APPENDIX F
TRAFFIC IMPACT STUDY (with all appendices)

TRAFFIC IMPACT STUDY

FOR THE

FIG GARDEN FINANCIAL CENTER PHASE IV

Fresno, California

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This Traffic Impact Study has been prepared under the direction of Walter V. Hutcheson. Walter V. Hutcheson attests to the technical information contained therein and has judged the qualifications of recommendations, conclusions, and decisions are based on City of Fresno guidelines, general engineering standards, and California/Federal laws.

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TRAFFIC IMPACT STUDY
FOR THE
FIG GARDEN FINANCIAL CENTER
PHASE IV

CHAPTER 1 – INTRODUCTION

This Traffic Impact Study (TIS) was prepared to assess the traffic impacts due to the proposed Fig Garden Financial Center Phase IV (Project), which will be located on the south side of West San Jose Avenue between Maroa and Palm Avenues in the City of Fresno. The approximately 3.96 acre site is currently occupied by a vacant, single-level apartment complex with 44 units. The proposed Project will be comprised of a four-story 104,593 square foot (sf) office building. This study evaluates the impacts of the proposed development on adjacent segment and intersection operations and provides an assessment of the Project driveways and on-site circulation. Figure 1-1 shows the Project location.

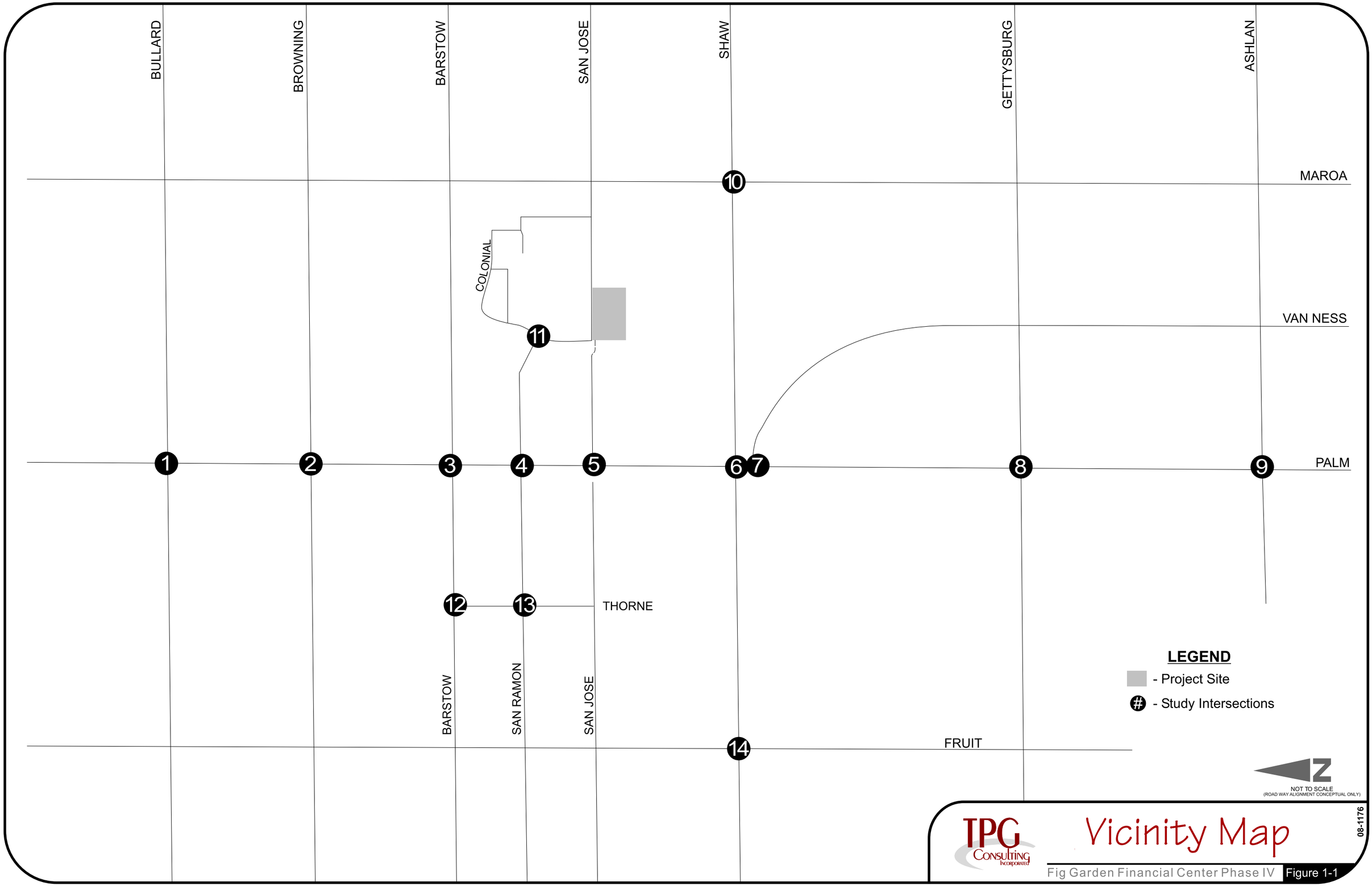
The Project study area for the analysis of traffic impacts extends from Bullard Avenue (north) to Ashlan Avenue (south) and from Fruit Avenue (west) to Maroa Avenue (east). This report analyzes fourteen (14) intersections and eleven (11) segments for two (2) time periods (weekday AM and PM peak hours). Unsignalized and signalized intersection levels of service (LOS) were calculated using *Synchro 7.0* software, which is an industry standard and is recognized for use in the City of Fresno. The *Synchro 7.0* software is based on the *2000 Highway Capacity Manual (HCM 2000)* methodology, which is also an industry standard. Segment levels of service were calculated using the unadjusted *2007 Florida Tables*. Signal warrants were prepared using the *California Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways*. The analysis methodology used in this report is included in Appendix A.

Queue lengths for the movements at the study intersections were also calculated based on the LOS calculations. The signalized intersection queue lengths are not calculated using the *HCM 2000* methodology. Therefore the queue length calculations for the signalized study intersections are calculated using *Synchro 7.0* methodologies and are included in Appendix B.

To analyze the traffic impacts resulting from the build out of the Project, the following five (5) scenarios were evaluated:

- Existing (2011) Traffic Conditions
- Existing Plus the Project Traffic Conditions
- Existing Plus Approved Projects Plus the Project
- 2030 No Project Traffic Conditions
- 2030 Plus the Project Traffic Conditions

Growth increments developed from the Council of Fresno County Governments (COFCG) Fresno County Traffic Model (Model) were used to develop the 2030 No Project volumes. The model years used to develop the 2030 No Project growth increments were 2008 and 2030.



Vicinity Map

Fig Garden Financial Center Phase IV Figure 1-1

CHAPTER 2 – EXECUTIVE SUMMARY

The Fig Garden Financial Center Phase IV trip generation was developed using the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, which is the recommended methodology in the City of Fresno. Table 2-1 shows the Project trip generation used in this analysis.

TABLE 2-1:
FIG GARDEN FINANCIAL CENTER PHASE IV TRIP GENERATION DATA

		AM			PM		
Land Use	**Daily**	**Enter**	**Exit**	**Total**	**Enter**	**Exit**	**Total**
General Office Building	**1,381**	**171**	**23**	**194**	**33**	**163**	**196**

2.1 Thresholds of Significance

2.1.1 Level of Service Standards

City of Fresno

According to the City of Fresno's Traffic Impact Study Guidelines:

> *"All City intersections and roadway segments shall operate at a LOS D or better under the near-term conditions, unless a finding of overriding consideration was adopted in the General Plan MEIR. Under long-term conditions (Year 2030 Conditions) all City intersections and roadway segments shall operate at a LOS D or better, except for the roadway segments adopted in the General Plan MEIR to operate at LOS E or F."*[1]

The City's General Plan MEIR identifies four (4) study area roadway segments that have been adopted to operate below the LOS D policy, as follows:

- Bullard Avenue – Marks to Fresno – LOS F
- Barstow Avenue – Palm to Blackstone – LOS F
- Shaw Avenue – Brawley to SR 168 – LOS F
- Ashlan Avenue – Fruit to Maple – LOS F

Since the General Plan MEIR found the above roadway segments were projected to operate below the LOS D standard, a finding of overriding considerations was made for those segments. The potential improvements required for those segments to operate at LOS D were determined to be infeasible by the Master EIR, therefore all City of Fresno study segments shown above will be evaluated against the LOS F policy. The remaining study locations within the City of Fresno will be evaluated against the LOS D policy.

County of Fresno

According to the Fresno County General Plan Circulation Element:

> *"The County shall plan and design its roadway system in a manner that strives to meet level of service (LOS) D on urban roadways within the spheres of influence of the cities of Fresno and Clovis and LOS C on all other roadways in the County."*[2]

[1] *City of Fresno Traffic Impact Study Guidelines*, City of Fresno, February 2009, Page 3.
[2] *County of Fresno 2000 General Plan*, The County of Fresno, August 2010 , Page 2-99.

The County's General Plan EIR identifies that Ashlan Avenue, east and west of Palm Avenue, is currently operating and projected to operate at LOS F under all scenarios. No improvements (widening to four lanes) are considered feasible for this segment of Ashlan Avenue. As such, the County has adopted an overriding consideration for this segment. Therefore, the intersection of Ashlan Avenue at Palm Avenue will be evaluated against the City's adopted LOS standard (LOS D).

All study intersections and segments were evaluated according to the appropriate adopted LOS standard based on the controlling agency's policies. Table 2-2 shows the adopted LOS policy for each study location.

2.1.2 Significant Impact Threshold

According to the City of Fresno Traffic Impact Study Guidelines[3]:

> *"For study intersections, the impact is considered significant if the addition of the traffic generated from the proposed project results in any one of the following:*
>
> 1. *Triggers an intersection operating at acceptable LOS to operate at unacceptable levels of service*
> 2. *Triggers an intersection operating at unacceptable LOS (LOS E) to operate at LOS F*
> 3. *Increases the average delay for a study intersection that is already operating at unacceptable LOS"*

After each study intersection has been evaluated against the LOS policy, those locations found to be deficient were compared to the above policies to determine the level of significance of the potential impacts.

For study segments with an adopted LOS F standard, the significance criteria for Project-related impacts are identified in the General Plan MEIR as follows:

> *Development projects that are consistent with plans and policies but that could affect conditions on major street segments predicted by the General Plan EIR traffic analysis to perform at an ADT LOS "F" shall not cause further substantial degradation of conditions on those segments before 2025 without completing a traffic and transportation evaluation. This evaluation will be used to determine appropriate project-specific design measures or street/transportation improvements that will contribute to achieving and maintaining a LOS equivalent to that anticipated in the General Plan. Further substantial degradation is defined as an increase in the peak hour vehicle/capacity (v/c) ratio of 0.15 or greater for roadway segments whose v/c ratio is estimated to be 1.00 or higher in 2025 by the General Plan EIR.*[4]

The v/c increase (0.15) criteria was applied to determine what, if any, significant project-related impacts occur for all study locations with Master EIR adopted LOS F standards and which are projected to operate at LOS F. As shown below, none of the study segments meet this criteria.

It had been previously understood that the General Plan MEIR's adoption of an alternative LOS for specified impacted segments of the major street network encompassed the adoption of the alternative LOS standard for intersections along the identified segment (MEIR at page V-B16-17). The City of

[3] *City of Fresno Traffic Impact Study Guidelines*, City of Fresno, February 2009, Page 10.
[4] *Draft Master Environmental Impact Report for the 2025 General Plan*, City of Fresno, May 2002, Page V-B17

Fresno Public Works Department has recently stated that it does not believe the General Plan MEIR made such a finding with respect to the intersections along those impacted segments, and that the MEIR's adoption of an alternative LOS for impacted roadway networks relates solely to the roadway segments.

This traffic study finds that many of the intersections along the impacted roadway network will operate at less than the LOS D standard, without the Project. That circumstance reflects an existing cumulative significant impact under the existing General Plan. Therefore, in evaluating the impacts of the Project to intersections along the impacted segments, this EIR takes the approach that the incremental effects of the Project are cumulatively considerable (and thereby a significant cumulative impact), only if one of two criteria exists:

1. *Triggers an intersection operating at unacceptable LOS (LOS E) to operate at LOS F.*
2. *Increases the average delay* ***by five or more seconds*** *for a study intersection that is already operating at unacceptable LOS.*[5]

The change in the second criteria from the City of Fresno's published Traffic Impact Study Guidelines to include the addition of the 5 second criteria is consistent with the standards adopted by the City in its certification of the Fresno El Paseo Environmental Impact Report (SCH #2008011003). This criterion was also used in the recently published EIR for the Fresno Southeast Walmart Expansion Project (SCH #2007091064)[6]. This criteria, although not included in the City of Fresno's TIS Guidelines or the General Plan MEIR, is commonplace in many jurisdictions including: The Cities of Bakersfield and Folsom and in the County of Sonoma (among many other jurisdictions).

2.2 Level of Service Analysis

Table 2-2 shows the levels of service (LOS) for the study segments and intersections for the various scenarios. Segments, intersections (signalized) or movements (unsignalized) currently operating below or projected to operate below the appropriate adopted level of service standard are shown in bold in Table 2-2. The signalized intersection levels of service shown in Table 2-2 are representative of the whole intersection. As shown in Table 2-2, the following locations, by scenario, are projected to operate below the appropriate City of Fresno or County of Fresno's adopted level of service standards:

2.2.1 Cumulative Analysis

The following segments and intersections were predicted to operate below the City of Fresno's appropriate LOS standards.

2030 Without the Project

Segments

- Barstow Avenue – Palm Avenue to Fruit Avenue – PM peak hour

Intersections

- Bullard Avenue at Palm Avenue – PM peak hour
- Barstow Avenue at Palm Avenue – PM peak hour
- Shaw Avenue at Maroa Avenue – PM peak hour

[5] *Recirculated Draft Fresno El Paseo Environmental Impact Report*, City of Fresno, August 2010, page 5.13-14.
[6] *Fresno Southeast Walmart Expansion Project*, City of Fresno, December 2010, page 157.

TABLE 2-2:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE STUDY SEGMENTS AND INTERSECTIONS

Segment	LOS Standard	Existing LOS AM/PM	Existing Plus the Project LOS AM/PM	Existing Plus Approved Project Plus the Project[1] LOS PM	2030 No Project LOS AM/PM	2030 Plus the Project LOS AM/PM
Shaw Avenue – Palm Avenue to Fruit Avenue	F	C/C	C/C	C	C/D	C/D
Shaw Avenue – Maroa Avenue to Palm Avenue	F	C/C	C/C	C	C/D	C/D
Palm Avenue – Bullard Avenue to Barstow Avenue	D	C/C	C/C	C	C/D	C/D
Palm Avenue – Barstow Avenue to San Ramon Avenue	D	C/C	C/C	D	C/D	C/D
Palm Avenue – San Ramon Avenue to San Jose Avenue	D	C/C	C/C	D	C/D	C/D
Palm Avenue – San Jose Avenue to Shaw Avenue	D	C/C	C/C	C	C/D	C/D
Palm Avenue – Shaw Avenue to Gettysburg	D	C/C	C/C	C	C/C	C/C
San Jose Avenue – Colonial Avenue to Maroa Avenue	D	C/C	C/C	C	C/C	C/C
San Ramon Avenue – Palm Avenue to Fruit Avenue	D	C/C	C/C	C	C/C	C/C
Barstow Avenue – Palm Avenue to Fruit Avenue	D	C/D	C/D	D	D/**F**	D/**F**
Thorne Avenue – Barstow Avenue to San Ramon Avenue	D	C/C	C/C	C	C/C	C/C

Intersection	LOS Standard	LOS AM/PM	Delay[2] AM/PM	LOS AM/PM	Delay[2] PM	LOS PM	Delay[2] PM	LOS AM/PM	Delay[2] AM/PM	LOS AM/PM	Delay[2] AM/PM
Bullard Avenue at Palm Avenue	D	C/D	34.2/38.8	D/D	35.4/39.6	D	51.1	D/F	49.0/100.3	D/F	51.3/102.8
Browning Avenue at Palm Avenue	D	B/A	14.6/8.7	B/B	14.8/8.8	B	14.3	B/C	16.6/22.8	B/C	16.9/23.0
Barstow Avenue at Palm Avenue	D	C/C	20.6/29.9	C/C	21.1/31.2	D	54.1	C/F	33.3/81.1	C/F	34.8/84.5
San Ramon Avenue at Palm Avenue											
• NB Left		B/B	10.7/10.0	B/A	11.1/9.9	B	10.5	A/B	9.6/11.9	A/B	9.8/12.1
• SB Left	D	A/B	9.4/10.9	A/B	9.4/11.3	B	12..4	A/B	9.1/14.0	A/B	9.1/14.7
• EB Approach		B/B	13.6/14.9	B/B	13.6/14.4	B	13.1	B/C	11.7/15.9	B/C	11.7/16.4
• WB Approach		C/B	20.0/15.0	C/B	19.2/15.0	B	14.5	C/C	15.1/17.1	B/C	14.5/18.1
San Jose Avenue at Palm Avenue	D	A/B	10.0/15.9	B/B	12.5/18.0	B	19.5	A/B	9.1/16.1	B/B	10.6/17.9
Shaw Avenue at Palm Avenue	D	D/D	37.2/39.2	D/D	38.3/42.1	D	49.2	C/C	29.7/32.9	C/C	27.4/35.0
Van Ness Avenue at Palm Avenue	D										
• WB Right		B/B	11.8/11.1	B/B	12.0/11.2	B	11.4	B/B	10.8/10.9	B/B	11.0/11.0
Gettysburg Avenue at Palm Avenue	D	A/A	7.1/6.4	A/A	7.1/6.3	A	6.3	B/A	10.3/9.9	B/B	10.3/10.1
Ashlan Avenue at Palm Avenue	D	B/B	14.6/19.1	B/B	15.0/19.4	C	20.9	B/C	16.8/28.9	B/C	16.8/29.2
Barstow Avenue at Thorne Avenue								C/C	26.8/24.3	C/C	26.9/23.9
• WB Left	D	A/A	9.3/8.5	A/A	9.3/8.5	A	9.0				
• NB Approach		D/B	33.6/14.2	D/B	34.6/14.4	C	18.6				
San Ramon Avenue at Thorne Avenue											
• EB Approach		B/A	10.9/9.8	B/A	10.9/9.8	B	10.1	B/A	10.3/9.6	B/B	10.3/9.6
• WB Approach	D	B/A	10.5/9.8	B/A	10.5/9.8	A	10.0	A/A	10.0/9.7	A/B	10.0/9.7
• NB Approach		A/A	0.0/0.5	A/A	0.0/0.5	A	0.5	A/A	0.0/0.4	A/A	0.0/0.4
• SB Approach		A/A	4.9/1.4	A/A	4.9/1.4	A	2.0	A/A	4.8/1.9	A/A	4.8/1.9
Shaw Avenue at Fruit Avenue	D	B/B	13.6/14.4	B/B	13.6/14.8	B	14.9	B/B	15.8/17.5	B/B	14.7/17.2
Shaw Avenue at Maroa Avenue	D	B/B	13.3/19.5	B/B	13.4/19.6	C	22.0	B/E	19.4/75.1	B/E	17.2/72.2
San Ramon Avenue at Colonial Avenue											
• NB Left-Through	D	A/A	5.5/3.7	A/A	5.6/3.7	A	3.7	A/A	5.8/3.8	A/A	5.9/3.8
• EB Approach		A/A	8.8/8.9	A/A	8.8/8.9	A	8.9	A/A	8.8/8.9	A/A	8.8/8.9

[1] *No AM peak hour Approved Project traffic – only PM peak hour analyzed* [2] *delay in seconds per vehicle*
NB = northbound *SB = southbound* *EB = eastbound* *WB = westbound*

2030 Plus the Fig Garden Project

Segments

- Barstow Avenue – Palm Avenue to Fruit Avenue – PM peak hour

Intersections

- Bullard Avenue at Palm Avenue – PM peak hour
- Barstow Avenue at Palm Avenue – PM peak hour
- Shaw Avenue at Maroa Avenue – PM peak hour

2.2.2 Fig Garden Project-Specific Analysis

After determination of the cumulative analysis identified in the LOS analysis, the significance criteria were applied to determine what, if any, impacts are project-related. Based on the City's significant impact threshold, none of the study locations that are projected to operate below the appropriate adopted LOS standard are significantly impacted by the Project. For locations with an LOS F standard that are projected to operate at LOS F in the 2030 without the Project and in the 2030 Plus the Fig Garden Project scenarios, the overall intersection delay increase was analyzed to determine what, if any, significant project-related impacts occur. The results of the delay comparison are as follows:

Intersections

- Bullard Avenue at Palm Avenue – increase in average delay = 2.8 < the 5 sec threshold
  - 2030 No Project PM Delay: = 100.3
  - 2030 Plus the Project: PM Delay: = 102.8
- Barstow Avenue at Palm Avenue – increase in average delay = 3.4 < the 5 sec threshold
  - 2030 No Project: PM Delay: = 81.1
  - 2030 Plus the Project: PM Delay: = 84.5
- Shaw Avenue at Maroa Avenue – decrease in average delay = 2.9 < 5 the sec threshold
  - 2030 No Project: PM Delay = 75.1
  - 2030 Plus the Project: PM Delay = 72.2

As shown above, all average delay changes associated with the Project are projected to be below the 5 second increase threshold of significance. There are no significant impacts as a result of the development of the Fig Garden Financial Center Phase IV Project.

2.3 Roadway Improvements

2.3.1 City of Fresno

Potentially recommended improvements (such as addition of through and turn lanes, changes in signal phasing, movement restriction, etc.) have been evaluated against the established criteria presented in the City of Fresno's TIS Guidelines, as follows:

> *"For all recommendations to increase the number of travel lanes on a street or at an intersection as a mitigation measure, the report must clearly identify the impacts associated with such a change such as whether or not additional right of way will be required and whether it is feasible to acquire the right of way based on the level of development of the adjacent land and buildings (if any). All mitigations should be reviewed in the field to make sure that they can be accommodated. If they cannot be*

> *accommodated or are not feasible please advise in the TIS so that the applicant and the City of Fresno are aware of right-of-way issues in advance."*[7]

As shown above, the Project does not create any project-specific significant impacts to the analysis roadways. Therefore, the Project will pay the City's Fresno Major Street Improvement (FMSI) and Traffic Signal Mitigation Impact (TSMI) fees to mitigate its contribution to the cumulative impacts.

2.3.2 County of Fresno

This is consistent for all County controlled locations (Browning Avenue, Van Ness Blvd, and Ashlan Avenue at their intersections with Palm Avenue) with the County's General Plan policies, as follows:

> *Draft General Plan Implementation Program TR-A.B states that the County would require new development within an unincorporated area of a city sphere of influence to pay the traffic impact fees of that city. It would be the responsibility of the cities to develop and maintain their roadway capital improvement programs and adequate funding mechanisms to maintain their adopted level of service programs for the entire sphere of influence.*[8]

2.3.3 Planned City Improvements

Based on the City of Fresno's current TSMI project list, three improvements included in the TSMI apply to the study locations. These improvements will be constructed using TSMI funds, which the Project will pay into. These improvements are as follows:

- Shaw Avenue at Palm Avenue
  - Widening to dual left-turn lanes on all four legs
    - Dual left-turn lanes are already located on the southbound approach
    - Separate right-turn lanes are already located on the westbound and southbound approaches

This improvement is currently ranked number 2 on the Fiscal Year 2011 (FY11) Priority List for Intersection Traffic Flow Improvements. The left-turn lanes and separate right-turn lanes are assumed to be in place for the 2030 No Project and 2030 Project scenarios.

- Barstow Avenue at Palm Avenue
  - Installation of left-turn signals with dedicated phases

This improvement is currently ranked number 12 on the FY11 Priority List for Warranted Left Turn Signals. The left-turn signals are assumed to be in place for the 2030 No Project and 2030 Project scenarios.

- Barstow Avenue at Thorne Avenue
  - Installation a traffic signal

This improvement is currently ranked number 14 on the FY11 Priority List for New Traffic Signal Installations. This traffic signal is warranted based on the school crossing signal warrant. As shown in the signal warrant analysis included in this report, the peak hour traffic signal warrant is not currently met or projected to be met in the future conditions. This traffic signal is assumed to be in place for the 2030 No Project and 2030 Project scenarios.

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[7] *City of Fresno Traffic Impact Study Guidelines*, City of Fresno, February 2009, Page 11.
[8] *County of Fresno General Plan Update Draft Environmental Impact Report*, County of Fresno, February 2000, page 4.4-31

In addition to the improvements planned in the TSMI, additional improvements are also planned in the City of Fresno's Intelligent Transportation Systems (ITS) Program. Phase 4 of the City's ongoing traffic signal synchronization program will be to synchronize all traffic signals on Shaw Avenue from SR 99 to SR 41 (fiber) and Bullard Avenue from Marks Avenue to Willow Avenue (wireless). These improvements are programmed for some time between 2011 and 2015. Therefore, the study intersections located on these corridors have been analyzed as coordinated for the 2030 No Project and 2030 Project scenarios.

2.3.4 Cumulative Improvements

Potential improvements have been prepared for all study locations projected to operate below the appropriate adopted LOS standard. The feasibility of each of the proposed improvements is then addressed. Based on the identified right-of-way constraints, 2025 General Plan designations, on-street parking needs, existing and planned bicycle facilities, and City practices and policies, improvements are not feasible at these locations. Therefore the cumulative conditions are considered significant and unavoidable because no feasible mitigation measures are available.

2030 Without the Project

Segments

- Barstow Avenue – Palm Avenue to Fruit Avenue
  - No improvements recommended

This segment of Barstow Avenue is currently constructed to two (2) lanes with a continuous two-way left-turn lane. This is the buildout configuration for this roadway adopted in the General Plan. Further widening of Barstow Avenue would conflict with the adopted General Plan and *Bicycle, Pedestrian and Trails Master Plan* policies. If the segment was widened to four lanes, then the segment is projected to operate at LOS C in both the 2030 No Project and 2030 Plus the Project scenarios. Widening of this roadway segment would require removal of the current on-street parking on both sides of Barstow Avenue. On-street parking is needed for the residential development fronting Barstow Avenue on both sides of the street. On-street parking is also needed on the north side of the roadway for the adjacent schools. Additional right-of-way cannot be feasibly obtained for widening due to the level of residential development and the adjacent school buildings.

Intersections

- Bullard Avenue at Palm Avenue
  - No improvements recommended

All approaches to this intersection currently have separate left-turn lanes and two through lanes. Separate right-turn lanes are available on the westbound and southbound approaches. Adjacent development is located in very close proximity to the roadways on the northwest, southwest, and southeast corners, prohibiting widening on those approaches. In addition, the on-street parking located on Bullard Avenue is needed for the adjacent residential development and would likely need to be removed to accommodate widening at the intersection. The addition of through lanes and/or right-turn lanes is not feasible.

- Barstow Avenue at Palm Avenue
  - No improvements recommended

The Barstow Avenue approaches to this intersection currently have separate left-turn lanes, one through lane, and a separate right–turn lane. Palm Avenue approaches have separate left-turn lanes and two through lanes with shared right-turn lanes. See above for discussion of the roadway configuration for Barstow Avenue. Adjacent development is located in very close proximity to the

roadways on the southwest, southeast, and northeast corners, prohibiting widening on those approaches. In addition, the on-street parking located on Bullard Avenue is needed for the adjacent residential development and would likely need to be removed to accommodate widening at the intersection. The same would be required of the existing on-street bicycle lanes on Barstow Avenue. The intersection is already planned for installation of protected left-turn phasing, which is the most feasible improvement for the intersection. The addition of through lanes and/or right-turn lanes is not feasible.

- Shaw Avenue at Maroa Avenue
  - No improvements recommended

The Maroa Avenue approaches to this intersection currently have separate left-turn lanes, one through lane, and a separate right–turn lane. Shaw Avenue approaches have separate left-turn lanes and three through lanes with shared right-turn lanes. Adjacent development is located in very close proximity to the roadways on all four corners, prohibiting widening on those approaches. In addition, Maroa Avenue, south of Shaw Avenue, is constructed as a two-lane roadway with undeveloped frontages. The acquisition of additional right-of-way and removal of trees and structures would be required to extend the four-lane Maroa section to the south. The addition of right-turn lanes on Shaw Avenue or additional through lanes on Maroa Avenue are not feasible.

2.4 Project Mitigations

As previously discussed, the Fig Garden Financial Center Phase IV Project will pay the City of Fresno's TSMI and FMSI fees based on the currently adopted fee schedule at the time the Project's building permit is obtained. As requested by Caltrans in its response to the Notice of Preparation and at the Scoping meeting conducted with Caltrans on July 28, 2011, Chapter 3 of this report details the Project trips anticipated to access nearby freeway interchanges. It should also be noted that the Project is also subject to payment of the Fresno County Regional Transportation Mitigation Fee (RTMF). The RTMF is currently $1.03 per square foot for Commercial/Office/Service uses. These fees are based on the *Fresno-Madera Freeway Interchange Deficiency Study* and intended to provide mitigation for impacts to Caltrans facilities. Based on the analysis detailed in Chapter 3, the payment of the RTMF fees will provide complete mitigation for the Project's cumulative impact to State Facilities identified in Chapter 3.

CHAPTER 3 – PROJECT INFORMATION

The proposed Fig Garden Financial Center Phase IV will be located on the south side of West San Jose Avenue between Maroa and Palm Avenues in the City of Fresno. The approximately 3.96 acre site is currently occupied by a vacant, single-level apartment complex with 44 units. The proposed Project will be comprised of a four-story 104,593 square foot (sf) office building. This study evaluates the impacts of the proposed development on adjacent segment and intersection operations and provides an assessment of the Project driveways and on-site circulation. Figure 1 shows the Project location.

3.1 Project Site Use

According to the ITE *Trip Generation* manual[9], the uses analyzed in this report are defined as follows:

- "*A* ***General Office Building*** house multiple tenants; it is a location where affairs of businesses, commercial or industrial organizations, or professional persons or firms are conducted. An office building or buildings may contain a mixture of tenants including professional services, insurance companies, investment brokers and tenant services, such as a bank or savings and loan institution, a restaurant or cafeteria and service retail facilities."

The trip generation and trip distribution data used in the various Project analyses are described and quantified below. A copy of the site plan is shown in Figure 3-1.

3.2 Project Site Access and Circulation Analysis

Typical driveway throat length and queuing analyses are not prepared since the Project trips will all travel through existing commercial driveways (office building and/or Fig Garden Shopping Center) via cross access easements prior to reaching the City street system.

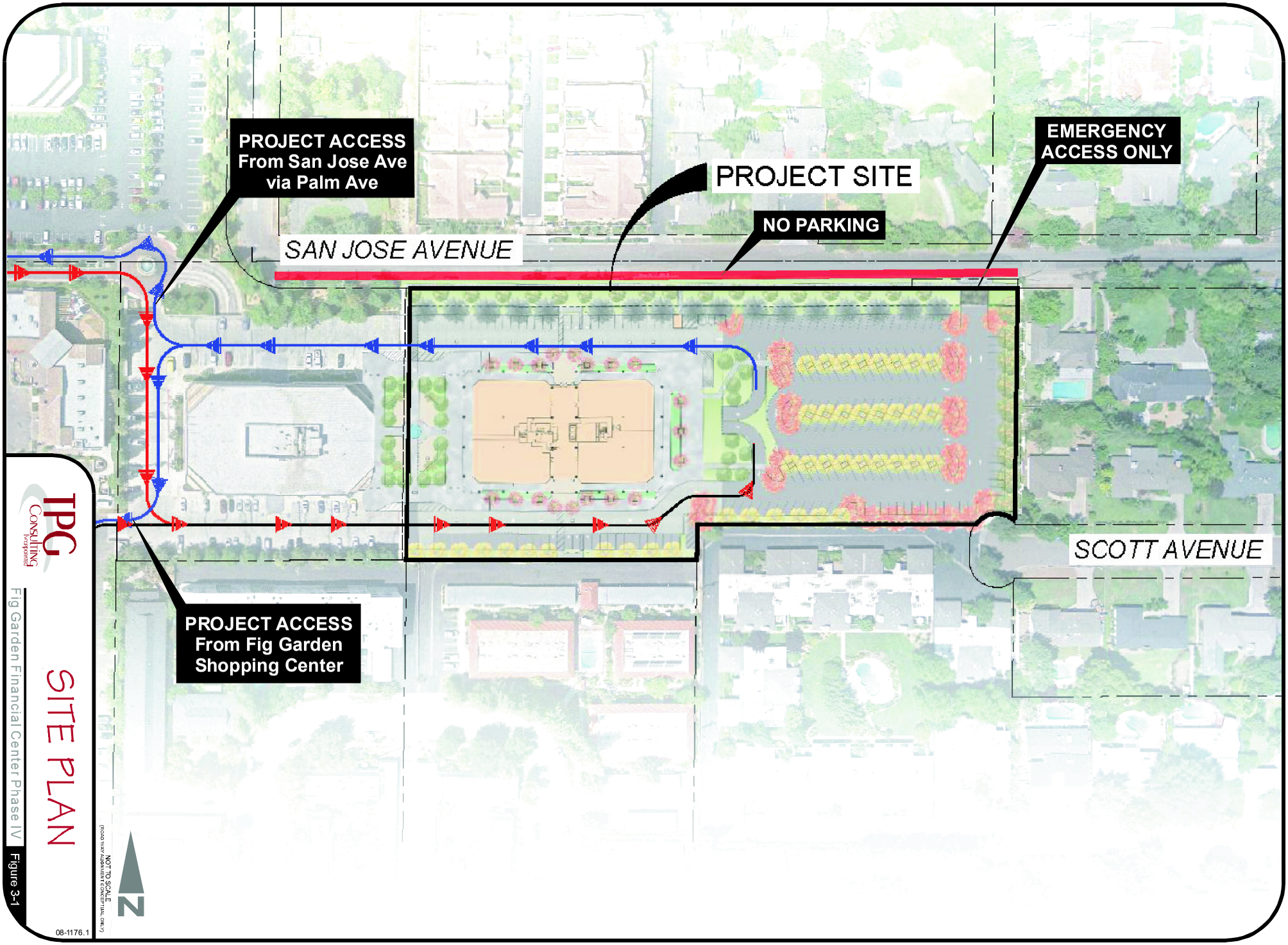
3.2.1 Existing Site Access

The vacant apartments accessed San Jose Avenue, east of Colonial Avenue, via a single driveway on the eastern side of the Project site. The trip generation for the apartments is shown below in Table 3-3. When they were occupied, the apartments functioned as a stand-alone residential development, with no vehicle access to the Fig Garden Shopping or Financial Centers. All apartment trips traveled to/from San Jose Avenue via the surrounding local residential streets.

3.2.2 Proposed Site Access

The proposed Project will remove vehicular trips from the local streets in the residential neighborhood to the north by moving the access point. All Project-related vehicle trips will access the Project through the existing parking lot for the office building west of the Project site. Vehicles may only access the Project through the Fig Garden Shopping Center or via the San Jose Avenue at Palm Avenue intersection. The Project's parking area will have no direct vehicular access to the City street system. Specifically, **NO** access will be allowed directly onto San Jose Avenue (in the residential area). The main access to the City street system is via that portion of San Jose Avenue in the vicinity of the Financial Center at the northwest corner of the adjacent office building parking lot. The southwest corner of the adjacent office building parking lot also has open access to the Fig Garden Shopping Center. Vehicular access is shown in Figure 3-1.

[9] *Trip Generation*, 8th edition, Volume 2, ITE, 2008, pages 326, 482



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SITE PLAN

Fig Garden Financial Center Phase IV

Figure 3-1

08-1176.1

In addition to the restricted access from the Project site to San Jose Avenue, the curb on San Jose Avenue along the Project's north frontage will be restricted from Project parking by means of a red curb. This is intended to prohibit Project traffic from parking on the street and walking into the office building. As shown below in Figures 3-2 and 3-3, the Project's trip distribution is expected to add no more than 1 vehicle to the neighboring residential streets during either of the peak hour time periods. This represents approximately 0.5% of the total Project trips. These additional trips are not using the residential streets as a by-pass to the surrounding collectors and arterials; rather they are anticipated to originate within the residential areas (by the COFCG traffic model). Therefore, any new trips along these roadways will likely be made by residents of the area.

3.2.3 Pedestrian Access

Pedestrian access to the Project site is provided via entrances on the north and south sides of the Project building. Sidewalks are available on San Jose Avenue, Colonial Avenue, and San Ramon Avenue. Pedestrian access to/from the Fig Garden Shopping and Financial Centers is available through the adjacent office building parking lot, similar to the vehicular access. Sidewalks and pedestrian amenities are available within the centers. The project at the present time is not proposing direct pedestrian access from the residential neighborhood located to the north of the proposed project site.

3.2.4 Emergency Access

Emergency vehicle access to the project site is available via three (3) separate routes. These routes include; through the Fig Garden Shopping Center, San Jose Avenue (west – Palm Avenue entrance to Financial Center), and San Jose Avenue (east – residential area) via a fire access gate. The fire access gate will be closed and locked, prohibiting access for non-emergency vehicles.

3.3 Fig Garden Financial Center Phase IV Trip Generation

3.3.1 Project Trip Generation

The Project trips were developed using the ITE *Trip Generation* manual and the corresponding software.[10] It should be noted that the trip generation information prepared from the use of the manual or software is raw data to be used as a basis for further evaluation by the traffic impact study preparer. Table 3-1 lists the daily, AM and PM peak of the street average rates and the directional distribution used in this Project assessment. The ITE fitted curve equations were used to calculate the trip generation. This was done using the methodology included in the ITE *Trip Generation Handbook*.

TABLE 3-1:
ITE TRIP GENERATION DATA
AVERAGE RATE AND DIRECTIONAL DISTRIBUTION DATA

Land Use	Period	Equation	Directional Distribution (%)	
			Enter	Exit
General Office Building (ITE Land Use 710)	Daily	ln(T) = 0.77ln(X) + 3.65	50	50
	AM Peak of Street	ln(T) = 0.8ln(X) + 1.55	88	12
	PM Peak of Street	T = 1.12ln(X) + 78.81	17	83

T = number of trips *X = thousand square feet of gross leasable area*

The rates shown in Table 3-1 are based on the building's square footage as the independent variable. Table 3-2 shows the projected number of daily, AM and PM peak hour trips that would be generated by the Project based on the equations and distributional data shown in Table 3-1.

[10] *Trip Generation* (software), Version 6, Microtrans, 2008.

TABLE 3-2:
PROJECT TRIP GENERATION DATA

Land Use	Size	Daily	AM			PM		
			Enter	Exit	Total	Enter	Exit	Total
General Office Building	104,593 sf	1,381	171	23	194	33	163	196

3.3.2 Trip Capture

The City of Fresno typically does not allow the use of vehicle capture in traffic impact analysis for land use projects. However, given the proximity of the Fig Garden Shopping Center and the Fig Garden Financial Center and other office buildings, some trip capture is expected between the Project and these uses. Since the Project has access to these uses without entering the City street system, captured trips are projected to remain "on-site."

The COFCG traffic model accounts for the captured trips based on the distribution of trips between the proposed Project and the Fig Garden Shopping Center. The Model determines the trip types to and from specific uses and distributes them to compatible land uses. For instance, Home-to-Work trips will be distributed from residential land uses to commercial, industrial, etc. land uses based on average trip lengths calculated by COFCG.

The number of Project vehicle trips "captured" within the Fig Garden Shopping Center represents nearly 2% of the Project's vehicle trip generation. This percentage is consistent with the Retail-Office capture percentages shown in the ITE *Trip Generation Handbook* (2-4% for midday, PM peak hour and daily). Therefore, captured trip reductions were not calculated for the project using the ITE methodology, but were still accounted for by the model based on the compatibility and proximity of the land uses. As such, the mixed-use nature of the Project area is accounted for in a methodology acceptable to the City of Fresno.

3.4 Project Trip Distribution

Trip distribution for the Fig Garden Financial Center Phase IV Project trips was based on Model generated trip distribution data. Basically the Model determines the locations that the residents of the Project are likely to travel to and from. The Model then estimates the roadways that these residents would likely use to travel to/from the site, and calculates the number of Model generated vehicle trips projected to occur on each roadway. This roadway trip data is then converted to match the trip generation data developed for the Project. Per *Traffic Impact Analysis for Site Development*, use of a Model is one of the most commonly accepted methods for estimating trip distribution.[11] As stated previously, the Project trip distribution data was prepared using the 2030 Model.

Figures 3-2 (Existing) and 3-3 (2030) show the Project trip distribution percentages and segment and intersection assignment for the Existing Plus the Project and 2030 Plus the Project scenarios, respectively.

3.5 Interchange Trip Distribution

Per Caltrans' request, the project trips were also traced out to adjacent interchanges. Table 3-3 shows the requested interchanges and the number of Project Trips projected to utilize each one.

[11] *Traffic Impact Analysis for Site Development*, An ITE Proposed Recommended Practice, ITE, 2006, page 45.

TABLE 3-3:
FIG GARDEN FINANCIAL CENTER PHASE IV INTERCHANGE TRIP DISTRIBUTION

Interchange	Existing AM/PM	2030 AM/PM
Bullard Avenue at SR 41	3/5	11/8
Shaw Avenue at SR 41	40/38	33/32
Ashlan Avenue at SR 41	2/2	4/2
Shaw Avenue at SR 99	4/3	9/9

Caltrans, in its response to the Notice of Preparation, also requested the inclusion of the proportionate share percentages. Using the above 2030 Project trips, the Approved Project trips, and the 2011 and 2030 COFCG models, proportionate share percentages were calculated at each of the interchanges using the following formula from the Caltrans *Guide for the Preparation of Traffic Impact Studies*:

$$P = \frac{T}{T_B - T_E}$$

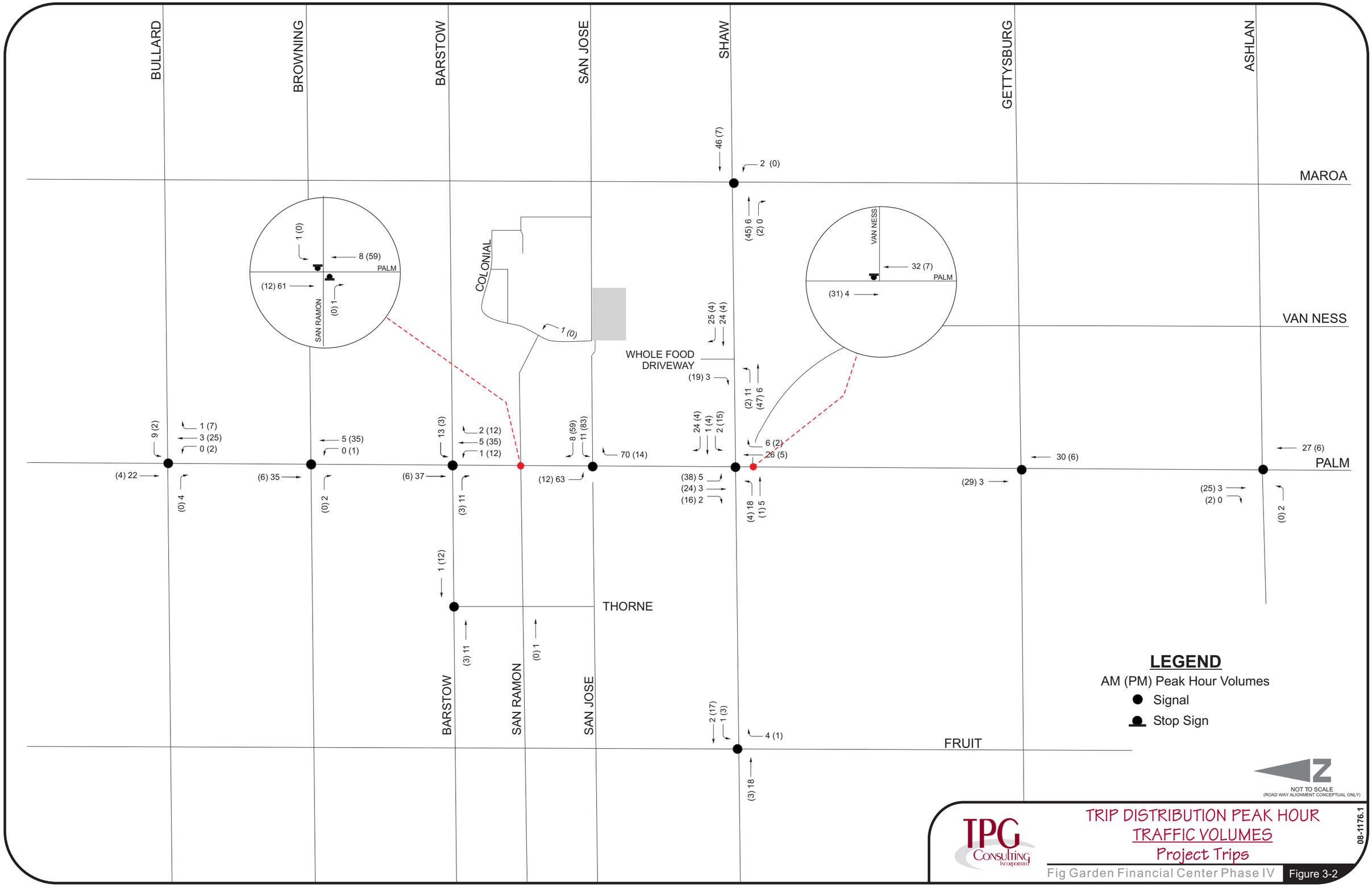
Where:
P = The equitable share for the proposed project's traffic impact.
T = The vehicle trips generated by the project during the peak hour of adjacent State highway facility invehicles per hour, vph.
T_B = The forecasted traffic volume on an impacted State highway facility at the time of general plan build-out (e.g., 20 year model or the furthest future model date feasible), vph.
T_E = The traffic volume existing on the impacted State highway facility plus other approved projects that will generate traffic that has yet to be constructed/opened, vph.

Table 3-4 shows the proportionate share volumes and percentages.

TABLE 3-4:
PROPORTIONATE SHARE PERCENTAGES

Intersections	Project Trips AM/PM	Existing[1] AM/PM	2030 Plus the Project[1] AM/PM	Proportionate Share % AM/PM
Bullard Avenue at SR 41	11/8	4,252/4,516	5,649/6,118	**0.8**/0.5
Shaw Avenue at SR 41	33/32	5,413/5,972	5,944/6,458	6.2/**6.6**
Ashlan Avenue at SR 41	4/2	3,961/4,343	4,395/4,707	**0.9**/0.5
Shaw Avenue at SR 99	9/9	3,976/4,394	6,314/6,802	**0.4**/0.4

[1] *Includes the Approved Project trips*


BULLARD
BROWNING
BARSTOW
SAN JOSE
SHAW
GETTYSBURG
ASHLAN
MAROA
VAN NESS
PALM
FRUIT
THORNE
SAN RAMON
COLONIAL
WHOLE FOOD DRIVEWAY
LEGEND
AM (PM) Peak Hour Volumes
Signal
Stop Sign
NOT TO SCALE
(ROAD WAY ALIGNMENT CONCEPTUAL ONLY)
TPG Consulting Incorporated
TRIP DISTRIBUTION PEAK HOUR
TRAFFIC VOLUMES
Project Trips
Fig Garden Financial Center Phase IV
Figure 3-2
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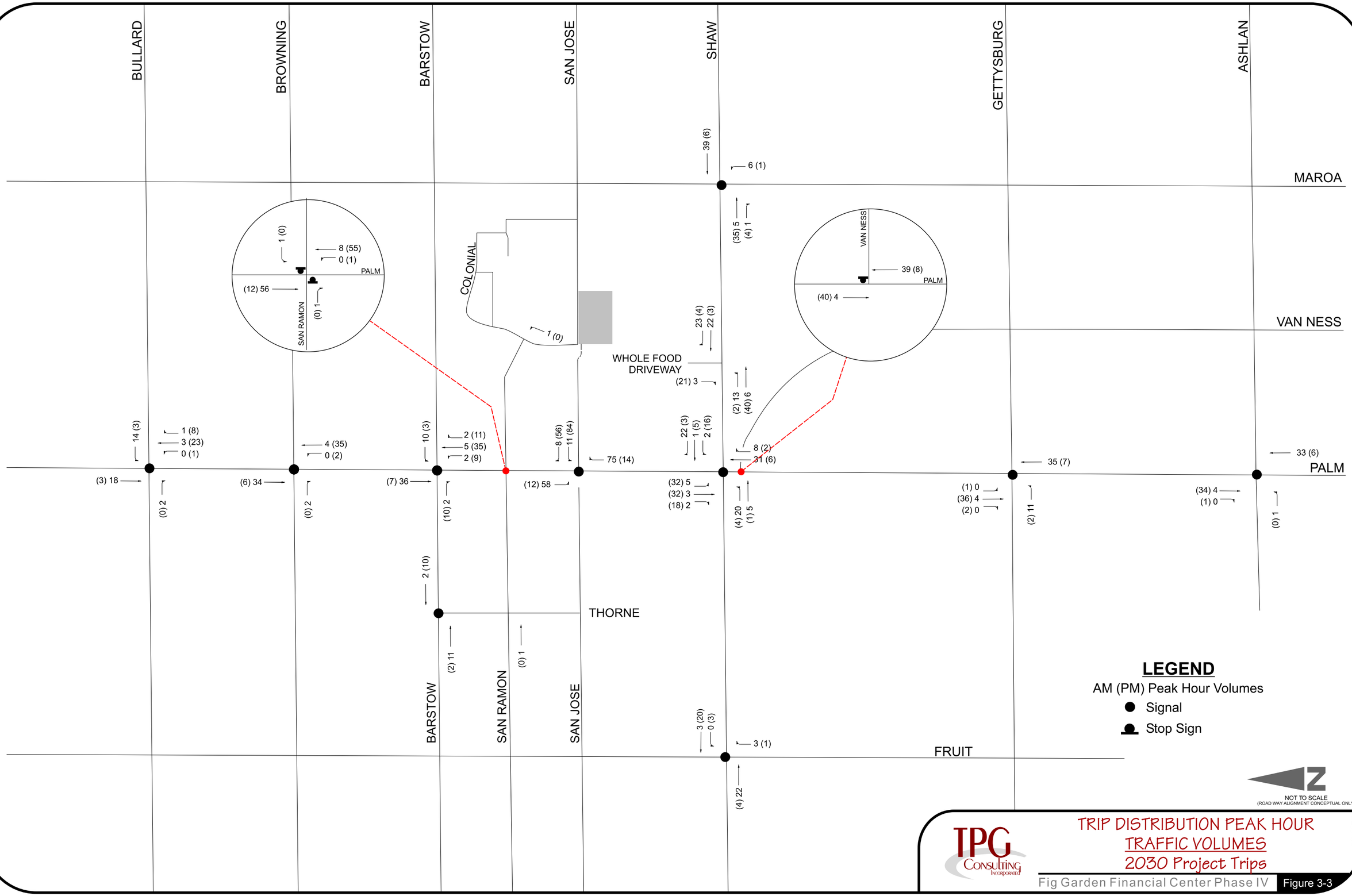

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TRIP DISTRIBUTION PEAK HOUR TRAFFIC VOLUMES
2030 Project Trips

Fig Garden Financial Center Phase IV | Figure 3-3

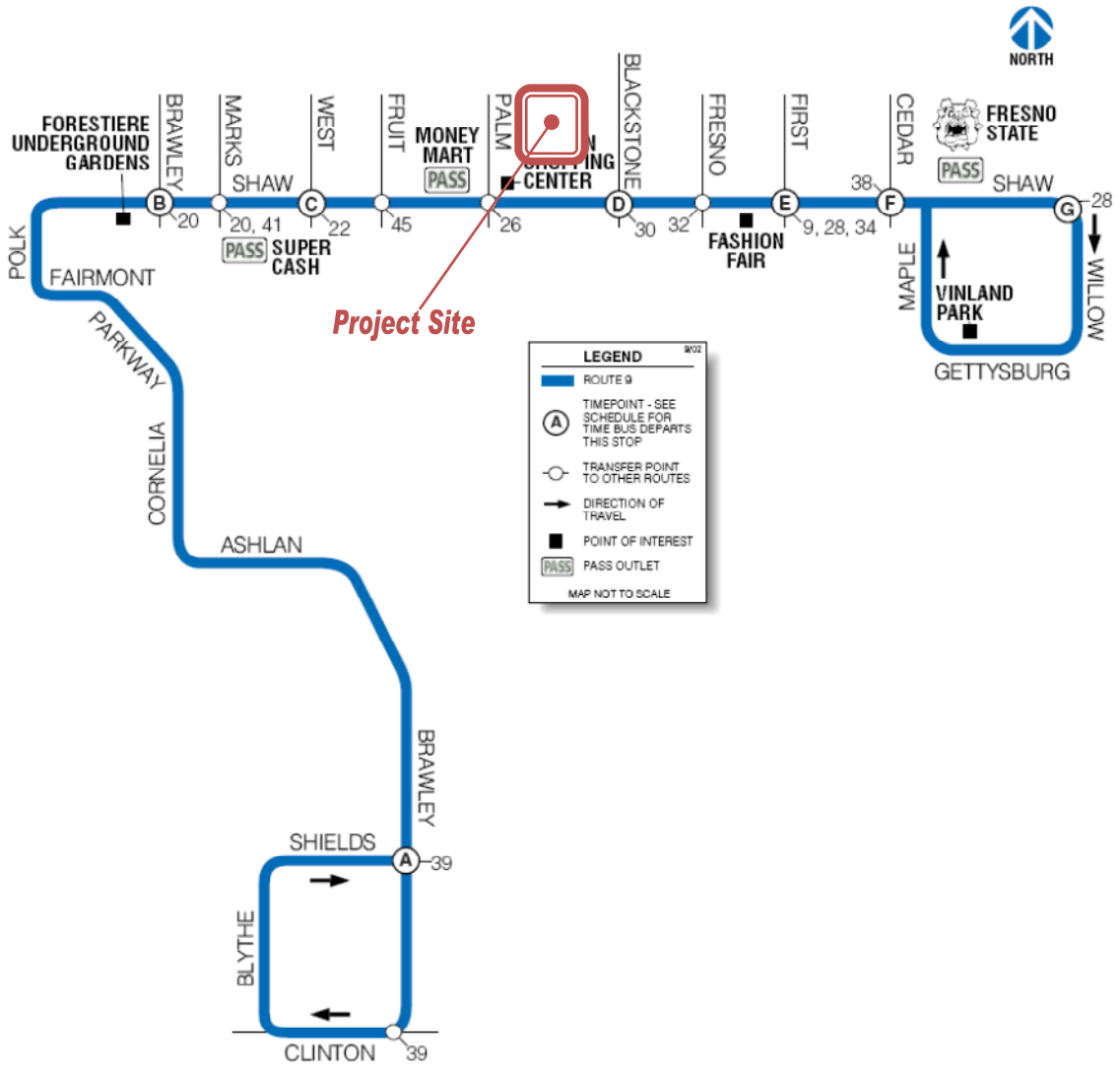
08-1176

Caltrans, in its response to the Notice of Preparation, incorporated by reference a letter of August 25, 2009 concerning development of the proposed site, wherein it specifically stated that its requested analysis was limited to Project trip traces and calculation of proportional share percentages (detailed above), and that no technical analysis, including a level of service analysis, was requested. Based on that Caltrans request, and consistent with the proportionate share determinations detailed above, no Project specific impact to the service levels of the Caltrans facilities is evident. . The Project is subject to payment of the Fresno County Regional Transportation Mitigation Fee (RTMF). The RTMF is currently $1.03 per square foot for Commercial/Office/Service uses. These fees are based on the *Fresno-Madera Freeway Interchange Deficiency Study* and intended to provide mitigation for impacts to Caltrans facilities. Based on the above analysis, the payment of the RTMF fees will provide complete mitigation for the Project's cumulative impact to the above State Facilities.

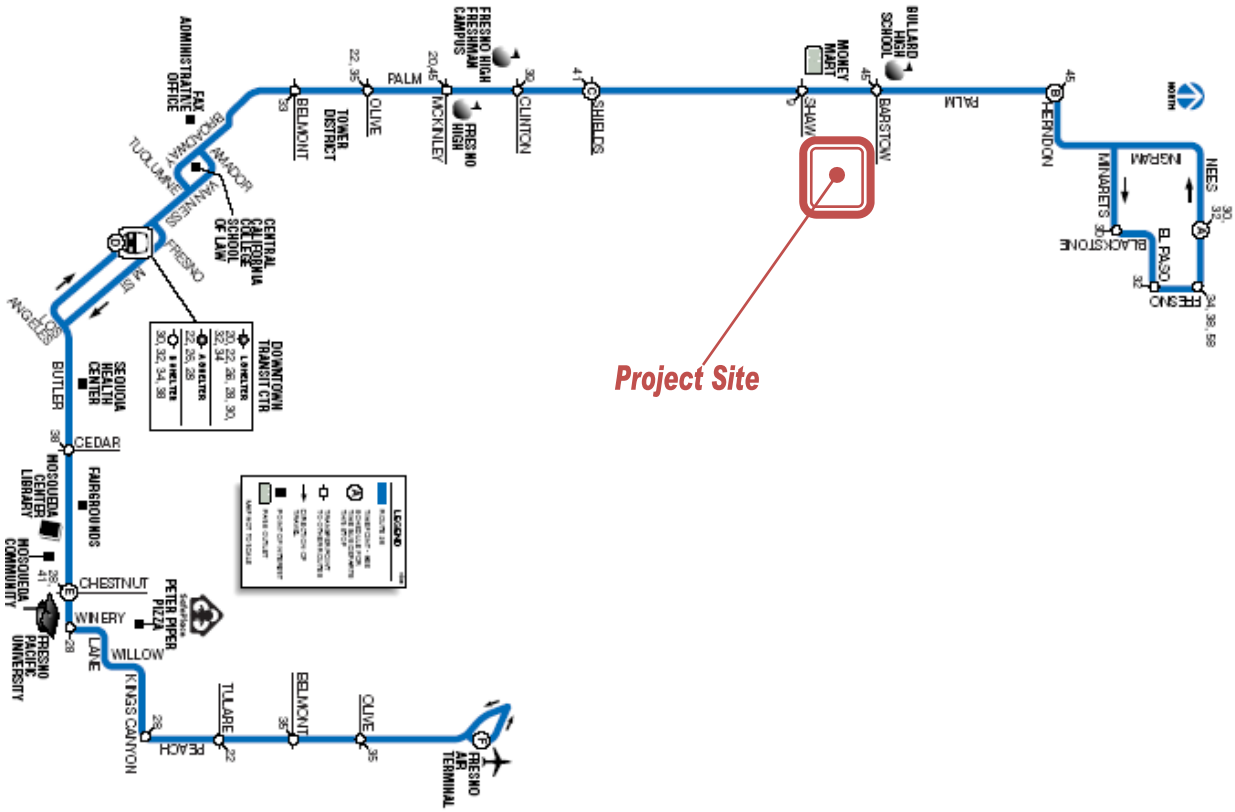
CHAPTER 4 – EXISTING CONDITIONS

4.1 Transit

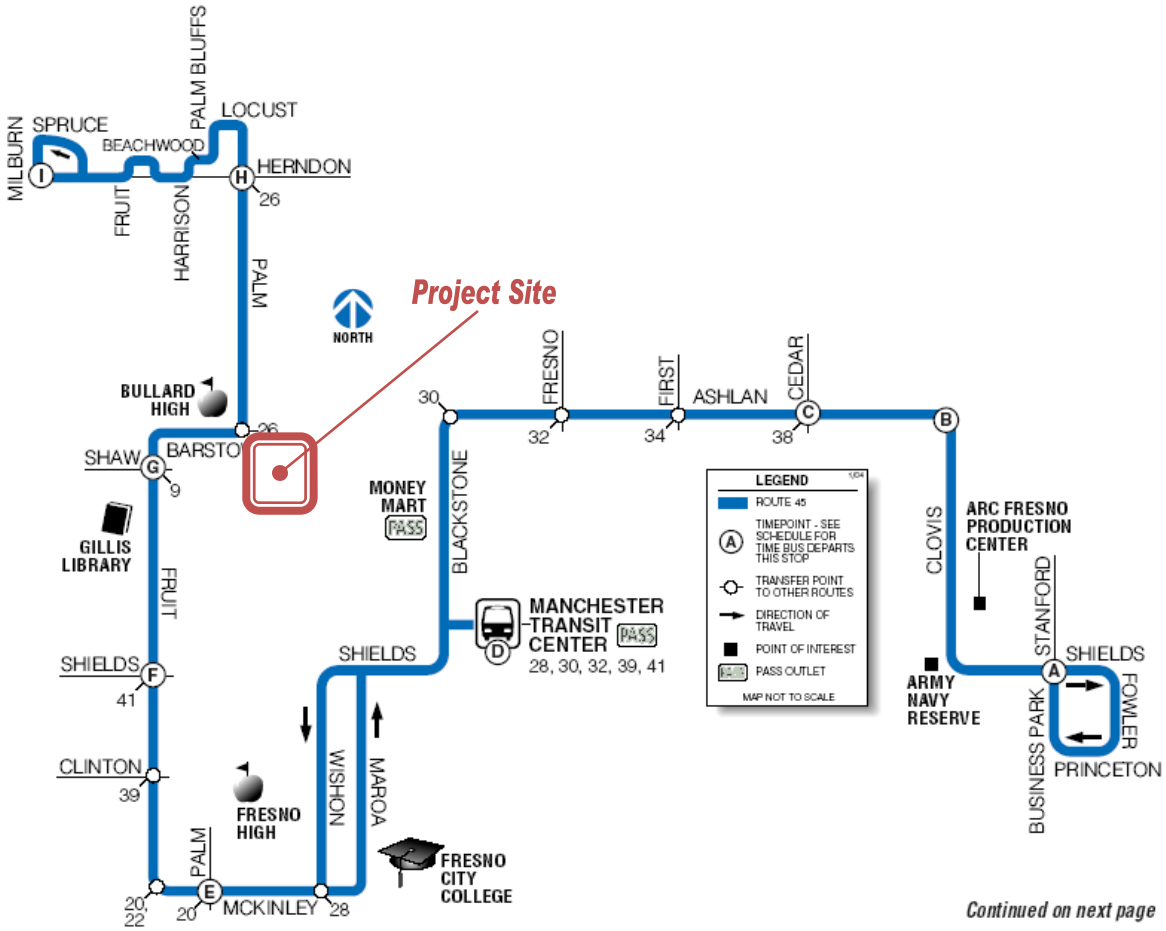
Currently, the Fresno Area Express (FAX) operates three (3) transit routes in the study area. **Route 9**, Shaw Avenue Crosstown, operates along Shaw Avenue in the study area with stops near the intersections of Shaw Avenue at Palm Avenue, and Shaw Avenue at Fruit Avenue. The route runs from approximately 5:40 AM to 10:30 PM weekdays and from approximately 6:45 AM to 7:30 PM weekends with 30 minute headways.



Route 26, North Palm/Peach Avenue operates along Palm Avenue in the study area in with a stop near the intersection of Palm Avenue at Shaw Avenue, and Palm Avenue at Barstow Avenue. The route runs from approximately 6:00 AM to 10:30 PM weekdays and from approximately 7:15 AM to 7:30 PM weekends with 30 minute headways.



Route 45, Ashlan Crosstown, operates along Fruit Avenue and Palm Avenue with stops near the intersections of Fruit Avenue and Shaw Avenue, and Barstow Avenue and Palm Avenue. The route runs from approximately 6:00 AM to 9:15 PM weekdays and from approximately 9:30 Am to 6:30 PM weekends with one hour headways.



4.2 Bicycle Facilities

Currently, bicycle lanes exist along the following locations:

- Browning Avenue at Palm Avenue – west leg
- San Jose Avenue at Palm Avenue – north leg, south leg
- Palm Avenue at Barstow Avenue – south leg, east leg, west leg
- Palm Avenue at Bullard Avenue – north leg, west leg, east leg
- Palm Avenue at Shaw Avenue – north leg
- San Ramon Avenue at Palm Avenue – north leg, south leg
- Barstow Avenue at Thorne Avenue – east leg, west leg

According to the *2010 Fresno Bicycle, Pedestrian, and Trails Master Plan* and the *City of Fresno Circulation Element* bike lanes are planned along Palm, Shaw, Fruit and Maroa Avenues in the study area. Bicycle lanes provide for a striped lane for one-way travel on a street or highway. The Project is not anticipated to make changes to the existing bicycle facilities in the study area.

4.3 Pedestrian Facilities

Currently, sidewalks exist on all legs of the study locations except at the following locations:

- Bullard Avenue
  - North and South sides – east and west of Palm Avenue
- Browning Avenue
  - North and South sides – east and west of Palm Avenue
- Barstow Avenue
  - South side – Fruit Avenue to Palm Avenue
- San Ramon Avenue
  - North and South sides – Fruit Avenue to Colonial Avenue
- San Jose Avenue
  - North and South sides – Palm Avenue to eastern terminus (office building driveway)
  - North and South sides – eastern Project boundary to Maroa Avenue
- Gettysburg Avenue
  - North side – east and west of Palm Avenue
  - South side – east of Palm Avenue
- Ashlan Avenue
  - North side – west of Palm Avenue
- Palm Avenue
  - East and West sides – Bullard Avenue to San Madele Avenue
  - East side – San Ramon Avenue to Fig Garden Middle driveway
  - West side – San Jose Avenue to Shaw Avenue
  - West side – Alamos Avenue to Gettysburg Avenue
  - East side – Santa Ana Avenue to Gettysburg Avenue
- Thorne Avenue
  - East and West sides – Barstow Avenue to San Jose Avenue
- Colonial Avenue
  - West side – north terminus to San Jose Avenue
- Maroa Avenue
  - East and West sides – south of Shaw Avenue

The project is not anticipated to make any changes to study area pedestrian facilities other than to construct sidewalk along the Project frontage on San Jose Avenue. The project at the present time is not proposing direct pedestrian access from the residential neighborhood located to the north of the proposed project site.

4.4 Roadways

Table 4-1 describes the Existing street system in the study area including the street classification, number of lanes, and the posted speed limits.

TABLE 4-1:
DESCRIPTION OF EXISTING STREET SYSTEM

Street	Classification	No. of Lanes (2-dir)	Posted Speed Limit (mph)
Bullard Avenue	Arterial	4	40
Browning Avenue	Local	2	35[1]
Barstow Avenue	Collector	2	35[1]
San Ramon Avenue	Local	2	NPS
San Jose Avenue	Local	2	NPS
Shaw Avenue	Arterial	6	40
Van Ness Blvd	Local	2	25
Gettysburg Avenue	Collector	2	30
Ashlan Avenue	Arterial	2	30[1]
Fruit Avenue	Collector	2	40[1]
Thorne Avenue	Local	2	NPS
Palm Avenue	Arterial	4	40[1]
Colonial Avenue	Local	2	NPS
Maroa Avenue	Collector	4	35

[1] *posted 25 mph school zone for portions of the study segments*
NPS = *no posted speed limit; residential or business district subject to 25 mph speed limit based on California Vehicle Code*

Table 4-2 lists the study intersections and their associated intersection control.

TABLE 4-2:
EXISTING INTERSECTION CONTROL

Intersection	Signalized/Unsignalized	Type
Bullard Avenue at Palm Avenue	Signalized	AU
Browning Avenue at Palm Avenue	Signalized	AU
Barstow Avenue at Palm Avenue	Signalized	AU
San Ramon Avenue at Palm Avenue	Unsignalized	TWSC
San Jose Avenue at Palm Avenue	Signalized	AU
Shaw Avenue at Palm Avenue	Signalized	AU
Van Ness Blvd at Palm Avenue	Unsignalized	TWSC
Gettysburg Avenue at Palm Avenue	Signalized	AU
Ashlan Avenue at Palm Avenue	Signalized	AU
Barstow Avenue at Thorne Avenue	Unsignalized	TWSC
San Ramon Avenue at Thorne Avenue	Unsignalized	TWSC
Shaw Avenue at Fruit Avenue	Signalized	AU
Shaw Avenue at Maroa Avenue	Signalized	AU
San Ramon Avenue at Colonial Avenue	Unsignalized	No Control

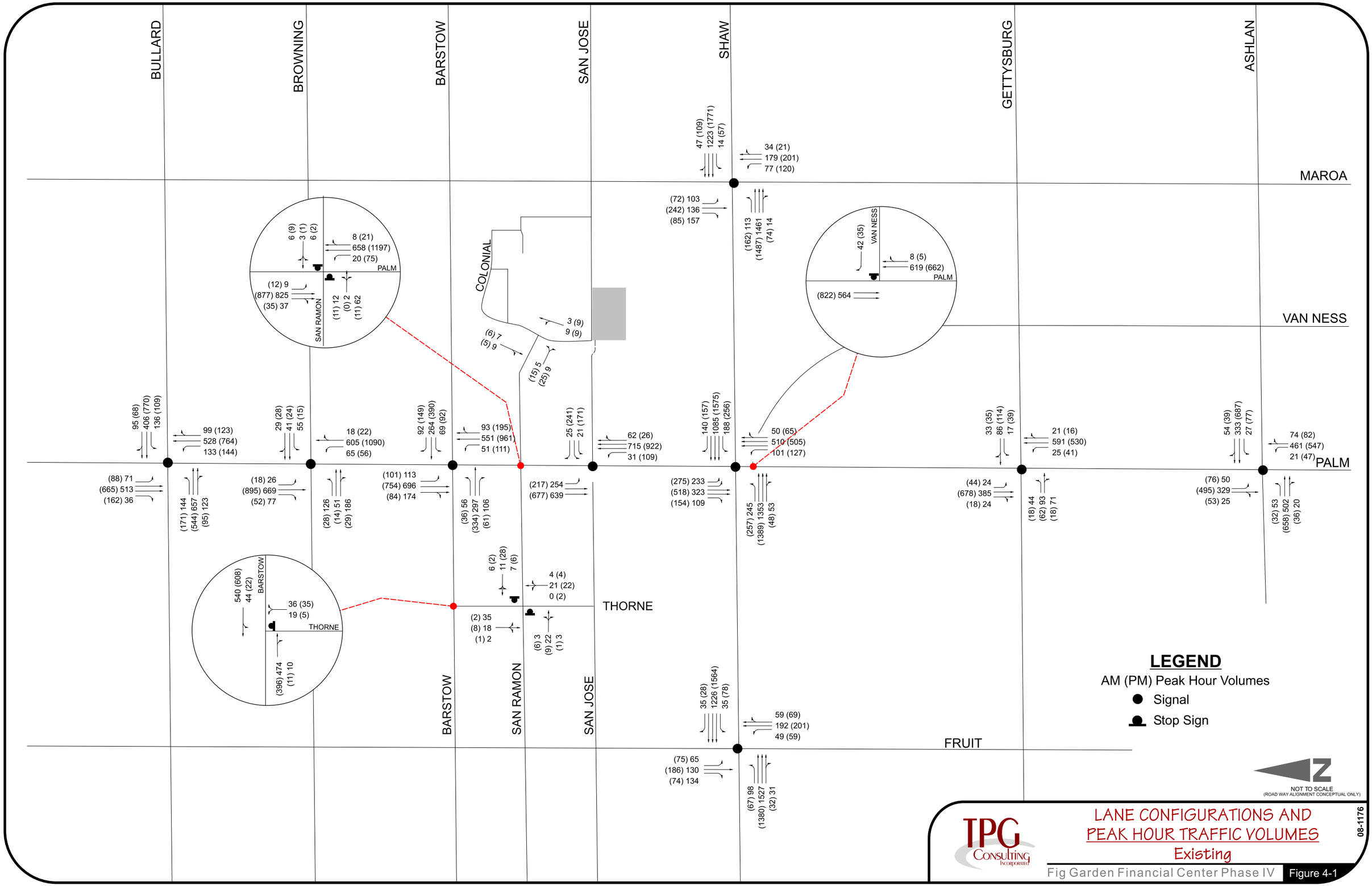
AU = actuated uncoordinated *TWSC = two-way stop-control*

4.5 Freeways

Level of service analysis was not prepared for the closest freeways and ramp intersections (SR 41 and 99) due to the size and location of the Project in relation to those facilities. The City of Fresno and Caltrans have agreed that for smaller development, not immediately adjacent to freeways, the level of analysis for Caltrans facilities within Fresno will be limited to Project trip traces through adjacent interchanges and calculation of the Project's proportionate fair shares. In addition, Caltrans in its response to the Notice of Preparation incorporated by reference a letter of August 25, 2009 concerning development of the proposed site, wherein it specifically stated that its requested analysis was limited to Project trip traces and calculation of proportional share percentages, and that no technical analysis, including a level of service analysis, was requested. The calculations requested by Caltrans can be found in Tables 3-3 and 3-4.

4.6 Level of Service

The Existing segment and intersection lane configurations and intersection controls and segment and intersection peak hour traffic volumes are shown on Figure 4-1. Using the lane configurations and volumes shown on Figure 4-1, the segments and intersections were analyzed for Existing levels of service. Table 4-3 shows the Existing levels of service for the study segments and intersections respectively. The signalized intersection levels of service shown in Table 4-3 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown in Table 4-3. The Existing conditions traffic counts are included in Appendix C. The Existing intersection levels of service calculations are included in Appendix D.



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LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES

Existing

08-1176

Fig Garden Financial Center Phase IV | Figure 4-1

TABLE 4-3:
EXISTING CONDITIONS ANALYSIS LEVELS OF SERVICE

Segment	AM Peak Hour LOS		PM Peak Hour LOS	
Shaw Avenue – Palm Avenue to Fruit Avenue	C		C	
Shaw Avenue – Maroa Avenue to Palm Avenue	C		C	
Palm Avenue – Bullard Avenue to Barstow Avenue	C		C	
Palm Avenue – Barstow Avenue to San Ramon Avenue	C		C	
Palm Avenue – San Ramon Avenue to San Jose Avenue	C		C	
Palm Avenue – San Jose Avenue to Shaw Avenue	C		C	
Palm Avenue – Shaw Avenue to Gettysburg	C		C	
San Jose Avenue – Colonial Avenue to Maroa Avenue	C		C	
San Ramon Avenue – Palm Avenue to Fruit Avenue	C		C	
Barstow Avenue – Palm Avenue to Fruit Avenue	C		D	
Thorne Avenue – Barstow Avenue to San Ramon Avenue	C		C	
Intersection	**LOS**	**Delay[1]**	**LOS**	**Delay[1]**
Bullard Avenue at Palm Avenue	C	34.2	D	38.8
Browning Avenue at Palm Avenue	B	14.6	A	8.7
Barstow Avenue at Palm Avenue	C	20.6	C	29.9
San Ramon Avenue at Palm Avenue				
• NB Left	B	10.7	B	10.0
• SB Left	A	9.4	B	10.9
• EB Approach	B	13.6	B	14.9
• WB Approach	C	20.0	B	15.0
San Jose Avenue at Palm Avenue	A	10.0	B	15.9
Shaw Avenue at Palm Avenue	D	37.2	D	39.2
Van Ness Boulevard at Palm Avenue				
• WB Right	B	11.8	B	11.1
Gettysburg Avenue at Palm Avenue	A	7.1	A	6.4
Ashlan Avenue at Palm Avenue	B	14.6	B	19.1
Barstow Avenue at Thorne Avenue				
• WB Left	A	9.3	A	8.5
• NB Approach	D	33.6	B	14.2
San Ramon Avenue at Thorne Avenue				
• EB Left-Through-Right	B	10.9	A	9.8
• WB Left-Through-Right	B	10.5	A	9.8
• NB Approach	A	0.0	A	0.5
• SB Approach	A	4.9	A	1.4
Shaw Avenue at Fruit Avenue	B	13.6	B	14.4
Shaw Avenue at Maroa Avenue	B	13.3	B	19.5
San Ramon Avenue at Colonial Avenue				
• NB Left-Through	A	5.5	A	3.7
• EB Approach	A	8.8	A	8.9

[1] *delay in seconds per vehicle*
SB = southbound *NB = northbound* *EB = eastbound* *WB = westbound*

As shown in Table 4-3, all the study segments and intersections are currently operating at or above the appropriate adopted level or service standard in the Existing conditions scenario. Therefore, there are no existing LOS impacts at the study locations.

4.7 Signal Warrants

Peak hour traffic signal warrants (Warrant 3, part B) were also prepared for the five (5) unsignalized intersections. Based on the peak hour traffic signal warrants, the warrant is not currently met at any of the unsignalized intersections in the Existing conditions scenario. These warrant analyses are limited to the peak hour volume warrant (Warrant 3, part B) only and other conditions may exist which meet other traffic signal warrants. Copies of the warrant analyses are included in Appendix E.

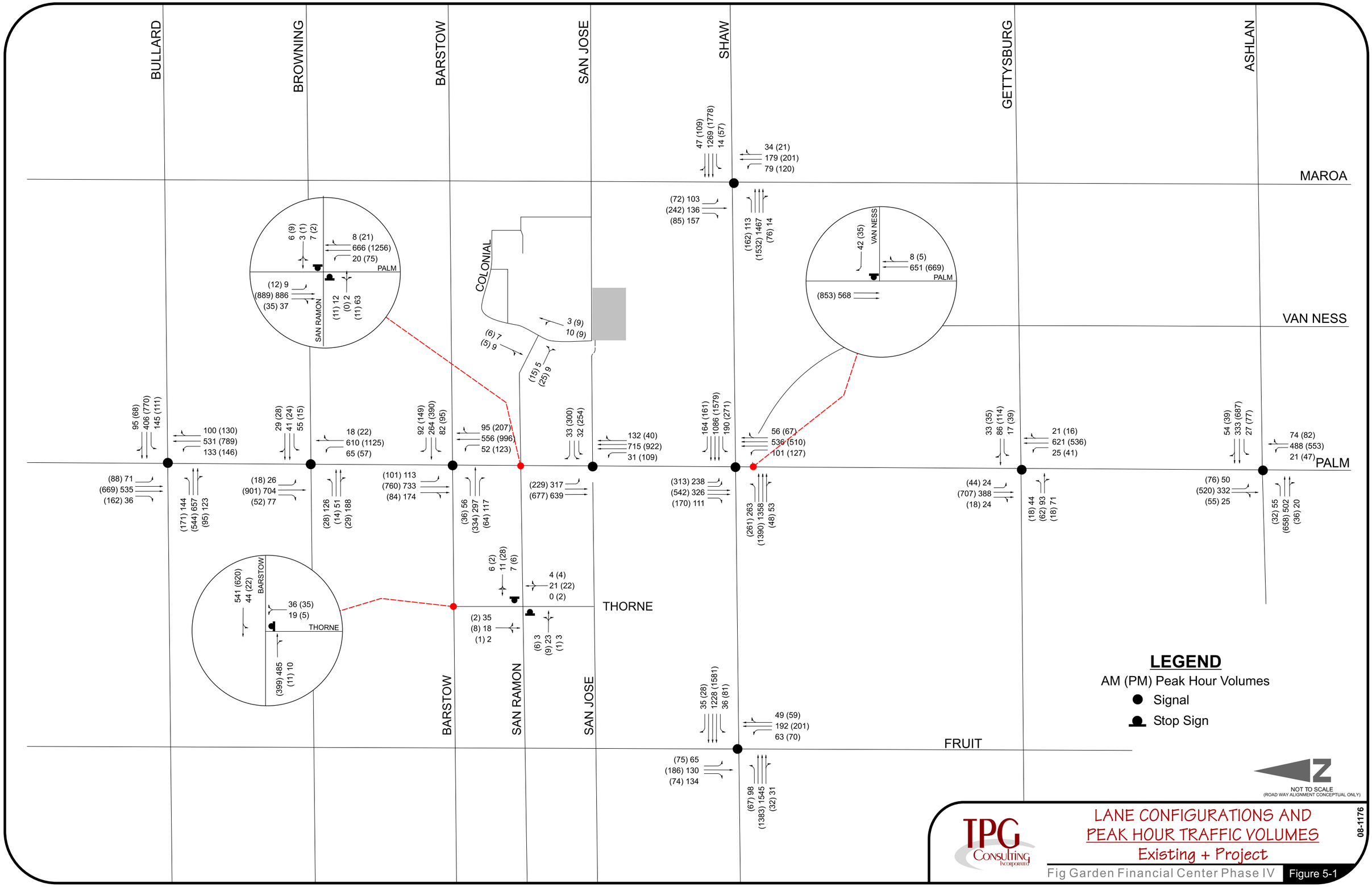
4.8 Accident Analysis

The accident analysis for the study intersections is included in Appendix F.

CHAPTER 5 – EXISTING PLUS THE PROJECT CONDITIONS

5.1 Level of Service

The Existing Plus the Fig Garden Financial Center Phase IV Project segment and intersection lane configurations and intersection controls and segment and intersection peak hour traffic volumes are shown on Figure 5-1. Using the lane configurations and volumes shown on Figure 5-1, the segments and intersections were analyzed for Existing Plus the Project levels of service. Table 5-1 shows the Existing Plus the Project levels of service for the study segments and intersections respectively. The signalized intersection levels of service shown in Table 5-1 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown in Table 5-1. The Existing Plus the Project intersection levels of service calculations are included in Appendix G.



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LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES

Existing + Project

Fig Garden Financial Center Phase IV

Figure 5-1

08-1176

TABLE 5-1:
EXISTING PLUS THE PROJECT CONDITIONS ANALYSIS LEVELS OF SERVICE

	AM Peak Hour		PM Peak Hour	
Segment	**LOS**		**LOS**	
Shaw Avenue – Palm Avenue to Fruit Avenue	C		C	
Shaw Avenue – Maroa Avenue to Palm Avenue	C		C	
Palm Avenue – Bullard Avenue to Barstow Avenue	C		C	
Palm Avenue – Barstow Avenue to San Ramon Avenue	C		C	
Palm Avenue – San Ramon Avenue to San Jose Avenue	C		C	
Palm Avenue – San Jose Avenue to Shaw Avenue	C		C	
Palm Avenue – Shaw Avenue to Gettysburg	C		C	
San Jose Avenue – Colonial Avenue to Maroa Avenue	C		C	
San Ramon Avenue – Palm Avenue to Fruit Avenue	C		C	
Barstow Avenue – Palm Avenue to Fruit Avenue	C		D	
Thorne Avenue – Barstow Avenue to San Ramon Avenue	C		C	
Intersection	**LOS**	**Delay[1]**	**LOS**	**Delay[1]**
Bullard Avenue at Palm Avenue	D	35.4	D	39.6
Browning Avenue at Palm Avenue	B	14.8	B	8.8
Barstow Avenue at Palm Avenue	C	21.1	C	31.2
San Ramon Avenue at Palm Avenue				
• NB Left	B	11.1	A	9.9
• SB Left	A	9.4	B	11.3
• EB Approach	B	13.6	B	14.4
• WB Approach	C	19.2	B	15.0
San Jose Avenue at Palm Avenue	B	12.5	B	18.0
Shaw Avenue at Palm Avenue	D	38.3	D	42.1
Van Ness Boulevard at Palm Avenue				
• WB Right	B	12.0	B	11.2
Gettysburg Avenue at Palm Avenue	A	7.1	A	6.3
Ashlan Avenue at Palm Avenue	B	15.0	B	19.4
Barstow Avenue at Thorne Avenue				
• WB Left	A	9.3	A	8.5
• NB Approach	D	34.6	B	14.4
San Ramon Avenue at Thorne Avenue				
• EB Left-Through-Right	B	10.9	A	9.8
• WB Left-Through-Right	B	10.5	A	9.8
• NB Approach	A	0.0	A	0.5
• SB Approach	A	4.9	A	1.4
Shaw Avenue at Fruit Avenue	B	13.6	B	14.8
Shaw Avenue at Maroa Avenue	B	13.4	B	19.6
San Ramon Avenue at Colonial Avenue				
• NB Left-Through	A	5.6	A	3.7
• EB Approach	A	8.8	A	8.9

[1] *delay in seconds per vehicle*
SB = southbound *NB = northbound* *EB = eastbound* *WB = westbound*

As shown in Table 5-1, all the study segments and intersections are projected to operate at or above the appropriate adopted level or service standard in the Existing Plus the Project conditions scenario. Therefore, there are no LOS impacts caused by the Project in the near-term conditions at the study locations.

5.2 Signal Warrants

Peak hour traffic signal warrants (Warrant 3, part B) were also prepared for the five (5) unsignalized intersections. Based on the peak hour traffic signal warrants, the warrant is not projected to be met at any of the unsignalized intersections in the Existing Plus the Project conditions scenario. These warrant analyses are limited to the peak hour volume warrant (Warrant 3, part B) only and other conditions may exist which meet other traffic signal warrants.

CHAPTER 6 – EXISTING PLUS APPROVED PROJECTS PLUS THE PROJECT CONDITIONS

For purposes of this TIS, the Approved Projects that were added to the Existing Plus the Project scenario was based upon including the Bullard High School Improvement Project detailed in *Traffic Impact Study for the Bullard High School Improvement Project*, URS Corporation, December 2009 (the "Bullard High Improvement Project"), as the sole Approved Project that was relevant for this cumulative impact analysis. This analysis also relied upon the trip distribution for the Bullard High School Improvement Project that was detailed in that traffic study. According to the *Traffic Impact Study for the Bullard High School Improvement Project* the Approved Project is only projected to increase PM peak hour trips. Therefore only the PM peak hour time period is analyzed for this scenario.

The trip generation and trip distributions for the Bullard High Improvement Project, as reported by the *Traffic Impact Study for the Bullard High School Improvement Project* are detailed in Tables 6-1 and 6-2.

TABLE 6-1:
BHS LARGE EVENT TRIP GENERATION

Athletic Event (3,000) Spectator Attendance)	Daily Trips Event Parking [1]	7-9 AM Peak Hour Trips [2]			4-6 PM Peak Hour Trips		
		Enter	Exit	Total	Enter	Exit	Total
Offsite [3]	458	n/a	n/a	n/a	229	229	458
Onsite [4]	1,362	n/a	n/a	n/a	485	485	970

Source: Traffic Impact Study for the Bullard High School Improvement Project, Table 4.2
[1] Represents event and parking capacity driven roundtrips only.
[2] No high attendance event anticipated in the morning.
[3] 50 percent pre-event occupancy
[4] 30 percent pre-event occupancy

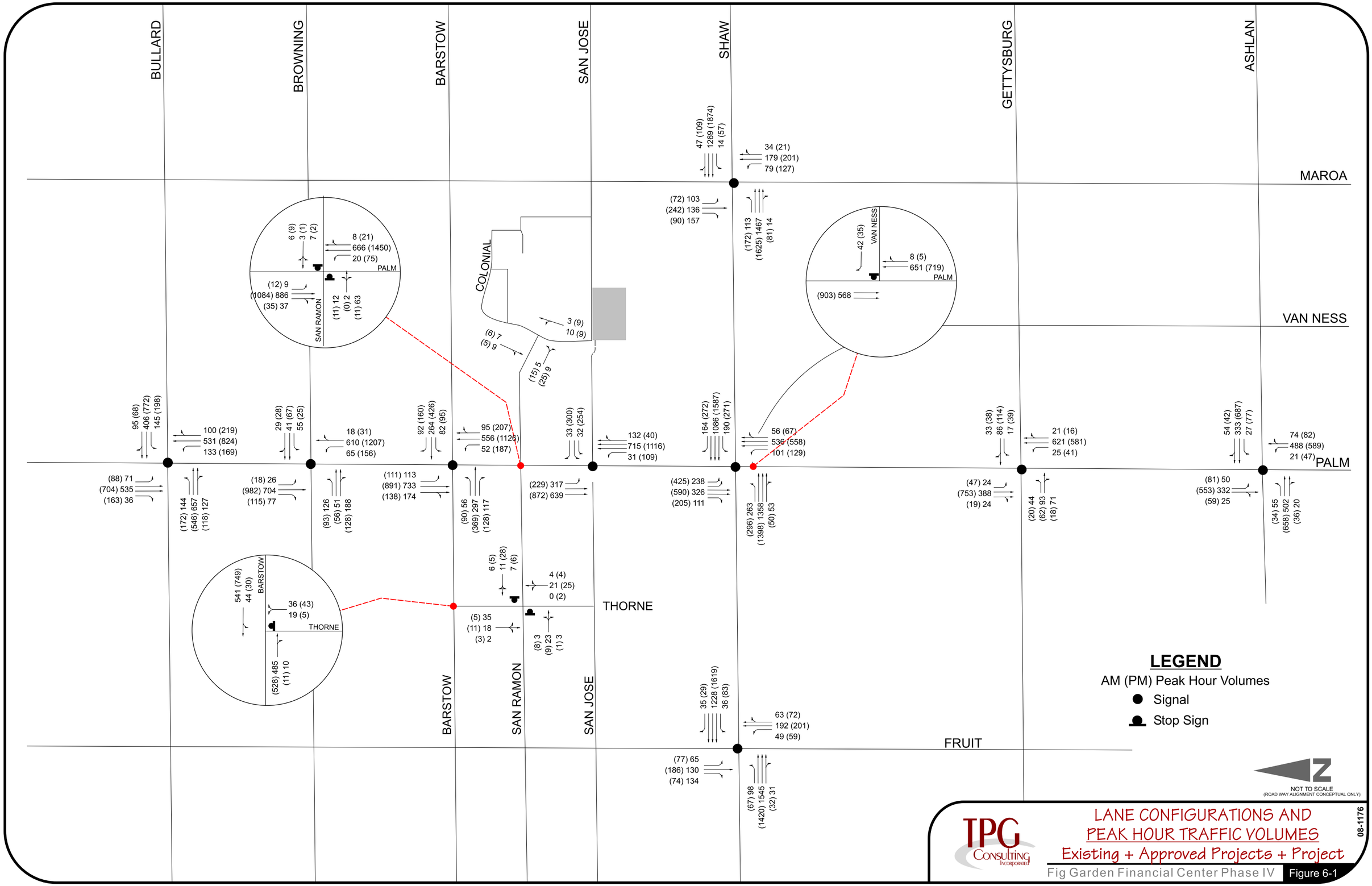
TABLE 6-1:
BHS TRIP DISTRIBUTION

Direction	Percentage
North of BHS	19%
East of BHS	12%
East of BHS and SR 41	10%
South of BHS	28%
West of BHS	31%

Source: Traffic Impact Study for the Bullard High School Improvement Project, Section 4.2.2.

6.1 Level of Service

The Existing Plus Approved Projects Plus the Project segment and intersection lane configurations and intersection controls and segment and intersection peak hour traffic volumes are shown on Figure 6-1. Using the lane configurations and volumes shown on Figure 6-1, the segments and intersections were analyzed for Existing Plus Approved Projects Plus the Project levels of service. Table 6-3 shows the Existing Plus Approved Projects Plus the Project levels of service for the study segments and intersections respectively. The signalized intersection levels of service shown in Table 6-3 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown in Table 6-3. The Existing Plus Approved Projects Plus the Project intersection levels of service calculations are included in Appendix H.



TPG Consulting Incorporated

LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES

Existing + Approved Projects + Project

Fig Garden Financial Center Phase IV

Figure 6-1

08-1176

TABLE 6-3:
EXISTING PLUS APPROVED PROJECTS PLUS THE PROJECT CONDITIONS ANALYSIS LEVELS OF SERVICE

Segment	**PM Peak Hour LOS**	
Shaw Avenue – Palm Avenue to Fruit Avenue	C	
Shaw Avenue – Maroa Avenue to Palm Avenue	C	
Palm Avenue – Bullard Avenue to Barstow Avenue	C	
Palm Avenue – Barstow Avenue to San Ramon Avenue	D	
Palm Avenue – San Ramon Avenue to San Jose Avenue	D	
Palm Avenue – San Jose Avenue to Shaw Avenue	C	
Palm Avenue – Shaw Avenue to Gettysburg	C	
San Jose Avenue – Colonial Avenue to Maroa Avenue	C	
San Ramon Avenue – Palm Avenue to Fruit Avenue	C	
Barstow Avenue – Palm Avenue to Fruit Avenue	D	
Thorne Avenue – Barstow Avenue to San Ramon Avenue	C	
Intersection	**LOS**	**Delay**[1]
Bullard Avenue at Palm Avenue	D	51.1
Browning Avenue at Palm Avenue	B	14.3
Barstow Avenue at Palm Avenue	D	54.1
San Ramon Avenue at Palm Avenue		
• NB Left	B	10.5
• SB Left	B	12..4
• EB Approach	B	13.1
• WB Approach	B	14.5
San Jose Avenue at Palm Avenue	B	19.5
Shaw Avenue at Palm Avenue	D	49.2
Van Ness Boulevard at Palm Avenue		
• WB Right	B	11.4
Gettysburg Avenue at Palm Avenue	A	6.3
Ashlan Avenue at Palm Avenue	C	20.9
Barstow Avenue at Thorne Avenue		
• WB Left	A	9.0
• NB Approach	C	18.6
San Ramon Avenue at Thorne Avenue		
• EB Left-Through-Right	B	10.1
• WB Left-Through-Right	A	10.0
• NB Approach	A	0.5
• SB Approach	A	2.0
Shaw Avenue at Fruit Avenue	B	14.9
Shaw Avenue at Maroa Avenue	C	22.0
San Ramon Avenue at Colonial Avenue		
• NB Left-Through	A	3.7
• EB Approach	A	8.9

[1] *delay in seconds per vehicle*
SB = southbound *NB = northbound* *EB = eastbound* *WB = westbound*

As shown in Table 6-3, all the study segments and intersections are projected to operate at or above the appropriate adopted level or service standard in the Existing Plus Approved Projects Plus the Project conditions scenario. Therefore, there are no LOS impacts caused by the Project, in addition to the Approved Projects, in the near-term conditions at the study locations.

6.2 Signal Warrants

Peak hour traffic signal warrants (Warrant 3, part B) were also prepared for the five (5) unsignalized intersections. Based on the peak hour traffic signal warrants, the warrant is not projected to be met at any of the unsignalized intersections in the Existing Plus Approved Projects Plus the Project conditions scenario. These warrant analyses are limited to the peak hour volume warrant (Warrant 3, part B) only and other conditions may exist which meet other traffic signal warrants.

CHAPTER 7 – 2030 NO PROJECT CONDITIONS (WITHOUT THE PROJECT)

The 2030 No Project conditions scenario was prepared to address future conditions without the construction of the proposed Project. The 2030 No Project traffic volumes were developed using the Existing traffic counts, the trip distribution for the Bullard High School Improvement Project,[12] and the COFCG traffic model, as shown in Appendix I. The 2030 No Project scenario assumes no development of the Project site. The 2030 No Project scenario represents the cumulative traffic conditions without the Project. The 2030 No Project scenario also includes all City planned projects, including the following:

- Shaw Avenue at Palm Avenue
    - Widening to dual left-turn lanes on all four legs
        - Dual left-turn lanes are already located on the southbound approach
        - Separate right-turn lanes are already located on the westbound and southbound approaches

This improvement is currently ranked number 2 on the Fiscal Year 2011 (FY11) Priority List for Intersection Traffic Flow Improvements. The left-turn lanes and separate right-turn lanes are assumed to be in place for the 2030 No Project and 2030 Project scenarios.

- Barstow Avenue at Palm Avenue
    - Installation of left-turn signals with dedicated phases

This improvement is currently ranked number 12 on the FY11 Priority List for Warranted Left Turn Signals. The left-turn signals are assumed to be in place for the 2030 No Project and 2030 Project scenarios.

- Barstow Avenue at Thorne Avenue
    - Installation a traffic signal

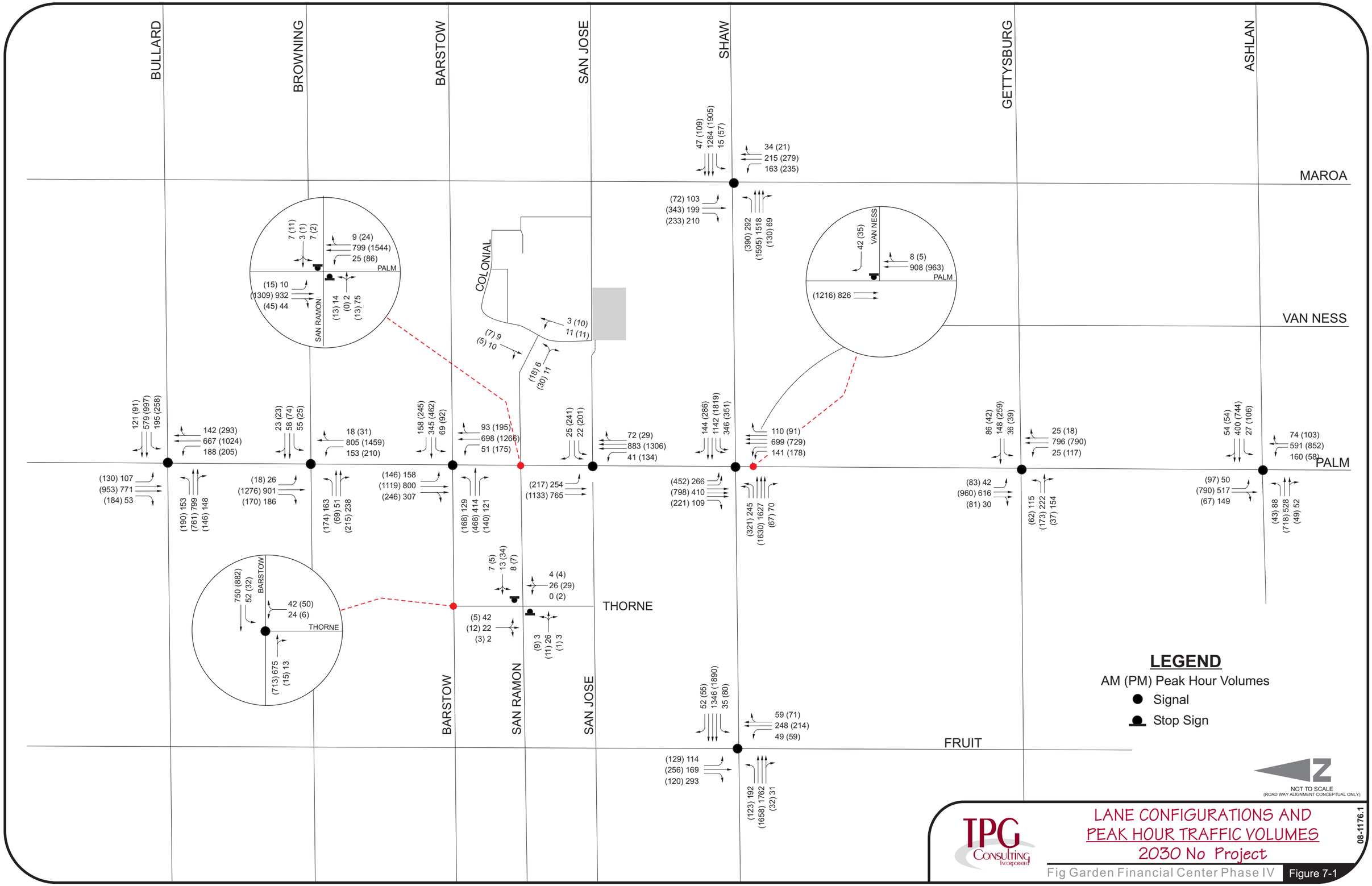
This improvement is currently ranked number 14 on the FY11 Priority List for New Traffic Signal Installations. The traffic signal is assumed to be in place for the 2030 No Project and 2030 Project scenarios.

In addition to the improvements planned in the TSMI, additional improvements are also planned in the City of Fresno's Intelligent Transportation Systems (ITS) Program. Phase 4 of the City's ongoing traffic signal synchronization program will be to synchronize all traffic signals on Shaw Avenue from SR 99 to SR 41 (fiber) and Bullard Avenue from Marks Avenue to Willow Avenue (wireless). These improvements are programmed for some time between 2011 and 2015.

7.1 Level of Service

The 2030 No Project segment and intersection lane configurations and intersection controls and segment and intersection peak hour traffic volumes are shown on Figure 7-1. Using the lane configurations and volumes shown on Figure 7-1, the segments and intersections were analyzed for 2030 No Project levels of service. Table 7-1 shows the 2030 No Project levels of service for the study segments and intersections respectively. The signalized intersection levels of service shown in Table 7-1 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown in Table 7-1. The 2030 No Project intersection levels of service calculations are included in Appendix J.

[12] *Traffic Impact Study for the Bullard High School Improvement Project*, URS Corporation, December 2009.


BULLARD
BROWNING
BARSTOW
SAN JOSE
SHAW
GETTYSBURG
ASHLAN
MAROA
VAN NESS
PALM
THORNE
FRUIT
SAN RAMON
COLONIAL
121 (91)
579 (997)
195 (258)
142 (293)
667 (1024)
188 (205)
(130) 107
(953) 771
(184) 53
(190) 153
(761) 799
(146) 148
23 (23)
58 (74)
55 (25)
(18) 26
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18 (31)
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158 (245)
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69 (92)
(146) 158
(1119) 800
(246) 307
93 (195)
698 (1266)
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(168) 129
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22 (201)
72 (29)
883 (1306)
41 (134)
(217) 254
(1133) 765
144 (286)
1142 (1819)
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(221) 109
47 (109)
1264 (1905)
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(233) 210
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(1595) 1518
(130) 69
110 (91)
699 (729)
141 (178)
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(1630) 1627
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36 (39)
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(81) 30
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796 (790)
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591 (852)
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(49) 52
7 (11)
3 (1)
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(45) 44
(13) 14
(0) 2
(13) 75
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8 (5)
908 (963)
(1216) 826
3 (10)
11 (11)
(7) 9
(5) 10
(18) 6
(30) 11
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52 (32)
42 (50)
24 (6)
(713) 675
(15) 13
7 (5)
13 (34)
8 (7)
4 (4)
26 (29)
0 (2)
(5) 42
(12) 22
(3) 2
(9) 3
(11) 26
(1) 3
52 (55)
1346 (1890)
35 (80)
59 (71)
248 (214)
49 (59)
(129) 114
(256) 169
(120) 293
(123) 192
(1658) 1762
(32) 31
LEGEND
AM (PM) Peak Hour Volumes
Signal
Stop Sign
NOT TO SCALE
(ROAD WAY ALIGNMENT CONCEPTUAL ONLY)
TPG Consulting Incorporated
LANE CONFIGURATIONS AND
PEAK HOUR TRAFFIC VOLUMES
2030 No Project
08-1176.1
Fig Garden Financial Center Phase IV
Figure 7-1

TABLE 7-1:
2030 NO PROJECT (WITHOUT THE PROJECT) CONDITIONS ANALYSIS LEVELS OF SERVICE

	AM Peak Hour		PM Peak Hour	
Segment	**LOS**		**LOS**	
Shaw Avenue – Palm Avenue to Fruit Avenue	C		D	
Shaw Avenue – Maroa Avenue to Palm Avenue	C		D	
Palm Avenue – Bullard Avenue to Barstow Avenue	C		D	
Palm Avenue – Barstow Avenue to San Ramon Avenue	C		D	
Palm Avenue – San Ramon Avenue to San Jose Avenue	C		D	
Palm Avenue – San Jose Avenue to Shaw Avenue	C		D	
Palm Avenue – Shaw Avenue to Gettysburg	C		C	
San Jose Avenue – Colonial Avenue to Maroa Avenue	C		C	
San Ramon Avenue – Palm Avenue to Fruit Avenue	C		C	
Barstow Avenue – Palm Avenue to Fruit Avenue	D		**F**	
Thorne Avenue – Barstow Avenue to San Ramon Avenue	C		C	
Intersection	**LOS**	**Delay[1]**	**LOS**	**Delay[1]**
Bullard Avenue at Palm Avenue	D	49.0	**F**	**100.3**
Browning Avenue at Palm Avenue	B	16.6	C	22.8
Barstow Avenue at Palm Avenue	C	33.3	**F**	**81.1**
San Ramon Avenue at Palm Avenue				
• NB Left	A	9.6	B	11.9
• SB Left	A	9.1	B	14.0
• EB Approach	B	11.7	C	15.9
• WB Approach	C	15.1	C	17.1
San Jose Avenue at Palm Avenue	A	9.1	B	16.1
Shaw Avenue at Palm Avenue	C	29.7	C	32.9
Van Ness Boulevard at Palm Avenue				
• WB Right	B	10.8	B	10.9
Gettysburg Avenue at Palm Avenue	B	10.3	A	9.9
Ashlan Avenue at Palm Avenue	B	16.8	C	28.9
Barstow Avenue at Thorne Avenue	C	26.8	C	24.3
San Ramon Avenue at Thorne Avenue				
• EB Left-Through-Right	B	10.3	A	9.6
• WB Left-Through-Right	A	10.0	A	9.7
• NB Approach	A	0.0	A	0.4
• SB Approach	A	4.8	A	1.9
Shaw Avenue at Fruit Avenue	B	15.8	B	17.5
Shaw Avenue at Maroa Avenue	B	19.4	**E**	**75.1**
San Ramon Avenue at Colonial Avenue				
• NB Left-Through	A	5.8	A	3.8
• EB Approach	A	8.8	A	8.9

[1] *delay in seconds per vehicle*
SB = southbound *NB = northbound* *EB = eastbound* *WB = westbound*

Segments and intersections projected to operate below the adopted level of service standard are shown bolded in Table 7-1. As shown in Table 7-1, one (1) segment and three (3) intersections are projected to operate below the appropriate level of service standard in the 2030 No Project conditions scenario. All the remaining study segments and intersections are projected to operate at or above the appropriate adopted level or service standard in the 2030 No Project conditions scenario. Therefore, there is one cumulative LOS impact identified in the 2030 No Project (without the Project) conditions at the study locations.

7.2 Signal Warrants

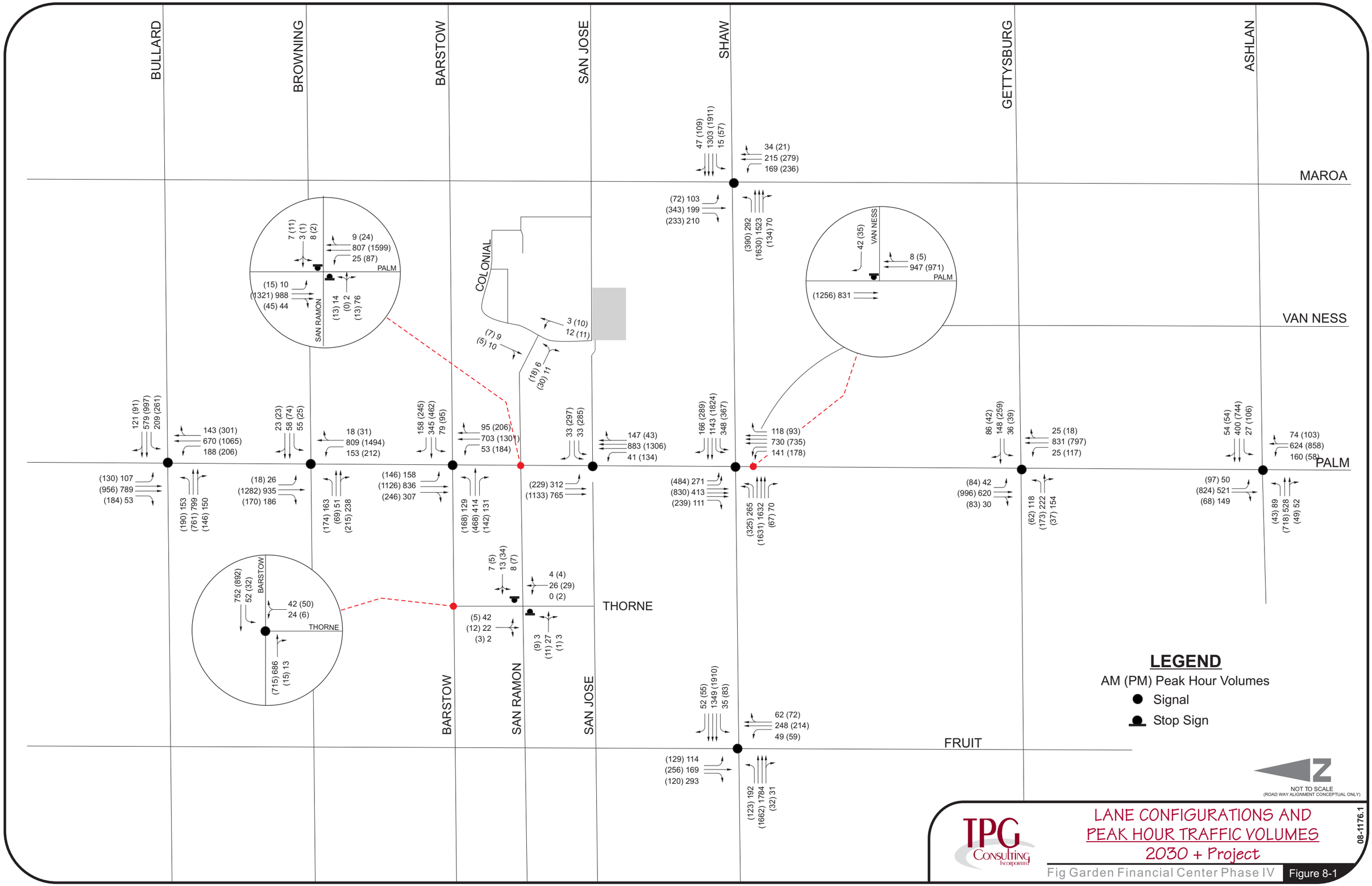
Peak hour traffic signal warrants (Warrant 3, part B) were also prepared for the four (4) unsignalized intersections. Based on the peak hour traffic signal warrant, the unsignalized intersections are not projected to meet the warrant in the 2030 No Project conditions scenario. These warrant analyses are limited to the peak hour volume warrant (Warrant 3, part B) only and other conditions may exist which meet other traffic signal warrants.

CHAPTER 8 – 2030 PLUS THE PROJECT CONDITIONS

The 2030 Plus the Fig Garden Financial Center Phase IV Project conditions scenario was prepared to address future conditions with the construction of the Fig Garden Financial Center Phase IV. The 2030 Plus the Project traffic volumes were developed using the 2030 No Project traffic volumes and the Project traffic (as identified in Chapter 3). The 2030 Plus Project scenario represents the cumulative traffic conditions with the addition of the Fig Garden Financial Center Phase IV Project. All roadway improvements identified in the 2030 No Project (without the Project) scenario are also assumed to be in place for the 2030 Plus the Project scenario.

8.1 Level of Service

The 2030 Plus the Project segment and intersection lane configurations and intersection controls and segment and intersection peak hour traffic volumes are shown on Figure 8-1. Using the lane configurations and volumes shown on Figure 8-1, the segments and intersections were analyzed for 2030 Plus the Project levels of service. Table 8-1 shows the 2030 Plus the Project levels of service for the study segments and intersections respectively. The signalized intersection levels of service shown in Table 8-1 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown in Table 8-1. The 2030 Plus the Project intersection levels of service calculations are included in Appendix K.


BULLARD
BROWNING
BARSTOW
SAN JOSE
SHAW
GETTYSBURG
ASHLAN
MAROA
VAN NESS
PALM
FRUIT
THORNE
SAN RAMON
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AM (PM) Peak Hour Volumes
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Stop Sign
NOT TO SCALE
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IPG Consulting Incorporated
LANE CONFIGURATIONS AND
PEAK HOUR TRAFFIC VOLUMES
2030 + Project
Fig Garden Financial Center Phase IV
Figure 8-1
08-1176.1

TABLE 8-1:
2030 PLUS THE PROJECT CONDITIONS ANALYSIS LEVELS OF SERVICE

	AM Peak Hour		PM Peak Hour	
Segment	**LOS**		**LOS**	
Shaw Avenue – Palm Avenue to Fruit Avenue	C		D	
Shaw Avenue – Maroa Avenue to Palm Avenue	C		D	
Palm Avenue – Bullard Avenue to Barstow Avenue	C		D	
Palm Avenue – Barstow Avenue to San Ramon Avenue	C		D	
Palm Avenue – San Ramon Avenue to San Jose Avenue	C		D	
Palm Avenue – San Jose Avenue to Shaw Avenue	C		D	
Palm Avenue – Shaw Avenue to Gettysburg	C		C	
San Jose Avenue – Colonial Avenue to Maroa Avenue	C		C	
San Ramon Avenue – Palm Avenue to Fruit Avenue	C		C	
Barstow Avenue – Palm Avenue to Fruit Avenue	D		**F**	
Thorne Avenue – Barstow Avenue to San Ramon Avenue	C		C	
Intersection	**LOS**	**Delay[1]**	**LOS**	**Delay[1]**
Bullard Avenue at Palm Avenue	D	51.3	**F**	**102.8**
Browning Avenue at Palm Avenue	B	16.9	C	23.0
Barstow Avenue at Palm Avenue	C	34.8	**F**	**84.5**
San Ramon Avenue at Palm Avenue				
• NB Left	A	9.8	B	12.1
• SB Left	A	9.1	B	14.7
• EB Approach	B	11.7	C	16.4
• WB Approach	B	14.5	C	18.1
San Jose Avenue at Palm Avenue	B	10.6	B	17.9
Shaw Avenue at Palm Avenue	C	27.4	C	35.0
Van Ness Boulevard at Palm Avenue				
• WB Right	B	11.0	B	11.0
Gettysburg Avenue at Palm Avenue	B	10.3	B	10.1
Ashlan Avenue at Palm Avenue	B	16.8	C	29.2
Barstow Avenue at Thorne Avenue	C	26.9	C	23.9
San Ramon Avenue at Thorne Avenue				
• EB Left-Through-Right	B	10.3	B	9.6
• WB Left-Through-Right	A	10.0	B	9.7
• NB Approach	A	0.0	A	0.4
• SB Approach	A	4.8	A	1.9
Shaw Avenue at Fruit Avenue	B	14.7	B	17.2
Shaw Avenue at Maroa Avenue	B	17.2	**E**	**72.2**
San Ramon Avenue at Colonial Avenue				
• NB Left-Through	A	5.9	A	3.8
• EB Approach	A	8.8	A	8.9

[1] *delay in seconds per vehicle*
SB = southbound *NB = northbound* *EB = eastbound* *WB = westbound*

Segments and intersections projected to operate below the adopted level of service standard are shown bolded in Table 8-1. As shown in Table 8-1, one (1) segment and three (3) intersections are projected to operate below the appropriate level of service standard in the 2030 Plus the Project conditions scenario. All the remaining study segments and intersections are projected to operate at or above the appropriate adopted level or service standard in the 2030 Plus the Project conditions scenario. Therefore, there is one cumulative LOS impact which the Fig Garden Financial Center Phase IV Project contributes to in the 2030 Plus the Project conditions at the study locations.

8.2 Signal Warrants

Peak hour traffic signal warrants (Warrant 3, part B) were also prepared for the four (4) unsignalized intersections. Based on the peak hour traffic signal warrant, the unsignalized intersections are not projected to meet the warrant in the 2030 Plus the Project conditions scenario. These warrant analyses are limited to the peak hour volume warrant (Warrant 3, part B) only and other conditions may exist which meet other traffic signal warrants.

CHAPTER 9 – CONCLUSIONS AND RECOMMENDATIONS

9.1 Level of Service Analysis

As previously discussed, the following locations, by scenario, are projected to operate below the appropriate City of Fresno or County of Fresno's adopted level of service standards:

9.1.1 Cumulative Analysis

The following segments and intersections were predicted to operate below the City of Fresno's appropriate LOS standards.

2030 Without the Project

Segments

- Barstow Avenue – Palm Avenue to Fruit Avenue – PM peak hour

Intersections

- Bullard Avenue at Palm Avenue – PM peak hour
- Barstow Avenue at Palm Avenue – PM peak hour
- Shaw Avenue at Maroa Avenue – PM peak hour

2030 Plus the Fig Garden Project

Segments

- Barstow Avenue – Palm Avenue to Fruit Avenue – PM peak hour

Intersections

- Bullard Avenue at Palm Avenue – PM peak hour
- Barstow Avenue at Palm Avenue – PM peak hour
- Shaw Avenue at Maroa Avenue – PM peak hour

9.1.2 Fig Garden Project-Specific Analysis

After determination of the cumulative analysis identified in the LOS analysis, the significance criteria were applied to determine what, if any, impacts are project-related. Based on the City's significant impact threshold, none of the study locations that are projected to operate below the appropriate adopted LOS standard are significantly impacted by the Project. For locations with an LOS F standard that are projected to operate at LOS F in the 2030 without the Project and in the 2030 Plus the Fig Garden Project scenarios, the overall intersection delay increase was analyzed to determine what, if any, significant project-related impacts occur. The results of the delay comparison are as follows:

Intersections

- Bullard Avenue at Palm Avenue – increase in average delay = 2.8 < the 5 sec threshold
  - 2030 No Project PM Delay: = 100.3
  - 2030 Plus the Project: PM Delay: = 102.8
- Barstow Avenue at Palm Avenue – increase in average delay = 3.4 < the 5 sec threshold
  - 2030 No Project: PM Delay: = 81.1
  - 2030 Plus the Project: PM Delay: = 84.5

- Shaw Avenue at Maroa Avenue – decrease in average delay = 2.9 < 5 the sec threshold
  - 2030 No Project: PM Delay = 75.1
  - 2030 Plus the Project: PM Delay = 72.2

As shown above, all average delay changes associated with the Project are projected to be below the 5 second increase threshold of significance. There are no significant impacts as a result of the development of the Fig Garden Financial Center Phase IV Project.

9.2 Roadway Improvements

9.2.1 City of Fresno

Potentially recommended improvements (such as addition of through and turn lanes, changes in signal phasing, movement restriction, etc.) have been evaluated against the established criteria presented in the City of Fresno's TIS Guidelines, as follows:

> *"For all recommendations to increase the number of travel lanes on a street or at an intersection as a mitigation measure, the report must clearly identify the impacts associated with such a change such as whether or not additional right of way will be required and whether it is feasible to acquire the right of way based on the level of development of the adjacent land and buildings (if any). All mitigations should be reviewed in the field to make sure that they can be accommodated. If they cannot be accommodated or are not feasible please advise in the TIS so that the applicant and the City of Fresno are aware of right-of-way issues in advance."*[13]

As shown above, the Project does not create any project-specific significant impacts to the analysis roadways. Therefore, the Project will pay the City's Fresno Major Street Improvement (FMSI) and Traffic Signal Mitigation Impact (TSMI) fees to mitigate its contribution to the cumulative impacts.

9.2.2 County of Fresno

This is consistent for all County controlled locations (Browning Avenue, Van Ness Blvd, and Ashlan Avenue at their intersections with Palm Avenue) with the County's General Plan policies, as follows:

> *Draft General Plan Implementation Program TR-A.B states that the County would require new development within an unincorporated area of a city sphere of influence to pay the traffic impact fees of that city. It would be the responsibility of the cities to develop and maintain their roadway capital improvement programs and adequate funding mechanisms to maintain their adopted level of service programs for the entire sphere of influence.*[14]

[13] City of Fresno Traffic Impact Study Guidelines, City of Fresno, February 2009, Page 11.
[14] County of Fresno General Plan Update Draft Environmental Impact Report, County of Fresno, February 2000, page 4.4-31

9.2.3 Planned City Improvements

Based on the City of Fresno's current TSMI project list, three improvements included in the TSMI apply to the study locations. These improvements will be constructed using TSMI funds, which the Project will pay into. These improvements are as follows:

- Shaw Avenue at Palm Avenue
    - Widening to dual left-turn lanes on all four legs
        - Dual left-turn lanes are already located on the southbound approach
        - Separate right-turn lanes are already located on the westbound and southbound approaches

This improvement is currently ranked number 2 on the Fiscal Year 2011 (FY11) Priority List for Intersection Traffic Flow Improvements. The left-turn lanes and separate right-turn lanes are assumed to be in place for the 2030 No Project and 2030 Project scenarios.

- Barstow Avenue at Palm Avenue
    - Installation of left-turn signals with dedicated phases

This improvement is currently ranked number 12 on the FY11 Priority List for Warranted Left Turn Signals. The left-turn signals are assumed to be in place for the 2030 No Project and 2030 Project scenarios.

- Barstow Avenue at Thorne Avenue
    - Installation a traffic signal

This improvement is currently ranked number 14 on the FY11 Priority List for New Traffic Signal Installations. This traffic signal is warranted based on the school crossing signal warrant. As shown in the signal warrant analysis included in this report, the peak hour traffic signal warrant is not currently met or projected to be met in the future conditions. This traffic signal is assumed to be in place for the 2030 No Project and 2030 Project scenarios.

In addition to the improvements planned in the TSMI, additional improvements are also planned in the City of Fresno's Intelligent Transportation Systems (ITS) Program. Phase 4 of the City's ongoing traffic signal synchronization program will be to synchronize all traffic signals on Shaw Avenue from SR 99 to SR 41 (fiber) and Bullard Avenue from Marks Avenue to Willow Avenue (wireless). These improvements are programmed for some time between 2011 and 2015. Therefore, the study intersections located on these corridors have been analyzed as coordinated for the 2030 No Project and 2030 Project scenarios.

9.2.4 Cumulative Improvements

Potential improvements have been prepared for all study locations projected to operate below the appropriate adopted LOS standard. The feasibility of each of the proposed improvements is then addressed. Based on the identified right-of-way constraints, 2025 General Plan designations, on-street parking needs, existing and planned bicycle facilities, and City practices and policies, improvements are not feasible at these locations. Therefore the cumulative conditions are considered significant and unavoidable because no feasible mitigation measures are available.

2030 Without the Project

Segments

- Barstow Avenue – Palm Avenue to Fruit Avenue
  - No improvements recommended

This segment of Barstow Avenue is currently constructed to two (2) lanes with a continuous two-way left-turn lane. This is the buildout configuration for this roadway adopted in the General Plan. Further widening of Barstow Avenue would conflict with the adopted General Plan and *Bicycle, Pedestrian and Trails Master Plan* policies. If the segment was widened to four lanes, then the segment is projected to operate at LOS C in both the 2030 No Project and 2030 Plus the Project scenarios. Widening of this roadway segment would require removal of the current on-street parking on both sides of Barstow Avenue. On-street parking is needed for the residential development fronting Barstow Avenue on both sides of the street. On-street parking is also needed on the north side of the roadway for the adjacent schools. Additional right-of-way cannot be feasibly obtained for widening due to the level of residential development and the adjacent school buildings.

Intersections

- Bullard Avenue at Palm Avenue
  - No improvements recommended

All approaches to this intersection currently have separate left-turn lanes and two through lanes. Separate right-turn lanes are available on the westbound and southbound approaches. Adjacent development is located in very close proximity to the roadways on the northwest, southwest, and southeast corners, prohibiting widening on those approaches. In addition, the on-street parking located on Bullard Avenue is needed for the adjacent residential development and would likely need to be removed to accommodate widening at the intersection. The addition of through lanes and/or right-turn lanes is not feasible.

- Barstow Avenue at Palm Avenue
  - No improvements recommended

The Barstow Avenue approaches to this intersection currently have separate left-turn lanes, one through lane, and a separate right–turn lane. Palm Avenue approaches have separate left-turn lanes and two through lanes with shared right-turn lanes. See above for discussion of the roadway configuration for Barstow Avenue. Adjacent development is located in very close proximity to the roadways on the southwest, southeast, and northeast corners, prohibiting widening on those approaches. In addition, the on-street parking located on Bullard Avenue is needed for the adjacent residential development and would likely need to be removed to accommodate widening at the intersection. The same would be required of the existing on-street bicycle lanes on Barstow Avenue. The intersection is already planned for installation of protected left-turn phasing, which is the most feasible improvement for the intersection. The addition of through lanes and/or right-turn lanes is not feasible.

- Shaw Avenue at Maroa Avenue
  - No improvements recommended

The Maroa Avenue approaches to this intersection currently have separate left-turn lanes, one through lane, and a separate right–turn lane. Shaw Avenue approaches have separate left-turn lanes and three through lanes with shared right-turn lanes. Adjacent development is located in very close proximity to the roadways on all four corners, prohibiting widening on those approaches. In addition, Maroa Avenue, south of Shaw Avenue, is constructed as a two-lane roadway with undeveloped frontages.

The acquisition of additional right-of-way and removal of trees and structures would be required to extend the four-lane Maroa section to the south. The addition of right-turn lanes on Shaw Avenue or additional through lanes on Maroa Avenue are not feasible.

9.3 Project Mitigations

As previously discussed, the Fig Garden Financial Center Phase IV Project will pay the City of Fresno's TSMI and FMSI fees based on the currently adopted fee schedule at the time the Project's building permit is obtained. As requested by Caltrans in its response to the Notice of Preparation and at the Scoping meeting conducted with Caltrans on July 28, 2011, Chapter 3 of this report details the Project trips anticipated to access nearby freeway interchanges. It should also be noted that the Project is also subject to payment of the Fresno County Regional Transportation Mitigation Fee (RTMF). The RTMF is currently $1.03 per square foot for Commercial/Office/Service uses. These fees are based on the *Fresno-Madera Freeway Interchange Deficiency Study* and intended to provide mitigation for impacts to Caltrans facilities. Based on the analysis detailed in Chapter 3, the payment of the RTMF fees will provide complete mitigation for the Project's cumulative impact to State Facilities identified in Chapter 3.

APPENDIX A

ANALYSIS METHODOLOGY

APPENDIX A – METHODOLOGY

This TIS was prepared to assess the traffic impacts due to the proposed Fig Garden Financial Center Phase IV (Project), which will be located on the south side of West San Jose Avenue between Maroa and Palm Avenues in the City of Fresno. The approximately 3.96 acre site is currently occupied by a vacant, single-level apartment complex with 44 units. The proposed Project will be comprised of a four-story 104,593 square foot (sf) office building. This study evaluates the impacts of the proposed development on adjacent segment and intersection operations and provides an assessment of the Project driveways and on-site circulation.

In order to prepare the traffic evaluation for the Project, a variety of data and technical assumptions had to be developed. This section of the report describes the various sources, data and technical assumptions used in this evaluation. The methodology and technical assumptions, including the scenarios, study locations, and study time periods, were established in coordination with, and approved by the City of Fresno Traffic Engineering Division of the Public Works Department.

A.1 Sources

This report was prepared using information taken from the following sources:

- *2000 Highway Capacity Manual (HCM 2000)*, Transportation Research Board, 2000.
- *2002 Quality/Level of Service Handbook*, Florida Department of Transportation, 2002.
- *2002 QLOS Handbook Addendum*, Florida Department of Transportation, May 2007.
- *2010 City of Fresno Bicycle, Pedestrian and Trails Master Plan*, Fehr & Peers, 2010.
- Bryan Jones, TE, Traffic Engineering Manager, City of Fresno, Phone/email discussions, 2008-2011.
- *Fresno County Traffic Model*, Council of Fresno County Governments, April 2001.
- *Fresno-Madera Metropolitan Freeway Interchange Deficiency Study*, Fehr & Peers, November 2008.
- *Guide for the Preparation of Traffic Impact Studies*, State of California Department of Transportation, December, 2002.
- *Master Environmental Impact Report for the 2025 Fresno General Plan*, City of Fresno Planning and Development Department, May 2002.
- *Recommended Procedures for Using Traffic Projections from the Fresno COG Travel Model*, Fresno COG Model Steering Committee, December 2002.
- *Synchro 7.0*, Trafficware, 2007.
- *Traffic Impact Analysis for Site Development*, A Recommended Practice, ITE, Transportation Planners Council Task Force on Traffic Access/Impact Studies, 2006.
- *Traffic Impact Study for the Bullard High School Improvement Project*, URS Corporation, December 2009.
- *Traffic Impact Study Report Guidelines*, City of Fresno, February 2009.
- *Trip Generation*, 8th Edition, Volume 2, ITE, 2008.
- *Trip Generation* (software), Version 6, Microtrans, 2008.

A.2 Scenarios

The scenarios that were analyzed for this study included:

- Existing Traffic Conditions (Without the Project)
- Existing Plus the Project Traffic Conditions (With the Project)
- Existing Plus Approved Projects Plus the Project Traffic Conditions (With the Project)
- 2030 No Project Traffic Conditions (Without the Project)
- 2030 Plus the Project Traffic Conditions (With the Project)

The Existing Plus the Project, Existing Plus Approved Projects Plus the Project, 2030 No Project, and 2030 Plus the Project scenarios reflect cumulative conditions analysis as required by CEQA.

A.3 Study Locations

The following locations were analyzed:

Segments

1. Shaw Avenue – Maroa Avenue to Palm Avenue
2. Shaw Avenue – Palm Avenue to Fruit Avenue
3. Palm Avenue – Bullard Avenue to Barstow Avenue
4. Palm Avenue – Barstow Avenue to San Ramon Avenue
5. Palm Avenue – San Ramon Avenue to San Jose Avenue
6. Pam Avenue – San Jose Avenue to Shaw Avenue
7. Palm Avenue – Shaw Avenue to Gettysburg Avenue
8. San Jose Avenue – Colonial Avenue to Maroa Avenue
9. San Ramon Avenue – Palm Avenue to Fruit Avenue
10. Barstow Avenue – Palm Avenue to Fruit Avenue
11. Thorne Avenue – Barstow Avenue to San Ramon Avenue

Intersections

1. Barstow Avenue at Palm Avenue
2. Browning Avenue at Palm Avenue
3. Bullard Avenue at Palm Avenue
4. San Ramon Avenue at Palm Avenue
5. San Jose Avenue at Palm Avenue
6. Shaw Avenue at Palm Avenue
7. Van Ness Boulevard at Palm Avenue
8. Gettysburg Avenue at Palm Avenue
9. Ashlan Avenue at Palm Avenue
10. Shaw Avenue at Fruit Avenue
11. Shaw Avenue at Maroa Avenue
12. San Ramon Avenue at Thorne Avenue
13. Barstow Avenue at Thorne Avenue
14. San Ramon Avenue at Colonial Avenue

A.4 Analysis Time Periods

According to *Traffic Impact Analyses for Site Development*, the overall purpose of a traffic impact study is to determine the project impacts that are likely to occur to the surrounding street system. In order to accomplish this purpose you need to determine what occurs when the peak of the project generated traffic overlays the peak of the street traffic. *Traffic Impact Analyses for Site Development* states "the peak periods [of the adjacent street and highway system] are generally the weekday morning (7-9 a.m.) and evening (4-6 p.m.) peak hours, although local area characteristics occasionally result in other peaks (e.g., at major shopping or recreational centers)". The peak hours analyzed in this study were:

- 7:00 to 9:00 AM
- 4:00 to 6:00 PM

These are the standard peak hours of the street typically used for study in the City of Fresno as stated in the *Traffic Impact Study Report Guidelines*.

The traffic analysis time periods are the typical AM and PM peak hours as shown above. Daily traffic counts on the following roadways were analyzed to confirm whether or not the PM peak hour is significantly altered due to the proximity of nearby schools:

- Barstow Avenue
- Bullard Avenue
- Fruit Avenue
- Palm Avenue

Based on traffic counts provided by the City of Fresno, the typical PM peak hour (4-6 PM) is higher for all roadways except Barstow Avenue, west of West Avenue.

A.5 Traffic Counts

According to the Caltrans *Guide for the Preparation of Traffic Impact Studies*, one of the common rules for counting vehicular traffic is:

> "Vehicle counts should be conducted on Tuesdays, Wednesdays, or Thursdays during weeks not containing a holiday and conducted in favorable weather conditions."[15]

The City of Fresno *Traffic Impact Study Report Guidelines* states that "Counts shall be collected during A.M. (7:00 a.m. to 9:00 a.m.) and P.M. (4:00 p.m. to 6:00 p.m.) peak hours, unless otherwise specified (such as midday or weekend peak periods)".[16]

Traffic counts were conducted between the week of May 30, 2011 and July 6, 2011. Traffic counts were taken at intersections immediately adjacent to Bullard High School during the week of May 30, 2011 in order to account for regular school traffic. The remaining intersection counts were delayed by construction on Palm and Shaw Avenues. The remaining locations were adjusted based on the school period counts. The traffic counts were also compared to the traffic counts taken at all study intersections in 2009 for the *Traffic Impact Study for the Villas at Fig Garden*. Through the counts taken during the regular school session and the prior traffic counts, it was ensured that the traffic counts analyzed in this traffic study properly account for "normal" traffic conditions. Segment

[15] *Guide for the Preparation of Traffic Impact Studies*, State of California Department of Transportation, December 2002, page 4.
[16] Traffic Impact Study Report Guideline, City of Fresno, March 2006, page 5.

volumes were developed using the adjacent intersection volumes. The counts are included in Appendix D.

The level of development within the Fig Garden Shopping and Financial Centers at the time of the traffic counts was observed to be less than 100%. Several retail pads and potentially some office spaces were vacant at the time traffic counts were taken. While this does represent less than the maximum potential traffic in the study area, it does represent an accurate depiction of traffic for the Existing conditions. The current economic climate has affected not only the levels of retail development, but the travel patterns in general for all types of travel, especially automobile. It is likely that the levels of area development observed during the traffic counts will continue for an undetermined amount of time and represent reasonable Existing conditions traffic patterns.

A.6 Fresno County Traffic Model

A.6.1 Background

COFCG is the State Regional Transportation Planning Agency and the federal Metropolitan Planning Organization for Fresno County. As a transportation planning agency, COFCG is responsible for developing and maintaining a microcomputer-based traffic simulation model that represents Fresno County.

Modeling activities are monitored by the Model Steering Committee. This Committee includes representatives from local agencies, private consultants, and others interested in the development and application of the Model to local traffic analysis issues. The Committee provides a focused forum for presentation of traffic related issues to local agency planning and traffic engineering staffs as well as project proponents. Since being formed in 1986, the Committee has developed into a valuable resource to both monitor modeling applications and to provide ongoing direction for continued Model development.

A.6.2 Project Model Use

The Model was used in this study to develop the following pieces of information:

- Existing (2009) and 2030 Plus the Project primary (new) trip distributions
- 2030 No Project background growth increments

The 2011 and 2030 model years were used to create the 2030 No Project growth increments for the study area roadways per the COFCG adopted methodology[17]. For those movements that are showing negative or less than 1% growth by 2030, a 1% growth factor applied to the Existing count data was used to generate the 2030 No Project volumes and should be considered a worst-case. Copies of the Model request and Model plots are included in Appendix I.

A.7 Approved/Pending/Proposed Project Trips

One Proposed Project was identified in the Project area. The Bullard High School Improvement Project includes numerous improvements to the athletics facilities at Bullard High School. The improvements will be completed to facilities located on-campus which is located west of Palm Avenue between Barstow Avenue and Browning Avenue. The only significant traffic increases that

[17] *Recommended Procedures for Using Traffic Projections from the Fresno COG Travel Model*, Fresno COG Model Steering Committee, September 2001.

will occur from this project will occur during the PM peak hour when large events (larger than the current facilities can accommodate) are held, which will only be a handful of times per year. Traffic generation and distribution for this project were taken from the recently completed TIS.[18]

A.8 Intersection Analysis and Volume Adjustments

Intersection heavy vehicle percentages were developed from the Existing conditions count data. Heavy vehicle percentages used in the analysis were the greater of either the counted or the *HCM 2000* 2% default. These percentages were used in all scenarios. The actual peak hour factor was calculated and used at each intersection in the Existing, Existing Plus the Project, and Existing Plus Approved Projects Plus the Project scenarios. The urban default peak hour factor of 0.92 was used at all intersection locations in the 2030 No Project and 2030 Plus the Project scenarios.

A.9 Existing Network Configurations

Signal timing information provided by the City of Fresno was utilized at all signalized study intersections. All signalized intersections were optimized to achieve the greatest reduction in overall intersection delay in the 2030 scenarios. A minimum of 10 pedestrian calls per hour were used at all signalized intersections.

Left-turns at signalized intersections were analyzed as either "protected" or "permitted" based on the existing signal timing or the planned installation of left-turn phasing (Barstow Avenue at Palm Avenue). Protected lefts are left-turns that are only allowed to go during their "protected" phase of the signal, and the left-turns are not allowed to go at the same time as the opposing direction through and right-turn movements. Permitted/unprotected lefts are left-turns that are allowed to go at the same time as the opposing direction through and right-turn movements.

A.10 Signal Warrant Analysis

Urban peak hour volume warrants (Warrant 3) were prepared for all unsignalized intersections, as appropriate, based on the methodology presented in the *California Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways*, pages 4C-4, 4C-5 and 4C-10. The urban peak hour volume warrant is prepared for locations with speed limits less than or equal to 40 mph. According to the MUTCD, "the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal." Therefore prior to making a final determination on installation of a proposed signal, a thorough engineering investigation, including collision history, should be conducted.

A.11 Queuing Analysis

Queuing analysis was completed using *Synchro 7.0*, as shown in Appendix B. *Synchro 7.0* printouts provide the 95th percentile maximum queue lengths in feet. According to the *Synchro 7.0* manual, "the 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes."

[18] *Traffic Impact Study for the Bullard High School Improvement Project*, URS Corporation, December 2009.

A.12 Level of Service Analysis Methods

Unsignalized and signalized intersection analyses were completed using *Synchro 7.0*, which incorporates the *HCM 2000* methodologies. *Synchro 7.0* allows for optimization of signals to provide for the greatest reduction in overall intersection delay. This optimization process can result in different signal cycle lengths for both the AM and PM peak hours of a given scenario and across all scenarios. The changing of the signal cycle length somewhat reflects the agency process whereby the agency will adjust intersection signal cycle lengths for differing traffic conditions based on current count data. Segments were analyzed using the unadjusted *2002 Florida Tables*, as amended in May 2007.

A.13 Level of Service

For analysis purposes, the *HCM 2000* defines six levels of service for various facility types. The six levels are given letter designations ranging from "A" to "F", with "A" representing the best operating conditions and "F" the worst. Quantifiable measures of effectiveness that best describe the quality of operation on the subject facility type are used to determine the facilities level of service. For segments, the quantifiable measure of effectiveness is volume to capacity measurements. For signalized and unsignalized intersections, the quantifiable measure of effectiveness is average control delay.[19]

Segments

The *Florida Tables* are generalized planning tables based on the definitions and measurement techniques of the *HCM 2000*. This methodology incorporates both signalization characteristics (number of signals per mile) and roadway characteristics (number of lanes, left-turn pockets, divided/undivided) into the level of service determination. The *Florida Tables* separate facility types into freeways, state arterials with both interrupted (signalized) and uninterrupted (non-signalized) flow, and non-state roadways. Within these various classifications, the facilities are separated by number of lanes and divided versus undivided. There are also adjustments for facility types not given in the tables. For each facility type under each classification are levels of service "A" through "F" with corresponding traffic volumes. These volumes are the maximum amount of traffic that a given facility with given characteristics can carry and maintain a given level of service. This maximum volume per level of service is also called the capacity of the facility. The "State Two-Way Arterials" and "Non-State Roadways" section of Table 4-7 was used in this analysis. Table A-1 shows the level of service thresholds for each roadway analyzed in the TIS. A copy of the *Florida Tables* used in this analysis is included in Appendix L.

[19] Control delay, according to the *2000 Highway Capacity Manual*, page 16-1, includes initial acceleration delay, queue move-up time, stopped delay, and final acceleration delay.

TABLE A-1:
PEAK HOUR DIRECTIONAL VOLUMES[1]
SEGMENT LEVEL OF SERVICE THRESHOLDS

Roadways	No. of Lanes[2]	Divided/ Undivided	Level of Service				
			A	B	C	D	E
Signalized Arterials							
Barstow Avenue	1	Undivided	***	100	590	810	850
Palm Avenue	2	Undivided[3]	***	209	1,292	1,625	1,710
		Divided		220	1,360	1,710	1,800
Shaw Avenue	3	Divided	***	340	2,110	2,570	2,710
Local Roads							
Thorne Avenue San Jose Avenue San Ramon Avenue	1	Undivided	***	***	250	530	660

[1] All volumes represent the highest direction during the peak hour
[2] Number of lanes in highest direction during the peak hour
[3] Undivided multilane facilities receive a 5% reduction from the divided threshold
**** = no level of service report for these volumes*

As can be seen in Table A-1, higher level of service values may not be achieved on some interrupted flow facilities, even with extremely low traffic volumes. As stated in the manual, these higher quality levels of service cannot be achieved primarily because the roadway characteristics will not allow vehicles to attain relatively high average travel speeds. Therefore the study roadway may never attain LOS “A” or “B”.

Intersections

Control delay for two-way stop-controlled (TWSC) intersections, which have stop signs on only the minor street approaches, is per vehicle and is computed for the stop-controlled or minor street movements only since theoretically the through movements on the major street are not experiencing any delay. Since there is no aggregation of delay for a TWSC intersection, there is no intersection level of service as a whole, only levels of service for the individual minor movements. The minor movements generally consist of separate lefts on the major street approaches and all movements on both minor street approaches.

Table A-2 shows the six levels of service and their corresponding ranges of average control delay for both signalized and unsignalized intersections. Table A-2 also contains a brief traffic flow description for signalized intersections for each level of service category. The level of service diagrams provided throughout the report show the levels of service for the study intersections. The levels of service shown for signalized intersections are representative of the overall level of service for that intersection. For TWSC intersections, the level of service shown on the maps is the level of service for the worst operating movement at that intersection as opposed to the overall intersection level of service.

TABLE A-2: INTERSECTION LEVEL OF SERVICE DESCRIPTION			**Intersections**	
			Signalized	**Unsignalized[1]**
Level of Service	**Conditions**	**Signalized Intersection Description**	**Delay (sec/veh)**	**Delay (sec/veh)**
"A"	Free Flow	*Users experience very low delay. Progression is favorable and most vehicles do not stop at all.*	≤10.0	≤10.0
"B"	Stable Operations	*Vehicles travel with good progression. Some vehicles stop, causing slight delay.*	>10.0 – 20.0	>10.0 – 15.0
"C"	Stable Operations	*Higher delays result from fair progression. A significant number of vehicles stop, although many continue to pass through the intersection without stopping.*	>20.0 to 35.0	>15.0 – 25.0
"D"	Approaching Unstable	*Congestion is noticeable. Progression is unfavorable, with more vehicles stopping rather than passing through the intersection.*	>35.0 – 55.0	>25.0 – 35.0
"E"	Unstable Operations	*Traffic volumes are at capacity. Users experience poor progression and long delays.*	>55.0 – 80.0	>35.0 – 50.0
"F"	Forced Flow	*Intersection's capacity is oversaturated, causing poor progression and unusually long delays.*	>80.0	>50.0

Source: 2000 Highway Capacity Manual, Transportation Research Board.
[1] *Unsignalized intersections include TWSC and AWSC*

APPENDIX B

QUEUE LENGTH CALCULATIONS

APPENDIX B – QUEUE LENGTH ANALYSIS

The City of Fresno TIS Guidelines state that queuing analysis be prepared for all movements at the study intersections. Table B-1 shows the 95th percentile queue lengths calculated by Synchro as a part of the LOS calculations.

Near-Term Conditions

As shown in Table B-1, the following locations currently exceed the available storage lengths:

Existing (Without the Project)

- Bullard Avenue at Palm Avenue
  - EB Left
  - WB Left
  - NB Left
  - SB Right
- San Jose Avenue at Palm Avenue
  - SB Left
- Shaw Avenue at Palm Avenue
  - SB Right
- Shaw Avenue at Maroa Avenue
  - NB Left

The proposed Project does not cause any additional movements to exceed the currently available storage distances in the Existing Plus the Project scenario.

Two additional movements are projected to exceed the currently available storage distances in the Existing Plus Approved Projects Plus the Project scenario, as follows:

Existing Plus Approved Projects Plus the Project (With the Project)

- Barstow Avenue at Palm Avenue
  - NB Left
- Shaw Avenue at Palm Avenue
  - EB Left

Cumulative Conditions

In addition to the queue length exceedances identified in the Existing conditions, the following queue lengths are projected to exceed the currently available storage distances in the 2030 No Project scenario:

2030 No Project (Without the Project)

- Bullard Avenue at Palm Avenue
  - SB Left
- Browning Avenue at Palm Avenue
  - EB Left
  - NB Left

TABLE B-1:
95TH-PERCENTILE QUEUE LENGTH SUMMARY

Intersection	Existing Storage Length (ft)	Existing AM/PM	Existing Plus Project AM/PM	Existing Plus Approved Project Plus Project AM/PM	2030 No Project AM/PM	2030 Project AM/PM
Bullard Avenue at Palm Avenue						
• EB Left	175	**186** / **241**	**186** / **241**	**186** / **255**	**193** / **358**	**193** / **358**
• EB Through-Right		292 / 237	294 / 237	294 / 252	432 / 583	438 / 583
• WB Left	175	**186** / 140	**201** / 140	**201** / **266**	**265** / **441**	**277** / **447**
• WB Through-Right		182 / 338	183 / 338	183 / 310	263 / 708	259 / 708
• NB Left	175	155 / **206**	167 / **206**	167 / **244**	**263** / **353**	**263** / **354**
• NB Through-Right		224 / 391	226 / 391	226 / 478	339 / 776	350 / 806
• SB Left	200	98 / 143	98 / 143	98 / 143	163 / **276**	163 / **276**
• SB Through		199 / 261	204 / 261	204 / 277	351 / 480	373 / 481
• SB Right	75	27 / **84**	27 / **84**	27 / **87**	42 / **139**	43 / **139**
Browning Avenue at Palm Avenue						
• EB Left	150	78 / 25	78 / 25	78 / 72	120 / **186**	120 / **186**
• EB Through		35 / 16	35 / 16	35 / 45	42 / 72	42 / 72
• EB Right	125	23 / 16	26 / 16	26 / 34	67 / 71	71 / 70
• WB Left	50	37 / 15	37 / 15	37 / 24	46 / 34	46 / 34
• WB Through-Right		28 / 24	28 / 24	28 / 54	52 / 86	52 / 86
• NB Left	175	59 / 64	59 / 64	59 / 166	158 / **258**	158 / **260**
• NB Through-Right		132 / 298	133 / 298	133 / 331	185 / 423	186 / 441
• SB Left	125	31 / 26	31 / 26	31 / 27	35 / 34	35 / 34
• SB Through-Right		175 / 231	186 / 231	186 / 323	348 / 592	369 / 597
Barstow Avenue at Palm Avenue						
• EB Left	250[1]	45 / 42	45 / 42	45 / 121	163 / **311**	176 / **311**
• EB Through		173 / 220	173 / 220	173 / 229	360 / 644	411 / 624
• EB Right	100	21 / 24	21 / 24	21 / 33	54 / **118**	69 / **116**
• WB Left	200[1]	60 / 122	79 / 122	79 / 127	103 / 167	124 / 193
• WB Through		154 / 265	154 / 265	154 / 301	306 / 358	346 / 658
• WB Right	75	23 / 56	23 / 56	23 / 55	74 / **220**	**90** / **220**
• NB Left	200	50 / 135	50 / 135	50 / **215**	63 / **309**	80 / **315**
• NB Through-Right		147 / 431	150 / 431	150 / 494	263 / 853	292 / 885
• SB Left	200	92 / 125	92 / 125	92 / 136	197 / **267**	187 / **279**
• SB Through-Right		196 / 236	208 / 236	208 / 307	416 / 764	412 / 783
San Ramon Avenue at Palm Avenue						
• EB Left-Through-Right		20 / 7	21 / 7	21 / 6	14 / 6	14 / 8
• WB Left-Through-Right		8 / 3	8 / 3	8 / 3	4 / 4	4 / 4
• NB Left	200	3 / 8	4 / 8	4 / 9	3 / 13	3 / 13
• NB Through-Right		0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
• SB Left	125	1 / 2	1 / 2	1 / 2	1 / 3	1 / 3
• SB Through-Right		0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
San Jose Avenue at Palm Avenue						
• WB Left	280	8 / 71	12 / 71	12 / 71	11 / 59	14 / 81
• WB Right	280	3 / 42	2 / 42	2 / 63	16 / 48	18 / 85
• NB U-turn	125	27 / 86	30 / 86	30 / 101	36 / **134**	36 / **134**
• NB Through-Right		126 / 164	152 / 164	152 / 206	160 / 240	172 / 243
• SB Left	215	**222** / 186	**264** / 186	**264** / 186	**218** / 188	**283** / 202

TABLE B-1:
95TH-PERCENTILE QUEUE LENGTH SUMMARY

Intersection	Existing Storage Length (ft)	Existing AM/PM	Existing Plus Project AM/PM	Existing Plus Approved Project Plus Project AM/PM	2030 No Project AM/PM	2030 Project AM/PM
• SB Through		96 / 167	95 / 167	95 / 210	117 / 320	117 / 320
Shaw Avenue at Palm Avenue						
• EB Left	325	285 / 319	301 / 319	301 / **383**	122 / 195	132 / 198
• EB Through-Right		356 / 401	358 / 401	358 / 449	405 / 464	426 / 503
• EB Right	n/a[2]	n / a	n / a	n / a	5 / 10	5 / 13
• WB Left	500	239 / 323	242 / 323	242 / 336	188 / 120	187 / 123
• WB Through		271 / 445	276 / 445	276 / 504	114 / 83	60 / 347
• WB Right	125	54 / 73	62 / 73	62 / 140	7 / 0	0 / 12
• NB Left	225	115 / 186	115 / 186	115 / 175	67 / 126	67 / 126
• NB Through-Right		146 / 150	154 / 150	154 / 186	162 / 224	169 / 226
• NB Right	n/a[2]	n / a	n / a	n / a	40 / 43	41 / 43
• SB Left	300	105 / 184	107 / 184	107 / 257	146 / 263	150 / 280
• SB Through		124 / 224	125 / 224	125 / 283	146 / 381	147 / 396
• SB Right	75	28 / **86**	29 / **86**	29 / **131**	39 / **142**	39 / **154**
Van Ness Boulevard at Palm Avenue						
• WB Right		9 / 8	9 / 8	9 / 8	6 / 5	6 / 8
Gettysburg Avenue at Palm Avenue						
• EB Left	100	26 / 14	26 / 14	26 / 16	69 / 49	70 / 49
• EB Through-Right		53 / 35	54 / 35	54 / 37	173 / 113	173 / 113
• WB Left	100	13 / 26	13 / 26	13 / 27	28 / 31	28 / 31
• WB Through-Right		44 / 64	46 / 64	46 / 67	98 / 168	98 / 168
• NB Left	150	16 / 26	16 / 26	16 / 26	17 / **124**	17 / **129**
• NB Through-Right		108 / 96	114 / 96	114 / 105	156 / 147	165 / 149
• SB Left	150	15 / 25	15 / 25	15 / 26	27 / 49	28 / 50
• SB Through-Right		67 / 133	67 / 133	67 / 143	115 / 204	116 / 215
Ashlan Avenue at Palm Avenue						
• EB Left	125	28 / 25	31 / 25	31 / 30	63 / 40	63 / 40
• EB Through-Right		230 / 348	240 / 348	240 / 368	367 / 490	367 / 490
• WB Left	125	20 / 74	21 / 74	21 / 80	25 / **128**	25 / **128**
• WB Through-Right		156 / 430	162 / 430	162 / 463	223 / 520	223 / 520
• NB Left	150	17 / 45	16 / 45	16 / 55	140 / 67	141 / 67
• NB Through-Right		114 / 151	117 / 151	117 / 170	132 / 278	140 / 282
• SB Left	150	42 / 60	42 / 60	42 / 77	34 / 117	34 / 117
• SB Through-Right		80 / 137	78 / 137	78 / 156	125 / 214	126 / 225
Barstow Avenue at Thorne Avenue						
• EB Through-Right		0 / 0	0 / 0	0 / 0	487 / 516	497 / 517
• WB Left	n/a[1,2]	7 / 2	7 / 2	7 / 3	68 / 39	68 / 39
• WB Through		0 / 0	0 / 0	0 / 0	361 / 559	364 / 570
• NB Left-Right		33 / 10	34 / 10	34 / 18	34 / 27	34 / 27
San Ramon Avenue at Thorne Avenue						
• EB Left-Through-Right		5 / 4	5 / 4	5 / 5	4 / 2	4 / 6
• WB Left-Through-Right		6 / 5	6 / 5	6 / 5	3 / 5	3 / 7
• NB Left-Through-Right		0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
• SB Left-Through-Right		3 / 0	3 / 0	3 / 0	2 / 0	2 / 0
Shaw Avenue at Fruit Avenue						

TABLE B-1:
95TH-PERCENTILE QUEUE LENGTH SUMMARY

Intersection	Existing Storage Length (ft)	Existing AM/PM	Existing Plus Project AM/PM	Existing Plus Approved Project Plus Project AM/PM	2030 No Project AM/PM	2030 Project AM/PM
• EB Left	300	97 / 80	97 / 80	97 / 80	166 / 143	166 / 143
• EB Through-Right		286 / 254	291 / 254	291 / 263	343 / 345	350 / 355
• WB Left	300	40 / 72	41 / 72	41 / 73	36 / 65	29 / 64
• WB Through		203 / 268	203 / 268	203 / 278	61 / 45	60 / 49
• WB Right	75	17 / 28	17 / 28	17 / 29	0 / 34	1 / 33
• NB Left	150	41 / 43	41 / 43	41 / 43	50 / 81	50 / 81
• NB Through-Right		62 / 56	62 / 56	62 / 56	100 / 112	100 / 112
• SB Left	175	54 / 56	54 / 56	54 / 57	112 / 167	114 / 167
• SB Through		87 / 109	87 / 109	87 / 109	132 / 243	132 / 243
• SB Right	150	29 / 22	29 / 22	29 / 22	80 / 45	59 / 45
Shaw Avenue at Maroa Avenue						
• EB Left	250	117 / 192	117 / 192	117 / 212	187 / **428**	187 / **384**
• EB Through-Right		239 / 273	240 / 273	240 / 300	77 / 328	13 / 127
• WB Left	150	20 / 65	20 / 65	20 / 69	26 / 98	26 / 98
• WB Through-Right		194 / 373	204 / 373	204 / 420	280 / 712	292 / 715
• NB Left	100	45 / **145**	46 / **145**	46 / **168**	**180 / 358**	**188 / 360**
• NB Through-Right		44 / 74	44 / 74	44 / 80	82 / 112	82 / 112
• SB Left	200	70 / 66	70 / 66	70 / 71	94 / 74	93 / 74
• SB Through		76 / 180	76 / 180	76 / 194	150 / 291	150 / 291
• SB Right	100	30 / 33	30 / 33	30 / 35	50 / 52	50 / 52
San Ramon Avenue at Colonial Avenue						
• EB Left-Right		2 / 5	2 / 5	2 / 5	1 / 4	1 / 6
• NB Left-Through		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
• SB Through-Right		0 / 0	0 / 0	0 / 0	0 / 0	0 / 0

[1] *striped dedicated left-turn lane extends to two-way left-turn lane*
[2] *turn lane does not currently exist*

- Barstow Avenue at Palm Avenue
  - EB Left
  - EB Right
  - WB Right
  - NB Left
  - SB Left
- San Jose Avenue at Palm Avenue
  - NB Left (U-turn)
- Gettysburg Avenue at Palm Avenue
  - NB Left
- Ashlan Avenue at Palm Avenue
  - WB Left
- Barstow Avenue at Palm Avenue
  - EB Left
- Shaw Avenue at Maroa Avenue
  - EB Left

The proposed Project does not cause any additional movements to exceed the currently available storage distances in the 2030 Plus the Project scenario.

Possible Improvements

All movements which currently exceed or are projected to exceed the currently available storage distances are located at signalized intersections. As such, the queue lengths are entirely dependent on the signal timing and phasing. In many cases, extension of the turn lanes is not possible due to the location of adjacent turn lanes, median breaks, bicycle lanes, or adjacent development, as detailed below:

Existing (Without the Project)

- Bullard Avenue at Palm Avenue
  - EB Left – cannot be extended without removal of bicycle lanes
  - WB Left – cannot be extended without removal of bicycle lanes
  - NB Left – cannot be extended due to back-to-back left-turn lanes in median
  - SB Right – cannot be extended without removal of bicycle lanes
- San Jose Avenue at Palm Avenue
  - SB Left – may be extended an additional 50-60 feet through the existing concrete median
- Shaw Avenue at Palm Avenue
  - SB Right – cannot be extended without removal of adjacent driveway
- Shaw Avenue at Maroa Avenue
  - NB Left – cannot be extended without widening of Maroa Avenue south of Shaw Avenue

Existing Plus Approved Projects Plus the Project (With the Project)

- Barstow Avenue at Palm Avenue
  - NB Left – may be extended an additional 100 feet through the existing concrete median

- Shaw Avenue at Palm Avenue
  - EB Left – cannot be extended due to back-to-back left-turn lanes in median

2030 No Project (Without the Project)

- Bullard Avenue at Palm Avenue
  - SB Left – cannot be extended due to back-to-back left-turn lanes in median
- Browning Avenue at Palm Avenue
  - EB Left – cannot be extended without removal of bicycle lanes and on-street parking in front of school
  - NB Left – may be extended an additional 200 feet through the existing concrete median
- Barstow Avenue at Palm Avenue
  - EB Left – queues may back up into the existing two-way left-turn lane
  - EB Right – cannot be extended without removal of bicycle lanes
  - WB Right – cannot be extended without removal of bicycle lanes
  - NB Left – may be extended an additional 150 feet through the existing concrete median
  - SB Left – cannot be extended due to back-to-back left-turn lanes in median
- San Jose Avenue at Palm Avenue
  - NB Left – cannot be extended due to back-to-back left-turn lanes in median
- Gettysburg Avenue at Palm Avenue
  - NB Left – may be extended through striping
- Ashlan Avenue at Palm Avenue
  - WB Left – cannot be extended without widening of Ashlan Avenue east of Palm Avenue
- Barstow Avenue at Palm Avenue
  - EB Left – queues may back up into the existing two-way left-turn lane
- Shaw Avenue at Maroa Avenue
  - EB Left – may be extended through the existing concrete median

Extension of turn lanes is not the only improvement that will reduce vehicle queue lengths. Many of the calculated queue lengths may be shortened through retiming of the existing traffic signals or future signal coordination. Traffic signal timing will be periodically reviewed by the City of Fresno and adjustments made based on traffic flow. Also, many turn movements can exceed striped turn lanes with little to no effect on overall traffic flow (such as at right-turn lanes or left-turn lanes that extend to two-way left-turn lanes).

Existing AM

1: Bullard Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	153	830	151	557	175	825	88	633	44
v/c Ratio	0.77	0.80	0.78	0.55	0.80	0.72	0.63	0.70	0.11
Control Delay	65.1	33.8	66.8	26.4	65.6	30.0	61.7	33.8	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.1	33.8	66.8	26.4	65.6	30.0	61.7	33.8	13.7
Queue Length 50th (ft)	86	220	85	130	99	214	50	168	6
Queue Length 95th (ft)	#186	292	#186	182	#155	224	#98	199	27
Internal Link Dist (ft)		3244		3287		1236		2979	
Turn Bay Length (ft)	150		150		175		175		75
Base Capacity (vph)	211	1128	205	1095	232	1169	148	1017	461
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.74	0.74	0.51	0.75	0.71	0.59	0.62	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing AM
2: Barstow Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	396	141	87	334	116	72	907	161	1243
v/c Ratio	0.33	0.67	0.24	0.49	0.56	0.20	0.47	0.70	0.75	0.76
Control Delay	22.0	25.7	4.7	29.6	22.8	5.1	38.7	19.7	52.0	18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	25.7	4.7	29.6	22.8	5.1	38.7	19.7	52.0	18.8
Queue Length 50th (ft)	22	134	0	28	108	1	28	147	63	215
Queue Length 95th (ft)	45	173	21	60	154	23	50	147	#92	196
Internal Link Dist (ft)		1231			3299			560		1232
Turn Bay Length (ft)	150		100	125		75	200		200	
Base Capacity (vph)	226	593	586	176	593	567	156	1305	216	1631
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.67	0.24	0.49	0.56	0.20	0.46	0.70	0.75	0.76

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing AM
4: San Jose Avenue & Palm Avenue

Lane Group	WBL	WBR	NBU	NBT	SBL	SBT
Lane Group Flow (vph)	47	56	39	983	292	734
v/c Ratio	0.12	0.25	0.12	0.41	0.70	0.26
Control Delay	19.6	9.2	13.2	11.3	31.7	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	9.2	13.2	11.3	31.7	3.4
Queue Length 50th (ft)	6	0	7	70	79	24
Queue Length 95th (ft)	8	3	27	126	#222	96
Internal Link Dist (ft)	862			1217		262
Turn Bay Length (ft)	75	75	125		200	
Base Capacity (vph)	1030	496	328	2383	444	2845
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.11	0.12	0.41	0.66	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing AM
5: Shaw Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	288	1654	214	1233	159	129	718	370	513	173
v/c Ratio	0.91	0.91	0.87	0.75	0.27	0.70	0.65	0.89	0.62	0.37
Control Delay	71.4	36.2	72.2	30.4	8.1	60.3	34.4	63.0	34.4	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.4	36.2	72.2	30.4	8.1	60.3	34.4	63.0	34.4	11.2
Queue Length 50th (ft)	163	322	121	227	13	72	133	108	137	18
Queue Length 95th (ft)	#285	356	#239	271	54	#115	146	105	124	28
Internal Link Dist (ft)		2511		2553			106		1217	
Turn Bay Length (ft)	300		450		125	200		250		75
Base Capacity (vph)	315	1821	245	1653	583	190	1125	418	839	464
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.91	0.87	0.75	0.27	0.68	0.64	0.89	0.61	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing AM
6: Gettysburg Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	56	210	23	161	31	765	35	593
v/c Ratio	0.21	0.47	0.09	0.37	0.07	0.38	0.10	0.29
Control Delay	14.4	12.7	12.6	13.1	7.0	6.9	7.4	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	12.7	12.6	13.1	7.0	6.9	7.4	6.2
Queue Length 50th (ft)	11	28	4	25	2	38	3	27
Queue Length 95th (ft)	26	53	13	44	16	108	15	67
Internal Link Dist (ft)		2039		2122		2598		2374
Turn Bay Length (ft)	75		75		100		100	
Base Capacity (vph)	632	933	601	950	519	2313	427	2348
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.23	0.04	0.17	0.06	0.33	0.08	0.25

Intersection Summary

Existing AM
9: Shaw Avenue & Fruit Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	122	1948	42	1477	42	64	326	80	160	165
v/c Ratio	0.49	0.69	0.18	0.61	0.06	0.24	0.40	0.37	0.38	0.35
Control Delay	34.9	13.3	27.1	13.5	6.2	21.8	17.4	25.3	22.7	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	13.3	27.1	13.5	6.2	21.8	17.4	25.3	22.7	6.2
Queue Length 50th (ft)	38	106	13	129	2	18	40	23	47	0
Queue Length 95th (ft)	#97	286	40	203	17	41	62	54	87	29
Internal Link Dist (ft)		1860		2511			2362		2241	
Turn Bay Length (ft)	275		300		75	150		300		
Base Capacity (vph)	251	2976	294	2836	872	456	1358	374	726	699
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.65	0.14	0.52	0.05	0.14	0.24	0.21	0.22	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing AM
10: Shaw Avenue & Maroa Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	136	1777	15	1396	128	355	123	162	187
v/c Ratio	0.66	0.63	0.07	0.67	0.42	0.39	0.52	0.34	0.35
Control Delay	43.6	11.2	24.6	14.6	21.0	15.4	25.4	18.1	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	11.2	24.6	14.6	21.0	15.4	25.4	18.1	5.1
Queue Length 50th (ft)	42	100	4	113	34	43	34	42	0
Queue Length 95th (ft)	#117	239	20	194	45	44	70	76	30
Internal Link Dist (ft)		2553		1310		1393		1214	
Turn Bay Length (ft)	225		150		75		150		
Base Capacity (vph)	207	2836	207	2364	464	1363	363	726	714
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.63	0.07	0.59	0.28	0.26	0.34	0.22	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing AM
14: Ashlan Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	645	30	430	31	798	59	416
v/c Ratio	0.20	0.79	0.18	0.53	0.08	0.59	0.31	0.31
Control Delay	10.5	20.9	11.9	13.0	13.8	16.1	19.7	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.5	20.9	11.9	13.0	13.8	16.1	19.7	13.3
Queue Length 50th (ft)	12	167	6	90	7	111	14	51
Queue Length 95th (ft)	28	230	20	156	17	114	42	80
Internal Link Dist (ft)		2109		2491		1418		2598
Turn Bay Length (ft)	100		100		100		100	
Base Capacity (vph)	407	1007	202	998	365	1359	190	1362
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.64	0.15	0.43	0.08	0.59	0.31	0.31

Intersection Summary

Existing AM

16: Browning Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	203	82	300	95	121	90	865	34	981
v/c Ratio	0.63	0.17	0.52	0.28	0.25	0.46	0.46	0.19	0.66
Control Delay	28.8	17.9	8.5	20.1	12.6	36.1	10.4	29.6	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.8	17.9	8.5	20.1	12.6	36.1	10.4	29.6	16.2
Queue Length 50th (ft)	66	23	18	28	20	32	68	12	137
Queue Length 95th (ft)	78	35	23	37	28	59	132	31	175
Internal Link Dist (ft)		1698			1897		1232		1236
Turn Bay Length (ft)	125		125	75		125		75	
Base Capacity (vph)	507	746	777	525	730	213	2170	195	1798
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.11	0.39	0.18	0.17	0.42	0.40	0.17	0.55

Intersection Summary

Existing PM
1: Bullard Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	190	710	112	864	157	964	104	782	191
v/c Ratio	0.95	0.64	0.69	0.85	0.87	0.86	0.87	0.77	0.37
Control Delay	93.1	28.6	62.2	38.7	82.1	37.0	96.5	35.0	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.1	28.6	62.2	38.7	82.1	37.0	96.5	35.0	14.1
Queue Length 50th (ft)	109	176	62	238	90	261	60	212	37
Queue Length 95th (ft)	#241	237	#136	#338	#203	#354	#143	259	83
Internal Link Dist (ft)		3244		3287		1236		2979	
Turn Bay Length (ft)	150		150		175		175		75
Base Capacity (vph)	201	1111	175	1043	180	1155	120	1050	529
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.95	0.64	0.64	0.83	0.87	0.83	0.87	0.74	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing PM
2: Barstow Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	458	84	124	527	201	126	1314	126	1047
v/c Ratio	0.46	0.77	0.16	0.98	0.89	0.36	0.68	0.90	0.82	0.68
Control Delay	36.4	32.7	7.3	107.4	43.3	10.4	50.1	28.7	71.9	19.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	32.7	7.3	107.4	43.3	10.4	50.1	28.7	71.9	19.1
Queue Length 50th (ft)	17	176	4	52	213	26	53	258	55	190
Queue Length 95th (ft)	39	208	22	#116	#251	51	#120	#384	#118	216
Internal Link Dist (ft)		1231			3299			560		1232
Turn Bay Length (ft)	150		100	125		75	200		200	
Base Capacity (vph)	106	591	535	126	591	566	192	1452	154	1533
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.77	0.16	0.98	0.89	0.36	0.66	0.90	0.82	0.68

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing PM
4: San Jose Avenue & Palm Avenue

Lane Group	WBL	WBR	NBU	NBT	SBL	SBT
Lane Group Flow (vph)	228	321	135	1170	278	868
v/c Ratio	0.46	0.66	0.48	0.58	0.72	0.50
Control Delay	23.2	10.1	28.5	15.4	34.8	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	10.1	28.5	15.4	34.8	12.9
Queue Length 50th (ft)	35	0	40	103	83	98
Queue Length 95th (ft)	50	25	86	162	#171	167
Internal Link Dist (ft)	862			1217		262
Turn Bay Length (ft)	75	75	125		200	
Base Capacity (vph)	951	636	337	2005	410	1742
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.50	0.40	0.58	0.68	0.50

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing PM
5: Shaw Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	279	1562	272	1676	167	138	620	306	576	171
v/c Ratio	0.92	0.88	0.90	0.93	0.27	0.87	0.57	0.88	0.73	0.39
Control Delay	74.3	34.3	69.9	38.1	10.3	86.6	32.5	67.4	38.0	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.3	34.3	69.9	38.1	10.3	86.6	32.5	67.4	38.0	13.4
Queue Length 50th (ft)	158	302	153	332	25	79	110	90	158	24
Queue Length 95th (ft)	#309	#373	#298	#436	70	#186	148	#164	216	79
Internal Link Dist (ft)		2511		2553			106		1217	
Turn Bay Length (ft)	300		450		125	200		250		75
Base Capacity (vph)	302	1779	304	1809	611	159	1130	347	830	448
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.88	0.89	0.93	0.27	0.87	0.55	0.88	0.69	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing PM
6: Gettysburg Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	108	48	182	45	593	52	819
v/c Ratio	0.09	0.25	0.16	0.41	0.12	0.26	0.10	0.36
Control Delay	13.0	12.1	14.0	14.4	7.4	5.9	6.9	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.0	12.1	14.0	14.4	7.4	5.9	6.9	6.5
Queue Length 50th (ft)	5	17	10	32	4	28	4	42
Queue Length 95th (ft)	14	35	25	63	25	95	25	126
Internal Link Dist (ft)		2039		2122		2598		2374
Turn Bay Length (ft)	75		75		100		100	
Base Capacity (vph)	661	1005	713	1015	424	2466	564	2515
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.11	0.07	0.18	0.11	0.24	0.09	0.33

Intersection Summary

Existing PM
9: Shaw Avenue & Fruit Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	74	1551	86	1719	31	82	375	93	230	91
v/c Ratio	0.40	0.71	0.33	0.68	0.13	0.33	0.41	0.41	0.49	0.20
Control Delay	33.8	16.3	27.3	13.3	18.7	22.0	15.3	24.2	22.2	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	16.3	27.3	13.3	18.7	22.0	15.3	24.2	22.2	5.6
Queue Length 50th (ft)	24	150	27	158	5	24	45	27	70	0
Queue Length 95th (ft)	#74	253	70	268	28	43	56	56	109	22
Internal Link Dist (ft)		1860		2511			2362		2241	
Turn Bay Length (ft)	275		300		75	150		300		
Base Capacity (vph)	186	2390	307	2827	272	392	1424	366	759	681
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.65	0.28	0.61	0.11	0.21	0.26	0.25	0.30	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing PM
10: Shaw Avenue & Maroa Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	180	1734	65	2136	133	246	80	269	94
v/c Ratio	0.81	0.60	0.39	0.87	0.83	0.30	0.32	0.62	0.22
Control Delay	61.2	12.4	39.2	21.7	65.2	22.1	26.5	31.5	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.2	12.4	39.2	21.7	65.2	22.1	26.5	31.5	6.8
Queue Length 50th (ft)	83	206	29	308	56	44	30	108	0
Queue Length 95th (ft)	#192	262	65	371	#145	74	66	180	33
Internal Link Dist (ft)		2553		1310		1393		567	
Turn Bay Length (ft)	225		150		75		150		
Base Capacity (vph)	222	2912	172	2524	194	978	299	518	494
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.60	0.38	0.85	0.69	0.25	0.27	0.52	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing PM
14: Ashlan Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	35	763	89	835	49	662	107	772
v/c Ratio	0.27	0.79	0.52	0.87	0.36	0.59	0.60	0.69
Control Delay	14.4	19.0	23.2	24.2	25.3	19.1	35.9	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	19.0	23.2	24.2	25.3	19.1	35.9	21.3
Queue Length 50th (ft)	6	196	19	230	14	101	33	125
Queue Length 95th (ft)	25	#344	#68	#429	43	150	60	131
Internal Link Dist (ft)		2109		2491		1418		2598
Turn Bay Length (ft)	100		100		100		100	
Base Capacity (vph)	137	1027	181	1027	137	1121	179	1120
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.74	0.49	0.81	0.36	0.59	0.60	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing PM
16: Browning Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	32	16	33	21	74	63	1250	19	1007
v/c Ratio	0.09	0.04	0.09	0.06	0.18	0.23	0.46	0.08	0.42
Control Delay	18.4	17.9	8.0	18.2	11.9	26.4	6.6	26.1	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	17.9	8.0	18.2	11.9	26.4	6.6	26.1	9.1
Queue Length 50th (ft)	8	4	0	5	9	17	54	5	94
Queue Length 95th (ft)	25	16	16	15	24	#63	284	26	229
Internal Link Dist (ft)		1698			1897		1232		1236
Turn Bay Length (ft)	125		125	75		125		75	
Base Capacity (vph)	962	1130	973	962	1054	279	2745	251	2438
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.01	0.03	0.02	0.07	0.23	0.46	0.08	0.41

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project AM
1: Bullard Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	153	834	161	557	175	831	88	660	44
v/c Ratio	0.78	0.80	0.83	0.55	0.85	0.72	0.64	0.71	0.10
Control Delay	65.9	34.2	72.7	26.4	75.0	30.1	62.5	33.3	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.9	34.2	72.7	26.4	75.0	30.1	62.5	33.3	13.5
Queue Length 50th (ft)	86	221	91	130	100	216	50	174	7
Queue Length 95th (ft)	#186	294	#201	183	#167	226	#98	204	27
Internal Link Dist (ft)		3244		3287		1236		2979	
Turn Bay Length (ft)	150		150		175		175		75
Base Capacity (vph)	208	1106	202	1073	208	1165	146	1046	473
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.75	0.80	0.52	0.84	0.71	0.60	0.63	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project AM
2: Barstow Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	396	156	104	334	116	73	917	161	1296
v/c Ratio	0.33	0.67	0.26	0.59	0.56	0.20	0.48	0.71	0.76	0.79
Control Delay	22.1	25.8	4.6	36.1	22.9	5.1	39.1	19.8	52.2	20.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	25.8	4.6	36.1	22.9	5.1	39.1	19.8	52.2	20.1
Queue Length 50th (ft)	22	134	0	34	108	1	28	150	63	232
Queue Length 95th (ft)	45	173	21	#79	154	23	50	150	#92	208
Internal Link Dist (ft)		1231			3299			560		1232
Turn Bay Length (ft)	150		100	125		75	200		200	
Base Capacity (vph)	225	592	596	175	592	566	155	1304	216	1634
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.67	0.26	0.59	0.56	0.20	0.47	0.70	0.75	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project AM
4: San Jose Avenue & Palm Avenue

Lane Group	WBL	WBR	NBU	NBT	SBL	SBT
Lane Group Flow (vph)	71	73	39	1072	364	734
v/c Ratio	0.19	0.32	0.13	0.50	0.75	0.27
Control Delay	23.0	10.1	15.8	14.5	32.2	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	10.1	15.8	14.5	32.2	3.5
Queue Length 50th (ft)	11	0	8	94	106	26
Queue Length 95th (ft)	12	2	30	152	#264	95
Internal Link Dist (ft)	862			1217		262
Turn Bay Length (ft)	75	75	125		200	
Base Capacity (vph)	920	460	295	2130	551	2722
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.16	0.13	0.50	0.66	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project AM
5: Shaw Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	309	1660	216	1234	186	129	759	378	517	176
v/c Ratio	0.93	0.92	0.88	0.78	0.32	0.70	0.68	0.91	0.61	0.38
Control Delay	72.2	37.2	72.9	32.1	8.5	60.6	35.0	66.5	34.3	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.2	37.2	72.9	32.1	8.5	60.6	35.0	66.5	34.3	11.3
Queue Length 50th (ft)	175	325	122	231	17	72	142	111	138	18
Queue Length 95th (ft)	#301	358	#242	276	62	#115	154	107	125	29
Internal Link Dist (ft)		2511		2553			106		1217	
Turn Bay Length (ft)	300		450		125	200		250		75
Base Capacity (vph)	333	1807	246	1590	578	189	1120	417	842	466
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.92	0.88	0.78	0.32	0.68	0.68	0.91	0.61	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project AM
6: Gettysburg Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	56	210	23	161	31	802	35	597
v/c Ratio	0.21	0.47	0.09	0.37	0.07	0.40	0.10	0.29
Control Delay	14.6	12.9	12.9	13.2	6.9	7.0	7.4	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.6	12.9	12.9	13.2	6.9	7.0	7.4	6.2
Queue Length 50th (ft)	11	28	4	25	2	40	3	27
Queue Length 95th (ft)	26	54	13	46	16	114	15	67
Internal Link Dist (ft)		2039		2122		2598		2374
Turn Bay Length (ft)	75		75		100		100	
Base Capacity (vph)	630	930	598	948	515	2308	406	2343
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.23	0.04	0.17	0.06	0.35	0.09	0.25

Intersection Summary

Existing Plus Project AM
9: Shaw Avenue & Fruit Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	122	1970	43	1480	42	64	331	80	160	165
v/c Ratio	0.50	0.70	0.18	0.61	0.06	0.25	0.41	0.38	0.38	0.35
Control Delay	35.2	13.5	27.2	13.4	6.2	21.9	17.2	25.6	22.8	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	13.5	27.2	13.4	6.2	21.9	17.2	25.6	22.8	6.2
Queue Length 50th (ft)	39	108	13	130	2	19	41	24	48	0
Queue Length 95th (ft)	#97	291	41	203	17	41	62	54	87	29
Internal Link Dist (ft)		1860		2511			2362		2241	
Turn Bay Length (ft)	275		300		75	150		300		
Base Capacity (vph)	249	2974	292	2816	866	451	1350	367	721	696
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.66	0.15	0.53	0.05	0.14	0.25	0.22	0.22	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project AM
10: Shaw Avenue & Maroa Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	136	1784	15	1447	132	355	123	162	187
v/c Ratio	0.66	0.63	0.07	0.69	0.44	0.39	0.52	0.34	0.35
Control Delay	44.2	11.2	24.6	14.9	21.6	15.6	25.8	18.2	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.2	11.2	24.6	14.9	21.6	15.6	25.8	18.2	5.1
Queue Length 50th (ft)	42	100	4	119	36	43	34	42	0
Queue Length 95th (ft)	#117	240	20	204	46	44	70	76	30
Internal Link Dist (ft)		2553		1310		1393		1214	
Turn Bay Length (ft)	225		150		75		150		
Base Capacity (vph)	205	2851	205	2344	459	1351	358	719	709
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.63	0.07	0.62	0.29	0.26	0.34	0.23	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project AM
14: Ashlan Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	68	645	30	430	31	838	59	420
v/c Ratio	0.21	0.80	0.19	0.54	0.08	0.60	0.32	0.30
Control Delay	11.3	22.4	12.9	13.7	13.2	16.1	19.8	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.3	22.4	12.9	13.7	13.2	16.1	19.8	12.9
Queue Length 50th (ft)	13	174	6	94	7	122	15	53
Queue Length 95th (ft)	31	240	21	162	16	117	42	78
Internal Link Dist (ft)		2109		2491		1418		2598
Turn Bay Length (ft)	100		100		100		100	
Base Capacity (vph)	381	955	183	947	374	1395	183	1399
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.68	0.16	0.45	0.08	0.60	0.32	0.30

Intersection Summary

Existing Plus Project AM
16: Browning Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	203	82	303	95	121	90	872	34	1027
v/c Ratio	0.63	0.17	0.53	0.29	0.25	0.47	0.46	0.19	0.68
Control Delay	29.3	18.0	9.1	20.2	12.7	36.6	10.4	29.8	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.3	18.0	9.1	20.2	12.7	36.6	10.4	29.8	16.6
Queue Length 50th (ft)	66	23	20	28	20	32	69	12	147
Queue Length 95th (ft)	78	35	26	37	28	59	133	31	186
Internal Link Dist (ft)		1698			1897		1232		1236
Turn Bay Length (ft)	125		125	75		125		75	
Base Capacity (vph)	496	730	761	514	715	208	2146	191	1759
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.11	0.40	0.18	0.17	0.43	0.41	0.18	0.58

Intersection Summary

Existing Plus Project PM
1: Bullard Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	190	710	114	864	159	999	104	787	191
v/c Ratio	0.95	0.64	0.70	0.85	0.88	0.89	0.87	0.77	0.37
Control Delay	94.1	28.7	63.0	38.9	84.7	39.2	97.1	35.0	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	94.1	28.7	63.0	38.9	84.7	39.2	97.1	35.0	14.2
Queue Length 50th (ft)	109	176	64	238	91	274	60	213	37
Queue Length 95th (ft)	#241	237	#140	#338	#206	#391	#143	261	84
Internal Link Dist (ft)		3244		3287		1236		2979	
Turn Bay Length (ft)	150		150		175		175		75
Base Capacity (vph)	200	1105	175	1039	180	1151	120	1046	526
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.95	0.64	0.65	0.83	0.88	0.87	0.87	0.75	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project PM
2: Barstow Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	458	88	128	527	201	140	1367	126	1055
v/c Ratio	0.49	0.76	0.16	0.96	0.88	0.35	0.70	0.93	0.82	0.74
Control Delay	41.3	32.9	8.0	100.2	42.3	11.3	51.3	32.6	74.7	22.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	32.9	8.0	100.2	42.3	11.3	51.3	32.6	74.7	22.6
Queue Length 50th (ft)	18	189	6	58	229	31	63	297	59	211
Queue Length 95th (ft)	42	220	24	#122	265	56	#135	#431	#125	236
Internal Link Dist (ft)		1231			3299			560		1232
Turn Bay Length (ft)	150		100	125		75	200		200	
Base Capacity (vph)	99	601	542	133	601	569	211	1468	153	1423
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.76	0.16	0.96	0.88	0.35	0.66	0.93	0.82	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project PM
4: San Jose Avenue & Palm Avenue

Lane Group	WBL	WBR	NBU	NBT	SBL	SBT
Lane Group Flow (vph)	339	400	135	1187	294	868
v/c Ratio	0.58	0.75	0.50	0.62	0.78	0.52
Control Delay	24.7	13.7	30.2	16.9	40.1	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	13.7	30.2	16.9	40.1	14.1
Queue Length 50th (ft)	55	15	43	118	96	113
Queue Length 95th (ft)	71	42	86	164	#186	167
Internal Link Dist (ft)	862			1217		262
Turn Bay Length (ft)	75	75	125		200	
Base Capacity (vph)	910	642	322	1915	392	1678
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.62	0.42	0.62	0.75	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project PM
5: Shaw Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	284	1563	288	1680	171	138	627	348	602	189
v/c Ratio	0.96	0.90	0.96	0.95	0.28	0.87	0.58	0.91	0.72	0.41
Control Delay	82.3	36.6	82.0	41.2	10.7	86.6	32.6	69.5	37.2	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.3	36.6	82.0	41.2	10.7	86.6	32.6	69.5	37.2	13.7
Queue Length 50th (ft)	162	306	165	337	27	79	112	102	164	28
Queue Length 95th (ft)	#319	#401	#323	#445	73	#186	150	#184	224	86
Internal Link Dist (ft)		2511		2553			106		1217	
Turn Bay Length (ft)	300		450		125	200		250		75
Base Capacity (vph)	296	1734	300	1774	601	159	1130	382	865	469
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.90	0.96	0.95	0.28	0.87	0.55	0.91	0.70	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project PM
6: Gettysburg Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	108	48	182	45	600	52	853
v/c Ratio	0.09	0.25	0.16	0.41	0.12	0.27	0.10	0.37
Control Delay	13.2	12.2	14.2	14.6	7.5	5.9	6.9	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	12.2	14.2	14.6	7.5	5.9	6.9	6.5
Queue Length 50th (ft)	5	17	10	32	4	28	4	45
Queue Length 95th (ft)	14	35	26	64	26	96	25	133
Internal Link Dist (ft)		2039		2122		2598		2374
Turn Bay Length (ft)	75		75		100		100	
Base Capacity (vph)	660	1003	711	1013	405	2461	558	2510
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.11	0.07	0.18	0.11	0.24	0.09	0.34

Intersection Summary

Existing Plus Project PM
9: Shaw Avenue & Fruit Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	74	1555	89	1737	31	82	376	93	230	91
v/c Ratio	0.44	0.71	0.34	0.68	0.13	0.34	0.41	0.41	0.49	0.20
Control Delay	37.2	16.3	27.5	13.1	18.6	22.0	15.3	24.2	22.2	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.2	16.3	27.5	13.1	18.6	22.0	15.3	24.2	22.2	5.6
Queue Length 50th (ft)	25	152	28	157	5	24	45	28	70	0
Queue Length 95th (ft)	#80	254	72	268	28	43	56	56	109	22
Internal Link Dist (ft)		1860		2511			2362		2241	
Turn Bay Length (ft)	275		300		75	150		300		
Base Capacity (vph)	169	2385	307	2865	272	392	1420	365	758	680
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.65	0.29	0.61	0.11	0.21	0.26	0.25	0.30	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project PM
10: Shaw Avenue & Maroa Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	180	1786	65	2144	133	246	80	269	94
v/c Ratio	0.81	0.61	0.39	0.87	0.83	0.30	0.32	0.62	0.22
Control Delay	61.3	12.6	39.2	21.9	65.2	22.1	26.5	31.6	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.3	12.6	39.2	21.9	65.2	22.1	26.5	31.6	6.8
Queue Length 50th (ft)	83	216	29	310	56	44	30	108	0
Queue Length 95th (ft)	#192	273	65	373	#145	74	66	180	33
Internal Link Dist (ft)		2553		1310		1393		567	
Turn Bay Length (ft)	225		150		75		150		
Base Capacity (vph)	222	2913	172	2523	194	977	299	518	494
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.61	0.38	0.85	0.69	0.25	0.27	0.52	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project PM
14: Ashlan Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	35	763	89	835	49	668	107	809
v/c Ratio	0.27	0.80	0.53	0.87	0.39	0.59	0.60	0.72
Control Delay	14.4	19.1	23.9	24.4	27.0	19.1	36.2	22.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	19.1	23.9	24.4	27.0	19.1	36.2	22.0
Queue Length 50th (ft)	6	197	19	230	14	102	33	133
Queue Length 95th (ft)	25	#348	#74	#430	#45	151	60	137
Internal Link Dist (ft)		2109		2491		1418		2598
Turn Bay Length (ft)	100		100		100		100	
Base Capacity (vph)	137	1023	179	1023	127	1126	178	1126
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.75	0.50	0.82	0.39	0.59	0.60	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Project PM
16: Browning Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	32	16	33	21	74	64	1289	19	1014
v/c Ratio	0.09	0.04	0.09	0.06	0.19	0.24	0.47	0.08	0.42
Control Delay	18.4	17.9	8.0	18.2	11.9	26.6	7.0	26.1	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	17.9	8.0	18.2	11.9	26.6	7.0	26.1	9.2
Queue Length 50th (ft)	8	4	0	5	9	17	56	5	95
Queue Length 95th (ft)	25	16	16	15	24	#64	298	26	231
Internal Link Dist (ft)		1698			1897		1232		1236
Turn Bay Length (ft)	125		125	75		125		75	
Base Capacity (vph)	955	1122	966	955	1047	275	2746	248	2437
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.01	0.03	0.02	0.07	0.23	0.47	0.08	0.42

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Approved Projects Plus Project PM
1: Bullard Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	191	738	204	866	184	1134	104	828	192
v/c Ratio	1.07	0.72	1.06	0.83	1.03	0.99	0.87	0.80	0.37
Control Delay	127.9	31.7	121.7	36.9	117.6	55.1	98.2	36.0	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	127.9	31.7	121.7	36.9	117.6	55.1	98.2	36.0	14.8
Queue Length 50th (ft)	~123	187	~130	235	~114	~328	60	228	40
Queue Length 95th (ft)	#255	252	#266	310	#244	#478	#143	277	87
Internal Link Dist (ft)		3244		3287		1236		2979	
Turn Bay Length (ft)	150		150		175		175		75
Base Capacity (vph)	179	1058	193	1073	179	1143	119	1040	521
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.07	0.70	1.06	0.81	1.03	0.99	0.87	0.80	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Approved Projects Plus Project PM
2: Barstow Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	123	505	175	128	576	216	212	1515	139	1286
v/c Ratio	1.16	0.82	0.29	1.16	0.94	0.37	1.02	1.06	0.95	0.95
Control Delay	166.7	35.0	7.1	166.0	49.0	10.7	104.2	64.8	98.3	37.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	166.7	35.0	7.1	166.0	49.0	10.7	104.2	64.8	98.3	37.9
Queue Length 50th (ft)	~64	197	12	~67	237	31	~96	~383	61	270
Queue Length 95th (ft)	#121	229	33	#127	#301	55	#215	#494	#136	#307
Internal Link Dist (ft)		1231			3299			560		1232
Turn Bay Length (ft)	150		100	125		75	200		200	
Base Capacity (vph)	106	615	597	110	615	585	207	1424	147	1348
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.16	0.82	0.29	1.16	0.94	0.37	1.02	1.06	0.95	0.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Approved Projects Plus Project PM
4: San Jose Avenue & Palm Avenue

Lane Group	WBL	WBR	NBU	NBT	SBL	SBT
Lane Group Flow (vph)	339	400	135	1427	294	1118
v/c Ratio	0.56	0.79	0.60	0.75	0.79	0.64
Control Delay	24.0	18.7	39.0	20.0	41.3	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.0	18.7	39.0	20.0	41.3	14.9
Queue Length 50th (ft)	55	30	45	152	96	150
Queue Length 95th (ft)	71	63	#101	206	#186	210
Internal Link Dist (ft)	862			1217		262
Turn Bay Length (ft)	75	75	125		200	
Base Capacity (vph)	901	606	235	1898	389	1750
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.66	0.57	0.75	0.76	0.64

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Approved Projects Plus Project PM
5: Shaw Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	322	1574	288	1688	289	140	680	472	656	228
v/c Ratio	0.99	0.92	0.91	0.99	0.47	0.73	0.68	0.97	0.81	0.51
Control Delay	90.0	41.8	74.5	52.7	14.8	65.4	40.1	78.2	45.5	20.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.0	41.8	74.5	52.7	14.8	65.4	40.1	78.2	45.5	20.1
Queue Length 50th (ft)	207	350	182	389	63	87	143	156	209	56
Queue Length 95th (ft)	#383	#449	#336	#504	140	#175	186	#257	#283	131
Internal Link Dist (ft)		2511		2553			106		1217	
Turn Bay Length (ft)	300		450		125	200		250		75
Base Capacity (vph)	325	1711	318	1709	615	201	1010	486	811	444
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.99	0.92	0.91	0.99	0.47	0.70	0.67	0.97	0.81	0.51

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Approved Projects Plus Project PM
6: Gettysburg Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	27	108	48	185	45	649	55	908
v/c Ratio	0.10	0.25	0.16	0.42	0.13	0.29	0.11	0.39
Control Delay	13.7	12.4	14.5	14.8	7.6	5.9	6.9	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	12.4	14.5	14.8	7.6	5.9	6.9	6.6
Queue Length 50th (ft)	5	17	10	32	4	32	5	48
Queue Length 95th (ft)	16	37	27	67	26	105	26	143
Internal Link Dist (ft)		2039		2122		2598		2374
Turn Bay Length (ft)	75		75		100		100	
Base Capacity (vph)	656	1000	709	1008	374	2454	531	2502
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.11	0.07	0.18	0.12	0.26	0.10	0.36

Intersection Summary

Existing Plus Approved Projects Plus Project PM
9: Shaw Avenue & Fruit Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	74	1595	91	1779	32	82	379	95	230	91
v/c Ratio	0.44	0.72	0.34	0.69	0.14	0.34	0.41	0.42	0.49	0.20
Control Delay	37.2	16.8	27.6	13.4	18.7	22.1	15.2	24.7	22.2	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.2	16.8	27.6	13.4	18.7	22.1	15.2	24.7	22.2	5.6
Queue Length 50th (ft)	25	157	28	163	6	24	45	28	70	0
Queue Length 95th (ft)	#80	263	73	278	29	43	56	57	109	22
Internal Link Dist (ft)		1860		2511			2362		2241	
Turn Bay Length (ft)	275		300		75	150		300		
Base Capacity (vph)	168	2376	305	2857	271	388	1416	360	755	678
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.67	0.30	0.62	0.12	0.21	0.27	0.26	0.30	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Approved Projects Plus Project PM
10: Shaw Avenue & Maroa Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	191	1896	65	2254	141	246	80	269	100
v/c Ratio	0.85	0.66	0.42	0.89	0.89	0.30	0.33	0.63	0.23
Control Delay	66.9	14.2	43.7	24.0	80.4	24.2	28.8	33.9	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.9	14.2	43.7	24.0	80.4	24.2	28.8	33.9	7.1
Queue Length 50th (ft)	95	245	32	360	67	49	32	118	0
Queue Length 95th (ft)	#212	300	69	420	#168	80	71	194	35
Internal Link Dist (ft)		2553		1310		1393		567	
Turn Bay Length (ft)	225		150		75		150		
Base Capacity (vph)	226	2860	158	2546	178	913	274	484	472
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.66	0.41	0.89	0.79	0.27	0.29	0.56	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Approved Projects Plus Project PM
14: Ashlan Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	37	763	89	838	49	706	114	862
v/c Ratio	0.31	0.80	0.55	0.88	0.42	0.60	0.66	0.73
Control Delay	17.3	20.4	26.8	26.3	30.4	19.9	42.3	23.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.3	20.4	26.8	26.3	30.4	19.9	42.3	23.1
Queue Length 50th (ft)	8	219	21	259	15	118	39	155
Queue Length 95th (ft)	30	#368	#80	#463	#55	170	#77	156
Internal Link Dist (ft)		2109		2491		1418		2598
Turn Bay Length (ft)	100		100		100		100	
Base Capacity (vph)	126	1018	172	1017	118	1179	172	1179
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.75	0.52	0.82	0.42	0.60	0.66	0.73

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing Plus Approved Projects Plus Project PM
16: Browning Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	107	64	147	36	136	175	1391	19	1167
v/c Ratio	0.46	0.18	0.36	0.15	0.39	0.65	0.55	0.13	0.71
Control Delay	28.7	21.7	6.9	21.6	20.7	40.2	8.1	31.1	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.7	21.7	6.9	21.6	20.7	40.2	8.1	31.1	17.1
Queue Length 50th (ft)	36	20	0	11	35	61	95	7	164
Queue Length 95th (ft)	72	45	34	24	54	#166	331	27	#323
Internal Link Dist (ft)		1698			1897		1232		1236
Turn Bay Length (ft)	125		125	75		125		75	
Base Capacity (vph)	457	682	672	487	671	292	2494	146	1769
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.09	0.22	0.07	0.20	0.60	0.56	0.13	0.66

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project AM
1: Bullard Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	166	1029	212	761	204	879	116	838	58
v/c Ratio	0.81	0.96	1.01	0.72	1.04	0.85	0.84	0.90	0.14
Control Delay	67.9	51.1	106.3	31.2	115.5	38.1	86.6	46.3	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.9	51.1	106.3	31.2	115.5	38.1	86.6	46.3	16.2
Queue Length 50th (ft)	93	295	~124	195	~126	238	66	242	12
Queue Length 95th (ft)	#193	#432	#265	263	#263	#339	#163	#351	42
Internal Link Dist (ft)		3244		3287		1236		2979	
Turn Bay Length (ft)	150		150		175		175		75
Base Capacity (vph)	216	1069	210	1058	197	1037	138	932	425
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.96	1.01	0.72	1.04	0.85	0.84	0.90	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project AM
2: Barstow Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	140	450	132	75	375	172	55	860	172	1204
v/c Ratio	0.78	0.75	0.24	0.66	0.78	0.36	0.44	0.76	0.87	0.83
Control Delay	64.9	35.3	9.2	65.3	40.4	12.2	47.1	28.4	74.7	27.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.9	35.3	9.2	65.3	40.4	12.2	47.1	28.4	74.7	27.0
Queue Length 50th (ft)	70	208	14	38	174	24	27	193	86	278
Queue Length 95th (ft)	#163	#360	54	#103	#306	74	63	263	#197	#416
Internal Link Dist (ft)		1231			3299			560		1232
Turn Bay Length (ft)	150		100	125		75	200		200	
Base Capacity (vph)	180	597	555	114	483	479	127	1148	198	1445
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.75	0.24	0.66	0.78	0.36	0.43	0.75	0.87	0.83

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project AM
4: San Jose Avenue & Palm Avenue

Lane Group	WBL	WBR	NBU	NBT	SBL	SBT
Lane Group Flow (vph)	24	27	45	1038	276	832
v/c Ratio	0.06	0.14	0.15	0.43	0.68	0.29
Control Delay	19.1	10.0	13.6	11.2	30.9	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.1	10.0	13.6	11.2	30.9	3.4
Queue Length 50th (ft)	3	0	8	74	73	27
Queue Length 95th (ft)	11	16	36	160	#218	117
Internal Link Dist (ft)	862			1217		262
Turn Bay Length (ft)	75	75	125		200	
Base Capacity (vph)	1025	476	305	2439	442	2854
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.06	0.15	0.43	0.62	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project AM
5: Shaw Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	266	1768	76	376	1241	157	153	760	120	289	446	118
v/c Ratio	0.71	0.97	0.13	0.91	0.65	0.23	0.49	0.61	0.27	0.91	0.51	0.25
Control Delay	55.1	31.4	2.9	67.4	13.3	2.6	40.2	29.2	6.9	70.1	28.4	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.1	31.4	2.9	67.4	13.3	2.6	40.2	29.2	6.9	70.1	28.4	6.6
Queue Length 50th (ft)	68	318	1	106	64	0	38	123	0	75	101	0
Queue Length 95th (ft)	#122	#405	m5	m#188	114	m7	67	162	40	#146	146	39
Internal Link Dist (ft)		2511			2553			106			1217	
Turn Bay Length (ft)	300		150	450		125	200			250		75
Base Capacity (vph)	375	1831	580	414	1913	670	318	1265	455	318	880	469
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.97	0.13	0.91	0.65	0.23	0.48	0.60	0.26	0.91	0.51	0.25

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 No Project AM
6: Gettysburg Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	125	408	39	254	27	892	46	703
v/c Ratio	0.40	0.71	0.21	0.44	0.08	0.49	0.18	0.38
Control Delay	17.7	20.1	15.4	12.9	8.7	9.8	10.4	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	20.1	15.4	12.9	8.7	9.8	10.4	8.7
Queue Length 50th (ft)	27	81	8	42	4	77	6	56
Queue Length 95th (ft)	69	173	28	98	17	156	27	115
Internal Link Dist (ft)		2039		2122		2598		2374
Turn Bay Length (ft)	75		75		100		100	
Base Capacity (vph)	467	830	279	839	380	2038	292	2074
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.49	0.14	0.30	0.07	0.44	0.16	0.34

Intersection Summary

2030 No Project AM
7: Barstow Avenue & Thorne Avenue

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	748	57	815	72
v/c Ratio	0.91	0.47	0.83	0.14
Control Delay	33.5	44.6	20.0	10.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	33.5	44.6	20.0	10.0
Queue Length 50th (ft)	263	22	215	8
Queue Length 95th (ft)	#487	#68	361	34
Internal Link Dist (ft)	1201		1231	570
Turn Bay Length (ft)		200		
Base Capacity (vph)	899	120	1176	525
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.83	0.47	0.69	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project AM
9: Shaw Avenue & Fruit Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	209	1949	38	1463	57	53	334	124	184	318
v/c Ratio	0.68	0.63	0.23	0.61	0.08	0.27	0.46	0.72	0.48	0.59
Control Delay	42.4	13.3	43.4	7.4	1.8	28.4	26.0	51.3	31.2	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	13.3	43.4	7.4	1.8	28.4	26.0	51.3	31.2	9.9
Queue Length 50th (ft)	96	238	21	46	0	22	68	58	81	15
Queue Length 95th (ft)	166	343	m36	61	m0	50	100	#112	132	80
Internal Link Dist (ft)		1860		2511			2362		2241	
Turn Bay Length (ft)	275		300		75	150		300		
Base Capacity (vph)	341	3085	197	2416	748	250	922	221	489	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.63	0.19	0.61	0.08	0.21	0.36	0.56	0.38	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 No Project AM
10: Shaw Avenue & Maroa Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	317	1725	16	1425	177	271	112	216	228
v/c Ratio	0.83	0.53	0.12	0.69	0.85	0.32	0.47	0.49	0.42
Control Delay	52.1	4.9	36.7	22.5	62.4	23.3	32.1	29.5	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.1	4.9	36.7	22.5	62.4	23.3	32.1	29.5	6.1
Queue Length 50th (ft)	175	57	8	226	81	52	46	90	0
Queue Length 95th (ft)	m187	m77	26	280	#180	82	94	150	50
Internal Link Dist (ft)		2553		1310		1393		567	
Turn Bay Length (ft)	225		150		75		150		
Base Capacity (vph)	400	3239	134	2074	244	970	277	515	588
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.53	0.12	0.69	0.73	0.28	0.40	0.42	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 No Project AM
14: Ashlan Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	96	631	29	494	174	722	54	724
v/c Ratio	0.43	0.86	0.23	0.67	0.66	0.47	0.20	0.47
Control Delay	20.1	29.9	16.8	19.3	29.9	12.7	13.4	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.1	29.9	16.8	19.3	29.9	12.7	13.4	11.8
Queue Length 50th (ft)	24	191	6	132	49	90	12	83
Queue Length 95th (ft)	63	#367	25	223	#140	132	34	125
Internal Link Dist (ft)		2109		2491		1418		2598
Turn Bay Length (ft)	100		100		100		100	
Base Capacity (vph)	238	792	138	791	263	1547	265	1548
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.80	0.21	0.62	0.66	0.47	0.20	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project AM
16: Browning Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	177	55	259	60	88	166	895	28	1181
v/c Ratio	0.63	0.14	0.51	0.21	0.22	0.69	0.42	0.19	0.79
Control Delay	33.2	20.3	9.5	21.8	16.6	44.4	9.0	32.4	20.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	20.3	9.5	21.8	16.6	44.4	9.0	32.4	20.6
Queue Length 50th (ft)	63	17	15	19	20	61	64	10	186
Queue Length 95th (ft)	120	42	67	46	52	#158	185	35	#348
Internal Link Dist (ft)		1698			1897		1232		1236
Turn Bay Length (ft)	125		125	75		125		75	
Base Capacity (vph)	428	612	662	441	602	262	2147	157	1584
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.09	0.39	0.14	0.15	0.63	0.42	0.18	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project PM
1: Bullard Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	207	986	280	1183	223	1451	141	1036	200
v/c Ratio	1.28	1.09	1.22	1.16	1.08	1.05	1.37	0.85	0.35
Control Delay	207.6	99.0	176.6	119.3	134.5	72.6	257.9	44.9	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	207.6	99.0	176.6	119.3	134.5	72.6	257.9	44.9	21.2
Queue Length 50th (ft)	~203	~448	~267	~569	~193	~635	~144	390	74
Queue Length 95th (ft)	#358	#583	#441	#708	#353	#776	#276	480	139
Internal Link Dist (ft)		3244		3287		1236		2979	
Turn Bay Length (ft)	150		150		175		175		75
Base Capacity (vph)	162	904	229	1024	207	1384	103	1212	568
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.28	1.09	1.22	1.16	1.08	1.05	1.37	0.85	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project PM
2: Barstow Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	183	509	152	100	502	266	190	1588	159	1483
v/c Ratio	1.12	1.05	0.35	0.75	1.11	0.61	1.04	1.07	0.99	1.00
Control Delay	154.3	98.3	24.0	87.1	118.4	34.2	129.1	75.5	122.7	57.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	154.3	98.3	24.0	87.1	118.4	34.2	129.1	75.5	122.7	57.4
Queue Length 50th (ft)	~163	~431	56	77	~445	126	~159	~712	125	~587
Queue Length 95th (ft)	#311	#644	118	#167	#658	220	#309	#853	#267	#764
Internal Link Dist (ft)		1231			3299			560		1232
Turn Bay Length (ft)	150		100	125		75	200		200	
Base Capacity (vph)	164	484	440	134	452	433	183	1490	161	1482
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.12	1.05	0.35	0.75	1.11	0.61	1.04	1.07	0.99	1.00

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project PM
4: San Jose Avenue & Palm Avenue

Lane Group	WBL	WBR	NBU	NBT	SBL	SBT
Lane Group Flow (vph)	218	262	146	1452	236	1232
v/c Ratio	0.45	0.60	0.60	0.68	0.68	0.67
Control Delay	23.1	9.5	37.0	16.2	33.8	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.1	9.5	37.0	16.2	33.8	14.6
Queue Length 50th (ft)	34	0	45	132	70	150
Queue Length 95th (ft)	59	48	#134	240	#188	#320
Internal Link Dist (ft)	862			1217		262
Turn Bay Length (ft)	75	75	125		200	
Base Capacity (vph)	954	598	252	2121	380	1832
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.44	0.58	0.68	0.62	0.67

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project PM
5: Shaw Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	349	1772	73	382	1977	311	193	792	99	491	867	240
v/c Ratio	0.93	0.91	0.12	0.92	0.97	0.44	0.85	0.78	0.27	0.96	0.87	0.47
Control Delay	78.3	28.0	3.0	65.2	11.0	0.6	78.3	44.3	9.3	74.1	44.9	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.3	28.0	3.0	65.2	11.0	0.6	78.3	44.3	9.3	74.1	44.9	19.7
Queue Length 50th (ft)	98	410	9	132	88	0	63	176	0	162	276	67
Queue Length 95th (ft)	#195	#464	m10	m120	m83	m0	#126	224	43	#263	#381	142
Internal Link Dist (ft)		2511			2553			106			1217	
Turn Bay Length (ft)	300		150	450		125	200			250		75
Base Capacity (vph)	374	1958	611	415	2039	708	227	1012	369	512	998	507
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.91	0.12	0.92	0.97	0.44	0.85	0.78	0.27	0.96	0.87	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 No Project PM
6: Gettysburg Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	67	228	42	328	127	879	90	1131
v/c Ratio	0.35	0.46	0.15	0.65	0.64	0.45	0.30	0.57
Control Delay	21.9	18.7	16.9	23.9	29.6	8.2	10.9	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	18.7	16.9	23.9	29.6	8.2	10.9	9.3
Queue Length 50th (ft)	19	61	11	97	24	73	13	102
Queue Length 95th (ft)	49	113	31	168	#124	147	49	204
Internal Link Dist (ft)		2039		2122		2598		2374
Turn Bay Length (ft)	75		75		100		100	
Base Capacity (vph)	305	767	437	777	229	2270	344	2292
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.30	0.10	0.42	0.55	0.39	0.26	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project PM
7: Barstow Avenue & Thorne Avenue

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	791	35	959	61
v/c Ratio	0.85	0.30	0.92	0.13
Control Delay	25.6	36.2	27.7	8.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	25.6	36.2	27.7	8.0
Queue Length 50th (ft)	196	14	283	2
Queue Length 95th (ft)	#516	39	#559	27
Internal Link Dist (ft)	1201		1231	570
Turn Bay Length (ft)		200		
Base Capacity (vph)	965	115	1161	469
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.82	0.30	0.83	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project PM
9: Shaw Avenue & Fruit Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	134	1837	87	2054	60	64	310	140	278	130
v/c Ratio	0.62	0.62	0.41	0.73	0.32	0.57	0.42	0.80	0.72	0.31
Control Delay	54.7	16.5	37.1	6.0	31.9	54.2	30.4	67.4	47.1	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.7	16.5	37.1	6.0	31.9	54.2	30.4	67.4	47.1	7.6
Queue Length 50th (ft)	81	319	57	39	29	36	76	84	164	0
Queue Length 95th (ft)	143	345	m65	m45	m34	81	112	#167	243	45
Internal Link Dist (ft)		1860		2511			2362		2241	
Turn Bay Length (ft)	275		300		75	150		300		
Base Capacity (vph)	237	3002	223	2818	198	136	877	212	466	479
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.61	0.39	0.73	0.30	0.47	0.35	0.66	0.60	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 No Project PM
10: Shaw Avenue & Maroa Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	424	1875	62	2189	255	326	78	373	253
v/c Ratio	1.34	0.74	0.53	1.17	1.23	0.27	0.25	0.59	0.37
Control Delay	193.1	8.2	62.6	113.3	168.5	24.1	26.4	31.7	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	193.1	8.2	62.6	113.3	168.5	24.1	26.4	31.7	4.7
Queue Length 50th (ft)	~368	331	39	~614	~202	76	35	194	0
Queue Length 95th (ft)	m#428	m328	#98	#712	#358	112	74	291	52
Internal Link Dist (ft)		2553		1310		1393		567	
Turn Bay Length (ft)	225		150		75		150		
Base Capacity (vph)	317	2555	118	1870	208	1196	318	635	688
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.34	0.73	0.53	1.17	1.23	0.27	0.25	0.59	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 No Project PM
14: Ashlan Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	47	833	115	868	63	1038	105	932
v/c Ratio	0.38	0.91	0.93	0.95	0.51	0.84	0.85	0.76
Control Delay	20.6	31.7	87.8	37.8	33.9	25.7	74.4	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	31.7	87.8	37.8	33.9	25.7	74.4	21.7
Queue Length 50th (ft)	10	255	36	276	18	173	34	150
Queue Length 95th (ft)	40	#490	#128	#520	#67	#278	#117	214
Internal Link Dist (ft)		2109		2491		1418		2598
Turn Bay Length (ft)	100		100		100		100	
Base Capacity (vph)	124	911	124	911	124	1235	124	1234
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.91	0.93	0.95	0.51	0.84	0.85	0.76

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 No Project PM
16: Browning Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	189	75	234	27	105	228	1620	20	1572
v/c Ratio	0.77	0.21	0.50	0.11	0.30	0.86	0.67	0.20	0.89
Control Delay	54.8	30.6	10.0	29.3	27.3	67.0	11.3	45.6	28.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	30.6	10.0	29.3	27.3	67.0	11.3	45.6	28.1
Queue Length 50th (ft)	98	35	10	12	42	124	210	11	396
Queue Length 95th (ft)	#186	72	71	34	86	#258	423	34	#592
Internal Link Dist (ft)		1698			1897		1232		1236
Turn Bay Length (ft)	125		125	75		125		75	
Base Capacity (vph)	303	441	535	312	437	277	2411	100	1778
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.17	0.44	0.09	0.24	0.82	0.67	0.20	0.88

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project AM
1: Bullard Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	166	1031	227	761	204	883	116	858	58
v/c Ratio	0.81	0.98	0.99	0.70	1.04	0.87	0.84	0.94	0.14
Control Delay	68.0	54.8	98.9	30.3	115.5	40.3	86.6	53.1	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.0	54.8	98.9	30.3	115.5	40.3	86.6	53.1	16.8
Queue Length 50th (ft)	93	297	131	193	~126	242	66	252	13
Queue Length 95th (ft)	#193	#438	#277	259	#263	#350	#163	#373	43
Internal Link Dist (ft)		3244		3287		1236		2979	
Turn Bay Length (ft)	150		150		175		175		75
Base Capacity (vph)	216	1053	229	1080	197	1014	138	908	414
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.98	0.99	0.70	1.04	0.87	0.84	0.94	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project AM
2: Barstow Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	140	450	142	86	375	172	58	867	172	1243
v/c Ratio	0.76	0.78	0.27	0.69	0.81	0.38	0.51	0.76	0.74	0.84
Control Delay	66.5	40.9	12.5	70.7	46.9	15.9	57.3	30.3	57.4	28.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.5	40.9	12.5	70.7	46.9	15.9	57.3	30.3	57.4	28.3
Queue Length 50th (ft)	79	243	23	49	202	34	33	221	95	313
Queue Length 95th (ft)	#176	#411	69	#124	#346	90	#80	292	#187	#412
Internal Link Dist (ft)		1231			3299			560		1232
Turn Bay Length (ft)	150		100	125		75	200		200	
Base Capacity (vph)	185	576	534	124	472	460	115	1201	249	1487
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.78	0.27	0.69	0.79	0.37	0.50	0.72	0.69	0.84

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project AM
4: San Jose Avenue & Palm Avenue

Lane Group	WBL	WBR	NBU	NBT	SBL	SBT
Lane Group Flow (vph)	36	36	45	1120	339	832
v/c Ratio	0.09	0.17	0.16	0.50	0.75	0.29
Control Delay	19.4	9.5	13.9	11.9	33.5	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	9.5	13.9	11.9	33.5	3.5
Queue Length 50th (ft)	5	0	8	80	94	28
Queue Length 95th (ft)	14	18	36	172	#283	117
Internal Link Dist (ft)	862			1217		262
Turn Bay Length (ft)	75	75	125		200	
Base Capacity (vph)	1050	492	285	2261	453	2850
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.07	0.16	0.50	0.75	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project AM
5: Shaw Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	288	1774	76	378	1242	180	153	793	128	295	449	121
v/c Ratio	0.73	0.98	0.13	0.94	0.67	0.27	0.32	0.64	0.28	0.89	0.62	0.30
Control Delay	44.3	31.4	2.0	59.7	8.8	1.0	34.5	29.6	6.8	65.5	32.6	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.3	31.4	2.0	59.7	8.8	1.0	34.5	29.6	6.8	65.5	32.6	7.2
Queue Length 50th (ft)	82	320	8	107	46	0	36	129	0	76	108	0
Queue Length 95th (ft)	#132	#426	m5	m#187	60	m0	67	169	41	#150	147	39
Internal Link Dist (ft)		2511			2553			106			1217	
Turn Bay Length (ft)	300		150	450		125	200			250		75
Base Capacity (vph)	395	1818	576	403	1856	667	476	1265	461	333	885	474
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.98	0.13	0.94	0.67	0.27	0.32	0.63	0.28	0.89	0.51	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 Project AM
6: Gettysburg Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	128	408	39	254	27	930	46	707
v/c Ratio	0.41	0.71	0.21	0.44	0.08	0.52	0.19	0.39
Control Delay	17.8	20.0	15.4	12.9	8.7	10.0	10.7	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	20.0	15.4	12.9	8.7	10.0	10.7	8.7
Queue Length 50th (ft)	28	81	8	42	4	82	6	56
Queue Length 95th (ft)	70	173	28	98	17	165	28	116
Internal Link Dist (ft)		2039		2122		2598		2374
Turn Bay Length (ft)	75		75		100		100	
Base Capacity (vph)	466	830	280	838	376	2039	274	2072
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.49	0.14	0.30	0.07	0.46	0.17	0.34

Intersection Summary

2030 Project AM
7: Barstow Avenue & Thorne Avenue

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	760	57	817	72
v/c Ratio	0.91	0.48	0.83	0.14
Control Delay	33.9	45.0	19.6	10.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	33.9	45.0	19.6	10.0
Queue Length 50th (ft)	271	22	216	8
Queue Length 95th (ft)	#497	#68	364	34
Internal Link Dist (ft)	1201		1231	570
Turn Bay Length (ft)		200		
Base Capacity (vph)	890	119	1163	520
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.85	0.48	0.70	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project AM
9: Shaw Avenue & Fruit Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	209	1973	38	1466	57	53	337	124	184	318
v/c Ratio	0.68	0.64	0.22	0.61	0.08	0.27	0.46	0.72	0.48	0.56
Control Delay	42.4	13.6	21.1	5.1	0.8	28.4	25.9	52.0	31.2	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	13.6	21.1	5.1	0.8	28.4	25.9	52.0	31.2	7.2
Queue Length 50th (ft)	96	249	19	44	0	22	68	58	81	0
Queue Length 95th (ft)	166	350	m29	60	m1	50	100	#114	132	59
Internal Link Dist (ft)		1860		2511			2362		2241	
Turn Bay Length (ft)	275		300		75	150		300		
Base Capacity (vph)	341	3070	197	2415	748	250	923	219	489	637
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.64	0.19	0.61	0.08	0.21	0.37	0.57	0.38	0.50

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 Project AM
10: Shaw Avenue & Maroa Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	317	1731	16	1467	184	271	112	216	228
v/c Ratio	0.84	0.54	0.11	0.71	0.85	0.32	0.46	0.48	0.42
Control Delay	30.7	0.8	36.2	23.1	62.6	23.0	31.4	29.0	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	0.8	36.2	23.1	62.6	23.0	31.4	29.0	6.0
Queue Length 50th (ft)	175	5	8	235	84	51	46	88	0
Queue Length 95th (ft)	m187	m13	26	292	#188	82	93	150	50
Internal Link Dist (ft)		2553		1310		1393		567	
Turn Bay Length (ft)	225		150		75		150		
Base Capacity (vph)	396	3213	140	2058	246	970	278	515	588
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.54	0.11	0.71	0.75	0.28	0.40	0.42	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 Project AM
14: Ashlan Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	631	29	494	174	758	54	728
v/c Ratio	0.44	0.86	0.23	0.67	0.67	0.49	0.22	0.47
Control Delay	20.2	29.9	16.8	19.3	30.4	13.0	13.8	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	29.9	16.8	19.3	30.4	13.0	13.8	11.9
Queue Length 50th (ft)	24	191	6	132	49	96	12	83
Queue Length 95th (ft)	63	#367	25	223	#141	140	34	126
Internal Link Dist (ft)		2109		2491		1418		2598
Turn Bay Length (ft)	100		100		100		100	
Base Capacity (vph)	238	792	138	791	261	1548	249	1549
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.80	0.21	0.62	0.67	0.49	0.22	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project AM
16: Browning Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	177	55	261	60	88	166	899	28	1218
v/c Ratio	0.64	0.14	0.52	0.21	0.22	0.69	0.42	0.19	0.80
Control Delay	33.4	20.4	9.9	21.8	16.6	44.8	9.0	32.5	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	20.4	9.9	21.8	16.6	44.8	9.0	32.5	21.4
Queue Length 50th (ft)	63	17	17	19	20	61	64	10	195
Queue Length 95th (ft)	120	42	71	46	52	#158	186	35	#369
Internal Link Dist (ft)		1698			1897		1232		1236
Turn Bay Length (ft)	125		125	75		125		75	
Base Capacity (vph)	424	606	655	437	597	259	2154	156	1571
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.09	0.40	0.14	0.15	0.64	0.42	0.18	0.78

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project PM
1: Bullard Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	207	986	284	1183	224	1485	141	1039	200
v/c Ratio	1.28	1.09	1.24	1.16	1.08	1.07	1.37	0.86	0.35
Control Delay	207.6	99.0	182.8	119.3	135.8	80.7	257.9	45.1	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	207.6	99.0	182.8	119.3	135.8	80.7	257.9	45.1	21.2
Queue Length 50th (ft)	~203	~448	~273	~569	~195	~664	~144	391	74
Queue Length 95th (ft)	#358	#583	#447	#708	#354	#806	#276	481	139
Internal Link Dist (ft)		3244		3287		1236		2979	
Turn Bay Length (ft)	150		150		175		175		75
Base Capacity (vph)	162	904	229	1024	207	1384	103	1212	568
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.28	1.09	1.24	1.16	1.08	1.07	1.37	0.86	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project PM
2: Barstow Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	183	509	154	103	502	266	200	1638	159	1491
v/c Ratio	1.12	1.00	0.33	0.93	1.11	0.61	1.02	1.08	1.09	1.03
Control Delay	154.3	84.5	22.8	124.1	118.4	34.2	120.8	80.1	151.5	64.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	154.3	84.5	22.8	124.1	118.4	34.2	120.8	80.1	151.5	64.4
Queue Length 50th (ft)	~163	~397	55	81	~445	126	~160	~743	~139	~642
Queue Length 95th (ft)	#311	#624	116	#193	#658	220	#315	#885	#279	#783
Internal Link Dist (ft)		1231			3299			560		1232
Turn Bay Length (ft)	150		100	125		75	200		200	
Base Capacity (vph)	164	508	460	111	452	433	197	1516	146	1454
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.12	1.00	0.33	0.93	1.11	0.61	1.02	1.08	1.09	1.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project PM
4: San Jose Avenue & Palm Avenue

Lane Group	WBL	WBR	NBU	NBT	SBL	SBT
Lane Group Flow (vph)	310	323	146	1467	249	1232
v/c Ratio	0.56	0.70	0.62	0.72	0.72	0.69
Control Delay	24.4	14.2	39.1	17.8	36.9	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	14.2	39.1	17.8	36.9	15.8
Queue Length 50th (ft)	50	17	47	145	78	164
Queue Length 95th (ft)	81	85	#134	243	#202	#320
Internal Link Dist (ft)	862			1217		262
Turn Bay Length (ft)	75	75	125		200	
Base Capacity (vph)	923	589	244	2031	367	1780
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.55	0.60	0.72	0.68	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project PM
5: Shaw Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	353	1773	73	399	1983	314	193	799	101	526	902	260
v/c Ratio	0.94	0.94	0.12	0.92	0.99	0.45	0.85	0.79	0.27	0.98	0.88	0.50
Control Delay	67.6	32.0	3.6	35.5	21.8	1.5	78.3	44.6	9.2	76.3	45.1	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.6	32.0	3.6	35.5	21.8	1.5	78.3	44.6	9.2	76.3	45.1	20.2
Queue Length 50th (ft)	101	425	11	138	489	15	63	178	0	174	287	76
Queue Length 95th (ft)	#198	#503	m13	m123	m347	m12	#126	226	43	#280	#396	154
Internal Link Dist (ft)		2511			2553			106			1217	
Turn Bay Length (ft)	300		150	450		125	200			250		75
Base Capacity (vph)	374	1892	591	433	1998	696	227	1012	371	539	1026	522
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.94	0.12	0.92	0.99	0.45	0.85	0.79	0.27	0.98	0.88	0.50

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 Project PM
6: Gettysburg Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	67	228	42	328	127	886	91	1173
v/c Ratio	0.36	0.47	0.16	0.67	0.66	0.44	0.30	0.58
Control Delay	22.8	19.3	17.2	24.8	32.7	8.1	10.8	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.8	19.3	17.2	24.8	32.7	8.1	10.8	9.4
Queue Length 50th (ft)	19	61	11	97	25	74	13	108
Queue Length 95th (ft)	49	113	31	168	#129	149	50	215
Internal Link Dist (ft)		2039		2122		2598		2374
Turn Bay Length (ft)	75		75		100		100	
Base Capacity (vph)	287	742	416	751	209	2192	330	2214
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.31	0.10	0.44	0.61	0.40	0.28	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project PM
7: Barstow Avenue & Thorne Avenue

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	793	35	970	61
v/c Ratio	0.84	0.30	0.93	0.13
Control Delay	25.4	36.3	28.4	8.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	25.4	36.3	28.4	8.0
Queue Length 50th (ft)	197	14	290	2
Queue Length 95th (ft)	#517	39	#570	27
Internal Link Dist (ft)	1201		1231	570
Turn Bay Length (ft)		200		
Base Capacity (vph)	965	115	1153	466
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.82	0.30	0.84	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project PM
9: Shaw Avenue & Fruit Avenue

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	134	1842	90	2076	60	64	311	140	278	130
v/c Ratio	0.62	0.63	0.41	0.74	0.30	0.57	0.42	0.80	0.71	0.31
Control Delay	54.5	17.0	27.5	5.8	19.3	54.1	30.3	67.5	47.0	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.5	17.0	27.5	5.8	19.3	54.1	30.3	67.5	47.0	7.6
Queue Length 50th (ft)	81	323	48	43	25	36	76	84	164	0
Queue Length 95th (ft)	143	355	m64	m49	m33	81	112	#167	243	45
Internal Link Dist (ft)		1860		2511			2362		2241	
Turn Bay Length (ft)	275		300		75	150		300		
Base Capacity (vph)	238	2960	236	2814	210	136	877	211	466	479
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.62	0.38	0.74	0.29	0.47	0.35	0.66	0.60	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 Project PM
10: Shaw Avenue & Maroa Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	424	1918	62	2195	257	326	78	373	253
v/c Ratio	1.34	0.76	0.55	1.17	1.24	0.27	0.25	0.59	0.37
Control Delay	194.8	5.2	64.6	114.6	172.0	24.1	26.4	31.7	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	194.8	5.2	64.6	114.6	172.0	24.1	26.4	31.7	4.7
Queue Length 50th (ft)	~344	115	39	~617	~204	76	35	194	0
Queue Length 95th (ft)	m#384	m127	#98	#715	#360	112	74	291	52
Internal Link Dist (ft)		2553		1310		1393		567	
Turn Bay Length (ft)	225		150		75		150		
Base Capacity (vph)	317	2555	113	1870	208	1196	318	635	688
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.34	0.75	0.55	1.17	1.24	0.27	0.25	0.59	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2030 Project PM
14: Ashlan Avenue & Palm Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	47	833	115	868	63	1045	105	970
v/c Ratio	0.38	0.91	0.93	0.95	0.51	0.85	0.85	0.79
Control Delay	20.6	31.7	87.8	37.8	33.9	26.0	74.4	22.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	31.7	87.8	37.8	33.9	26.0	74.4	22.9
Queue Length 50th (ft)	10	255	36	276	18	175	34	158
Queue Length 95th (ft)	40	#490	#128	#520	#67	#282	#117	225
Internal Link Dist (ft)		2109		2491		1418		2598
Turn Bay Length (ft)	100		100		100		100	
Base Capacity (vph)	124	911	124	911	124	1235	124	1235
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.91	0.93	0.95	0.51	0.85	0.85	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2030 Project PM
16: Browning Avenue & Palm Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	189	75	234	27	105	230	1658	20	1578
v/c Ratio	0.78	0.21	0.50	0.11	0.30	0.86	0.69	0.21	0.90
Control Delay	54.9	30.6	9.9	29.3	27.3	67.1	11.6	46.1	28.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.9	30.6	9.9	29.3	27.3	67.1	11.6	46.1	28.5
Queue Length 50th (ft)	98	35	10	12	42	125	218	11	400
Queue Length 95th (ft)	#186	72	70	34	86	#260	441	34	#597
Internal Link Dist (ft)		1698			1897		1232		1236
Turn Bay Length (ft)	125		125	75		125		75	
Base Capacity (vph)	303	440	536	312	436	279	2415	96	1770
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.17	0.44	0.09	0.24	0.82	0.69	0.21	0.89

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX C

COUNT DATA

Wednesday 6/29/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	8	38	4	3	4	32	4	2	7	63	4	2	6	66	7	3
7:15-7:30	7	43	5	8	10	41	10	6	3	58	2	6	10	54	7	4
7:30-7:45	16	55	11	1	15	64	6	10	23	62	17	1	18	121	20	2
7:45-8:00	19	92	17	3	29	47	15	2	22	68	4	3	26	80	13	3
8:00-8:15	14	50	12	7	10	36	6	1	5	70	4	1	12	63	19	1
8:15-8:30	18	67	10	3	15	58	21	2	13	62	7	2	17	68	11	2
8:30-8:45	7	37	9	6	9	36	15	5	3	65	9	1	13	77	13	1
8:45-9:00	13	79	12	5	24	81	22	3	12	107	16	3	19	96	30	2

Wednesday 6/29/11																
PM																
4:00-4:15	26	151	21	3	19	160	10	1	17	149	33	2	30	131	21	2
4:15-4:30	26	120	18	1	25	129	6	1	20	117	30	3	22	99	20	1
4:30-4:45	24	171	19	2	17	146	19	1	16	135	26	1	38	102	14	1
4:45-5:00	25	82	20	1	16	112	11	1	13	88	21	3	20	83	17	1
5:00-5:15	23	117	23	2	18	138	5	1	18	124	27	3	28	90	21	1
5:15-5:30	27	156	23	3	32	159	14	1	16	158	43	3	37	117	20	1
5:30-5:45	21	134	32	2	20	108	13	2	16	116	38	1	25	94	18	1
5:45-6:00	19	109	24	1	17	90	12	1	13	123	27	1	28	91	20	1

Intersection: Palm @ Bullard

Thursday 6/2/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	7	64	0	3	0	2	2	2	1	107	11	4	10	9	18	0
7:15-7:30	5	102	1	16	4	10	5	5	4	121	10	9	9	2	21	2
7:30-7:45	22	165	5	22	13	7	14	13	3	167	23	23	40	15	47	10
7:45-8:00	27	190	8	14	33	15	5	35	8	240	29	52	61	21	95	1
8:00-8:15	11	148	4	11	5	9	5	3	11	141	15	15	16	13	23	7
8:15-8:30	4	85	1	2	2	1	4	1	2	107	11	5	9	4	15	0
8:30-8:45	13	125	4	6	12	7	3	2	4	122	15	9	6	2	13	1
8:45-9:00	19	88	5	5	5	11	7	0	6	119	11	5	7	4	6	3

Thursday 6/2/11																
PM																
4:00-4:15	14	202	4	1	2	7	4	1	6	202	10	15	11	9	15	11
4:15-4:30	9	222	5	6	3	7	7	0	6	176	9	1	5	6	11	2
4:30-4:45	9	270	1	3	3	4	10	0	4	202	9	3	8	5	5	1
4:45-5:00	11	231	8	6	4	3	5	0	3	212	11	7	9	2	8	4
5:00-5:15	15	292	11	2	5	9	9	0	6	222	12	4	9	4	9	0
5:15-5:30	21	297	2	8	3	8	4	0	5	259	20	6	2	3	7	2
5:30-5:45	10	200	5	2	3	11	2	1	7	223	18	0	18	10	10	1
5:45-6:00	9	243	12	3	5	2	7	0	6	163	18	0	18	3	8	0

Intersection: Palm @ Browning

Thursday 6/2/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	4	52	11	3	7	19	13	2	4	56	3	2	5	28	10	1
7:15-7:30	8	63	11	8	15	16	8	1	5	85	6	4	4	31	6	1
7:30-7:45	11	99	20	3	10	22	18	16	15	90	20	1	8	53	7	1
7:45-8:00	19	124	19	15	24	48	23	3	35	146	29	3	7	72	40	1
8:00-8:15	9	108	17	7	11	29	17	4	8	118	15	2	11	50	22	2
8:15-8:30	6	106	27	6	16	37	15	0	20	126	5	4	10	42	8	0
8:30-8:45	2	86	17	5	18	30	14	2	9	99	5	2	2	36	11	0
8:45-9:00	5	98	18	1	12	28	4	1	15	111	3	1	6	35	20	2

Thursday 6/2/11																
PM																
4:00-4:15	12	185	41	2	14	69	19	4	24	138	13	2	5	46	10	1
4:15-4:30	19	172	28	3	15	50	24	0	15	149	8	3	10	34	24	3
4:30-4:45	18	201	38	2	13	53	40	9	12	112	8	0	2	54	11	1
4:45-5:00	23	189	46	0	27	89	16	1	23	139	14	5	3	58	17	1
5:00-5:15	25	215	54	0	20	81	31	3	27	119	18	1	9	65	11	1
5:15-5:30	17	221	40	4	13	73	68	6	13	169	14	2	3	65	13	0
5:30-5:45	30	196	27	1	19	90	12	1	11	128	16	0	12	68	6	1
5:45-6:00	26	177	33	2	23	66	9	0	13	153	16	1	6	43	9	0

Intersection: Palm @ Barstow

Tuesday 6/28/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	2	48	1	3	0	1	2	0	0	80	0	2	3	0	7	0
7:15-7:30	2	79	2	7	1	0	2	3	2	100	2	2	3	1	10	0
7:30-7:45	4	150	1	3	1	0	1	0	1	140	0	3	2	0	11	1
7:45-8:00	5	183	1	12	2	1	3	0	3	177	23	3	4	2	22	0
8:00-8:15	8	138	1	2	1	1	1	1	2	183	5	2	2	0	15	0
8:15-8:30	1	114	4	2	1	1	0	0	1	140	0	4	3	0	7	0
8:30-8:45	4	119	2	3	1	0	2	0	2	123	5	2	2	0	11	0
8:45-9:00	1	129	3	2	4	0	4	1	3	148	4	9	4	0	8	1

Tuesday 6/28/11																
PM																
4:00-4:15	10	200	11	3	2	1	2	0	2	168	1	0	7		7	
4:15-4:30	14	202	5	2	1	0	3	0	5	151	4	3	4		4	
4:30-4:45	16	241	4	1	0	0	3	1	2	191	3	1	3		3	
4:45-5:00	18	247	3	1	0	0	0	0	0	175	6	5	1		1	
5:00-5:15	14	270	5	2	0	0	3	2	4	199	9	1	3		3	
5:15-5:30	16	265	6	2	2	1	2	0	4	184	12	1	2		2	
5:30-5:45	16	239	2	0	0	1	5	0	5	179	9	0	2		2	
5:45-6:00	7	215	8	1	1	0	4	0	4	177	4	2	3		3	

Intersection: Palm @ San Ramon

Thursday 6/2/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	3	84	8	1	3	0	3	1	20	108	0	2	0	0	0	
7:15-7:30	2	116	6	5	5	0	5	2	20	101	0	1	0	0	0	
7:30-7:45	2	163	11	3	4	0	3	1	28	135	0	1	0	0	0	
7:45-8:00	10	239	22	0	5	0	6	0	39	197	0	2	0	0	0	
8:00-8:15	11	170	14	3	6	0	9	2	42	198	0	0	0	0	0	
8:15-8:30	8	143	15	1	6	0	7	1	62	109	0	1	0	0	0	
8:30-8:45	6	124	22	1	13	0	9	1	39	110	0	1	0	0	0	
8:45-9:00	8	134	18	1	8	0	10	1	38	129	0	1	0	0	0	

Thursday 6/2/11																
PM																
4:00-4:15	31	230	5		28	0	52	0	58	162	0	1	0	0	0	
4:15-4:30	24	204	5		34	0	42	1	69	112	0	2	0	0	0	
4:30-4:45	32	177	3		36	0	51	2	60	143	0	2	0	0	0	
4:45-5:00	26	198	8		30	0	60	0	52	182	0	1	0	0	0	
5:00-5:15	28	196	4		10	0	74	0	51	155	0	0	0	0	0	
5:15-5:30	23	251	11		95	0	56	2	54	197	0	1	0	0	0	
5:30-5:45	10	172	3		42	0	53	1	52	163	0	1	0	0	0	
5:45-6:00	15	169	6		22	0	47	1	35	153	0	0	0	0	0	

Intersection: Palm @ San Jose

Wednesday 7/6/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	8	46	12	1	22	141	22	10	20	34	21	2	20	185	7	5
7:15-7:30	9	71	20	21	31	149	15	2	18	39	16	1	41	243	9	7
7:30-7:45	18	94	12	15	48	240	27	7	30	59	19	0	40	346	6	9
7:45-8:00	36	154	14	3	39	278	44	5	59	95	41	6	78	336	7	8
8:00-8:15	12	106	15	14	43	226	39	3	66	64	29	6	54	282	14	12
8:15-8:30	24	99	3	2	37	220	14	5	52	69	8	6	46	239	20	1
8:30-8:45	35	61	12	6	25	262	28	9	32	48	7	2	43	249	6	8
8:45-9:00	29	123	10	0	25	293	29	9	32	52	18	12	65	287	9	8

Wednesday 7/6/11																
PM																
4:00-4:15	21	90	13	4	65	281	38	6	64	81	38	5	58	340	16	2
4:15-4:30	28	96	22	0	76	290	35	2	49	92	39	4	63	322	12	3
4:30-4:45	24	106	10	2	60	290	29	3	59	128	44	1	53	362	14	3
4:45-5:00	21	99	17	1	65	328	43	3	89	131	49	3	77	325	10	3
5:00-5:15	32	95	23	8	48	314	46	6	77	127	35	5	51	371	14	1
5:15-5:30	48	112	12	1	67	308	34	3	65	138	44	4	78	357	13	1
5:30-5:45	26	99	13	0	76	625	34	0	44	122	26	1	51	336	11	2
5:45-6:00	31	73	6	0	58	266	22	4	44	77	16	2	31	295	14	2

Intersection: Palm @ Shaw

Wednesday 7/6/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15			6				6									
7:15-7:30			2				4									
7:30-7:45			2				7									
7:45-8:00			4				11									
8:00-8:15			1				10									
8:15-8:30			0				9									
8:30-8:45			2				4									
8:45-9:00			2				3									
Tuesday 6/28/11																
PM																
4:00-4:15			2				13									
4:15-4:30			0				6									
4:30-4:45			3				4									
4:45-5:00			0				5									
5:00-5:15			1				6									
5:15-5:30			1				9									
5:30-5:45			1				6									
5:45-6:00			1				9									

Intersection: Palm @ Van Ness

Wednesday 6/29/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	2	48	3	1	1	13	1	1	3	43	7	1	2	8	6	1
7:15-7:30	2	81	5	0	4	7	6	0	0	66	2	0	6	16	17	1
7:30-7:45	2	130	5	1	3	11	9	2	6	64	6	1	9	18	14	1
7:45-8:00	4	168	8	0	8	19	6	0	7	96	7	0	8	23	13	1
8:00-8:15	7	102	1	1	3	24	8	2	7	103	8	1	14	20	22	1
8:15-8:30	9	125	5	0	1	22	6	0	1	79	0	0	8	22	14	0
8:30-8:45	1	88	3	1	3	11	10	0	4	56	0	1	3	18	9	1
8:45-9:00	10	121	4	0	2	17	8	0	6	58	3	1	2	5	6	0

Wednesday 6/29/11																
PM																
4:00-4:15	5	94	1	1	6	38	7	0	13	87	6	0	1	22	2	0
4:15-4:30	3	91	3	1	5	24	5	0	7	92	0	1	6	9	9	0
4:30-4:45	6	91	2	0	8	12	3	0	11	80	4	0	1	13	0	0
4:45-5:00	4	100	3	1	7	16	5	0	3	82	3	0	7	15	3	0
5:00-5:15	9	92	2	0	13	24	13	0	7	117	4	1	4	17	2	0
5:15-5:30	18	136	3	1	4	27	6	1	6	134	4	1	5	12	6	0
5:30-5:45	4	132	3	1	11	30	5	1	7	109	2	0	5	15	2	0
5:45-6:00	4	93	6	0	5	16	6	0	10	99	2	0	1	9	5	0

Intersection: Palm @ Gettysburg

Wednesday 6/29/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	1	39	8	1	4	46	5	0	8	30	1	1	7	66	2	5
7:15-7:30	5	57	15	2	8	70	5	1	9	38	1	3	7	114	0	2
7:30-7:45	5	102	20	1	3	74	6	3	10	71	3	1	8	122	4	4
7:45-8:00	4	136	17	2	10	77	20	3	10	80	3	2	10	131	7	6
8:00-8:15	7	70	18	2	5	78	5	4	11	84	6	2	12	85	4	3
8:15-8:30	3	102	11	1	6	67	17	1	13	57	10	1	17	108	3	9
8:30-8:45	3	78	18	3	7	58	5	4	11	63	3	3	4	76	3	3
8:45-9:00	3	86	16	2	9	89	13	1	10	45	0	2	10	95	1	1

Wednesday 6/29/11																
PM																
4:00-4:15	5	83	15	1	10	135	12	2	17	81	8	1	12	122	2	1
4:15-4:30	8	94	16	2	10	139	4	0	14	72	5	2	8	116	10	1
4:30-4:45	9	90	20	1	8	140	3	2	12	72	12	0	7	147	5	1
4:45-5:00	9	100	12	2	13	157	11	1	10	101	11	3	4	123	6	1
5:00-5:15	8	107	18	0	22	148	8	3	21	90	7	2	5	155	11	0
5:15-5:30	12	128	16	1	11	119	9	1	20	130	15	2	10	130	9	0
5:30-5:45	11	132	24	2	20	163	5	0	14	102	12	1	8	154	5	1
5:45-6:00	8	90	18	1	19	126	8	1	15	95	15	1	9	130	7	0

Intersection: Palm @ Ashlan

Wednesday 7/6/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	3	20	6	2	6	21	5	5	14	14	8	1	0	0	0	3
7:15-7:30	8	28	7	3	5	224	6	1	9	34	18	1	18	334	10	6
7:30-7:45	9	27	15	2	4	151	3	2	8	7	22	2	8	271	6	3
7:45-8:00	6	48	13	2	9	264	8	4	14	26	30	3	35	248	2	6
8:00-8:15	11	29	6	2	6	205	7	3	13	23	22	4	10	260	4	3
8:15-8:30	7	40	13	3	11	188	2	1	16	30	17	1	5	253	5	4
8:30-8:45	9	29	21	2	8	167	9	2	11	15	25	2	15	232	10	6
8:45-9:00	9	50	14	2	12	197	9	8	4	32	34	2	10	222	8	10

Wednesday 7/6/11																
PM																
4:00-4:15	1	32	14		4	267	7		12	38	13		15	289	8	
4:15-4:30	24	45	13		20	288	2		8	41	12		6	230	6	
4:30-4:45	5	37	20		16	307	13		15	36	13		20	276	7	
4:45-5:00	5	30	13		17	266	6		17	30	11		14	233	3	
5:00-5:15	18	47	15		22	325	10		24	36	8		17	348	6	
5:15-5:30	12	43	10		10	361	7		12	51	21		9	273	10	
5:30-5:45	8	47	17		12	318	0		12	35	23		18	294	5	
5:45-6:00	12	35	15		20	286	7		14	37	11		13	228	6	

Intersection: Fruit @ Shaw

Wednesday 7/6/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	5	17	2	0	5	149	10	5	15	11	13	0	11	171	1	3
7:15-7:30	10	24	4	0	7	164	6	2	19	18	25	2	13	210	3	2
7:30-7:45	7	27	9	4	3	243	9	4	25	27	28	0	23	315	2	9
7:45-8:00	22	43	9	0	2	343	16	1	27	35	40	1	34	304	2	6
8:00-8:15	19	34	3	3	4	244	9	2	13	14	27	0	17	295	3	5
8:15-8:30	12	37	6	0	3	291	9	3	14	28	25	0	15	240	4	8
8:30-8:45	5	14	6	1	3	284	17	4	12	11	21	0	20	279	4	11
8:45-9:00	16	37	9	0	5	306	17	5	20	24	20	0	17	230	4	5

Wednesday 7/6/11																
PM																
4:00-4:15	16	47	11	0	12	283	11	2	9	38	13	0	16	352	16	3
4:15-4:30	27	42	9	0	10	347	16	1	27	34	9	0	25	280	8	0
4:30-4:45	12	31	2	0	10	315	19	1	12	33	12	0	28	336	16	0
4:45-5:00	26	40	4	0	9	353	20	1	19	60	13	1	28	307	12	1
5:00-5:15	24	30	5	0	11	351	26	3	15	54	23	2	52	363	27	1
5:15-5:30	21	48	5	0	12	326	24	1	15	50	19	0	37	321	14	0
5:30-5:45	22	38	2	0	12	345	15	1	15	51	21	0	27	332	13	1
5:45-6:00	23	47	3	0	10	308	19	0	19	39	22	0	22	282	18	0

Intersection: Maroa @ Shaw

Tuesday 6/28/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	1	1	0	0	0	0	0	1	0	0	0	1	2	1	0
7:15-7:30	0	0	1	0	1	2	0	0	1	2	0	0	0	2	0	0
7:30-7:45	0	5	0	1	0	2	0	0	1	1	0	1	0	3	0	0
7:45-8:00	0	0	2	1	1	3	1	1	8	4	1	0	1	8	0	0
8:00-8:15	0	3	1	1	1	0	0	2	3	3	1	2	0	3	0	1
8:15-8:30	0	2	4	0	1	1	0	1	0	0	0	1	0	1	0	2
8:30-8:45	0	2	0	2	0	1	1	0	1	1	0	0	1	5	0	0
8:45-9:00	0	3	2	0	0	0	1	0	1	2	1	1	2	6	0	0

Tuesday 6/28/11																
PM																
4:00-4:15	0	2	0	0	0	4	0	0	1	2	1	0	0	0	0	0
4:15-4:30	0	2	0	1	1	2	2	0	1	3	0	0	0	2	0	0
4:30-4:45	1	2	1	0	1	4	1	0	0	1	0	0	1	1	0	0
4:45-5:00	0	2	1	0	1	6	1	0	0	1	0	0	0	3	0	0
5:00-5:15	0	4	2	0	2	4	2	0	0	1	1	0	1	3	0	0
5:15-5:30	0	4	0	0	2	5	0	0	1	2	2	1	0	2	1	0
5:30-5:45	0	4	2	0	1	5	0	0	0	0	0	0	0	2	0	0
5:45-6:00	0	2	1	0	2	1	0	0	2	0	1	0	0	0	0	0

Intersection: Thorne @ San Ramon

Tuesday 6/28/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0		3	0	1	26								45	4	1
7:15-7:30	0		3	0	1	40								71	0	0
7:30-7:45	0		7	0	5	87								115	0	1
7:45-8:00	5		18	1	26	181								148	2	0
8:00-8:15	4		5	0	7	130								76	3	1
8:15-8:30	8		2	0	1	82								82	4	0
8:30-8:45	1		3	0	1	52								62	2	0
8:45-9:00	2		5	0	1	60								65	1	1
WEDNESDAY 7/6/11																
PM																
4:00-4:15	1	0	5	0	1	91								66	2	1
4:15-4:30	0	0	2	0	1	97								75	2	0
4:30-4:45	1	0	10	0	4	191								128	3	1
4:45-5:00	1	0	6	0	6	200								162	3	1
5:00-5:15	3	0	18	0	10	339								232	6	4
5:15-5:30	1	0	17	0	10	345								243	6	1
5:30-5:45	4	0	25	1	14	462								298	8	6
5:45-6:00	2	0	25	0	15	439								326	10	1

Intersection: Palm @ Ashlan

Tuesday 6/28/11	NBL	NBT	NBR	NBTrucks	WBL	WBT	WBR	WBTrucks	SBL	SBT	SBR	SBTrucks	EBL	EBT	EBR	EBTrucks
AM																
7:00-7:15	0	1		1						0	0		0		0	0
7:15-7:30	2	2		0						1	2		1		3	0
7:30-7:45	1	1		0						1	3		0		3	0
7:45-8:00	2	0		0						1	2		1		1	0
8:00-8:15	3	0		0						3	1		2		1	0
8:15-8:30	1	0		0						0	2		2		2	0
8:30-8:45	0	1		1						1	2		2		3	0
8:45-9:00	1	0		0						1	3		2		2	1

Tuesday 6/28/11																
PM																
4:00-4:15	4	4		0						0	2		3		5	0
4:15-4:30	2	2		0						1	2		2		5	1
4:30-4:45	2	1		0						4	1		1		1	0
4:45-5:00	0	0		1						1	1		1		1	1
5:00-5:15	3	2		1						2	1		2		5	0
5:15-5:30	2	1		0						0	1		3		7	1
5:30-5:45	2	5		0						3	1		3		2	0
5:45-6:00	1	0		0						0	1		5		7	0

Intersection: Colonial @ San Ramon

APPENDIX D

EXISTING CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Existing AM
1: Bullard Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	144	657	123	136	406	95	133	528	99	71	513	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.97		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)	1770	3441		1719	3323		1770	3440		1770	3539	1537
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3441		1719	3323		1770	3440		1770	3539	1537
Peak-hour factor, PHF	0.94	0.94	0.94	0.90	0.90	0.90	0.76	0.76	0.76	0.81	0.81	0.81
Adj. Flow (vph)	153	699	131	151	451	106	175	695	130	88	633	44
RTOR Reduction (vph)	0	20	0	0	27	0	0	19	0	0	0	24
Lane Group Flow (vph)	153	810	0	151	530	0	175	806	0	88	633	20
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	5.1	24.0		5.1	24.0		6.1	24.6		3.8	22.3	22.3
Effective Green, g (s)	5.1	24.0		5.1	24.0		6.1	24.6		3.8	22.3	22.3
Actuated g/C Ratio	0.07	0.32		0.07	0.32		0.08	0.33		0.05	0.30	0.30
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	4.5		2.0	4.5	4.5
Lane Grp Cap (vph)	120	1097		116	1059		143	1124		89	1048	455
v/s Ratio Prot	0.09	c0.24		c0.09	0.16		c0.10	c0.23		0.05	0.18	
v/s Ratio Perm												0.01
v/c Ratio	1.27	0.74		1.30	0.50		1.22	0.72		0.99	0.60	0.04
Uniform Delay, d1	35.1	22.9		35.1	20.8		34.6	22.3		35.7	22.7	18.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	173.4	3.0		184.9	0.6		147.6	2.5		90.6	1.3	0.1
Delay (s)	208.5	25.8		220.0	21.4		182.2	24.8		126.4	24.0	19.0
Level of Service	F	C		F	C		F	C		F	C	B
Approach Delay (s)		54.3			63.8			52.4			35.5	
Approach LOS		D			E			D			D	

Intersection Summary

HCM Average Control Delay	51.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	75.3	Sum of lost time (s)	12.9
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing AM
2: Barstow Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	297	106	69	264	92	51	551	93	113	696	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.9	3.9	3.9	3.9	3.9	3.9	3.1	4.4		3.1	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1760	1863	1538	1762	1863	1538	1703	3311		1770	3404	
Flt Permitted	0.38	1.00	1.00	0.30	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	709	1863	1538	552	1863	1538	1703	3311		1770	3404	
Peak-hour factor, PHF	0.75	0.75	0.75	0.79	0.79	0.79	0.71	0.71	0.71	0.70	0.70	0.70
Adj. Flow (vph)	75	396	141	87	334	116	72	776	131	161	994	249
RTOR Reduction (vph)	0	0	97	0	0	78	0	20	0	0	31	0
Lane Group Flow (vph)	75	396	44	87	334	38	72	887	0	161	1212	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Turn Type	Perm		Perm	Perm		Perm	Prot			Prot		
Protected Phases		4			4		1	6		5	2	
Permitted Phases	4		4	4		4						
Actuated Green, G (s)	20.0	20.0	20.0	20.0	20.0	20.0	3.0	26.0		6.9	29.9	
Effective Green, g (s)	20.6	20.6	20.6	20.6	20.6	20.6	3.9	26.5		7.8	30.4	
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.31	0.31	0.06	0.40		0.12	0.46	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.9		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	220	579	478	172	579	478	100	1323		208	1561	
v/s Ratio Prot		c0.21			0.18		0.04	0.27		c0.09	c0.36	
v/s Ratio Perm	0.11		0.03	0.16		0.02						
v/c Ratio	0.34	0.68	0.09	0.51	0.58	0.08	0.72	0.67		0.77	0.78	
Uniform Delay, d1	17.6	20.0	16.2	18.7	19.2	16.2	30.7	16.3		28.4	15.1	
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	0.7	3.1	0.1	1.7	1.1	0.1	19.3	1.8		15.0	2.9	
Delay (s)	18.3	23.1	16.3	20.4	20.3	16.2	49.9	18.1		43.4	18.0	
Level of Service	B	C	B	C	C	B	D	B		D	B	
Approach Delay (s)		20.9			19.5			20.4			20.9	
Approach LOS		C			B			C			C	

Intersection Summary

HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	66.3	Sum of lost time (s)	7.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Existing AM
3: San Ramon Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	2	62	6	3	6	20	658	8	9	825	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.66	0.66	0.66	0.56	0.56	0.56	0.70	0.70	0.70	0.70	0.70	0.70
Hourly flow rate (vph)	18	3	94	11	5	11	29	940	11	13	1179	53
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								679			640	
pX, platoon unblocked	0.82	0.82	0.74	0.82	0.82	0.85	0.74			0.85		
vC, conflicting volume	1791	2259	636	1733	2280	496	1241			961		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	673	1244	0	602	1270	37	627			588		
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.3			2.2		
p0 queue free %	93	98	88	96	96	99	96			98		
cM capacity (veh/h)	247	131	790	246	121	840	665			824		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	115	27	29	627	325	13	786	446
Volume Left	18	11	29	0	0	13	0	0
Volume Right	94	11	0	0	11	0	0	53
cSH	534	267	665	1700	1700	824	1700	1700
Volume to Capacity	0.22	0.10	0.04	0.37	0.19	0.02	0.46	0.26
Queue Length 95th (ft)	20	8	3	0	0	1	0	0
Control Delay (s)	13.6	20.0	10.7	0.0	0.0	9.4	0.0	0.0
Lane LOS	B	C	B			A		
Approach Delay (s)	13.6	20.0	0.3			0.1		
Approach LOS	B	C						

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	38.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Existing AM
4: San Jose Avenue & Palm Avenue

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (vph)	21	25	31	715	62	254	639
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0		3.1	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2757	1218	1748	4960		1752	3505
Flt Permitted	0.95	1.00	0.37	1.00		0.95	1.00
Satd. Flow (perm)	2757	1218	686	4960		1752	3505
Peak-hour factor, PHF	0.45	0.45	0.79	0.79	0.79	0.87	0.87
Adj. Flow (vph)	47	56	39	905	78	292	734
RTOR Reduction (vph)	0	50	0	12	0	0	0
Lane Group Flow (vph)	47	6	39	971	0	292	734
Confl. Peds. (#/hr)	10	10	10		10	10	
Confl. Bikes (#/hr)	10	10	10	10	10	10	10
Heavy Vehicles (%)	27%	27%	3%	3%	3%	3%	3%
Turn Type		Perm	Perm			Prot	
Protected Phases	4			6		5	2
Permitted Phases		4	6				
Actuated Green, G (s)	5.3	5.3	24.0	24.0		11.4	39.4
Effective Green, g (s)	5.3	5.3	24.9	24.9		12.3	40.3
Actuated g/C Ratio	0.10	0.10	0.46	0.46		0.23	0.75
Clearance Time (s)	4.0	4.0	4.9	4.9		4.0	4.9
Vehicle Extension (s)	2.0	2.0	4.0	4.0		2.0	4.0
Lane Grp Cap (vph)	273	120	319	2304		402	2635
v/s Ratio Prot	c0.02			c0.20		c0.17	0.21
v/s Ratio Perm		0.00	0.06				
v/c Ratio	0.17	0.05	0.12	0.42		0.73	0.28
Uniform Delay, d1	22.1	21.9	8.1	9.6		19.1	2.1
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.1	0.8	0.6		5.5	0.3
Delay (s)	22.2	21.9	8.9	10.1		24.6	2.4
Level of Service	C	C	A	B		C	A
Approach Delay (s)	22.1			10.1			8.7
Approach LOS	C			B			A

Intersection Summary

HCM Average Control Delay	10.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	53.6	Sum of lost time (s)	11.1
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Existing AM
5: Shaw Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	1353	53	188	1085	140	101	510	50	233	323	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.4		3.1	4.0	4.0	3.1	4.0		3.1	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5051		1770	5085	1533	1770	5001		3433	3539	1528
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5051		1770	5085	1533	1770	5001		3433	3539	1528
Peak-hour factor, PHF	0.85	0.85	0.85	0.88	0.88	0.88	0.78	0.78	0.78	0.63	0.63	0.63
Adj. Flow (vph)	288	1592	62	214	1233	159	129	654	64	370	513	173
RTOR Reduction (vph)	0	4	0	0	0	84	0	13	0	0	0	102
Lane Group Flow (vph)	288	1650	0	214	1233	75	129	705	0	370	513	71
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						4
Actuated Green, G (s)	15.0	31.6		11.5	28.1	28.1	8.4	18.6		10.0	20.2	20.2
Effective Green, g (s)	15.9	32.1		12.4	29.0	29.0	9.3	19.5		10.9	21.1	21.1
Actuated g/C Ratio	0.18	0.36		0.14	0.32	0.32	0.10	0.22		0.12	0.24	0.24
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0	2.5	5.4		2.5	3.0	3.0
Lane Grp Cap (vph)	314	1812		245	1648	497	184	1090		418	834	360
v/s Ratio Prot	c0.16	c0.33		0.12	0.24		0.07	0.14		c0.11	c0.14	
v/s Ratio Perm						0.05						0.05
v/c Ratio	0.92	0.91		0.87	0.75	0.15	0.70	0.65		0.89	0.62	0.20
Uniform Delay, d1	36.2	27.3		37.8	27.0	21.5	38.8	31.9		38.7	30.6	27.4
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	30.1	7.3		27.0	1.9	0.1	10.6	2.0		19.4	1.4	0.3
Delay (s)	66.2	34.6		64.8	28.9	21.6	49.4	33.8		58.1	31.9	27.7
Level of Service	E	C		E	C	C	D	C		E	C	C
Approach Delay (s)		39.3			33.0			36.2			40.4	
Approach LOS		D			C			D			D	

Intersection Summary

HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	89.5	Sum of lost time (s)	6.2
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing AM
6: Gettysburg Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	93	71	17	86	33	25	591	21	24	385	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.1	4.1		4.1	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.94		1.00	0.96		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1744	1704		1762	1771		1723	3448		1760	3499	
Flt Permitted	0.66	1.00		0.62	1.00		0.43	1.00		0.34	1.00	
Satd. Flow (perm)	1203	1704		1144	1771		776	3448		638	3499	
Peak-hour factor, PHF	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.69	0.69	0.69
Adj. Flow (vph)	56	119	91	23	116	45	31	739	26	35	558	35
RTOR Reduction (vph)	0	57	0	0	29	0	0	3	0	0	6	0
Lane Group Flow (vph)	56	153	0	23	132	0	31	762	0	35	587	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	9.8	9.8		9.8	9.8		24.4	24.4		24.4	24.4	
Effective Green, g (s)	10.0	10.0		10.0	10.0		25.3	25.3		25.3	25.3	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.58	0.58		0.58	0.58	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	275	390		262	405		449	1996		369	2026	
v/s Ratio Prot		c0.09			0.07			c0.22			0.17	
v/s Ratio Perm	0.05			0.02			0.04			0.05		
v/c Ratio	0.20	0.39		0.09	0.33		0.07	0.38		0.09	0.29	
Uniform Delay, d1	13.6	14.3		13.3	14.0		4.0	5.0		4.1	4.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.5		0.1	0.3		0.0	0.0		0.0	0.0	
Delay (s)	13.9	14.8		13.4	14.4		4.1	5.0		4.1	4.7	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		14.6			14.3			5.0			4.7	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	7.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	43.7	Sum of lost time (s)	8.4
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Existing AM
7: Barstow Avenue & Thorne Avenue

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	474	10	44	540	19	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.76	0.76	0.60	0.60	0.92	0.92
Hourly flow rate (vph)	624	13	73	900	21	39
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				1311		
pX, platoon unblocked					0.95	
vC, conflicting volume			647		1697	650
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			647		1707	650
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		76	92
cM capacity (veh/h)			917		86	461

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	637	73	900	60
Volume Left	0	73	0	21
Volume Right	13	0	0	39
cSH	1700	917	1700	184
Volume to Capacity	0.37	0.08	0.53	0.32
Queue Length 95th (ft)	0	7	0	33
Control Delay (s)	0.0	9.3	0.0	33.6
Lane LOS		A		D
Approach Delay (s)	0.0	0.7		33.6
Approach LOS				D

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Existing AM
8: San Ramon Avenue & Thorne Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	22	3	7	11	6	0	21	4	35	18	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.70	0.70	0.70	0.50	0.50	0.50	0.63	0.63	0.63	0.53	0.53	0.53
Hourly flow rate (vph)	4	31	4	14	22	12	0	33	6	66	34	4
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	247	228	56	244	226	57	48			50		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	247	228	56	244	226	57	48			50		
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	95	100	98	97	99	100			96		
cM capacity (veh/h)	634	629	988	638	633	993	1547			1544		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	40	48	40	104
Volume Left	4	14	0	66
Volume Right	4	12	6	4
cSH	655	698	1547	1544
Volume to Capacity	0.06	0.07	0.00	0.04
Queue Length 95th (ft)	5	6	0	3
Control Delay (s)	10.9	10.5	0.0	4.9
Lane LOS	B	B		A
Approach Delay (s)	10.9	10.5	0.0	4.9
Approach LOS	B	B		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	23.6%	ICU Level of Service	A
Analysis Period (min)	15		

Existing AM
9: Shaw Avenue & Fruit Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	1527	31	35	1226	35	49	192	59	65	130	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.0		3.1	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5066		1770	5085	1545	1757	3389		1760	1863	1535
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.63	1.00		0.52	1.00	1.00
Satd. Flow (perm)	1770	5066		1770	5085	1545	1170	3389		962	1863	1535
Peak-hour factor, PHF	0.80	0.80	0.80	0.83	0.83	0.83	0.77	0.77	0.77	0.81	0.81	0.81
Adj. Flow (vph)	122	1909	39	42	1477	42	64	249	77	80	160	165
RTOR Reduction (vph)	0	2	0	0	0	15	0	46	0	0	0	129
Lane Group Flow (vph)	122	1946	0	42	1477	27	64	280	0	80	160	36
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	5.1	30.0		2.6	27.0	27.0	11.6	11.6		11.6	11.6	11.6
Effective Green, g (s)	6.0	30.9		3.5	27.9	27.9	12.5	12.5		12.5	12.5	12.5
Actuated g/C Ratio	0.10	0.53		0.06	0.48	0.48	0.22	0.22		0.22	0.22	0.22
Clearance Time (s)	4.5	4.9		4.0	4.9	4.9	4.9	4.9		4.9	4.9	4.9
Vehicle Extension (s)	3.0	3.0		2.5	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	183	2699		107	2446	743	252	730		207	402	331
v/s Ratio Prot	c0.07	c0.38		0.02	0.29			0.08			c0.09	
v/s Ratio Perm						0.02	0.05			0.08		0.02
v/c Ratio	0.67	0.72		0.39	0.60	0.04	0.25	0.38		0.39	0.40	0.11
Uniform Delay, d1	25.0	10.3		26.2	11.0	8.0	18.9	19.5		19.5	19.5	18.3
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	8.8	1.0		1.7	0.4	0.0	0.5	0.3		1.2	0.6	0.1
Delay (s)	33.9	11.2		28.0	11.4	8.0	19.4	19.8		20.7	20.2	18.4
Level of Service	C	B		C	B	A	B	B		C	C	B
Approach Delay (s)		12.6			11.8			19.7			19.6	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	11.6
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Existing AM
10: Shaw Avenue & Maroa Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	1461	14	14	1223	47	77	179	34	103	136	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.0		3.1	4.0		3.9	3.9		3.9	3.9	3.9
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00		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)	1770	5076		1770	5052		1758	3438		1761	1863	1537
Flt Permitted	0.95	1.00		0.95	1.00		0.64	1.00		0.50	1.00	1.00
Satd. Flow (perm)	1770	5076		1770	5052		1193	3438		931	1863	1537
Peak-hour factor, PHF	0.83	0.83	0.83	0.91	0.91	0.91	0.60	0.60	0.60	0.84	0.84	0.84
Adj. Flow (vph)	136	1760	17	15	1344	52	128	298	57	123	162	187
RTOR Reduction (vph)	0	1	0	0	6	0	0	30	0	0	0	142
Lane Group Flow (vph)	136	1776	0	15	1390	0	128	325	0	123	162	45
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	5.1	27.7		0.9	23.5		12.5	12.5		12.5	12.5	12.5
Effective Green, g (s)	6.0	28.6		1.8	24.4		13.1	13.1		13.1	13.1	13.1
Actuated g/C Ratio	0.11	0.52		0.03	0.45		0.24	0.24		0.24	0.24	0.24
Clearance Time (s)	4.0	4.9		4.0	4.9		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	195	2664		58	2262		287	826		224	448	369
v/s Ratio Prot	c0.08	c0.35		0.01	0.28			0.09			0.09	
v/s Ratio Perm							0.11			c0.13		0.03
v/c Ratio	0.70	0.67		0.26	0.61		0.45	0.39		0.55	0.36	0.12
Uniform Delay, d1	23.4	9.5		25.7	11.5		17.6	17.4		18.1	17.2	16.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.6	0.6		1.7	0.5		1.1	0.3		2.7	0.5	0.1
Delay (s)	33.0	10.1		27.4	12.0		18.7	17.7		20.9	17.7	16.3
Level of Service	C	B		C	B		B	B		C	B	B
Approach Delay (s)		11.7			12.1			18.0			18.0	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	7.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Existing AM

11: San Ramon Avenue & Colonial Avenue

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	9	9	3	7	9
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.69	0.69	0.70	0.70	0.75	0.75
Hourly flow rate (vph)	7	13	13	4	9	12
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	65	35	31			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	65	35	31			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	910	1012	1568			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	17	21
Volume Left	7	13	0
Volume Right	13	0	12
cSH	973	1568	1700
Volume to Capacity	0.02	0.01	0.01
Queue Length 95th (ft)	2	1	0
Control Delay (s)	8.8	5.5	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	5.5	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	20.2%	ICU Level of Service	A
Analysis Period (min)	15		

Existing AM
14: Ashlan Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	502	20	27	333	54	21	461	74	50	329	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1852		1770	1824		1770	3466		1770	3502	
Flt Permitted	0.40	1.00		0.20	1.00		0.51	1.00		0.26	1.00	
Satd. Flow (perm)	750	1852		372	1824		947	3466		491	3502	
Peak-hour factor, PHF	0.81	0.81	0.81	0.90	0.90	0.90	0.67	0.67	0.67	0.85	0.85	0.85
Adj. Flow (vph)	65	620	25	30	370	60	31	688	110	59	387	29
RTOR Reduction (vph)	0	3	0	0	11	0	0	20	0	0	9	0
Lane Group Flow (vph)	65	642	0	30	419	0	31	778	0	59	407	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	24.2	24.2		24.2	24.2		21.3	21.3		21.3	21.3	
Effective Green, g (s)	24.2	24.2		24.2	24.2		21.3	21.3		21.3	21.3	
Actuated g/C Ratio	0.44	0.44		0.44	0.44		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	330	815		164	803		367	1342		190	1356	
v/s Ratio Prot		c0.35			0.23			c0.22			0.12	
v/s Ratio Perm	0.09			0.08			0.03			0.12		
v/c Ratio	0.20	0.79		0.18	0.52		0.08	0.58		0.31	0.30	
Uniform Delay, d1	9.4	13.2		9.4	11.2		10.7	13.3		11.7	11.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	4.9		0.4	0.5		0.5	1.8		4.2	0.6	
Delay (s)	9.7	18.1		9.8	11.7		11.1	15.1		15.9	12.3	
Level of Service	A	B		A	B		B	B		B	B	
Approach Delay (s)		17.3			11.5			15.0			12.7	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing AM
15: Van Ness Avenue & Palm Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	42	619	8	0	564
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.66	0.66	0.77	0.77	0.63	0.63
Hourly flow rate (vph)	0	64	804	10	0	895
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						186
pX, platoon unblocked	0.87					
vC, conflicting volume	1257	407			814	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1002	407			814	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			100	
cM capacity (veh/h)	209	593			809	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	64	536	278	448	448
Volume Left	0	0	0	0	0
Volume Right	64	0	10	0	0
cSH	593	1700	1700	1700	1700
Volume to Capacity	0.11	0.32	0.16	0.26	0.26
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	11.8	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.8	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

Existing AM
16: Browning Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	51	186	55	41	29	65	605	18	26	669	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1747		1770	3524		1770	3485	
Flt Permitted	0.68	1.00	1.00	0.70	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1265	1863	1583	1311	1747		1770	3524		1770	3485	
Peak-hour factor, PHF	0.62	0.62	0.62	0.58	0.58	0.58	0.72	0.72	0.72	0.76	0.76	0.76
Adj. Flow (vph)	203	82	300	95	71	50	90	840	25	34	880	101
RTOR Reduction (vph)	0	0	179	0	38	0	0	3	0	0	12	0
Lane Group Flow (vph)	203	82	121	95	83	0	90	862	0	34	969	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	13.9	13.9	13.9	13.9	13.9		4.3	29.0		1.9	24.7	
Effective Green, g (s)	13.9	13.9	13.9	13.9	13.9		4.3	29.0		1.9	24.7	
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25		0.08	0.52		0.03	0.44	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	312	460	391	324	431		135	1815		60	1529	
v/s Ratio Prot		0.04			0.05		c0.05	0.24		0.02	c0.28	
v/s Ratio Perm	c0.16		0.08	0.07								
v/c Ratio	0.65	0.18	0.31	0.29	0.19		0.67	0.47		0.57	0.63	
Uniform Delay, d1	19.0	16.7	17.3	17.2	16.8		25.3	8.8		26.8	12.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	0.1	0.3	0.4	0.2		9.2	0.4		7.1	1.2	
Delay (s)	23.3	16.8	17.6	17.6	16.9		34.5	9.2		33.9	13.5	
Level of Service	C	B	B	B	B		C	A		C	B	
Approach Delay (s)		19.5			17.2			11.6			14.2	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	13.4
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Existing PM
1: Bullard Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	171	544	95	109	770	68	144	764	123	88	665	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		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)	1770	3445		1719	3388		1770	3451		1770	3539	1534
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3445		1719	3388		1770	3451		1770	3539	1534
Peak-hour factor, PHF	0.90	0.90	0.90	0.97	0.97	0.97	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	190	604	106	112	794	70	157	830	134	104	782	191
RTOR Reduction (vph)	0	16	0	0	7	0	0	14	0	0	0	75
Lane Group Flow (vph)	190	694	0	112	857	0	157	950	0	104	782	116
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	10.0	28.0		8.3	26.3		9.0	28.3		6.0	25.3	25.3
Effective Green, g (s)	10.0	28.0		8.3	26.3		9.0	28.3		6.0	25.3	25.3
Actuated g/C Ratio	0.11	0.32		0.09	0.30		0.10	0.32		0.07	0.29	0.29
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	4.5		2.0	4.5	4.5
Lane Grp Cap (vph)	200	1091		161	1008		180	1105		120	1013	439
v/s Ratio Prot	c0.11	0.20		0.07	c0.25		c0.09	c0.28		0.06	0.22	
v/s Ratio Perm												0.08
v/c Ratio	0.95	0.64		0.70	0.85		0.87	0.86		0.87	0.77	0.26
Uniform Delay, d1	39.0	25.8		38.8	29.2		39.1	28.2		40.8	28.9	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	49.0	1.5		10.0	7.5		33.2	7.3		42.6	4.2	0.6
Delay (s)	87.9	27.4		48.9	36.7		72.3	35.5		83.4	33.1	24.9
Level of Service	F	C		D	D		E	D		F	C	C
Approach Delay (s)		40.2			38.1			40.7			36.5	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	88.4	Sum of lost time (s)	17.8
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing PM
2: Barstow Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	334	61	92	390	149	111	961	195	101	754	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.9	3.9	3.9	3.9	3.9	3.9	3.1	4.4		3.1	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1764	1863	1537	1763	1863	1537	1703	3295		1770	3471	
Flt Permitted	0.18	1.00	1.00	0.21	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	335	1863	1537	397	1863	1537	1703	3295		1770	3471	
Peak-hour factor, PHF	0.73	0.73	0.73	0.74	0.74	0.74	0.88	0.88	0.88	0.80	0.80	0.80
Adj. Flow (vph)	49	458	84	124	527	201	126	1092	222	126	942	105
RTOR Reduction (vph)	0	0	47	0	0	79	0	24	0	0	11	0
Lane Group Flow (vph)	49	458	37	124	527	122	126	1290	0	126	1036	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Turn Type	Perm		Perm	Perm		Perm	Prot			Prot		
Protected Phases		4			4		1	6		5	2	
Permitted Phases	4		4	4		4						
Actuated Green, G (s)	21.6	21.6	21.6	21.6	21.6	21.6	5.6	30.6		5.2	30.2	
Effective Green, g (s)	22.2	22.2	22.2	22.2	22.2	22.2	6.5	31.1		6.1	30.7	
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.31	0.31	0.09	0.44		0.09	0.43	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.9		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	105	584	482	124	584	482	156	1447		153	1505	
v/s Ratio Prot		0.25			0.28		c0.07	c0.39		0.07	0.30	
v/s Ratio Perm	0.15		0.02	c0.31		0.08						
v/c Ratio	0.47	0.78	0.08	1.00	0.90	0.25	0.81	0.89		0.82	0.69	
Uniform Delay, d1	19.5	22.1	17.1	24.3	23.3	18.1	31.5	18.3		31.8	16.2	
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	2.4	6.6	0.0	80.8	17.2	0.2	24.2	7.8		27.6	1.7	
Delay (s)	21.9	28.7	17.1	105.1	40.5	18.3	55.8	26.1		59.4	17.9	
Level of Service	C	C	B	F	D	B	E	C		E	B	
Approach Delay (s)		26.5			44.7			28.7			22.4	
Approach LOS		C			D			C			C	

Intersection Summary

HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	7.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing PM
3: San Ramon Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	0	11	2	1	9	75	1197	21	12	877	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.65	0.65	0.65	0.85	0.85	0.85	0.95	0.95	0.95	0.93	0.93	0.93
Hourly flow rate (vph)	17	0	17	2	1	11	79	1260	22	13	943	38
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								679			640	
pX, platoon unblocked	0.88	0.88	0.81	0.88	0.88	0.78	0.81			0.78		
vC, conflicting volume	1807	2448	510	1963	2455	661	991			1292		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	676	1406	0	854	1415	17	524			822		
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.3			2.2		
p0 queue free %	93	100	98	99	99	99	90			98		
cM capacity (veh/h)	257	105	866	186	99	803	798			625		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	34	14	79	840	442	13	629	352
Volume Left	17	2	79	0	0	13	0	0
Volume Right	17	11	0	0	22	0	0	38
cSH	397	375	798	1700	1700	625	1700	1700
Volume to Capacity	0.09	0.04	0.10	0.49	0.26	0.02	0.37	0.21
Queue Length 95th (ft)	7	3	8	0	0	2	0	0
Control Delay (s)	14.9	15.0	10.0	0.0	0.0	10.9	0.0	0.0
Lane LOS	B	B	B			B		
Approach Delay (s)	14.9	15.0	0.6			0.1		
Approach LOS	B	B						

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

Existing PM
4: San Jose Avenue & Palm Avenue

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (vph)	171	241	109	922	26	217	677
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.1	4.0		3.1	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91		1.00	0.95
Frpb, ped/bikes	1.00	0.97	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	1.00		1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2757	1230	1752	5009		1752	3505
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	2757	1230	1752	5009		1752	3505
Peak-hour factor, PHF	0.75	0.75	0.81	0.81	0.81	0.78	0.78
Adj. Flow (vph)	228	321	135	1138	32	278	868
RTOR Reduction (vph)	0	264	0	4	0	0	0
Lane Group Flow (vph)	228	57	135	1166	0	278	868
Confl. Peds. (#/hr)	10	10	10		10	10	
Confl. Bikes (#/hr)	10	10	10	10	10	10	10
Heavy Vehicles (%)	27%	27%	3%	3%	3%	3%	3%
Turn Type		Perm	Prot			Prot	
Protected Phases	4		1	6		5	2
Permitted Phases		4					
Actuated Green, G (s)	10.0	10.0	6.8	22.2		11.3	26.7
Effective Green, g (s)	10.0	10.0	7.7	23.1		12.2	27.6
Actuated g/C Ratio	0.18	0.18	0.14	0.41		0.22	0.49
Clearance Time (s)	4.0	4.0	4.0	4.9		4.0	4.9
Vehicle Extension (s)	2.0	2.0	2.0	4.0		2.0	4.0
Lane Grp Cap (vph)	489	218	239	2052		379	1715
v/s Ratio Prot	c0.08		0.08	c0.23		c0.16	0.25
v/s Ratio Perm		0.05					
v/c Ratio	0.47	0.26	0.56	0.57		0.73	0.51
Uniform Delay, d1	20.8	20.0	22.8	12.8		20.6	9.8
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.3	0.2	1.8	1.1		6.2	1.1
Delay (s)	21.1	20.2	24.6	14.0		26.8	10.8
Level of Service	C	C	C	B		C	B
Approach Delay (s)	20.6			15.1			14.7
Approach LOS	C			B			B

Intersection Summary

HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	11.1
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Existing PM
5: Shaw Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	257	1389	48	256	1575	157	127	505	65	275	518	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.4		3.1	4.0	4.0	3.1	4.0		3.1	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5055		1770	5085	1534	1770	4977		3433	3539	1527
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5055		1770	5085	1534	1770	4977		3433	3539	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	279	1510	52	272	1676	167	138	549	71	306	576	171
RTOR Reduction (vph)	0	4	0	0	0	65	0	18	0	0	0	92
Lane Group Flow (vph)	279	1558	0	272	1676	102	138	602	0	306	576	79
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						4
Actuated Green, G (s)	14.3	30.8		14.3	30.8	30.8	7.1	18.1		8.1	19.1	19.1
Effective Green, g (s)	15.2	31.3		15.2	31.7	31.7	8.0	19.0		9.0	20.0	20.0
Actuated g/C Ratio	0.17	0.35		0.17	0.36	0.36	0.09	0.21		0.10	0.22	0.22
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0	2.5	5.4		2.5	3.0	3.0
Lane Grp Cap (vph)	302	1776		302	1809	546	159	1061		347	794	343
v/s Ratio Prot	c0.16	0.31		0.15	c0.33		0.08	0.12		c0.09	c0.16	
v/s Ratio Perm						0.07						0.05
v/c Ratio	0.92	0.88		0.90	0.93	0.19	0.87	0.57		0.88	0.73	0.23
Uniform Delay, d1	36.4	27.1		36.2	27.6	19.8	40.0	31.4		39.5	32.0	28.3
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	32.4	5.2		27.9	8.7	0.2	35.7	1.3		22.0	3.3	0.3
Delay (s)	68.8	32.3		64.1	36.2	20.0	75.7	32.6		61.5	35.3	28.6
Level of Service	E	C		E	D	B	E	C		E	D	C
Approach Delay (s)		37.9			38.5			40.5			41.8	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	39.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	89.1	Sum of lost time (s)	10.2
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing PM
6: Gettysburg Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	62	18	39	114	35	41	530	16	44	678	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.1	4.1		4.1	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1744	1772		1761	1784		1727	3452		1757	3522	
Flt Permitted	0.64	1.00		0.69	1.00		0.33	1.00		0.43	1.00	
Satd. Flow (perm)	1180	1772		1274	1784		594	3452		791	3522	
Peak-hour factor, PHF	0.74	0.74	0.74	0.82	0.82	0.82	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	24	84	24	48	139	43	45	576	17	52	798	21
RTOR Reduction (vph)	0	19	0	0	24	0	0	3	0	0	2	0
Lane Group Flow (vph)	24	89	0	48	158	0	45	590	0	52	817	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	8.4	8.4		8.4	8.4		25.4	25.4		25.4	25.4	
Effective Green, g (s)	8.6	8.6		8.6	8.6		26.3	26.3		26.3	26.3	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.61	0.61		0.61	0.61	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	234	352		253	354		361	2097		480	2139	
v/s Ratio Prot		0.05			c0.09			0.17			c0.23	
v/s Ratio Perm	0.02			0.04			0.08			0.07		
v/c Ratio	0.10	0.25		0.19	0.45		0.12	0.28		0.11	0.38	
Uniform Delay, d1	14.2	14.6		14.4	15.3		3.6	4.0		3.6	4.3	
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		0.3	0.7		0.1	0.0		0.0	0.0	
Delay (s)	14.3	14.9		14.7	15.9		3.7	4.1		3.6	4.4	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		14.8			15.7			4.0			4.3	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	43.3	Sum of lost time (s)	8.4
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Existing PM
7: Barstow Avenue & Thorne Avenue

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	396	11	22	608	5	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.75	0.75
Hourly flow rate (vph)	450	12	25	691	7	47
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				1311		
pX, platoon unblocked					0.78	
vC, conflicting volume			472		1217	476
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			472		1138	476
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		96	92
cM capacity (veh/h)			1065		167	579

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	462	25	691	53
Volume Left	0	25	0	7
Volume Right	12	0	0	47
cSH	1700	1065	1700	443
Volume to Capacity	0.27	0.02	0.41	0.12
Queue Length 95th (ft)	0	2	0	10
Control Delay (s)	0.0	8.5	0.0	14.2
Lane LOS		A		B
Approach Delay (s)	0.0	0.3		14.2
Approach LOS				B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		

Existing PM
8: San Ramon Avenue & Thorne Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	9	1	6	28	2	2	22	4	2	8	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.36	0.36	0.36	0.75	0.75	0.75	0.54	0.54	0.54	0.55	0.55	0.55
Hourly flow rate (vph)	17	25	3	8	37	3	4	41	7	4	15	2
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	116	98	35	110	95	64	26			58		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	116	98	35	110	95	64	26			58		
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	97	100	99	95	100	100			100		
cM capacity (veh/h)	796	771	1014	817	778	983	1574			1533		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	44	48	52	20
Volume Left	17	8	4	4
Volume Right	3	3	7	2
cSH	792	793	1574	1533
Volume to Capacity	0.06	0.06	0.00	0.00
Queue Length 95th (ft)	4	5	0	0
Control Delay (s)	9.8	9.8	0.5	1.4
Lane LOS	A	A	A	A
Approach Delay (s)	9.8	9.8	0.5	1.4
Approach LOS	A	A		

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	19.0%	ICU Level of Service	A
Analysis Period (min)	15		

Existing PM
9: Shaw Avenue & Fruit Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	1380	32	78	1564	28	59	201	69	75	186	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.0		3.1	4.0	3.1	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5063		1770	5085	1495	1759	3378		1761	1863	1537
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.52	1.00		0.48	1.00	1.00
Satd. Flow (perm)	1770	5063		1770	5085	1495	963	3378		899	1863	1537
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.72	0.72	0.72	0.81	0.81	0.81
Adj. Flow (vph)	74	1516	35	86	1719	31	82	279	96	93	230	91
RTOR Reduction (vph)	0	3	0	0	0	12	0	59	0	0	0	69
Lane Group Flow (vph)	74	1548	0	86	1719	19	82	316	0	93	230	22
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot		custom	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						1	8			4		4
Actuated Green, G (s)	2.4	23.4		5.5	26.0	5.5	12.8	12.8		12.8	12.8	12.8
Effective Green, g (s)	3.3	24.3		6.4	26.9	6.4	13.7	13.7		13.7	13.7	13.7
Actuated g/C Ratio	0.06	0.44		0.12	0.48	0.12	0.25	0.25		0.25	0.25	0.25
Clearance Time (s)	4.5	4.9		4.0	4.9	4.0	4.9	4.9		4.9	4.9	4.9
Vehicle Extension (s)	3.0	3.0		2.5	3.0	2.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	105	2217		204	2465	172	238	834		222	460	379
v/s Ratio Prot	c0.04	0.31		0.05	c0.34			0.09			c0.12	
v/s Ratio Perm						0.01	0.09			0.10		0.01
v/c Ratio	0.70	0.70		0.42	0.70	0.11	0.34	0.38		0.42	0.50	0.06
Uniform Delay, d1	25.6	12.6		22.8	11.1	22.0	17.2	17.4		17.6	18.0	16.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	19.3	1.0		1.0	0.9	0.2	0.9	0.3		1.3	0.9	0.1
Delay (s)	44.9	13.6		23.9	12.0	22.2	18.1	17.7		18.8	18.8	16.0
Level of Service	D	B		C	B	C	B	B		B	B	B
Approach Delay (s)		15.0			12.7			17.7			18.2	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	55.5	Sum of lost time (s)	11.6
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing PM
10: Shaw Avenue & Maroa Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	162	1487	74	57	1771	109	120	201	21	72	242	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.0		3.1	4.0		3.9	3.9		3.9	3.9	3.9
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5039		1770	5033		1758	3479		1755	1863	1531
Flt Permitted	0.95	1.00		0.95	1.00		0.38	1.00		0.58	1.00	1.00
Satd. Flow (perm)	1770	5039		1770	5033		698	3479		1075	1863	1531
Peak-hour factor, PHF	0.90	0.90	0.90	0.88	0.88	0.88	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	180	1652	82	65	2012	124	133	223	23	80	269	94
RTOR Reduction (vph)	0	6	0	0	8	0	0	11	0	0	0	73
Lane Group Flow (vph)	180	1728	0	65	2128	0	133	235	0	80	269	21
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	8.0	40.2		3.4	35.6		15.9	15.9		15.9	15.9	15.9
Effective Green, g (s)	8.9	41.1		4.3	36.5		16.5	16.5		16.5	16.5	16.5
Actuated g/C Ratio	0.12	0.56		0.06	0.50		0.23	0.23		0.23	0.23	0.23
Clearance Time (s)	4.0	4.9		4.0	4.9		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	216	2841		104	2520		158	787		243	422	347
v/s Ratio Prot	c0.10	0.34		0.04	c0.42			0.07			0.14	
v/s Ratio Perm							c0.19			0.07		0.01
v/c Ratio	0.83	0.61		0.62	0.84		0.84	0.30		0.33	0.64	0.06
Uniform Delay, d1	31.3	10.6		33.5	15.7		27.0	23.4		23.6	25.5	22.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.8	0.4		9.7	2.8		31.3	0.2		0.8	3.1	0.1
Delay (s)	54.1	10.9		43.2	18.5		58.3	23.6		24.4	28.6	22.2
Level of Service	D	B		D	B		E	C		C	C	C
Approach Delay (s)		15.0			19.2			35.8			26.5	
Approach LOS		B			B			D			C	

Intersection Summary

HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	72.9	Sum of lost time (s)	11.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing PM
11: San Ramon Avenue & Colonial Avenue

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	25	9	9	6	5
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.70	0.70	0.79	0.79	0.69	0.69
Hourly flow rate (vph)	21	36	11	11	9	7
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	66	32	26			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66	32	26			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	96	99			
cM capacity (veh/h)	909	1016	1575			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	57	23	16
Volume Left	21	11	0
Volume Right	36	0	7
cSH	973	1575	1700
Volume to Capacity	0.06	0.01	0.01
Queue Length 95th (ft)	5	1	0
Control Delay (s)	8.9	3.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	3.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Existing PM
14: Ashlan Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	658	36	77	687	39	47	547	82	76	495	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1848		1770	1848		1770	3470		1770	3488	
Flt Permitted	0.13	1.00		0.18	1.00		0.23	1.00		0.30	1.00	
Satd. Flow (perm)	247	1848		327	1848		431	3470		563	3488	
Peak-hour factor, PHF	0.91	0.91	0.91	0.87	0.87	0.87	0.95	0.95	0.95	0.71	0.71	0.71
Adj. Flow (vph)	35	723	40	89	790	45	49	576	86	107	697	75
RTOR Reduction (vph)	0	3	0	0	3	0	0	19	0	0	14	0
Lane Group Flow (vph)	35	760	0	89	832	0	49	643	0	107	758	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	30.2	30.2		30.2	30.2		18.5	18.5		18.5	18.5	
Effective Green, g (s)	30.2	30.2		30.2	30.2		18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.52	0.52		0.52	0.52		0.32	0.32		0.32	0.32	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	128	959		170	959		137	1103		179	1109	
v/s Ratio Prot		0.41			c0.45			0.19			c0.22	
v/s Ratio Perm	0.14			0.27			0.11			0.19		
v/c Ratio	0.27	0.79		0.52	0.87		0.36	0.58		0.60	0.68	
Uniform Delay, d1	7.8	11.4		9.2	12.2		15.3	16.6		16.7	17.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	4.4		2.2	8.3		7.1	2.3		13.9	3.4	
Delay (s)	8.7	15.8		11.5	20.5		22.4	18.9		30.6	20.7	
Level of Service	A	B		B	C		C	B		C	C	
Approach Delay (s)		15.5			19.6			19.1			21.9	
Approach LOS		B			B			B			C	

Intersection Summary

HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	9.5
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing PM
15: Van Ness Avenue & Palm Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	35	662	5	0	822
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.55	0.55	0.97	0.97	0.90	0.90
Hourly flow rate (vph)	0	64	682	5	0	913
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						186
pX, platoon unblocked	0.85					
vC, conflicting volume	1142	344			688	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	816	344			688	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	90			100	
cM capacity (veh/h)	268	652			902	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	64	455	233	457	457
Volume Left	0	0	0	0	0
Volume Right	64	0	5	0	0
cSH	652	1700	1700	1700	1700
Volume to Capacity	0.10	0.27	0.14	0.27	0.27
Queue Length 95th (ft)	8	0	0	0	0
Control Delay (s)	11.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.1	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

Existing PM
16: Browning Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	14	29	15	24	28	56	1090	22	18	895	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1712		1770	3529		1770	3510	
Flt Permitted	0.85	1.00	1.00	0.85	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1585	1863	1583	1585	1712		1770	3529		1770	3510	
Peak-hour factor, PHF	0.87	0.87	0.87	0.70	0.70	0.70	0.89	0.89	0.89	0.94	0.94	0.94
Adj. Flow (vph)	32	16	33	21	34	40	63	1225	25	19	952	55
RTOR Reduction (vph)	0	0	30	0	36	0	0	1	0	0	5	0
Lane Group Flow (vph)	32	16	3	21	38	0	63	1249	0	19	1002	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	4.7	4.7	4.7	4.7	4.7		2.3	29.4		0.6	25.8	
Effective Green, g (s)	4.7	4.7	4.7	4.7	4.7		2.3	29.4		0.6	25.8	
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.05	0.64		0.01	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	161	190	161	161	174		88	2246		23	1960	
v/s Ratio Prot		0.01			c0.02		c0.04	c0.35		0.01	0.29	
v/s Ratio Perm	0.02		0.00	0.01								
v/c Ratio	0.20	0.08	0.02	0.13	0.22		0.72	0.56		0.83	0.51	
Uniform Delay, d1	19.0	18.8	18.7	18.9	19.1		21.6	4.7		22.7	6.3	
Progression Factor	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	0.0	0.3	0.5		20.4	0.5		106.5	0.5	
Delay (s)	19.5	18.9	18.7	19.2	19.5		42.1	5.2		129.2	6.8	
Level of Service	B	B	B	B	B		D	A		F	A	
Approach Delay (s)		19.1			19.4			7.0			9.0	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	8.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	46.2	Sum of lost time (s)	8.5
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E

SIGNAL WARRANT ANALYSIS

MUTCD Traffic Signal Warrant 3 - Peak Hour (Part B)

Existing Conditions Scenario		Entering Lanes		Speed Limit		Entering Volume[1]		Warrant Met?
		Major Street	Minor Street	Major Street	Minor Street	Major Street	Minor Street	
Palm Ave @ San Ramon Ave	AM	2	1	40	25	1557	76	No
	PM	2	1	40	25	2217	22	No
Thorne Ave @ Barstow Ave	AM	1	1	35	25	1068	55	No
	PM	1	1	35	25	1037	40	No
Thorne Ave @ San Ramon	AM	1	1	25	25	80	28	No
	PM	1	1	25	25	52	28	No
Colonial Ave @ San Ramon Ave	AM	1	1	25	25	28	14	No
	PM	1	1	25	25	40	18	No
Palm Ave @ Van Ness Ave	AM	2	1	40	25	1191	42	No
	PM	2	1	40	25	1489	35	No

[1] Both approaches on Major Street, Highest approach on Minor Street

Existing Plus Project Conditions Scenario		Entering Lanes		Speed Limit		Entering Volume[1]		Warrant Met?
		Major Street	Minor Street	Major Street	Minor Street	Major Street	Minor Street	
Palm Ave @ San Ramon Ave	AM	2	1	40	25	1626	77	No
	PM	2	1	40	25	2288	22	No
Thorne Ave @ Barstow Ave	AM	1	1	35	25	1080	55	No
	PM	1	1	35	25	1052	40	No
Thorne Ave @ San Ramon	AM	1	1	25	25	80	29	No
	PM	1	1	25	25	52	28	No
Colonial Ave @ San Ramon Ave	AM	1	1	25	25	29	14	No
	PM	1	1	25	25	40	18	No
Palm Ave @ Van Ness Ave	AM	2	1	40	25	1227	42	No
	PM	2	1	40	25	1527	35	No

[1] Both approaches on Major Street, Highest approach on Minor Street

2030 No Project Conditions Scenario		Entering Lanes		Speed Limit		Entering Volume[1]		Warrant Met?
		Major Street	Minor Street	Major Street	Minor Street	Major Street	Minor Street	
Palm Ave @ San Ramon Ave	AM	2	1	40	25	1819	91	No
	PM	2	1	40	25	2634	26	No
Thorne Ave @ San Ramon	AM	1	1	25	25	96	32	No
	PM	1	1	25	25	62	32	No
Colonial Ave @ San Ramon Ave	AM	1	1	25	25	33	17	No
	PM	1	1	25	25	48	21	No
Palm Ave @ Van Ness Ave	AM	2	1	40	25	1742	42	No
	PM	2	1	40	25	2084	35	No

[1] Both approaches on Major Street, Highest approach on Minor Street

2030 Project Conditions Scenario		Entering Lanes		Speed Limit		Entering Volume[1]		Warrant Met?
		Major Street	Minor Street	Major Street	Minor Street	Major Street	Minor Street	
Palm Ave @ San Ramon Ave	AM	2	1	40	25	1883	92	No
	PM	2	1	40	25	3091	26	No
Thorne Ave @ San Ramon	AM	1	1	25	25	96	33	No
	PM	1	1	25	25	67	35	No
Colonial Ave @ San Ramon Ave	AM	1	1	25	25	34	17	No
	PM	1	1	25	25	48	21	No
Palm Ave @ Van Ness Ave	AM	2	1	40	25	1786	42	No
	PM	2	1	40	25	2232	35	No

[1] Both approaches on Major Street, Highest approach on Minor Street

APPENDIX F

ACCIDENT ANALYSIS

APPENDIX F –ACCIDENT ANALYSIS

A review was made of the accident data from the three-year time period of 2007-2009 for the study intersections. Accident data was provided by the City of Fresno and Fresno County for the intersections within their jurisdictions. The actual accident rates were computed based on the accident data provided and the traffic counts taken for this report. The actual accident rates were then compared to basic average accident rates developed by Caltrans for state facilities.[22] Table F-1 shows the results of this comparison.

TABLE F-1:
COMPARISON OF ACTUAL TO BASIC AVERAGE ACCIDENT RATES

Location	Fatal Accident Rates[1] (Actual / Average)	Injury Accident Rates[1] (Actual / Average)	PDO Accident Rates[1] (Actual / Average)	Total Accident Rates[1] (Actual / Average)
Bullard Ave at Palm Ave	0.000 / 0.002	0.11 / 0.19	0.24 / 0.24	0.35 / 0.43
Browning Ave at Palm Ave	0.000 / 0.002	0.00 / 0.19	0.14 / 0.24	.014 / 0.43
Barstow Ave at Palm Ave	0.000 / 0.002	0.13 / 0.19	0.13 / 0.24	0.26 / 0.43
San Ramon Ave at Palm Ave	0.000 / 0.002	0.00 / 0.09	0.00 / 0.13	0.00 / 0.22
San Jose Ave at Palm Ave	0.000 / 0.002	0.08 / 0.19	0.04 / 0.24	0.13 / 0.43
Shaw Ave at Palm Ave	0.000 / 0.002	0.05 / 0.19	0.09 / 0.24	0.14 / 0.43
Van Ness Boulevard at Palm Ave	0.000 / 0.001	0.05 / 0.06	0.00 / 0.08	0.05 / 0.14
Gettysburg Ave at Palm Ave	0.000 / 0.002	0.07 / 0.19	0.07 / 0.24	0.13 / 0.43
Ashlan Ave at Palm Ave	0.000 / 0.002	**0.36** / 0.19	**0.53** / 0.24	**0.89** / 0.43
Barstow Ave at Thorne Ave	0.000 / 0.001	0.00 / 0.06	**0.25** / 0.08	**0.25** / 0.14
San Ramon Ave at Thorne Ave	0.000 / 0.002	0.00 / 0.09	0.00 / 0.13	0.00 / 0.22
Shaw Ave at Fruit Ave	0.000 / 0.002	0.14 / 0.19	0.08 / 0.24	0.21 / 0.43
Shaw Ave at Maroa Ave	0.000 / 0.002	0.19 / 0.19	0.14 / 0.24	0.33 / 0.43
San Ramon Ave at Colonial Ave	0.000 / 0.001	0.00 / 0.04	0.00 / 0.06	0.00 / 0.10

[1] *Accident rates for intersections are accidents per million vehicles entering the intersection*
PDO = property damage only

Intersections with actual accident rates above the average rates are shown bolded in Table 4-4. As seen in Table 4-4, the Ashlan Avenue at Palm Avenue and Barstow Avenue at Thorne Avenue intersections are operating above the basic average accident rate. It should also be noted that no fatal accidents occurred at any of the study intersections during the analyzed time periods.

[22] *Caltrans 2001 Accident Data on California State Highways*, Basic Average Accident Rate Table for Intersections, 8/15/00

APPENDIX G

EXISTING PLUS THE PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Existing Plus Project AM
1: Bullard Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	144	657	127	145	406	95	133	531	100	71	535	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.97		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)	1770	3437		1719	3322		1770	3439		1770	3539	1534
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3437		1719	3322		1770	3439		1770	3539	1534
Peak-hour factor, PHF	0.94	0.94	0.94	0.90	0.90	0.90	0.76	0.76	0.76	0.81	0.81	0.81
Adj. Flow (vph)	153	699	135	161	451	106	175	699	132	88	660	44
RTOR Reduction (vph)	0	18	0	0	22	0	0	17	0	0	0	20
Lane Group Flow (vph)	153	816	0	161	535	0	175	814	0	88	660	24
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	9.5	25.6		9.7	25.8		9.9	28.2		5.4	23.7	23.7
Effective Green, g (s)	9.5	25.6		9.7	25.8		9.9	28.2		5.4	23.7	23.7
Actuated g/C Ratio	0.11	0.30		0.11	0.30		0.11	0.33		0.06	0.27	0.27
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	4.5		2.0	4.5	4.5
Lane Grp Cap (vph)	194	1015		192	989		202	1119		110	967	419
v/s Ratio Prot	0.09	c0.24		c0.09	0.16		c0.10	c0.24		0.05	0.19	
v/s Ratio Perm												0.02
v/c Ratio	0.79	0.80		0.84	0.54		0.87	0.73		0.80	0.68	0.06
Uniform Delay, d1	37.6	28.2		37.7	25.5		37.7	25.9		40.1	28.1	23.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	17.5	5.2		25.1	0.9		29.1	2.7		31.1	2.3	0.1
Delay (s)	55.2	33.5		62.8	26.4		66.9	28.6		71.2	30.5	23.3
Level of Service	E	C		E	C		E	C		E	C	C
Approach Delay (s)		36.8			34.6			35.2			34.6	
Approach LOS		D			C			D			C	

Intersection Summary

HCM Average Control Delay	35.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	12.9
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project AM
2: Barstow Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	297	117	82	264	92	52	556	95	113	733	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.9	3.9	3.9	3.9	3.9	3.9	3.1	4.4		3.1	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1760	1863	1538	1762	1863	1538	1703	3310		1770	3410	
Flt Permitted	0.38	1.00	1.00	0.30	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	708	1863	1538	551	1863	1538	1703	3310		1770	3410	
Peak-hour factor, PHF	0.75	0.75	0.75	0.79	0.79	0.79	0.71	0.71	0.71	0.70	0.70	0.70
Adj. Flow (vph)	75	396	156	104	334	116	73	783	134	161	1047	249
RTOR Reduction (vph)	0	0	108	0	0	78	0	21	0	0	30	0
Lane Group Flow (vph)	75	396	48	104	334	38	73	896	0	161	1266	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Turn Type	Perm		Perm	Perm		Perm	Prot			Prot		
Protected Phases		4			4		1	6		5	2	
Permitted Phases	4		4	4		4						
Actuated Green, G (s)	20.0	20.0	20.0	20.0	20.0	20.0	3.0	26.1		6.9	30.0	
Effective Green, g (s)	20.6	20.6	20.6	20.6	20.6	20.6	3.9	26.6		7.8	30.5	
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.31	0.31	0.06	0.40		0.12	0.46	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.9		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	220	578	477	171	578	477	100	1326		208	1566	
v/s Ratio Prot		c0.21			0.18		0.04	0.27		c0.09	c0.37	
v/s Ratio Perm	0.11		0.03	0.19		0.02						
v/c Ratio	0.34	0.69	0.10	0.61	0.58	0.08	0.73	0.68		0.77	0.81	
Uniform Delay, d1	17.7	20.1	16.3	19.5	19.2	16.2	30.7	16.4		28.4	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	0.7	3.1	0.1	5.1	1.2	0.1	20.8	1.8		15.0	3.6	
Delay (s)	18.3	23.1	16.4	24.6	20.4	16.2	51.5	18.2		43.4	19.1	
Level of Service	B	C	B	C	C	B	D	B		D	B	
Approach Delay (s)		20.9			20.3			20.6			21.8	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	66.4	Sum of lost time (s)	7.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project AM
3: San Ramon Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	2	63	7	3	6	20	666	8	9	886	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.66	0.66	0.66	0.56	0.56	0.56	0.70	0.70	0.70	0.70	0.70	0.70
Hourly flow rate (vph)	18	3	95	12	5	11	29	951	11	13	1266	53
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								679			640	
pX, platoon unblocked	0.80	0.80	0.72	0.80	0.80	0.83	0.72			0.83		
vC, conflicting volume	1884	2358	679	1790	2379	501	1329			973		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	631	1221	0	514	1247	0	665			543		
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.3			2.2		
p0 queue free %	93	98	87	95	96	99	95			98		
cM capacity (veh/h)	260	132	763	277	123	867	621			836		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	117	29	29	634	329	13	844	475
Volume Left	18	12	29	0	0	13	0	0
Volume Right	95	11	0	0	11	0	0	53
cSH	535	282	621	1700	1700	836	1700	1700
Volume to Capacity	0.22	0.10	0.05	0.37	0.19	0.02	0.50	0.28
Queue Length 95th (ft)	21	8	4	0	0	1	0	0
Control Delay (s)	13.6	19.2	11.1	0.0	0.0	9.4	0.0	0.0
Lane LOS	B	C	B			A		
Approach Delay (s)	13.6	19.2	0.3			0.1		
Approach LOS	B	C						

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	40.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Existing Plus Project AM
4: San Jose Avenue & Palm Avenue

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (vph)	32	33	31	715	132	317	639
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0		3.1	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	0.98		1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2757	1221	1747	4886		1752	3505
Flt Permitted	0.95	1.00	0.37	1.00		0.95	1.00
Satd. Flow (perm)	2757	1221	686	4886		1752	3505
Peak-hour factor, PHF	0.45	0.45	0.79	0.79	0.79	0.87	0.87
Adj. Flow (vph)	71	73	39	905	167	364	734
RTOR Reduction (vph)	0	65	0	32	0	0	0
Lane Group Flow (vph)	71	8	39	1040	0	364	734
Confl. Peds. (#/hr)	10	10	10		10	10	
Confl. Bikes (#/hr)	10	10	10	10	10	10	10
Heavy Vehicles (%)	27%	27%	3%	3%	3%	3%	3%
Turn Type		Perm	Perm			Prot	
Protected Phases	4			6		5	2
Permitted Phases		4	6				
Actuated Green, G (s)	6.7	6.7	24.0	24.0		15.0	43.0
Effective Green, g (s)	6.7	6.7	24.9	24.9		15.9	43.9
Actuated g/C Ratio	0.11	0.11	0.42	0.42		0.27	0.75
Clearance Time (s)	4.0	4.0	4.9	4.9		4.0	4.9
Vehicle Extension (s)	2.0	2.0	4.0	4.0		2.0	4.0
Lane Grp Cap (vph)	315	140	291	2076		475	2626
v/s Ratio Prot	c0.03			c0.21		c0.21	0.21
v/s Ratio Perm		0.01	0.06				
v/c Ratio	0.23	0.06	0.13	0.50		0.77	0.28
Uniform Delay, d1	23.6	23.1	10.3	12.3		19.6	2.3
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.1	1.0	0.9		6.6	0.3
Delay (s)	23.7	23.2	11.2	13.2		26.2	2.6
Level of Service	C	C	B	B		C	A
Approach Delay (s)	23.5			13.1			10.4
Approach LOS	C			B			B

Intersection Summary

HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	11.1
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project AM
5: Shaw Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	263	1358	53	190	1086	164	101	536	56	238	326	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.4		3.1	4.0	4.0	3.1	4.0		3.1	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5051		1770	5085	1532	1770	4996		3433	3539	1528
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5051		1770	5085	1532	1770	4996		3433	3539	1528
Peak-hour factor, PHF	0.85	0.85	0.85	0.88	0.88	0.88	0.78	0.78	0.78	0.63	0.63	0.63
Adj. Flow (vph)	309	1598	62	216	1234	186	129	687	72	378	517	176
RTOR Reduction (vph)	0	5	0	0	0	99	0	14	0	0	0	103
Lane Group Flow (vph)	309	1655	0	216	1234	87	129	745	0	378	517	73
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						4
Actuated Green, G (s)	16.0	31.6		11.6	27.2	27.2	8.4	18.9		10.0	20.5	20.5
Effective Green, g (s)	16.9	32.1		12.5	28.1	28.1	9.3	19.8		10.9	21.4	21.4
Actuated g/C Ratio	0.19	0.36		0.14	0.31	0.31	0.10	0.22		0.12	0.24	0.24
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0	2.5	5.4		2.5	3.0	3.0
Lane Grp Cap (vph)	333	1804		246	1589	479	183	1100		416	842	364
v/s Ratio Prot	c0.17	c0.33		0.12	0.24		0.07	c0.15		c0.11	0.15	
v/s Ratio Perm						0.06						0.05
v/c Ratio	0.93	0.92		0.88	0.78	0.18	0.70	0.68		0.91	0.61	0.20
Uniform Delay, d1	35.9	27.6		38.0	28.1	22.5	39.0	32.1		39.0	30.6	27.4
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	31.0	7.9		27.6	2.5	0.2	10.9	2.3		23.1	1.3	0.3
Delay (s)	66.9	35.5		65.5	30.5	22.7	49.8	34.5		62.1	31.9	27.7
Level of Service	E	D		E	C	C	D	C		E	C	C
Approach Delay (s)		40.4			34.2			36.7			41.9	
Approach LOS		D			C			D			D	

Intersection Summary

HCM Average Control Delay	38.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	89.9	Sum of lost time (s)	10.2
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project AM
6: Gettysburg Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	93	71	17	86	33	25	621	21	24	388	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.1	4.1		4.1	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.94		1.00	0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1744	1704		1762	1771		1723	3449		1760	3499	
Flt Permitted	0.66	1.00		0.62	1.00		0.43	1.00		0.33	1.00	
Satd. Flow (perm)	1203	1704		1141	1771		773	3449		607	3499	
Peak-hour factor, PHF	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.69	0.69	0.69
Adj. Flow (vph)	56	119	91	23	116	45	31	776	26	35	562	35
RTOR Reduction (vph)	0	57	0	0	29	0	0	3	0	0	6	0
Lane Group Flow (vph)	56	153	0	23	132	0	31	799	0	35	591	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	9.8	9.8		9.8	9.8		24.6	24.6		24.6	24.6	
Effective Green, g (s)	10.0	10.0		10.0	10.0		25.5	25.5		25.5	25.5	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.58	0.58		0.58	0.58	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	274	388		260	403		449	2003		353	2032	
v/s Ratio Prot		c0.09			0.07			c0.23			0.17	
v/s Ratio Perm	0.05			0.02			0.04			0.06		
v/c Ratio	0.20	0.39		0.09	0.33		0.07	0.40		0.10	0.29	
Uniform Delay, d1	13.7	14.4		13.4	14.1		4.0	5.0		4.1	4.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.5		0.1	0.3		0.0	0.0		0.0	0.0	
Delay (s)	14.0	14.9		13.5	14.5		4.0	5.1		4.1	4.7	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		14.7			14.4			5.0			4.6	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	7.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	43.9	Sum of lost time (s)	8.4
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project AM
7: Barstow Avenue & Thorne Avenue

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	485	10	44	541	19	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.76	0.76	0.60	0.60	0.92	0.92
Hourly flow rate (vph)	638	13	73	902	21	39
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				1311		
pX, platoon unblocked					0.95	
vC, conflicting volume			661		1713	665
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			661		1724	665
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		75	91
cM capacity (veh/h)			905		84	453

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	651	73	902	60
Volume Left	0	73	0	21
Volume Right	13	0	0	39
cSH	1700	905	1700	180
Volume to Capacity	0.38	0.08	0.53	0.33
Queue Length 95th (ft)	0	7	0	34
Control Delay (s)	0.0	9.3	0.0	34.6
Lane LOS		A		D
Approach Delay (s)	0.0	0.7		34.6
Approach LOS				D

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Project AM
8: San Ramon Avenue & Thorne Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	23	3	7	11	6	0	21	4	35	18	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.70	0.70	0.70	0.50	0.50	0.50	0.63	0.63	0.63	0.53	0.53	0.53
Hourly flow rate (vph)	4	33	4	14	22	12	0	33	6	66	34	4
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	247	228	56	245	226	57	48			50		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	247	228	56	245	226	57	48			50		
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	95	100	98	97	99	100			96		
cM capacity (veh/h)	634	629	988	637	633	993	1547			1544		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	41	48	40	104
Volume Left	4	14	0	66
Volume Right	4	12	6	4
cSH	654	698	1547	1544
Volume to Capacity	0.06	0.07	0.00	0.04
Queue Length 95th (ft)	5	6	0	3
Control Delay (s)	10.9	10.5	0.0	4.9
Lane LOS	B	B		A
Approach Delay (s)	10.9	10.5	0.0	4.9
Approach LOS	B	B		

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	23.6%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Project AM
9: Shaw Avenue & Fruit Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	1545	31	36	1228	35	49	192	63	65	130	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.0		3.1	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5066		1770	5085	1545	1757	3382		1760	1863	1535
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.63	1.00		0.51	1.00	1.00
Satd. Flow (perm)	1770	5066		1770	5085	1545	1167	3382		948	1863	1535
Peak-hour factor, PHF	0.80	0.80	0.80	0.83	0.83	0.83	0.77	0.77	0.77	0.81	0.81	0.81
Adj. Flow (vph)	122	1931	39	43	1480	42	64	249	82	80	160	165
RTOR Reduction (vph)	0	2	0	0	0	14	0	51	0	0	0	130
Lane Group Flow (vph)	122	1968	0	43	1480	28	64	280	0	80	160	35
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	5.1	30.3		2.6	27.3	27.3	11.6	11.6		11.6	11.6	11.6
Effective Green, g (s)	6.0	31.2		3.5	28.2	28.2	12.5	12.5		12.5	12.5	12.5
Actuated g/C Ratio	0.10	0.54		0.06	0.48	0.48	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	4.5	4.9		4.0	4.9	4.9	4.9	4.9		4.9	4.9	4.9
Vehicle Extension (s)	3.0	3.0		2.5	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	182	2711		106	2460	747	250	725		203	399	329
v/s Ratio Prot	c0.07	c0.39		0.02	0.29			0.08			c0.09	
v/s Ratio Perm						0.02	0.05			0.08		0.02
v/c Ratio	0.67	0.73		0.41	0.60	0.04	0.26	0.39		0.39	0.40	0.11
Uniform Delay, d1	25.2	10.3		26.4	11.0	7.9	19.0	19.6		19.7	19.7	18.4
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	9.3	1.0		1.8	0.4	0.0	0.5	0.3		1.3	0.7	0.1
Delay (s)	34.5	11.3		28.2	11.4	7.9	19.6	20.0		20.9	20.3	18.6
Level of Service	C	B		C	B	A	B	B		C	C	B
Approach Delay (s)		12.6			11.7			19.9			19.7	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	11.6
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project AM
10: Shaw Avenue & Maroa Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	1467	14	14	1269	47	79	179	34	103	136	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.0		3.1	4.0		3.9	3.9		3.9	3.9	3.9
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00		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)	1770	5076		1770	5053		1757	3438		1760	1863	1536
Flt Permitted	0.95	1.00		0.95	1.00		0.64	1.00		0.50	1.00	1.00
Satd. Flow (perm)	1770	5076		1770	5053		1189	3438		928	1863	1536
Peak-hour factor, PHF	0.83	0.83	0.83	0.91	0.91	0.91	0.60	0.60	0.60	0.84	0.84	0.84
Adj. Flow (vph)	136	1767	17	15	1395	52	132	298	57	123	162	187
RTOR Reduction (vph)	0	1	0	0	6	0	0	30	0	0	0	142
Lane Group Flow (vph)	136	1783	0	15	1441	0	132	325	0	123	162	45
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	5.1	28.1		0.9	23.9		12.5	12.5		12.5	12.5	12.5
Effective Green, g (s)	6.0	29.0		1.8	24.8		13.1	13.1		13.1	13.1	13.1
Actuated g/C Ratio	0.11	0.53		0.03	0.45		0.24	0.24		0.24	0.24	0.24
Clearance Time (s)	4.0	4.9		4.0	4.9		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	193	2681		58	2283		284	820		221	445	367
v/s Ratio Prot	c0.08	c0.35		0.01	0.29			0.09			0.09	
v/s Ratio Perm							0.11			c0.13		0.03
v/c Ratio	0.70	0.66		0.26	0.63		0.46	0.40		0.56	0.36	0.12
Uniform Delay, d1	23.6	9.4		25.9	11.5		17.9	17.6		18.3	17.4	16.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.3	0.6		1.7	0.6		1.2	0.3		3.0	0.5	0.1
Delay (s)	33.9	10.0		27.6	12.1		19.1	17.9		21.4	17.9	16.5
Level of Service	C	B		C	B		B	B		C	B	B
Approach Delay (s)		11.7			12.3			18.2			18.3	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	54.9	Sum of lost time (s)	7.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project AM
11: San Ramon Avenue & Colonial Avenue

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	9	10	3	7	9
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.69	0.69	0.70	0.70	0.75	0.75
Hourly flow rate (vph)	7	13	14	4	9	12
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	68	35	31			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	68	35	31			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	905	1012	1568			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	19	21
Volume Left	7	14	0
Volume Right	13	0	12
cSH	971	1568	1700
Volume to Capacity	0.02	0.01	0.01
Queue Length 95th (ft)	2	1	0
Control Delay (s)	8.8	5.6	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	5.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	20.2%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Project AM
14: Ashlan Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	502	20	27	333	54	21	488	74	50	332	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1852		1770	1824		1770	3470		1770	3503	
Flt Permitted	0.40	1.00		0.19	1.00		0.51	1.00		0.25	1.00	
Satd. Flow (perm)	739	1852		355	1824		943	3470		459	3503	
Peak-hour factor, PHF	0.81	0.81	0.81	0.90	0.90	0.90	0.67	0.67	0.67	0.85	0.85	0.85
Adj. Flow (vph)	68	620	25	30	370	60	31	728	110	59	391	29
RTOR Reduction (vph)	0	3	0	0	11	0	0	19	0	0	8	0
Lane Group Flow (vph)	68	642	0	30	419	0	31	819	0	59	412	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	24.2	24.2		24.2	24.2		22.2	22.2		22.2	22.2	
Effective Green, g (s)	24.2	24.2		24.2	24.2		22.2	22.2		22.2	22.2	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.40	0.40		0.40	0.40	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	320	802		154	790		375	1378		182	1391	
v/s Ratio Prot		c0.35			0.23			c0.24			0.12	
v/s Ratio Perm	0.09			0.08			0.03			0.13		
v/c Ratio	0.21	0.80		0.19	0.53		0.08	0.59		0.32	0.30	
Uniform Delay, d1	9.9	13.8		9.8	11.7		10.5	13.3		11.7	11.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	5.6		0.5	0.5		0.4	1.9		4.7	0.5	
Delay (s)	10.1	19.4		10.3	12.2		10.9	15.2		16.3	12.1	
Level of Service	B	B		B	B		B	B		B	B	
Approach Delay (s)		18.5			12.1			15.0			12.6	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	55.9	Sum of lost time (s)	9.5
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project AM
15: Van Ness Avenue & Palm Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	42	651	8	0	568
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.66	0.66	0.77	0.77	0.63	0.63
Hourly flow rate (vph)	0	64	845	10	0	902
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						186
pX, platoon unblocked	0.87					
vC, conflicting volume	1301	428			856	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1051	428			856	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			100	
cM capacity (veh/h)	194	575			780	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	64	564	292	451	451
Volume Left	0	0	0	0	0
Volume Right	64	0	10	0	0
cSH	575	1700	1700	1700	1700
Volume to Capacity	0.11	0.33	0.17	0.27	0.27
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	12.0	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	12.0	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Project AM
16: Browning Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	51	188	55	41	29	65	610	18	26	704	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1747		1770	3524		1770	3487	
Flt Permitted	0.68	1.00	1.00	0.70	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1265	1863	1583	1311	1747		1770	3524		1770	3487	
Peak-hour factor, PHF	0.62	0.62	0.62	0.58	0.58	0.58	0.72	0.72	0.72	0.76	0.76	0.76
Adj. Flow (vph)	203	82	303	95	71	50	90	847	25	34	926	101
RTOR Reduction (vph)	0	0	175	0	38	0	0	3	0	0	12	0
Lane Group Flow (vph)	203	82	128	95	83	0	90	869	0	34	1015	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	13.9	13.9	13.9	13.9	13.9		4.4	29.6		1.9	25.2	
Effective Green, g (s)	13.9	13.9	13.9	13.9	13.9		4.4	29.6		1.9	25.2	
Actuated g/C Ratio	0.24	0.24	0.24	0.24	0.24		0.08	0.52		0.03	0.44	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	309	455	387	320	427		137	1833		59	1544	
v/s Ratio Prot		0.04			0.05		c0.05	0.25		0.02	c0.29	
v/s Ratio Perm	c0.16		0.08	0.07								
v/c Ratio	0.66	0.18	0.33	0.30	0.19		0.66	0.47		0.58	0.66	
Uniform Delay, d1	19.4	17.0	17.7	17.5	17.1		25.5	8.7		27.1	12.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.1	0.4	0.4	0.2		8.4	0.4		8.2	1.4	
Delay (s)	23.8	17.1	18.1	17.9	17.2		33.9	9.1		35.3	13.8	
Level of Service	C	B	B	B	B		C	A		D	B	
Approach Delay (s)		19.9			17.5			11.4			14.5	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	13.4
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project PM
1: Bullard Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	171	544	95	111	770	68	146	789	130	88	669	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		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)	1770	3445		1719	3388		1770	3450		1770	3539	1534
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3445		1719	3388		1770	3450		1770	3539	1534
Peak-hour factor, PHF	0.90	0.90	0.90	0.97	0.97	0.97	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	190	604	106	114	794	70	159	858	141	104	787	191
RTOR Reduction (vph)	0	16	0	0	7	0	0	15	0	0	0	74
Lane Group Flow (vph)	190	694	0	114	857	0	159	984	0	104	787	117
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	10.0	28.0		8.4	26.4		9.0	28.6		6.0	25.6	25.6
Effective Green, g (s)	10.0	28.0		8.4	26.4		9.0	28.6		6.0	25.6	25.6
Actuated g/C Ratio	0.11	0.32		0.09	0.30		0.10	0.32		0.07	0.29	0.29
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	4.5		2.0	4.5	4.5
Lane Grp Cap (vph)	199	1086		163	1007		179	1111		120	1020	442
v/s Ratio Prot	c0.11	0.20		0.07	c0.25		c0.09	c0.29		0.06	0.22	
v/s Ratio Perm												0.08
v/c Ratio	0.95	0.64		0.70	0.85		0.89	0.89		0.87	0.77	0.26
Uniform Delay, d1	39.2	26.1		39.0	29.4		39.4	28.6		41.0	28.9	24.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	50.2	1.6		10.1	7.5		36.4	9.1		42.6	4.1	0.6
Delay (s)	89.3	27.6		49.1	36.9		75.8	37.7		83.6	33.0	24.9
Level of Service	F	C		D	D		E	D		F	C	C
Approach Delay (s)		40.7			38.3			42.9			36.5	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	39.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	17.8
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project PM
2: Barstow Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	334	64	95	390	149	123	996	207	101	760	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.9	3.9	3.9	3.9	3.9	3.9	3.1	4.4		3.1	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1764	1863	1536	1763	1863	1536	1703	3293		1770	3471	
Flt Permitted	0.17	1.00	1.00	0.22	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	307	1863	1536	412	1863	1536	1703	3293		1770	3471	
Peak-hour factor, PHF	0.73	0.73	0.73	0.74	0.74	0.74	0.88	0.88	0.88	0.80	0.80	0.80
Adj. Flow (vph)	49	458	88	128	527	201	140	1132	235	126	950	105
RTOR Reduction (vph)	0	0	46	0	0	73	0	24	0	0	11	0
Lane Group Flow (vph)	49	458	42	128	527	128	140	1343	0	126	1044	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Turn Type	Perm		Perm	Perm		Perm	Prot			Prot		
Protected Phases		4			4		1	6		5	2	
Permitted Phases	4		4	4		4						
Actuated Green, G (s)	23.6	23.6	23.6	23.6	23.6	23.6	8.0	32.4		5.6	30.0	
Effective Green, g (s)	24.2	24.2	24.2	24.2	24.2	24.2	8.9	32.9		6.5	30.5	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.32	0.12	0.44		0.09	0.41	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.9		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	99	601	496	133	601	496	202	1445		153	1412	
v/s Ratio Prot		0.25			0.28		0.08	c0.41		c0.07	0.30	
v/s Ratio Perm	0.16		0.03	c0.31		0.08						
v/c Ratio	0.49	0.76	0.08	0.96	0.88	0.26	0.69	0.93		0.82	0.74	
Uniform Delay, d1	20.5	22.8	17.7	25.0	24.0	18.8	31.7	20.0		33.7	18.9	
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	2.8	5.4	0.1	66.1	13.5	0.2	8.0	11.2		27.6	2.5	
Delay (s)	23.3	28.3	17.7	91.0	37.5	19.0	39.8	31.1		61.2	21.4	
Level of Service	C	C	B	F	D	B	D	C		E	C	
Approach Delay (s)		26.3			41.1			31.9			25.6	
Approach LOS		C			D			C			C	

Intersection Summary

HCM Average Control Delay	31.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project PM
3: San Ramon Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	0	11	2	1	9	75	1256	21	12	889	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.65	0.65	0.65	0.85	0.85	0.85	0.95	0.95	0.95	0.93	0.93	0.93
Hourly flow rate (vph)	17	0	17	2	1	11	79	1322	22	13	956	38
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								679			640	
pX, platoon unblocked	0.88	0.88	0.79	0.88	0.88	0.78	0.79			0.78		
vC, conflicting volume	1851	2523	517	2032	2530	692	1004			1354		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	638	1402	0	844	1411	30	484			882		
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.3			2.2		
p0 queue free %	94	100	98	99	99	99	90			98		
cM capacity (veh/h)	275	106	846	189	100	781	808			588		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	34	14	79	881	463	13	637	356
Volume Left	17	2	79	0	0	13	0	0
Volume Right	17	11	0	0	22	0	0	38
cSH	415	374	808	1700	1700	588	1700	1700
Volume to Capacity	0.08	0.04	0.10	0.52	0.27	0.02	0.37	0.21
Queue Length 95th (ft)	7	3	8	0	0	2	0	0
Control Delay (s)	14.4	15.0	9.9	0.0	0.0	11.3	0.0	0.0
Lane LOS	B	B	A			B		
Approach Delay (s)	14.4	15.0	0.6			0.1		
Approach LOS	B	B						

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

Existing Plus Project PM
4: San Jose Avenue & Palm Avenue

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (vph)	254	300	109	922	40	229	677
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.1	4.0		3.1	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91		1.00	0.95
Frpb, ped/bikes	1.00	0.97	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2757	1231	1752	4996		1752	3505
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	2757	1231	1752	4996		1752	3505
Peak-hour factor, PHF	0.75	0.75	0.81	0.81	0.81	0.78	0.78
Adj. Flow (vph)	339	400	135	1138	49	294	868
RTOR Reduction (vph)	0	277	0	7	0	0	0
Lane Group Flow (vph)	339	123	135	1180	0	294	868
Confl. Peds. (#/hr)	10	10	10		10	10	
Confl. Bikes (#/hr)	10	10	10	10	10	10	10
Heavy Vehicles (%)	27%	27%	3%	3%	3%	3%	3%
Turn Type		Perm	Prot			Prot	
Protected Phases	4		1	6		5	2
Permitted Phases		4					
Actuated Green, G (s)	12.2	12.2	6.8	22.1		11.5	26.8
Effective Green, g (s)	12.2	12.2	7.7	23.0		12.4	27.7
Actuated g/C Ratio	0.21	0.21	0.13	0.39		0.21	0.47
Clearance Time (s)	4.0	4.0	4.0	4.9		4.0	4.9
Vehicle Extension (s)	2.0	2.0	2.0	4.0		2.0	4.0
Lane Grp Cap (vph)	573	256	230	1958		370	1654
v/s Ratio Prot	c0.12		0.08	c0.24		c0.17	0.25
v/s Ratio Perm		0.10					
v/c Ratio	0.59	0.48	0.59	0.60		0.79	0.52
Uniform Delay, d1	21.0	20.5	24.0	14.2		21.9	10.9
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.1	0.5	2.5	1.4		10.5	1.2
Delay (s)	22.1	21.0	26.5	15.6		32.4	12.1
Level of Service	C	C	C	B		C	B
Approach Delay (s)	21.5			16.7			17.2
Approach LOS	C			B			B

Intersection Summary

HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	58.7	Sum of lost time (s)	11.1
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project PM
5: Shaw Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	261	1390	48	271	1579	161	127	510	67	313	542	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.4		3.1	4.0	4.0	3.1	4.0		3.1	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5055		1770	5085	1534	1770	4976		3433	3539	1528
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5055		1770	5085	1534	1770	4976		3433	3539	1528
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	284	1511	52	288	1680	171	138	554	73	348	602	189
RTOR Reduction (vph)	0	4	0	0	0	66	0	19	0	0	0	96
Lane Group Flow (vph)	284	1559	0	288	1680	105	138	608	0	348	602	93
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						4
Actuated Green, G (s)	14.0	30.0		14.2	30.2	30.2	7.1	18.1		9.0	20.0	20.0
Effective Green, g (s)	14.9	30.5		15.1	31.1	31.1	8.0	19.0		9.9	20.9	20.9
Actuated g/C Ratio	0.17	0.34		0.17	0.35	0.35	0.09	0.21		0.11	0.23	0.23
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0	2.5	5.4		2.5	3.0	3.0
Lane Grp Cap (vph)	296	1730		300	1775	535	159	1061		381	830	358
v/s Ratio Prot	0.16	0.31		c0.16	c0.33		0.08	0.12		c0.10	c0.17	
v/s Ratio Perm						0.07						0.06
v/c Ratio	0.96	0.90		0.96	0.95	0.20	0.87	0.57		0.91	0.73	0.26
Uniform Delay, d1	36.8	27.9		36.7	28.2	20.3	40.0	31.4		39.2	31.5	27.8
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	40.9	6.9		41.1	11.1	0.2	35.7	1.3		25.7	3.2	0.4
Delay (s)	77.7	34.8		77.8	39.3	20.4	75.7	32.7		64.9	34.6	28.2
Level of Service	E	C		E	D	C	E	C		E	C	C
Approach Delay (s)		41.4			43.0			40.5			42.8	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	42.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	89.1	Sum of lost time (s)	6.2
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project PM
6: Gettysburg Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	62	18	39	114	35	41	536	16	44	707	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.1	4.1		4.1	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1744	1772		1761	1784		1727	3452		1757	3522	
Flt Permitted	0.64	1.00		0.69	1.00		0.31	1.00		0.43	1.00	
Satd. Flow (perm)	1180	1772		1274	1784		568	3452		786	3522	
Peak-hour factor, PHF	0.74	0.74	0.74	0.82	0.82	0.82	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	24	84	24	48	139	43	45	583	17	52	832	21
RTOR Reduction (vph)	0	19	0	0	24	0	0	3	0	0	2	0
Lane Group Flow (vph)	24	89	0	48	158	0	45	597	0	52	851	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	8.3	8.3		8.3	8.3		25.6	25.6		25.6	25.6	
Effective Green, g (s)	8.5	8.5		8.5	8.5		26.5	26.5		26.5	26.5	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.61	0.61		0.61	0.61	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	231	347		250	349		347	2108		480	2151	
v/s Ratio Prot		0.05			c0.09			0.17			c0.24	
v/s Ratio Perm	0.02			0.04			0.08			0.07		
v/c Ratio	0.10	0.26		0.19	0.45		0.13	0.28		0.11	0.40	
Uniform Delay, d1	14.3	14.8		14.6	15.4		3.6	4.0		3.5	4.3	
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		0.3	0.7		0.1	0.0		0.0	0.0	
Delay (s)	14.5	15.1		14.9	16.1		3.6	4.0		3.6	4.4	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		14.9			15.8			4.0			4.3	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	6.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	43.4	Sum of lost time (s)	8.4
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project PM
7: Barstow Avenue & Thorne Avenue

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	399	11	22	620	5	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.75	0.75
Hourly flow rate (vph)	453	12	25	705	7	47
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				1311		
pX, platoon unblocked					0.77	
vC, conflicting volume			476		1234	480
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			476		1157	480
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		96	92
cM capacity (veh/h)			1062		161	576

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	466	25	705	53
Volume Left	0	25	0	7
Volume Right	12	0	0	47
cSH	1700	1062	1700	436
Volume to Capacity	0.27	0.02	0.41	0.12
Queue Length 95th (ft)	0	2	0	10
Control Delay (s)	0.0	8.5	0.0	14.4
Lane LOS		A		B
Approach Delay (s)	0.0	0.3		14.4
Approach LOS				B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Project PM
8: San Ramon Avenue & Thorne Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	9	1	6	28	2	2	22	4	2	8	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.36	0.36	0.36	0.75	0.75	0.75	0.54	0.54	0.54	0.55	0.55	0.55
Hourly flow rate (vph)	17	25	3	8	37	3	4	41	7	4	15	2
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	116	98	35	110	95	64	26			58		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	116	98	35	110	95	64	26			58		
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	97	100	99	95	100	100			100		
cM capacity (veh/h)	796	771	1014	817	778	983	1574			1533		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	44	48	52	20
Volume Left	17	8	4	4
Volume Right	3	3	7	2
cSH	792	793	1574	1533
Volume to Capacity	0.06	0.06	0.00	0.00
Queue Length 95th (ft)	4	5	0	0
Control Delay (s)	9.8	9.8	0.5	1.4
Lane LOS	A	A	A	A
Approach Delay (s)	9.8	9.8	0.5	1.4
Approach LOS	A	A		

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	19.0%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Project PM
9: Shaw Avenue & Fruit Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	1383	32	81	1581	28	59	201	70	75	186	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.0		3.1	4.0	3.1	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5063		1770	5085	1495	1759	3377		1761	1863	1537
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.52	1.00		0.48	1.00	1.00
Satd. Flow (perm)	1770	5063		1770	5085	1495	963	3377		897	1863	1537
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.72	0.72	0.72	0.81	0.81	0.81
Adj. Flow (vph)	74	1520	35	89	1737	31	82	279	97	93	230	91
RTOR Reduction (vph)	0	3	0	0	0	12	0	59	0	0	0	69
Lane Group Flow (vph)	74	1552	0	89	1737	19	82	317	0	93	230	22
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot		custom	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						1	8			4		4
Actuated Green, G (s)	2.1	23.4		5.5	26.3	5.5	12.8	12.8		12.8	12.8	12.8
Effective Green, g (s)	3.0	24.3		6.4	27.2	6.4	13.7	13.7		13.7	13.7	13.7
Actuated g/C Ratio	0.05	0.44		0.12	0.49	0.12	0.25	0.25		0.25	0.25	0.25
Clearance Time (s)	4.5	4.9		4.0	4.9	4.0	4.9	4.9		4.9	4.9	4.9
Vehicle Extension (s)	3.0	3.0		2.5	3.0	2.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	96	2217		204	2492	172	238	834		221	460	379
v/s Ratio Prot	c0.04	0.31		0.05	c0.34			0.09			c0.12	
v/s Ratio Perm						0.01	0.09			0.10		0.01
v/c Ratio	0.77	0.70		0.44	0.70	0.11	0.34	0.38		0.42	0.50	0.06
Uniform Delay, d1	25.9	12.6		22.9	11.0	22.0	17.2	17.4		17.6	18.0	16.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	30.9	1.0		1.1	0.9	0.2	0.9	0.3		1.3	0.9	0.1
Delay (s)	56.9	13.6		24.0	11.8	22.2	18.1	17.7		18.9	18.8	16.0
Level of Service	E	B		C	B	C	B	B		B	B	B
Approach Delay (s)		15.6			12.6			17.7			18.2	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	55.5	Sum of lost time (s)	11.6
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project PM
10: Shaw Avenue & Maroa Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	162	1532	76	57	1778	109	120	201	21	72	242	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.0		3.1	4.0		3.9	3.9		3.9	3.9	3.9
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5039		1770	5034		1758	3479		1755	1863	1531
Flt Permitted	0.95	1.00		0.95	1.00		0.38	1.00		0.58	1.00	1.00
Satd. Flow (perm)	1770	5039		1770	5034		698	3479		1075	1863	1531
Peak-hour factor, PHF	0.90	0.90	0.90	0.88	0.88	0.88	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	180	1702	84	65	2020	124	133	223	23	80	269	94
RTOR Reduction (vph)	0	6	0	0	8	0	0	11	0	0	0	73
Lane Group Flow (vph)	180	1780	0	65	2136	0	133	235	0	80	269	21
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	8.0	40.2		3.4	35.6		15.9	15.9		15.9	15.9	15.9
Effective Green, g (s)	8.9	41.1		4.3	36.5		16.5	16.5		16.5	16.5	16.5
Actuated g/C Ratio	0.12	0.56		0.06	0.50		0.23	0.23		0.23	0.23	0.23
Clearance Time (s)	4.0	4.9		4.0	4.9		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	216	2841		104	2520		158	787		243	422	347
v/s Ratio Prot	c0.10	0.35		0.04	c0.42			0.07			0.14	
v/s Ratio Perm							c0.19			0.07		0.01
v/c Ratio	0.83	0.63		0.62	0.85		0.84	0.30		0.33	0.64	0.06
Uniform Delay, d1	31.3	10.7		33.5	15.8		27.0	23.4		23.6	25.5	22.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.8	0.4		9.7	2.8		31.3	0.2		0.8	3.1	0.1
Delay (s)	54.1	11.2		43.2	18.6		58.3	23.6		24.4	28.6	22.2
Level of Service	D	B		D	B		E	C		C	C	C
Approach Delay (s)		15.1			19.3			35.8			26.5	
Approach LOS		B			B			D			C	

Intersection Summary

HCM Average Control Delay	19.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	72.9	Sum of lost time (s)	11.0
Intersection Capacity Utilization	79.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project PM
11: San Ramon Avenue & Colonial Avenue

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	25	9	9	6	5
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.70	0.70	0.79	0.79	0.69	0.69
Hourly flow rate (vph)	21	36	11	11	9	7
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	66	32	26			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66	32	26			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	96	99			
cM capacity (veh/h)	909	1016	1575			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	57	23	16
Volume Left	21	11	0
Volume Right	36	0	7
cSH	973	1575	1700
Volume to Capacity	0.06	0.01	0.01
Queue Length 95th (ft)	5	1	0
Control Delay (s)	8.9	3.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	3.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Project PM
14: Ashlan Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	658	36	77	687	39	47	553	82	76	520	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1848		1770	1848		1770	3471		1770	3489	
Flt Permitted	0.13	1.00		0.17	1.00		0.22	1.00		0.30	1.00	
Satd. Flow (perm)	248	1848		324	1848		401	3471		557	3489	
Peak-hour factor, PHF	0.91	0.91	0.91	0.87	0.87	0.87	0.95	0.95	0.95	0.71	0.71	0.71
Adj. Flow (vph)	35	723	40	89	790	45	49	582	86	107	732	77
RTOR Reduction (vph)	0	3	0	0	3	0	0	19	0	0	13	0
Lane Group Flow (vph)	35	760	0	89	832	0	49	649	0	107	796	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	30.1	30.1		30.1	30.1		18.6	18.6		18.6	18.6	
Effective Green, g (s)	30.1	30.1		30.1	30.1		18.6	18.6		18.6	18.6	
Actuated g/C Ratio	0.52	0.52		0.52	0.52		0.32	0.32		0.32	0.32	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	128	956		168	956		128	1109		178	1115	
v/s Ratio Prot		0.41			c0.45			0.19			c0.23	
v/s Ratio Perm	0.14			0.27			0.12			0.19		
v/c Ratio	0.27	0.79		0.53	0.87		0.38	0.59		0.60	0.71	
Uniform Delay, d1	7.9	11.5		9.3	12.3		15.4	16.6		16.7	17.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	4.5		2.3	8.4		8.5	2.3		14.1	3.9	
Delay (s)	8.7	16.0		11.6	20.8		23.8	18.8		30.8	21.4	
Level of Service	A	B		B	C		C	B		C	C	
Approach Delay (s)		15.7			19.9			19.2			22.5	
Approach LOS		B			B			B			C	

Intersection Summary

HCM Average Control Delay	19.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	9.5
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Project PM
15: Van Ness Avenue & Palm Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	35	669	5	0	853
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.55	0.55	0.97	0.97	0.90	0.90
Hourly flow rate (vph)	0	64	690	5	0	948
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						186
pX, platoon unblocked	0.84					
vC, conflicting volume	1166	347			695	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	829	347			695	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	90			100	
cM capacity (veh/h)	261	649			897	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	64	460	235	474	474
Volume Left	0	0	0	0	0
Volume Right	64	0	5	0	0
cSH	649	1700	1700	1700	1700
Volume to Capacity	0.10	0.27	0.14	0.28	0.28
Queue Length 95th (ft)	8	0	0	0	0
Control Delay (s)	11.2	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.2	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	28.7%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Project PM
16: Browning Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	14	29	15	24	28	57	1125	22	18	901	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1712		1770	3529		1770	3510	
Flt Permitted	0.85	1.00	1.00	0.85	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1585	1863	1583	1585	1712		1770	3529		1770	3510	
Peak-hour factor, PHF	0.87	0.87	0.87	0.70	0.70	0.70	0.89	0.89	0.89	0.94	0.94	0.94
Adj. Flow (vph)	32	16	33	21	34	40	64	1264	25	19	959	55
RTOR Reduction (vph)	0	0	30	0	36	0	0	1	0	0	5	0
Lane Group Flow (vph)	32	16	3	21	38	0	64	1288	0	19	1009	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	4.7	4.7	4.7	4.7	4.7		2.3	29.6		0.6	26.0	
Effective Green, g (s)	4.7	4.7	4.7	4.7	4.7		2.3	29.6		0.6	26.0	
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.05	0.64		0.01	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	161	189	160	161	173		88	2251		23	1967	
v/s Ratio Prot		0.01			c0.02		c0.04	c0.36		0.01	0.29	
v/s Ratio Perm	0.02		0.00	0.01								
v/c Ratio	0.20	0.08	0.02	0.13	0.22		0.73	0.57		0.83	0.51	
Uniform Delay, d1	19.1	18.9	18.8	19.0	19.2		21.7	4.8		22.8	6.3	
Progression Factor	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	0.0	0.3	0.5		22.2	0.6		106.5	0.5	
Delay (s)	19.6	19.0	18.8	19.3	19.6		43.9	5.4		129.3	6.7	
Level of Service	B	B	B	B	B		D	A		F	A	
Approach Delay (s)		19.2			19.6			7.2			9.0	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	8.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	46.4	Sum of lost time (s)	8.5
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX H

EXISTING PLUS APPROVED PROJECT

PLUS THE PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Existing Plus Approved Projects Plus Project PM
1: Bullard Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	172	546	118	198	772	68	169	824	219	88	704	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3427		1719	3388		1770	3406		1770	3539	1535
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3427		1719	3388		1770	3406		1770	3539	1535
Peak-hour factor, PHF	0.90	0.90	0.90	0.97	0.97	0.97	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	191	607	131	204	796	70	184	896	238	104	828	192
RTOR Reduction (vph)	0	21	0	0	8	0	0	26	0	0	0	70
Lane Group Flow (vph)	191	717	0	204	858	0	184	1108	0	104	828	122
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	9.0	26.1		10.0	27.1		9.0	29.2		6.0	26.2	26.2
Effective Green, g (s)	9.0	26.1		10.0	27.1		9.0	29.2		6.0	26.2	26.2
Actuated g/C Ratio	0.10	0.29		0.11	0.30		0.10	0.33		0.07	0.29	0.29
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	4.5		2.0	4.5	4.5
Lane Grp Cap (vph)	179	1004		193	1030		179	1116		119	1041	451
v/s Ratio Prot	0.11	0.21		c0.12	c0.25		c0.10	c0.33		0.06	0.23	
v/s Ratio Perm												0.08
v/c Ratio	1.07	0.71		1.06	0.83		1.03	0.99		0.87	0.80	0.27
Uniform Delay, d1	40.0	28.2		39.6	28.9		40.0	29.8		41.2	29.0	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	86.2	2.8		80.7	6.4		74.8	25.1		44.9	4.8	0.6
Delay (s)	126.2	31.0		120.2	35.3		114.8	54.9		86.0	33.7	24.7
Level of Service	F	C		F	D		F	D		F	C	C
Approach Delay (s)		50.5			51.5			63.3			37.0	
Approach LOS		D			D			E			D	

Intersection Summary

HCM Average Control Delay	51.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	89.1	Sum of lost time (s)	12.9
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Approved Projects Plus Project PM
2: Barstow Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	369	128	95	426	160	187	1126	207	111	891	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.9	3.9	3.9	3.9	3.9	3.9	3.1	4.4		3.1	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1765	1863	1538	1764	1863	1538	1703	3304		1770	3448	
Flt Permitted	0.17	1.00	1.00	0.18	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	322	1863	1538	335	1863	1538	1703	3304		1770	3448	
Peak-hour factor, PHF	0.73	0.73	0.73	0.74	0.74	0.74	0.88	0.88	0.88	0.80	0.80	0.80
Adj. Flow (vph)	123	505	175	128	576	216	212	1280	235	139	1114	172
RTOR Reduction (vph)	0	0	89	0	0	77	0	21	0	0	18	0
Lane Group Flow (vph)	123	505	86	128	576	139	212	1494	0	139	1268	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Turn Type	Perm		Perm	Perm		Perm	Prot			Prot		
Protected Phases		4			4		1	6		5	2	
Permitted Phases	4		4	4		4						
Actuated Green, G (s)	22.5	22.5	22.5	22.5	22.5	22.5	7.6	29.2		4.9	26.5	
Effective Green, g (s)	23.1	23.1	23.1	23.1	23.1	23.1	8.5	29.7		5.8	27.0	
Actuated g/C Ratio	0.33	0.33	0.33	0.33	0.33	0.33	0.12	0.42		0.08	0.39	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.9		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	106	615	508	111	615	508	207	1402		147	1330	
v/s Ratio Prot		0.27			0.31		c0.12	c0.45		0.08	0.37	
v/s Ratio Perm	0.38		0.06	c0.38		0.09						
v/c Ratio	1.16	0.82	0.17	1.15	0.94	0.27	1.02	1.07		0.95	0.95	
Uniform Delay, d1	23.4	21.6	16.6	23.4	22.7	17.3	30.8	20.2		31.9	20.9	
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	136.9	8.5	0.1	132.5	21.8	0.2	69.0	43.6		57.0	15.3	
Delay (s)	160.4	30.0	16.8	155.9	44.5	17.5	99.7	63.7		89.0	36.1	
Level of Service	F	C	B	F	D	B	F	E		F	D	
Approach Delay (s)		47.1			53.7			68.1			41.3	
Approach LOS		D			D			E			D	

Intersection Summary

HCM Average Control Delay	54.1	HCM Level of Service	D
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	11.4
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Approved Projects Plus Project PM
3: San Ramon Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	0	11	2	1	9	75	1450	21	12	1084	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.65	0.65	0.65	0.85	0.85	0.85	0.95	0.95	0.95	0.93	0.93	0.93
Hourly flow rate (vph)	17	0	17	2	1	11	79	1526	22	13	1166	38
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								679			640	
pX, platoon unblocked	0.85	0.85	0.70	0.85	0.85	0.71	0.70			0.71		
vC, conflicting volume	2162	2937	622	2341	2944	794	1213			1558		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	460	1370	0	669	1379	0	460			958		
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.3			2.2		
p0 queue free %	95	100	98	99	99	99	89			97		
cM capacity (veh/h)	352	106	750	242	100	742	732			500		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	34	14	79	1018	531	13	777	426
Volume Left	17	2	79	0	0	13	0	0
Volume Right	17	11	0	0	22	0	0	38
cSH	479	394	732	1700	1700	500	1700	1700
Volume to Capacity	0.07	0.04	0.11	0.60	0.31	0.03	0.46	0.25
Queue Length 95th (ft)	6	3	9	0	0	2	0	0
Control Delay (s)	13.1	14.5	10.5	0.0	0.0	12.4	0.0	0.0
Lane LOS	B	B	B			B		
Approach Delay (s)	13.1	14.5	0.5			0.1		
Approach LOS	B	B						

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		

Existing Plus Approved Projects Plus Project PM
4: San Jose Avenue & Palm Avenue

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (vph)	254	300	109	1116	40	229	872
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.1	4.0		3.1	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91		1.00	0.95
Frpb, ped/bikes	1.00	0.97	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2757	1232	1752	5003		1752	3505
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	2757	1232	1752	5003		1752	3505
Peak-hour factor, PHF	0.75	0.75	0.81	0.81	0.81	0.78	0.78
Adj. Flow (vph)	339	400	135	1378	49	294	1118
RTOR Reduction (vph)	0	237	0	5	0	0	0
Lane Group Flow (vph)	339	163	135	1422	0	294	1118
Confl. Peds. (#/hr)	10	10	10		10	10	
Confl. Bikes (#/hr)	10	10	10	10	10	10	10
Heavy Vehicles (%)	27%	27%	3%	3%	3%	3%	3%
Turn Type		Perm	Prot			Prot	
Protected Phases	4		1	6		5	2
Permitted Phases		4					
Actuated Green, G (s)	12.8	12.8	5.4	22.3		11.5	28.4
Effective Green, g (s)	12.8	12.8	6.3	23.2		12.4	29.3
Actuated g/C Ratio	0.22	0.22	0.11	0.39		0.21	0.49
Clearance Time (s)	4.0	4.0	4.0	4.9		4.0	4.9
Vehicle Extension (s)	2.0	2.0	2.0	4.0		2.0	4.0
Lane Grp Cap (vph)	593	265	186	1951		365	1726
v/s Ratio Prot	0.12		0.08	c0.28		c0.17	0.32
v/s Ratio Perm		c0.13					
v/c Ratio	0.57	0.61	0.73	0.73		0.81	0.65
Uniform Delay, d1	20.9	21.1	25.8	15.5		22.4	11.3
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.8	3.0	11.3	2.4		11.5	1.9
Delay (s)	21.7	24.1	37.0	17.9		33.9	13.1
Level of Service	C	C	D	B		C	B
Approach Delay (s)	23.0			19.5			17.5
Approach LOS	C			B			B

Intersection Summary

HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	59.5	Sum of lost time (s)	11.1
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Approved Projects Plus Project PM
5: Shaw Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	296	1398	50	271	1587	272	129	558	67	425	590	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.4		3.1	4.0	4.0	3.1	4.0		3.1	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5053		1770	5085	1531	1770	4983		3433	3539	1525
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5053		1770	5085	1531	1770	4983		3433	3539	1525
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	322	1520	54	288	1688	289	140	607	73	472	656	228
RTOR Reduction (vph)	0	4	0	0	0	101	0	15	0	0	0	95
Lane Group Flow (vph)	322	1570	0	288	1688	188	140	665	0	472	656	133
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						4
Actuated Green, G (s)	17.4	33.2		16.8	32.6	32.6	9.9	18.7		13.2	22.0	22.0
Effective Green, g (s)	18.3	33.7		17.7	33.5	33.5	10.8	19.6		14.1	22.9	22.9
Actuated g/C Ratio	0.18	0.34		0.18	0.34	0.34	0.11	0.20		0.14	0.23	0.23
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0	2.5	5.4		2.5	3.0	3.0
Lane Grp Cap (vph)	325	1708		314	1709	514	192	980		486	813	350
v/s Ratio Prot	c0.18	0.31		0.16	c0.33		0.08	0.13		c0.14	c0.19	
v/s Ratio Perm						0.12						0.09
v/c Ratio	0.99	0.92		0.92	0.99	0.37	0.73	0.68		0.97	0.81	0.38
Uniform Delay, d1	40.6	31.7		40.3	32.9	25.1	43.0	37.1		42.6	36.3	32.4
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	47.3	8.3		30.1	18.7	0.4	12.2	2.6		33.3	5.9	0.7
Delay (s)	87.9	40.0		70.4	51.6	25.5	55.2	39.8		75.9	42.2	33.1
Level of Service	F	D		E	D	C	E	D		E	D	C
Approach Delay (s)		48.2			50.7			42.4			52.4	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	49.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	99.7	Sum of lost time (s)	10.2
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Approved Projects Plus Project PM
6: Gettysburg Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	62	18	39	114	38	41	581	16	47	753	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.1	4.1		4.1	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1744	1772		1761	1780		1728	3454		1758	3523	
Flt Permitted	0.64	1.00		0.69	1.00		0.29	1.00		0.41	1.00	
Satd. Flow (perm)	1177	1772		1274	1780		528	3454		750	3523	
Peak-hour factor, PHF	0.74	0.74	0.74	0.82	0.82	0.82	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	27	84	24	48	139	46	45	632	17	55	886	22
RTOR Reduction (vph)	0	19	0	0	26	0	0	2	0	0	2	0
Lane Group Flow (vph)	27	89	0	48	159	0	45	647	0	55	906	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	8.3	8.3		8.3	8.3		25.9	25.9		25.9	25.9	
Effective Green, g (s)	8.5	8.5		8.5	8.5		26.8	26.8		26.8	26.8	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.61	0.61		0.61	0.61	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	229	345		248	346		324	2118		460	2161	
v/s Ratio Prot		0.05			c0.09			0.19			c0.26	
v/s Ratio Perm	0.02			0.04			0.09			0.07		
v/c Ratio	0.12	0.26		0.19	0.46		0.14	0.31		0.12	0.42	
Uniform Delay, d1	14.5	14.9		14.7	15.6		3.6	4.0		3.5	4.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.3	0.7		0.1	0.0		0.0	0.0	
Delay (s)	14.7	15.2		15.0	16.3		3.6	4.1		3.6	4.4	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		15.1			16.0			4.0			4.4	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	6.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	43.7	Sum of lost time (s)	8.4
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Approved Projects Plus Project PM
7: Barstow Avenue & Thorne Avenue

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	528	11	30	749	5	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.75	0.75
Hourly flow rate (vph)	600	12	34	851	7	57
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				1311		
pX, platoon unblocked					0.76	
vC, conflicting volume			622		1546	626
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			622		1560	626
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		93	88
cM capacity (veh/h)			936		89	476

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	612	34	851	64
Volume Left	0	34	0	7
Volume Right	12	0	0	57
cSH	1700	936	1700	328
Volume to Capacity	0.36	0.04	0.50	0.20
Queue Length 95th (ft)	0	3	0	18
Control Delay (s)	0.0	9.0	0.0	18.6
Lane LOS		A		C
Approach Delay (s)	0.0	0.3		18.6
Approach LOS				C

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Approved Projects Plus Project PM
8: San Ramon Avenue & Thorne Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	9	1	6	28	5	2	25	4	5	11	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.36	0.36	0.36	0.75	0.75	0.75	0.54	0.54	0.54	0.55	0.55	0.55
Hourly flow rate (vph)	22	25	3	8	37	7	4	46	7	9	20	5
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	144	122	43	134	121	70	35			64		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	144	122	43	134	121	70	35			64		
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	97	100	99	95	99	100			99		
cM capacity (veh/h)	757	746	1005	786	750	976	1562			1526		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	50	52	57	35
Volume Left	22	8	4	9
Volume Right	3	7	7	5
cSH	762	779	1562	1526
Volume to Capacity	0.07	0.07	0.00	0.01
Queue Length 95th (ft)	5	5	0	0
Control Delay (s)	10.1	10.0	0.5	2.0
Lane LOS	B	A	A	A
Approach Delay (s)	10.1	10.0	0.5	2.0
Approach LOS	B	A		

Intersection Summary				
Average Delay		5.8		
Intersection Capacity Utilization		19.0%	ICU Level of Service	A
Analysis Period (min)		15		

Existing Plus Approved Projects Plus Project PM
9: Shaw Avenue & Fruit Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	1420	32	83	1619	29	59	201	72	77	186	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.0		3.1	4.0	3.1	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5064		1770	5085	1496	1759	3373		1761	1863	1537
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.52	1.00		0.48	1.00	1.00
Satd. Flow (perm)	1770	5064		1770	5085	1496	959	3373		888	1863	1537
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.72	0.72	0.72	0.81	0.81	0.81
Adj. Flow (vph)	74	1560	35	91	1779	32	82	279	100	95	230	91
RTOR Reduction (vph)	0	3	0	0	0	11	0	62	0	0	0	69
Lane Group Flow (vph)	74	1592	0	91	1779	21	82	317	0	95	230	22
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot		custom	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						1	8			4		4
Actuated Green, G (s)	2.2	23.5		5.6	26.4	5.6	12.7	12.7		12.7	12.7	12.7
Effective Green, g (s)	3.1	24.4		6.5	27.3	6.5	13.6	13.6		13.6	13.6	13.6
Actuated g/C Ratio	0.06	0.44		0.12	0.49	0.12	0.24	0.24		0.24	0.24	0.24
Clearance Time (s)	4.5	4.9		4.0	4.9	4.0	4.9	4.9		4.9	4.9	4.9
Vehicle Extension (s)	3.0	3.0		2.5	3.0	2.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	99	2222		207	2497	175	235	825		217	456	376
v/s Ratio Prot	c0.04	0.31		0.05	c0.35			0.09			c0.12	
v/s Ratio Perm						0.01	0.09			0.11		0.01
v/c Ratio	0.75	0.72		0.44	0.71	0.12	0.35	0.38		0.44	0.50	0.06
Uniform Delay, d1	25.9	12.8		22.9	11.1	22.0	17.3	17.5		17.8	18.1	16.1
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	26.1	1.1		1.1	1.0	0.2	0.9	0.3		1.4	0.9	0.1
Delay (s)	52.0	13.9		23.9	12.1	22.2	18.2	17.8		19.2	19.0	16.2
Level of Service	D	B		C	B	C	B	B		B	B	B
Approach Delay (s)		15.6			12.8			17.9			18.4	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.6	Sum of lost time (s)	11.6
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Approved Projects Plus Project PM
10: Shaw Avenue & Maroa Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	172	1625	81	57	1874	109	127	201	21	72	242	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.0		3.1	4.0		3.9	3.9		3.9	3.9	3.9
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5039		1770	5036		1757	3479		1754	1863	1530
Flt Permitted	0.95	1.00		0.95	1.00		0.37	1.00		0.57	1.00	1.00
Satd. Flow (perm)	1770	5039		1770	5036		684	3479		1057	1863	1530
Peak-hour factor, PHF	0.90	0.90	0.90	0.88	0.88	0.88	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	191	1806	90	65	2130	124	141	223	23	80	269	100
RTOR Reduction (vph)	0	6	0	0	8	0	0	10	0	0	0	77
Lane Group Flow (vph)	191	1890	0	65	2246	0	141	236	0	80	269	23
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	9.0	43.1		4.7	38.8		17.3	17.3		17.3	17.3	17.3
Effective Green, g (s)	9.9	44.0		5.6	39.7		17.9	17.9		17.9	17.9	17.9
Actuated g/C Ratio	0.13	0.56		0.07	0.51		0.23	0.23		0.23	0.23	0.23
Clearance Time (s)	4.0	4.9		4.0	4.9		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	223	2824		126	2547		156	793		241	425	349
v/s Ratio Prot	c0.11	0.38		0.04	c0.45			0.07			0.14	
v/s Ratio Perm							c0.21			0.08		0.01
v/c Ratio	0.86	0.67		0.52	0.88		0.90	0.30		0.33	0.63	0.07
Uniform Delay, d1	33.6	12.1		35.1	17.3		29.5	25.1		25.3	27.3	23.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	25.8	0.6		2.6	4.0		44.8	0.2		0.8	3.1	0.1
Delay (s)	59.4	12.7		37.8	21.3		74.2	25.3		26.1	30.4	23.8
Level of Service	E	B		D	C		E	C		C	C	C
Approach Delay (s)		17.0			21.7			43.1			28.2	
Approach LOS		B			C			D			C	

Intersection Summary

HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	78.5	Sum of lost time (s)	11.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Approved Projects Plus Project PM
11: San Ramon Avenue & Colonial Avenue

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	25	9	9	6	5
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.70	0.70	0.79	0.79	0.69	0.69
Hourly flow rate (vph)	21	36	11	11	9	7
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	66	32	26			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66	32	26			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	96	99			
cM capacity (veh/h)	909	1016	1575			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	57	23	16
Volume Left	21	11	0
Volume Right	36	0	7
cSH	973	1575	1700
Volume to Capacity	0.06	0.01	0.01
Queue Length 95th (ft)	5	1	0
Control Delay (s)	8.9	3.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	3.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Approved Projects Plus Project PM
14: Ashlan Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	658	36	77	687	42	47	589	82	81	553	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1848		1770	1847		1770	3475		1770	3488	
Flt Permitted	0.12	1.00		0.17	1.00		0.19	1.00		0.28	1.00	
Satd. Flow (perm)	229	1848		312	1847		353	3475		513	3488	
Peak-hour factor, PHF	0.91	0.91	0.91	0.87	0.87	0.87	0.95	0.95	0.95	0.71	0.71	0.71
Adj. Flow (vph)	37	723	40	89	790	48	49	620	86	114	779	83
RTOR Reduction (vph)	0	3	0	0	3	0	0	17	0	0	12	0
Lane Group Flow (vph)	37	760	0	89	835	0	49	689	0	114	850	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	32.5	32.5		32.5	32.5		21.1	21.1		21.1	21.1	
Effective Green, g (s)	32.5	32.5		32.5	32.5		21.1	21.1		21.1	21.1	
Actuated g/C Ratio	0.52	0.52		0.52	0.52		0.33	0.33		0.33	0.33	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	118	952		161	951		118	1162		172	1166	
v/s Ratio Prot		0.41			c0.45			0.20			c0.24	
v/s Ratio Perm	0.16			0.28			0.14			0.22		
v/c Ratio	0.31	0.80		0.55	0.88		0.42	0.59		0.66	0.73	
Uniform Delay, d1	8.8	12.6		10.4	13.5		16.2	17.4		18.0	18.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	4.6		3.3	9.1		10.4	2.2		18.4	4.0	
Delay (s)	10.0	17.2		13.6	22.7		26.7	19.7		36.3	22.5	
Level of Service	A	B		B	C		C	B		D	C	
Approach Delay (s)		16.8			21.8			20.1			24.1	
Approach LOS		B			C			C			C	

Intersection Summary

HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	63.1	Sum of lost time (s)	9.5
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Existing Plus Approved Projects Plus Project PM
15: Van Ness Avenue & Palm Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	35	719	5	0	903
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.55	0.55	0.97	0.97	0.90	0.90
Hourly flow rate (vph)	0	64	741	5	0	1003
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						186
pX, platoon unblocked	0.83					
vC, conflicting volume	1245	373			746	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	875	373			746	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	90			100	
cM capacity (veh/h)	238	624			858	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	64	494	252	502	502
Volume Left	0	0	0	0	0
Volume Right	64	0	5	0	0
cSH	624	1700	1700	1700	1700
Volume to Capacity	0.10	0.29	0.15	0.30	0.30
Queue Length 95th (ft)	8	0	0	0	0
Control Delay (s)	11.4	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.4	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Plus Approved Projects Plus Project PM
16: Browning Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	56	128	25	67	28	156	1207	31	18	982	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1781		1770	3526		1770	3484	
Flt Permitted	0.67	1.00	1.00	0.72	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1248	1863	1583	1332	1781		1770	3526		1770	3484	
Peak-hour factor, PHF	0.87	0.87	0.87	0.70	0.70	0.70	0.89	0.89	0.89	0.94	0.94	0.94
Adj. Flow (vph)	107	64	147	36	96	40	175	1356	35	19	1045	122
RTOR Reduction (vph)	0	0	126	0	26	0	0	2	0	0	11	0
Lane Group Flow (vph)	107	64	21	36	110	0	175	1389	0	19	1156	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	9.0	9.0	9.0	9.0	9.0		8.8	40.5		0.7	30.5	
Effective Green, g (s)	9.0	9.0	9.0	9.0	9.0		8.8	40.5		0.7	30.5	
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.15		0.14	0.66		0.01	0.49	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	182	272	231	194	260		252	2314		20	1722	
v/s Ratio Prot		0.03			0.06		c0.10	c0.39		0.01	0.33	
v/s Ratio Perm	c0.09		0.01	0.03								
v/c Ratio	0.59	0.24	0.09	0.19	0.42		0.69	0.60		0.95	0.67	
Uniform Delay, d1	24.6	23.3	22.8	23.1	24.0		25.2	6.0		30.5	11.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.0	0.3	0.1	0.3	0.8		6.5	0.7		176.2	1.4	
Delay (s)	28.6	23.6	22.9	23.5	24.8		31.7	6.7		206.7	13.2	
Level of Service	C	C	C	C	C		C	A		F	B	
Approach Delay (s)		25.0			24.5			9.5			16.3	
Approach LOS		C			C			A			B	

Intersection Summary

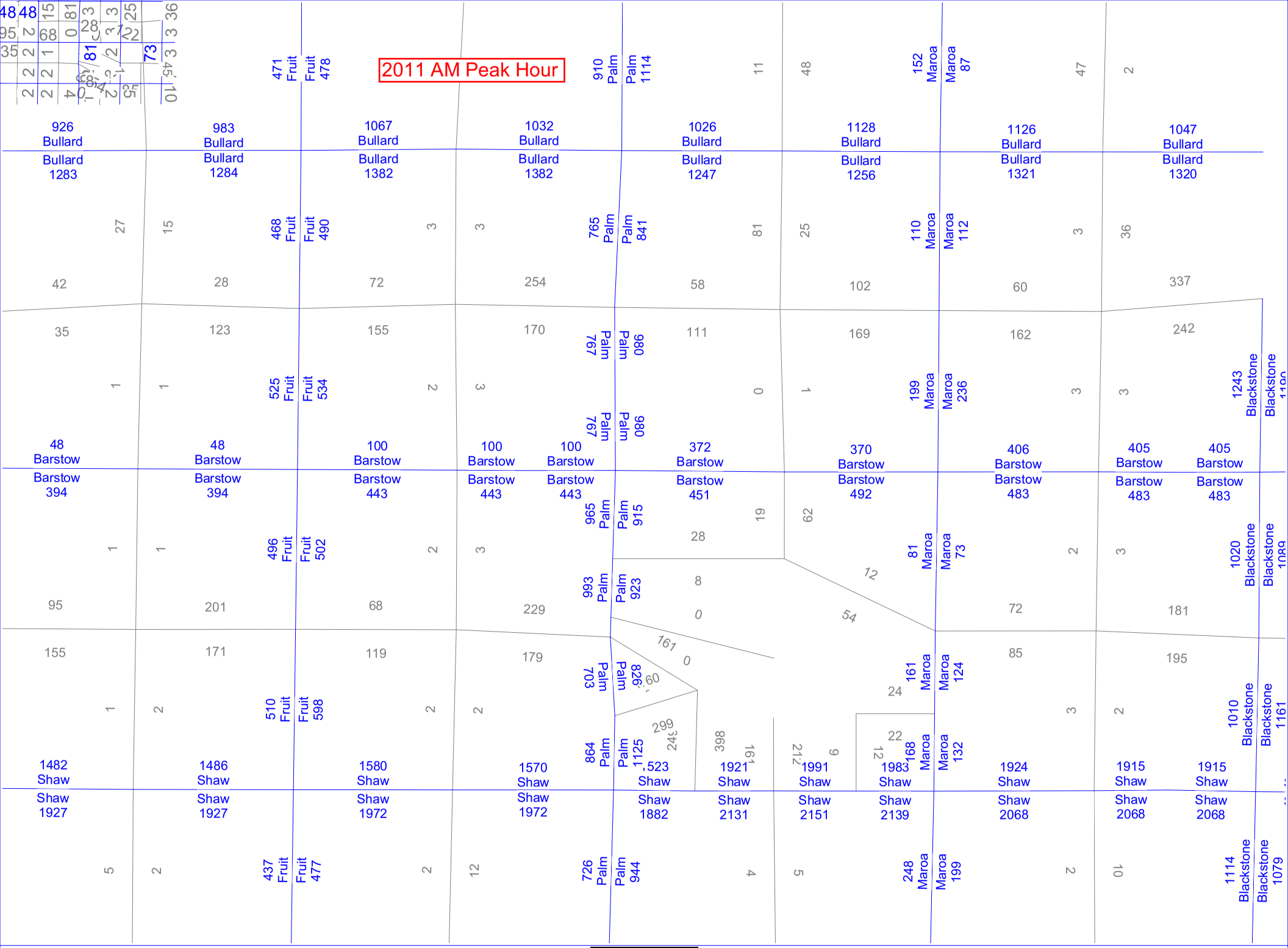
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	8.5
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX I

FRESNO COG MODEL REQUEST & MODEL PLOTS

2011 AM Peak Hour



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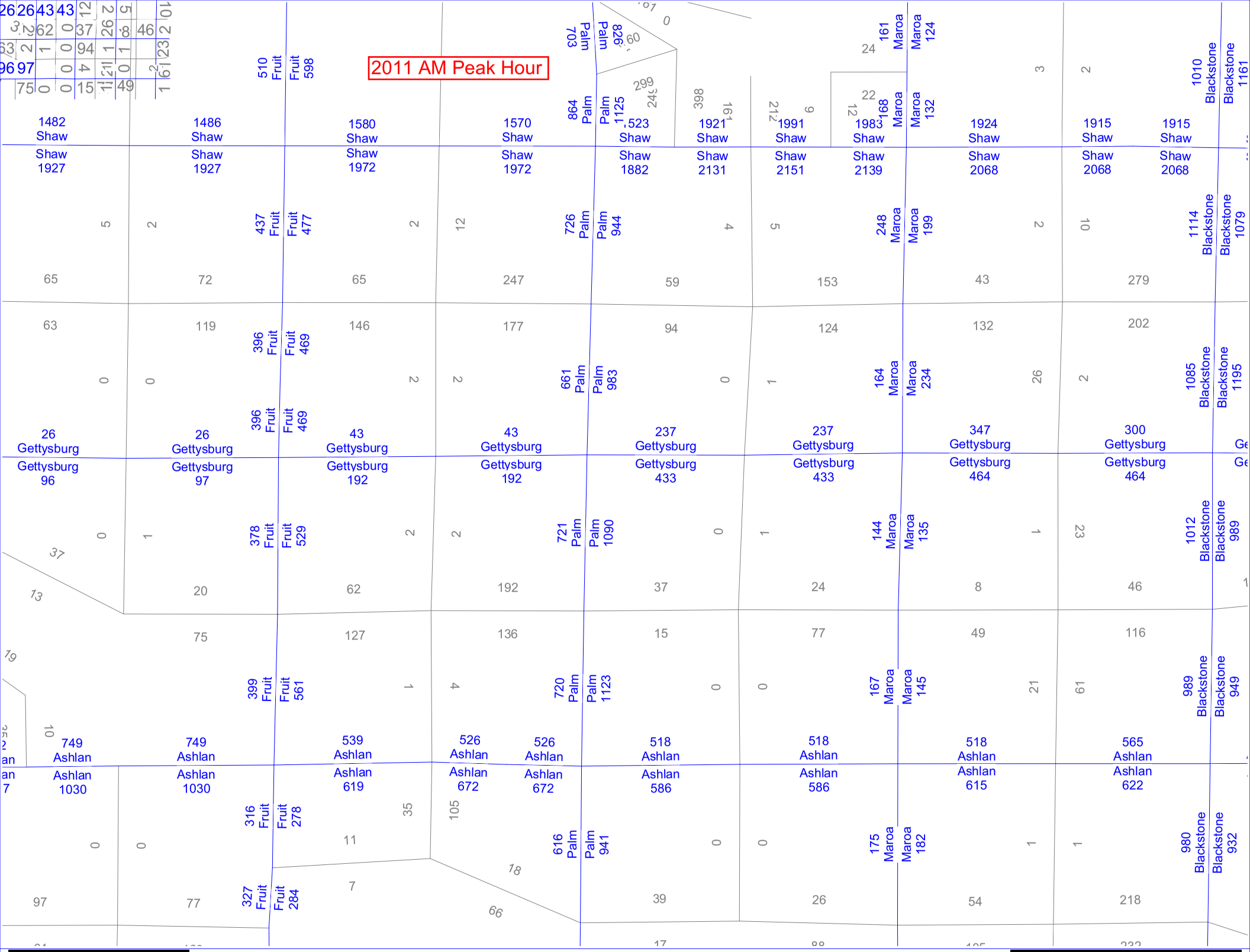
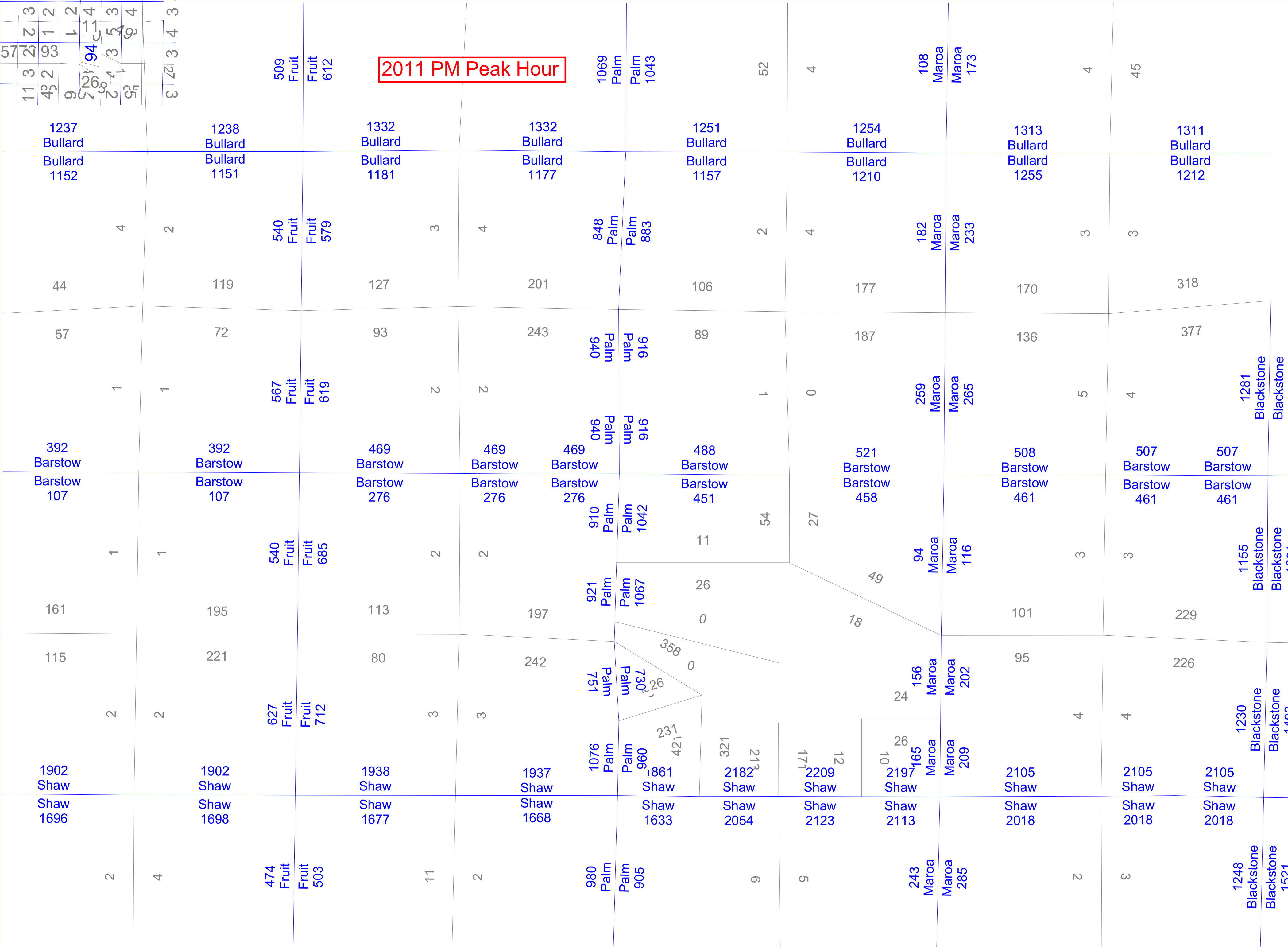
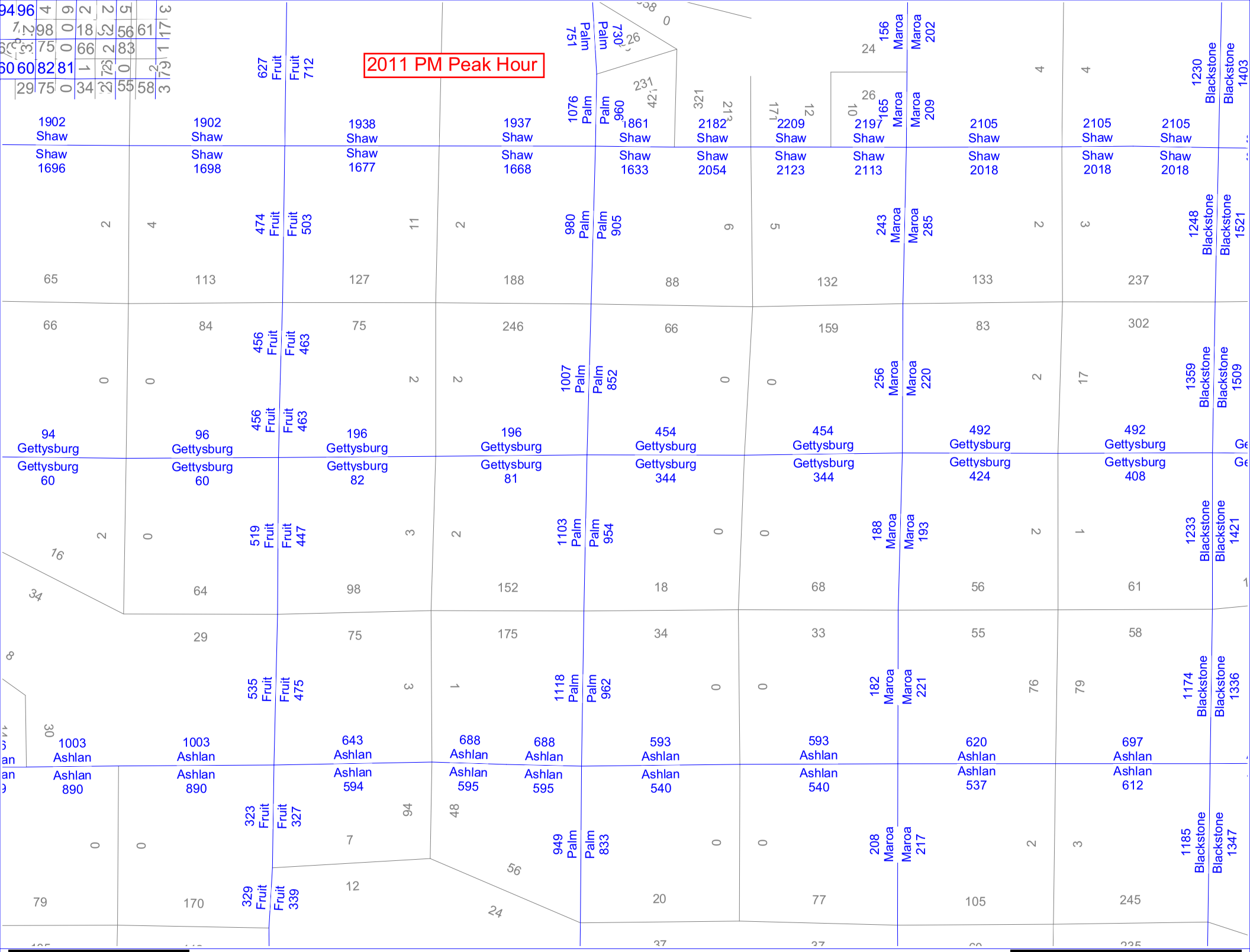
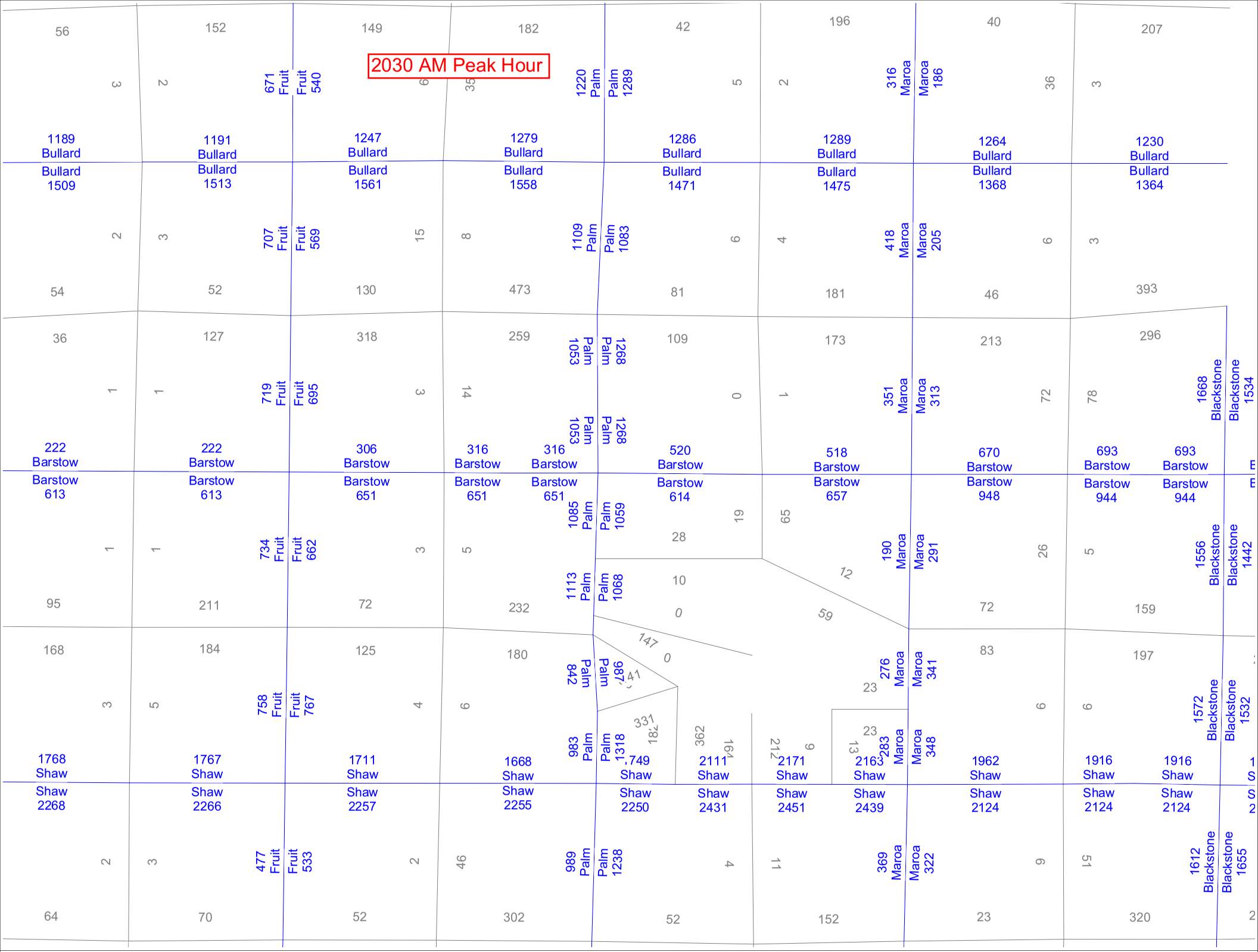
2011 AM Peak Hour




2011 PM Peak Hour
1237 Bullard
Bullard 1152
1238 Bullard
Bullard 1151
1332 Bullard
Bullard 1181
1332 Bullard
Bullard 1177
1251 Bullard
Bullard 1157
1254 Bullard
Bullard 1210
1313 Bullard
Bullard 1255
1311 Bullard
Bullard 1212
509 Fruit
Fruit 612
540 Fruit
Fruit 579
567 Fruit
Fruit 619
540 Fruit
Fruit 685
627 Fruit
Fruit 712
474 Fruit
Fruit 503
1069 Palm
Palm 1043
848 Palm
Palm 883
940 Palm
Palm 916
940 Palm
Palm 916
910 Palm
Palm 1042
921 Palm
Palm 1067
751 Palm
Palm 730
1076 Palm
Palm 960
980 Palm
Palm 905
108 Maroa
Maroa 173
182 Maroa
Maroa 233
259 Maroa
Maroa 265
94 Maroa
Maroa 116
156 Maroa
Maroa 202
165 Maroa
Maroa 209
243 Maroa
Maroa 285
392 Barstow
Barstow 107
392 Barstow
Barstow 107
469 Barstow
Barstow 276
469 Barstow
Barstow 276
469 Barstow
Barstow 276
488 Barstow
Barstow 451
521 Barstow
Barstow 458
508 Barstow
Barstow 461
507 Barstow
Barstow 461
507 Barstow
Barstow 461
1902 Shaw
Shaw 1696
1902 Shaw
Shaw 1698
1938 Shaw
Shaw 1677
1937 Shaw
Shaw 1668
1861 Shaw
Shaw 1633
2182 Shaw
Shaw 2054
2209 Shaw
Shaw 2123
2197 Shaw
Shaw 2113
2105 Shaw
Shaw 2018
2105 Shaw
Shaw 2018
2105 Shaw
Shaw 2018
1281 Blackstone
Blackstone 1624
1155 Blackstone
Blackstone 1391
1230 Blackstone
Blackstone 1403
1248 Blackstone
Blackstone 1521

2011 PM Peak Hour




2030 AM Peak Hour
56
152
149
182
42
196
40
207
3
2
671 Fruit
Fruit 540
6
35
1220 Palm
Palm 1289
5
2
316 Maroa
Maroa 186
36
3
1189 Bullard
1191 Bullard
1247 Bullard
1279 Bullard
1286 Bullard
1289 Bullard
1264 Bullard
1230 Bullard
Bullard 1509
Bullard 1513
Bullard 1561
Bullard 1558
Bullard 1471
Bullard 1475
Bullard 1368
Bullard 1364
2
3
707 Fruit
Fruit 569
15
8
1109 Palm
Palm 1083
9
4
418 Maroa
Maroa 205
6
3
54
52
130
473
81
181
46
393
36
127
318
259
109
173
213
296
1
1
719 Fruit
Fruit 695
3
14
1053 Palm
1268 Palm
0
1
351 Maroa
Maroa 313
72
78
1668 Blackstone
Blackstone 1534
1053 Palm
1268 Palm
222 Barstow
222 Barstow
306 Barstow
316 Barstow
316 Barstow
520 Barstow
518 Barstow
670 Barstow
693 Barstow
693 Barstow
Barstow 613
Barstow 613
Barstow 651
Barstow 651
Barstow 651
Barstow 614
Barstow 657
Barstow 948
Barstow 944
Barstow 944
1
1
734 Fruit
Fruit 662
3
5
1085 Palm
Palm 1059
19
65
190 Maroa
Maroa 291
26
5
1556 Blackstone
Blackstone 1442
28
12
1113 Palm
Palm 1068
10
0
59
95
211
72
232
72
159
168
184
125
180
147
0
987
941
842 Palm
23
276 Maroa
Maroa 341
83
197
3
5
758 Fruit
Fruit 767
4
6
331
182
362
164
23
283 Maroa
Maroa 348
6
6
1572 Blackstone
Blackstone 1532
983 Palm
Palm 1318
749
2111
2171
2163
1768 Shaw
1767 Shaw
1711 Shaw
1668 Shaw
Shaw 2250
Shaw 2431
Shaw 2451
Shaw 2439
1962 Shaw
1916 Shaw
1916 Shaw
Shaw 2268
Shaw 2266
Shaw 2257
Shaw 2255
Shaw 2124
Shaw 2124
Shaw 2124
2
3
477 Fruit
Fruit 533
2
46
989 Palm
Palm 1238
4
11
369 Maroa
Maroa 322
9
51
1612 Blackstone
Blackstone 1655
64
70
52
302
52
152
23
320

2030 AM Peak Hour

1768 Shaw
Shaw 2268
2
64
64
0
68 Gettysburg
Gettysburg 405
0
34
13

1767 Shaw
Shaw 2266
3
70
123
5
72 Gettysburg
Gettysburg 416
11
21
71
11
952 Ashlan
Ashlan 1229
0
89

758 Fruit
477 Fruit
Fruit 533
430 Fruit
Fruit 568
430 Fruit
Fruit 568
465 Fruit
Fruit 610
512 Fruit
Fruit 703
357 Fruit
Fruit 398
358 Fruit
Fruit 406

Fruit 767
1711 Shaw
Shaw 2257
2
52
187
3
127 Gettysburg
Gettysburg 477
3
86
181
1
629 Ashlan
Ashlan 757
23
14
20

1668 Shaw
Shaw 2255
46
302
201
11
112 Gettysburg
Gettysburg 477
26
320
201
85
639 Ashlan
Ashlan 768
107
68

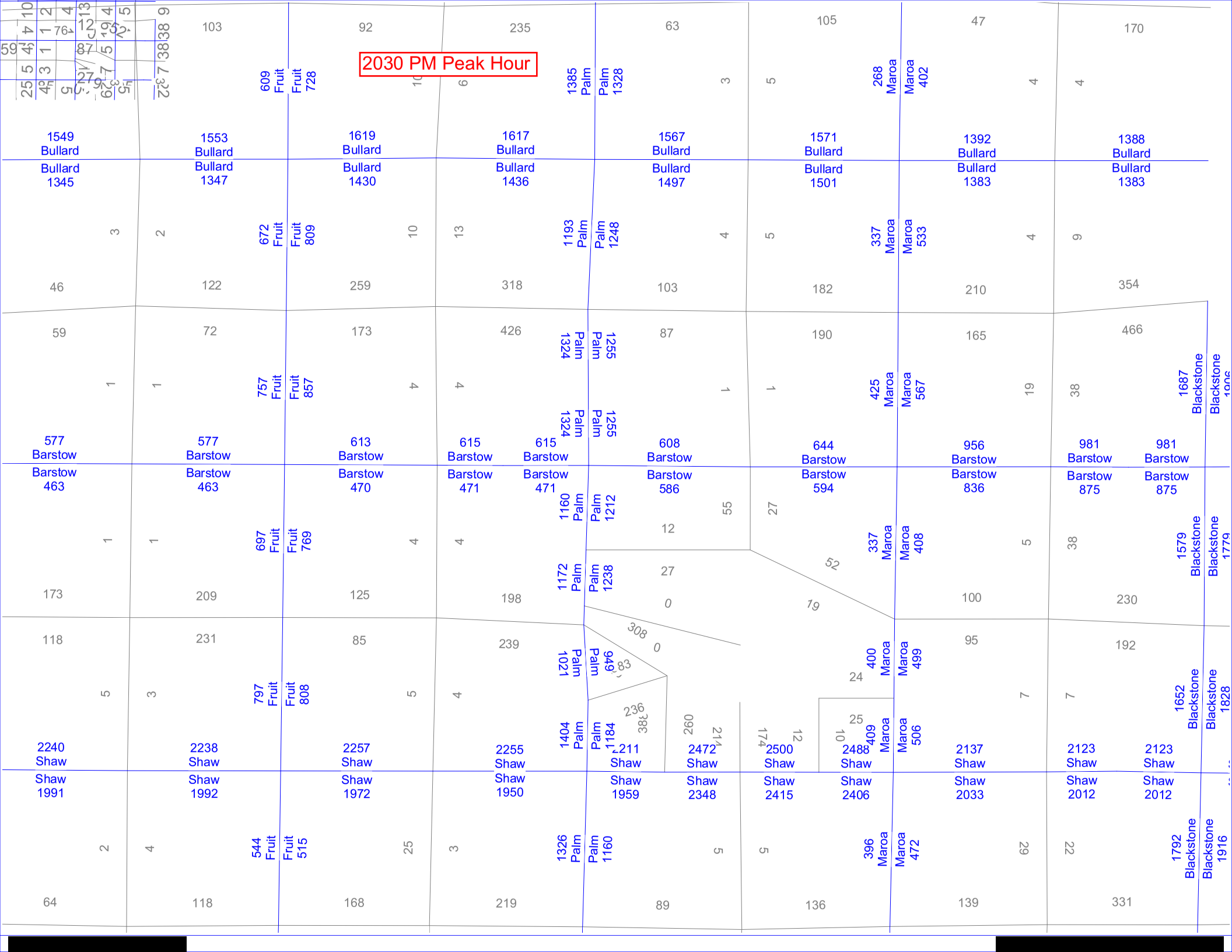
983 Palm
989 Palm
920 Palm
1056 Palm
1032 Palm
903 Palm

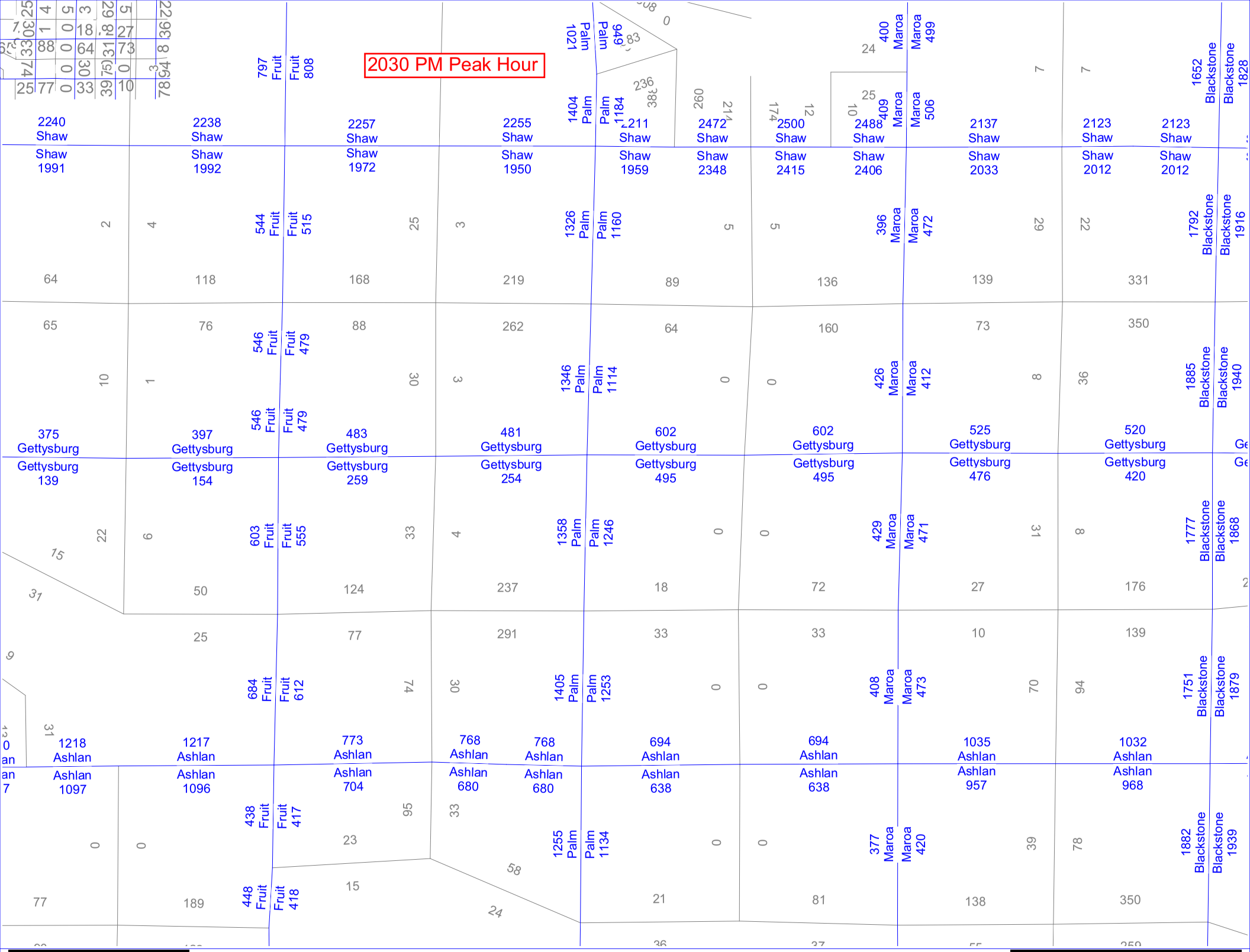
Palm 842
Palm 987
Palm 1318
Palm 1238
Palm 1313
Palm 1296
Palm 1370
Palm 1211

1749 Shaw
Shaw 2250
52
95
373 Gettysburg
Gettysburg 585
0
36
16
585 Ashlan
Ashlan 684
0
39
18

2111 Shaw
Shaw 2431
4
0
16
0
0
0

2030 PM Peak Hour




2030 PM Peak Hour
2240 Shaw
Shaw 1991
2238 Shaw
Shaw 1992
2257 Shaw
Shaw 1972
2255 Shaw
Shaw 1950
2211 Shaw
Shaw 1959
2472 Shaw
Shaw 2348
2500 Shaw
Shaw 2415
2488 Shaw
Shaw 2406
2137 Shaw
Shaw 2033
2123 Shaw
Shaw 2012
2123 Shaw
Shaw 2012
375 Gettysburg
Gettysburg 139
397 Gettysburg
Gettysburg 154
483 Gettysburg
Gettysburg 259
481 Gettysburg
Gettysburg 254
602 Gettysburg
Gettysburg 495
602 Gettysburg
Gettysburg 495
525 Gettysburg
Gettysburg 476
520 Gettysburg
Gettysburg 420
1218 Ashlan
Ashlan 1097
1217 Ashlan
Ashlan 1096
773 Ashlan
Ashlan 704
768 Ashlan
Ashlan 680
768 Ashlan
Ashlan 680
694 Ashlan
Ashlan 638
694 Ashlan
Ashlan 638
1035 Ashlan
Ashlan 957
1032 Ashlan
Ashlan 968
797 Fruit
Fruit 808
544 Fruit
Fruit 515
546 Fruit
Fruit 479
546 Fruit
Fruit 479
603 Fruit
Fruit 555
684 Fruit
Fruit 612
438 Fruit
Fruit 417
448 Fruit
Fruit 418
1404 Palm
1021 Palm
949 Palm
1326 Palm
Palm 1160
1346 Palm
Palm 1114
1358 Palm
Palm 1246
1405 Palm
Palm 1253
1255 Palm
Palm 1134
400 Maroa
Maroa 499
409 Maroa
Maroa 506
396 Maroa
Maroa 472
426 Maroa
Maroa 412
429 Maroa
Maroa 471
408 Maroa
Maroa 473
377 Maroa
Maroa 420
1652 Blackstone
Blackstone 1828
1792 Blackstone
Blackstone 1916
1885 Blackstone
Blackstone 1940
1777 Blackstone
Blackstone 1868
1751 Blackstone
Blackstone 1879
1882 Blackstone
Blackstone 1939

APPENDIX J

2030 NO PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

2030 No Project AM
1: Bullard Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	153	799	148	195	579	121	188	667	142	107	771	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.97		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3440		1719	3332		1770	3428		1770	3539	1533
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3440		1719	3332		1770	3428		1770	3539	1533
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	166	868	161	212	629	132	204	725	154	116	838	58
RTOR Reduction (vph)	0	17	0	0	19	0	0	20	0	0	0	21
Lane Group Flow (vph)	166	1012	0	212	742	0	204	859	0	116	838	37
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	10.5	27.5		11.0	28.0		10.0	26.7		7.0	23.7	23.7
Effective Green, g (s)	10.5	27.5		11.0	28.0		10.0	26.7		7.0	23.7	23.7
Actuated g/C Ratio	0.12	0.31		0.12	0.31		0.11	0.30		0.08	0.26	0.26
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	4.5		2.0	4.5	4.5
Lane Grp Cap (vph)	207	1051		210	1037		197	1017		138	932	404
v/s Ratio Prot	0.09	c0.29		c0.12	0.22		c0.12	c0.25		0.07	0.24	
v/s Ratio Perm												0.02
v/c Ratio	0.80	0.96		1.01	0.72		1.04	0.84		0.84	0.90	0.09
Uniform Delay, d1	38.7	30.8		39.5	27.5		40.0	29.7		40.9	32.0	25.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	18.6	19.6		64.6	2.7		73.7	7.1		33.4	11.9	0.2
Delay (s)	57.4	50.3		104.1	30.2		113.7	36.8		74.4	43.8	25.2
Level of Service	E	D		F	C		F	D		E	D	C
Approach Delay (s)		51.3			46.3			51.3			46.3	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	49.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project AM
2: Barstow Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	414	121	69	345	158	51	698	93	158	800	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.9	3.9	3.9	3.9	3.9	3.9	3.1	4.4		3.1	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1534	1770	1863	1532	1703	3327		1770	3349	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1534	1770	1863	1532	1703	3327		1770	3349	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	450	132	75	375	172	55	759	101	172	870	334
RTOR Reduction (vph)	0	0	65	0	0	82	0	13	0	0	48	0
Lane Group Flow (vph)	140	450	67	75	375	90	55	847	0	172	1156	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	7.5	24.9	24.9	3.6	21.0	21.0	3.0	27.7		8.0	32.7	
Effective Green, g (s)	8.1	25.5	25.5	4.2	21.6	21.6	3.9	28.2		8.9	33.2	
Actuated g/C Ratio	0.10	0.31	0.31	0.05	0.26	0.26	0.05	0.34		0.11	0.40	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.9		4.0	4.9	
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5	2.5	2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	175	579	476	91	490	403	81	1143		192	1354	
v/s Ratio Prot	c0.08	c0.24		0.04	0.20		0.03	0.25		c0.10	c0.35	
v/s Ratio Perm			0.04			0.06						
v/c Ratio	0.80	0.78	0.14	0.82	0.77	0.22	0.68	0.74		0.90	0.85	
Uniform Delay, d1	36.2	25.7	20.4	38.6	27.9	23.7	38.5	23.7		36.1	22.2	
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	22.4	6.2	0.1	42.8	6.7	0.2	16.3	3.2		36.4	6.0	
Delay (s)	58.6	32.0	20.5	81.4	34.6	23.9	54.8	26.9		72.5	28.2	
Level of Service	E	C	C	F	C	C	D	C		E	C	
Approach Delay (s)		35.0			37.3			28.6			33.8	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	10.9
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project AM
3: San Ramon Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	2	75	7	3	7	25	799	9	10	932	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	2	82	8	3	8	27	868	10	11	1013	48
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								679			640	
pX, platoon unblocked	0.82	0.82	0.74	0.82	0.82	0.85	0.74			0.85		
vC, conflicting volume	1577	2011	550	1559	2030	459	1071			888		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	443	975	0	421	999	19	402			523		
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.3			2.2		
p0 queue free %	96	99	90	98	98	99	97			99		
cM capacity (veh/h)	373	192	792	344	179	870	813			879		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	99	18	27	579	299	11	675	386
Volume Left	15	8	27	0	0	11	0	0
Volume Right	82	8	0	0	10	0	0	48
cSH	638	377	813	1700	1700	879	1700	1700
Volume to Capacity	0.16	0.05	0.03	0.34	0.18	0.01	0.40	0.23
Queue Length 95th (ft)	14	4	3	0	0	1	0	0
Control Delay (s)	11.7	15.1	9.6	0.0	0.0	9.1	0.0	0.0
Lane LOS	B	C	A			A		
Approach Delay (s)	11.7	15.1	0.3			0.1		
Approach LOS	B	C						

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		

2030 No Project AM
4: San Jose Avenue & Palm Avenue

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (vph)	22	25	41	883	72	254	765
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0		3.1	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	0.99		1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2757	1216	1748	4964		1752	3505
Flt Permitted	0.95	1.00	0.34	1.00		0.95	1.00
Satd. Flow (perm)	2757	1216	623	4964		1752	3505
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	27	45	960	78	276	832
RTOR Reduction (vph)	0	24	0	12	0	0	0
Lane Group Flow (vph)	24	3	45	1026	0	276	832
Confl. Peds. (#/hr)	10	10	10		10	10	
Confl. Bikes (#/hr)	10	10	10	10	10	10	10
Heavy Vehicles (%)	27%	27%	3%	3%	3%	3%	3%
Turn Type		Perm	Perm			Prot	
Protected Phases	4			6		5	2
Permitted Phases		4	6				
Actuated Green, G (s)	5.1	5.1	24.6	24.6		11.1	39.7
Effective Green, g (s)	5.1	5.1	25.5	25.5		12.0	40.6
Actuated g/C Ratio	0.09	0.09	0.47	0.47		0.22	0.76
Clearance Time (s)	4.0	4.0	4.9	4.9		4.0	4.9
Vehicle Extension (s)	2.0	2.0	4.0	4.0		2.0	4.0
Lane Grp Cap (vph)	262	115	296	2357		392	2650
v/s Ratio Prot	c0.01			c0.21		c0.16	0.24
v/s Ratio Perm		0.00	0.07				
v/c Ratio	0.09	0.02	0.15	0.44		0.70	0.31
Uniform Delay, d1	22.2	22.0	8.0	9.3		19.2	2.1
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.0	1.1	0.6		4.6	0.3
Delay (s)	22.2	22.1	9.1	9.9		23.9	2.4
Level of Service	C	C	A	A		C	A
Approach Delay (s)	22.1			9.9			7.7
Approach LOS	C			A			A

Intersection Summary

HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	53.7	Sum of lost time (s)	11.1
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project AM
5: Shaw Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	1627	70	346	1142	144	141	699	110	266	410	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.4	4.9	3.1	4.0	4.0	3.1	4.0	4.9	3.1	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1536	3433	5085	1537	3433	5085	1530	3433	3539	1531
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1536	3433	5085	1537	3433	5085	1530	3433	3539	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	1768	76	376	1241	157	153	760	120	289	446	118
RTOR Reduction (vph)	0	0	37	0	0	92	0	0	92	0	0	89
Lane Group Flow (vph)	266	1768	39	376	1241	65	153	760	28	289	446	29
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	7.8	28.3	28.3	8.7	29.2	29.2	6.4	18.7	18.7	6.5	18.8	18.8
Effective Green, g (s)	8.7	28.8	28.3	9.6	30.1	30.1	7.3	19.6	18.7	7.4	19.7	19.7
Actuated g/C Ratio	0.11	0.36	0.35	0.12	0.38	0.38	0.09	0.25	0.23	0.09	0.25	0.25
Clearance Time (s)	4.0	4.9	4.9	4.0	4.9	4.9	4.0	4.9	4.9	4.0	4.9	4.9
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0	3.0	2.5	5.4	5.4	2.5	3.0	3.0
Lane Grp Cap (vph)	373	1831	543	412	1913	578	313	1246	358	318	871	377
v/s Ratio Prot	0.08	c0.35		c0.11	0.24		0.04	c0.15		c0.08	0.13	
v/s Ratio Perm			0.03			0.04			0.02			0.02
v/c Ratio	0.71	0.97	0.07	0.91	0.65	0.11	0.49	0.61	0.08	0.91	0.51	0.08
Uniform Delay, d1	34.4	25.1	17.1	34.8	20.6	16.2	34.6	26.8	23.9	36.0	26.0	23.2
Progression Factor	1.33	0.71	0.33	1.28	0.57	0.51	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.7	12.2	0.2	19.6	1.3	0.3	0.9	1.4	0.2	28.1	0.5	0.1
Delay (s)	50.5	29.9	5.9	64.2	13.1	8.5	35.5	28.2	24.1	64.1	26.5	23.3
Level of Service	D	C	A	E	B	A	D	C	C	E	C	C
Approach Delay (s)		31.6			23.5			28.8			38.8	
Approach LOS		C			C			C			D	

Intersection Summary

HCM Average Control Delay	29.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.6
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project AM
6: Gettysburg Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	222	154	36	148	86	25	796	25	42	616	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.1	4.1		4.1	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.95		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1744	1713		1764	1744		1724	3451		1761	3507	
Flt Permitted	0.55	1.00		0.32	1.00		0.35	1.00		0.27	1.00	
Satd. Flow (perm)	1008	1713		603	1744		643	3451		495	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	241	167	39	161	93	27	865	27	46	670	33
RTOR Reduction (vph)	0	46	0	0	39	0	0	3	0	0	5	0
Lane Group Flow (vph)	125	362	0	39	215	0	27	889	0	46	698	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	15.0	15.0		15.0	15.0		25.0	25.0		25.0	25.0	
Effective Green, g (s)	15.2	15.2		15.2	15.2		25.9	25.9		25.9	25.9	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.52	0.52		0.52	0.52	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	310	526		185	536		336	1806		259	1835	
v/s Ratio Prot		c0.21			0.12			c0.26			0.20	
v/s Ratio Perm	0.12			0.06			0.04			0.09		
v/c Ratio	0.40	0.69		0.21	0.40		0.08	0.49		0.18	0.38	
Uniform Delay, d1	13.6	15.1		12.7	13.6		5.9	7.6		6.2	7.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	3.4		0.4	0.4		0.0	0.1		0.1	0.0	
Delay (s)	14.2	18.5		13.1	13.9		5.9	7.7		6.3	7.1	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		17.5			13.8			7.6			7.0	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	49.5	Sum of lost time (s)	8.4
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project AM
7: Barstow Avenue & Thorne Avenue

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	675	13	52	750	24	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	0.97	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.91	
Flt Protected	1.00		0.95	1.00	0.98	
Satd. Flow (prot)	1786		1719	1810	1617	
Flt Permitted	1.00		0.95	1.00	0.98	
Satd. Flow (perm)	1786		1719	1810	1617	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	734	14	57	815	26	46
RTOR Reduction (vph)	1	0	0	0	32	0
Lane Group Flow (vph)	747	0	57	815	40	0
Confl. Peds. (#/hr)		10	10		10	10
Confl. Bikes (#/hr)	10	10	10	10	10	10
Heavy Vehicles (%)	6%	6%	5%	5%	2%	2%
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Actuated Green, G (s)	27.5		2.3	34.3	18.2	
Effective Green, g (s)	27.5		2.3	34.3	18.2	
Actuated g/C Ratio	0.45		0.04	0.56	0.30	
Clearance Time (s)	4.5		4.5	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	799		64	1009	479	
v/s Ratio Prot	c0.42		0.03	c0.45	c0.02	
v/s Ratio Perm						
v/c Ratio	0.93		0.89	0.81	0.08	
Uniform Delay, d1	16.1		29.5	10.9	15.6	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	17.8		74.9	4.8	0.3	
Delay (s)	34.0		104.3	15.8	16.0	
Level of Service	C		F	B	B	
Approach Delay (s)	34.0			21.6	16.0	
Approach LOS	C			C	B	

Intersection Summary

HCM Average Control Delay	26.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project AM
8: San Ramon Avenue & Thorne Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	26	3	8	13	7	0	26	4	42	22	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	28	3	9	14	8	0	28	4	46	24	2
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											650	
pX, platoon unblocked												
vC, conflicting volume	181	169	45	184	168	50	36			43		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	181	169	45	184	168	50	36			43		
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 %	100	96	100	99	98	99	100			97		
cM capacity (veh/h)	719	688	1002	712	692	1001	1562			1553		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	35	30	33	72
Volume Left	3	9	0	46
Volume Right	3	8	4	2
cSH	711	756	1562	1553
Volume to Capacity	0.05	0.04	0.00	0.03
Queue Length 95th (ft)	4	3	0	2
Control Delay (s)	10.3	10.0	0.0	4.8
Lane LOS	B	A		A
Approach Delay (s)	10.3	10.0	0.0	4.8
Approach LOS	B	A		

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		

2030 No Project AM
9: Shaw Avenue & Fruit Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	1762	31	35	1346	52	49	248	59	114	169	293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.0		3.1	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5068		1770	5085	1540	1754	3415		1757	1863	1529
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.52	1.00		0.45	1.00	1.00
Satd. Flow (perm)	1770	5068		1770	5085	1540	953	3415		841	1863	1529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	1915	34	38	1463	57	53	270	64	124	184	318
RTOR Reduction (vph)	0	2	0	0	0	17	0	28	0	0	0	222
Lane Group Flow (vph)	209	1947	0	38	1463	40	53	306	0	124	184	96
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	13.0	46.2		4.4	37.1	37.1	15.6	15.6		15.6	15.6	15.6
Effective Green, g (s)	13.9	47.1		5.3	38.0	38.0	16.5	16.5		16.5	16.5	16.5
Actuated g/C Ratio	0.17	0.59		0.07	0.48	0.48	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	4.5	4.9		4.0	4.9	4.9	4.9	4.9		4.9	4.9	4.9
Vehicle Extension (s)	3.0	3.0		2.5	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	308	2984		117	2415	732	197	704		173	384	315
v/s Ratio Prot	c0.12	c0.38		0.02	0.29			0.09			0.10	
v/s Ratio Perm						0.03	0.06			c0.15		0.06
v/c Ratio	0.68	0.65		0.32	0.61	0.05	0.27	0.43		0.72	0.48	0.30
Uniform Delay, d1	31.0	11.0		35.6	15.5	11.3	26.7	27.7		29.6	28.0	26.9
Progression Factor	1.00	1.00		1.22	0.38	0.20	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.8	1.1		1.0	0.9	0.1	0.7	0.4		13.2	0.9	0.5
Delay (s)	36.8	12.1		44.6	6.9	2.4	27.4	28.1		42.8	28.9	27.4
Level of Service	D	B		D	A	A	C	C		D	C	C
Approach Delay (s)		14.5			7.6			28.0			30.9	
Approach LOS		B			A			C			C	

Intersection Summary

HCM Average Control Delay	15.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.6
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project AM
10: Shaw Avenue & Maroa Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	292	1518	69	15	1264	47	163	215	34	103	199	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.0		3.1	4.0		3.9	3.9		3.9	3.9	3.9
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		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)	1770	5042		1770	5053		1755	3451		1755	1863	1530
Flt Permitted	0.95	1.00		0.95	1.00		0.48	1.00		0.54	1.00	1.00
Satd. Flow (perm)	1770	5042		1770	5053		883	3451		1004	1863	1530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	317	1650	75	16	1374	51	177	234	37	112	216	228
RTOR Reduction (vph)	0	5	0	0	5	0	0	17	0	0	0	174
Lane Group Flow (vph)	317	1720	0	16	1420	0	177	254	0	112	216	54
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	16.4	47.2		1.0	31.8		18.4	18.4		18.4	18.4	18.4
Effective Green, g (s)	17.3	48.1		1.9	32.7		19.0	19.0		19.0	19.0	19.0
Actuated g/C Ratio	0.22	0.60		0.02	0.41		0.24	0.24		0.24	0.24	0.24
Clearance Time (s)	4.0	4.9		4.0	4.9		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	383	3032		42	2065		210	820		238	442	363
v/s Ratio Prot	c0.18	0.34		0.01	c0.28			0.07			0.12	
v/s Ratio Perm							c0.20			0.11		0.04
v/c Ratio	0.83	0.57		0.38	0.69		0.84	0.31		0.47	0.49	0.15
Uniform Delay, d1	29.9	9.7		38.5	19.5		29.1	25.1		26.2	26.3	24.1
Progression Factor	1.46	0.52		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.6	0.3		4.2	1.9		25.2	0.2		1.5	0.9	0.2
Delay (s)	49.3	5.3		42.6	21.3		54.3	25.3		27.7	27.2	24.3
Level of Service	D	A		D	C		D	C		C	C	C
Approach Delay (s)		12.1			21.6			36.8			26.1	
Approach LOS		B			C			D			C	

Intersection Summary

HCM Average Control Delay	19.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project AM
11: San Ramon Avenue & Colonial Avenue

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	11	11	3	9	10
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	12	12	3	10	11
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	62	35	31			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	62	35	31			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	914	1012	1569			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	18	15	21
Volume Left	7	12	0
Volume Right	12	0	11
cSH	975	1569	1700
Volume to Capacity	0.02	0.01	0.01
Queue Length 95th (ft)	1	1	0
Control Delay (s)	8.8	5.8	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	5.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		

2030 No Project AM
14: Ashlan Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	528	52	27	400	54	160	591	74	50	517	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		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)	1770	1838		1770	1829		1770	3480		1770	3420	
Flt Permitted	0.30	1.00		0.17	1.00		0.32	1.00		0.32	1.00	
Satd. Flow (perm)	556	1838		323	1829		599	3480		601	3420	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	574	57	29	435	59	174	642	80	54	562	162
RTOR Reduction (vph)	0	6	0	0	8	0	0	16	0	0	43	0
Lane Group Flow (vph)	96	625	0	29	486	0	174	706	0	54	681	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	23.1	23.1		23.1	23.1		25.7	25.7		25.7	25.7	
Effective Green, g (s)	23.1	23.1		23.1	23.1		25.7	25.7		25.7	25.7	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.44	0.44		0.44	0.44	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	220	728		128	725		264	1534		265	1508	
v/s Ratio Prot		c0.34			0.27			0.20			0.20	
v/s Ratio Perm	0.17			0.09			c0.29			0.09		
v/c Ratio	0.44	0.86		0.23	0.67		0.66	0.46		0.20	0.45	
Uniform Delay, d1	12.8	16.1		11.7	14.5		12.8	11.4		10.0	11.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	9.8		0.7	2.1		12.2	1.0		1.7	1.0	
Delay (s)	13.9	25.9		12.3	16.6		25.1	12.4		11.7	12.4	
Level of Service	B	C		B	B		C	B		B	B	
Approach Delay (s)		24.3			16.4			14.9			12.3	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	9.5
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project AM
15: Van Ness Avenue & Palm Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	42	908	8	0	826
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	46	987	9	0	898
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						186
pX, platoon unblocked	0.89					
vC, conflicting volume	1440	333			996	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1255	333			996	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	93			100	
cM capacity (veh/h)	146	662			691	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	46	395	395	206	449	449
Volume Left	0	0	0	0	0	0
Volume Right	46	0	0	9	0	0
cSH	662	1700	1700	1700	1700	1700
Volume to Capacity	0.07	0.23	0.23	0.12	0.26	0.26
Queue Length 95th (ft)	6	0	0	0	0	0
Control Delay (s)	10.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	10.8	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		

2030 No Project AM
16: Browning Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	163	51	238	55	58	23	153	805	18	26	901	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1783		1770	3527		1770	3448	
Flt Permitted	0.70	1.00	1.00	0.72	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1304	1863	1583	1343	1783		1770	3527		1770	3448	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	55	259	60	63	25	166	875	20	28	979	202
RTOR Reduction (vph)	0	0	168	0	20	0	0	2	0	0	22	0
Lane Group Flow (vph)	177	55	91	60	68	0	166	893	0	28	1159	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	13.2	13.2	13.2	13.2	13.2		8.5	37.6		2.0	29.2	
Effective Green, g (s)	13.2	13.2	13.2	13.2	13.2		8.5	37.6		2.0	29.2	
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.13	0.58		0.03	0.45	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	268	382	325	276	366		234	2062		55	1566	
v/s Ratio Prot		0.03			0.04		c0.09	0.25		0.02	c0.34	
v/s Ratio Perm	c0.14		0.06	0.04								
v/c Ratio	0.66	0.14	0.28	0.22	0.19		0.71	0.43		0.51	0.74	
Uniform Delay, d1	23.5	20.9	21.5	21.3	21.1		26.7	7.4		30.7	14.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.4	0.1	0.3	0.3	0.2		7.8	0.3		2.7	2.3	
Delay (s)	28.9	21.1	21.9	21.5	21.3		34.5	7.7		33.3	16.7	
Level of Service	C	C	C	C	C		C	A		C	B	
Approach Delay (s)		24.3			21.4			11.9			17.1	
Approach LOS		C			C			B			B	

Intersection Summary

HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	64.3	Sum of lost time (s)	13.4
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
1: Bullard Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	190	761	146	258	997	91	205	1042	293	130	953	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3435		1719	3386		1770	3398		1770	3539	1530
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3435		1719	3386		1770	3398		1770	3539	1530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	827	159	280	1084	99	223	1133	318	141	1036	200
RTOR Reduction (vph)	0	13	0	0	6	0	0	22	0	0	0	44
Lane Group Flow (vph)	207	973	0	280	1177	0	223	1429	0	141	1036	156
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	11.0	31.1		16.0	36.1		14.0	48.1		7.0	41.1	41.1
Effective Green, g (s)	11.0	31.1		16.0	36.1		14.0	48.1		7.0	41.1	41.1
Actuated g/C Ratio	0.09	0.26		0.13	0.30		0.12	0.40		0.06	0.34	0.34
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	4.5		2.0	4.5	4.5
Lane Grp Cap (vph)	162	890		229	1019		207	1362		103	1212	524
v/s Ratio Prot	0.12	0.28		c0.16	c0.35		c0.13	c0.42		c0.08	0.29	
v/s Ratio Perm												0.10
v/c Ratio	1.28	1.09		1.22	1.16		1.08	1.05		1.37	0.85	0.30
Uniform Delay, d1	54.5	44.5		52.0	42.0		53.0	36.0		56.5	36.7	28.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	164.0	58.7		132.8	81.3		84.6	38.5		215.9	6.5	0.6
Delay (s)	218.5	103.2		184.8	123.2		137.6	74.4		272.4	43.2	29.4
Level of Service	F	F		F	F		F	E		F	D	C
Approach Delay (s)		123.2			135.0			82.9			64.7	
Approach LOS		F			F			F			E	

Intersection Summary

HCM Average Control Delay	100.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	101.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
2: Barstow Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	168	468	140	92	462	245	175	1266	195	146	1119	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.9	3.9	3.9	3.9	3.9	3.9	3.1	4.4		3.1	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.96	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1523	1770	1863	1522	1703	3314		1770	3411	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1523	1770	1863	1522	1703	3314		1770	3411	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	183	509	152	100	502	266	190	1376	212	159	1216	267
RTOR Reduction (vph)	0	0	44	0	0	64	0	10	0	0	15	0
Lane Group Flow (vph)	183	509	108	100	502	202	190	1578	0	159	1468	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	10.5	30.6	30.6	8.4	28.5	28.5	12.0	53.1		10.0	51.1	
Effective Green, g (s)	11.1	31.2	31.2	9.0	29.1	29.1	12.9	53.6		10.9	51.6	
Actuated g/C Ratio	0.09	0.26	0.26	0.08	0.24	0.24	0.11	0.45		0.09	0.43	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.9		4.0	4.9	
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5	2.5	2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	164	484	396	133	452	369	183	1480		161	1467	
v/s Ratio Prot	c0.10	c0.27		0.06	0.27		c0.11	c0.48		0.09	0.43	
v/s Ratio Perm			0.07			0.13						
v/c Ratio	1.12	1.05	0.27	0.75	1.11	0.55	1.04	1.07		0.99	1.00	
Uniform Delay, d1	54.5	44.4	35.4	54.4	45.5	39.7	53.5	33.2		54.5	34.2	
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	104.7	55.2	0.3	21.0	76.0	1.3	76.9	43.3		66.5	23.6	
Delay (s)	159.2	99.6	35.6	75.5	121.4	41.0	130.5	76.5		121.0	57.8	
Level of Service	F	F	D	E	F	D	F	E		F	E	
Approach Delay (s)		101.0			91.5			82.3			63.9	
Approach LOS		F			F			F			E	

Intersection Summary

HCM Average Control Delay	81.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
3: San Ramon Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	0	13	2	1	11	86	1544	24	15	1309	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	0	14	2	1	12	93	1678	26	16	1423	49
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								679			640	
pX, platoon unblocked	0.75	0.75	0.60	0.75	0.75	0.69	0.60			0.69		
vC, conflicting volume	2538	3391	756	2656	3403	872	1482			1714		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	561	1691	0	717	1706	0	476			1146		
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.3			2.2		
p0 queue free %	94	100	98	99	98	98	85			96		
cM capacity (veh/h)	250	56	641	189	52	729	617			416		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	28	15	93	1119	586	16	949	523
Volume Left	14	2	93	0	0	16	0	0
Volume Right	14	12	0	0	26	0	0	49
cSH	360	312	617	1700	1700	416	1700	1700
Volume to Capacity	0.08	0.05	0.15	0.66	0.34	0.04	0.56	0.31
Queue Length 95th (ft)	6	4	13	0	0	3	0	0
Control Delay (s)	15.9	17.1	11.9	0.0	0.0	14.0	0.0	0.0
Lane LOS	C	C	B			B		
Approach Delay (s)	15.9	17.1	0.6			0.2		
Approach LOS	C	C						

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

2030 No Project PM
4: San Jose Avenue & Palm Avenue

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (vph)	201	241	134	1306	29	217	1133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.1	4.0		3.1	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91		1.00	0.95
Frpb, ped/bikes	1.00	0.97	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	1.00		1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2757	1229	1752	5015		1752	3505
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	2757	1229	1752	5015		1752	3505
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	262	146	1420	32	236	1232
RTOR Reduction (vph)	0	216	0	3	0	0	0
Lane Group Flow (vph)	218	46	146	1449	0	236	1232
Confl. Peds. (#/hr)	10	10	10		10	10	
Confl. Bikes (#/hr)	10	10	10	10	10	10	10
Heavy Vehicles (%)	27%	27%	3%	3%	3%	3%	3%
Turn Type		Perm	Prot			Prot	
Protected Phases	4		1	6		5	2
Permitted Phases		4					
Actuated Green, G (s)	9.8	9.8	5.5	23.5		10.1	28.1
Effective Green, g (s)	9.8	9.8	6.4	24.4		11.0	29.0
Actuated g/C Ratio	0.17	0.17	0.11	0.43		0.20	0.52
Clearance Time (s)	4.0	4.0	4.0	4.9		4.0	4.9
Vehicle Extension (s)	2.0	2.0	2.0	4.0		2.0	4.0
Lane Grp Cap (vph)	480	214	199	2173		342	1805
v/s Ratio Prot	c0.08		0.08	0.29		c0.13	c0.35
v/s Ratio Perm		0.04					
v/c Ratio	0.45	0.21	0.73	0.67		0.69	0.68
Uniform Delay, d1	20.9	19.9	24.1	12.7		21.1	10.2
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.2	11.4	1.6		4.8	2.1
Delay (s)	21.1	20.1	35.5	14.4		25.8	12.3
Level of Service	C	C	D	B		C	B
Approach Delay (s)	20.6			16.3			14.5
Approach LOS	C			B			B

Intersection Summary

HCM Average Control Delay	16.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	7.1
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
5: Shaw Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	321	1630	67	351	1819	286	178	729	91	452	798	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.4	4.9	3.1	4.0	4.0	3.1	4.0	4.9	3.1	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.96	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1532	3433	5085	1533	3433	5085	1522	3433	3539	1528
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1532	3433	5085	1533	3433	5085	1522	3433	3539	1528
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	349	1772	73	382	1977	311	193	792	99	491	867	240
RTOR Reduction (vph)	0	0	29	0	0	93	0	0	80	0	0	76
Lane Group Flow (vph)	349	1772	44	382	1977	218	193	792	19	491	867	164
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	10.0	38.0	38.0	11.2	39.2	39.2	5.7	19.0	19.0	14.0	27.3	27.3
Effective Green, g (s)	10.9	38.5	38.0	12.1	40.1	40.1	6.6	19.9	19.0	14.9	28.2	28.2
Actuated g/C Ratio	0.11	0.38	0.38	0.12	0.40	0.40	0.07	0.20	0.19	0.15	0.28	0.28
Clearance Time (s)	4.0	4.9	4.9	4.0	4.9	4.9	4.0	4.9	4.9	4.0	4.9	4.9
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0	3.0	2.5	5.4	5.4	2.5	3.0	3.0
Lane Grp Cap (vph)	374	1958	582	415	2039	615	227	1012	289	512	998	431
v/s Ratio Prot	0.10	0.35		c0.11	c0.39		0.06	0.16		c0.14	c0.24	
v/s Ratio Perm			0.03			0.14			0.01			0.11
v/c Ratio	0.93	0.91	0.08	0.92	0.97	0.35	0.85	0.78	0.07	0.96	0.87	0.38
Uniform Delay, d1	44.2	29.0	19.8	43.5	29.4	20.9	46.2	38.0	33.2	42.2	34.1	28.9
Progression Factor	1.11	0.72	0.27	1.42	0.24	0.04	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	26.6	6.4	0.2	3.6	2.2	0.1	24.7	4.8	0.2	29.3	8.1	0.6
Delay (s)	75.4	27.4	5.6	65.1	9.2	0.9	70.9	42.8	33.4	71.5	42.3	29.4
Level of Service	E	C	A	E	A	A	E	D	C	E	D	C
Approach Delay (s)		34.3			16.2			46.9			49.3	
Approach LOS		C			B			D			D	

Intersection Summary

HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.2
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
6: Gettysburg Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	173	37	39	259	42	117	790	18	83	960	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.1	4.1		4.1	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1745	1788		1760	1817		1730	3456		1760	3485	
Flt Permitted	0.39	1.00		0.56	1.00		0.19	1.00		0.28	1.00	
Satd. Flow (perm)	719	1788		1034	1817		350	3456		524	3485	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	67	188	40	42	282	46	127	859	20	90	1043	88
RTOR Reduction (vph)	0	13	0	0	10	0	0	2	0	0	9	0
Lane Group Flow (vph)	67	215	0	42	318	0	127	877	0	90	1122	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	14.4	14.4		14.4	14.4		29.9	29.9		29.9	29.9	
Effective Green, g (s)	14.6	14.6		14.6	14.6		30.8	30.8		30.8	30.8	
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.57	0.57		0.57	0.57	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	195	485		281	493		200	1979		300	1995	
v/s Ratio Prot		0.12			c0.17			0.25			0.32	
v/s Ratio Perm	0.09			0.04			c0.36			0.17		
v/c Ratio	0.34	0.44		0.15	0.64		0.64	0.44		0.30	0.56	
Uniform Delay, d1	15.7	16.2		14.9	17.3		7.7	6.6		5.9	7.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.5		0.2	2.6		4.8	0.1		0.2	0.2	
Delay (s)	16.5	16.7		15.1	19.9		12.5	6.6		6.1	7.5	
Level of Service	B	B		B	B		B	A		A	A	
Approach Delay (s)		16.7			19.3			7.4			7.4	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	53.8	Sum of lost time (s)	8.4
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
7: Barstow Avenue & Thorne Avenue

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	713	15	32	882	6	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	0.95	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.88	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	1786		1719	1810	1554	
Flt Permitted	1.00		0.95	1.00	0.99	
Satd. Flow (perm)	1786		1719	1810	1554	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	775	16	35	959	7	54
RTOR Reduction (vph)	1	0	0	0	40	0
Lane Group Flow (vph)	790	0	35	959	21	0
Confl. Peds. (#/hr)		10	10		10	10
Confl. Bikes (#/hr)	10	10	10	10	10	10
Heavy Vehicles (%)	6%	6%	5%	5%	2%	2%
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Actuated Green, G (s)	32.1		1.5	38.1	17.0	
Effective Green, g (s)	32.1		1.5	38.1	17.0	
Actuated g/C Ratio	0.50		0.02	0.59	0.27	
Clearance Time (s)	4.5		4.5	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	894		40	1076	412	
v/s Ratio Prot	0.44		0.02	c0.53	c0.01	
v/s Ratio Perm						
v/c Ratio	0.88		0.88	0.89	0.05	
Uniform Delay, d1	14.3		31.2	11.2	17.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	10.3		93.6	9.5	0.2	
Delay (s)	24.7		124.8	20.7	17.8	
Level of Service	C		F	C	B	
Approach Delay (s)	24.7			24.3	17.8	
Approach LOS	C			C	B	

Intersection Summary

HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
8: San Ramon Avenue & Thorne Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	11	1	7	34	5	2	29	4	5	12	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	12	1	8	37	5	2	32	4	5	13	3
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											650	
pX, platoon unblocked												
vC, conflicting volume	108	86	35	91	85	54	26			46		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	108	86	35	91	85	54	26			46		
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	98	100	99	95	99	100			100		
cM capacity (veh/h)	804	783	1015	854	788	997	1575			1549		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	50	38	22
Volume Left	10	8	2	5
Volume Right	1	5	4	3
cSH	801	816	1575	1549
Volume to Capacity	0.03	0.06	0.00	0.00
Queue Length 95th (ft)	2	5	0	0
Control Delay (s)	9.6	9.7	0.4	1.9
Lane LOS	A	A	A	A
Approach Delay (s)	9.6	9.7	0.4	1.9
Approach LOS	A	A		

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	19.0%	ICU Level of Service	A
Analysis Period (min)	15		

2030 No Project PM
9: Shaw Avenue & Fruit Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	123	1658	32	80	1890	55	59	214	71	129	256	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.0		3.1	4.0	3.1	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5066		1770	5085	1490	1756	3376		1754	1863	1525
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.29	1.00		0.46	1.00	1.00
Satd. Flow (perm)	1770	5066		1770	5085	1490	541	3376		845	1863	1525
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	1802	35	87	2054	60	64	233	77	140	278	130
RTOR Reduction (vph)	0	2	0	0	0	12	0	34	0	0	0	103
Lane Group Flow (vph)	134	1835	0	87	2054	48	64	276	0	140	278	27
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot		custom	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						1	8			4		4
Actuated Green, G (s)	12.1	56.4		9.9	53.7	9.9	19.9	19.9		19.9	19.9	19.9
Effective Green, g (s)	13.0	57.3		10.8	54.6	10.8	20.8	20.8		20.8	20.8	20.8
Actuated g/C Ratio	0.13	0.57		0.11	0.55	0.11	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	4.5	4.9		4.0	4.9	4.0	4.9	4.9		4.9	4.9	4.9
Vehicle Extension (s)	3.0	3.0		2.5	3.0	2.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	230	2903		191	2776	161	113	702		176	388	317
v/s Ratio Prot	c0.08	0.36		0.05	c0.40			0.08			0.15	
v/s Ratio Perm						0.03	0.12			c0.17		0.02
v/c Ratio	0.58	0.63		0.46	0.74	0.30	0.57	0.39		0.80	0.72	0.09
Uniform Delay, d1	40.9	14.3		41.8	17.3	41.1	35.6	34.2		37.6	36.9	31.9
Progression Factor	1.00	1.00		0.84	0.29	0.90	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.7	1.1		0.5	0.7	0.3	6.4	0.4		21.5	6.2	0.1
Delay (s)	44.7	15.4		35.8	5.8	37.2	41.9	34.5		59.1	43.1	32.0
Level of Service	D	B		D	A	D	D	C		E	D	C
Approach Delay (s)		17.3			7.8			35.8			44.5	
Approach LOS		B			A			D			D	

Intersection Summary

HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.6
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
10: Shaw Avenue & Maroa Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	390	1595	130	57	1905	109	235	279	21	72	343	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.0		3.1	4.0		3.9	3.9		3.9	3.9	3.9
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5009		1770	5036		1759	3493		1753	1863	1530
Flt Permitted	0.95	1.00		0.95	1.00		0.33	1.00		0.51	1.00	1.00
Satd. Flow (perm)	1770	5009		1770	5036		609	3493		932	1863	1530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	1734	141	62	2071	118	255	303	23	78	373	253
RTOR Reduction (vph)	0	9	0	0	6	0	0	5	0	0	0	167
Lane Group Flow (vph)	424	1866	0	62	2183	0	255	321	0	78	373	86
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	17.8	48.4		4.7	35.3		33.5	33.5		33.5	33.5	33.5
Effective Green, g (s)	18.7	49.3		5.6	36.2		34.1	34.1		34.1	34.1	34.1
Actuated g/C Ratio	0.19	0.49		0.06	0.36		0.34	0.34		0.34	0.34	0.34
Clearance Time (s)	4.0	4.9		4.0	4.9		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	331	2469		99	1823		208	1191		318	635	522
v/s Ratio Prot	c0.24	0.37		0.04	c0.43			0.09			0.20	
v/s Ratio Perm							c0.42			0.08		0.06
v/c Ratio	1.28	0.76		0.63	1.20		1.23	0.27		0.25	0.59	0.17
Uniform Delay, d1	40.6	20.5		46.2	31.9		33.0	23.9		23.7	27.2	23.0
Progression Factor	0.89	0.36		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	136.4	1.0		10.2	94.4		136.6	0.1		0.4	1.4	0.2
Delay (s)	172.6	8.3		56.4	126.3		169.6	24.0		24.1	28.5	23.2
Level of Service	F	A		E	F		F	C		C	C	C
Approach Delay (s)		38.6			124.4			87.9			26.1	
Approach LOS		D			F			F			C	

Intersection Summary

HCM Average Control Delay	75.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
11: San Ramon Avenue & Colonial Avenue

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	30	11	10	7	5
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	33	12	11	8	5
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	65	30	23			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	65	30	23			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	99			
cM capacity (veh/h)	911	1018	1579			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	52	23	13
Volume Left	20	12	0
Volume Right	33	0	5
cSH	975	1579	1700
Volume to Capacity	0.05	0.01	0.01
Queue Length 95th (ft)	4	1	0
Control Delay (s)	8.9	3.8	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	3.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	20.7%	ICU Level of Service	A
Analysis Period (min)	15		

2030 No Project PM
14: Ashlan Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	718	49	106	744	54	58	852	103	97	790	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1845		1770	1844		1770	3482		1770	3498	
Flt Permitted	0.14	1.00		0.14	1.00		0.19	1.00		0.19	1.00	
Satd. Flow (perm)	253	1845		253	1844		355	3482		355	3498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	780	53	115	809	59	63	926	112	105	859	73
RTOR Reduction (vph)	0	4	0	0	5	0	0	16	0	0	10	0
Lane Group Flow (vph)	47	829	0	115	863	0	63	1022	0	105	922	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	29.5	29.5		29.5	29.5		21.0	21.0		21.0	21.0	
Effective Green, g (s)	29.5	29.5		29.5	29.5		21.0	21.0		21.0	21.0	
Actuated g/C Ratio	0.49	0.49		0.49	0.49		0.35	0.35		0.35	0.35	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	124	907		124	907		124	1219		124	1224	
v/s Ratio Prot		0.45			c0.47			0.29			0.26	
v/s Ratio Perm	0.19			0.46			0.18			c0.30		
v/c Ratio	0.38	0.91		0.93	0.95		0.51	0.84		0.85	0.75	
Uniform Delay, d1	9.5	14.1		14.2	14.6		15.4	17.9		18.0	17.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	13.4		58.2	19.2		14.1	7.0		47.5	4.3	
Delay (s)	10.9	27.5		72.4	33.7		29.5	24.9		65.5	21.5	
Level of Service	B	C		E	C		C	C		E	C	
Approach Delay (s)		26.6			38.3			25.2			26.0	
Approach LOS		C			D			C			C	

Intersection Summary

HCM Average Control Delay	28.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

2030 No Project PM
15: Van Ness Avenue & Palm Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	35	963	5	0	1216
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	38	1047	5	0	1322
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						186
pX, platoon unblocked	0.77					
vC, conflicting volume	1710	352			1052	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1318	352			1052	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			100	
cM capacity (veh/h)	114	645			657	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	38	419	419	215	661	661
Volume Left	0	0	0	0	0	0
Volume Right	38	0	0	5	0	0
cSH	645	1700	1700	1700	1700	1700
Volume to Capacity	0.06	0.25	0.25	0.13	0.39	0.39
Queue Length 95th (ft)	5	0	0	0	0	0
Control Delay (s)	10.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	10.9	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

2030 No Project PM
16: Browning Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	174	69	215	25	74	23	210	1459	31	18	1276	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1796		1770	3528		1770	3477	
Flt Permitted	0.69	1.00	1.00	0.71	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1284	1863	1583	1319	1796		1770	3528		1770	3477	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	75	234	27	80	25	228	1586	34	20	1387	185
RTOR Reduction (vph)	0	0	172	0	13	0	0	1	0	0	11	0
Lane Group Flow (vph)	189	75	62	27	92	0	228	1619	0	20	1561	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	16.2	16.2	16.2	16.2	16.2		12.8	58.3		1.8	45.4	
Effective Green, g (s)	16.2	16.2	16.2	16.2	16.2		12.8	58.3		1.8	45.4	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.15	0.66		0.02	0.52	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	237	344	292	243	331		258	2343		36	1798	
v/s Ratio Prot		0.04			0.05		c0.13	0.46		0.01	c0.45	
v/s Ratio Perm	c0.15		0.04	0.02								
v/c Ratio	0.80	0.22	0.21	0.11	0.28		0.88	0.69		0.56	0.87	
Uniform Delay, d1	34.2	30.4	30.4	29.8	30.8		36.8	9.2		42.6	18.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.3	0.2	0.3	0.1	0.3		27.3	1.1		10.1	5.2	
Delay (s)	50.6	30.7	30.6	30.0	31.1		64.1	10.3		52.7	23.8	
Level of Service	D	C	C	C	C		E	B		D	C	
Approach Delay (s)		38.2			30.9			16.9			24.1	
Approach LOS		D			C			B			C	

Intersection Summary

HCM Average Control Delay	22.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	87.8	Sum of lost time (s)	13.4
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX K

2030 PLUS THE PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

2030 Project AM
1: Bullard Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	153	799	150	209	579	121	188	670	143	107	789	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.97		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3439		1719	3332		1770	3427		1770	3539	1533
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3439		1719	3332		1770	3427		1770	3539	1533
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	166	868	163	227	629	132	204	728	155	116	858	58
RTOR Reduction (vph)	0	17	0	0	20	0	0	20	0	0	0	21
Lane Group Flow (vph)	166	1014	0	227	741	0	204	863	0	116	858	37
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	10.5	27.1		12.0	28.6		10.0	26.1		7.0	23.1	23.1
Effective Green, g (s)	10.5	27.1		12.0	28.6		10.0	26.1		7.0	23.1	23.1
Actuated g/C Ratio	0.12	0.30		0.13	0.32		0.11	0.29		0.08	0.26	0.26
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	4.5		2.0	4.5	4.5
Lane Grp Cap (vph)	207	1036		229	1059		197	994		138	908	393
v/s Ratio Prot	0.09	c0.29		c0.13	0.22		c0.12	c0.25		0.07	0.24	
v/s Ratio Perm												0.02
v/c Ratio	0.80	0.98		0.99	0.70		1.04	0.87		0.84	0.94	0.09
Uniform Delay, d1	38.7	31.2		38.9	26.9		40.0	30.3		40.9	32.8	25.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	18.6	22.7		56.7	2.4		73.7	8.7		33.4	18.2	0.2
Delay (s)	57.4	53.9		95.7	29.3		113.7	39.0		74.4	51.0	25.7
Level of Service	E	D		F	C		F	D		E	D	C
Approach Delay (s)		54.4			44.6			53.0			52.2	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	51.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

2030 Project AM
2: Barstow Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	414	131	79	345	158	53	703	95	158	836	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.9	3.9	3.9	3.9	3.9	3.9	3.1	4.4		3.1	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1532	1770	1863	1530	1703	3326		1770	3354	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1532	1770	1863	1530	1703	3326		1770	3354	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	450	142	86	375	172	58	764	103	172	909	334
RTOR Reduction (vph)	0	0	61	0	0	72	0	12	0	0	42	0
Lane Group Flow (vph)	140	450	81	86	375	100	58	855	0	172	1201	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	8.5	26.4	26.4	4.3	22.2	22.2	3.9	30.2		10.6	36.9	
Effective Green, g (s)	9.1	27.0	27.0	4.9	22.8	22.8	4.8	30.7		11.5	37.4	
Actuated g/C Ratio	0.10	0.30	0.30	0.05	0.26	0.26	0.05	0.34		0.13	0.42	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.9		4.0	4.9	
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5	2.5	2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	180	563	463	97	475	390	91	1142		228	1403	
v/s Ratio Prot	c0.08	c0.24		0.05	0.20		0.03	0.26		c0.10	c0.36	
v/s Ratio Perm			0.05			0.07						
v/c Ratio	0.78	0.80	0.17	0.89	0.79	0.26	0.64	0.75		0.75	0.86	
Uniform Delay, d1	39.2	28.7	23.0	42.0	31.1	26.5	41.4	25.9		37.6	23.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	18.8	7.6	0.1	55.9	8.2	0.3	10.3	3.3		11.8	5.9	
Delay (s)	58.0	36.3	23.1	97.9	39.3	26.8	51.7	29.2		49.4	29.4	
Level of Service	E	D	C	F	D	C	D	C		D	C	
Approach Delay (s)		37.9			43.8			30.6			31.9	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	89.4	Sum of lost time (s)	7.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 Project AM
3: San Ramon Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	2	76	8	3	7	25	807	9	10	988	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	2	83	9	3	8	27	877	10	11	1074	48
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								679			640	
pX, platoon unblocked	0.80	0.80	0.72	0.80	0.80	0.84	0.72			0.84		
vC, conflicting volume	1642	2081	581	1599	2100	463	1132			897		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	401	947	0	348	971	0	417			488		
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.3			2.2		
p0 queue free %	96	99	89	98	98	99	97			99		
cM capacity (veh/h)	393	196	771	380	183	879	782			890		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	100	20	27	585	302	11	716	406
Volume Left	15	9	27	0	0	11	0	0
Volume Right	83	8	0	0	10	0	0	48
cSH	637	397	782	1700	1700	890	1700	1700
Volume to Capacity	0.16	0.05	0.03	0.34	0.18	0.01	0.42	0.24
Queue Length 95th (ft)	14	4	3	0	0	1	0	0
Control Delay (s)	11.7	14.5	9.8	0.0	0.0	9.1	0.0	0.0
Lane LOS	B	B	A			A		
Approach Delay (s)	11.7	14.5	0.3			0.1		
Approach LOS	B	B						

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	44.0%	ICU Level of Service	A	
Analysis Period (min)	15			

2030 Project AM
4: San Jose Avenue & Palm Avenue

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (vph)	33	33	41	883	147	312	765
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0		3.1	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	0.98		1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2757	1217	1748	4899		1752	3505
Flt Permitted	0.95	1.00	0.34	1.00		0.95	1.00
Satd. Flow (perm)	2757	1217	623	4899		1752	3505
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	36	45	960	160	339	832
RTOR Reduction (vph)	0	33	0	30	0	0	0
Lane Group Flow (vph)	36	3	45	1090	0	339	832
Confl. Peds. (#/hr)	10	10	10		10	10	
Confl. Bikes (#/hr)	10	10	10	10	10	10	10
Heavy Vehicles (%)	27%	27%	3%	3%	3%	3%	3%
Turn Type		Perm	Perm			Prot	
Protected Phases	4			6		5	2
Permitted Phases		4	6				
Actuated Green, G (s)	5.1	5.1	22.4	22.4		12.3	38.7
Effective Green, g (s)	5.1	5.1	23.3	23.3		13.2	39.6
Actuated g/C Ratio	0.10	0.10	0.44	0.44		0.25	0.75
Clearance Time (s)	4.0	4.0	4.9	4.9		4.0	4.9
Vehicle Extension (s)	2.0	2.0	4.0	4.0		2.0	4.0
Lane Grp Cap (vph)	267	118	275	2166		439	2634
v/s Ratio Prot	c0.01			c0.22		c0.19	0.24
v/s Ratio Perm		0.00	0.07				
v/c Ratio	0.13	0.03	0.16	0.50		0.77	0.32
Uniform Delay, d1	21.8	21.6	8.8	10.5		18.4	2.1
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.0	1.3	0.8		7.5	0.3
Delay (s)	21.9	21.6	10.1	11.4		25.9	2.5
Level of Service	C	C	B	B		C	A
Approach Delay (s)	21.7			11.3			9.2
Approach LOS	C			B			A

Intersection Summary

HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	52.7	Sum of lost time (s)	11.1
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

2030 Project AM
5: Shaw Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	265	1632	70	348	1143	166	141	730	118	271	413	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.4	4.9	3.1	4.0	4.0	3.1	4.0	4.9	3.1	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1536	3433	5085	1536	3433	5085	1530	3433	3539	1528
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1536	3433	5085	1536	3433	5085	1530	3433	3539	1528
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	288	1774	76	378	1242	180	153	793	128	295	449	121
RTOR Reduction (vph)	0	0	37	0	0	107	0	0	98	0	0	96
Lane Group Flow (vph)	288	1774	39	378	1242	73	153	793	30	295	449	25
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	8.3	28.1	28.1	8.5	28.3	28.3	10.2	18.7	18.7	6.9	15.4	15.4
Effective Green, g (s)	9.2	28.6	28.1	9.4	29.2	29.2	11.1	19.6	18.7	7.8	16.3	16.3
Actuated g/C Ratio	0.12	0.36	0.35	0.12	0.36	0.36	0.14	0.25	0.23	0.10	0.20	0.20
Clearance Time (s)	4.0	4.9	4.9	4.0	4.9	4.9	4.0	4.9	4.9	4.0	4.9	4.9
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0	3.0	2.5	5.4	5.4	2.5	3.0	3.0
Lane Grp Cap (vph)	395	1818	540	403	1856	561	476	1246	358	335	721	311
v/s Ratio Prot	0.08	c0.35		c0.11	0.24		c0.04	c0.16		c0.09	0.13	
v/s Ratio Perm			0.03			0.05			0.02			0.02
v/c Ratio	0.73	0.98	0.07	0.94	0.67	0.13	0.32	0.64	0.08	0.88	0.62	0.08
Uniform Delay, d1	34.2	25.4	17.3	35.0	21.3	16.9	31.1	27.0	24.0	35.6	29.0	25.8
Progression Factor	1.01	0.63	0.21	0.90	0.34	0.07	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.9	13.7	0.2	23.6	1.4	0.4	0.3	1.6	0.2	22.5	1.7	0.1
Delay (s)	39.4	29.6	3.9	55.1	8.7	1.5	31.3	28.6	24.2	58.1	30.7	25.9
Level of Service	D	C	A	E	A	A	C	C	C	E	C	C
Approach Delay (s)		30.0			17.7			28.5			39.4	
Approach LOS		C			B			C			D	

Intersection Summary

HCM Average Control Delay	27.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.6
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 Project AM
6: Gettysburg Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	118	222	154	36	148	86	25	831	25	42	620	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.1	4.1		4.1	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.95		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1744	1713		1764	1744		1724	3451		1762	3507	
Flt Permitted	0.55	1.00		0.33	1.00		0.35	1.00		0.25	1.00	
Satd. Flow (perm)	1009	1713		605	1744		639	3451		465	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	128	241	167	39	161	93	27	903	27	46	674	33
RTOR Reduction (vph)	0	46	0	0	39	0	0	3	0	0	5	0
Lane Group Flow (vph)	128	362	0	39	215	0	27	927	0	46	702	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	15.1	15.1		15.1	15.1		25.0	25.0		25.0	25.0	
Effective Green, g (s)	15.3	15.3		15.3	15.3		25.9	25.9		25.9	25.9	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.52	0.52		0.52	0.52	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	311	528		187	538		334	1802		243	1831	
v/s Ratio Prot		c0.21			0.12			c0.27			0.20	
v/s Ratio Perm	0.13			0.06			0.04			0.10		
v/c Ratio	0.41	0.68		0.21	0.40		0.08	0.51		0.19	0.38	
Uniform Delay, d1	13.6	15.0		12.7	13.5		5.9	7.7		6.3	7.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	3.4		0.4	0.4		0.0	0.1		0.1	0.0	
Delay (s)	14.2	18.4		13.1	13.9		5.9	7.8		6.4	7.1	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		17.4			13.8			7.8			7.1	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	49.6	Sum of lost time (s)	8.4
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 Project AM
7: Barstow Avenue & Thorne Avenue

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	686	13	52	752	24	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	0.97	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.91	
Flt Protected	1.00		0.95	1.00	0.98	
Satd. Flow (prot)	1786		1719	1810	1617	
Flt Permitted	1.00		0.95	1.00	0.98	
Satd. Flow (perm)	1786		1719	1810	1617	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	746	14	57	817	26	46
RTOR Reduction (vph)	1	0	0	0	33	0
Lane Group Flow (vph)	759	0	57	817	39	0
Confl. Peds. (#/hr)		10	10		10	10
Confl. Bikes (#/hr)	10	10	10	10	10	10
Heavy Vehicles (%)	6%	6%	5%	5%	2%	2%
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Actuated Green, G (s)	28.0		2.3	34.8	18.1	
Effective Green, g (s)	28.0		2.3	34.8	18.1	
Actuated g/C Ratio	0.45		0.04	0.56	0.29	
Clearance Time (s)	4.5		4.5	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	808		64	1018	473	
v/s Ratio Prot	c0.42		0.03	c0.45	c0.02	
v/s Ratio Perm						
v/c Ratio	0.94		0.89	0.80	0.08	
Uniform Delay, d1	16.1		29.7	10.8	15.9	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	18.3		74.9	4.6	0.3	
Delay (s)	34.5		104.5	15.5	16.2	
Level of Service	C		F	B	B	
Approach Delay (s)	34.5			21.3	16.2	
Approach LOS	C			C	B	

Intersection Summary

HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 Project AM
8: San Ramon Avenue & Thorne Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	27	3	8	13	7	0	26	4	42	22	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	29	3	9	14	8	0	28	4	46	24	2
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											650	
pX, platoon unblocked												
vC, conflicting volume	181	169	45	185	168	50	36			43		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	181	169	45	185	168	50	36			43		
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 %	100	96	100	99	98	99	100			97		
cM capacity (veh/h)	719	688	1002	711	692	1001	1562			1553		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	36	30	33	72
Volume Left	3	9	0	46
Volume Right	3	8	4	2
cSH	711	756	1562	1553
Volume to Capacity	0.05	0.04	0.00	0.03
Queue Length 95th (ft)	4	3	0	2
Control Delay (s)	10.3	10.0	0.0	4.8
Lane LOS	B	A		A
Approach Delay (s)	10.3	10.0	0.0	4.8
Approach LOS	B	A		

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

2030 Project AM
9: Shaw Avenue & Fruit Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	1784	31	35	1349	52	49	248	62	114	169	293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.0		3.1	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5068		1770	5085	1540	1754	3410		1757	1863	1529
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.52	1.00		0.45	1.00	1.00
Satd. Flow (perm)	1770	5068		1770	5085	1540	953	3410		834	1863	1529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	1939	34	38	1466	57	53	270	67	124	184	318
RTOR Reduction (vph)	0	2	0	0	0	17	0	29	0	0	0	252
Lane Group Flow (vph)	209	1971	0	38	1466	40	53	308	0	124	184	66
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	13.0	45.9		4.7	37.1	37.1	15.6	15.6		15.6	15.6	15.6
Effective Green, g (s)	13.9	46.8		5.6	38.0	38.0	16.5	16.5		16.5	16.5	16.5
Actuated g/C Ratio	0.17	0.58		0.07	0.48	0.48	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	4.5	4.9		4.0	4.9	4.9	4.9	4.9		4.9	4.9	4.9
Vehicle Extension (s)	3.0	3.0		2.5	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	308	2965		124	2415	732	197	703		172	384	315
v/s Ratio Prot	0.12	c0.39		0.02	c0.29			0.09			0.10	
v/s Ratio Perm						0.03	0.06			c0.15		0.04
v/c Ratio	0.68	0.66		0.31	0.61	0.05	0.27	0.44		0.72	0.48	0.21
Uniform Delay, d1	31.0	11.3		35.4	15.5	11.3	26.7	27.7		29.6	28.0	26.3
Progression Factor	1.00	1.00		0.56	0.24	0.08	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.8	1.2		0.8	0.9	0.1	0.7	0.4		13.8	0.9	0.3
Delay (s)	36.8	12.5		20.7	4.7	1.0	27.4	28.1		43.4	28.9	26.7
Level of Service	D	B		C	A	A	C	C		D	C	C
Approach Delay (s)		14.8			5.0			28.0			30.6	
Approach LOS		B			A			C			C	

Intersection Summary

HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 Project AM
10: Shaw Avenue & Maroa Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	292	1523	70	15	1303	47	169	215	34	103	199	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.0		3.1	4.0		3.9	3.9		3.9	3.9	3.9
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		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)	1770	5042		1770	5054		1755	3451		1755	1863	1531
Flt Permitted	0.95	1.00		0.95	1.00		0.48	1.00		0.55	1.00	1.00
Satd. Flow (perm)	1770	5042		1770	5054		892	3451		1007	1863	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	317	1655	76	16	1416	51	184	234	37	112	216	228
RTOR Reduction (vph)	0	5	0	0	4	0	0	17	0	0	0	173
Lane Group Flow (vph)	317	1726	0	16	1463	0	184	254	0	112	216	55
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	19.4	46.8		1.0	28.4		18.8	18.8		18.8	18.8	18.8
Effective Green, g (s)	20.3	47.7		1.9	29.3		19.4	19.4		19.4	19.4	19.4
Actuated g/C Ratio	0.25	0.60		0.02	0.37		0.24	0.24		0.24	0.24	0.24
Clearance Time (s)	4.0	4.9		4.0	4.9		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	449	3006		42	1851		216	837		244	452	371
v/s Ratio Prot	c0.18	0.34		0.01	c0.29			0.07			0.12	
v/s Ratio Perm							c0.21			0.11		0.04
v/c Ratio	0.71	0.57		0.38	0.79		0.85	0.30		0.46	0.48	0.15
Uniform Delay, d1	27.1	9.9		38.5	22.6		28.9	24.8		25.8	26.0	23.8
Progression Factor	0.69	0.06		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.8	0.3		4.2	3.5		26.2	0.2		1.4	0.8	0.2
Delay (s)	20.5	0.9		42.6	26.1		55.1	25.0		27.2	26.8	24.0
Level of Service	C	A		D	C		E	C		C	C	C
Approach Delay (s)		3.9			26.3			37.2			25.7	
Approach LOS		A			C			D			C	

Intersection Summary

HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 Project AM
11: San Ramon Avenue & Colonial Avenue

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	11	12	3	9	10
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	12	13	3	10	11
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	65	35	31			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	65	35	31			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	911	1012	1569			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	18	16	21
Volume Left	7	13	0
Volume Right	12	0	11
cSH	974	1569	1700
Volume to Capacity	0.02	0.01	0.01
Queue Length 95th (ft)	1	1	0
Control Delay (s)	8.8	5.9	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	5.9	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		

2030 Project AM
14: Ashlan Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	528	52	27	400	54	160	624	74	50	521	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		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)	1770	1838		1770	1829		1770	3483		1770	3421	
Flt Permitted	0.30	1.00		0.17	1.00		0.32	1.00		0.30	1.00	
Satd. Flow (perm)	556	1838		323	1829		595	3483		565	3421	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	574	57	29	435	59	174	678	80	54	566	162
RTOR Reduction (vph)	0	6	0	0	8	0	0	15	0	0	43	0
Lane Group Flow (vph)	97	625	0	29	486	0	174	743	0	54	685	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	23.1	23.1		23.1	23.1		25.7	25.7		25.7	25.7	
Effective Green, g (s)	23.1	23.1		23.1	23.1		25.7	25.7		25.7	25.7	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.44	0.44		0.44	0.44	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	220	728		128	725		262	1535		249	1508	
v/s Ratio Prot		c0.34			0.27			0.21			0.20	
v/s Ratio Perm	0.17			0.09			c0.29			0.10		
v/c Ratio	0.44	0.86		0.23	0.67		0.66	0.48		0.22	0.45	
Uniform Delay, d1	12.9	16.1		11.7	14.5		12.9	11.6		10.1	11.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	9.8		0.7	2.1		12.5	1.1		2.0	1.0	
Delay (s)	13.9	25.9		12.3	16.6		25.4	12.7		12.1	12.4	
Level of Service	B	C		B	B		C	B		B	B	
Approach Delay (s)		24.3			16.4			15.1			12.4	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	9.5
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 Project AM
15: Van Ness Avenue & Palm Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	42	947	8	0	831
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	46	1029	9	0	903
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						186
pX, platoon unblocked	0.89					
vC, conflicting volume	1485	347			1038	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1292	347			1038	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	93			100	
cM capacity (veh/h)	137	649			665	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	46	412	412	215	452	452
Volume Left	0	0	0	0	0	0
Volume Right	46	0	0	9	0	0
cSH	649	1700	1700	1700	1700	1700
Volume to Capacity	0.07	0.24	0.24	0.13	0.27	0.27
Queue Length 95th (ft)	6	0	0	0	0	0
Control Delay (s)	11.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	11.0	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

2030 Project AM
16: Browning Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	163	51	240	55	58	23	153	809	18	26	935	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1783		1770	3527		1770	3451	
Flt Permitted	0.70	1.00	1.00	0.72	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1304	1863	1583	1343	1783		1770	3527		1770	3451	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	55	261	60	63	25	166	879	20	28	1016	202
RTOR Reduction (vph)	0	0	165	0	20	0	0	2	0	0	21	0
Lane Group Flow (vph)	177	55	96	60	68	0	166	897	0	28	1197	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	13.3	13.3	13.3	13.3	13.3		8.5	38.0		2.0	29.6	
Effective Green, g (s)	13.3	13.3	13.3	13.3	13.3		8.5	38.0		2.0	29.6	
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.13	0.59		0.03	0.46	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	268	382	325	276	366		232	2068		55	1576	
v/s Ratio Prot		0.03			0.04		c0.09	0.25		0.02	c0.35	
v/s Ratio Perm	c0.14		0.06	0.04								
v/c Ratio	0.66	0.14	0.30	0.22	0.19		0.72	0.43		0.51	0.76	
Uniform Delay, d1	23.7	21.1	21.8	21.4	21.3		27.0	7.4		30.9	14.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.4	0.1	0.4	0.3	0.2		8.4	0.3		2.7	2.6	
Delay (s)	29.1	21.2	22.2	21.7	21.5		35.4	7.7		33.6	17.2	
Level of Service	C	C	C	C	C		D	A		C	B	
Approach Delay (s)		24.5			21.6			12.1			17.6	
Approach LOS		C			C			B			B	

Intersection Summary

HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	64.8	Sum of lost time (s)	13.4
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
1: Bullard Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	190	761	146	261	997	91	206	1065	301	130	956	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3435		1719	3386		1770	3398		1770	3539	1530
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3435		1719	3386		1770	3398		1770	3539	1530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	827	159	284	1084	99	224	1158	327	141	1039	200
RTOR Reduction (vph)	0	13	0	0	6	0	0	22	0	0	0	44
Lane Group Flow (vph)	207	973	0	284	1177	0	224	1463	0	141	1039	156
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases												2
Actuated Green, G (s)	11.0	31.1		16.0	36.1		14.0	48.1		7.0	41.1	41.1
Effective Green, g (s)	11.0	31.1		16.0	36.1		14.0	48.1		7.0	41.1	41.1
Actuated g/C Ratio	0.09	0.26		0.13	0.30		0.12	0.40		0.06	0.34	0.34
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	4.9		4.0	4.9	4.9
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	4.5		2.0	4.5	4.5
Lane Grp Cap (vph)	162	890		229	1019		207	1362		103	1212	524
v/s Ratio Prot	0.12	0.28		c0.17	c0.35		c0.13	c0.43		c0.08	0.29	
v/s Ratio Perm												0.10
v/c Ratio	1.28	1.09		1.24	1.16		1.08	1.07		1.37	0.86	0.30
Uniform Delay, d1	54.5	44.5		52.0	42.0		53.0	36.0		56.5	36.7	28.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	164.0	58.7		139.5	81.3		86.1	47.1		215.9	6.6	0.6
Delay (s)	218.5	103.2		191.5	123.2		139.1	83.0		272.4	43.3	29.4
Level of Service	F	F		F	F		F	F		F	D	C
Approach Delay (s)		123.2			136.4			90.4			64.7	
Approach LOS		F			F			F			E	

Intersection Summary

HCM Average Control Delay	102.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	102.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
2: Barstow Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	168	468	142	95	462	245	184	1301	206	146	1126	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.9	3.9	3.9	3.9	3.9	3.9	3.1	4.4		3.1	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.96	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1524	1770	1863	1522	1703	3312		1770	3411	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1524	1770	1863	1522	1703	3312		1770	3411	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	183	509	154	103	502	266	200	1414	224	159	1224	267
RTOR Reduction (vph)	0	0	45	0	0	64	0	10	0	0	16	0
Lane Group Flow (vph)	183	509	109	103	502	202	200	1628	0	159	1475	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	10.5	32.1	32.1	6.9	28.5	28.5	13.0	54.1		9.0	50.1	
Effective Green, g (s)	11.1	32.7	32.7	7.5	29.1	29.1	13.9	54.6		9.9	50.6	
Actuated g/C Ratio	0.09	0.27	0.27	0.06	0.24	0.24	0.12	0.46		0.08	0.42	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.9		4.0	4.9	
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5	2.5	2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	164	508	415	111	452	369	197	1507		146	1438	
v/s Ratio Prot	c0.10	c0.27		0.06	c0.27		c0.12	c0.49		c0.09	0.43	
v/s Ratio Perm			0.07			0.13						
v/c Ratio	1.12	1.00	0.26	0.93	1.11	0.55	1.02	1.08		1.09	1.03	
Uniform Delay, d1	54.5	43.6	34.2	56.0	45.5	39.7	53.0	32.7		55.0	34.7	
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	104.7	40.4	0.2	62.3	76.0	1.3	68.1	48.1		100.3	30.6	
Delay (s)	159.2	84.1	34.4	118.3	121.4	41.0	121.2	80.8		155.4	65.3	
Level of Service	F	F	C	F	F	D	F	F		F	E	
Approach Delay (s)		91.3			96.5			85.2			74.0	
Approach LOS		F			F			F			E	

Intersection Summary

HCM Average Control Delay	84.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	98.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
3: San Ramon Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	0	13	2	1	11	87	1599	24	15	1321	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	0	14	2	1	12	95	1738	26	16	1436	49
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								679			640	
pX, platoon unblocked	0.76	0.76	0.61	0.76	0.76	0.68	0.61			0.68		
vC, conflicting volume	2584	3466	762	2725	3478	902	1495			1774		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	600	1754	0	784	1769	0	519			1210		
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.3			2.2		
p0 queue free %	94	100	98	99	98	98	84			96		
cM capacity (veh/h)	235	51	647	170	47	719	599			389		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	28	15	95	1159	605	16	957	528
Volume Left	14	2	95	0	0	16	0	0
Volume Right	14	12	0	0	26	0	0	49
cSH	345	291	599	1700	1700	389	1700	1700
Volume to Capacity	0.08	0.05	0.16	0.68	0.36	0.04	0.56	0.31
Queue Length 95th (ft)	7	4	14	0	0	3	0	0
Control Delay (s)	16.4	18.1	12.1	0.0	0.0	14.7	0.0	0.0
Lane LOS	C	C	B			B		
Approach Delay (s)	16.4	18.1	0.6			0.2		
Approach LOS	C	C						

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	65.3%	ICU Level of Service	C	
Analysis Period (min)	15			

2030 Project PM
4: San Jose Avenue & Palm Avenue

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (vph)	285	297	134	1306	43	229	1133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.1	4.0		3.1	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91		1.00	0.95
Frpb, ped/bikes	1.00	0.97	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	1.00		1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	2757	1231	1752	5005		1752	3505
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	2757	1231	1752	5005		1752	3505
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	310	323	146	1420	47	249	1232
RTOR Reduction (vph)	0	212	0	5	0	0	0
Lane Group Flow (vph)	310	111	146	1462	0	249	1232
Confl. Peds. (#/hr)	10	10	10		10	10	
Confl. Bikes (#/hr)	10	10	10	10	10	10	10
Heavy Vehicles (%)	27%	27%	3%	3%	3%	3%	3%
Turn Type		Perm	Prot			Prot	
Protected Phases	4		1	6		5	2
Permitted Phases		4					
Actuated Green, G (s)	11.5	11.5	5.5	23.2		10.4	28.1
Effective Green, g (s)	11.5	11.5	6.4	24.1		11.3	29.0
Actuated g/C Ratio	0.20	0.20	0.11	0.42		0.19	0.50
Clearance Time (s)	4.0	4.0	4.0	4.9		4.0	4.9
Vehicle Extension (s)	2.0	2.0	2.0	4.0		2.0	4.0
Lane Grp Cap (vph)	547	244	193	2080		341	1753
v/s Ratio Prot	c0.11		0.08	0.29		c0.14	c0.35
v/s Ratio Perm		0.09					
v/c Ratio	0.57	0.45	0.76	0.70		0.73	0.70
Uniform Delay, d1	21.0	20.5	25.0	14.0		21.9	11.2
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.8	0.5	13.9	2.0		6.8	2.4
Delay (s)	21.8	21.0	38.9	16.0		28.7	13.6
Level of Service	C	C	D	B		C	B
Approach Delay (s)	21.4			18.1			16.1
Approach LOS	C			B			B

Intersection Summary

HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	7.1
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
5: Shaw Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	325	1631	67	367	1824	289	178	735	93	484	830	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.4	4.9	3.1	4.0	4.0	3.1	4.0	4.9	3.1	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1532	3433	5085	1532	3433	5085	1522	3433	3539	1528
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1532	3433	5085	1532	3433	5085	1522	3433	3539	1528
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	353	1773	73	399	1983	314	193	799	101	526	902	260
RTOR Reduction (vph)	0	0	28	0	0	93	0	0	82	0	0	79
Lane Group Flow (vph)	353	1773	45	399	1983	221	193	799	19	526	902	181
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	10.0	36.7	36.7	11.7	38.4	38.4	5.7	19.0	19.0	14.8	28.1	28.1
Effective Green, g (s)	10.9	37.2	36.7	12.6	39.3	39.3	6.6	19.9	19.0	15.7	29.0	29.0
Actuated g/C Ratio	0.11	0.37	0.37	0.13	0.39	0.39	0.07	0.20	0.19	0.16	0.29	0.29
Clearance Time (s)	4.0	4.9	4.9	4.0	4.9	4.9	4.0	4.9	4.9	4.0	4.9	4.9
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0	3.0	2.5	5.4	5.4	2.5	3.0	3.0
Lane Grp Cap (vph)	374	1892	562	433	1998	602	227	1012	289	539	1026	443
v/s Ratio Prot	0.10	c0.35		0.12	c0.39		0.06	c0.16		c0.15	c0.25	
v/s Ratio Perm			0.03			0.14			0.01			0.12
v/c Ratio	0.94	0.94	0.08	0.92	0.99	0.37	0.85	0.79	0.07	0.98	0.88	0.41
Uniform Delay, d1	44.2	30.3	20.6	43.2	30.2	21.5	46.2	38.1	33.2	42.0	33.8	28.6
Progression Factor	0.79	0.73	0.31	0.68	0.52	0.12	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	28.5	8.9	0.2	3.5	4.6	0.2	24.7	5.0	0.2	32.3	8.7	0.6
Delay (s)	63.6	31.1	6.7	32.8	20.1	2.6	70.9	43.0	33.5	74.3	42.5	29.2
Level of Service	E	C	A	C	C	A	E	D	C	E	D	C
Approach Delay (s)		35.5			20.0			47.1			50.4	
Approach LOS		D			B			D			D	

Intersection Summary

HCM Average Control Delay	35.0	HCM Level of Service	C
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
6: Gettysburg Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	173	37	39	259	42	117	797	18	84	996	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.3	4.3		4.3	4.3		4.1	4.1		4.1	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1745	1787		1760	1816		1731	3456		1760	3486	
Flt Permitted	0.38	1.00		0.55	1.00		0.18	1.00		0.28	1.00	
Satd. Flow (perm)	702	1787		1019	1816		330	3456		521	3486	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	67	188	40	42	282	46	127	866	20	91	1083	90
RTOR Reduction (vph)	0	13	0	0	10	0	0	2	0	0	8	0
Lane Group Flow (vph)	67	215	0	42	318	0	127	884	0	91	1165	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	14.6	14.6		14.6	14.6		31.3	31.3		31.3	31.3	
Effective Green, g (s)	14.8	14.8		14.8	14.8		32.2	32.2		32.2	32.2	
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.58	0.58		0.58	0.58	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	188	477		272	485		192	2009		303	2026	
v/s Ratio Prot		0.12			c0.17			0.26			0.33	
v/s Ratio Perm	0.10			0.04			c0.38			0.17		
v/c Ratio	0.36	0.45		0.15	0.66		0.66	0.44		0.30	0.57	
Uniform Delay, d1	16.4	16.9		15.5	18.0		7.9	6.5		5.9	7.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.5		0.2	2.8		6.5	0.1		0.2	0.2	
Delay (s)	17.3	17.4		15.7	20.9		14.4	6.6		6.1	7.5	
Level of Service	B	B		B	C		B	A		A	A	
Approach Delay (s)		17.4			20.3			7.6			7.4	
Approach LOS		B			C			A			A	

Intersection Summary

HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	8.4
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
7: Barstow Avenue & Thorne Avenue

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	715	15	32	892	6	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	0.95	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.88	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	1786		1719	1810	1553	
Flt Permitted	1.00		0.95	1.00	0.99	
Satd. Flow (perm)	1786		1719	1810	1553	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	777	16	35	970	7	54
RTOR Reduction (vph)	1	0	0	0	40	0
Lane Group Flow (vph)	792	0	35	970	21	0
Confl. Peds. (#/hr)		10	10		10	10
Confl. Bikes (#/hr)	10	10	10	10	10	10
Heavy Vehicles (%)	6%	6%	5%	5%	2%	2%
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Actuated Green, G (s)	32.5		1.6	38.6	17.0	
Effective Green, g (s)	32.5		1.6	38.6	17.0	
Actuated g/C Ratio	0.50		0.02	0.60	0.26	
Clearance Time (s)	4.5		4.5	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	899		43	1082	409	
v/s Ratio Prot	0.44		0.02	c0.54	c0.01	
v/s Ratio Perm						
v/c Ratio	0.88		0.81	0.90	0.05	
Uniform Delay, d1	14.3		31.4	11.3	17.8	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	10.1		69.6	9.8	0.2	
Delay (s)	24.4		101.0	21.1	18.0	
Level of Service	C		F	C	B	
Approach Delay (s)	24.4			23.9	18.0	
Approach LOS	C			C	B	

Intersection Summary

HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	64.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
8: San Ramon Avenue & Thorne Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	11	1	7	34	5	2	29	4	5	12	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	12	1	8	37	5	2	32	4	5	13	3
Pedestrians		10			10			10			10	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											650	
pX, platoon unblocked												
vC, conflicting volume	108	86	35	91	85	54	26			46		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	108	86	35	91	85	54	26			46		
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	98	100	99	95	99	100			100		
cM capacity (veh/h)	804	783	1015	854	788	997	1575			1549		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	50	38	22
Volume Left	10	8	2	5
Volume Right	1	5	4	3
cSH	801	816	1575	1549
Volume to Capacity	0.03	0.06	0.00	0.00
Queue Length 95th (ft)	2	5	0	0
Control Delay (s)	9.6	9.7	0.4	1.9
Lane LOS	A	A	A	A
Approach Delay (s)	9.6	9.7	0.4	1.9
Approach LOS	A	A		

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	19.0%	ICU Level of Service	A
Analysis Period (min)	15		

2030 Project PM
9: Shaw Avenue & Fruit Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	123	1662	32	83	1910	55	59	214	72	129	256	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.0		3.1	4.0	3.1	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5066		1770	5085	1493	1756	3374		1754	1863	1525
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.29	1.00		0.46	1.00	1.00
Satd. Flow (perm)	1770	5066		1770	5085	1493	544	3374		845	1863	1525
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	1807	35	90	2076	60	64	233	78	140	278	130
RTOR Reduction (vph)	0	2	0	0	0	12	0	35	0	0	0	103
Lane Group Flow (vph)	134	1840	0	90	2076	48	64	276	0	140	278	27
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot		custom	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						1	8			4		4
Actuated Green, G (s)	11.3	55.8		10.4	54.4	10.4	20.0	20.0		20.0	20.0	20.0
Effective Green, g (s)	12.2	56.7		11.3	55.3	11.3	20.9	20.9		20.9	20.9	20.9
Actuated g/C Ratio	0.12	0.57		0.11	0.55	0.11	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	4.5	4.9		4.0	4.9	4.0	4.9	4.9		4.9	4.9	4.9
Vehicle Extension (s)	3.0	3.0		2.5	3.0	2.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	216	2872		200	2812	169	114	705		177	389	319
v/s Ratio Prot	0.08	c0.36		0.05	c0.41			0.08			0.15	
v/s Ratio Perm						0.03	0.12			c0.17		0.02
v/c Ratio	0.62	0.64		0.45	0.74	0.29	0.56	0.39		0.79	0.71	0.09
Uniform Delay, d1	41.7	14.7		41.4	16.9	40.7	35.4	34.1		37.5	36.8	31.9
Progression Factor	1.00	1.00		0.63	0.28	0.54	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.4	1.1		0.4	0.7	0.2	6.2	0.4		21.0	6.1	0.1
Delay (s)	47.1	15.8		26.4	5.4	22.2	41.6	34.4		58.4	42.9	32.0
Level of Service	D	B		C	A	C	D	C		E	D	C
Approach Delay (s)		18.0			6.7			35.7			44.3	
Approach LOS		B			A			D			D	

Intersection Summary

HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
10: Shaw Avenue & Maroa Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	390	1630	134	57	1911	109	236	279	21	72	343	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.1	4.0		3.1	4.0		3.9	3.9		3.9	3.9	3.9
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5008		1770	5036		1759	3493		1753	1863	1530
Flt Permitted	0.95	1.00		0.95	1.00		0.33	1.00		0.51	1.00	1.00
Satd. Flow (perm)	1770	5008		1770	5036		609	3493		932	1863	1530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	1772	146	62	2077	118	257	303	23	78	373	253
RTOR Reduction (vph)	0	10	0	0	6	0	0	5	0	0	0	167
Lane Group Flow (vph)	424	1908	0	62	2189	0	257	321	0	78	373	86
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)	10	10	10	10	10	10	10	10	10	10	10	10
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	17.0	48.6		4.5	36.1		33.5	33.5		33.5	33.5	33.5
Effective Green, g (s)	17.9	49.5		5.4	37.0		34.1	34.1		34.1	34.1	34.1
Actuated g/C Ratio	0.18	0.50		0.05	0.37		0.34	0.34		0.34	0.34	0.34
Clearance Time (s)	4.0	4.9		4.0	4.9		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	317	2479		96	1863		208	1191		318	635	522
v/s Ratio Prot	c0.24	0.38		0.04	c0.43			0.09			0.20	
v/s Ratio Perm							c0.42			0.08		0.06
v/c Ratio	1.34	0.77		0.65	1.17		1.24	0.27		0.25	0.59	0.17
Uniform Delay, d1	41.0	20.6		46.4	31.5		33.0	23.9		23.7	27.2	23.0
Progression Factor	1.01	0.22		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	160.1	0.9		12.4	84.7		140.3	0.1		0.4	1.4	0.2
Delay (s)	201.6	5.4		58.8	116.2		173.3	24.0		24.1	28.5	23.2
Level of Service	F	A		E	F		F	C		C	C	C
Approach Delay (s)		40.9			114.6			89.8			26.1	
Approach LOS		D			F			F			C	

Intersection Summary

HCM Average Control Delay	72.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	105.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
11: San Ramon Avenue & Colonial Avenue

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	30	11	10	7	5
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	33	12	11	8	5
Pedestrians	10			10	10	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	65	30	23			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	65	30	23			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	99			
cM capacity (veh/h)	911	1018	1579			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	52	23	13
Volume Left	20	12	0
Volume Right	33	0	5
cSH	975	1579	1700
Volume to Capacity	0.05	0.01	0.01
Queue Length 95th (ft)	4	1	0
Control Delay (s)	8.9	3.8	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	3.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	20.7%	ICU Level of Service	A
Analysis Period (min)	15		

2030 Project PM
14: Ashlan Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	718	49	106	744	54	58	858	103	97	824	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1845		1770	1844		1770	3482		1770	3499	
Flt Permitted	0.14	1.00		0.14	1.00		0.19	1.00		0.19	1.00	
Satd. Flow (perm)	253	1845		253	1844		355	3482		355	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	780	53	115	809	59	63	933	112	105	896	74
RTOR Reduction (vph)	0	4	0	0	5	0	0	16	0	0	10	0
Lane Group Flow (vph)	47	829	0	115	863	0	63	1029	0	105	960	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	29.5	29.5		29.5	29.5		21.0	21.0		21.0	21.0	
Effective Green, g (s)	29.5	29.5		29.5	29.5		21.0	21.0		21.0	21.0	
Actuated g/C Ratio	0.49	0.49		0.49	0.49		0.35	0.35		0.35	0.35	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	124	907		124	907		124	1219		124	1225	
v/s Ratio Prot		0.45			c0.47			0.30			0.27	
v/s Ratio Perm	0.19			0.46			0.18			c0.30		
v/c Ratio	0.38	0.91		0.93	0.95		0.51	0.84		0.85	0.78	
Uniform Delay, d1	9.5	14.1		14.2	14.6		15.4	18.0		18.0	17.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	13.4		58.2	19.2		14.1	7.3		47.5	5.1	
Delay (s)	10.9	27.5		72.4	33.7		29.5	25.3		65.5	22.5	
Level of Service	B	C		E	C		C	C		E	C	
Approach Delay (s)		26.6			38.3			25.5			26.7	
Approach LOS		C			D			C			C	

Intersection Summary

HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	94.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

2030 Project PM
15: Van Ness Avenue & Palm Avenue

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	35	971	5	0	1256
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	38	1055	5	0	1365
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						186
pX, platoon unblocked	0.76					
vC, conflicting volume	1741	355			1061	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1336	355			1061	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			100	
cM capacity (veh/h)	110	642			652	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	38	422	422	217	683	683
Volume Left	0	0	0	0	0	0
Volume Right	38	0	0	5	0	0
cSH	642	1700	1700	1700	1700	1700
Volume to Capacity	0.06	0.25	0.25	0.13	0.40	0.40
Queue Length 95th (ft)	5	0	0	0	0	0
Control Delay (s)	11.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	11.0	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

2030 Project PM
16: Browning Avenue & Palm Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	174	69	215	25	74	23	212	1494	31	18	1282	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1796		1770	3528		1770	3477	
Flt Permitted	0.69	1.00	1.00	0.71	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1284	1863	1583	1319	1796		1770	3528		1770	3477	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	75	234	27	80	25	230	1624	34	20	1393	185
RTOR Reduction (vph)	0	0	173	0	13	0	0	1	0	0	11	0
Lane Group Flow (vph)	189	75	61	27	92	0	230	1657	0	20	1567	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)	16.2	16.2	16.2	16.2	16.2		12.9	58.5		1.7	45.4	
Effective Green, g (s)	16.2	16.2	16.2	16.2	16.2		12.9	58.5		1.7	45.4	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.15	0.67		0.02	0.52	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	3.0		4.0	4.9	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	237	343	292	243	331		260	2348		34	1796	
v/s Ratio Prot		0.04			0.05		c0.13	0.47		0.01	c0.45	
v/s Ratio Perm	c0.15		0.04	0.02								
v/c Ratio	0.80	0.22	0.21	0.11	0.28		0.88	0.71		0.59	0.87	
Uniform Delay, d1	34.3	30.5	30.4	29.9	30.8		36.8	9.3		42.8	18.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.3	0.2	0.3	0.1	0.3		27.3	1.2		15.6	5.4	
Delay (s)	50.6	30.7	30.7	30.0	31.2		64.1	10.5		58.4	24.1	
Level of Service	D	C	C	C	C		E	B		E	C	
Approach Delay (s)		38.2			30.9			17.0			24.6	
Approach LOS		D			C			B			C	

Intersection Summary

HCM Average Control Delay	23.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	13.4
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX L

FLORIDA TABLES

TABLE 4 – 7

GENERALIZED **PEAK HOUR DIRECTIONAL** VOLUMES FOR FLORIDA'S **URBANIZED AREAS***

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	110	400	790	1,130	1,440
2	Divided	1,060	1,720	2,500	3,230	3,670
3	Divided	1,600	2,590	3,740	4,840	5,500

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	220	720	860	890
2	Divided	250	1,530	1,810	1,860	***
3	Divided	380	2,330	2,720	2,790	***
4	Divided	490	3,030	3,460	3,540	***

Class II (2.00 to 4.50 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	100	590	810	850
2	Divided	**	220	1,360	1,710	1,800
3	Divided	**	340	2,110	2,570	2,710
4	Divided	**	440	2,790	3,330	3,500

Class III (more than 4.5 signalized intersections per mile and not within primary city central business district of an urbanized area over 750,000)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	280	660	810
2	Divided	**	**	650	1,510	1,720
3	Divided	**	**	1,020	2,330	2,580
4	Divided	**	**	1,350	3,070	3,330

Class IV (more than 4.5 signalized intersections per mile and within primary city central business district of an urbanized area over 750,000)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	270	720	780
2	Divided	**	**	650	1,580	1,660
3	Divided	**	**	1,000	2,390	2,490
4	Divided	**	**	1,350	3,130	3,250

NON-STATE ROADWAYS

Major City/County Roadways

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	480	760	810
2	Divided	**	**	1,120	1,620	1,720
3	Divided	**	**	1,740	2,450	2,580

Other Signalized Roadways
(signalized intersection analysis)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	250	530	660
2	Divided	**	**	580	1,140	1,320

Source: Florida Department of Transportation 05/17/07
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www.dot.state.fl.usplanning/systems/sm/los/default.htm

FREEWAYS

Interchange spacing ≥ 2 mi. apart

Lanes	Level of Service A	B	C	D	E
2	1,270	2,110	2,940	3,580	3,980
3	1,970	3,260	4,550	5,530	6,150
4	2,660	4,410	6,150	7,480	8,320
5	3,360	5,560	7,760	9,440	10,480
6	4,050	6,710	9,360	11,390	12,650

Interchange spacing < 2 mi. apart

Lanes	Level of Service A	B	C	D	E
2	1,130	1,840	2,660	3,440	3,910
3	1,780	2,890	4,180	5,410	6,150
4	2,340	3,940	5,700	7,380	8,380
5	3,080	4,990	7,220	9,340	10,620
6	3,730	6,040	8,740	11,310	12,850

BICYCLE MODE

(**Note**: Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	Level of Service A	B	C	D	E
0-49%	**	**	170	720	>720
50-84%	**	130	210	>210	***
85-100%	160	380	>380	***	***

PEDESTRIAN MODE

(**Note:** Level of service for the pedestrian mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not the number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-49%	**	**	**	330	810
50-84%	**	**	**	520	990
85-100%	**	120	590	>590	***

BUS MODE (Scheduled Fixed Route)

(**Note:** Buses per hour shown are only for the **peak hour** in the **single direction** of the higher traffic flow.)

Sidewalk Coverage	Level of Service (Buses per hour) A	B	C	D	E
0-84%	**	>5	≥4	≥3	≥2
85-100%	>6	>4	≥3	≥2	≥1

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS

(alter corresponding volume by the indicated percent)

Lanes	Median	Left Turns Lanes	Adjustment Factors
1	Divided	Yes	+5%
1	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE WAY FACILITIES
Increase corresponding volume by 1.2.

* Values shown are hourly directional volumes for levels of service and are for the automobile/truck modes unless specifically stated. To convert to annual average daily traffic volumes, these volumes must be divided by appropriate D and K factors. This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, Pedestrian LOS Model and Transit Capacity and Quality of Service Manual, respectively for the automobile/truck, bicycle, pedestrian and bus modes.

**Cannot be achieved using table input value defaults.

***Not applicable for that level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

APPENDIX G
UPDATED ENVIRONMENTAL NOISE ASSESSMENT

ENVIRONMENTAL NOISE ASSESSMENT

FIG GARDEN FINANCIAL CENTER PHASE IV
FRESNO, CALIFORNIA

BBA Report 09-001A

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DECEMBER 7, 2011
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1. INTRODUCTION

1.1 Project Description and Location:

The proposed Fig Garden Financial Center Phase IV (project) office building would be located on the south side of West San Jose Avenue between Maroa and Palm Avenues within the City of Fresno. The project would consist of a four-story 104,593 square foot office building to be constructed on a 4.9-acre site currently occupied by one single-family home and a vacant 44-unit apartment complex. The project site location is shown by Figure 1.

The project site is surrounded by single- and multi-family homes to the north, single-family homes to the east, multi-family apartments to the south and an existing Fig Garden Financial Center office building to the west. Although the project is located within the City of Fresno, the residential areas to the east and south of the project site are located within an unincorporated area of Fresno County.

1.2 Environmental Noise Assessment:

This environmental noise assessment has been prepared by Brown-Buntin Associates, Inc. (BBA) to determine if significant noise impacts would be expected to occur as a result of the project, and to describe mitigation measures for noise if significant impacts are determined.

Appendix A provides a description of the acoustical terminology used in this report. Unless otherwise stated, all sound levels reported are in A-weighted decibels (dB). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards utilize A-weighting, as it provides a high degree of correlation with human annoyance and health effects.

2. REGULATORY SETTING

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified for proposed development projects, and that such impacts be eliminated or mitigated to the extent feasible. A significant effect from noise may exist if a project would:

- Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies,
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project,
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project, or
- Result in exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels.

3. THRESHOLDS OF SIGNIFICANCE

3.1 Local Noise Level Standards:

3.1.1 City of Fresno Noise Element

The primary objective of the City of Fresno Noise Element of the General Plan[1] is to protect the citizens of the city from the harmful and annoying effects of exposure to excessive noise. The noise element establishes noise compatibility standards for transportation and stationary noise sources. Public roadways, railroads and aircraft are considered transportation noise sources. Noise sources *not* related to transportation are considered to be stationary noise sources. This would include mechanical equipment and vehicle movements that do not occur on a public roadway. The following policies of the noise element specifically pertain to the project:

Policy H-1-a: New noise-sensitive land uses impacted by existing or projected future transportation noise sources shall include mitigation measures so that resulting noise levels do not exceed the standards shown in Table I.

TABLE I

MAXIMUM ALLOWABLE NOISE EXPOSURE
TRANSPORTATION NOISE SOURCES

Noise-Sensitive Land Use[4]	Outdoor Activity Areas[1] DNL, dB	Interior Spaces	
		DNL, dB	L_{eq} dB[2]
Residential	60[3]	45	---
Transient Lodging	60[3]	45	---
Hospitals, Nursing Homes	60[3]	45	---
Theaters, Auditoriums, Music Halls	---	---	35
Churches, Meeting Halls	60[3]	---	45
Office Buildings	---	---	45
Schools, Libraries, Museums	---	---	45

[1]Where the location of outdoor activity areas is unknown or is not applicable, the exterior noise level standard shall be applied to the property line of the receiving land use.

[2]As determined for a typical worst-case hour during periods of use.

[3]Noise levels up to 65 dB DNL adjacent to the Burlington Northern Santa Fe and Union Pacific mainline tracks may be allowed by the project approving authority when it is determined that it is not possible to achieve 60 dB DNL in outdoor activity areas using a practical application of the best-available noise reduction technology, and when all feasible exterior noise reduction measures have been proposed.

[4]The Planning and Development Director, on a case-by-case basis, may designate land uses other than those shown in this table to be noise-sensitive, and may require appropriate noise mitigation measures.

Source: Table 8 of the City of Fresno Noise Element.

Policy H-1-b: For purposes of city analyses of noise impacts, and for determining appropriate noise mitigation, a significant increase in noise levels is assumed if the project results in any of the following conditions:

- the existing ambient noise level is less than 60 dB DNL and the project will cause the ambient noise level to increase by 5 dB or more.
- the existing ambient noise level is 60-65 dB DNL and the project will cause the ambient noise level to increase by 3 dB or more.
- the existing ambient noise level is greater than 65 dB DNL and the project will cause the ambient noise level to increase by 1.5 dB or more.

Policy H-1-c: The city shall review new public and private development proposals to determine conformance with the policies of the noise element.

Policy H-1-l: Noise created by proposed new stationary noise sources or existing stationary noise sources that undergo modifications that may increase noise levels shall be mitigated so as not to exceed the standards shown in Table II at noise-sensitive land uses.

TABLE II

MAXIMUM ALLOWABLE NOISE EXPOSURE[1]
STATIONARY NOISE SOURCES

	Daytime (7:00 a.m.-10:00 p.m.)	**Nighttime (10:00 p.m.-7:00 a.m.)**
Hourly Equivalent Sound Level (L_{eq}), dBA	50	45
Maximum Sound Level (L_{max}), dBA	70	65

[1]As determined at outdoor activity areas. Where the location of outdoor activity areas is unknown or is not applicable, the exterior noise level standard shall be applied to the property line of the receiving land use. When ambient noise levels equal or exceed the levels in this table, mitigation shall only be required to limit noise to the ambient plus five (5) dB.

Source: Table 9 of the City of Fresno Noise Element.

3.1.2 City of Fresno Noise Ordinance

The City of Fresno Municipal Code (Noise Ordinance)[2] prohibits excessive noise from sources not preempted from local control by existing federal or state noise regulations. This would include mechanical equipment and vehicles not operated on a public roadway (referred to as stationary sources in the noise element). A potential violation of the noise ordinance would exist if the existing ambient noise level would be exceeded by five (5) dBA due to an existing or proposed use. The existing ambient noise level may be measured, but in no case may it be presumed to be lower than specified by the ordinance.

Table III summarizes the noise level standards of the city's noise ordinance as they are applied at residential and commercial properties. *The noise element standards are more restrictive than the noise ordinance standards, and have therefore been used to determine noise mitigation requirements for the Fig Garden Financial Center Phase IV project.*

TABLE III

CITY OF FRESNO NOISE ORDINANCE STANDARDS
RESIDENTIAL AND COMMERCIAL PROPERTIES

Time	Presumed Lowest Ambient Level, dBA[1]	Allowable increase, dBA
Residential Receivers		
10:00 p.m.-7:00 a.m.	50	+5
7:00 p.m.-10:00 p.m.	55	+5
7:00 a.m.-7:00 p.m.	60	+5
Commercial Receivers		
10:00 p.m.-7:00 a.m.	60	+5
7:00 a.m.-10:00 p.m.	65	+5

[1] Assumed by BBA to be defined by the L_{eq} noise metric for consistency with the noise element standards.

Source: City of Fresno Municipal Code, Section 9-2701(a)

3.1.3 Fresno County Noise Element

The Fresno County Noise Element establishes a land use compatibility criterion of 60 dB DNL for exterior noise levels in outdoor activity areas of residential developments. Outdoor activity areas generally include backyards of single-family residences and individual patios or decks of multi-family developments. The county's 60 dB DNL standard is consistent with the city's noise element although the county's standard is applicable to both transportation and stationary noise sources. In instances where it is not possible to achieve 60 dB DNL after a practical application of the best available noise reduction technology, the county will allow an exterior noise exposure of up to 65 dB DNL. The intent of the exterior noise level requirement is to provide an acceptable noise environment for outdoor activities and recreation.

Although not expressly stated in the county's noise element, it is assumed that the county also requires that interior noise levels attributable to exterior noise sources not exceed 45 dB DNL. An interior noise level standard of 45 dB DNL is consistent with earlier versions of the county's noise element, the U.S. Department of Housing and Urban Development (HUD) noise standards and the California Noise Insulation Standards. The intent of the interior noise level standard is to provide an acceptable noise environment for indoor communication and sleep.

3.1.4 Fresno County Noise Ordinance

Chapter 8.40 of the Fresno County Ordinance Code (noise ordinance) applies to noise sources that are not pre-empted from local control by existing state or federal regulations. Pre-empted noise sources include traffic on public roadways, railroad operations and aircraft in flight.

The county's noise ordinance addresses the statistical distribution of noise over time and allows for progressively shorter periods of exposure to levels of increasing loudness. Table IV summarizes the exterior noise level standards of the ordinance. The standards are to be adjusted by -5 dB if the noise source of concern consists primarily of speech or music. The ordinance is to be applied during any one-hour time period of the day or night and the standards are 5 dB more restrictive during the nighttime hours of 10:00 p.m. to 7:00 a.m.

TABLE IV

EXTERIOR NOISE LEVEL STANDARDS, DBA
FRESNO COUNTY NOISE ORDINANCE

Category	Cumulative # Min/Hr. (L_n)[1]	Daytime (7 am-10 pm)	Nighttime (10 pm-7 am)
1	30 (L_{50})	50	45
2	15 (L_{25})	55	50
3	5 ($L_{8.3}$)	60	55
4	1 ($L_{1.7}$)	65	60
5	0 (L_{max})	70	65

[1]In layman's terms, the noise level standards shown may not be exceeded for more than the specified number of minutes within any one-hour time period. The L_n value shown in parenthesis indicates the percent of the time during an hour that a particular noise level may not be exceeded. For example, the L_{50} represents 50% of the hour, or 30 minutes.

Source: Fresno County Ordinance Code

3.1.5 Construction Noise and Vibration

Noise due to construction activities is generally considered to be less than significant if the construction activity is temporary, use of heavy equipment and noisy activities is limited to daytime hours, pile driving or surface blasting would not occur, and all industry-standard noise abatement measures are implemented for noise-producing equipment. These general parameters acknowledge that people are not as likely to be annoyed by activities that are perceived as being necessary for normal commerce, so long as the inconveniences due to noise are of relatively short duration and all practical measures are being implemented to reduce the impacts of noise-producing activities.

Neither the city nor the county noise element specifically limits hours during which construction may occur. However, it is a common practice to limit hours of construction activity to minimize

construction noise impacts at nearby residential receptors during the early morning and late evening hours, and on weekends and holidays. Although not specifically stated in the city or county noise elements, it is also a standard requirement for many jurisdictions that all construction equipment be properly maintained and muffled to minimize noise generation at the source.

Neither the city nor the county has regulations that define acceptable levels of vibration. One reference suggesting vibration standards is the Federal Transit Administration (FTA) publication concerning noise and vibration impact assessment from transit activities[3]. Although the FTA guidelines are to be applied to transit activities, they may be reasonably applied to the assessment of the potential for annoyance or structural damage resulting from other activities. To prevent vibration annoyance in residences, a vibration velocity level of 80 VdB or less is suggested when there are fewer than 70 vibration events per day. A level of 100 VdB or less is suggested by the FTA guidelines to prevent damage to fragile buildings.

4. EXISTING CONDTIONS

The predominant existing noise sources affecting the project site and surrounding area include vehicular traffic on local roadways, ventilation equipment associated with underground parking garages at the existing Fig Garden Financial Center office building to the west and aircraft over-flights associated with the Fresno-Yosemite International Airport (FAT). The project site is not directly affected by parking lot activities or other sources of noise associated with the Fig Garden Shopping Center located to the south due to distance and acoustic shielding provided by existing intervening office and apartment buildings.

4.1 Ambient Noise Level Measurements:

Existing ambient noise levels were measured at two locations within or near the project site on May 12, 2010. Noise monitoring equipment consisted of a Larson-Davis Laboratories Model LDL 820 sound level analyzer equipped with a Bruel & Kjaer (B&K) Type 4176 ½″ microphone. The microphone was located on a tripod at approximately five (5) feet above the ground. The noise monitoring equipment was calibrated with a B&K Type 4230 acoustical calibrator to ensure the accuracy of the measurements. The equipment complies with applicable specifications of the American National Standards Institute (ANSI) for Type 1 sound measurement systems.

The locations of the ambient noise monitoring sites are noted on Figure 1. The first site was located near the northeast corner of the proposed office building site, approximately 50 feet from the center of West San Jose Avenue. The site is predominantly affected by noise from vehicular traffic on West San Jose Avenue, residential maintenance activities on nearby properties, birds in nearby trees and occasional aircraft over-flights. Distant train horns are also occasionally audible. Measured noise levels ranged from 40-74 dBA with an energy average (L_{eq}) of 52.4 dBA.

The second site was located west of the intersection of West San Jose Avenue and North Colonial Avenue, approximately 50 feet from the center of the intersection. The site is exposed

to noise from the same sources identified above plus noise from ventilation fans associated with the underground parking garage at the existing Fig Garden Financial Center office building to the west. Measured noise levels ranged from 47-75 dBA with an energy average (L_{eq}) of 57.2 dBA.

4.2 Existing Traffic Noise Exposure:

Existing traffic noise levels within and near the project site were modeled using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model[4] and traffic data obtained from the Traffic Impact Study prepared for the project by TPG Consulting, Inc. (August 2011)[5].

The FHWA Model is an analytical method utilized by many state and local agencies, including Caltrans, for highway traffic noise prediction. The FHWA Model is based upon reference energy emission levels for automobiles, medium trucks (2 axles) and heavy trucks (3 or more axles), with consideration given to vehicles volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions, and is generally considered to be accurate within ±1.5 dB. To predict DNL values, it is necessary to determine the hourly distribution of traffic for a typical day and adjust the traffic volume input data to yield an equivalent hourly traffic volume. The FHWA Model assumes a clear view of traffic with no shielding at the receiver location.

Existing traffic volumes on West San Jose Avenue adjacent to the proposed office building site are very low. Peak hour traffic volumes on the section of West San Jose Avenue adjacent to the site were not specifically addressed in the above-referenced traffic impact study. The annual average daily traffic volume was therefore estimated by BBA based upon data for Colonial Avenue. Colonial Avenue connects to West San Jose Avenue just west of the site. Using the FHWA Model and an estimated AADT of 500, the predicted DNL at 50 feet from the center of the roadway is less than 50 dB. This is well below the City's 60 dB DNL standard for residential uses exposed to transportation noise sources.

4.3 Stationary Noise Sources:

The existing Fig Garden Financial Center office building located to the west of the project site has ventilation fans for an underground parking garage. There are fans located near the southwest and northwest corners of the project site. The fans were found to produce noise levels in the range of 60-66 dBA, depending upon direction from the fan outlet grills, at a distance of 50 feet.

4.4 Aircraft Noise Exposure:

The project site is located approximately 4.5 miles northwest of the Fresno-Yosemite International Airport (FAT). The site is just south of the extended centerlines of the airport runways, and is therefore subject to aircraft over-flights. Aircraft typically depart to the northwest over the site, but aircraft arrivals occur over the site when required by wind conditions or other factors. Aircraft arrivals were observed during the project site visit and noise

measurements on May 12, 2010. Noise levels from individual arrivals by commuter propeller and regional jet aircraft were in the range of 55-65 dBA. Noise levels from departing jet aircraft, especially California Air National Guard CANG) jet aircraft, would be expected to be higher.

According to the public information office at the 144th Fighter Wing of the CANG[6], the number of CANG aircraft operations at FAT has been slightly higher than normal in recent months due to new flight crew training requirements. CANG operations are expected to return to normal over the next few months. Also, it is possible that the F-16 aircraft now operated by the CANG may be replaced in 2-3 years by F-15 aircraft. The CANG is in the process of preparing an EIR/EIS for the possible aircraft conversion project. Currently, the project site is located well outside the annual average 60 dB CNEL contours for existing or projected future aircraft operations at FAT[7].

4.5 High Speed Rail Noise Exposure:

According to the recently released Draft Environmental Impact Report and Statement (August 9, 2011)[8] for the Merced-Fresno section of the proposed California High Speed Rail (HSR) project, the proposed alignment of the HSR line would follow the existing Union Pacific Railroad (UPRR) line in the area of Shaw Avenue. This is more than three miles from the project site. Since the HSR line would be at grade in this area, and noise would be attenuated due to distance from the source and other factors by at least 50 dB, noise or vibration from the HSR line would not be significant at the project site.

5. PROJECT-RELATED NOISE IMPACTS

The Fig Garden Financial Center Phase IV project could cause noise levels to increase within the project site and in areas near the project site. The proposed office building is considered a noise-sensitive land use by the policies of the city's noise element. There are also noise-sensitive uses located adjacent to and near the project site. Such uses include the existing single-family homes to the east of the project site and on the north side of West San Jose Avenue, the existing multi-family apartment units to the south of the project site and the existing office building to the west. Additionally, residential uses are located at various locations along major roadways near the project site that could experience project-related increases in traffic.

5.1 On-Site Transportation Noise Source Impacts (Not significant with mitigation):

Noise levels from existing or future traffic on West San Jose Avenue or aircraft operations at FAT would not exceed 60 dB DNL exterior to the proposed office building. Assuming that the peak hour L_{eq} for combined traffic and aircraft noise sources would not exceed 65 dBA (a worst-case assessment), compliance with the city's 45 dBA hourly L_{eq} interior standard for office uses (Policy H-1-a) would require a minimum exterior-to-interior noise level reduction (NLR) of 20 dB (65-45=20). Since standard commercial office building construction will provide a minimum of 25 dB of NLR, the project will comply with city's interior noise level standard for office buildings provided windows and doors are closed.

Mitigation of On-site Transportation Noise Source Impacts

Mitigation of on-site noise exposure from transportation sources may be achieved by requiring that air conditioning or some other form of mechanical ventilation will be provided for all indoor office spaces.

5.2 On-Site Stationary Noise Source Impacts (Not significant with mitigation):

The city's noise element (Policies H-1a and H-1-l) pertain to outdoor activity areas and interior spaces. The proposed commercial office building will not have outdoor activity areas, so the applicable standard is an interior hourly L_{eq} of 45 dBA. Compliance would require that noise levels from exterior on-site stationary noise sources (fans, other mechanical equipment and vehicle movements within the site) not exceed an hourly L_{eq} of 70 dBA at the building facade, and that standard commercial office building construction (minimum NLR of 25 dB) be utilized. Assuming that noise levels from on-site stationary noise sources will have to be mitigated so as not to exceed applicable standards within nearby (off-site) residential areas, the project will achieve an acceptable interior noise level.

Mitigation of On-site Stationary Noise Source Impacts

Mitigation of on-site noise exposure from stationary sources may be achieved by requiring that air conditioning or some other form of mechanical ventilation will be provided for all indoor office spaces.

5.3 Off-Site Transportation Noise Source Impacts (Not significant):

The project could result in an increase in traffic on some roadways in the project area. The potential for significant increases in traffic noise exposure at off-site noise-sensitive uses was analyzed using the above-referenced traffic impact study and the FHWA Model. Traffic noise modeling assumptions are summarized in Appendix B. Since the noise-sensitive uses of concern are residential uses, traffic noise exposure was calculated using the DNL metric.

Traffic noise levels were calculated at typical residential setbacks for selected roadways in the project area for existing and future (2030) conditions. Calculated DNL values with and without the project were compared to determine if the project would cause traffic noise levels to exceed the city/county 60 dB DNL exterior standard (Policy H-1-a) or result in a significant noise level increase (Policy H-1-b). Existing noise barriers or other noise mitigation features were not accounted for in the calculations since the analysis is intended to demonstrate the *relative change* in traffic noise exposure that could occur as a result of the project.

Table V summarizes the findings of the off-site traffic noise analysis. Shown by the table are existing, existing plus project, and future (2030) traffic noise levels at typical residential setbacks near intersections analyzed by the TPG Traffic Impact Study. Typical residential setbacks were determined by reference to aerial photographs of the area and field observations by BBA staff. A typical residential setback of 50 feet from the center of the roadway was assumed for all

roadways to provide a worst-case assessment of traffic noise exposure. Many existing homes in the project area are located at greater distances from the roadway or are acoustically shielded from roadway traffic noise by intervening buildings or sound walls.

Table V shows that existing (existing plus project) and cumulative (2030 with project) traffic exposure along the roadways analyzed could increase by up to 1.0 dB as a result of the project. Such increases are not considered significant as defined by the noise element. Additionally, the project would not cause traffic noise levels to exceed the city/county 60 dB DNL standard along any of the roadway segments analyzed.

TABLE V

SUMMARY OF TRAFFIC NOISE IMPACTS
FIG GARDEN FINANCIAL CENTER PHASE IV PROJECT

		DNL (dB) @ Typical Residential Setback[1]							
Roadway	**Roadway Segment**	**Existing**	**Existing + Project**	**Change[2]**	**Significant?**	**2030 No Project**	**2030 Project**	**Change[3]**	**Significant?**
Palm Ave	n/o Barstow Ave.	69.1	69.2	+0.1	No	71.0	71.0	-0-	No
	s/o Barstow Ave	69.3	69.4	+0.1	No	70.7	70.8	+0.1	No
	n/o San Jose Ave	69.1	69.2	+0.1	No	70.5	70.6	+0.1	No
	s/o San Jose Ave	68.7	68.9	+0.2	No	70.4	70.6	+0.2	No
	n/o Shaw Ave	68.6	68.8	+0.2	No	70.4	70.6	+0.2	No
	s/o Shaw Ave	67.7	67.9	+0.2	No	69.4	69.5	+0.1	No
	n/o Gettysburg Ave	67.1	67.3	+0.2	No	69.0	69.1	+0.1	No
Barstow Ave.	w/o Palm Ave	63.8	63.9	+0.1	No	65.9	65.9	-0-	No
	e/o Palm Ave	64.7	64.8	+0.1	No	65.8	65.8	-0-	No
San Jose Ave.	e/o Palm Ave	58.7	59.7	+1.0	No	58.9	59.9	+1.0	No
Shaw Ave.	w/o Palm Ave	71.4	71.5	+0.1	No	72.2	72.2	-0-	No
	e/o Palm Ave	71.6	71.7	+0.1	No	72.6	72.6	-0-	No
Gettysburg Ave.	w/o Palm Ave	56.5	56.5	-0-	No	60.8	60.9	+0.1	No
	e/o Palm Ave	57.1	57.1	-0-	No	60.1	60.1	-0-	No

[1]A typical residential setback was assumed to be 50 feet from the center of the roadway.
[2] Compared to "existing" traffic noise levels.
[3] Compared to "2030 No Project" noise levels.

Source: Brown-Buntin Associates, Inc.

5.4 Off-Site Stationary Noise Source Impacts (Not significant with mitigation):

Noise from ventilation fans associated with the underground parking garage for the proposed office building and vehicle movements within the project site have the potential to exceed applicable city or county standards, depending upon project design. Typical maximum noise levels from mechanical ventilation systems are in the range of 60-70 dBA at a distance of 50 feet. Low-speed vehicle movements within a driveway or parking lot typically produce noise levels in the range of 60 to 65 dBA at a distance of 40 feet. Noise sources in parking lots that are not related to vehicle movements may include voices, stereo systems, honking horns and the opening and closing of car doors and trunk lids.
The precise location and configuration of ventilation equipment associated with the underground parking garage were unknown to BBA at the time this analysis was prepared. Vehicle access to the underground parking garage would be located on the east side of the office building. Vehicles would utilize driveways to be located on the north and south sides of the building to access the surface parking lot on the east side of the building and the entrance to the underground parking garage. Vehicles would pass as close as about 40 feet from the closest noise-sensitive uses to the south and 120 feet from the closest noise-sensitive uses to the north of the project site. The project design includes a six (6) foot high block wall around the north, east and south perimeters of the project site.

As previously noted, noise-sensitive receptors to the south and east of the project site are located in an unincorporated area of Fresno County. Noise-sensitive receptors to the north of the project site are located within the City of Fresno. The county's noise element applies a DNL standard of 60 dB to stationary noise sources, whereas the city's noise element applies hourly L_{eq} and L_{max} standards to stationary noise sources. The city's noise element standards for stationary noise sources are summarized in Table II.

The county's noise *ordinance* addresses the statistical distribution of noise over time as summarized in Table IV. The county's hourly L_{50} and L_{max} standards are comparable to the hourly L_{eq} and L_{max} standards of the city's noise element as described above. As previously noted, the city's noise element is more restrictive than its noise ordinance with regard to stationary noise sources.

The above-referenced six-foot high block wall around the site perimeter would be expected to reduce noise from vehicle movements within the parking lot and driveways by a minimum of 5 dB. This will be sufficient to achieve compliance the daytime and/or nighttime hourly L_{50} standards of the county's noise *ordinance* and the 60 dB DNL standard of the county's noise *element* at all noise-sensitive receptors within the unincorporated area of the county. Noise from vehicle movements within the site would also not be expected to exceed the hourly L_{eq} standards of the city's noise element to the north of the project site.

With respect to maximum noise levels, on-site vehicle movements would be expected to produce L_{max} values in the range of 55-60 dBA at the closest residential receptors to the south of the project site after acoustic shielding from the proposed perimeter block wall is taken into consideration. Such levels would not exceed the 65 dBA nighttime or 70 dBA daytime L_{max}

standards of the county's noise ordinance. Maximum noise levels from on-site vehicle movements would also comply with applicable city standards at the closest residential receptors to the north of the site.

Mitigation of Off-site Stationary Noise Source Impacts

Ventilation systems and other mechanical equipment should be designed so that their noise levels do not exceed an hourly L_{eq} of 45 dBA at the closest off-site noise-sensitive uses. As noted previously, the hourly L_{eq} descriptor used by the city is comparable to the hourly L_{50} descriptor used by the county. Mitigation measures may include shielding of proposed fan inlet/outlet openings or other acoustical design features to reduce noise at the source.

5.5 Off-Site Construction Noise and Vibration (Not significant with mitigation):

During construction of the proposed office building, noise from construction activities could potentially impact noise-sensitive land uses in the immediate area. Activities associated with construction would generate noise levels at 50 feet as indicated by Table VI. Most of the heavy equipment that produces the highest noise levels would only be used for demolition of existing structures, project grading and excavation or during utility construction.

Vibration from demolition and/or construction activities could occasionally be perceptible at the closest sensitive land uses. The primary vibratory sources during demolition or construction within the project area would likely be large bulldozers or excavators and loaded trucks. Typical bulldozer or loaded truck activities generate an approximate vibration level of 86-87 VdB at a distance of 25 feet. Typically, vibration levels must exceed 80 VdB before annoyance occurs or 100 VdB before building damage occurs.

TABLE VI

TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS

Type of Equipment	Maximum Level, dB (50 Ft.)
Backhoe	78
Concrete Saw	90
Crane	81
Excavator	81
Front End Loader	79
Jackhammer	89
Paver	77
Pneumatic Tools	85
Bulldozer	82

Source: FHWA[9]

Mitigation of Off-site Construction Noise and Vibration Impacts

Construction noise or vibration are not usually considered to be significant impacts if construction occurring near noise-sensitive land uses is limited to the daytime hours, extraordinary noise-producing activities (e.g., pile driving) are not anticipated, and construction equipment is adequately maintained and muffled. Construction activities should not be allowed between the hours of 10:00 p.m. and 7:00 a.m.

6. SOURCES CONSULTED

1. City of Fresno, Noise Element of the 2025 General Plan, February 1, 2002.

2. City of Fresno, Municipal Code, Section 9-2701 (a).

3. U.S. Department of Transportation, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, April 1995.

4. Federal Highway Administration, Traffic Noise Model, Version 2.5, April 14, 2004.

5. TPG Consulting, Inc., *Villas at Fig Garden Traffic Impact Analysis Report*, April 2010.

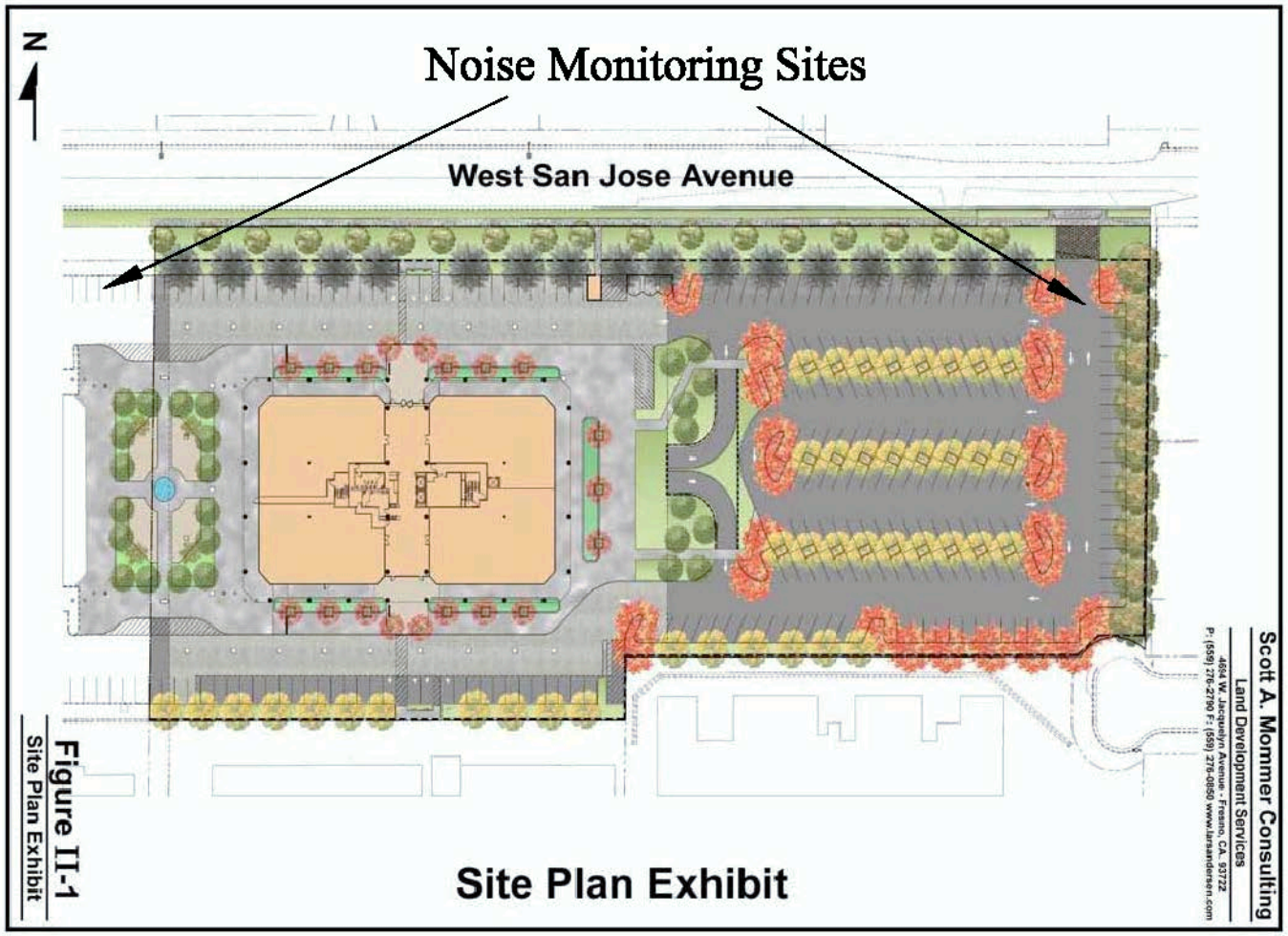
6. Public Information Office, 144th Fighter Wing, California Air National Guard, telephone conversation, August 29, 2011.

7. City of Fresno, *FAR Part 150 Noise Exposure Maps for Fresno-Yosemite International Airport*.

8. California High Speed Rail Authority, *Draft Environmental Impact Report and Statement for Merced-Fresno Section*, August 9, 2011.

9. Federal Highway Administration, *Roadway Construction Noise Model User's Guide*, January 2006.

Figure 1: Project Site Plan and Noise Monitoring Sites



APPENDIX A

ACOUSTICAL TERMINOLOGY

AMBIENT NOISE LEVEL: The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

CNEL: Community Noise Equivalent Level. The average equivalent sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.

DECIBEL, dB: A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

DNL/L_{dn}: Day/Night Average Sound Level. The average equivalent sound level during a 24-hour day, obtained after addition of ten decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.

L_{eq}: Equivalent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L_{eq} is typically computed over 1, 8 and 24-hour sample periods.

NOTE: The CNEL and DNL represent daily levels of noise exposure averaged on an annual basis, while L_{eq} represents the average noise exposure for a shorter time period, typically one hour.

L_{max}: The maximum noise level recorded during a noise event.

L_n: The sound level exceeded "n" percent of the time during a sample interval (L_{90}, L_{50}, L_{10}, etc.). For example, L_{10} equals the level exceeded 10 percent of the time.

ACOUSTICAL TERMINOLOGY

NOISE EXPOSURE CONTOURS: Lines drawn about a noise source indicating constant levels of noise exposure. CNEL and DNL contours are frequently utilized to describe community exposure to noise.

NOISE LEVEL REDUCTION (NLR): The noise reduction between indoor and outdoor environments or between two rooms that is the numerical difference, in decibels, of the average sound pressure levels in those areas or rooms. A measurement of Anoise level reduction@ combines the effect of the transmission loss performance of the structure plus the effect of acoustic absorption present in the receiving room.

SEL or SENEL: Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to a duration of one second. More specifically, it is the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on a reference pressure of 20 micropascals and a reference duration of one second.

SOUND LEVEL: The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

SOUND TRANSMISSION CLASS (STC): The single-number rating of sound transmission loss for a construction element (window, door, etc.) over a frequency range where speech intelligibility largely occurs.

APPENDIX B

TRAFFIC NOISE MODELING ASSUMPTIONS

Brown Buntin Associates, Inc Appendix B-1
FHWA-RD-77-108
Calculation Sheets
October 2, 2012

Project #:	09-001A	**Contour Levels (dB)**	55	60	65	70	
Description:	Fig Garden Financial Center Phase IV-Existing						
Ldn/Cnel:	Ldn						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	Truck % Med	Truck % Hvy	Speed mph	Dist ft	Offset dB
1	Palm Avenue	n/o Barstow Ave	20850	90		10	3	2	40	50	
2	Palm Avenue	s/o Barstow Ave	21740	90		10	3	2	40	50	
3	Palm Avenue	n/o San Jose Ave	20570	90		10	3	2	40	50	
4	Palm Avenue	s/o San Jose Ave	19050	90		10	3	2	40	50	
5	Palm Avenue	n/o Shaw Ave	18660	90		10	3	2	40	50	
6	Palm Avenue	s/o Shaw Ave	15190	90		10	3	2	40	50	
7	Palm Avenue	n/o Gettysburg Ave	13230	90		10	3	2	40	50	
8	Barstow Avenue	w/o Palm Ave	10160	90		10	2	1	35	50	
9	Barstow Avenue	e/o Palm Ave	12610	90		10	2	1	35	50	
10	San Jose Avenue	e/o Palm Ave	6550	90		10	2	1	25	50	
11	Shaw Avenue	w/o Palm Ave	35500	90		10	3	2	40	50	
12	Shaw Avenue	e/o Palm Ave	37170	90		10	3	2	40	50	
13	Gettysburg Aven	w/o Palm Ave	2710	90		10	2	1	30	50	
14	Gettysburg Aven	e/o Palm Ave	3100	90		10	2	1	30	50	
15	San Jose Avenue	at Site	430	90		10	2	1	25	50	

Brown Buntin Associates, Inc Appendix B-2
FHWA-RD-77-108
Calculation Sheets
October 2, 2012

Project #:	09-001A	**Contour Levels (dB)**	55	60	65	70	
Description:	Fig Garden Financial Center Phase IV-Existing plus Project						
Ldn/Cnel:	Ldn						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	Truck % Med	Truck % Hvy	Speed mph	Dist ft	Offset dB
1	Palm Avenue	n/o Barstow Ave	21260	90		10	3	2	40	50	
2	Palm Avenue	s/o Barstow Ave	22450	90		10	3	2	40	50	
3	Palm Avenue	n/o San Jose Ave	21280	90		10	3	2	40	50	
4	Palm Avenue	s/o San Jose Ave	20020	90		10	3	2	40	50	
5	Palm Avenue	n/o Shaw Ave	19570	90		10	3	2	40	50	
6	Palm Avenue	s/o Shaw Ave	15650	90		10	3	2	40	50	
7	Palm Avenue	n/o Gettysburg Ave	13580	90		10	3	2	40	50	
8	Barstow Avenue	w/o Palm Ave	10310	90		10	2	1	35	50	
9	Barstow Avenue	e/o Palm Ave	12760	90		10	2	1	35	50	
10	San Jose Avenue	e/o Palm Ave	8230	90		10	2	1	25	50	
11	Shaw Avenue	w/o Palm Ave	35750	90		10	3	2	40	50	
12	Shaw Avenue	e/o Palm Ave	37810	90		10	3	2	40	50	
13	Gettysburg Aven	w/o Palm Ave	2710	90		10	2	1	30	50	
14	Gettysburg Aven	e/o Palm Ave	3100	90		10	2	1	30	50	
15	San Jose Avenue	at Site	430	90		10	2	1	25	50	

Brown Buntin Associates, Inc Appendix B-3
FHWA-RD-77-108
Calculation Sheets
October 2, 2012

Project #:	09-001A	**Contour Levels (dB)**	55	60	65	70	
Description:	Fig Garden Financial Center Phase IV-2030 No Project						
Ldn/Cnel:	Ldn						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	Truck % Med	Truck % Hvy	Speed mph	Dist ft	Offset dB
1	Palm Avenue	n/o Barstow Ave	31890	90		10	3	2	40	50	
2	Palm Avenue	s/o Barstow Ave	29860	90		10	3	2	40	50	
3	Palm Avenue	n/o San Jose Ave	28970	90		10	3	2	40	50	
4	Palm Avenue	s/o San Jose Ave	28030	90		10	3	2	40	50	
5	Palm Avenue	n/o Shaw Ave	28070	90		10	3	2	40	50	
6	Palm Avenue	s/o Shaw Ave	22140	90		10	3	2	40	50	
7	Palm Avenue	n/o Gettysburg Ave	20180	90		10	3	2	40	50	
8	Barstow Avenue	w/o Palm Ave	16590	90		10	2	1	35	50	
9	Barstow Avenue	e/o Palm Ave	16080	90		10	2	1	35	50	
10	San Jose Avenue	e/o Palm Ave	6880	90		10	2	1	25	50	
11	Shaw Avenue	w/o Palm Ave	42360	90		10	3	2	40	50	
12	Shaw Avenue	e/o Palm Ave	46290	90		10	3	2	40	50	
13	Gettysburg Aven	w/o Palm Ave	7290	90		10	2	1	30	50	
14	Gettysburg Aven	e/o Palm Ave	6140	90		10	2	1	30	50	
15	San Jose Avenue	at Site	510	90		10	2	1	25	50	

Brown Buntin Associates, Inc Appendix B-4
FHWA-RD-77-108
Calculation Sheets
October 2, 2012

Project #:	09-001A	**Contour Levels (dB)**	55	60	65	70	
Description:	Fig Garden Financial Center Phase IV-2030 Project						
Ldn/Cnel:	Ldn						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	Truck % Med	Truck % Hvy	Speed mph	Dist ft	Offset dB
1	Palm Avenue	n/o Barstow Ave	32320	90		10	3	2	40	50	
2	Palm Avenue	s/o Barstow Ave	30540	90		10	3	2	40	50	
3	Palm Avenue	n/o San Jose Ave	29650	90		10	3	2	40	50	
4	Palm Avenue	s/o San Jose Ave	29010	90		10	3	2	40	50	
5	Palm Avenue	n/o Shaw Ave	29020	90		10	3	2	40	50	
6	Palm Avenue	s/o Shaw Ave	22700	90		10	3	2	40	50	
7	Palm Avenue	n/o Gettysburg Ave	20640	90		10	3	2	40	50	
8	Barstow Avenue	w/o Palm Ave	16700	90		10	2	1	35	50	
9	Barstow Avenue	e/o Palm Ave	16220	90		10	2	1	35	50	
10	San Jose Avenue	e/o Palm Ave	8540	90		10	2	1	25	50	
11	Shaw Avenue	w/o Palm Ave	42640	90		10	3	2	40	50	
12	Shaw Avenue	e/o Palm Ave	46880	90		10	3	2	40	50	
13	Gettysburg Aven	w/o Palm Ave	7310	90		10	2	1	30	50	
14	Gettysburg Aven	e/o Palm Ave	6150	90		10	2	1	30	50	
	San Jose Avenue	at Site	510	90			2	1	25	50	

APPENDIX I
UPDATED PRELIMINARY INFRASTRUCTURE REPORT

UTILITY INFRASTRUCTURE REPORT
&
PUBLIC IMPROVEMENTS

FIG GARDEN FINANCIAL CENTER PHASE IV

SEC WEST SAN JOSE AVENUE & NORTH COLONIAL AVENUE
FRESNO, CALIFORNIA

CUP-2011-088, GAP No. A-11-006,
R-07-77 & VTPM-2008-07

Project No. 08017.00
November 29, 2011
Revised August 1, 2012
Revised August 17, 2012

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OVERVIEW

The project proponents propose to provide for Phase IV to the existing Fig Garden Financial Center (the "Financial Center") by incorporating a commercial office building on property immediately adjacent to the Financial Center (the "Site Addition"). The Site Addition is presently designated high to medium residential and is being rezoned to C-P. The Site Addition (comprising APNs 417-231-16, 417-231-17, 417-240-37and 417-240-03) consisting on approximately 4.69 acres and is planned four-story office building of approximately 104,593 square feet of usable office space and an underground parking lot of 83,076 square feet.

The Site Addition is currently occupied by an existing apartment complex, vacant parcel which was recently cleared of a pre-existing single family residence and a parcel of a single family house. The Site Addition is bounded to the north by West San Jose Avenue, and a residential and single family apartment complex properties beyond; to the east by residential properties; to the south by an existing two-story multi-family apartment complex; and to the west by the existing four (4)-story Fig Garden Financial Center.

WATER INFRASTRUCTURE

The purpose of this section is to determine water demands, availability of water and any additional water supplies that might be necessary to serve the project.

Existing Water Main Facilities

The Project is entirely within a fluoridated water supply zone, served by the City of Fresno-Water Division. This water zone must have adequate water supply and distribution facilities to meet instantaneous peak water demands or pressure drops could occur in the Project vicinity. The Project proponents have been advised that long term water demands must also be consistent with the City's Urban Water Management Plan.

City of Fresno maintains all existing public water facilities in the Project vicinity and will provide the domestic supply and fire flow to serve the Project. City has an existing 6" steel water main located on the south side of west San Jose Avenue, an existing 6" steel water main located outside and parallel to the west property line of the project, within the existing five (5) feet wide water easement, and also has an existing 6" steel water main located inside and parallel to the east property line of the project with no existing easement in records. A fire flow test was conducted on November 19, 2008 at 9:15 am by Fire Department at existing Fire Hydrant #601, located within the project frontage at West San Jose Avenue, with static pressure of 45 PSI, residual of 30 PSI at 1,360 GPM and calculated available flow of 1,800 GPM at 20 PSI.

Domestic Water Demands of the Project

Water supply impacts of the Site Addition will be fully mitigated. Pre and post Project water demands have been developed. The difference between pre and post Project water demands reflects the water supply impacts of the Project. Both peak and average annual water demands must be considered. Unless fully mitigated, increases in peak water demand attributable to the Project could result in undesirable pressure drops in the surrounding water service area.

Water impacts of the Site Addition will be fully mitigated by retrofitting existing domestic and irrigation systems throughout the existing office complex at 5250, 5260 and 5200 North Palm Avenue, installation of water conserving fixtures throughout if necessary by the development of additional water supply facilities off the Project site. Water impacts were considered both for indoor (domestic) and outdoor (irrigation) uses. Estimates of peak and annual water demands have been prepared in reliance on historic water use records for the Project area and widely accepted water use standards.

Domestic (Indoor) Water Demand of the Proposed Site Addition

When completed, the Project will have a usable floor area of 104,593 square feet. The building will be equipped with water conserving fixtures including 1.6 gallon "low flow" toilets and low flow faucets. Water use studies frequently cited in developing water use estimates include: (1) 1999 study issued by the American Water Works Association, and (2) a 2003 study by the East Bay Municipal Utility District. Both of these rigorous studies compare indoor water use of existing homes with older plumbing to the same homes after retrofitting with the water conserving fixtures now required by the California Uniform Plumbing Code.

Water usable for the office building is presumed to be 9.2 AFY based on the existing office complex. Indoor water demand for the existing development (pre-Project) on the Site Addition is estimated to be 4 AC/F per year. Due to estimated head losses for the proposed four-story building, an onsite domestic booster pump will be necessary to maintain adequate water service pressure for upper floors.

Combined Indoor Water Demand of the Project

All one hundred and ten (110) 3.5 gallon per flush toilets in the Financial Center will be retrofitted with low flow systems to reduce water use to 1.6 gallons per flush. The indoor water supply impact of the completed Project is the difference between the historic indoor demand of the Site Addition and the estimated demand after completion of the Site Addition and the retrofit of existing toilets in the Financial Center.

Outdoor Water Demand of the Project

Development of the Site Addition will decrease outdoor water use as compared to the historic water uses on the 4.69 acres. There are 34,955 square feet of irrigable landscape proposed for the Site Addition compared to 85,377 square feet landscape in the existing Project site land uses.

Existing landscape is approximately 50 % greater than the proposed project. New water conserving irrigation systems and advanced "smart" controllers will be installed. The existing systems are out-dated, low efficient and prone to higher leakage rates. Furthermore, a review of historic irrigation meter data reveals that existing landscape has been irrigated at a rate between two and five times the evapotranspiration rate. A basic formula for calculating annual landscape water demand for the Site Addition is as follows:

MAWB = (ETO) (0.8) (LA) (0.62)

Where MAWB = Maximum allowable water budget expressed in gallons per year.

ETO = 45.1 inches/year reference evapotranspiration for Fresno.

0.8 = Allowable percentage of water budgeted for landscape per year.

LA = Landscape area requiring irrigation in square feet = 34,955 SF

0.62 = Conversion factor to calculate MAWB in gallons/year.

MAWB = (45.1) (0.8) (57,064 Ft^2) (0.62) = 807,444 gal/year = 2.6 acre-feet/year (AFY)

As discussed above, irrigation demand of the Site Addition will be reduced with this Project. Completion of the Project should also reduce historic peak demand for the City's water pressure zone serving the Project. Due to inefficient irrigation practices, historic landscape water use for the Financial Center is three to four times higher than required.

Water Demand Impacts

Total annual water demand for the Project is anticipated to be 11.8 acre feet per year as summarized in the attached Appendix A. Peak water demand of the Site Addition and the completed Project is not anticipated to increase. Water production and pressure records from the City of Fresno Utilities Department reveal that the highest peak water demands in the service area occur at 5 a.m. during the summer. This is clearly attributable to automated irrigation systems since, prior to 6 .am., indoor residential water demands are at a minimum. As discussed previously, irrigation demand is anticipated to decrease with the Project as compared to the existing pre Project irrigation demand. Consequently, it is not anticipated that the Project will have any adverse impact on peak demands in the service area.

Based on the calculation presented on Appendix "A", the estimated total water usage for the project AFY which is consistent with the Urban Water Management Plan (UWMP) allocations. The estimate total water usage accounts the following mitigation measures which will reduce the overall water demand of the Project.

1. Retro-fit all existing irrigation controllers with "Smart Controllers" (evaporation transpiration governed controllers). All new controllers in the Site Addition will be likewise equipped.

2. Retro-fit approximately 110 toilets to reduce water usage per flush from 3.5 gallons to 1.6 gallons. The calculations only account for a conservative 10% reduction of actual water consumption. According to a 2002 Retrofit Strategy Report prepared for HUD, attached in Appendix "A", Exhibit "5", the retrofit of toilets are anticipated to reduce water consumption by 10.77% or 6 gallons per capita a day. In order to comply with these mitigation measures, the retrofit of toilets and Smart Controllers shall be in place for the life of the project and are permanent. Proper equipment and construction methods will ensure the expected long term water savings will be achieved.

3. All new landscaping will conform to the State's new "Waterwise" standard. The State of California has adopted new landscape efficiency standards and the proposed office building project and associated landscape on the Site Addition will meet or exceed those requirements.

4. Irrigation controllers will be set to operate during off peak water demand periods.

Fire Flow Demand of the Project

Required Fire Flow for both building fire sprinklers and fire hydrants is 1500 GPM @ 20psi, according to Byron Beagles, Senior Fire Prevention Inspector with the Fresno Fire Department. Due to this required flow and available flow at the street system, a fire sprinkler pump is required. One (1) private fire hydrant and two (2) public fire hydrants are preliminary proposed for the project. Also, during a previous meeting with Neil Montgomery of the City of Fresno Water Division, he indicated that the existing 6" steel water main pipes that runs along outside the west property line up to water main junction to the south at North Wishon Avenue, at existing connection from West Shaw Avenue water main junction to next water main junction to the north at North Wishon Avenue alignment, and along inside the east property line of the project, will require replacement and/or size upgrade from 6" steel to 8" PVC water main pipes, due to the low water pressure within the water service zone area and due to the age of existing water main pipes.

Water Supply Improvements

The Project is located in a fluoridated water service zone which is isolated to maintain uniform and efficacious fluoride levels throughout the zone. The Project proponent could participate in one or more water projects, acceptable to the City, which generate additional water supply adequate to offset any and all increases in peak demand attributable to the Project should the City find this to be a factor. The balance of the new water supply will be available to supplement existing supply in the fluoridated water service area. The project also may not connect to the fluoridated system and use existing City water west of the site.

Water Distribution System Improvements

Based on the existing water main system, existing water flow and proposed four-story office building, system upgrades will be required in order to ensure water system distribution capacity. The project shall replace the existing public 6-inch water main along the west side of the project between West Shaw Avenue and N. Roosevelt/N. Wishon Avenue with a 8-inch water main. The project shall also install a new 8-inch public water main along the east side of the project between West San Jose and West Scott Avenue.

The project will be required to install booster pumps for both domestic water and fire to fully service the project. The project is proposing three (3) new fire hydrants, one (1) public fire hydrant is preliminary proposed along the frontage at West San Jose Avenue for service of proposed Fire Department Connection Assembly, one (1) public fire hydrant is preliminary proposed at the southwest side of the project and one (1) on-site private fire hydrant with required 8" fire line are preliminary proposed for the project. Aside from these fire hydrants; the project will be required to provide an 8" fire service line with double detector check valve in vault and 4" domestic water service with backflow prevention assembly and 2" landscape irrigation service with backflow assembly. The landscape irrigation will be required to accommodate pipelines within the project site to interconnect to future recycled water distribution mains that may be developed by the City to allow supply of such recycled water for on-site irrigation purposes. These services are planned to be installed at the northwest corner portion of the proposed building. The project will provide for the proposed water service facilities such as backflow prevention assemblies, fire department connection, post indicator valve, etc. near the public right-of-way.

The following water improvements shall be required prior to issuance of building permit.

1. The project proponent shall submit design-level drawings to the City of Fresno Department of Public Utilities demonstrating adequately sized infrastructure.
2. Dedicate water easement fall all onsite public water mains in conformance with City requirements
3. All public water facilities shall be constructed in accordance with City Standards, specifications, and policies

Conclusion for Water Infrastructure

The domestic water, fire and irrigation services of proposed project can be designed for project requirements and no impact to existing City system should occur.

WASTEWATER SYSTEM INFRASTRUCTURE

The purpose of this section is to identify and address sanitary sewerage issues and impacts, and determine the feasible solutions.

Existing Sanitary Sewer Facilities

City of Fresno maintains all the existing public sanitary sewer system and will provide the sewer service for the Project. City has an existing 8" Vitrified Clay (VCP) sewer main along West San Jose Avenue that flows from west to east, and also has an existing 8" cast iron sewer main, located approximately mid-half section of the project property, which flows from south to north into the existing 8" sewer main at West San Jose Avenue. This existing 8" sewer main that runs into the project site, is only up to existing manhole to the adjacent property to the south, approximately 51 feet from the south property line of the project and it is servicing the existing apartment to the south.

Proposed Sanitary Sewer System

The project public sanitary sewer infrastructure would be required to intertie into the existing 8-inch sanitary sewer main that transects the site with the installation of an 8-inch public sewer line that would connect to the the existing 8-inch main located within West Scott Avenue. The 8-inch public main that transects the site would be abandoned once the connection is made to West Scott Avenue. The following sewer improvements shall be required prior to providing City sewer service to the project:

1. Dedicate a 20-foot wide sewer main easement for all onsite public sanitary sewer mains.

2. Engineered improvement plans prepared by a Registered Civil Engineer shall be submitted for Department of Public Utilities review and approvals for proposed additions to the City Sewer System.

3. All public sanitary sewer facilities shall be constructed in accordance with City Standards, specifications, and policies.

Conclusion for Sewer Infrastructure

The sewer service of proposed project can be gravity flow into the existing sewer system and no impact to existing City system should occur.

STORM DRAINAGE

The purpose of this section is to identify and address storm drainage issues and impacts, and determine the feasible solutions.

Existing Storm Drain Facilities

The project site is currently developed with a former apartment complex, parking areas, and landscaping; a portion of the site was previously developed with a single-family residence, but that structure has since been removed. The central portion of the site is vacant. The area of proposed disturbance for the project site is approximately 4.69 acres. The property is currently covered with approximately 91,000 square feet of existing impervious surfaces, in the form of existing building footprints and pavement. The project would result in a total of about 169,448 square feet of impervious surfaces, which represents a net increase of about 70,448 square feet of impervious area compared with existing conditions. The additional impervious area would increase runoff flows. Drainage calculations prepared for the project indicate that the pre-development runoff flows from the site would be about 2.04 cubic feet per second (cfs) for the 2-year storm.

Fresno Metropolitan Flood Control District (FMFCD) is the jurisdiction agency for the drainage of the project site and the surrounding adjacent properties. FMFCD has an existing 24" storm drain line with curb inlet exist approximately at the middle portion of the project frontage at the south side of West San Jose Avenue which planned to collect the storm drainage flow of the majority (Approximately 86%) of the project drainage area. Also, there's an existing private maintained catch basin connected to an 18" storm drain lateral, located approximately 11 feet west and 30 feet south of the northwest corner of the project property at the adjacent Fig Garden Financial Center's parking lot. The remainder of drainage area of the project will sheet drain flow into the existing FMFCD storm drain system located on West San Jose Avenue and Nantucket Avenue intersection.

Estimated Storm Drain Discharge Flow for the Project

Based on the 2-year storm as required by FMFCD, Hydrology Pre-Development Plan, the preliminary total required peak-reducing maximum discharge flow of approximately 1.00 CFS.

Proposed Storm Drain Facilities

There will be no proposed new off-site storm drain line anticipated, aside from the required gravity storm drain lateral stub for the proposed building structures and on-site peak-reducing storm drain facility.

The proposed gravity storm drain stubs will be connected to the existing curb inlet located at West San Jose Avenue. Based on the preliminary calculated total peak-reducing maximum discharge flow of 1.28 CFS, a controlled outlet pipe should be sized accordingly based on 2-year pre-development discharge flow on each drainage tributary area. The collection drainage of building downspout, fire access drive and planters above ground level shall be directed to proposed peak-reducing facility before it will discharge to controlled storm drain outlets.

Also, a storm drain sump pump will be needed at the basement parking garage for the drainage of the proposed domestic water, fire pump room. This will discharge into the existing privately maintained catch basin, located at the adjacent Fig Garden Financial Center's parking lot.

Due to existing land use and existing FMFCD Master Plan drainage system, there will be a total required maximum peak-reducing discharge flow of 1.00 CFS based on the 2-year storm pre-development conditions, Hydrology Pre-Development Plan. Because of this controlled peak-reducing storm drain facility is required to mitigate the impacts of increase runoff due to change of land use from medium high density and medium low density residential to commercial land use, to eliminate the adverse impacts on the existing storm drain system. This peak- reducing storm drain facility can be detention pond and/or underground detention pipe system or combination of both which will be private maintained and located on-site.

Conclusion for Storm Drain Infrastructure

Storm drain discharge for the project site will be gravity controlled drain into the existing FMFCD curb inlet , located at west San Jose Avenue. The project will need a storm drain sump pump for the drainage of proposed domestic water and fire pump room at the basement parking garage that will drain into the existing privately maintained catch basin located at the adjacent Fig Garden Financial Center's parking lot. Also, a peak-reducing storm drain system is required to mitigate the impacts of increase runoff. Location and type of peak-reducing system should be evaluated and properly designed during preparation of final construction plans.

Also, FMFCD encourages, but does not require that roof drains be constructed such that they are directed onto and through a landscaped grassy swale area to filter out pollutants from roof runoff. Direct discharge connection of swimming backwash to storm drain is not permitted and should be directed onto and through a landscaped grassy swale area or approved equal.

Therefore, with the above there are none impacts to the FMFCD system.

ELECTRICITY, NATURAL GAS, TELEPHONE AND CATV INFRASTRUCTURE

The purpose of this section is to identify and address electricity, natural gas, telephone and CATV issues and impacts, and determine the feasible solutions.

Existing Dry Utility Facilities

PG&E maintained both existing electric and gas facilities along West San Jose Avenue, where the proposed electric and gas services of the project will connect service. PG&E has an existing overhead power lines that runs along the south side of West San Jose Avenue which along the project side. Also, PG&E has an existing 2" gas main along West San Jose Avenue, located approximately 11 feet north of centerline of West San Jose Avenue within the existing street asphalt paving.

AT&T maintained both existing telephone and CATV facilities along San Jose Avenue. Telephone line exists underground at the north side of West San Jose Avenue. These lines will be utilized to service the project site.

Electric, Gas, Telephone and CATV Demand for the Project

The following is the preliminary Dry Utility service demand for the project:

1. Electric – 2,500 AMP / 480V 3 Phase, 4 Wire, 100% Rate
2. Gas – 5 lbs., 200 CFH
3. Telephone – 2 of 4" Telephone Conduits 1500 Pairs
4. CATV – 2 of 2" CATV Conduits

Proposed Dry Utility Facilities

1. Electric
   The electric service for the project will be provided by Pacific Gas & Electric Company (PG&E) through extension of PG&E services of Rules 15 & 16.

2. Gas
   Proposed 2" gas service for the project will service from existing 2" gas main, located along west San Jose Avenue. Proposed number of gas meters will be determined and/or decided by both PG&E and mechanical consultant of the project during the final preparation of Construction Drawings.

3. Telephone and CATV
   The telephone and CATV services for the project will have service from the existing AT&T facilities along West San Jose Avenue. Two (2) of 4" conduits and two (2) of 2" conduits are preliminary requirements for telephone and CATV conduit stubs, respectively. These numbers of stubs of telephone and CATV services should be verified and/or decided by both AT&T and dry utility consultant of the project during the final preparation of the Construction Drawings.

Conclusion for Dry Utility Infrastructure

All required dry utility services for the project will obtain service from West San Jose Avenue and it was guaranteed by the respective utility companies that the project is feasible to provide utility service.

Therefore, there are no impacts on the dry utilities.

PUBLIC IMPROVEMENTS

Street Improvements

The project will be required to extend and construct the curb and gutter from the west half of the frontage to the east boundary line of the project, along W. San Jose Avenue with full width of AC paving from centerline plus a minimum of 16 feet wide AC paving on the north side street, measured from the centerline and necessary AC paving transition from the existing. The project will also require constructing a concrete sidewalk along the entire project frontage along San Jose Avenue along with the 26' wide fire/emergency driveway with emergency gate and street lights.

Water Improvements

The project shall replace the existing public 6-inch water main along the west side of the project between West Shaw Avenue and N. Roosevelt/N. Wishon Avenue with a 8-inch water main. The project shall also install a new 8-inch public water main along the east side of the project between West San Jose and West Scott Avenue. The public water mains would be placed in easements as required by the City of Fresno.

The project is proposing one (1) public fire hydrant is preliminary proposed along the frontage at West San Jose Avenue for service of proposed Fire Department Connection Assembly, one (1) public fire hydrant is preliminary proposed at the southwest side of the project.

Sewer Improvements

Due to the proposed new four-story office building, the existing public 8" sanitary sewer main that runs from south to north into the project property, will need to be removed and replaced/with a PVC pipe that entails the installation of an 8-inch public sewer line that would connect to the existing 8-inch main that transects the site with the existing 8-inch main located within West Scott Avenue. The 8-inch public main that transects the site would be abandoned once the connection is made to West Scott Avenue. with the required 20' wide sewer easement that will be dedicated to the City of Fresno, should the location be adjusted.

Storm Drain Improvements

There will be no proposed new off-site public storm drain line anticipated, aside from the required gravity storm drain lateral stub for the proposed building structures and on-site peak-reducing storm drain facility and pipe system.

Electric, Gas, Telephone and CATV Improvements

There will be no proposed or new off-site electric, natural gas, and/or telephone lines anticipated as the installation of new lines will occur inside the project site.

APPENDIX A

PRELIMINARY
WATER DEMAND CALCULATIONS

FIG GARDEN FINANCIAL CENTER PHASE IV
FRESNO, CALIFORNIA

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FIG GARDEN FINANCIAL CENTER PHASE IV

Total Water Demand of Existing:

Interior	=	36.73* AFY
Landscaping	=	29.16* AFY
Total		**65.89* AFY**

* Data from Table A

Less 18% for Retro-Fit & Smart Controllers	<11.86> AFY
New Demand	54.03 AFY
Less 42 Units	<5.46>** AFY
Final Demand of Existing with Retro-Fitting	**48.57 AFY**

** Data in Table B

Total Savings on Water Demands of Existing Financial Center:

65.89	AFY
<48.57>	AFY
17.32	**AFY**

Proposed Four-Story Demand:

Domestic:	11.5 AC Ft Yr**- <20% Water EFF>	=	9.2 AFY
Landscaping:	807,444 Gal/Yr	=	2.6 AFY
Total			**11.8 AFY**

Data is average of 5260 & 5200 N. Palm Avenue. (Table A)

Therefore:

Proposed Project of 11.8 AFY is less than the saving of retro-fitting the existing Financial Center of 17.32 AFY

Data of Existing Water Usage (Based on actual Water Billing Statements for subject properties)**:**

TABLE A

Office/Commercial	Interior - af/yr	Irrigation - af/yr
5250 N. Palm & 749 W San Ramon	8.09	7.35
5260 N. Palm	11.84	
5200 N. Palm	11.34	9.03
749 San Ramon		7.35
5251 Colonial		5.42
Multi-Family		
563 or 557 San Jose Ave S/A	5.46	
Sub-Totals	36.73	29.16

Total Water Used - af/yr 65.89

TABLE B

Existing Multi-Family	
Total Water Used - af/yr	5.46
	5.46
Number of Units	42
Water Used - af/yr/unit	0.13

PERKINS DESIGN ASSOCIATES

SITE PLANNING
LANDSCAPE ARCHITECTURE
RESORT DESIGN

May 31, 2011

Fig Garden Financial Center Phase IV

Palm Ave. & W. San Jose Ave.
Fresno, CA

Preliminary Water Use Calculations

WATER EFFICIENT LANDSCAPE WORKSHEET

SECTION A. HYDROZONE INFORMATION TABLE

Hydrozone*	Zone or Valve	Irrigation Method**	Area (Sq. Ft.)	% of Landscape Area
MW	1	Spray	4895	14
MW	2	Spray	5650	16
HW	3	Spray	2810	8
HW	4	Spray	2405	7
MW	5	Spray	3550	10
MW	6	Drip	1370	4
MW	7	Drip	2770	8
MW	8	Drip	905	3
MW	9	Spray	2395	7
MW	10	Drip	1370	4
MW	11	Drip	3535	10
LW	12	Spray	3300	9
Total			34955	100%

** Hydrozone*
HW = High Water Use Plants
MW = Moderate Water Use Plants
LW = Low Water Use Plants

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SECTION B. WATER BUDGET CALCULATIONS

Section B1. Maximum Applied Water Allowance (MAWA)

Maximum Applied Water Allowance is calculated using this equation:

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]

where:

MAWA= Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration from Appendix A (inches per year)
0.7 = ET Adjustment Factor (ETAF)
LA = Landscaped Area includes Special Landscape Area (square feet)
0.62 = Conversion factor (to gallons per square foot)
SLA = Portion of the landscape area identified as Special Landscape Area (square feet)
0.3 = the additional ET Adjustment Factor for Special Landscape Area (1.0 - 0.7 = 0.3)

Maximum Applied Water Allowance = 807,444 gallons per year

Show calculations.

MAWA = (53.3) (0.62) ((0.7 X 34,955) + (0.3 X 0) =

= (33.0) (24,468.5) + 0 =

= 807,444 Gallons

Effective Precipitation (Eppt)

If considering Effective Precipitation, use 25% of annual precipitation. Use the following equation to calculate Maximum Applied Water Allowance:

MAWA= (ETo – Eppt) (0.62) [(0.7 x LA) + (0.3 x SLA)]

Maximum Applied Water Allowance = _____N/A_____**gallons per year**

Show calculations.

N/A

Section B2. Estimated Total Water Use (ETWU)

The project's Estimated Total Water Use is calculated using the following formula:

$$ETWU = (ETo)(0.62)\left(\frac{PF\,xHA}{IE} + SLA\right)$$

where:

ETWU = Estimated total water use per year (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
PF = Plant Factor from WUCOLS (see Definitions)
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor (to gallons per square foot)
IE = Irrigation Efficiency (minimum 0.71)

Hydrozone Table for Calculating ETWU

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	PF x HA (square feet)
1	Medium	0.5	4895	2447.5
2	Medium	0.5	5650	2825
3	Medium	0.8	2810	2248
4	Medium	0.8	2405	1924
5	Medium	0.5	3550	1775
6	Medium	0.5	1370	685
7	Medium	0.5	2770	1385
8	Medium	0.5	905	452.5
9	Medium	0.5	2395	1197.5
10	Medium	0.5	1370	685
11	Medium	0.5	3535	1767.5
12	Medium	0.3	3300	990
			Sum PF x HA	18,292

Estimated Total Water Use = 428,571 gallons

Show calculations.

ETWU = (53.3) (0.62) ((18,292 / 0.71) + 0)

= (33.0) (12,987 + 0)

= 428,571 Gallons

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