		0.01			c0.03							
v/c Ratio		0.05			0.20		0.07	0.26		0.35	0.49	
Uniform Delay, d1		24.8			25.4		31.4	4.7		30.2	4.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.4		0.3	0.3		2.6	0.7	
Delay (s)		24.9			25.8		31.8	5.0		32.8	5.6	
Level of Service		C			C		C	A		C	A	
Approach Delay (s)		24.9			25.8			5.3			6.2	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM Average Control Delay			6.8				HCM Level of Service			A		
HCM Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			70.0				Sum of lost time (s)			4.0		
Intersection Capacity Utilization			49.5%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Olive Street & Waterman Avenue

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1800	1900	1900	1800	1900	1700	1800	1900	1700	1800	1900
Total Lost time (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.92			0.94		1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1596			1612		1583	3335		1583	3347	
Flt Permitted		0.90			0.87		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1466			1428		1583	3335		1583	3347	
Volume (vph)	7	1	12	19	2	19	22	1106	42	31	915	11
Peak-hour factor, PHF	0.59	0.59	0.59	0.81	0.81	0.81	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	12	2	20	23	2	23	23	1164	44	33	963	12
RTOR Reduction (vph)	0	17	0	0	20	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	17	0	0	28	0	23	1206	0	33	974	0
Turn Type	Perm		Perm			Prot		Prot				
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		6.7			6.7		2.3	45.9		2.4	46.0	
Effective Green, g (s)		9.7			9.7		5.3	48.9		5.4	49.0	
Actuated g/C Ratio		0.14			0.14		0.08	0.70		0.08	0.70	
Clearance Time (s)		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	
Lane Grp Cap (vph)		203			198		120	2330		122	2343	
v/s Ratio Prot							0.01	c0.36		c0.02	0.29	
v/s Ratio Perm		0.01			c0.02							
v/c Ratio		0.08			0.14		0.19	0.52		0.27	0.42	
Uniform Delay, d1		26.3			26.5		30.3	5.0		30.4	4.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.3		0.8	0.8		1.2	0.5	
Delay (s)		26.4			26.8		31.1	5.8		31.6	5.0	
Level of Service		C			C		C	A		C	A	
Approach Delay (s)		26.4			26.8			6.3			5.9	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM Average Control Delay			6.8				HCM Level of Service			A		
HCM Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			70.0				Sum of lost time (s)			6.0		
Intersection Capacity Utilization			44.0%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

7/16/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1900	1800	1900	1900	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.92			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1583	3336		1583	3337			1595			1612	
Flt Permitted	0.33	1.00		0.46	1.00			0.92			0.90	
Satd. Flow (perm)	555	3336		770	3337			1489			1485	
Volume (vph)	33	436	15	23	595	19	16	3	29	24	4	27
Peak-hour factor, PHF	0.90	0.90	0.90	0.77	0.77	0.77	0.60	0.60	0.60	0.68	0.68	0.68
Adj. Flow (vph)	37	484	17	30	773	25	27	5	48	35	6	40
RTOR Reduction (vph)	0	1	0	0	1	0	0	40	0	0	34	0
Lane Group Flow (vph)	37	500	0	30	797	0	0	40	0	0	47	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	55.9	55.9		55.9	55.9			10.1			10.1	
Effective Green, g (s)	58.9	58.9		58.9	58.9			12.1			12.1	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.16			0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	436	2620		605	2621			240			240	
v/s Ratio Prot	0.15		c0.24		c0.24		0.03		0.03		c0.03	
v/s Ratio Perm	0.07		0.04		0.04		0.03		0.03		c0.03	
v/c Ratio	0.08	0.19		0.05	0.30			0.17			0.20	
Uniform Delay, d1	1.9	2.0		1.8	2.3			27.1			27.2	
Progression Factor	0.82	0.83		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.2		0.0	0.1			0.2			0.4	
Delay (s)	1.9	1.8		1.8	2.4			27.3			27.7	
Level of Service	A		A		A		C		C		C	
Approach Delay (s)	1.8		2.3		2.3		27.3		27.3		27.7	
Approach LOS	A		A		A		C		C		C	
Intersection Summary												
HCM Average Control Delay	4.8		HCM Level of Service		A							
HCM Volume to Capacity ratio	0.28											
Actuated Cycle Length (s)	75.0		Sum of lost time (s)		4.0							
Intersection Capacity Utilization	42.3%		ICU Level of Service		A							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

7: Base Line Street & Crestview Avenue

7/16/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1900	1700	1800	1900	1900	1800	1900	1900	1800	1900
Total Lost time (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.92			0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	
Satd. Flow (prot)	1583	3340		1583	3336			1602			1628	
Flt Permitted	0.39	1.00		0.35	1.00			0.93			0.84	
Satd. Flow (perm)	647	3340		588	3336			1508			1401	
Volume (vph)	51	675	18	16	587	20	8	4	17	51	5	34
Peak-hour factor, PHF	0.94	0.94	0.94	0.93	0.93	0.93	0.63	0.63	0.63	0.92	0.92	0.92
Adj. Flow (vph)	54	718	19	17	631	22	13	6	27	55	5	37
RTOR Reduction (vph)	0	1	0	0	1	0	0	22	0	0	30	0
Lane Group Flow (vph)	54	736	0	17	652	0	0	24	0	0	67	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	54.2	54.2		54.2	54.2			11.8			11.8	
Effective Green, g (s)	57.2	57.2		57.2	57.2			13.8			13.8	
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.18			0.18	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		4.0	4.0			2.5			3.0	
Lane Grp Cap (vph)	493	2547		448	2544			277			258	
v/s Ratio Prot	c0.22		0.20		0.20		0.02		0.02		c0.05	
v/s Ratio Perm	0.08		0.03		0.03		0.02		0.02		c0.05	
v/c Ratio	0.11	0.29		0.04	0.26			0.09			0.26	
Uniform Delay, d1	2.3	2.7		2.2	2.6			25.4			26.2	
Progression Factor	0.67	0.66		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.3		0.0	0.1			0.1			0.5	
Delay (s)	2.0	2.1		2.2	2.7			25.5			26.8	
Level of Service	A	A		A	A			C			C	
Approach Delay (s)	2.1		2.7		2.7		25.5		25.5		26.8	
Approach LOS	A		A		A		C		C		C	

Intersection Summary

HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

33: Base Line Street & Stater Bros. Lot

7/16/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1800	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
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	0.93		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)	1583	3341		1583	3323		1583	1632		1583	1613	
Flt Permitted	0.40	1.00		0.48	1.00		0.74	1.00		0.74	1.00	
Satd. Flow (perm)	671	3341		801	3323		1232	1632		1238	1613	
Volume (vph)	27	403	10	10	500	32	10	10	10	20	10	14
Peak-hour factor, PHF	0.88	0.88	0.88	0.84	0.84	0.84	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	31	458	11	12	595	38	11	11	11	24	12	16
RTOR Reduction (vph)	0	1	0	0	2	0	0	9	0	0	14	0
Lane Group Flow (vph)	31	468	0	12	631	0	11	13	0	24	14	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	2			6			8			8		4
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	57.5	57.5		57.5	57.5		7.5	7.5		7.5	7.5	
Effective Green, g (s)	60.5	60.5		60.5	60.5		10.5	10.5		10.5	10.5	
Actuated g/C Ratio	0.81	0.81		0.81	0.81		0.14	0.14		0.14	0.14	
Clearance Time (s)	5.0	5.0		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	
Lane Grp Cap (vph)	541	2695		646	2681		172	228		173	226	
v/s Ratio Prot		0.14			c0.19			0.01			0.01	
v/s Ratio Perm	0.05			0.01			0.01			c0.02		
v/c Ratio	0.06	0.17		0.02	0.24		0.06	0.05		0.14	0.06	
Uniform Delay, d1	1.5	1.6		1.4	1.7		28.0	28.0		28.3	28.0	
Progression Factor	1.00	1.00		0.37	0.31		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.1		0.1	0.2		0.2	0.1		0.4	0.1	
Delay (s)	1.7	1.8		0.6	0.7		28.1	28.1		28.7	28.1	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		1.8			0.7			28.1			28.4	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM Average Control Delay			3.1			HCM Level of Service		A				
HCM Volume to Capacity ratio			0.22									
Actuated Cycle Length (s)			75.0			Sum of lost time (s)		4.0				
Intersection Capacity Utilization			39.4%			ICU Level of Service		A				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 32: Base Line Street & Stater Bros Lot

7/16/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Ideal Flow (vphpl)	1700	1800	1800	1700	1800	1800	1700	1800	1800	1700	1800	1800
Total Lost time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
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	0.93		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)	1583	3345		1583	3323		1583	1632		1583	1584	
Flt Permitted	0.38	1.00		0.36	1.00		0.73	1.00		0.74	1.00	
Satd. Flow (perm)	628	3345		597	3323		1221	1632		1238	1584	
Volume (vph)	45	669	10	10	586	37	10	10	10	49	10	22
Peak-hour factor, PHF	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	48	719	11	11	644	41	11	11	11	58	12	26
RTOR Reduction (vph)	0	0	0	0	2	0	0	9	0	0	22	0
Lane Group Flow (vph)	48	730	0	11	683	0	11	13	0	58	16	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Actuated Green, G (s)	55.5	55.5		55.5	55.5		9.5	9.5		9.5	9.5	
Effective Green, g (s)	58.5	58.5		58.5	58.5		12.5	12.5		12.5	12.5	
Actuated g/C Ratio	0.78	0.78		0.78	0.78		0.17	0.17		0.17	0.17	
Clearance Time (s)	5.0	5.0		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	
Lane Grp Cap (vph)	490	2609		466	2592		204	272		206	264	
v/s Ratio Prot	c0.22				0.21		0.01		0.01		0.01	
v/s Ratio Perm	0.08		0.02				0.01				c0.05	
v/c Ratio	0.10	0.28		0.02	0.26		0.05	0.05		0.28	0.06	
Uniform Delay, d1	2.0	2.3		1.8	2.3		26.3	26.2		27.3	26.3	
Progression Factor	1.00	1.00		0.74	0.67		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.3		0.1	0.2		0.1	0.1		0.8	0.1	
Delay (s)	2.4	2.6		1.5	1.8		26.4	26.3		28.1	26.4	
Level of Service	A		A		A		C		C		C	
Approach Delay (s)	2.6		1.8				26.3				27.4	
Approach LOS	A		A				C				C	
Intersection Summary												
HCM Average Control Delay	4.2		HCM Level of Service		A							
HCM Volume to Capacity ratio	0.28											
Actuated Cycle Length (s)	75.0		Sum of lost time (s)		4.0							
Intersection Capacity Utilization	45.4%		ICU Level of Service		A							
Analysis Period (min)	15											
c	Critical Lane Group											

**APPENDIX H:
CUMULATIVE PROJECTS LIST**

APPENDIX H
PENDING AND APPROVED PROJECTS TRIP GENERATION ^[a]

Existing Population	Location	Size	Unit ^[c]	Trip Generation						
				AM			PM			Daily
				In	Out	Total	In	Out	Total	Total
Commercial Building	Southeast corner of Waterman Avenue and Mill Street	4.995	KSF	0	0	0	6	8	14	221
Commercial Shopping Center with Home Improvement Store ^[b]	Southwest corner of Arden Avenue and Highland Avenue	204.720	KSF	169	122	291	237	249	486	5,692
Industrial Complex Center	Southeast corner of Arrowhead Avenue and	770.000	KSF	530	116	646	139	523	662	5,359
3-Story, Senior Housing Complex	Northwest corner of Medical Center Drive and 16th Street	93.000	U	4	8	12	9	6	15	324
Contractor Storage Yard	Southeast corner of Valley View Drive and Mill Street	4.500	KSF	0	0	0	1	1	2	11
3-Story Hotel	Highland Avenue between Valaria Drive and Robinson Road	100.000	RM	34	22	56	31	28	59	4,294
Industrial Building	1910 East Central Avenue	951.000	KSF	225	60	285	76	228	304	3,386
Residential	Rialto Avenue, 800 feet east of Tippecanoe Avenue	94.000	DU	18	53	71	60	35	95	900
Offices and Industrial Building	Northeast corner of Sterling Avenue and 3rd Street	27.129 19.943	KSF KSF	37 16 53	5 2 7	42 18 60	7 2 9	34 17 51	41 19 60	299 139 438
Office Building	1955 East Marshall Avenue	11.000	KSF	15	2	17	3	14	17	1,745
Trip Generation Total				1,048	390	1,438	571	1,143	1,714	22,370

Notes:

[a] Trip generations calculated from ITE Trip Generation (8th edition, 2008). Categories 110, 150, 210, 310, 710, and 820.

[b] Trip generation sourced from Home Depot Traffic Impact Study Report, Fehr and Peers, May 2011. See Appendix H for pending and approved projects trip generation.

[c] DU = dwelling unit, U = unit, RM = room, KSF = thousand square feet.

APPENDIX I:
CITY OF SAN BERNARDINO REFERENCE DOCUMENTS



CITY OF SAN BERNARDINO DEVELOPMENT SERVICES DEPARTMENT TRAFFIC IMPACT STUDY GUIDELINES

The Development/Environmental Review Committee may identify concerns that require a traffic study and report as part of the project review process. The City Engineer, under the authority of the Director of Development Services, will make the final decision on the need for a traffic study. The purpose of the traffic study is to identify impacts to traffic operation and safety. The purpose of these guidelines is to provide the standard requirements for the preparation of a traffic study.

Traffic Study Requirement Review

The City's Development Services Department shall do an initial assessment of the project based upon the description and proposed use(s). In general, the requirement for a traffic study as part of the project review process will be based upon, but not limited to, the following criteria:

- 1) Any project with initial traffic generation estimates showing that the project is likely to add 500 or more daily two-way trips, and/or likely to add 50 or more AM or PM peak period two-way trips to the existing circulation system, without consideration of pass-by trip reductions. Phased projects must be evaluated as a whole assuming full build-out conditions for purposes of determining the need for a traffic study.
- 2) Any project that is located in the vicinity (within a 1½-mile radius from the project site) of any key intersections that currently operate at a level of service (LOS) D or worse and project traffic is likely to significantly worsen this condition.
- 3) Any project that generates more than 40 percent of its total traffic in the form of truck traffic using passenger car equivalents (PCE).
- 4) Any project that intensifies the usage, density, or traffic generation of the site above the level currently allowed by zoning codes, requiring a Conditional Use Permit, General Plan Amendment, or other discretionary permit.

Study Review Fee

The applicant shall pay the City a study review fee of \$280.00 at the time of report submittal.

Study Requirements

When required, the traffic study must be prepared under the direction of, and signed by, a Professional Engineer, duly registered in the State of California to use the title “Traffic Engineer” and/or to practice Traffic Engineering. The traffic study must follow study guidelines as described herein. A “Scope of Study” form must be completed and submitted to the department for approval prior to the start of any traffic study.

The latest Congestion Management Program (CMP) for San Bernardino County and requirements for a Traffic Impact Analysis (TIA) must be reviewed to determine if the project meets the CMP TIA threshold. If the project meets CMP threshold requirements, the traffic study must incorporate all of the requirements for preparing a CMP TIA in addition to or in conjunction with the City’s requirements specified herein.

Trip Generation Estimates

1. Trip Generation Rates: Passenger vehicle trips shall be estimated using the rates and methodologies outlined in Trip Generation, latest edition, published by the Institute of Transportation Engineers (ITE). Approval must be obtained from the City Engineer prior to using any other source to establish the project trips.
2. Trip Generation Basis: The basis of all trip generation calculations will depend on the type of land use proposed. The trips generated by most commercial and industrial uses should be based on gross floor area. The trips generated by most residential uses should be based on the number of dwelling units. An alternate basis for estimating the project trips may be approved and/or required by the City Engineer for certain special uses where more appropriate and known features of the project will result in a more accurate estimate.
3. Unknown Trip Generation Rates: Some unique types of development or uses may not have rates/formulas published by ITE. In this case, a trip generation study may be conducted at a similar existing facility in order to determine acceptable trip generation rates to be used in the study. The type and location of the similar existing facility and the study methodology must be pre-approved by the City Engineer.
4. Pass-By and Diverted-Link Trips: With prior City Engineer approval, pass-by and/or diverted-link trips may be calculated and used in estimating the project-generated trips using the procedures specified in the latest edition of Trip Generation. The pass-by and/or diverted link trips must be justified by appropriate calculations. However, the reduced or net trips generated by the project should not be used to analyze project driveways and intersection(s) immediately adjacent to the project site (i.e., driveways and intersections in the immediate vicinity shall be analyzed using the full trip generation of the project). Typically, pass-by trips are associated with new fast-food restaurants, gas stations and shopping centers, etc.
5. Truck Trips: For some industrial and warehouse uses as well as heavy truck related land uses, such as truck stops, truck sales, used truck sales, heavy industrial and truck terminals, rates specified in “Truck Trip Generation Study” prepared by the City of

Fontana, latest edition, shall be used. Truck trips shall be calculated and shown separately. Peak hour distribution of inbound and outbound trucks shall be identified separate from passenger cars. For light industrial, industrial parks and warehouse uses, trip rates contained in the latest edition of Trip Generation shall be used. All truck trips shall be converted into passenger car equivalents (PCE) for intersection capacity analysis using the following factors:

2-axle trucks:	2.0 PCE
3-axle trucks:	2.5 PCE
4- and more axle trucks:	3.0 PCE

Trip Distribution Assumption

The traffic study preparer shall specify in the Scope of Study form (Page 8), either independently or in consultation with the Development Services Department, the trip distribution assumptions to be used in the traffic study and have them approved by the Department prior to completing the study. Ideally, the distribution should be based on general socioeconomic characteristics of the study area, location and intensity of major trip generation and attraction centers, trip length information, origin-destination information (specifically for industrial and warehouse uses) and any other known but verifiable information. For heavy truck related uses, where truck trips comprise a minimum of 20 percent of the total generated trips after converting into passenger car equivalents, trip distribution assumptions for truck trips should be shown separately and presented in the report text and figures separately. Use of the City's East Valley Travel Forecast Model or other approved model may be required to establish the project trip distribution.

Study Area

The scope of the traffic study shall include at a minimum any key intersection or roadway segment within a one and a half (1 ½) mile radius area from the project site. All key intersections and roadway segments within this study area must be analyzed to identify impacts to capacity and LOS. The study intersections and roadway segments should be listed in the "Scope of Study" form (Page 8) for review and approval by Development Services prior to starting the study.

Projects located within Specific Plan areas for which a program level Environmental Impact Report (EIR) has been previously approved by the City, may be allowed to use a study area limited to the immediate vicinity of the project to determine the need for any traffic improvements in addition to those already identified in the EIR. The traffic study for this type of project must specifically identify any differences between the project and the land use assumed for the site in the EIR. A meeting with Development Services will generally be necessary to discuss the specific scope of the study prior to preparing the traffic study.

Analysis Procedure and Methodology

1. Traffic Counts: Existing average daily traffic volumes for study intersections and

roadways shall be estimated using 24-hour automatic machine counters or a recognized traffic counting agency or company. Existing peak period intersection turning movement volumes shall be estimated using skilled personnel/technicians or a recognized traffic counting agency or company. Typical count days are Tuesday, Wednesday and Thursday of a typical week. Counts taken on holidays and the day before and after a holiday should not be used. Days with abnormal traffic conditions (such as rains, construction activities, road closures, etc.) must be avoided. Counts in the vicinity of a school should be taken when the school is in session. New traffic counts will not be necessary if counts are available from another source such as traffic studies and/or City records, provided that they have been obtained within the last two years.

2. Peak Periods: Generally, both morning (7 a.m. to 9 a.m.) and evening (4 p.m. to 6 p.m.) peak periods should be used in the analysis to identify traffic impacts and level of service problems. In some cases, an off-peak period may be required as directed and approved by the City Engineer. Ideally, the peak hours will be verified by 24-hour volume counts.
3. Analysis Scenarios: The following analysis scenarios, in the order shown, should be included for roadway and intersection capacity analysis:
 - a. Existing Year Traffic Condition (identify any existing deficiencies)
 - b. Project Opening Year Base Traffic Condition
 - c. Project Opening Year Base plus Other Proposed Projects Traffic Condition
 - d. Project Opening Year Base plus Other Projects plus Project Traffic Condition
 - e. Project Opening Year Base plus Other Projects plus Project Traffic Condition with Mitigation, if necessary
 - f. Future Build-out Year Cumulative Base (from City's East Valley Travel Forecast Model or other approved projection method) Traffic Condition
 - g. Future Build-out Year Cumulative Base plus Project Traffic Condition
 - h. Future Build-out Year Cumulative Base plus Project Traffic Condition with Mitigation, if necessary

Additionally, a staging analysis may be required for phased projects to identify the timing of future phases and needed mitigation measures.

4. Internal Circulation: Include a brief discussion on internal circulation and proposed on-site parking. Show and discuss how vehicles would enter and exit via the main access driveways and identify any on-site or off-site circulation problems. Identify the need for signal controls using traffic signal warrants specified in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) and California Supplement.
5. Capacity Analysis Method: The latest version of the Highway Capacity Manual (HCM) shall be the basis for operational delay (LOS) calculations for signalized and unsignalized intersections. Several software packages are available for conducting

LOS analysis. The software package and version must be identified in the report. Appendix C of the San Bernardino County Congestion Management Program (CMP) provides a summary of analysis assumptions, including minimum phase times, maximum cycle lengths, lost time per phase, peak hour factors, saturation flows of individual movements that are to be used in the analysis, etc. LOS analyses must be prepared in accordance with the approved methodologies presented in the CMP.

6. Traffic Growth: Use of the City’s East Valley Travel Forecast Model or other approved model may be required to determine the future traffic volumes and growth. In the absence of traffic model information, the future build-out year base traffic volumes shall be estimated using an annual growth factor of 3 percent per year, unless a different rate can be justified and is approved and/or required by the City Engineer.
7. Traffic Impacts: Traffic impacts at an intersection are to be considered “significant” when any of the following changes in the volume to capacity (V/C) ratios occur between the “without project” and the “with project” conditions identified in Item 3 above:

<u>LOS</u> <u>Without Project</u>	<u>V/C</u> <u>Difference</u>
C	> 0.0400
D	> 0.0200
E, F	> 0.0100

The LOS and V/C ratios above are based on the delay methodology outlined in the Highway Capacity Manual.

8. Mitigation Requirement: The report should identify level of service problems under existing conditions and identify measures that will provide an acceptable LOS. These measures shall be assumed to be in place for subsequent analyses. Mitigation measures must be identified for intersections that show a significant project impact per item 7 above, and operate at LOS D or worse under the conditions identified in Items 3d and/or 3g above. The LOS with mitigation must be improved to LOS D or better for intersections and LOS C or better for roadway segments, under the conditions identified in Items 3e and/or 3h above. Identify mitigation measures for both opening year and future build-out year conditions. Mitigation measures may need to be identified for other conditions, depending on the project phasing and timing.
9. Mitigation Fair-share Cost Calculations: The percentage of fair-share for the project shall be calculated at each location using the total trips generated by the project divided by the total “new” traffic, which is the net increase in traffic volume from all proposed projects (Other Projects plus Project) and growth. The cost of mitigation shall be estimated using verifiable cost estimates from reliable and recognized sources such as the CMP guidelines. Fair-share cost of mitigation shall be calculated using the fair-share percentage of the project volumes multiplied by total estimated cost of mitigation.

Report Format

To address traffic impact concerns, the traffic study report shall contain the following:

1. Cover Page with an appropriate title of the Study and applicable application numbers, Preparer's name and address with phone and fax numbers, and preparation date.
2. Certification Page with a statement indicating that the study has been prepared by, or under the supervision of, a registered traffic engineer, and the preparer's signature and seal of registration.
3. Table of Contents
4. An Executive Summary (describing the study scope and findings)
5. Introduction – (describing the project and the purpose of the study)
6. Data Collection, Data Source and Analysis Methodology
7. Documentation of Analysis and Findings (details may be included in an appendix)
8. Identification of traffic impacts associated with the project
9. Identification of measures required to mitigate the traffic impacts associated with the project and their timing, if needed
10. Project Mitigation Fair-Share Cost Calculation, if needed
11. Figures showing, at a minimum, the following:
 - a) Vicinity Map
 - b) Site Plan showing project driveways
 - c) Existing traffic volumes (peak hours and ADT)
 - d) Existing intersection lane configuration and traffic control
 - e) Location of Related Projects
 - f) Cumulative traffic volumes from other projects
 - g) Project trip distribution percentages
 - h) Project related traffic volumes, including at site-access driveways
 - i) Project opening year cumulative traffic volume
 - j) Build-out year traffic volume with Project
 - k) Future lane configuration and traffic control used in future analysis
 - l) Future lane configuration and traffic control used in future analysis with identified mitigation, if necessary.
12. Tables showing, at a minimum, the following:
 - a) Project trip generation
 - b) Other projects' trip generation
 - c) Intersection Capacity Analysis results for various scenarios, identifying locations with significant impacts that require mitigation, if necessary
 - d) Mitigation Measures, if necessary
 - e) Calculation of Project's fair-share cost of mitigation, if necessary
13. Conclusion

Scope of Study Form

To be completed by applicant and approved by Development Services prior to start of study

Project Name: _____
 Project Address: _____
 Project Description: _____
 Developer's Name: _____
 Address: _____
 Telephone No. _____ Fax Number: _____
 Email Address: _____

Trip Generation Rates From: ITE _____ Ed. _____ Other: _____

Trip Generation For:

<p>Land Use (1) _____ ITE Land Use Code _____ Daily Trips _____ AM Peak Hour Trips _____ Inbound _____ Outbound _____ Total _____ PM Peak Hour Trips _____ Inbound _____ Outbound _____ Total _____</p>		<p>Land Use (2) _____ ITE Land Use Code _____ Daily Trips _____ AM Peak Hour Trips _____ Inbound _____ Outbound _____ Total _____ PM Peak Hour Trips _____ Inbound _____ Outbound _____ Total _____</p>
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(Use Additional Sheet(s), if necessary)

Pass-by Trips (%), if applicable: _____ %

<p>Land Use (1) _____ ITE Land Use Code _____ Daily Trips _____ AM Peak Hour Trips _____ Inbound _____ Outbound _____ Total _____ PM Peak Hour Trips: _____ Inbound _____ Outbound _____ Total _____</p>		<p>Land Use (2) _____ ITE Land Use Code _____ Daily Trips _____ AM Peak Hour Trips _____ Inbound _____ Outbound _____ Total _____ PM Peak Hour Trips: _____ Inbound _____ Outbound _____ Total _____</p>
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Project Opening Year: _____

Build-out Year: _____

<p>Study Intersections: 1 _____ 2 _____ 3 _____ 4 _____ 5 _____</p>		<p>6 _____ 7 _____ 8 _____ 9 _____ 10 _____</p>
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(Use Additional Sheet(s) and Map, if necessary)

Ambient Growth Rate: _____ %

Trip Distribution: East _____ % West _____ % North _____ % South _____ %

Preparer's Name: _____
 Address: _____
 Telephone No. _____ Fax Number: _____
 Email Address: _____
 Signature: _____ Date: _____

Approved By (Development Services Department):

Signature: _____ Date: _____
 Name: _____ Title: _____

- unified, functionally related to efficiency, and compatible with adjacent uses; and (b) landscape locations and species are coordinated with architectural and site design. (PRT-1)
- 8.2.5 Design and develop parks to complement and reflect their natural environmental setting and maximize their open space character. (PRT-1)
- 8.2.6 Design and improve our parks according to the following:
- a. Locate parks on collector or neighborhood streets so they are easily accessible to adjacent residential neighborhoods;
 - b. Site uses so that they do not adversely impact adjacent residences (e.g., locating high activity, noise-generating, and nighttime uses away from residences);
 - c. Fulfill the particular needs of residents of the area they serve (i.e., senior citizens, and families with children);
 - d. Provide for parking so that it does not disrupt abutting residences; and
 - e. Incorporate landscape that “fits” with adjacent areas. (PRT-1)
- 8.2.7 Install new and replace existing landscaping where it is severely deteriorated, inappropriately located for park activities, and incompatible with other landscape and adjacent uses. (PRT-1)
- 8.2.8 Ensure that all parks are adequately illuminated for safe use at night. (PRT-1)
- 8.2.9 Provide for the supervision of park activities and promote enforcement of codes restricting illegal activity. (PRT-1)
- 8.2.10 Restrict and control nighttime park use so that adjacent residences are not adversely affected. (PRT-1)

Multi-Purpose Trails and Bikeways

As of 2003, there were no Class 1 bikeways in San Bernardino. We will change this situation. Our goal is to realize a complete system of safe, interconnected trails and bikeways that connect San Bernardino internally and with our surrounding region.



Importantly, we want to do so in a cost effective and planned manner. Due to the developed nature of parts of our community and the cost involved in right-of-way acquisition, a concentrated effort should be made to develop safe dual use of existing roadways. The use of parks, drainage channels, and utility easements should also continue to be explored.

Every trip starts with a pedestrian movement; however, pedestrians often have to compete for safe space. Pedestrian safety as well as amenable pedestrian environments are important quality of life factors in San Bernardino. Sidewalk access is sometimes reduced by the intrusion of various sidewalk impediments such as benches, newspaper boxes, signs, plantings, and garbage cans. It is important to have a safe pedestrian system that links commercial residential and open spaces land uses.

Goal 8.3 **Develop a well-designed system of interconnected multi-purpose trails, bikeways, and pedestrian paths.**

Policies:

- 8.3.1 Work cooperatively with appropriate regional agencies to facilitate development of interconnected trails that tie into major activity areas. (PRT-6)

- 8.3.2 Establish a multi-purpose trail system, as shown on Figure PRT-2, along the foothills of the San Bernardino Mountains, Santa Ana River, Cajon and Lytle Creeks, and interconnecting linkages in collaboration with the U.S. Forest Service, County of San Bernardino, City of Highland, Loma Linda, and other adjacent communities. (PRT-1)

- 8.3.3 Establish a recreational greenbelt system linking the river and drainage corridors with the mountains. (PRT-1)

- 8.3.4 All new developments on designated routes, as shown on Figure PRT-2, shall provide bicycle and pedestrian routes linked to adjacent facilities. (LU-1)

- 8.3.5 Provide routes accessible for disabled persons that link public facilities and commercial areas to residential neighborhoods. (PRT-1)

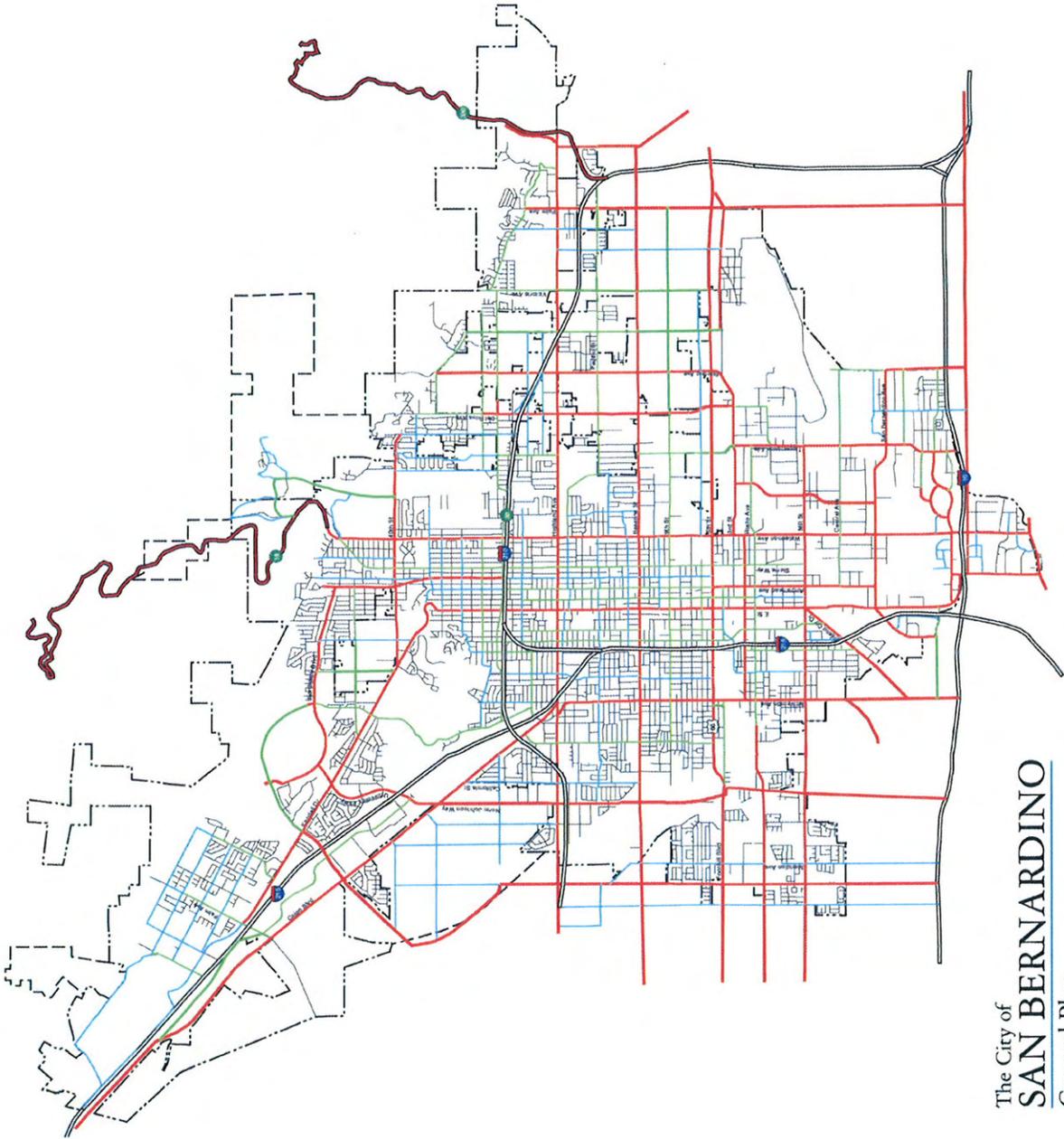
- 8.3.6 Adequate and secure bicycle storage facilities shall be provided for new institutional and non-residential development. (PRT-1 and LU-1)
- 8.3.7 Provide bicycle racks in public facilities and in activity centers. (PRT-1 and LU-1)
- 8.3.8 Install sidewalks and wheelchair ramps in existing neighborhoods. (PRT-1)
- 8.3.9 Separate bikeway and trail systems from traffic and roadways wherever possible. (PRT-1)
- 8.3.10 Provide clear separation of hikers, joggers, and equestrians where possible. (PRT-1)
- 8.3.11 Seek the use of easements and rights-of-way from owners and continue to negotiate agreements for the use of utility easements, flood controls channels, and railroad rights-of-way to expand the park and trail system. (PRT-1 and PRT-6)
- 8.3.12 Incorporate the following features in multi-purpose trails, bike routes, and pedestrian paths:
 - a. Special paving or markings at intersections;
 - b. Clear and unobstructed signing and trail/lane markings;
 - c. Improved signal phasing;
 - d. Vehicular turning restrictions at intersections;
 - e. Hearing impaired cross walk signals;
 - f. Trees to provide shade;
 - g. Safe and well lighted rest areas; and
 - h. Coordinated street furniture including signs, trash receptacles, newspaper stands, and drinking fountains. (PRT-1 and CD-1)

Funding

The provision of parks, trails, and recreational facilities and services requires funding for acquisition, development, ongoing maintenance, and ongoing programs. To promote the desired lifestyle, our recreational programs must be adequately funded.

Circulation Plan

- Freeway
- State Highway
- Major Arterial
- Secondary Arterial
- Collector
- Local
- City Boundary
- Sphere of Influence Boundary



The City of
SAN BERNARDINO
 General Plan

Figure C-2



Intelligent Transportation Systems

Or ITS, encompass a broad range of wireless and wireline communications-based information, control and electronics technologies. When integrated into the transportation system infrastructure, and in vehicles themselves, these technologies help monitor and manage traffic flow, reduce congestion, provide alternate routes to travelers, enhance productivity, and save lives, time and money.

The City plays a vital role in the use of transit through sound land planning efforts and ensuring that developments are designed in a manner that facilitates the provision of transit services.

Goal 6.6 Promote a network of multi-modal transportation facilities that are safe, efficient, and connected to various points of the City and the region.

Policies:

- 6.6.1 Support the efforts of regional, state, and federal agencies to provide additional local and express bus service in the City.
- 6.6.2 Create a partnership with Omnitrans to identify public transportation infrastructure needs that improve mobility.
- 6.6.3 In cooperation with Omnitrans, require new development to provide transit facilities, such as bus shelters and turnouts, as necessary and warranted by the scale of the development. (LU-1)
- 6.6.4 Ensure accessibility to public transportation for seniors and persons with disabilities.
- 6.6.5 In cooperation with Omnitrans, explore methods to improve the use, speed, and efficiency for transit services. These methods might include dedicated or priority lanes/signals, reduced parking standards for selected core areas, and incorporating Intelligent Transportation System architecture.
- 6.6.6 Support and encourage the provision of a range of paratransit opportunities to complement bus and rail service for specialized transit needs.
- 6.6.7 Encourage measures that will reduce the number of vehicle-miles traveled during peak periods, including the following examples of these types of measures:
 - Incentives for car-pooling and vanpooling.
 - Preferential parking for car-pools and vanpools.
 - An adequate, safe, and interconnected system of pedestrian and bicycle paths.

**APPENDIX J:
PROJECT SCOPING FORM**

Scope of Study Form

To be completed by applicant and approved by Development Services prior to start of study

Project Name: [Waterman Gardens](#)
Project Address: [Southeast Corner of North Waterman Avenue and Baseline Street](#)

Description: [Redevelopment of the Site to replace existing housing with additional housing and a new community center](#)
Developer's Name: [Housing Authority of the County of San Bernardino \(HACSB\)](#)
Address: [715 East Brier Drive, San Bernardino, CA 92408](#)
Telephone No: [909-890-0644](#) Fax Number: [909-890-4618](#)
Email Address: sgarcia@hacsb.com

Trip Generation Rates From: [ITE Trip Generation Handbook, 8th edition, 2008.](#)

Trip Generation For: Please see Table 1 for Project Trip Generation.

Land Use (1) Multi-Family Dwelling Units	Land Use (2) Community Center
ITE Land Use Code 220	ITE Land Use Code 495
Daily Trips 727	Daily Trips 1,305
AM Peak Hour Trips	AM Peak Hour Trips
Inbound 0	Inbound 57
Outbound 116	Outbound 37
Total 116	Total 93
PM Peak Hour Trips	PM Peak Hour Trips
Inbound 97	Inbound 31
Outbound 4	Outbound 53
Total 101	Total 84

Project Opening Year: [2012](#)

Buildout Year: [2012](#)

Study Intersections:

- | | |
|--|---------------------------------------|
| 1) N Waterman Avenue/Base Line Street | 7) N E Street/Base Line Street |
| 2) N Waterman Avenue/E Orange Street | 8) E 5th Street/N Waterman Avenue |
| 3) Base Line Street/Crestview Avenue | 9) Del Rosa Drive/Base Line Street |
| 4) Base Line Street/La Junta Road | 10) I-215 SB Off-Ramp/W 13th Street |
| 5) East Orange Street/La Junta Road | 11) I-215 NB Off-Ramp/W 13th Street |
| 6) E Highland Avenue/N Waterman Avenue | 12) I-215 NSB On-Ramp/W Orange Street |
| | 13) I-215 NB On-Ramp/W 10th Street |

Ambient Growth Rate: [3%](#)

Trip Distribution: East [20%](#) West [50%](#) North [20%](#) South [10%](#)

Related Projects: Please provide. Thank you.

Preparer's Name: [Fehr and Peers](#)
Address: [3850 Vine Street, Suite 140, Riverside, CA 92507](#)
Telephone No: [951-274-4800](#) Fax Number: [951-684-4324](#)
Email Address: c.gray@tehrandpeers.com
Signature: _____ Date: [4/28/2011 \(updated 5/25/12\)](#)

TABLE 1
PROJECT TRIP GENERATION¹

Existing Population	Size	Unit	Rate							Trip Generation						
			AM			PM			Daily	AM			PM			Daily
			In	Out	Total	In	Out	Total	Total	In	Out	Total	In	Out	Total	Total
New Multi-Family Dwelling Units	411	DU	0.10	0.41	0.51	0.40	0.22	0.62	6.65	42	168	210	166	90	256	2,733
Existing Multi-Family Dwelling Units ²	252	DU	Counts Collected April 28, 2011							-26	-88	-114	-105	-55	-160	-2,598
Subtotal									16	80	96	61	35	96	135	
Community Center	114.035	KSF	0.99	0.63	1.62	0.54	0.91	1.45	22.88	113	73	186	62	105	167	2,609
Assumed Internalization ³			50%	50%	50%	50%	50%	50%	50%	-57	-37	-93	-31	-53	-84	-1,305
Subtotal									57	37	93	31	53	84	1,305	
ITE Project Subtotal									155	241	396	228	195	423	5,342	
<i>Existing Trip Credits</i>									-26	-88	-114	-105	-55	-160	-2,598	
<i>Internalized Trip Credits</i>									-57	-37	-93	-31	-53	-84	-1,305	
Project Trip Generation Total									72	117	189	92	88	180	1,440	

Notes:

¹ Project trip generation calculated from ITE Trip Generation Manual (8th edition, 2008), Categories 220 and 495.

² Credits calculated from existing counts conducted on April 28, 2011 at inlet/outlet locations to project site. Proportion of existing land use units over proposed land use units (252/411 = 61.3%) is credited for counts exceeding ITE trip generation values.

³ Community Center is assumed to be primarily used by residents of project.