Appendix C:
Traffic Impact Report

MRO ENGINEERS

Final
Traffic Impact Analysis

Psychiatric Services Unit Office and Treatment Space
California State Prison - Sacramento

Prepared For
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August 17, 2010

TABLE OF CONTENTS

Executive Summary i
Introduction 1
Existing Conditions 6
Baseline No Project Conditions 9
Baseline Plus Project Conditions 13
Cumulative Conditions Analysis 21

Appendix A
Project Site Plan

Appendix B
Existing Conditions – Level of Service Calculation Worksheets

Appendix C
Approved Projects Trip Generation Summary

Appendix D
Baseline No Project Conditions – Level of Service Calculation Worksheets

Appendix E
Baseline + Project – Level of Service Calculation Worksheets

Appendix F
Cumulative No Project – Level of Service Calculation Worksheets

Appendix G
Cumulative + Project – Level of Service Calculation Worksheets

Appendix H
Queue Length Calculation Worksheets – East Natoma Street/Prison Road

LIST OF TABLES

Table 1 – Level of Service Definitions – Signalized Intersections 3
Table 2 – Level of Service Definitions – Unsignalized Intersections 4
Table 3 – Level of Service Summary – Existing Conditions 8
Table 4 – Approved Projects ..... 9 - 10
Table 5 – Level of Service Summary – Baseline No Project Conditions.....12
Table 6 – Trip Generation Rate Comparison 15
Table 7 – Trip Generation Estimate Summary.....16
Table 8 – Level of Service Summary – Baseline + Project Conditions 19
Table 9 – Level of Service Summary – Cumulative (2030) No Project Conditions 24
Table 10 – Level of Service Summary – Cumulative (2030) + Project Conditions.....27
Table 11 – Estimated Queue Length Summary – East Natoma Street/Prison Road Intersection.....30

LIST OF FIGURES

Figure 1 – Project Location 2
Figure 2 – Peak Hour Traffic Volumes – Existing Conditions 7
Figure 3 – Peak Hour Traffic Volumes – Baseline No Project Conditions.....11
Figure 4 – Project Trip Distribution 17
Figure 5 – Peak Hour Traffic Volumes – Baseline + Project Conditions 18
Figure 6 – Peak Hour Traffic Volumes – Cumulative (2030) No Project Conditions 23
Figure 7 – Peak Hour Traffic Volumes – Cumulative (2030) + Project Conditions.....26

EXECUTIVE SUMMARY

This study addresses the traffic impacts associated with the proposed Psychiatric Services Unit Office and Treatment Space, California State Prison - Sacramento. The proposed project will serve 152 Psychiatric Services Unit patients at the existing prison, and will be constructed as a new stand-alone building with 115 additional employees. It is proposed to include 17,395 square feet (SF) of therapy space, offices, and a classroom, as well as a 50-space parking lot. Vehicular access needs of the proposed project will be served by the existing driveways at the prison.

The study evaluates traffic operations in the vicinity of the project site under five scenarios: Existing Conditions, Baseline No Project, Baseline Plus Project, Cumulative No Project, and Cumulative Plus Project. Two peak-hour periods were examined: weekday AM and weekday PM peak hours. Impacts of the proposed project were evaluated at six key existing intersections in the vicinity of the project site using methodologies and evaluation criteria generally accepted by the City of Folsom.

The key findings and recommendations resulting from the analysis are summarized below.

Existing Conditions

- In the AM peak hour, all six study intersections conform to the City of Folsom's General Plan policy requiring Level of Service (LOS) C or better.
- Four of the six study intersections have acceptable levels of service in the PM peak hour. The intersections of East Natoma Street/Riley Street and East Natoma Street/Hancock Drive are both at LOS D, which falls short of meeting the City's LOS policy.

Baseline No Project Conditions

- The traffic associated with 21 previously-approved developments was added to the study area roadway system to evaluate traffic operations under Baseline No Project conditions. In total, those projects will generate about 3,100 AM peak hour trips and 4,800 PM peak hour trips.
- In the weekday AM and PM peak hours, four of the six study intersections will operate acceptably at LOS C or better. The exceptions are the signal-controlled intersection of East Natoma Street/Riley Street and the STOP-sign-controlled intersection of East Natoma Street/Hancock Drive. Both of those locations are projected to operate at LOS D in the AM peak hour and LOS E in the PM peak hour.

Baseline + Project Conditions

- Based on project-specific trip generation rates, the proposed Psychiatric Services Unit project is expected to generate 52 weekday AM peak hour trips (46 inbound and 6 outbound) and 37 weekday PM peak hour trips (7 inbound and 30 outbound).
- No reduction was made to reflect the possibility of internal trips (i.e., trips made entirely within the prison complex). Thus, this analysis represents a conservative indication of the proposed project's traffic impacts.
- In the AM peak hour, four of the six study intersections will continue to operate at acceptable levels of service. East Natoma Street/Riley Street and East Natoma Street/Hancock Drive will fail

to conform to the City's General Plan policy. In both cases, the level of service is unchanged from Baseline No Project conditions and the project-related incremental impact is less than the City's adopted significance threshold.

- In the PM peak hour, no change in LOS is projected at any of the six study intersections. Four study locations will be at LOS B, while the remaining two locations (East Natoma Street/Riley Street and East Natoma Street/Hancock Drive) are projected to operate at LOS E, the same as under Baseline No Project conditions. The incremental increase in delay directly attributable to project-generated traffic is less than the significance threshold employed by the City of Folsom.

- Project-related impacts are less than significant in both peak-hour periods. Therefore, no mitigation measures are required at any of the off-site study intersections.

Cumulative No Project Conditions

- The cumulative conditions analysis reflects the level of development anticipated in the Folsom Sphere of Influence (SOI) annexation area and throughout the Sacramento region through the year 2030. The peak hour traffic volume projections were based, in part, on preliminary information developed in connection with the analysis for the SOI annexation process. Adjustments were made to reflect conditions specific to the study area.

- The future year traffic forecasts used in this analysis reflect the construction of the U.S. Highway 50/Empire Ranch Road interchange, as well as various other planned and programmed roadway system improvements in Folsom.

- Although the specific program of roadway improvements associated with the Folsom SOI Annexation process has not yet been established, the following major projects are likely to occur in conjunction with the annexation and were assumed in this analysis:
  - Construction of a new interchange at Highway 50/Oak Avenue Parkway, and
  - Widening of the East Bidwell Street overpass at Highway 50 from five to six lanes.

- Four of the six study intersections are projected to operate at acceptable levels of service in the weekday AM peak hour. The intersections of East Natoma Street/Riley Street and East Natoma Street/Hancock Drive will fall short of the City's LOS C standard; each will have a projected level of service of LOS F.

- In the weekday PM peak hour, three of the study intersections are expected to operate at LOS C or better. At East Natoma Street/Riley Street and East Natoma Street/Hancock Drive, LOS F is projected, while East Natoma Street/Folsom Lake Crossing is expected to operate at LOS E.

Cumulative + Project Conditions

- No changes in AM peak hour level of service are projected, and four of the six study intersections are expected to continue to meet the City's LOS C policy under this analysis scenario. At the two intersections where substandard levels of service are projected (East Natoma Street/Riley Street and East Natoma Street/Hancock Drive), the project-related impact will be below the City's significance threshold, so the proposed project's impact is less than significant in this time period.

- In the weekday PM peak hour, three study locations are projected to operate at worse than LOS C, as East Natoma Street/Riley Street and East Natoma Street/Hancock Drive will both be at LOS F and East Natoma Street/Folsom Lake Crossing will operate at LOS E. No change in level of service is projected at these three intersections, compared to Cumulative No Project conditions. At the two signal-controlled locations, the project-related impact is less than the City's adopted significance threshold. Traffic volumes at the STOP-sign-controlled intersection of East Natoma Street/Hancock Drive will be too low to meet minimum requirement of the "Peak Hour Volume" signal warrant. Therefore, the project-related impact is less than significant.

- No significant impacts were identified with regard to vehicular delay and level of service at any of the off-site intersections in either peak-hour period.

Site Access Analysis

- Two existing roadways will serve the vehicular access needs of the proposed Psychiatric Services Unit project. One of those (Prison Road) meets East Natoma Street at a signal-controlled intersection, while the eastern access road (at East Natoma Street/Hancock Drive) is STOP-sign controlled.

- The East Natoma Street/Hancock Drive intersection will have insufficient traffic to meet the "Peak Hour Volume" warrant for a traffic signal. Therefore, installation of a traffic signal is not recommended at that location.

- Both access roadways have adequate sight distance for entering and exiting drivers.

- Under Baseline conditions, the existing turn lanes at the primary access intersection of East Natoma Street/Prison Road will be sufficient to accommodate the expected queues of vehicles waiting to turn into or out of the project site.

- Under cumulative (year 2030) conditions, the eastbound left-turn queue at East Natoma Street/Prison Road is projected to exceed the available storage, even before the project-generated traffic is considered. Under "no project" conditions, the queue is projected to be 225 feet, which would be 25 feet longer than the existing turn lane. Addition of the project-generated traffic would increase the estimated queue to a total estimated length of 300 feet. The southbound queues would continue to fit within the available storage, however.

- To mitigate the left-turn storage deficiency at East Natoma Street/Prison Road, the proposed project should restripe the existing eastbound left-turn lane to extend it to a total length of 300 feet (plus taper/transition). Although the proposed project's fair share of this improvement is estimated to be only 8.6 percent, the City of Folsom has no programmed improvement project at the East Natoma Street/Prison Road intersection and no funding mechanism exists through which the remaining funds for the mitigation measure could be acquired. Therefore, the only way to fully mitigate the project-related impact would be for the proposed project to provide 100 percent of the cost of the restriping project. Completion of the restriping project would reduce the project-related impact to less than significant.

INTRODUCTION

This study addresses the traffic impacts associated with the proposed Psychiatric Services Unit Office and Treatment Space at California State Prison - Sacramento. The proposed project will serve 152 patients at the existing prison, with 115 additional employees. Vehicular access needs of the proposed project will be served by the existing roadways at the prison complex. Figure 1 illustrates the project location.

In keeping with the analysis procedures typically employed in the City of Folsom, this study analyzed traffic operations under the following five scenarios:

- Existing Conditions,
- Baseline No Project Conditions,
- Baseline Plus Project Conditions,
- Cumulative No Project Conditions, and
- Cumulative Plus Project Conditions.

Traffic operations were evaluated in the weekday AM and PM peak hours, which typically correspond to the heaviest, commute-oriented traffic volumes.

This report presents the analysis procedures as well as the findings and recommendations resulting from the evaluation.

Project Description

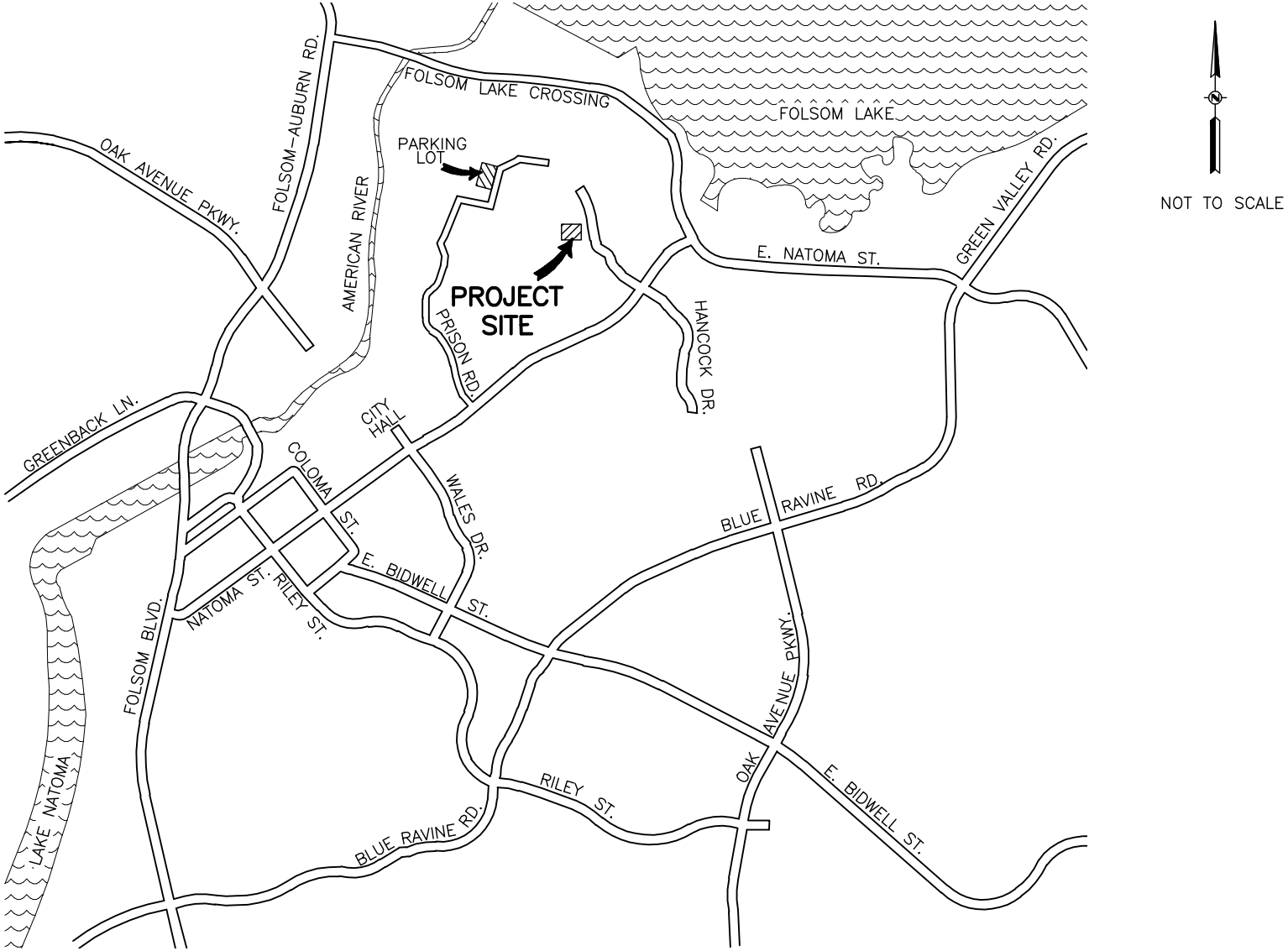
The proposed Psychiatric Services Unit Office and Treatment Space will serve 152 patients at the existing California State Prison – Sacramento. The proposed project will be constructed as a new stand-alone building with 17,395 square feet (SF) of therapy space, offices, and a classroom, as well as a 50-space parking lot. Approximately 115 new employees will be added in conjunction with the project. Appendix A contains a copy of the project site plan.

The vehicular access needs of the proposed project will be served by two existing roadways at the prison. Given the location of the proposed project's parking lot, primary vehicular access to and from the project will occur via Prison Road, which is near the western end of the prison property and meets East Natoma Street at a traffic-signal-controlled intersection. Nearer the proposed Psychiatric Services Unit building is a second existing access road, which meets East Natoma Street at a STOP-sign-controlled intersection directly opposite Hancock Drive, a residential street on the south side of East Natoma Street.

Study Area

The off-site impacts of the proposed project were evaluated at the following existing intersections:

- East Natoma Street/Riley Street,
- East Natoma Street/Coloma Street,
- East Natoma Street/Wales Drive/City Hall Driveway,
- East Natoma Street/Prison Road,



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PROJECT LOCATION

FIGURE 1

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- East Natoma Street/Hancock Drive (i.e., the easterly prison access road), and
- East Natoma Street/Folsom Lake Crossing.

Analysis Methodology

Intersection Operations

Intersection operations are typically described in terms of level of service (LOS), which is reported on a scale from LOS A (representing free-flow conditions) to LOS F (which represents substantial congestion and delay). The level of service designations are based on a quantitative calculation of delay at the intersection. The specific approach to estimating delay is based on procedures documented in the *Highway Capacity Manual* (Transportation Research Board, 2000).

Signalized Intersections

The signalized study intersections were analyzed using the "operational analysis" methodology presented in Chapter 16 of the *Highway Capacity Manual* (*HCM*). This methodology determines signalized intersection level of service by comparing the "average control delay per vehicle" to the thresholds shown in Table 1. Control delay represents the delay directly associated with the traffic signal. For this analysis, the level of service calculations were performed using the *Synchro* software package, which implements the intersection analysis procedures documented in the *HCM*.

Table 1
Level of Service Definitions
Signalized Intersections

Level of Service	Description	Average Control Delay (Seconds/Vehicle)
A	Very low delay. Most vehicles do not stop	≤ 10.0
B	Slight delay. Generally good signal progression.	10.1 – 20.0
C	Increased number of stopped vehicles. Fair signal progression.	20.1 - 35.0
D	Noticeable congestion. Large proportion of vehicles stopped.	35.1 – 55.0
E	Operating conditions at or near capacity. Frequent cycle failure.	55.1 - 80.0
F	Oversaturation. Forced or breakdown flow. Extensive queuing.	> 80.0

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

Unsignalized Intersections

The analysis of the unsignalized intersection of East Natoma Street/Hancock Drive was conducted using the method documented in Chapter 17 of the *HCM*. This method calculates average control delay for each minor movement at the intersection (i.e., movements that are required to yield to oncoming traffic). Level of service results reported for STOP-controlled intersections are based upon the average control delay per vehicle for the worst-case minor movement, based on the criteria set forth in Table 2. For unsignalized intersections, control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The unsignalized study intersection was also analyzed using the *Synchro* software package, which performs level of service calculations in accordance with the *HCM* procedures.

Table 2
Level of Service Definitions
Unsignalized Intersections

Level of Service	Description	Average Control Delay (Seconds/Vehicle)
A	Little or no conflicting traffic for minor movements.	≤ 10.0
B	Drivers on minor movements begin to notice absence of available gaps.	10.1 – 15.0
C	Drivers on minor movements begin to experience delays waiting for adequate gaps.	15.1 – 25.0
D	Queuing occurs on minor movements due to a reduction in available gaps.	25.1 – 35.0
E	Extensive minor movement queuing due to insufficient gaps.	35.1 – 50.0
F	Insufficient gaps of adequate size to allow minor movement traffic demand to be accommodated.	> 50.0

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

The analysis of the unsignalized project intersection also considered whether it would meet the minimum criteria for consideration of traffic signal installation. The need for installation of a traffic signal at a given location is initially judged relative to a defined set of traffic signal "warrants." The current signal warrants are documented in "Part 4 – Highway Traffic Signals" of the *California Manual on Uniform Traffic Control Devices 2010* (Caltrans, January 21, 2010). Eight such warrants have been defined, although not all warrants are relevant to each case. This analysis was conducted using the "Peak Hour Volume Warrant."

As noted in the *California MUTCD 2010*, "[t]he satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal." Based on this, other factors were also considered in this analysis in determining the feasibility of a traffic signal. Those factors included safety, signal spacing, maintenance of progressive traffic flow, and other considerations.

Sight Distance

To ensure that drivers will be able to enter and exit the site safely at the project access locations on East Natoma Street, a stopping sight distance analysis was conducted using parameters documented in *A Policy on Geometric Design of Highways and Streets* (American Association of State Highway and Transportation Officials, 2004).

Queuing/Storage Length

To minimize the potential for queuing-related problems at the primary project access location of East Natoma Street/Prison Road, the "95th-percentile" queues were calculated for the key turning movements using the probability-based methodology accepted by the City of Folsom. The intent of this analysis is to ensure that turning vehicles have enough stacking distance, which minimizes the possibility that those vehicles will queue back into the through-traffic lanes, potentially causing rear-end collisions.

Evaluation Criteria

Policy 17.17 of the *City of Folsom General Plan* identifies the minimum acceptable level of service for traffic operations at signal-controlled intersections in the City. Specifically, this policy states:

> "The City should strive to achieve at least a traffic Level of Service 'C' throughout the City. During the course of Plan buildout it may occur that temporarily higher Levels of Service result where roadway improvements have not been adequately phased as development proceeds. However, this situation will be minimized based on annual traffic studies and monitoring programs."

The City has defined appropriate standards of significance to reflect this policy, including criteria that address situations where the signalized intersection level of service is worse than LOS C under "no project" conditions. Those standards of significance are as follows:

- If the "no project" level of service is LOS C or better and the project-generated traffic causes the intersection level of service to degrade to worse than LOS C (i.e., LOS D, E, or F), then the proposed project must implement mitigation measures to return the intersection to LOS C or better.
- If the "no project" level of service is worse than LOS C (i.e., LOS D, E, or F) and the project-generated traffic causes the overall average delay value at the intersection to increase by five seconds or more, then the proposed project must implement mitigation measures to improve the intersection to the "no project" condition or better. It is not necessary to improve the intersection to LOS C.
- If the "no project" level of service is worse than LOS C (i.e., LOS D, E, or F) and the project-generated traffic causes the overall average delay value at the intersection to increase by less than five seconds, then the traffic impact is considered less than significant and no mitigation is required.

EXISTING CONDITIONS

This section describes the roadway network serving the proposed project, as well as existing traffic operations at key intersections in the vicinity of the project site.

Key Roadways

Brief descriptions of the key roadways serving the project site are provided below.

East Natoma Street is an arterial road that extends northeast from Folsom Boulevard near the Historic District of Folsom to provide a connection to the Empire Ranch area in the eastern part of the city, where it curves to the southeast. In the vicinity of the project site, East Natoma Street has one lane in each direction (plus bike lanes) and a posted speed limit of 45 MPH. To the west of the project site, the speed limit on East Natoma Street is 35 MPH, with the transition from 45 MPH to 35 MPH occurring between Hancock Drive and Prison Road.

Riley Street curves through Folsom in a generally northwest-to-southeast direction, beginning in the Historic District and ultimately connecting to Oak Avenue Parkway. In the study area, it is a two-lane street with left-turn lanes at intersections. Riley Street intersects East Natoma Street at a signalized intersection.

Coloma Street connects East Natoma Street with residential areas to the northwest, as well as to the commercial areas along East Bidwell Street and Riley Street to the southeast. It is a two-lane street, which intersects East Natoma Street at a signal-controlled location.

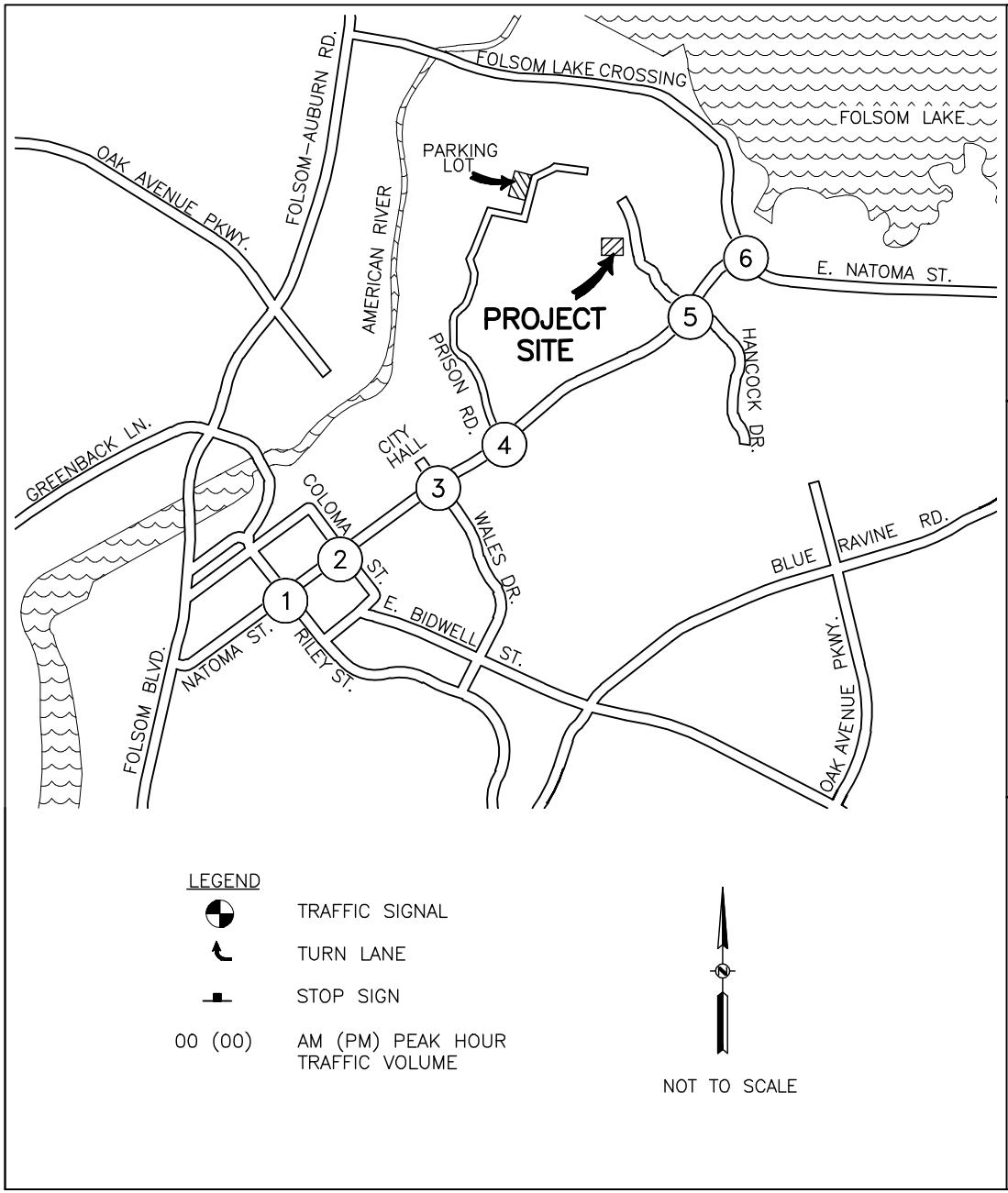
Wales Drive meets East Natoma Street at a traffic signal-controlled intersection, which also serves as the primary access to Folsom City Hall. It is a two-lane street that passes through a residential area before connecting to the commercial areas along East Bidwell Street and Riley Street. It has a 25 MPH posted speed limit.

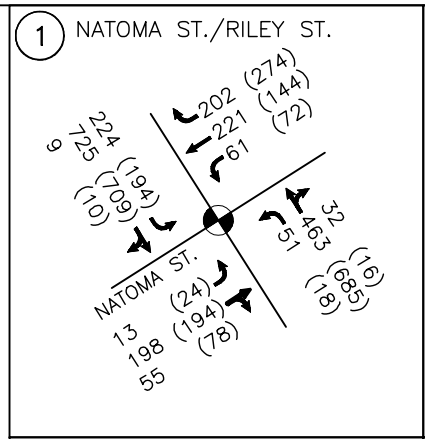
Prison Road is a two-lane road that serves as the primary vehicular access to and from California State Prison - Sacramento. It meets East Natoma Street at a signalized T-intersection, although the fourth (i.e., south) leg of that intersection will be added to serve a 32,000-square-foot office development that was approved by the City of Folsom in early 2009.

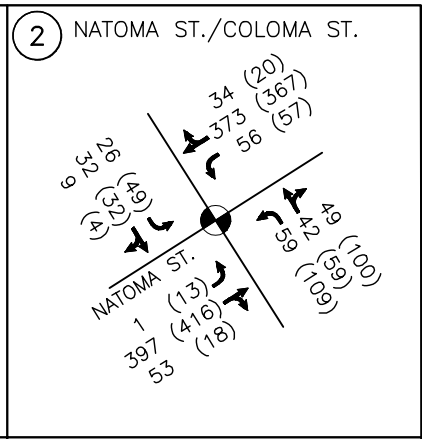
Folsom Lake Crossing is the roadway on the recently-constructed bridge across the American River, just below Folsom Dam. It provides four lanes plus bike lanes. In addition, a Class I off-street bike path is located along the north and east sides of the road. A 55 MPH speed limit is posted on Folsom Lake Crossing, which meets East Natoma Street at a signal-controlled T-intersection.

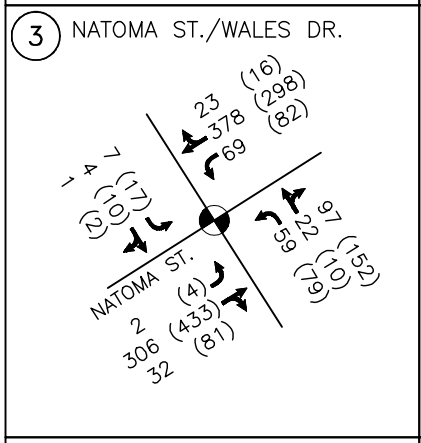
Existing Traffic Volumes

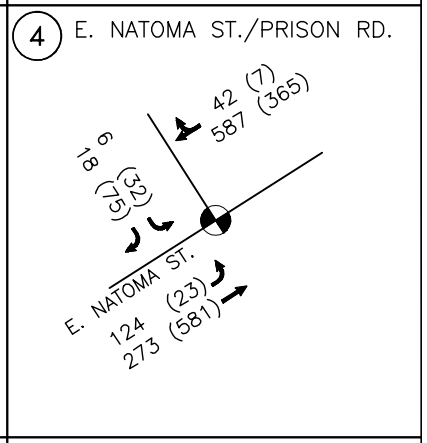
Weekday AM and PM peak-period turning movement counts were conducted at the study intersections on Tuesday May 11, 2010. The existing peak-hour volumes and intersection lane configurations are shown on Figure 2.

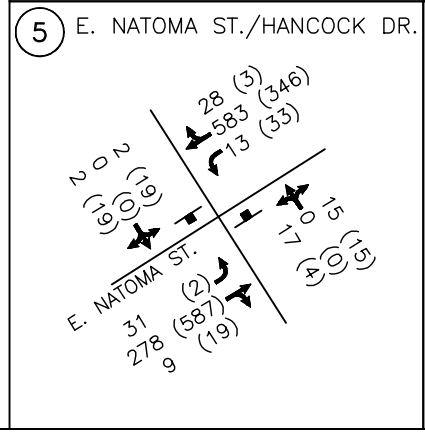


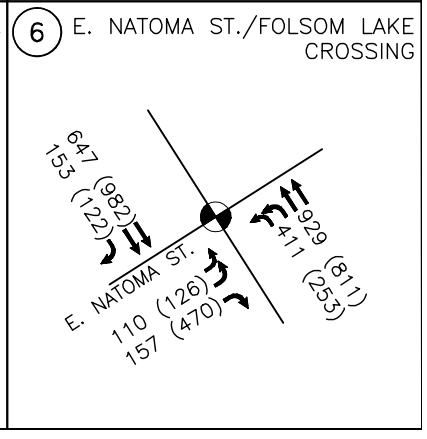












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PEAK HOUR TRAFFIC VOLUMES
EXISTING CONDITIONS

FIGURE 2

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Existing Intersection Level of Service

Table 3 summarizes the existing peak-hour levels of service at the designated study intersections. Appendix B contains the technical calculation sheets.

Table 3
Level of Service Summary[1]
Existing Conditions

Intersection	Traffic Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
		Delay[2]	LOS[3]	Delay	LOS
East Natoma Street/Riley Street	Signal	34.0	C	38.4[4]	D
East Natoma Street/Coloma Street	Signal	16.3	B	19.2	B
East Natoma Street/Wales Drive/City Hall Driveway	Signal	16.0	B	16.8	B
East Natoma Street/Prison Road	Signal	11.7	B	8.3	A
East Natoma Street/Hancock Drive	STOP Sign	22.7	C	26.1	D
East Natoma Street/Folsom Lake Crossing	Signal	7.8	A	13.2	B

Notes:
1 Reference: Transportation Research Board, *Highway Capacity Manual*, 2000.
2 Average control delay (seconds per vehicle).
3 Level of service.
4 Shaded cell denotes unacceptable level of service.

Weekday AM Peak Hour

In the weekday AM peak hour, all six study intersections meet the City's General Plan policy requiring operation at LOS C or better. Two intersections are at LOS C (East Natoma Street/Riley Street and East Natoma Street/Hancock Drive), while the remaining four locations operate at LOS A or B.

Weekday PM Peak Hour

Four study intersections operate at LOS A or B in the weekday PM peak hour. Thus, according to the City's General Plan policy, those study intersections operate at acceptable levels of service in this time period. Two study intersections, however, are at LOS D, which falls short of the City's LOS C goal. Those intersections are the signalized intersection of East Natoma Street/Riley Street and East Natoma Street/Hancock Drive, which is STOP-sign-controlled. At East Natoma Street/Hancock Drive, the critical movements are on the southbound approach, where a total of 38 vehicles were observed exiting the prison property onto East Natoma Street.

BASELINE NO PROJECT CONDITIONS

This section documents traffic operations in the anticipated construction year for the proposed Psychiatric Services Unit project, excluding the traffic generated by the project itself. This scenario includes the traffic associated with other previously-approved (or reasonably foreseeable) developments in the vicinity of the proposed project, as identified by City of Folsom staff.

Approved Projects

To develop a meaningful estimate of "baseline" traffic conditions, MRO Engineers, Inc., estimated the volume of peak-hour traffic to be generated by a number of approved projects in the vicinity of the proposed project, as identified by City of Folsom staff. Based on input from City staff, 21 such projects were identified. The specific land use assumptions for each of these projects were confirmed with City of Folsom staff prior to initiating the detailed analyses. Table 4 lists the projects included in this analysis scenario.

As summarized in Appendix C, the previously-approved projects included here will generate a total of about 3,100 weekday AM peak-hour trips and 4,800 weekday PM peak-hour trips. However, given the locations of the approved projects, not all of those trips will pass by the project site and through the study intersections.

The approved project trips were distributed and assigned to the City of Folsom road network in accordance with information presented in previous traffic analyses conducted within the city.

Table 4
Approved Projects[1]

Project	Land Use	Size	Location
Creekview Professional Center	Medical/Professional. Office	96,360 SF[2]	Northwest quadrant of East Bidwell Street/Creekside Drive
Mammoth Professional Center	Office	58,800 SF	Southeast quadrant of East Bidwell Street/Creekside Drive
Folsom Pointe Highway Commercial	Highway Commercial Center		East side of East Bidwell St., south of Iron Point Rd.
Broadstone Park Professional Center	Office	73,829 SF	South side of Iron Point Road east of McAdoo Drive
Palladio Retail – Phase 1[3]	Retail	564,800 SF	Bounded by Iron Point Road, East Bidwell Street, and Broadstone Parkway
Former Fire Station	Office	3,500 SF	East of Prairie City Road, South of Blue Ravine Road
Parkshore Plaza III	Industrial/Office	207,060 SF	Southwest of Parkshore Dr. in Silverbrook Island area
Wal-Mart Expansion[4]	Retail	26,515 SF & 3,000 SF Pad	South side of Riley St. between Lembi Dr. and Glenn Dr.
Willow Creek Village	Multi-family Residential	86 DU[5]	West side of Sibley Street at Levy Road

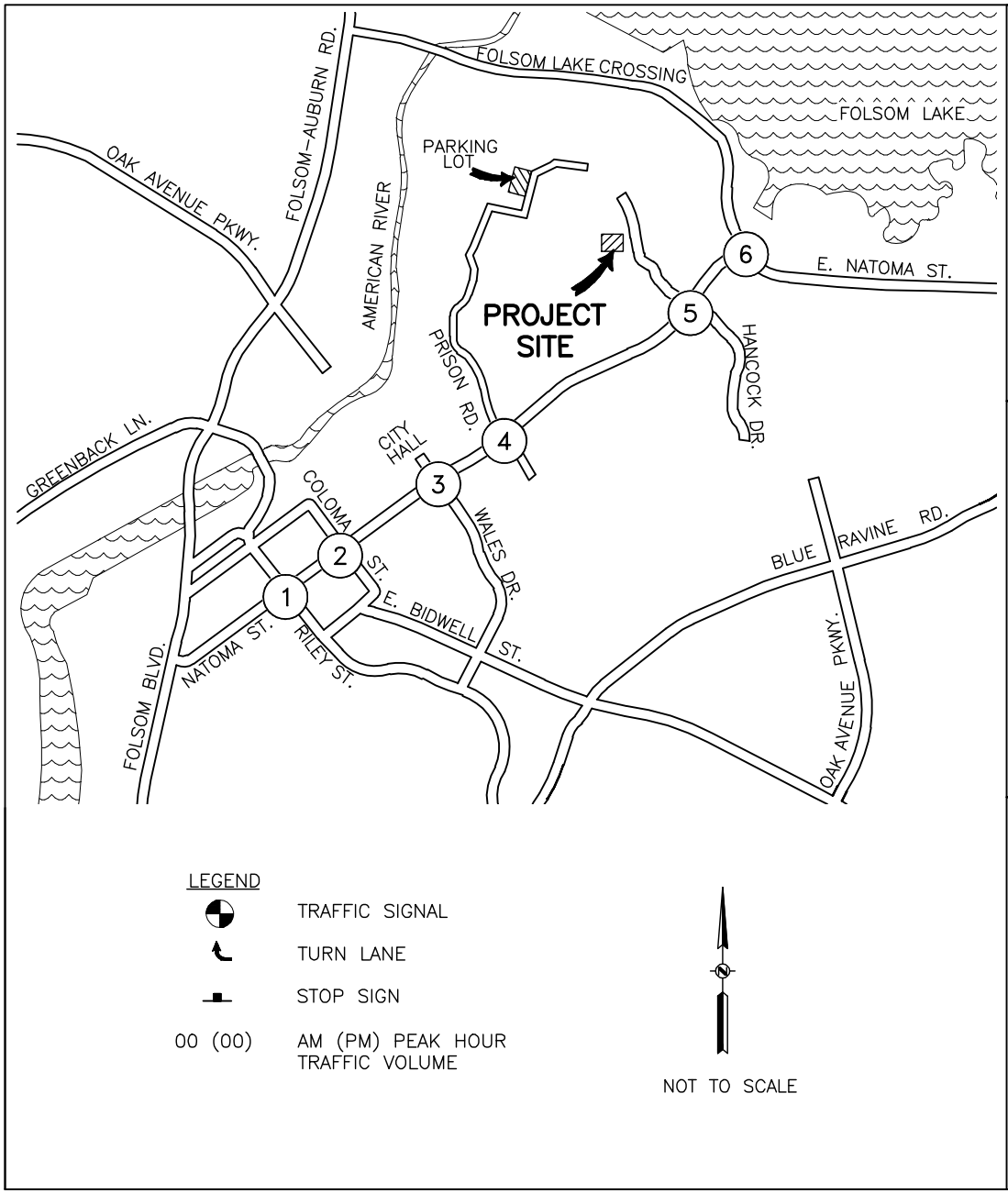
Table 4
Approved Projects[1]

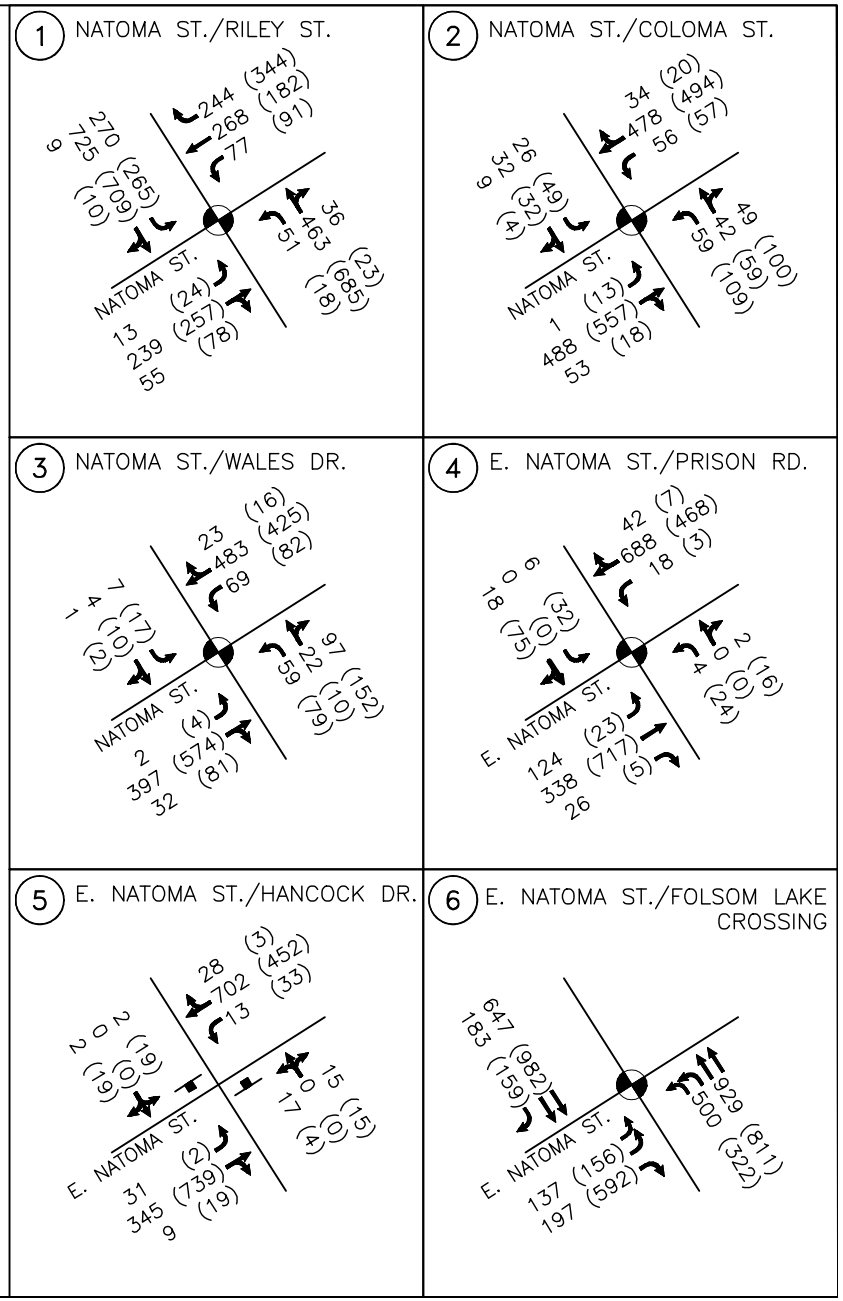
Project	Land Use	Size	Location
Broadstone Crossing Parcel 1	Two Hotels Three Restaurants	236 Rooms 22,230 SF	Southwest quadrant of Iron Point Road/Cavitt Drive
Broadstone Crossing Parcel 5	Strikes Family Entertainment Ctr.	55,000 SF	West side of Serpa Way south of Iron Point Road
Oaks at Willow Springs	Residential	200+/- DU[6]	South side Iron Point Road east of McAdoo Drive
Broadstone Oaks #2	Office Retail	56,800 SF 15,000 SF	Southeast quadrant of Iron Point Road/Oak Avenue Parkway
Calif. Independent System Operator	Office	277,000 SF	Southeast quadrant of Iron Point Road/Outcropping Way
The Parkway, Lot D	Residential Condominium	80 DU[6]	East Natoma St. east of Blue Ravine Rd./ Green Valley Rd.
La Collina dal Lago	Single-Family Residential	30 DU[6]	East Natoma Street west of Blue Ravine Road/Green Valley Road
Empire Ranch	Single-Family Residential	400 DU	East Natoma Street east of Blue Ravine Road/Green Valley Road
Natoma Valley Subdivision	Single-Family Residential	82 DU	Northwest quadrant of Blue Ravine Rd./Green Valley Rd./East Natoma St.
The Parkway, Lots I & J	Residential	212 DU[7]	Parkway Drive east of Blue Ravine Road
Montara Grove	Office	32,000 SF	South side of East Natoma Street at Prison Road
Sonic Drive-In	Fast Food Restaurant	1,760 SF	Southwest side of East Bidwell Street southeast of Clarksville Road/Scholar Way

Notes:
1 Reference: City of Folsom, Community Development Department
2 Square feet.
3 Excludes movie theater, which is complete and occupied.
4 Expansion of existing Wal-Mart store to Wal-Mart Supercenter (137,374 SF to 163,889 SF).
5 Dwelling units.
6 Approximate number of unbuilt units.

Baseline No Project Traffic Volumes

The peak-hour traffic generated by the approved projects listed above was added to the road system in the vicinity of the project site to develop a "Baseline No Project" traffic scenario. Figure 3 illustrates the result of adding the traffic associated with the related projects to the existing traffic volumes for the two peak-hour analysis periods.





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PEAK HOUR TRAFFIC VOLUMES
BASELINE NO PROJECT CONDITIONS

FIGURE 3

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Intersection Level of Service

Table 5 summarizes the results of the level of service calculations for the study intersections under Baseline No Project conditions. Appendix D contains the technical calculations.

Table 5
Level of Service Summary[1]
Baseline No Project Conditions

Intersection	Traffic Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
		Delay[2]	LOS[3]	Delay	LOS
East Natoma Street/Riley Street	Signal	40.3[4]	D	55.3	E
East Natoma Street/Coloma Street	Signal	18.0	B	19.3	B
East Natoma Street/Wales Drive/City Hall Driveway	Signal	19.0	B	19.1	B
East Natoma Street/Prison Road	Signal	16.7	B	14.6	B
East Natoma Street/Hancock Drive	STOP Sign	32.0	D	47.2	E
East Natoma Street/Folsom Lake Crossing	Signal	9.0	A	18.7	B

Notes:
1 Reference: Transportation Research Board, *Highway Capacity Manual*, 2000.
2 Average control delay (seconds per vehicle).
3 Level of service.
4 Shaded cell denotes unacceptable level of service.

Weekday AM Peak Hour

In the weekday AM peak hour, with addition of the traffic generated by the 21 previously-approved projects, four of the six study intersections will operate at LOS A or B, thereby conforming to the City of Folsom's level of service policy calling for operation at LOS C or better. The intersections of East Natoma Street/Riley Street and East Natoma Street/Hancock Drive are expected to operate at LOS D, which fails to conform to the City's operational goal. In this scenario, the critical movements at the East Natoma Street/Hancock Drive intersection are on the northbound approach.

Weekday PM Peak Hour

The weekday PM peak hour level of service results are somewhat similar to the AM peak hour findings. Again, four intersections are expected to operate at acceptable levels of service; in this time period, those four locations will all be at LOS B. As under Existing Conditions, the intersections of East Natoma Street/Riley Street (LOS E) and East Natoma Street/Hancock Drive (LOS E on the southbound approach) will be at unacceptable levels of service.

BASELINE PLUS PROJECT CONDITIONS

This section documents the impacts of the proposed Psychiatric Services Unit Office and Treatment Space at the California State Prison - Sacramento on traffic conditions in the assumed construction year. To evaluate off-site impacts, the volume of peak-hour traffic generated by the proposed project was estimated and that traffic was assigned to the adjacent street system. The levels of service at the study intersections were then analyzed for the weekday AM and PM peak hours.

Project Description

As noted above, the proposed Psychiatric Services Unit Office and Treatment Space will serve 152 patients at the existing California State Prison – Sacramento. The new stand-alone building is proposed to include 17,395 square feet (SF) of therapy space, offices, and a classroom, as well as a 50-space parking lot. A total of approximately 115 additional employees will be associated with the proposed project.

Vehicular access will be provided by two existing roadways at the prison. The project's parking lot will primarily be served by Prison Road, which is located near the western end of the prison property. Nearer the proposed Psychiatric Services Unit building is a second existing access road, which is directly opposite Hancock Drive, a residential street on the south side of East Natoma Street.

Trip Generation

Typically, project-related trip generation estimates would be based on information published in *Trip Generation* (Institute of Transportation Engineers, Eighth Edition, 2008). In some cases, however, the specific characteristics of the proposed project are not accurately reflected by the land uses contained within the ITE publication. This can occur with unusual projects that are not often constructed, such as the Psychiatric Services Unit under evaluation in the study. This issue is addressed in the ITE *Trip Generation Handbook* (Second Edition, June 2004), which provides direction with regard to application of the rates and formulae provided in the *Trip Generation* manual. Specifically, the *Trip Generation Handbook* states that local trip data should be collected when the "study site is not compatible with [the] ITE land use code definition."

Although the ITE *Trip Generation* manual includes information for "Medical-Dental Office Buildings," that data does not apply to the proposed project, which includes unique administrative, office, and medical functions. Traffic at a typical medical office building includes trips associated with staff, patients, and service/delivery vehicles. At the proposed project, no patient-related trips will occur on the public road system, since the patients will already be located on-site and, therefore, all patient trips will be internal to the prison complex. (Based on this lack of patient-generated traffic, it might be reasonable to expect that the proposed project will more closely resemble a typical general office building than a medical office building.)

Because the nature of the proposed project differs substantially from a typical medical office building, use of the ITE trip generation rates would over-estimate the volume of traffic associated with the project. Consequently, the estimated volume of traffic to be generated by the proposed project was developed based on site-specific data collected at the existing prison.

The trip generation rates for the proposed project were developed based on peak-period traffic counts conducted at the two prison access locations – East Natoma Street/Prison Road and East Natoma Street/Hancock Drive. The volume of traffic entering and exiting the prison during the AM and PM peak hours was converted to a trip generation rate in terms of trips/employee, based on the number of existing medical, education, and support services staff (i.e., non-custody staff) at the prison. According to the California Department of Corrections and Rehabilitation (CDCR) Website, 569 such employees are located at California State Prison - Sacramento. Whereas the custody staff at the prison work shifts that generally avoid the typical commute-related peak hours (i.e., 10:00 PM – 6:00 AM, 6:00 AM – 2:00 PM, and 2:00 PM – 10:00 PM), the non-custody staff is more likely to arrive and depart during the typical peak hours, working from 7:00 AM – 4:00 PM or 8:00 AM – 5:00 PM.

To ensure the validity of the trip generation rates derived from this process, they were compared to corresponding values from the ITE *Trip Generation* manual as well as to the trip rates used in the analysis of medical projects at several other California correctional facilities. A detailed comparison is provided in Table 6.

The trip rates derived for this analysis are somewhat lower than the rates for typical medical-dental offices, as documented in the ITE *Trip Generation* manual. As noted above, this is to be expected, given the lack of patient-generated traffic at the proposed project, since the patients are already located on-site within the existing prison complex. The rates for this analysis, however, compare favorably to the ITE rates for general office buildings, particularly in the AM peak hour. Although the proposed total PM peak hour rate is somewhat lower than the total ITE general office rate, this can be explained by differences in work hours (e.g., the work shift for a substantial number of the prison employees ends at 4:00 PM, whereas employees in general office buildings might be more likely to work until 5:00 PM).

The rates derived for this analysis were also compared to the trip rates used in recently-prepared traffic analyses for other medical facilities in the CDCR system. Table 6 presents information derived from three such studies. As shown, the total trip rate proposed for use in this analysis exceeds all of the other comparable examples. Although the inbound/outbound distribution varies somewhat from one location to the next, the general patterns are fairly consistent.

Recognizing the inherent variability in trip generation rates that exists from one location to another, the review presented here suggests that the rates derived for this analysis are valid. The derived rates are generally consistent with the universally-accepted ITE rates, particularly with regard to the general-office rates, which might be more directly comparable than the medical-dental office rates. As to the rates derived from the traffic analyses for the other three CDCR medical facilities, the rates proposed here will result in the highest, most conservative estimate of project-related traffic. Therefore, the trip generation rates derived from the counts at California State Prison – Sacramento are considered appropriate for use in this analysis.

Table 6
Trip Generation Rate Comparison[1]

Source	Weekday AM Peak Hour			Weekday PM Peak Hour		
	In	Out	Total	In	Out	Total
Proposed Rates[2]	**0.40**	**0.05**	**0.45**	**0.06**	**0.26**	**0.32**
Institute of Transportation Engineers						
ITE Medical-Dental Office[3]	0.42	0.11	0.53	0.36	0.70	1.06
ITE General Office[3]	0.42	0.06	0.48	0.08	0.38	0.46
Other California Department of Corrections and Rehabilitation Locations						
California Medical Facility, Vacaville[4]	0.28	0.14	0.42	0.07	0.17	0.24
San Quentin State Prison[5]	0.08	0.03	0.11	0.05	0.14	0.19
California Men's Colony, San Luis Obispo[6]	0.19	0.02	0.21	0.01	0.14	0.15
CDCR Average	0.18	0.06	0.24	0.04	0.15	0.19

Notes:
1 Trips per employee.
2 Based on counts conducted at the existing California State Prison - Sacramento.
3 Source: Institute of Transportation Engineers, *Trip Generation*, Eight Edition, 2008.
4 Source: EDAW, Inc., *Initial Study/Proposed Mitigated Negative Declaration – Intermediate Care Facility Project at the California Medical Facility*, November 2008.
5 DKS Associates, *San Quentin State Prison Central Health Services Center – Transportation Impact Analysis – Final Report*, May 29, 2007.
6 Michael Brandman Associates, *Initial Study and Proposed Mitigated Negative Declaration – 50-Bed Mental Health Crisis Beds (MHCB) Facility at California Men's Colony – San Luis Obispo, California*, October 1, 2009.

Based on application of the trip rates derived for this analysis, Table 7 summarizes the resulting trip generation estimates for the proposed project. During the weekday AM peak hour, 52 trips are projected, with 46 inbound and 6 outbound. In the weekday PM peak hour, an estimated total of 37 trips will occur, with 7 inbound and 30 outbound.

It should be noted that the location of the proposed project within the existing prison complex creates the potential for a certain amount of internal travel. Internal trips are those that occur entirely within the site (either as vehicular trips or pedestrian trips), and result in no additional traffic on the public streets serving the project site. Although it would be reasonable to assume that some portion of the project trips might remain internal to the prison complex, no reduction has been applied to the trip

generation estimate to reflect internal tripmaking. This results in a conservative analysis of project-related impacts.

Table 7
Trip Generation Estimate Summary[1]

	Weekday AM Peak Hour			Weekday PM Peak Hour		
	In	Out	Total	In	Out	Total
Trip Rates[2]	0.40	0.05	0.45	0.06	0.26	0.32
Peak-Hour Trips	46	6	52	7	30	37

Notes:
[1] Based on counts conducted at the existing California State Prison - Sacramento.
[2] Trips per employee.

Trip Distribution

The geographic distribution of the project-generated traffic was based primarily on information regarding the residence zip codes of existing prison employees, with the assumption that future employees will generally follow the same pattern. Existing traffic patterns in the vicinity of the project site were also considered, where appropriate.

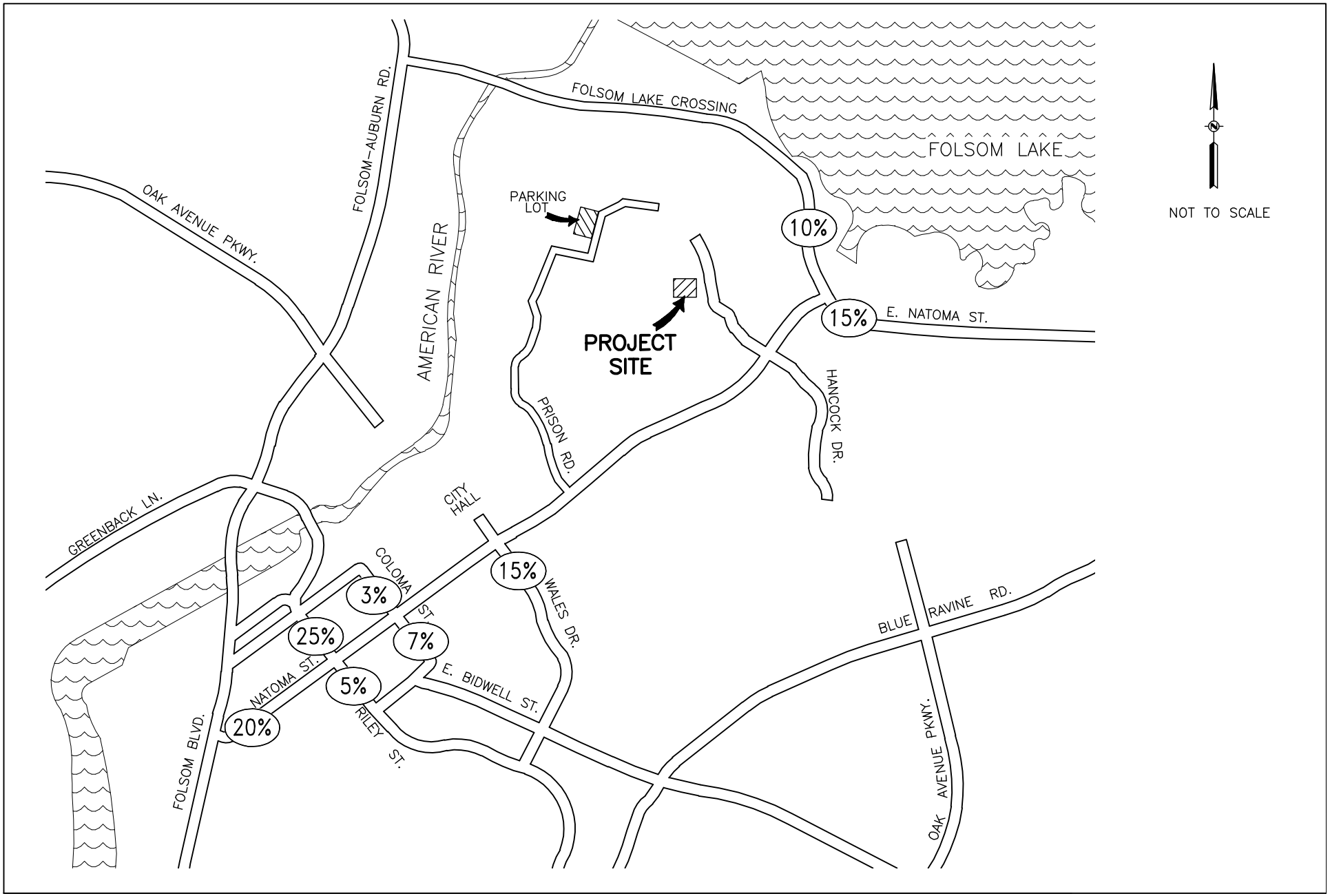
Figure 4 illustrates the detailed trip distribution for the "Baseline Plus Project" analysis. As shown there, approximately 75 percent of the project-related traffic will approach and depart to/from the west on East Natoma Street. The remaining 25 percent will be oriented to/from the east, with about 15 percent then traveling to/from El Dorado County via East Natoma Street and Green Valley Road and 10 percent using Folsom Lake Crossing and Folsom-Auburn Road to travel to/from Placer County.

Project Traffic Assignment

The peak-hour traffic volumes generated by the proposed project were added to the "Baseline No Project" traffic, with the result being the "Baseline Plus Project" scenario. Those estimated traffic volumes are shown on Figure 5, which also illustrates the assumed intersection lane configurations. No roadway system improvements were assumed for the study intersections within this time frame.

Intersection Level of Service

Table 8 presents the peak-hour levels of service at each study intersection under Baseline Plus Project conditions. Appendix E contains the technical calculation worksheets.



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PROJECT TRIP DISTRIBUTION

FIGURE 4

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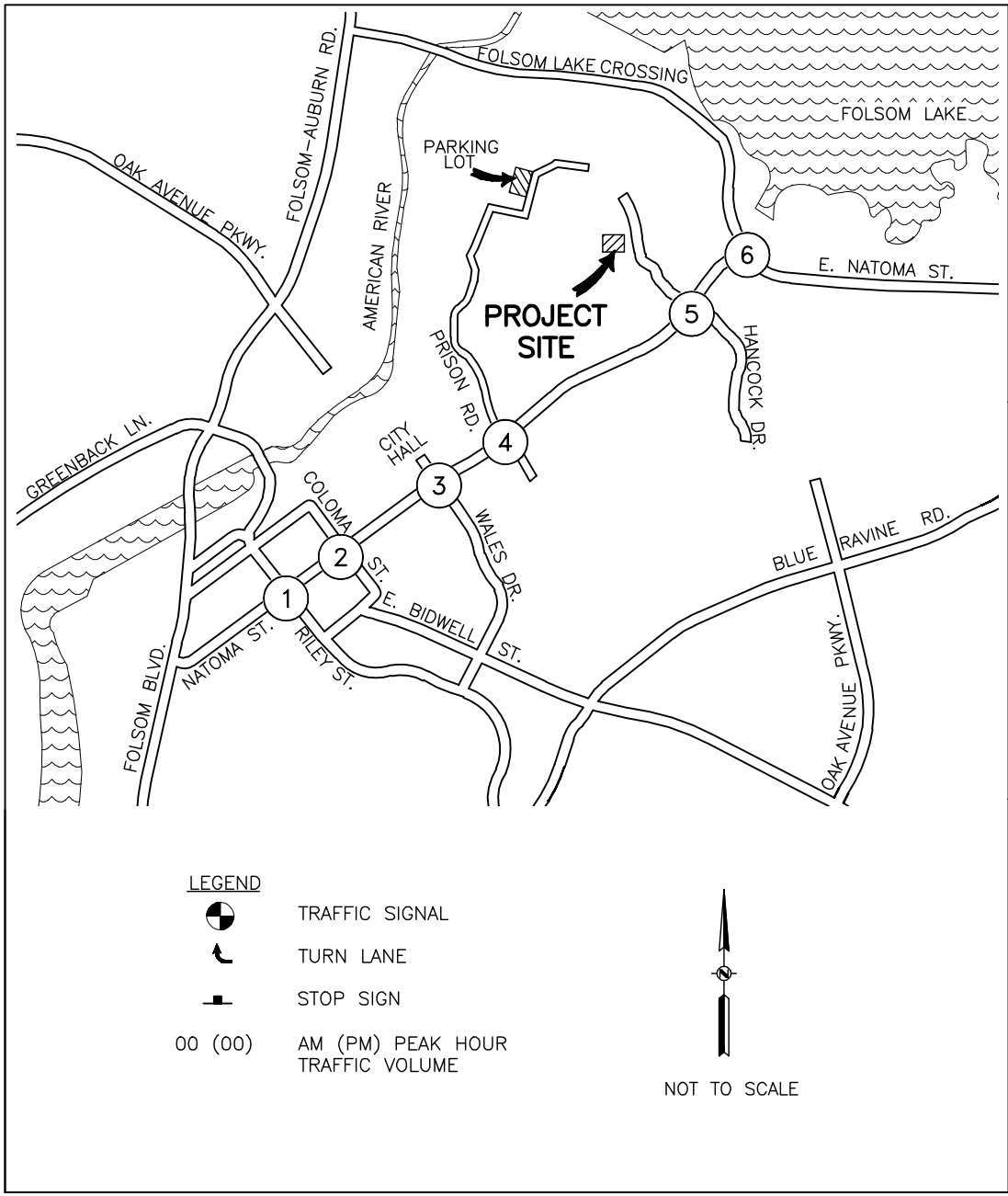

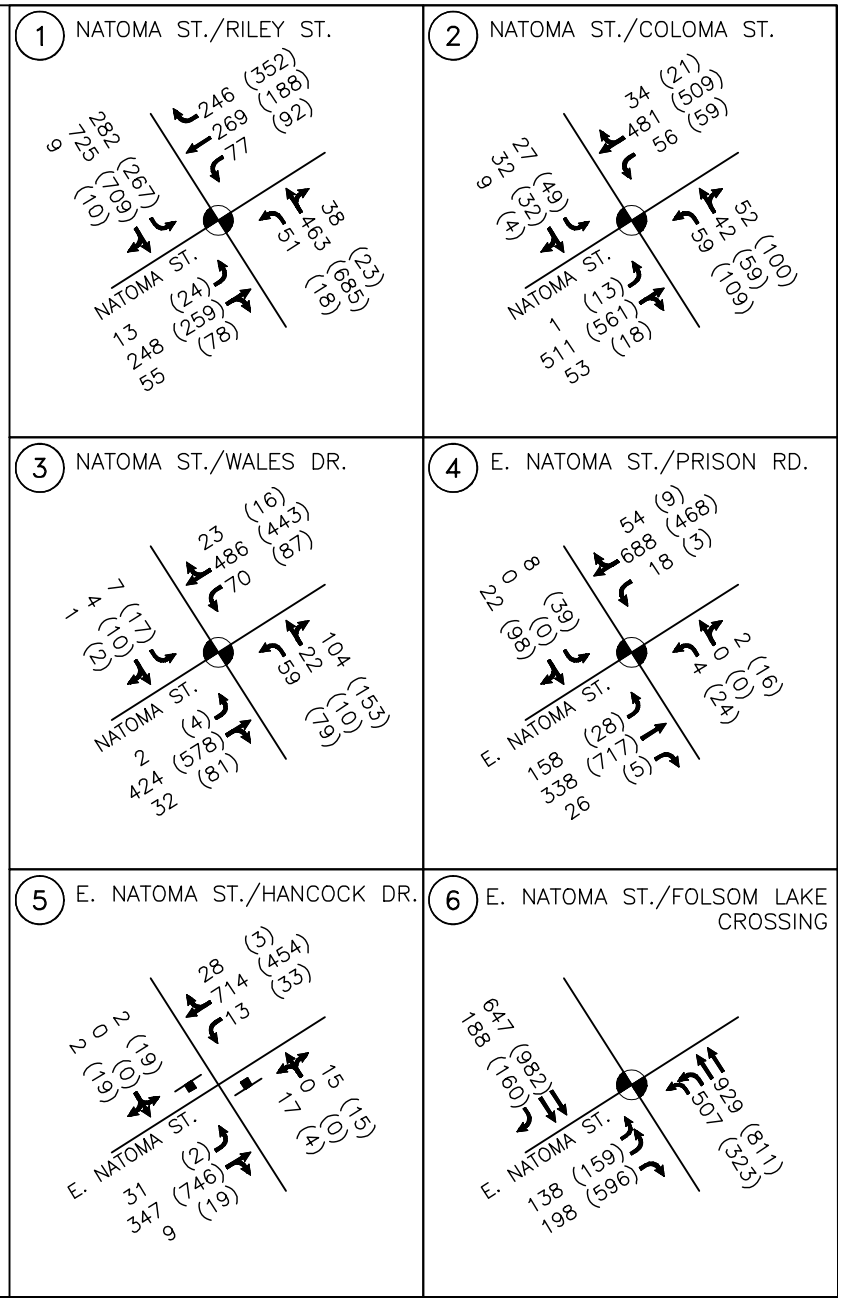

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PEAK HOUR TRAFFIC VOLUMES
BASELINE + PROJECT CONDITIONS

FIGURE 5

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Table 8
Level of Service Summary[1]
Baseline + Project Conditions

Intersection	Traffic Control	Weekday AM Peak Hour				Weekday PM Peak Hour			
		Baseline No Project		Baseline + Project		Baseline No Project		Baseline + Project	
		Delay[2]	LOS[3]	Delay	LOS	Delay	LOS	Delay	LOS
East Natoma Street/Riley Street	Signal	40.3[4]	D	41.8	D	55.3	E	56.0	E
East Natoma Street/Coloma Street	Signal	18.0	B	18.7	B	19.3	B	19.8	B
East Natoma Street/Wales Drive/City Hall Driveway	Signal	19.0	B	20.8	C	19.1	B	19.5	B
East Natoma Street/Prison Road	Signal	16.7	B	20.1	C	14.6	B	15.5	B
East Natoma Street/Hancock Drive	STOP Sign	32.0	D	33.0	D	47.2	E	48.4	E
East Natoma Street/Folsom Lake Crossing	Signal	9.0	A	9.1	A	18.7	B	19.0	B

Notes:
1 Reference: Transportation Research Board, *Highway Capacity Manual*, 2000.
2 Average control delay (seconds per vehicle).
3 Level of service.
4 Shaded cell denotes unacceptable level of service.

Weekday AM Peak Hour

In the AM peak hour, addition of the project-generated traffic will cause relatively minor changes to the level of delay at the study intersections. Four of the six locations will continue to operate at acceptable levels of service (i.e., LOS C or better). Two of the study intersections will fail to conform to the City's General Plan policy, however – East Natoma Street/Riley Street and East Natoma Street/Hancock Drive. In both cases, the level of service is unchanged from Baseline No Project conditions. In addition, the project-related incremental impact is less than the City's adopted threshold of 5.0 seconds per vehicle of added delay. Consequently, the project-related impact is less than significant in this time period.

Weekday PM Peak Hour

In the PM peak hour, no change in LOS is projected at any of the six study intersections. Four study locations will be at LOS B with the addition of project-related traffic, which conforms to the City's LOS C policy. The remaining two locations (East Natoma Street/Riley Street and East Natoma Street/Hancock Drive) are both projected to operate at LOS E, the same as under Baseline No Project conditions. As in the AM peak hour, the incremental increase in delay directly attributable to project-generated traffic is less than the significance threshold employed by the City of Folsom. Thus, the project-related impact is again less than significant in this time period.

Mitigation Measures

As described above, no significant impacts were identified in connection with the proposed project. Although two study intersections will be at unacceptable levels of service under both Baseline No Project and Baseline Plus Project conditions, the project's incremental impact falls short of the significance threshold adopted by the City. Further, although the unsignalized study intersection of East Natoma Street/Hancock Drive will operate at an unacceptable level of service, the projected traffic volumes are less than the minimum values associated with the "Peak Hour Volume" signal warrant. Therefore, no mitigation measures are recommended with respect to the project's off-site traffic impacts.

CUMULATIVE CONDITIONS ANALYSIS

This section describes the results of the analysis of study area traffic operations under cumulative conditions in the weekday AM and PM peak hours. This analysis reflects the level of development anticipated throughout the City of Folsom, including the Folsom Sphere of Influence (SOI) annexation area and the entire Sacramento region through the year 2030. The traffic volume projections were based on the SACMET travel demand forecasting model developed and maintained by the Sacramento Area Council of Governments (SACOG).

Analyses are presented for two scenarios: Cumulative No Project conditions and Cumulative Plus Project conditions, reflecting the addition of the traffic generated by the proposed Psychiatric Services Unit to the "no project" volumes. To ensure consistency with other ongoing traffic analyses in Folsom, the future year traffic forecasts employed in this analysis are based on preliminary information developed in connection with the traffic analysis for the SOI annexation process, currently being prepared for the City by others.

Planned Roadway Improvements

Between now and the year 2030, a variety of major transportation system improvements will be implemented in the Folsom area. These improvements, which are reflected in the future year traffic forecasts used in this analysis, include the following:

- Addition of the third through lane in both directions on Iron Point Road,
- Addition of a third through lane in each direction on East Bidwell Street (where necessary), and
- Construction of the U.S. Highway 50/Empire Ranch Road interchange.

In addition, the Folsom SOI traffic analyses are identifying the transportation system improvements that will be necessary to accommodate the additional traffic generated south of Highway 50. Although the specific program of roadway improvements has not yet been established, the following major projects are likely to occur in conjunction with the annexation and were assumed in this analysis:

- Construction of a new interchange at Highway 50/Oak Avenue Parkway, and
- Widening of the East Bidwell Street overpass at Highway 50 from five to six lanes.

No roadway system improvements are anticipated within the study area for this analysis.

Land Use Forecasts

The year 2030 travel demand forecasts developed for the Folsom SOI project, which serve as the basis for the future traffic volumes used in this analysis, assumed the following land uses in the 3,584-acre SOI area:

- 11,340 - 14,630 residential dwelling units,
- 295 acres of office/business/professional and retail/commercial uses,
- 297 acres of schools and City parks, and
- 1,075 acres of open space.

In addition, the year 2030 land use estimates for the Sacramento region included in the SACMET travel demand forecasting model were assumed.

Cumulative (2030) No Project Conditions

The year 2030 traffic volumes for Cumulative No Project conditions were derived from peak-hour traffic forecasts developed by others as part of the Folsom SOI project. As appropriate, adjustments were made to the future year forecasts to better reflect traffic conditions in the immediate vicinity of the proposed project. Because the SOI traffic analyses do not include any intersections along East Natoma Street, a growth factor was developed based on the traffic projections for the three SOI study intersections nearest the study area for this analysis. Evaluation of the estimated growth patterns at those intersections revealed that the year 2030 traffic volumes are approximately 55 percent higher than the existing volumes. Thus, that factor was applied to the existing traffic volumes in this study to conservatively estimate traffic volumes for cumulative conditions.

Figure 6 illustrates the Cumulative No Project peak-hour traffic volumes derived for this study, in addition to the intersection lane configurations assumed for year 2030 conditions. According to City of Folsom staff, no significant improvements are planned at the study intersections. Although the *Metropolitan Transportation Plan for 2035* (SACOG, 2008) indicates that East Natoma Street will be widened to four lanes between Fargo Way and Blue Ravine Road in conjunction with construction of the Folsom Lake Crossing Bridge, that widening project did not occur due to funding constraints. Because of the uncertainty as to whether it will be accomplished, it has not been assumed for this analysis.

Intersection Level of Service

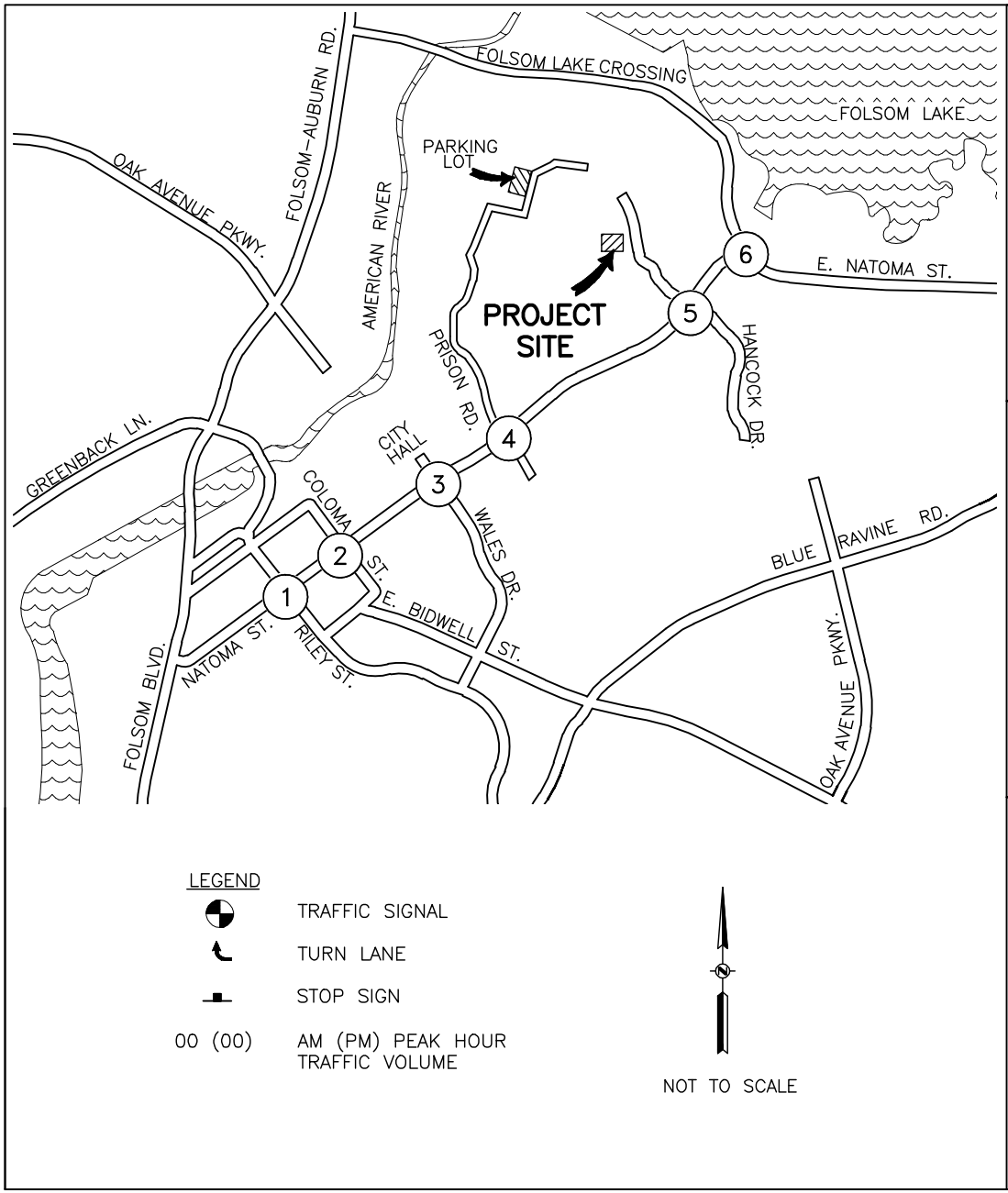
Table 9 summarizes the peak-hour intersection level of service results for Cumulative No Project conditions. The technical calculation worksheets are presented in Appendix F.

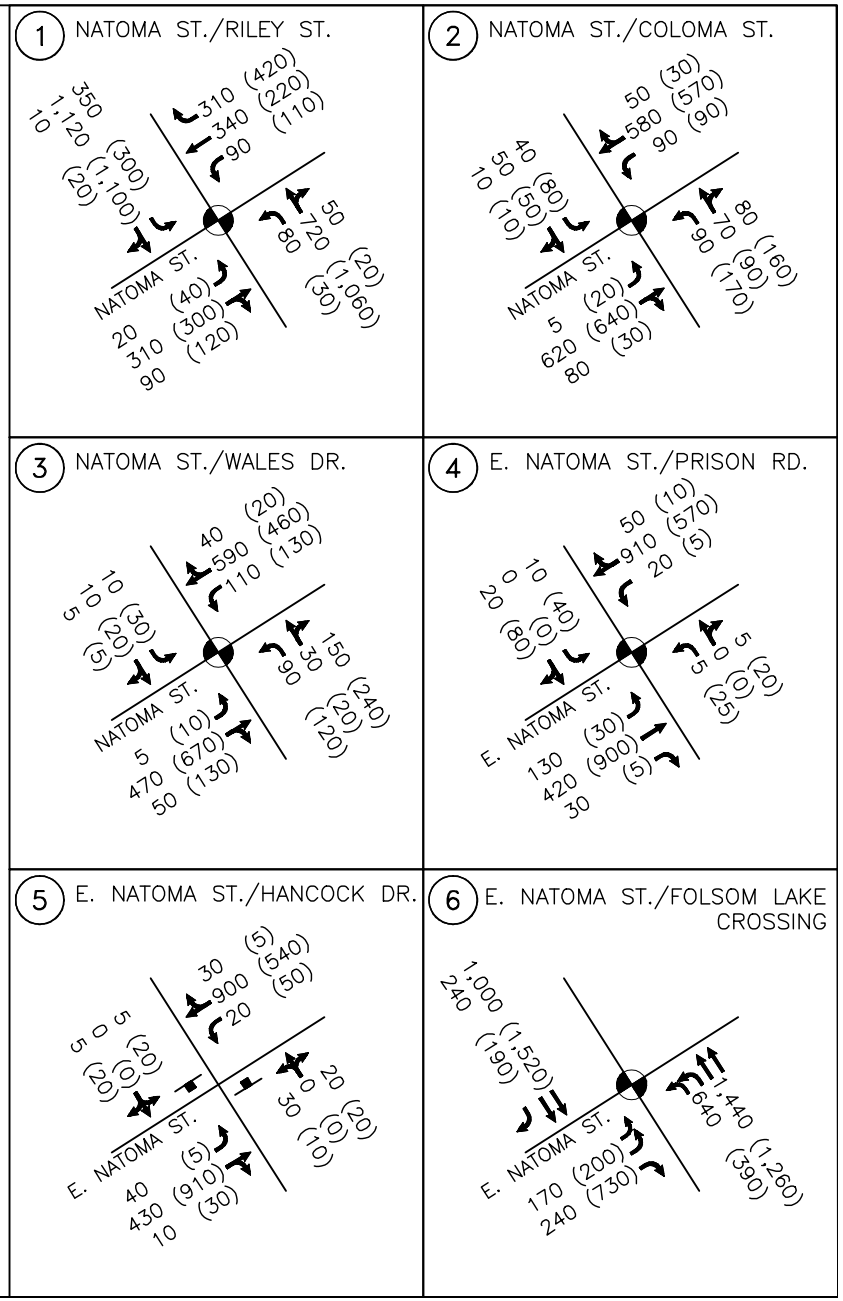
Weekday AM Peak Hour

Four of the six study intersections are projected to operate at acceptable levels of service in the weekday AM peak hour under Cumulative No Project conditions. LOS B is projected at East Natoma Street/Wales Drive/City Hall Driveway and East Natoma Street/Folsom Lake Crossing, while the intersections of East Natoma Street/Coloma Street and East Natoma Street/Prison Road will be at LOS C. The intersections of East Natoma Street/Riley Street and East Natoma Street/Hancock Drive will each fall short of the City's LOS C standard, with a projected level of service of LOS F.

Weekday PM Peak Hour

In the weekday PM peak hour, three of the study intersections are expected to operate at LOS C or better and three will be at LOS E or F. At both East Natoma Street/Coloma Street and East Natoma Street/Wales Drive/City Hall Driveway, LOS C is projected, which conforms to the City's General Plan policy. LOS B is expected at East Natoma Street/Prison Road. The signalized intersection of East Natoma Street/Riley Street and the STOP-sign-controlled intersection of East Natoma Street/ Hancock Drive will be at LOS F, while East Natoma Street/Folsom Lake Crossing will be at LOS E.





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PEAK HOUR TRAFFIC VOLUMES
CUMULATIVE (2030) NO PROJECT CONDITIONS

FIGURE 6

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Table 9
Level of Service Summary[1]
Cumulative No Project Conditions

Intersection	Traffic Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
		Delay[2]	LOS[3]	Delay	LOS
East Natoma Street/Riley Street	Signal	> 80.0	F	> 80.0	F
East Natoma Street/Coloma Street	Signal	27.8	C	29.9	C
East Natoma Street/Wales Drive/City Hall Driveway	Signal	17.5	B	25.1	C
East Natoma Street/Prison Road	Signal	27.6	C	18.4	B
East Natoma Street/Hancock Drive	STOP Sign	> 50.0	F	> 50.0	F
East Natoma Street/Folsom Lake Crossing	Signal	11.7	B	58.9	E

Notes:
1 Reference: Transportation Research Board, *Highway Capacity Manual*, 2000.
2 Average control delay (seconds per vehicle).
3 Level of service.
4 Shaded cell denotes unacceptable level of service.

Cumulative (2030) Plus Project Conditions

The following sections address the effects of adding the project-generated traffic to the Cumulative No Project volumes derived above.

Project Trip Generation

As described earlier, the proposed project will generate an estimated total of 52 trips (46 inbound and 6 outbound) in the weekday AM peak hour. During the weekday PM peak hour, 37 trips are projected, with 7 inbound and 30 outbound.

Project Trip Distribution

Based on the traffic volume forecasts described above, the long-term geographic distribution of the project-generated traffic was evaluated to determine whether the orientation of trips generated by the proposed project would change over time and, therefore, be different from what was assumed above for "Baseline" conditions. Based on that evaluation, it was determined that even with implementation of the SOI land uses and the assumed future roadway network, the basic distribution of the traffic in the vicinity of the project site would be similar to current patterns. Therefore, the project trip distribution pattern illustrated on Figure 4 was also used for the cumulative conditions analysis.

Intersection Traffic Volumes

Using the project trip generation and trip distribution information, the project-related trips were assigned to the future road network and added to the Cumulative No Project volumes. The Cumulative Plus Project traffic volumes for the two peak-hour periods are illustrated on Figure 7.

Intersection Level of Service

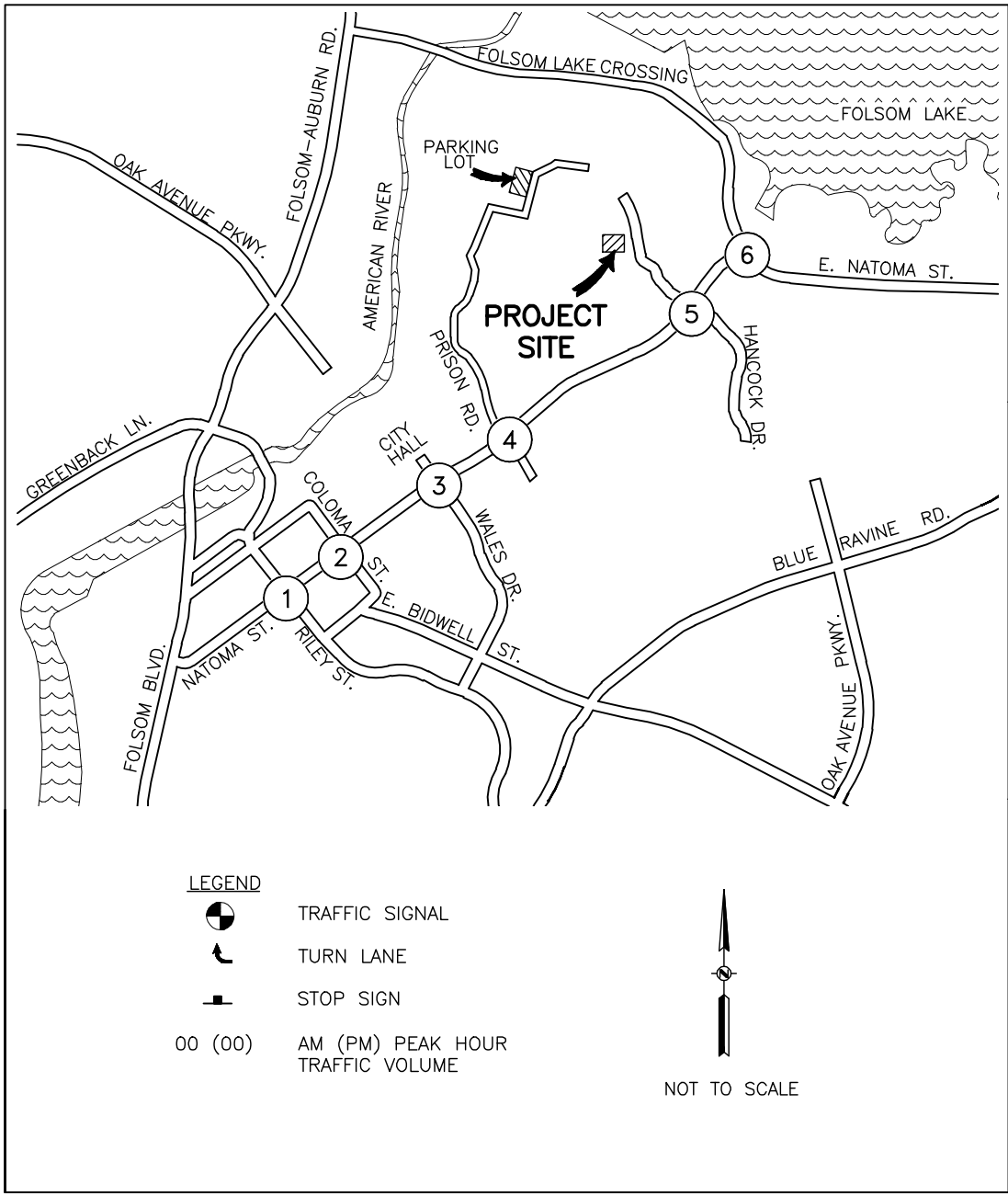
Table 10 presents the results of the intersection level of service analysis for the Cumulative Plus Project scenario. Appendix G contains the level of service calculation worksheets.

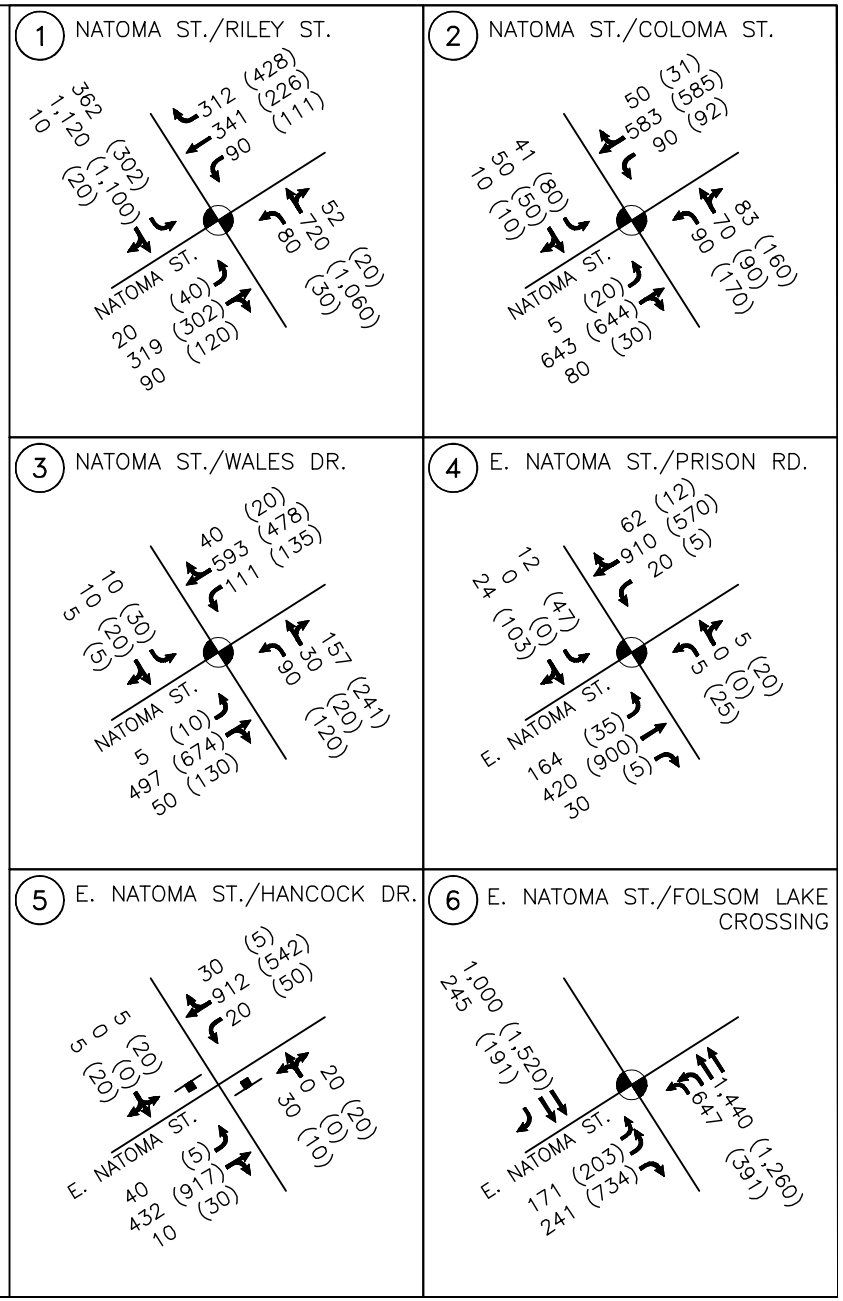
Weekday AM Peak Hour

No changes in level of service are projected, and four of the six study intersections are expected to continue to meet the City of Folsom's LOS C policy under this analysis scenario. The two intersections where substandard levels of service are projected are East Natoma Street/Riley Street (LOS F, the same as under Cumulative No Project conditions) and East Natoma Street/Hancock Drive (also the same as under Cumulative No Project conditions at LOS F). The project-related incremental delay value at East Natoma Street/Riley Street will be 3.0 seconds per vehicle, which is below the City's significance threshold of 5.0 seconds per vehicle. The STOP-sign-controlled intersection of East Natoma Street/Hancock Drive will have insufficient traffic on the minor legs to meet the minimum requirement of the "Peak Hour Volume" signal warrant. Consequently, the project's impact is less than significant in this time period.

Weekday PM Peak Hour

Three study locations are projected to operate at worse than LOS C, as East Natoma Street/Riley Street and East Natoma Street/Hancock Drive will both be at LOS F and East Natoma Street/Folsom Lake Crossing will operate at LOS E. No change in level of service is projected at these three intersections, compared to Cumulative No Project conditions. At East Natoma Street/Riley Street, the project-related traffic will increase the intersection delay value by 1.0 second per vehicle. The incremental impact at East Natoma Street/Folsom Lake Crossing is 1.1 seconds per vehicle. Thus, the project-related impact at both locations is less than 5.0 seconds. As in the AM peak hour, the projected traffic volumes on the minor legs of the STOP-sign-controlled intersection of East Natoma Street/Hancock Drive will be too low to meet the "Peak Hour Volume" signal warrant criteria. Therefore, the project-related impact is less than significant.





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PEAK HOUR TRAFFIC VOLUMES
CUMULATIVE (2030) + PROJECT CONDITIONS

FIGURE 7

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Table 10
Level of Service Summary[1]
Cumulative + Project Conditions

Intersection	Traffic Control	Weekday AM Peak Hour				Weekday PM Peak Hour			
		Cumulative No Project		Cumulative + Project		Cumulative No Project		Cumulative + Project	
		Delay[2]	LOS[3]	Delay	LOS	Delay	LOS	Delay	LOS
East Natoma Street/Riley Street	Signal	> 80.0[4]	F	> 80.0	F	> 80.0	F	> 80.0	F
East Natoma Street/Coloma Street	Signal	27.8	C	29.4	C	29.9	C	30.5	C
East Natoma Street/Wales Drive/City Hall Driveway	Signal	17.5	B	17.9	B	25.1	C	25.6	C
East Natoma Street/Prison Road	Signal	27.6	C	34.5	C	18.4	B	22.6	C
East Natoma Street/Hancock Drive	STOP Sign	> 50.0	F	> 50.0	F	> 50.0	F	> 50.0	F
East Natoma Street/Folsom Lake Crossing	Signal	11.7	B	11.7	B	58.9	E	60.0	E

Notes:
1 Reference: Transportation Research Board, *Highway Capacity Manual*, 2000.
2 Average control delay (seconds per vehicle).
3 Level of service.
4 Shaded cell denotes unacceptable level of service.

Site Access Analysis

This section describes the analysis of the proposed project's vehicular access system. As described earlier, vehicular access to and from the site will be via existing roadways serving the California State Prison - Sacramento.

Access Roadways

Two existing roadways will serve the vehicular access needs of the proposed Psychiatric Services Unit Office and Treatment Space project. Those roadways are described below:

- *Prison Road* – As described earlier, Prison Road is the primary vehicular access route serving California State Prison – Sacramento. It is a two-lane road, which meets East Natoma Street at a traffic-signal-controlled T-intersection. The fourth (south) leg of this T-intersection is to be constructed in connection with a recently-approved office project on the south side of East Natoma Street.
- *East Prison Access Road (Hancock Drive)* – The East Prison Access Road is located about 0.85-mile east of Prison Road and about 0.30-mile west of Folsom Lake Crossing. At its intersection with East Natoma Street, this roadway is STOP-sign controlled and all movements are allowed.

Because of the location of the project's parking lot on the prison property, virtually all of the project-generated traffic is expected to enter and exit by way of Prison Road.

Based on the Cumulative (2030) Plus Project peak hour traffic volumes, analyses were performed to address the operation and configuration of the two project access points with respect to:

- Driveway traffic control (i.e., signal or STOP-sign control) at the intersection of East Natoma Street/East Prison Access Road (Hancock Drive),
- Sight distance at both East Natoma Street intersections, and
- Queuing/vehicular storage needs at East Natoma Street/Prison Road.

East Natoma Street/East Prison Access Road Traffic Control

To determine the appropriate form of traffic control at East Natoma Street/East Prison Access Road (Hancock Drive), the intersection was analyzed using the Caltrans "Peak Hour Volume" signal warrant procedure, as documented in "Part 4 – Highway Traffic Signals" of the *California Manual on Uniform Traffic Control Devices 2010* (Caltrans, January 21, 2010). Even under Cumulative Plus Project conditions, the projected traffic volumes are expected to fall short of the minimum values needed to satisfy this signal warrant. Therefore, STOP-sign control should continue to be employed at this location.

Sight Distance

To ensure that drivers will be able to enter and exit the site safely, a stopping sight distance analysis was conducted at the project access intersections using information provided in *A Policy on Geometric Design of Highways and Streets* (American Association of State Highway and Transportation Officials, 2004).

East Natoma Street/Prison Road

The 35 MPH speed limit on East Bidwell Street at Prison Road calls for 250 feet of clear stopping sight distance. Accounting for the fact that some drivers will exceed the posted speed limit, a design value of 305 feet (representing the stopping sight distance at 40 MPH) was used for this analysis. Because the East Natoma Street/Prison Road intersection is traffic-signal controlled, the analysis was conducted relative to outbound right-turns-on-red from southbound Prison Road to westbound East Natoma Street. Exiting drivers have clear visibility well in excess of 305 feet. Thus, adequate sight distance is available to allow right-turns on-red to be made safely.

East Natoma Street/East Prison Access Road (Hancock Drive)

An analysis was also conducted at the East Natoma Street/East Prison Access Road (Hancock Drive) intersection. The analysis was conducted relative to both inbound left turns and outbound right turns at the East Prison Access Road, to ensure that project-related drivers could see and react to westbound vehicles on East Natoma Street. At that intersection, the speed limit on East Natoma Street is 45 MPH, which calls for a minimum of 360 feet of clear sight distance. Again allowing for the tendency of some drivers to exceed the speed limit, a design value of 425 feet was used, representing the sight distance needed at 50 MPH. Drivers at this location have a clear view exceeding 750 feet, which substantially exceeds the minimum requirement. Again, therefore, adequate sight distance is available to allow safe operations.

Queuing/Vehicular Storage Needs

Addition of project-generated traffic to the primary access intersection of East Natoma Street/Prison Road might increase the lengths of vehicular queues at that location. Of particular interest are the queue lengths in the eastbound left-turn lane and the southbound left- and right-turn lanes. The queue lengths at those locations were estimated for both Baseline and Cumulative conditions.

Specifically, an analysis was conducted to determine the expected "95th-percentile" queue length (i.e., there is a 95-percent probability that the actual queue at the driveway will be equal to or shorter than the projected queue; in other words, there is only a 5-percent probability that the actual queue will exceed the estimated value.). The estimated queue lengths were derived from the *Synchro* intersection level of service calculations. The calculation sheets are presented in Appendix H.

Table 11 summarizes the analysis results for baseline and cumulative conditions, both with and without the proposed project. As described there, 200 feet of storage length is currently provided for the eastbound left-turn maneuver (i.e., vehicles entering the prison site from eastbound East Natoma Street). The southbound (i.e., outbound) left- and right-turn lanes are each striped as 85 feet long. In reality, however, the width of Prison Road is sufficient to accommodate up to 300 feet of left- and right-turning vehicles on the southbound approach to the intersection.

Under baseline conditions, the existing turn lanes will be sufficient to accommodate the expected queues of vehicles waiting to turn into or out of the project site. Although the eastbound left-turn queue will increase from 125 feet under "no project" conditions to 175 feet when the project traffic is added, it will continue to be shorter than the existing left-turn lane. On the southbound/outbound movements, adequate storage will also be available.

Under cumulative (year 2030) conditions, however, the eastbound left-turn queue is projected to exceed the available storage, even before the project-generated traffic is considered. Under "no project" conditions, the queue is projected to be 225 feet, which would be 25 feet longer than the existing turn lane. Addition of the project-generated traffic would increase the estimated queue by an additional 75 feet, to a total estimated length of 300 feet. The southbound queues would continue to fit within the available storage, however.

Table 11
Estimated Queue Length Summary
East Natoma Street/Prison Road Intersection

Analysis Scenario	Estimated Queue Length (Feet)[1]					
	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Eastbound Left Turn[2]	Southbound Left Turn[3]	Southbound Right Turn[3]	Eastbound Left Turn[2]	Southbound Left Turn[3]	Southbound Right Turn[3]
Baseline Conditions						
Baseline No Project	125 Ft.	25 Ft.	25 Ft.	50 Ft.	50 Ft.	25 Ft.
Baseline + Project	175 Ft.	25 Ft.	25 Ft.	50 Ft.	50 Ft.	25 Ft.
Cumulative Conditions						
Cumulative No Project	225 Ft.[4]	50 Ft.	25 Ft.	75 Ft.	75 Ft.	25 Ft.
Cumulative + Project	300 Ft.[4]	50 Ft.	25 Ft.	75 Ft.	75 Ft.	25 Ft.

Notes:
1 Rounded to 25-foot increments, based on 25-foot assumed design vehicle length.
2 200 feet of storage available.
3 85 feet of storage striped, but up to 300 feet available within the existing road width.
4 Shaded cell denotes insufficient storage.

Mitigation Measures

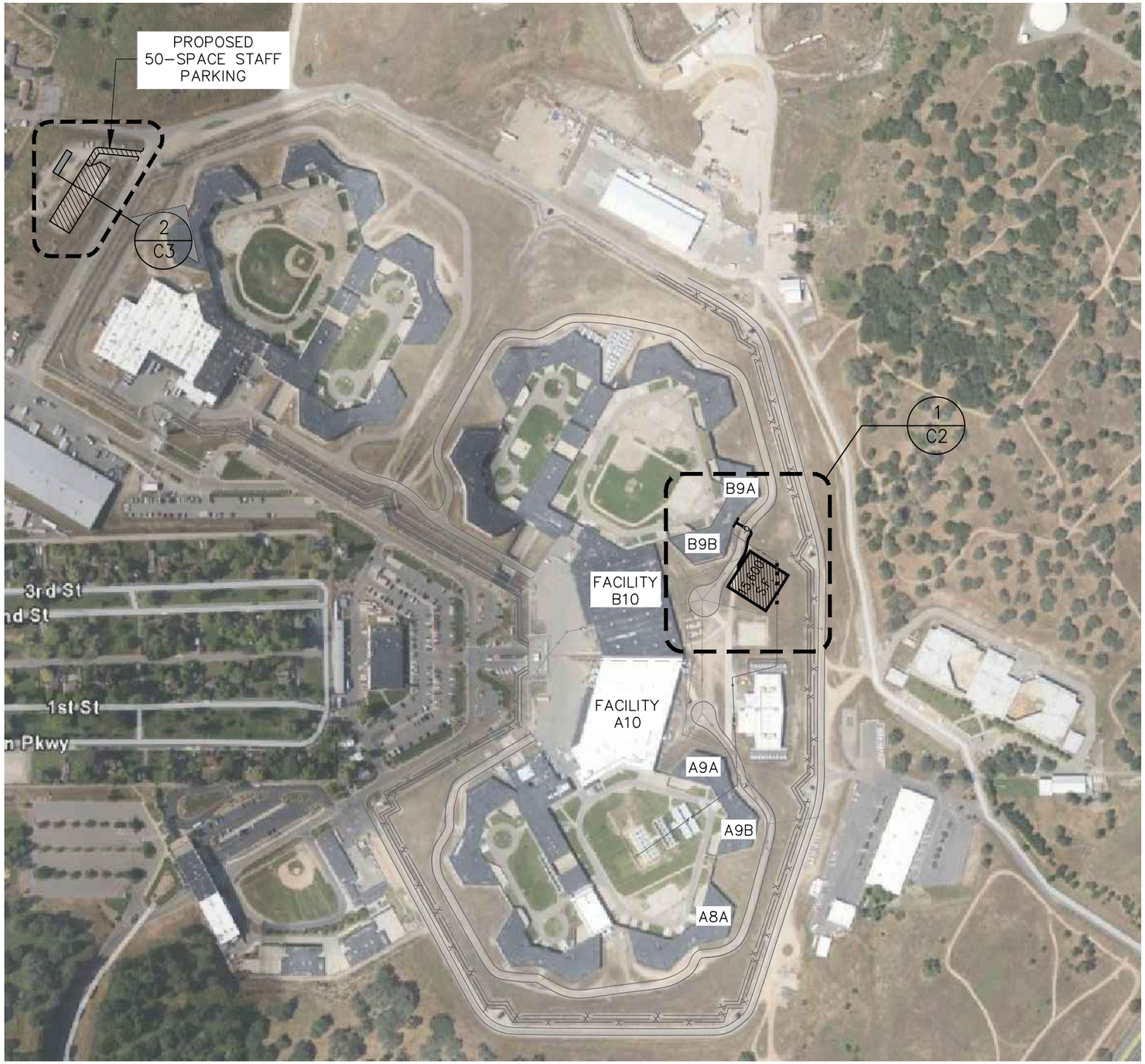
No project-related significant impacts were identified with regard to vehicular delay and level of service at any of the off-site intersections under cumulative conditions. Although three of the six study intersections will operate at unacceptable levels of service in at least one analysis time period under both "Cumulative No Project" and "Cumulative Plus Project" conditions, the project-related incremental impact is less than the City's adopted thresholds of significance.

The site access analysis revealed that, under cumulative conditions, 95th-percentile queues in the eastbound left-turn lane at the intersection of East Natoma Street/Prison Road would exceed the length of the existing turn lane. This deficiency would exist under both Cumulative No Project and Cumulative Plus Project conditions. Therefore, the appropriate mitigation measure is for the proposed project to make a fair share contribution toward the cost to extend the eastbound left-turn lane to 300 feet (plus taper/transition) from the existing 200 feet. This turn lane modification could be accomplished by restriping the existing turn lane, without adversely affecting the existing westbound

left-turn lane at the East Natoma Street/Fargo Way intersection, which is the next intersection to the west along East Natoma Street. (Approximately 100 feet would continue to be available between the two left-turn lanes to accomplish the necessary back-to-back transition.) The proposed project's fair share is estimated to be 8.6 percent for the AM peak hour when the storage deficiency is expected to occur. However, because the City of Folsom has no programmed improvement project at the East Natoma Street/Prison Road intersection, and no funding mechanism exists through which the remaining funds for the mitigation measure could be acquired, the only way to fully mitigate the project-related impact would be for the proposed project to provide 100 percent of the cost of the restriping project. Completion of the restriping project would reduce the project-related impact to less than significant.

APPENDIX A

PROJECT SITE PLAN



LEGEND

PROPOSED 152 PSU-EOP BUILDING & STAFF PARKING

SECURITY FENCE

(E) ROADWAY

NORTH

0 350 700

APPROXIMATE SCALE (FEET)

1 / – SITE LOCATION

KITCHELL
Capital Expenditure Managers
2750 Gateway Oaks Drive
Suite 300
Sacramento, CA 95833
(916) 646-9700

Psychiatric Services Unit Office and Treatment Space
CSP- California State Prison, Sacramento, Ca
30-Day Letter for Project Legislative Approval

CALIFORNIA DEPARTMENT OF CORRECTIONS AND REHABILITATION

CALIFORNIA STATE PRISON - SACRAMENTO

BUILDING:

SHEET TITLE:

SITE LOCATION

SCALE: AS SHOWN

REVISIONS

NO.	DATE	NO.	DATE

JOB NO. 3270U7

DATE 10-16-09

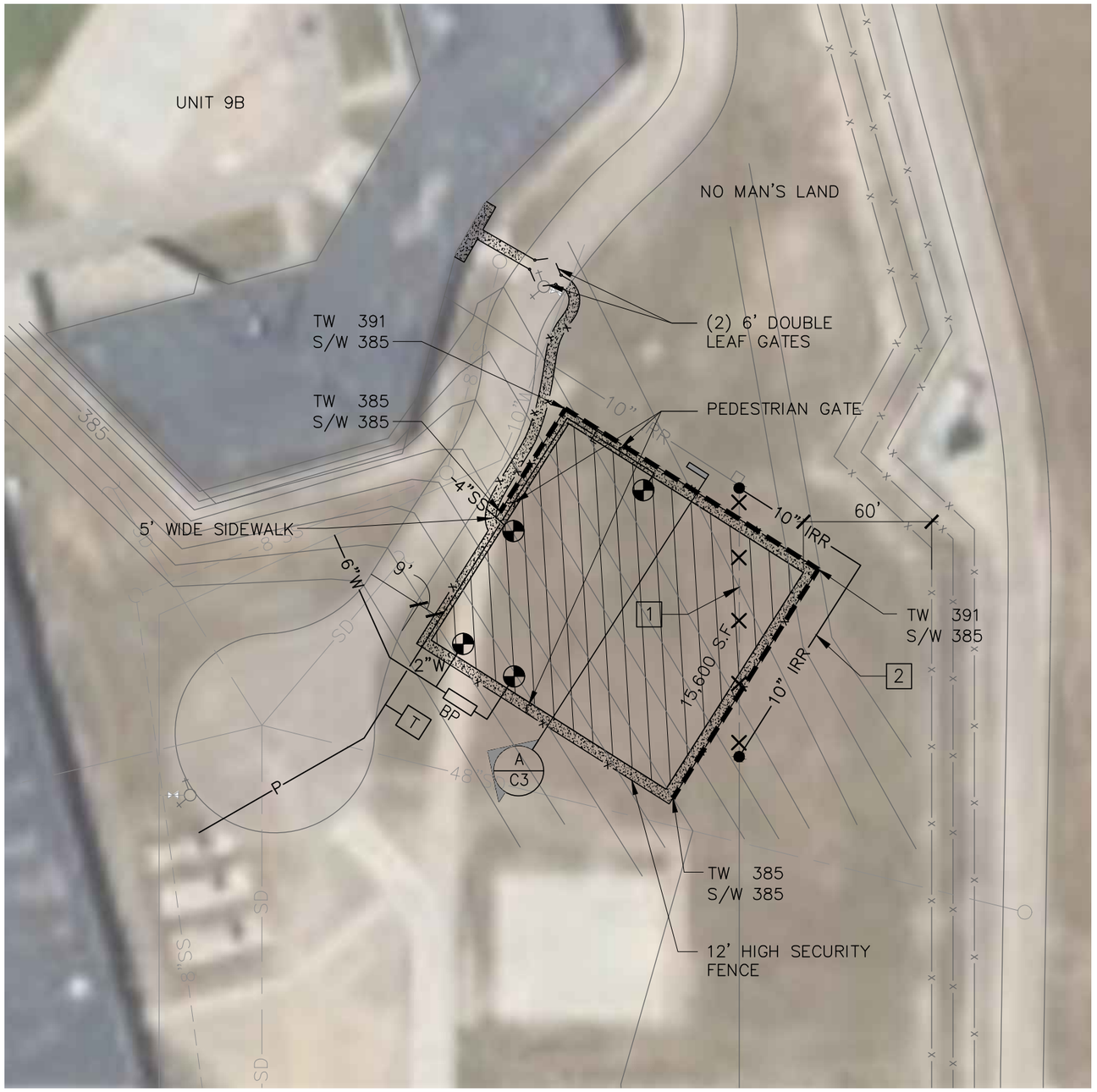
SHEET C1

PLOT SCALE: 1:1

LAST REVISION: 11/24/2009 9:06 AM

KEYNOTES:

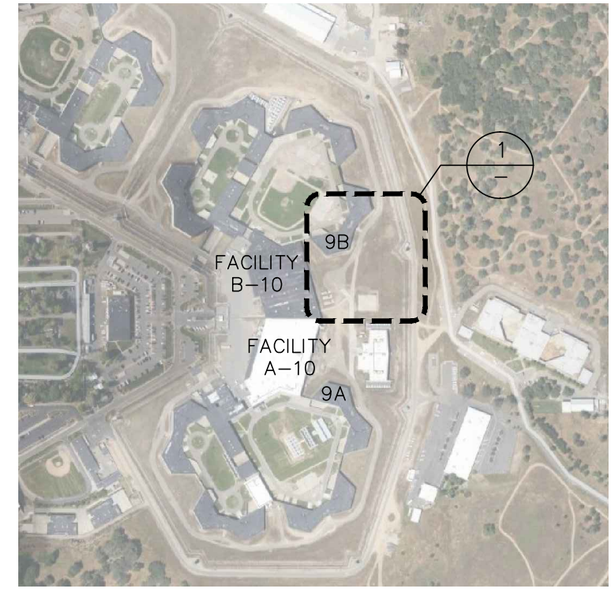
1. DEMOLISH (E) 10" IRRIGATION LINE.
2. PROVIDE 10" PVC IRRIGATION LINE WITH AIR VALVE & FLEXIBLE COUPLINGS.



1 — ENLARGED SITE PLAN

0 60 120
APPROXIMATE SCALE (FEET)

NORTH



2 — KEY PLAN

NTS

LEGEND

SD	STORM DRAIN
IRR	IRRIGATION (EXISTING SHOWN LIGHTER)
S	SEWER (EXISTING SHOWN LIGHTER)
W	WATER (EXISTING SHOWN LIGHTER)
	FIRE HYDRANT
	VALVE
	PROPOSED 152 PSU-EOP BUILDING
	CMU RETAINING WALL
X X	SECURITY FENCE
	6' DOUBLE LEAF SECURITY GATE
S/W	SIDEWALK
TW	TOP OF RETAINING WALL W/ SECURITY FENCE
	CONNECTION TO (E) UTILITY
	UTILITY CONNECTION TO BUILDING
BP	BACKFLOW PREVENTION DEVICE
E	ELECTRIC POWER – SECONDARY
P	ELECTRICAL POWER – PRIMARY
X X X	DEMOLITION

KITCHELL
Capital Expenditure Managers
2750 Gateway Oaks Drive
Suite 300
Sacramento, CA 95833
(916) 646-9700

Psychiatric Services Unit Office and Treatment Space
CSP- California State Prison, Sacramento, Ca
30-Day Letter for Project Legislative Approval

CALIFORNIA DEPARTMENT OF CORRECTIONS AND REHABILITATION

CALIFORNIA STATE PRISON - SACRAMENTO

BUILDING:

SHEET TITLE: ENLARGED SITE PLAN

SCALE: AS SHOWN

REVISIONS

NO.	DATE	NO.	DATE

JOB NO. 3270U7
DATE 10-16-09
SHEET C2

PLOT SCALE: 1:1
LAST REVISION: 11/23/2009 4:59 PM

APPENDIX B

EXISTING CONDITIONS
LEVEL OF SERVICE CALCULATION WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1802		1770	1863	1583	1770	1845		1770	1859	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1802		1770	1863	1583	1770	1845		1770	1859	
Volume (vph)	13	198	55	61	221	202	51	463	32	224	725	9
Peak-hour factor, PHF	0.88	0.88	0.88	0.85	0.85	0.85	0.85	0.85	0.85	0.96	0.96	0.96
Adj. Flow (vph)	15	225	62	72	260	238	60	545	38	233	755	9
RTOR Reduction (vph)	0	12	0	0	0	178	0	3	0	0	1	0
Lane Group Flow (vph)	15	275	0	72	260	60	60	580	0	233	763	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	0.7	15.9		3.6	18.8	18.8	2.9	26.8		12.1	36.0	
Effective Green, g (s)	0.7	15.9		3.6	18.8	18.8	2.9	26.8		12.1	36.0	
Actuated g/C Ratio	0.01	0.21		0.05	0.25	0.25	0.04	0.36		0.16	0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	17	385		86	471	400	69	665		288	900	
v/s Ratio Prot	0.01	c0.15		c0.04	c0.14		0.03	0.31		c0.13	c0.41	
v/s Ratio Perm						0.04						
v/c Ratio	0.88	0.71		0.84	0.55	0.15	0.87	0.87		0.81	0.85	
Uniform Delay, d1	36.8	27.1		35.1	24.1	21.6	35.6	22.2		30.0	16.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	159.7	6.2		47.5	1.4	0.2	64.4	12.1		15.3	7.5	
Delay (s)	196.5	33.3		82.6	25.5	21.8	99.9	34.3		45.3	24.3	
Level of Service	F	C		F	C	C	F	C		D	C	
Approach Delay (s)		41.4			31.2			40.4			29.2	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	74.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.92		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	1830		1770	1840		1770	1713		1770	1800	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1830		1770	1840		1770	1713		1770	1800	
Volume (vph)	1	397	53	56	373	34	59	42	49	26	32	9
Peak-hour factor, PHF	0.82	0.82	0.82	0.89	0.89	0.89	0.75	0.75	0.75	0.84	0.84	0.84
Adj. Flow (vph)	1	484	65	63	419	38	79	56	65	31	38	11
RTOR Reduction (vph)	0	9	0	0	6	0	0	59	0	0	10	0
Lane Group Flow (vph)	1	540	0	63	451	0	79	62	0	31	39	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	15.3		1.7	16.5		2.2	3.2		1.0	2.0	
Effective Green, g (s)	0.5	15.3		1.7	16.5		2.2	3.2		1.0	2.0	
Actuated g/C Ratio	0.01	0.41		0.05	0.44		0.06	0.09		0.03	0.05	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	24	753		81	816		105	147		48	97	
v/s Ratio Prot	0.00	c0.30		c0.04	0.25		c0.04	c0.04		0.02	0.02	
v/s Ratio Perm												
v/c Ratio	0.04	0.72		0.78	0.55		0.75	0.42		0.65	0.40	
Uniform Delay, d1	18.1	9.1		17.6	7.6		17.2	16.1		17.9	17.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	3.3		36.4	0.8		25.8	1.9		26.1	2.7	
Delay (s)	18.8	12.4		53.9	8.4		43.0	18.0		44.0	19.7	
Level of Service	B	B		D	A		D	B		D	B	
Approach Delay (s)		12.4			14.0			27.9			29.1	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	37.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.88		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	1836		1770	1846		1770	1635		1770	1816	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1836		1770	1846		1770	1635		1770	1816	
Volume (vph)	2	306	32	69	378	23	59	22	97	7	4	1
Peak-hour factor, PHF	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.75	0.75	0.75
Adj. Flow (vph)	2	336	35	77	420	26	66	25	109	9	5	1
RTOR Reduction (vph)	0	5	0	0	3	0	0	96	0	0	1	0
Lane Group Flow (vph)	2	366	0	77	443	0	66	38	0	9	5	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	8.0		2.2	9.7		2.1	3.7		0.6	2.2	
Effective Green, g (s)	0.5	8.0		2.2	9.7		2.1	3.7		0.6	2.2	
Actuated g/C Ratio	0.02	0.26		0.07	0.32		0.07	0.12		0.02	0.07	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	29	482		128	587		122	198		35	131	
v/s Ratio Prot	0.00	0.20		c0.04	c0.24		c0.04	c0.02		0.01	0.00	
v/s Ratio Perm												
v/c Ratio	0.07	0.76		0.60	0.76		0.54	0.19		0.26	0.04	
Uniform Delay, d1	14.8	10.4		13.7	9.3		13.7	12.1		14.7	13.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	6.8		7.7	5.5		4.8	0.5		3.9	0.1	
Delay (s)	15.8	17.1		21.5	14.8		18.6	12.5		18.6	13.3	
Level of Service	B	B		C	B		B	B		B	B	
Approach Delay (s)		17.1			15.8			14.5			16.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	30.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1863	1846		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1863	1846		1770	1583
Volume (vph)	124	273	587	42	6	18
Peak-hour factor, PHF	0.89	0.89	0.73	0.73	0.78	0.78
Adj. Flow (vph)	139	307	804	58	8	23
RTOR Reduction (vph)	0	0	4	0	0	22
Lane Group Flow (vph)	139	307	858	0	8	1
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	5.1	33.9	24.8		1.8	1.8
Effective Green, g (s)	5.1	33.9	24.8		1.8	1.8
Actuated g/C Ratio	0.12	0.78	0.57		0.04	0.04
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	207	1445	1048		73	65
v/s Ratio Prot	c0.08	0.16	c0.46		c0.00	
v/s Ratio Perm						0.00
v/c Ratio	0.67	0.21	0.82		0.11	0.01
Uniform Delay, d1	18.5	1.3	7.6		20.2	20.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	8.3	0.1	5.1		0.7	0.1
Delay (s)	26.8	1.4	12.7		20.8	20.2
Level of Service	C	A	B		C	C
Approach Delay (s)		9.3	12.7		20.4	
Approach LOS		A	B		C	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	43.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	31	278	9	13	583	28	17	0	15	2	0	2
Peak Hour Factor	0.92	0.92	0.92	0.75	0.75	0.75	0.73	0.73	0.73	0.50	0.50	0.50
Hourly flow rate (vph)	34	302	10	17	777	37	23	0	21	4	0	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	815			312			1190	1224	307	1221	1210	796
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	815			312			1190	1224	307	1221	1210	796
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			99			85	100	97	97	100	99
cM capacity (veh/h)	813			1248			156	169	733	146	173	387

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	34	312	17	815	44	8
Volume Left	34	0	17	0	23	4
Volume Right	0	10	0	37	21	4
cSH	813	1700	1248	1700	247	212
Volume to Capacity	0.04	0.18	0.01	0.48	0.18	0.04
Queue Length 95th (ft)	3	0	1	0	16	3
Control Delay (s)	9.6	0.0	7.9	0.0	22.7	22.7
Lane LOS	A		A		C	C
Approach Delay (s)	0.9		0.2		22.7	22.7
Approach LOS					C	C

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	110	157	411	929	647	153
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.93	0.93
Adj. Flow (vph)	125	178	467	1056	696	165
RTOR Reduction (vph)	0	42	0	0	0	110
Lane Group Flow (vph)	125	136	467	1056	696	55
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	3.0	11.6	8.6	24.3	11.7	11.7
Effective Green, g (s)	3.0	11.6	8.6	24.3	11.7	11.7
Actuated g/C Ratio	0.08	0.33	0.24	0.69	0.33	0.33
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	292	700	836	2436	1173	525
v/s Ratio Prot	c0.04	0.05	c0.14	0.30	c0.20	
v/s Ratio Perm		0.04				0.03
v/c Ratio	0.43	0.19	0.56	0.43	0.59	0.10
Uniform Delay, d1	15.3	8.5	11.7	2.4	9.8	8.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.1	0.8	0.1	0.8	0.1
Delay (s)	16.3	8.6	12.5	2.6	10.6	8.3
Level of Service	B	A	B	A	B	A
Approach Delay (s)	11.8			5.6	10.2	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	35.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1783		1770	1863	1583	1770	1856		1770	1859	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1783		1770	1863	1583	1770	1856		1770	1859	
Volume (vph)	24	194	78	72	144	274	18	685	16	194	709	10
Peak-hour factor, PHF	0.83	0.83	0.83	0.84	0.84	0.84	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	29	234	94	86	171	326	19	729	17	206	754	11
RTOR Reduction (vph)	0	16	0	0	0	230	0	1	0	0	0	0
Lane Group Flow (vph)	29	312	0	86	171	96	19	745	0	206	765	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	2.3	18.3		5.0	21.0	21.0	1.5	39.4		11.7	49.6	
Effective Green, g (s)	2.3	18.3		5.0	21.0	21.0	1.5	39.4		11.7	49.6	
Actuated g/C Ratio	0.03	0.20		0.06	0.23	0.23	0.02	0.44		0.13	0.55	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	45	361		98	433	368	29	809		229	1020	
v/s Ratio Prot	0.02	c0.18		c0.05	c0.09		0.01	c0.40		c0.12	0.41	
v/s Ratio Perm						0.06						
v/c Ratio	0.64	0.86		0.88	0.39	0.26	0.66	0.92		0.90	0.75	
Uniform Delay, d1	43.6	34.9		42.4	29.3	28.4	44.2	24.0		38.8	15.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	27.5	18.8		53.1	0.6	0.4	42.6	15.7		33.4	3.1	
Delay (s)	71.1	53.7		95.5	29.9	28.7	86.8	39.7		72.1	18.7	
Level of Service	E	D		F	C	C	F	D		E	B	
Approach Delay (s)		55.1			38.9			40.9			30.0	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM Average Control Delay	38.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.91		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1851		1770	1848		1770	1687		1770	1830	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1851		1770	1848		1770	1687		1770	1830	
Volume (vph)	13	416	18	57	367	20	109	59	100	49	32	4
Peak-hour factor, PHF	0.94	0.94	0.94	0.84	0.84	0.84	0.89	0.89	0.89	0.85	0.85	0.85
Adj. Flow (vph)	14	443	19	68	437	24	122	66	112	58	38	5
RTOR Reduction (vph)	0	2	0	0	3	0	0	77	0	0	5	0
Lane Group Flow (vph)	14	460	0	68	458	0	122	101	0	58	38	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.7	11.5		3.5	14.3		6.3	5.3		3.3	2.3	
Effective Green, g (s)	0.7	11.5		3.5	14.3		6.3	5.3		3.3	2.3	
Actuated g/C Ratio	0.02	0.29		0.09	0.36		0.16	0.13		0.08	0.06	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	31	538		156	667		282	226		148	106	
v/s Ratio Prot	0.01	c0.25		c0.04	c0.25		c0.07	c0.06		0.03	0.02	
v/s Ratio Perm												
v/c Ratio	0.45	0.85		0.44	0.69		0.43	0.45		0.39	0.36	
Uniform Delay, d1	19.3	13.3		17.1	10.8		15.0	15.8		17.2	17.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.1	12.6		1.9	3.0		1.1	1.4		1.7	2.1	
Delay (s)	29.4	25.8		19.1	13.7		16.1	17.2		18.9	20.0	
Level of Service	C	C		B	B		B	B		B	C	
Approach Delay (s)		25.9			14.4			16.8			19.4	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	39.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1819		1770	1849		1770	1600		1770	1820	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1819		1770	1849		1770	1600		1770	1820	
Volume (vph)	4	433	81	82	298	16	79	10	152	17	10	2
Peak-hour factor, PHF	0.93	0.93	0.93	0.88	0.88	0.88	0.89	0.89	0.89	0.91	0.91	0.91
Adj. Flow (vph)	4	466	87	93	339	18	89	11	171	19	11	2
RTOR Reduction (vph)	0	11	0	0	3	0	0	157	0	0	2	0
Lane Group Flow (vph)	4	542	0	93	354	0	89	25	0	19	11	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	14.7		2.5	16.7		2.8	3.1		0.5	0.8	
Effective Green, g (s)	0.5	14.7		2.5	16.7		2.8	3.1		0.5	0.8	
Actuated g/C Ratio	0.01	0.40		0.07	0.45		0.08	0.08		0.01	0.02	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	24	727		120	839		135	135		24	40	
v/s Ratio Prot	0.00	c0.30		c0.05	0.19		c0.05	c0.02		0.01	0.01	
v/s Ratio Perm												
v/c Ratio	0.17	0.74		0.78	0.42		0.66	0.19		0.79	0.28	
Uniform Delay, d1	17.9	9.4		16.9	6.8		16.5	15.7		18.1	17.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	4.2		26.2	0.3		11.1	0.7		94.5	3.7	
Delay (s)	21.2	13.6		43.1	7.1		27.6	16.4		112.6	21.4	
Level of Service	C	B		D	A		C	B		F	C	
Approach Delay (s)		13.7			14.6			20.1			75.6	
Approach LOS		B			B			C			E	

Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	36.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1863	1858		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1863	1858		1770	1583
Volume (vph)	23	581	365	7	32	75
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.70	0.70
Adj. Flow (vph)	28	709	397	8	46	107
RTOR Reduction (vph)	0	0	2	0	0	95
Lane Group Flow (vph)	28	709	403	0	46	12
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	0.5	16.1	11.6		3.1	3.1
Effective Green, g (s)	0.5	16.1	11.6		3.1	3.1
Actuated g/C Ratio	0.02	0.59	0.43		0.11	0.11
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	33	1103	792		202	180
v/s Ratio Prot	0.02	c0.38	0.22		c0.03	
v/s Ratio Perm						0.01
v/c Ratio	0.85	0.64	0.51		0.23	0.07
Uniform Delay, d1	13.3	3.7	5.7		11.0	10.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	95.0	1.3	0.5		0.6	0.2
Delay (s)	108.3	4.9	6.2		11.5	10.9
Level of Service	F	A	A		B	B
Approach Delay (s)		8.9	6.2		11.1	
Approach LOS		A	A		B	

Intersection Summary			
HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	27.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	587	19	33	346	3	4	0	15	19	0	19
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.68	0.68	0.68	0.56	0.56	0.56
Hourly flow rate (vph)	2	734	24	36	380	3	6	0	22	34	0	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	384			758			1237	1207	746	1215	1217	382
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	384			758			1237	1207	746	1215	1217	382
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			96	100	95	77	100	95
cM capacity (veh/h)	1175			854			140	175	414	145	173	665

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	2	758	36	384	28	68
Volume Left	2	0	36	0	6	34
Volume Right	0	24	0	3	22	34
cSH	1175	1700	854	1700	293	238
Volume to Capacity	0.00	0.45	0.04	0.23	0.10	0.29
Queue Length 95th (ft)	0	0	3	0	8	28
Control Delay (s)	8.1	0.0	9.4	0.0	18.6	26.1
Lane LOS	A		A		C	D
Approach Delay (s)	0.0		0.8		18.6	26.1
Approach LOS					C	D

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	126	470	253	811	982	122
Peak-hour factor, PHF	0.80	0.80	0.93	0.93	0.91	0.91
Adj. Flow (vph)	158	588	272	872	1079	134
RTOR Reduction (vph)	0	15	0	0	0	83
Lane Group Flow (vph)	158	573	272	872	1079	51
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	4.4	19.6	15.2	38.7	19.5	19.5
Effective Green, g (s)	4.4	19.6	15.2	38.7	19.5	19.5
Actuated g/C Ratio	0.09	0.38	0.30	0.76	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	296	731	1021	2680	1350	604
v/s Ratio Prot	0.05	c0.23	0.08	0.25	c0.30	
v/s Ratio Perm		0.13				0.03
v/c Ratio	0.53	0.78	0.27	0.33	0.80	0.08
Uniform Delay, d1	22.4	13.9	13.7	2.0	14.1	10.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	5.5	0.1	0.1	3.4	0.1
Delay (s)	24.2	19.4	13.8	2.1	17.5	10.2
Level of Service	C	B	B	A	B	B
Approach Delay (s)	20.4			4.9	16.7	
Approach LOS	C			A	B	

Intersection Summary			
HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	51.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX C

APPROVED PROJECTS TRIP GENERATION SUMMARY

Table B-1
Approved Projects Trip Generation Summary[1]
Psychiatric Services Unit
California State Prison - Sacramento

Project	Land Use	Size	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Creekview Professional Center	Medical/Professional Office	96,360 SF[2]	175	47	222	90	243	333
Mammoth Professional Center	Office	58,800 SF	108	15	123	25	120	145
Folsom Pointe Highway Commercial	Highway Commercial Center[3]		115	103	218	141	107	248
Broadstone Park Professional Center	Office	73,829 SF	129	18	147	19	91	110
Palladio Retail – Phase I[4]	Retail	564,800 SF	234	151	385	746	776	1,522
Former Fire Station	Office	3,500 SF	4	1	5	1	4	5
Parkshore Plaza III	Industrial/Office	207,060 SF	282	38	320	53	257	310
Wal-Mart Expansion	Retail	26,515 SF[5] & 3,000 SF Pad	78	112	190	33	50	83
Willow Creek Village	Multi-family Residential	86 DU[6]	9	35	44	35	19	54
Broadstone Crossing Parcel 1	Two Hotels Three Restaurants	236 Rooms 22,230 SF	122	96	218	205	155	360
Broadstone Crossing Parcel 5	Strikes Family Entertainment Center	55,000 SF	102	70	172	70	125	195
Oaks at Willow Springs	Residential	200 DU[7]	35	115	150	127	75	202
Broadstone Oaks #2	Office Retail	56,800 SF 15,000 SF	136	34	170	110	212	322
California Independent System Operator (Cal-ISO)	Office	277,000 SF	240	15	255	40	240	280
The Parkway, Lot D	Residential Condominium	80 DU[7]	8	33	41	32	18	50
La Collina dal Lago	Single-Family Residential	30 DU[7]	6	17	23	19	11	30
Empire Ranch	Single-Family Residential	400 DU	37	113	150	127	75	202
Natoma Valley Subdivision	Single-Family Residential	82 DU	16	46	62	52	31	83
The Parkway, Lots I & J	Single-Family Residential	63 DU	12	35	47	40	24	64
	Multi-Family Residential	149 DU	15	61	76	60	32	92
		Subtotal	27	96	123	100	56	156

Table B-1
Approved Projects Trip Generation Summary[1]
Psychiatric Services Unit
California State Prison - Sacramento

Project	Land Use	Size	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Montara Grove	Office	32,000 SF	44	6	50	8	40	48
Sonic Drive-In	Fast Food Restaurant	1,760 SF	16	19	35	29	30	59
		TOTAL	1,923	1,180	3,103	2,062	2,735	4,797

Notes:
1 Reference: Institute of Transportation Engineers, *Trip Generation*, Eighth Edition, 2008.
2 Square feet.
3 Three unbuilt pads (two restaurants and one retail building).
4 Excludes movie theater, which is complete and occupied.
5 Expansion of existing Wal-Mart store to Wal-Mart Supercenter (137,374 SF to 163,889 SF).
6 Dwelling units.
7 Approximate number of unbuilt units.

APPENDIX D

BASELINE NO PROJECT
LEVEL OF SERVICE CALCULATION WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1811		1770	1863	1583	1770	1843		1770	1859	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1811		1770	1863	1583	1770	1843		1770	1859	
Volume (vph)	13	239	55	77	268	244	51	463	36	270	725	9
Peak-hour factor, PHF	0.88	0.88	0.88	0.85	0.85	0.85	0.85	0.85	0.85	0.96	0.96	0.96
Adj. Flow (vph)	15	272	62	91	315	287	60	545	42	281	755	9
RTOR Reduction (vph)	0	9	0	0	0	210	0	3	0	0	1	0
Lane Group Flow (vph)	15	325	0	91	315	77	60	584	0	281	763	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	0.7	18.9		4.4	22.6	22.6	3.6	29.8		15.1	41.3	
Effective Green, g (s)	0.7	18.9		4.4	22.6	22.6	3.6	29.8		15.1	41.3	
Actuated g/C Ratio	0.01	0.22		0.05	0.27	0.27	0.04	0.35		0.18	0.49	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	15	407		92	500	425	76	652		317	912	
v/s Ratio Prot	0.01	c0.18		c0.05	c0.17		0.03	0.32		c0.16	c0.41	
v/s Ratio Perm						0.05						
v/c Ratio	1.00	0.80		0.99	0.63	0.18	0.79	0.90		0.89	0.84	
Uniform Delay, d1	41.8	30.9		39.9	27.1	23.7	39.9	25.7		33.7	18.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	232.4	10.5		89.4	2.6	0.2	40.6	14.8		24.3	6.8	
Delay (s)	274.1	41.4		129.3	29.7	23.9	80.5	40.5		58.0	25.3	
Level of Service	F	D		F	C	C	F	D		E	C	
Approach Delay (s)		51.4			40.4			44.2			34.1	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	40.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	84.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.92		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	1835		1770	1844		1770	1713		1770	1800	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1835		1770	1844		1770	1713		1770	1800	
Volume (vph)	1	488	53	56	478	34	59	42	49	26	32	9
Peak-hour factor, PHF	0.82	0.82	0.82	0.89	0.89	0.89	0.75	0.75	0.75	0.84	0.84	0.84
Adj. Flow (vph)	1	595	65	63	537	38	79	56	65	31	38	11
RTOR Reduction (vph)	0	6	0	0	4	0	0	57	0	0	10	0
Lane Group Flow (vph)	1	654	0	63	571	0	79	64	0	31	39	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	19.7		2.0	21.2		2.8	5.1		1.0	3.3	
Effective Green, g (s)	0.5	19.7		2.0	21.2		2.8	5.1		1.0	3.3	
Actuated g/C Ratio	0.01	0.45		0.05	0.48		0.06	0.12		0.02	0.08	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	20	825		81	893		113	199		40	136	
v/s Ratio Prot	0.00	c0.36		c0.04	0.31		c0.04	c0.04		0.02	0.02	
v/s Ratio Perm												
v/c Ratio	0.05	0.79		0.78	0.64		0.70	0.32		0.78	0.29	
Uniform Delay, d1	21.4	10.3		20.7	8.4		20.1	17.8		21.3	19.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	5.3		36.4	1.5		17.2	0.9		61.5	1.2	
Delay (s)	22.5	15.6		57.1	10.0		37.3	18.7		82.8	20.3	
Level of Service	C	B		E	A		D	B		F	C	
Approach Delay (s)		15.6			14.6			26.0			44.5	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	43.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.88		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	1842		1770	1850		1770	1635		1770	1816	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1842		1770	1850		1770	1635		1770	1816	
Volume (vph)	2	397	32	69	483	23	59	22	97	7	4	1
Peak-hour factor, PHF	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.75	0.75	0.75
Adj. Flow (vph)	2	436	35	77	537	26	66	25	109	9	5	1
RTOR Reduction (vph)	0	5	0	0	3	0	0	101	0	0	1	0
Lane Group Flow (vph)	2	466	0	77	560	0	66	33	0	9	5	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	16.4		1.8	17.7		1.5	2.9		0.5	1.9	
Effective Green, g (s)	0.5	16.4		1.8	17.7		1.5	2.9		0.5	1.9	
Actuated g/C Ratio	0.01	0.44		0.05	0.47		0.04	0.08		0.01	0.05	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	24	803		85	871		71	126		24	92	
v/s Ratio Prot	0.00	0.25		c0.04	c0.30		c0.04	c0.02		0.01	0.00	
v/s Ratio Perm												
v/c Ratio	0.08	0.58		0.91	0.64		0.93	0.27		0.38	0.05	
Uniform Delay, d1	18.3	8.0		17.8	7.6		18.0	16.3		18.4	17.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	1.1		66.6	1.6		81.6	1.1		9.6	0.2	
Delay (s)	19.8	9.1		84.4	9.2		99.6	17.5		28.0	17.2	
Level of Service	B	A		F	A		F	B		C	B	
Approach Delay (s)		9.1			18.2			44.6			23.7	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	37.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.99		1.00	0.85		1.00	0.85	
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	1847		1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1847		1770	1583		1770	1583	
Volume (vph)	124	338	26	18	688	42	4	0	2	6	0	18
Peak-hour factor, PHF	0.89	0.89	0.89	0.73	0.73	0.73	0.92	0.92	0.92	0.78	0.78	0.78
Adj. Flow (vph)	139	380	29	25	942	58	4	0	2	8	0	23
RTOR Reduction (vph)	0	0	8	0	2	0	0	2	0	0	22	0
Lane Group Flow (vph)	139	380	21	25	998	0	4	0	0	8	1	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	8.4	54.0	54.0	1.6	47.2		0.6	1.7		0.6	1.7	
Effective Green, g (s)	8.4	54.0	54.0	1.6	47.2		0.6	1.7		0.6	1.7	
Actuated g/C Ratio	0.11	0.73	0.73	0.02	0.64		0.01	0.02		0.01	0.02	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	201	1361	1157	38	1180		14	36		14	36	
v/s Ratio Prot	c0.08	0.20		0.01	c0.54		0.00	0.00		c0.00	c0.00	
v/s Ratio Perm			0.01									
v/c Ratio	0.69	0.28	0.02	0.66	0.85		0.29	0.00		0.57	0.01	
Uniform Delay, d1	31.5	3.4	2.7	35.9	10.5		36.4	35.3		36.5	35.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.8	0.1	0.0	34.3	5.8		10.9	0.0		46.0	0.2	
Delay (s)	41.3	3.5	2.7	70.2	16.2		47.4	35.3		82.5	35.4	
Level of Service	D	A	A	E	B		D	D		F	D	
Approach Delay (s)		13.0			17.6			43.3			47.6	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	73.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	31	345	9	13	702	28	17	0	15	2	0	2
Peak Hour Factor	0.92	0.92	0.92	0.75	0.75	0.75	0.73	0.73	0.73	0.50	0.50	0.50
Hourly flow rate (vph)	34	375	10	17	936	37	23	0	21	4	0	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	973			385			1422	1455	380	1452	1442	955
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	973			385			1422	1455	380	1452	1442	955
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			78	100	97	96	100	99
cM capacity (veh/h)	708			1174			107	122	667	100	124	313

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	34	385	17	973	44	8
Volume Left	34	0	17	0	23	4
Volume Right	0	10	0	37	21	4
cSH	708	1700	1174	1700	176	152
Volume to Capacity	0.05	0.23	0.01	0.57	0.25	0.05
Queue Length 95th (ft)	4	0	1	0	23	4
Control Delay (s)	10.3	0.0	8.1	0.0	32.0	30.0
Lane LOS	B		A		D	D
Approach Delay (s)	0.8		0.1		32.0	30.0
Approach LOS					D	D

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	137	197	500	929	647	183
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.93	0.93
Adj. Flow (vph)	156	224	568	1056	696	197
RTOR Reduction (vph)	0	31	0	0	0	137
Lane Group Flow (vph)	156	193	568	1056	696	60
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	4.4	14.0	9.6	25.0	11.4	11.4
Effective Green, g (s)	4.4	14.0	9.6	25.0	11.4	11.4
Actuated g/C Ratio	0.12	0.37	0.26	0.67	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	404	762	881	2366	1079	483
v/s Ratio Prot	c0.05	0.07	c0.17	0.30	c0.20	
v/s Ratio Perm		0.06				0.04
v/c Ratio	0.39	0.25	0.64	0.45	0.65	0.12
Uniform Delay, d1	15.3	8.1	12.4	2.9	11.2	9.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.2	1.6	0.1	1.3	0.1
Delay (s)	15.9	8.3	14.0	3.1	12.6	9.5
Level of Service	B	A	B	A	B	A
Approach Delay (s)	11.4			6.9	11.9	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	9.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	37.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1798		1770	1863	1583	1770	1854		1770	1859	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1798		1770	1863	1583	1770	1854		1770	1859	
Volume (vph)	24	257	78	91	182	344	18	685	23	265	709	10
Peak-hour factor, PHF	0.83	0.83	0.83	0.84	0.84	0.84	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	29	310	94	108	217	410	19	729	24	282	754	11
RTOR Reduction (vph)	0	11	0	0	0	250	0	1	0	0	0	0
Lane Group Flow (vph)	29	393	0	108	217	160	19	752	0	282	765	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	2.4	22.6		6.0	26.2	26.2	1.6	43.4		16.0	57.8	
Effective Green, g (s)	2.4	22.6		6.0	26.2	26.2	1.6	43.4		16.0	57.8	
Actuated g/C Ratio	0.02	0.22		0.06	0.25	0.25	0.02	0.42		0.15	0.56	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	41	391		102	469	399	27	774		272	1033	
v/s Ratio Prot	0.02	c0.22		c0.06	c0.12		0.01	c0.41		c0.16	0.41	
v/s Ratio Perm						0.10						
v/c Ratio	0.71	1.01		1.06	0.46	0.40	0.70	0.97		1.04	0.74	
Uniform Delay, d1	50.5	40.7		49.0	32.9	32.4	51.0	29.7		44.0	17.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	43.2	46.8		105.9	0.7	0.7	59.2	25.3		64.4	2.9	
Delay (s)	93.6	87.5		154.9	33.7	33.0	110.2	55.0		108.4	20.3	
Level of Service	F	F		F	C	C	F	E		F	C	
Approach Delay (s)		87.9			51.1			56.4			44.1	
Approach LOS		F			D			E			D	

Intersection Summary			
HCM Average Control Delay	55.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	104.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.91		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1854		1770	1852		1770	1687		1770	1830	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1854		1770	1852		1770	1687		1770	1830	
Volume (vph)	13	557	18	57	494	20	109	59	100	49	32	4
Peak-hour factor, PHF	0.94	0.94	0.94	0.84	0.84	0.84	0.89	0.89	0.89	0.85	0.85	0.85
Adj. Flow (vph)	14	593	19	68	588	24	122	66	112	58	38	5
RTOR Reduction (vph)	0	2	0	0	2	0	0	93	0	0	5	0
Lane Group Flow (vph)	14	610	0	68	610	0	122	85	0	58	38	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	18.7		2.0	20.2		4.8	4.8		2.0	2.0	
Effective Green, g (s)	0.5	18.7		2.0	20.2		4.8	4.8		2.0	2.0	
Actuated g/C Ratio	0.01	0.43		0.05	0.46		0.11	0.11		0.05	0.05	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	20	797		81	860		195	186		81	84	
v/s Ratio Prot	0.01	0.33		c0.04	c0.33		c0.07	c0.05		0.03	0.02	
v/s Ratio Perm												
v/c Ratio	0.70	0.77		0.84	0.71		0.63	0.45		0.72	0.46	
Uniform Delay, d1	21.4	10.5		20.6	9.3		18.5	18.1		20.5	20.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	71.8	4.4		50.0	2.7		6.1	1.8		25.8	3.9	
Delay (s)	93.3	15.0		70.6	12.0		24.6	19.9		46.3	24.1	
Level of Service	F	B		E	B		C	B		D	C	
Approach Delay (s)		16.7			17.9			21.8			36.8	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	43.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1828		1770	1853		1770	1600		1770	1820	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1828		1770	1853		1770	1600		1770	1820	
Volume (vph)	4	574	81	82	425	16	79	10	152	17	10	2
Peak-hour factor, PHF	0.93	0.93	0.93	0.88	0.88	0.88	0.89	0.89	0.89	0.91	0.91	0.91
Adj. Flow (vph)	4	617	87	93	483	18	89	11	171	19	11	2
RTOR Reduction (vph)	0	7	0	0	2	0	0	147	0	0	2	0
Lane Group Flow (vph)	4	697	0	93	499	0	89	35	0	19	11	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	21.4		3.8	24.7		4.9	6.9		1.0	3.0	
Effective Green, g (s)	0.5	21.4		3.8	24.7		4.9	6.9		1.0	3.0	
Actuated g/C Ratio	0.01	0.44		0.08	0.50		0.10	0.14		0.02	0.06	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	18	797		137	932		177	225		36	111	
v/s Ratio Prot	0.00	c0.38		c0.05	c0.27		c0.05	c0.02		0.01	0.01	
v/s Ratio Perm												
v/c Ratio	0.22	0.87		0.68	0.54		0.50	0.16		0.53	0.10	
Uniform Delay, d1	24.1	12.6		22.1	8.3		20.9	18.5		23.8	21.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	10.5		12.6	0.6		2.2	0.3		13.3	0.4	
Delay (s)	30.3	23.2		34.6	8.9		23.2	18.9		37.1	22.2	
Level of Service	C	C		C	A		C	B		D	C	
Approach Delay (s)		23.2			12.9			20.3			31.0	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	49.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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		1.00	0.85		1.00	0.85	
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	1858		1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1858		1770	1583		1770	1583	
Volume (vph)	23	717	5	3	468	7	24	0	16	32	0	75
Peak-hour factor, PHF	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.70	0.70	0.70
Adj. Flow (vph)	28	874	6	3	509	8	26	0	17	46	0	107
RTOR Reduction (vph)	0	0	3	0	1	0	0	16	0	0	100	0
Lane Group Flow (vph)	28	874	3	3	516	0	26	1	0	46	7	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	1.3	25.4	25.4	0.5	24.6		1.0	1.8		2.3	3.1	
Effective Green, g (s)	1.3	25.4	25.4	0.5	24.6		1.0	1.8		2.3	3.1	
Actuated g/C Ratio	0.03	0.55	0.55	0.01	0.53		0.02	0.04		0.05	0.07	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	50	1029	874	19	994		38	62		89	107	
v/s Ratio Prot	c0.02	c0.47		0.00	0.28		0.01	0.00		c0.03	c0.00	
v/s Ratio Perm			0.00									
v/c Ratio	0.56	0.85	0.00	0.16	0.52		0.68	0.01		0.52	0.07	
Uniform Delay, d1	22.1	8.7	4.6	22.5	6.9		22.3	21.2		21.3	20.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.6	6.7	0.0	3.9	0.5		40.6	0.1		5.0	0.3	
Delay (s)	35.6	15.4	4.6	26.4	7.4		62.9	21.3		26.3	20.4	
Level of Service	D	B	A	C	A		E	C		C	C	
Approach Delay (s)		15.9			7.5			46.5			22.1	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	46.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	739	19	33	452	3	4	0	15	19	0	19
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.68	0.68	0.68	0.56	0.56	0.56
Hourly flow rate (vph)	2	924	24	36	497	3	6	0	22	34	0	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	500			948			1544	1513	936	1522	1523	498
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	500			948			1544	1513	936	1522	1523	498
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			93	100	93	61	100	94
cM capacity (veh/h)	1064			724			85	114	322	87	112	572

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	2	948	36	500	28	68
Volume Left	2	0	36	0	6	34
Volume Right	0	24	0	3	22	34
cSH	1064	1700	724	1700	202	151
Volume to Capacity	0.00	0.56	0.05	0.29	0.14	0.45
Queue Length 95th (ft)	0	0	4	0	12	51
Control Delay (s)	8.4	0.0	10.2	0.0	25.6	47.2
Lane LOS	A		B		D	E
Approach Delay (s)	0.0		0.7		25.6	47.2
Approach LOS					D	E

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	156	592	322	811	982	159
Peak-hour factor, PHF	0.80	0.80	0.93	0.93	0.91	0.91
Adj. Flow (vph)	195	740	346	872	1079	175
RTOR Reduction (vph)	0	14	0	0	0	110
Lane Group Flow (vph)	195	726	346	872	1079	65
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	4.5	20.9	16.4	39.8	19.4	19.4
Effective Green, g (s)	4.5	20.9	16.4	39.8	19.4	19.4
Actuated g/C Ratio	0.09	0.40	0.31	0.76	0.37	0.37
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	295	754	1077	2693	1313	587
v/s Ratio Prot	0.06	c0.30	0.10	0.25	c0.30	
v/s Ratio Perm		0.16				0.04
v/c Ratio	0.66	0.96	0.32	0.32	0.82	0.11
Uniform Delay, d1	23.2	15.3	13.7	2.0	14.9	10.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	23.8	0.2	0.1	4.3	0.1
Delay (s)	28.6	39.1	13.9	2.1	19.2	10.9
Level of Service	C	D	B	A	B	B
Approach Delay (s)	36.9			5.4	18.0	
Approach LOS	D			A	B	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX E

BASELINE PLUS PROJECT
LEVEL OF SERVICE CALCULATION WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1812		1770	1863	1583	1770	1841		1770	1859	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1812		1770	1863	1583	1770	1841		1770	1859	
Volume (vph)	13	248	55	77	269	246	51	463	38	282	725	9
Peak-hour factor, PHF	0.88	0.88	0.88	0.85	0.85	0.85	0.85	0.85	0.85	0.96	0.96	0.96
Adj. Flow (vph)	15	282	62	91	316	289	60	545	45	294	755	9
RTOR Reduction (vph)	0	9	0	0	0	211	0	3	0	0	1	0
Lane Group Flow (vph)	15	335	0	91	316	78	60	587	0	294	763	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	0.7	19.4		4.4	23.1	23.1	3.7	30.1		15.5	41.9	
Effective Green, g (s)	0.7	19.4		4.4	23.1	23.1	3.7	30.1		15.5	41.9	
Actuated g/C Ratio	0.01	0.23		0.05	0.27	0.27	0.04	0.35		0.18	0.49	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	15	412		91	504	428	77	649		321	912	
v/s Ratio Prot	0.01	c0.19		c0.05	c0.17		0.03	0.32		c0.17	c0.41	
v/s Ratio Perm						0.05						
v/c Ratio	1.00	0.81		1.00	0.63	0.18	0.78	0.90		0.92	0.84	
Uniform Delay, d1	42.4	31.3		40.5	27.4	23.9	40.4	26.3		34.3	18.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	232.4	11.7		94.3	2.4	0.2	38.1	16.0		29.4	6.8	
Delay (s)	274.7	43.0		134.8	29.8	24.1	78.5	42.3		63.7	25.6	
Level of Service	F	D		F	C	C	E	D		E	C	
Approach Delay (s)		52.7			41.2			45.6			36.2	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	41.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	85.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.92		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	1836		1770	1844		1770	1709		1770	1800	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1836		1770	1844		1770	1709		1770	1800	
Volume (vph)	1	511	53	56	481	34	59	42	52	27	32	9
Peak-hour factor, PHF	0.82	0.82	0.82	0.89	0.89	0.89	0.75	0.75	0.75	0.84	0.84	0.84
Adj. Flow (vph)	1	623	65	63	540	38	79	56	69	32	38	11
RTOR Reduction (vph)	0	6	0	0	4	0	0	61	0	0	10	0
Lane Group Flow (vph)	1	682	0	63	574	0	79	64	0	32	39	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	20.3		2.0	21.8		2.8	5.1		1.0	3.3	
Effective Green, g (s)	0.5	20.3		2.0	21.8		2.8	5.1		1.0	3.3	
Actuated g/C Ratio	0.01	0.46		0.05	0.49		0.06	0.11		0.02	0.07	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	20	839		80	905		112	196		40	134	
v/s Ratio Prot	0.00	c0.37		c0.04	0.31		c0.04	c0.04		0.02	0.02	
v/s Ratio Perm												
v/c Ratio	0.05	0.81		0.79	0.63		0.71	0.33		0.80	0.29	
Uniform Delay, d1	21.7	10.4		21.0	8.4		20.4	18.1		21.6	19.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	6.1		38.7	1.5		18.3	1.0		69.2	1.2	
Delay (s)	22.8	16.5		59.7	9.8		38.7	19.0		90.8	20.6	
Level of Service	C	B		E	A		D	B		F	C	
Approach Delay (s)		16.5			14.7			26.6			48.4	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	44.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.88		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	1843		1770	1850		1770	1633		1770	1816	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1843		1770	1850		1770	1633		1770	1816	
Volume (vph)	2	424	32	70	486	23	59	22	104	7	4	1
Peak-hour factor, PHF	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.75	0.75	0.75
Adj. Flow (vph)	2	466	35	78	540	26	66	25	117	9	5	1
RTOR Reduction (vph)	0	5	0	0	3	0	0	108	0	0	1	0
Lane Group Flow (vph)	2	496	0	78	563	0	66	34	0	9	5	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	17.1		1.7	18.3		1.5	2.9		0.5	1.9	
Effective Green, g (s)	0.5	17.1		1.7	18.3		1.5	2.9		0.5	1.9	
Actuated g/C Ratio	0.01	0.45		0.04	0.48		0.04	0.08		0.01	0.05	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	23	825		79	886		70	124		23	90	
v/s Ratio Prot	0.00	0.27		c0.04	c0.30		c0.04	c0.02		0.01	0.00	
v/s Ratio Perm												
v/c Ratio	0.09	0.60		0.99	0.64		0.94	0.27		0.39	0.06	
Uniform Delay, d1	18.6	8.0		18.2	7.5		18.3	16.7		18.7	17.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	1.2		96.2	1.5		87.3	1.2		10.7	0.3	
Delay (s)	20.3	9.2		114.4	9.0		105.6	17.9		29.4	17.6	
Level of Service	C	A		F	A		F	B		C	B	
Approach Delay (s)		9.3			21.7			45.7			24.6	
Approach LOS		A			C			D			C	

Intersection Summary			
HCM Average Control Delay	20.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	38.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.99		1.00	0.85		1.00	0.85	
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	1842		1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1842		1770	1583		1770	1583	
Volume (vph)	158	338	26	18	688	54	4	0	2	8	0	22
Peak-hour factor, PHF	0.89	0.89	0.89	0.73	0.73	0.73	0.92	0.92	0.92	0.78	0.78	0.78
Adj. Flow (vph)	178	380	29	25	942	74	4	0	2	10	0	28
RTOR Reduction (vph)	0	0	7	0	3	0	0	2	0	0	27	0
Lane Group Flow (vph)	178	380	22	25	1013	0	4	0	0	10	1	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	11.6	61.3	61.3	1.7	51.4		0.7	1.9		0.7	1.9	
Effective Green, g (s)	11.6	61.3	61.3	1.7	51.4		0.7	1.9		0.7	1.9	
Actuated g/C Ratio	0.14	0.75	0.75	0.02	0.63		0.01	0.02		0.01	0.02	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	252	1400	1189	37	1160		15	37		15	37	
v/s Ratio Prot	c0.10	0.20		0.01	c0.55		0.00	0.00		c0.01	c0.00	
v/s Ratio Perm			0.01									
v/c Ratio	0.71	0.27	0.02	0.68	0.87		0.27	0.00		0.67	0.02	
Uniform Delay, d1	33.4	3.2	2.6	39.7	12.4		40.2	38.9		40.3	38.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.7	0.1	0.0	39.3	7.5		9.3	0.0		75.9	0.2	
Delay (s)	42.1	3.3	2.6	79.0	19.9		49.5	38.9		116.2	39.1	
Level of Service	D	A	A	E	B		D	D		F	D	
Approach Delay (s)		15.0			21.4			46.0			59.4	
Approach LOS		B			C			D			E	

Intersection Summary			
HCM Average Control Delay	20.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	31	347	9	13	714	28	17	0	15	2	0	2
Peak Hour Factor	0.92	0.92	0.92	0.75	0.75	0.75	0.73	0.73	0.73	0.50	0.50	0.50
Hourly flow rate (vph)	34	377	10	17	952	37	23	0	21	4	0	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	989			387			1440	1473	382	1470	1460	971
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	989			387			1440	1473	382	1470	1460	971
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			78	100	97	96	100	99
cM capacity (veh/h)	699			1172			104	119	665	97	121	307

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	34	387	17	989	44	8
Volume Left	34	0	17	0	23	4
Volume Right	0	10	0	37	21	4
cSH	699	1700	1172	1700	172	148
Volume to Capacity	0.05	0.23	0.01	0.58	0.26	0.05
Queue Length 95th (ft)	4	0	1	0	24	4
Control Delay (s)	10.4	0.0	8.1	0.0	33.0	30.8
Lane LOS	B		A		D	D
Approach Delay (s)	0.8		0.1		33.0	30.8
Approach LOS					D	D

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	138	198	507	929	647	188
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.93	0.93
Adj. Flow (vph)	157	225	576	1056	696	202
RTOR Reduction (vph)	0	31	0	0	0	140
Lane Group Flow (vph)	157	194	576	1056	696	62
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	4.4	14.0	9.6	25.0	11.4	11.4
Effective Green, g (s)	4.4	14.0	9.6	25.0	11.4	11.4
Actuated g/C Ratio	0.12	0.37	0.26	0.67	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	404	762	881	2366	1079	483
v/s Ratio Prot	c0.05	0.07	c0.17	0.30	c0.20	
v/s Ratio Perm		0.06				0.04
v/c Ratio	0.39	0.26	0.65	0.45	0.65	0.13
Uniform Delay, d1	15.3	8.1	12.4	2.9	11.2	9.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.2	1.8	0.1	1.3	0.1
Delay (s)	15.9	8.3	14.2	3.1	12.6	9.5
Level of Service	B	A	B	A	B	A
Approach Delay (s)	11.4			7.0	11.9	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	37.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1798		1770	1863	1583	1770	1854		1770	1859	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1798		1770	1863	1583	1770	1854		1770	1859	
Volume (vph)	24	259	78	92	188	352	18	685	23	267	709	10
Peak-hour factor, PHF	0.83	0.83	0.83	0.84	0.84	0.84	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	29	312	94	110	224	419	19	729	24	284	754	11
RTOR Reduction (vph)	0	11	0	0	0	250	0	1	0	0	0	0
Lane Group Flow (vph)	29	395	0	110	224	169	19	752	0	284	765	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	2.4	22.6		6.0	26.2	26.2	1.6	43.4		16.0	57.8	
Effective Green, g (s)	2.4	22.6		6.0	26.2	26.2	1.6	43.4		16.0	57.8	
Actuated g/C Ratio	0.02	0.22		0.06	0.25	0.25	0.02	0.42		0.15	0.56	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	41	391		102	469	399	27	774		272	1033	
v/s Ratio Prot	0.02	c0.22		c0.06	c0.12		0.01	c0.41		c0.16	0.41	
v/s Ratio Perm						0.11						
v/c Ratio	0.71	1.01		1.08	0.48	0.42	0.70	0.97		1.04	0.74	
Uniform Delay, d1	50.5	40.7		49.0	33.1	32.6	51.0	29.7		44.0	17.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	43.2	48.1		111.9	0.8	0.7	59.2	25.3		66.6	2.9	
Delay (s)	93.6	88.8		160.9	33.8	33.3	110.2	55.0		110.6	20.3	
Level of Service	F	F		F	C	C	F	E		F	C	
Approach Delay (s)		89.2			52.1			56.4			44.8	
Approach LOS		F			D			E			D	

Intersection Summary			
HCM Average Control Delay	56.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	104.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.91		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1854		1770	1852		1770	1687		1770	1830	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1854		1770	1852		1770	1687		1770	1830	
Volume (vph)	13	561	18	59	509	21	109	59	100	49	32	4
Peak-hour factor, PHF	0.94	0.94	0.94	0.84	0.84	0.84	0.89	0.89	0.89	0.85	0.85	0.85
Adj. Flow (vph)	14	597	19	70	606	25	122	66	112	58	38	5
RTOR Reduction (vph)	0	2	0	0	2	0	0	93	0	0	5	0
Lane Group Flow (vph)	14	614	0	70	629	0	122	85	0	58	38	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	18.7		2.0	20.2		4.8	4.8		2.0	2.0	
Effective Green, g (s)	0.5	18.7		2.0	20.2		4.8	4.8		2.0	2.0	
Actuated g/C Ratio	0.01	0.43		0.05	0.46		0.11	0.11		0.05	0.05	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	20	797		81	860		195	186		81	84	
v/s Ratio Prot	0.01	0.33		c0.04	c0.34		c0.07	c0.05		0.03	0.02	
v/s Ratio Perm												
v/c Ratio	0.70	0.77		0.86	0.73		0.63	0.45		0.72	0.46	
Uniform Delay, d1	21.4	10.6		20.6	9.4		18.5	18.1		20.5	20.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	71.8	4.6		56.9	3.2		6.1	1.8		25.8	3.9	
Delay (s)	93.3	15.2		77.5	12.7		24.6	19.9		46.3	24.1	
Level of Service	F	B		E	B		C	B		D	C	
Approach Delay (s)		16.9			19.1			21.8			36.8	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	43.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1828		1770	1853		1770	1600		1770	1820	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1828		1770	1853		1770	1600		1770	1820	
Volume (vph)	4	578	81	87	443	16	79	10	153	17	10	2
Peak-hour factor, PHF	0.93	0.93	0.93	0.88	0.88	0.88	0.89	0.89	0.89	0.91	0.91	0.91
Adj. Flow (vph)	4	622	87	99	503	18	89	11	172	19	11	2
RTOR Reduction (vph)	0	7	0	0	1	0	0	148	0	0	2	0
Lane Group Flow (vph)	4	702	0	99	520	0	89	35	0	19	11	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	21.6		3.8	24.9		4.9	6.9		1.0	3.0	
Effective Green, g (s)	0.5	21.6		3.8	24.9		4.9	6.9		1.0	3.0	
Actuated g/C Ratio	0.01	0.44		0.08	0.51		0.10	0.14		0.02	0.06	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	18	801		136	936		176	224		36	111	
v/s Ratio Prot	0.00	c0.38		c0.06	c0.28		c0.05	c0.02		0.01	0.01	
v/s Ratio Perm												
v/c Ratio	0.22	0.88		0.73	0.56		0.51	0.16		0.53	0.10	
Uniform Delay, d1	24.2	12.6		22.2	8.4		21.1	18.6		23.9	21.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	10.6		17.6	0.7		2.3	0.3		13.3	0.4	
Delay (s)	30.4	23.3		39.8	9.1		23.3	19.0		37.2	22.3	
Level of Service	C	C		D	A		C	B		D	C	
Approach Delay (s)		23.3			14.0			20.4			31.1	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	49.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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		1.00	0.85		1.00	0.85	
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	1857		1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1857		1770	1583		1770	1583	
Volume (vph)	28	717	5	3	468	9	24	0	16	39	0	98
Peak-hour factor, PHF	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.70	0.70	0.70
Adj. Flow (vph)	34	874	6	3	509	10	26	0	17	56	0	140
RTOR Reduction (vph)	0	0	3	0	1	0	0	16	0	0	131	0
Lane Group Flow (vph)	34	874	3	3	518	0	26	1	0	56	9	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	1.3	25.4	25.4	0.5	24.6		1.0	1.8		2.3	3.1	
Effective Green, g (s)	1.3	25.4	25.4	0.5	24.6		1.0	1.8		2.3	3.1	
Actuated g/C Ratio	0.03	0.55	0.55	0.01	0.53		0.02	0.04		0.05	0.07	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	50	1029	874	19	993		38	62		89	107	
v/s Ratio Prot	c0.02	c0.47		0.00	0.28		0.01	0.00		c0.03	c0.01	
v/s Ratio Perm			0.00									
v/c Ratio	0.68	0.85	0.00	0.16	0.52		0.68	0.01		0.63	0.09	
Uniform Delay, d1	22.1	8.7	4.6	22.5	6.9		22.3	21.2		21.4	20.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	31.8	6.7	0.0	3.9	0.5		40.6	0.1		13.1	0.4	
Delay (s)	54.0	15.4	4.6	26.4	7.4		62.9	21.3		34.5	20.5	
Level of Service	D	B	A	C	A		E	C		C	C	
Approach Delay (s)		16.7			7.5			46.5			24.5	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM Average Control Delay	15.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	46.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	746	19	33	454	3	4	0	15	19	0	19
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.68	0.68	0.68	0.56	0.56	0.56
Hourly flow rate (vph)	2	932	24	36	499	3	6	0	22	34	0	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	502			956			1555	1524	944	1533	1534	501
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	502			956			1555	1524	944	1533	1534	501
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			93	100	93	60	100	94
cM capacity (veh/h)	1062			719			83	112	318	85	110	570

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	2	956	36	502	28	68
Volume Left	2	0	36	0	6	34
Volume Right	0	24	0	3	22	34
cSH	1062	1700	719	1700	199	148
Volume to Capacity	0.00	0.56	0.05	0.30	0.14	0.46
Queue Length 95th (ft)	0	0	4	0	12	52
Control Delay (s)	8.4	0.0	10.3	0.0	26.0	48.4
Lane LOS	A		B		D	E
Approach Delay (s)	0.0		0.7		26.0	48.4
Approach LOS					D	E

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	159	596	323	811	982	160
Peak-hour factor, PHF	0.80	0.80	0.93	0.93	0.91	0.91
Adj. Flow (vph)	199	745	347	872	1079	176
RTOR Reduction (vph)	0	14	0	0	0	111
Lane Group Flow (vph)	199	731	347	872	1079	65
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	4.5	20.9	16.4	39.8	19.4	19.4
Effective Green, g (s)	4.5	20.9	16.4	39.8	19.4	19.4
Actuated g/C Ratio	0.09	0.40	0.31	0.76	0.37	0.37
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	295	754	1077	2693	1313	587
v/s Ratio Prot	0.06	c0.30	0.10	0.25	c0.30	
v/s Ratio Perm		0.16				0.04
v/c Ratio	0.67	0.97	0.32	0.32	0.82	0.11
Uniform Delay, d1	23.2	15.4	13.7	2.0	14.9	10.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.0	25.0	0.2	0.1	4.3	0.1
Delay (s)	29.2	40.4	13.9	2.1	19.2	10.9
Level of Service	C	D	B	A	B	B
Approach Delay (s)	38.0			5.4	18.0	
Approach LOS	D			A	B	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX F

CUMULATIVE NO PROJECT
LEVEL OF SERVICE CALCULATION WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1800		1770	1863	1583	1770	1845		1770	1860	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1800		1770	1863	1583	1770	1845		1770	1860	
Volume (vph)	20	310	90	90	340	310	80	720	50	350	1120	10
Peak-hour factor, PHF	0.88	0.88	0.88	0.85	0.85	0.85	0.85	0.85	0.85	0.96	0.96	0.96
Adj. Flow (vph)	23	352	102	106	400	365	94	847	59	365	1167	10
RTOR Reduction (vph)	0	7	0	0	0	252	0	2	0	0	0	0
Lane Group Flow (vph)	23	447	0	106	400	113	94	904	0	365	1177	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	2.4	31.6		7.0	36.2	36.2	6.0	62.0		25.0	81.0	
Effective Green, g (s)	2.4	31.6		7.0	36.2	36.2	6.0	62.0		25.0	81.0	
Actuated g/C Ratio	0.02	0.22		0.05	0.26	0.26	0.04	0.44		0.18	0.57	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	30	402		88	476	405	75	808		313	1064	
v/s Ratio Prot	0.01	c0.25		c0.06	0.21		0.05	0.49		c0.21	c0.63	
v/s Ratio Perm						0.07						
v/c Ratio	0.77	1.11		1.20	0.84	0.28	1.25	1.12		1.17	1.11	
Uniform Delay, d1	69.3	55.0		67.3	50.0	42.3	67.8	39.8		58.3	30.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	72.7	78.8		160.9	12.6	0.4	186.6	69.7		103.8	61.3	
Delay (s)	142.0	133.8		228.2	62.6	42.6	254.4	109.5		162.1	91.6	
Level of Service	F	F		F	E	D	F	F		F	F	
Approach Delay (s)		134.2			74.4			123.1			108.3	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM Average Control Delay	107.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	141.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.92		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	1831		1770	1841		1770	1713		1770	1816	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1831		1770	1841		1770	1713		1770	1816	
Volume (vph)	5	620	80	90	580	50	90	70	80	40	50	10
Peak-hour factor, PHF	0.82	0.82	0.82	0.89	0.89	0.89	0.75	0.75	0.75	0.84	0.84	0.84
Adj. Flow (vph)	6	756	98	101	652	56	120	93	107	48	60	12
RTOR Reduction (vph)	0	7	0	0	4	0	0	70	0	0	11	0
Lane Group Flow (vph)	6	847	0	101	704	0	120	130	0	48	61	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.7	31.3		4.0	34.6		4.5	7.6		2.2	5.3	
Effective Green, g (s)	0.7	31.3		4.0	34.6		4.5	7.6		2.2	5.3	
Actuated g/C Ratio	0.01	0.51		0.07	0.57		0.07	0.12		0.04	0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	20	938		116	1043		130	213		64	158	
v/s Ratio Prot	0.00	c0.46		c0.06	c0.38		c0.07	c0.08		0.03	0.03	
v/s Ratio Perm												
v/c Ratio	0.30	0.90		0.87	0.67		0.92	0.61		0.75	0.39	
Uniform Delay, d1	30.0	13.5		28.3	9.3		28.1	25.3		29.2	26.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.3	11.8		46.1	1.7		55.6	5.1		38.4	1.6	
Delay (s)	38.2	25.3		74.4	11.0		83.7	30.4		67.6	27.9	
Level of Service	D	C		E	B		F	C		E	C	
Approach Delay (s)		25.4			19.0			50.4			43.8	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	27.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	61.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.88		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1836		1770	1845		1770	1630		1770	1765	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1836		1770	1845		1770	1630		1770	1765	
Volume (vph)	5	470	50	110	590	40	90	30	150	10	10	5
Peak-hour factor, PHF	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.75	0.75	0.75
Adj. Flow (vph)	5	516	55	122	656	44	101	34	169	13	13	7
RTOR Reduction (vph)	0	6	0	0	3	0	0	151	0	0	7	0
Lane Group Flow (vph)	5	565	0	122	697	0	101	52	0	13	13	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	21.5		4.2	25.2		3.4	5.0		0.5	2.1	
Effective Green, g (s)	0.5	21.5		4.2	25.2		3.4	5.0		0.5	2.1	
Actuated g/C Ratio	0.01	0.46		0.09	0.53		0.07	0.11		0.01	0.04	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	19	836		158	985		128	173		19	79	
v/s Ratio Prot	0.00	0.31		c0.07	c0.38		c0.06	c0.03		0.01	0.01	
v/s Ratio Perm												
v/c Ratio	0.26	0.68		0.77	0.71		0.79	0.30		0.68	0.17	
Uniform Delay, d1	23.2	10.1		21.0	8.2		21.5	19.5		23.3	21.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.3	2.2		20.5	2.3		26.8	1.0		69.9	1.0	
Delay (s)	30.5	12.3		41.6	10.6		48.3	20.5		93.2	22.7	
Level of Service	C	B		D	B		D	C		F	C	
Approach Delay (s)		12.4			15.2			29.7			50.5	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	47.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.99		1.00	0.85		1.00	0.85	
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	1848		1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1848		1770	1583		1770	1583	
Volume (vph)	130	420	30	20	910	50	5	0	5	10	0	20
Peak-hour factor, PHF	0.89	0.89	0.89	0.73	0.73	0.73	0.92	0.92	0.92	0.78	0.78	0.78
Adj. Flow (vph)	146	472	34	27	1247	68	5	0	5	13	0	26
RTOR Reduction (vph)	0	0	6	0	1	0	0	5	0	0	25	0
Lane Group Flow (vph)	146	472	28	27	1314	0	5	0	0	13	1	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	15.3	117.6	117.6	4.0	106.3		0.7	2.1		1.8	3.2	
Effective Green, g (s)	15.3	117.6	117.6	4.0	106.3		0.7	2.1		1.8	3.2	
Actuated g/C Ratio	0.11	0.83	0.83	0.03	0.75		0.00	0.01		0.01	0.02	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	191	1548	1316	50	1388		9	23		23	36	
v/s Ratio Prot	c0.08	0.25		0.02	c0.71		0.00	0.00		c0.01	c0.00	
v/s Ratio Perm			0.02									
v/c Ratio	0.76	0.30	0.02	0.54	0.95		0.56	0.00		0.57	0.02	
Uniform Delay, d1	61.3	2.7	2.1	67.8	15.2		70.2	68.7		69.5	67.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.5	0.1	0.0	11.4	13.4		58.1	0.1		28.1	0.2	
Delay (s)	77.9	2.8	2.1	79.2	28.5		128.4	68.7		97.6	67.8	
Level of Service	E	A	A	E	C		F	E		F	E	
Approach Delay (s)		19.6			29.5			98.5			77.7	
Approach LOS		B			C			F			E	

Intersection Summary			
HCM Average Control Delay	27.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	141.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	40	430	10	20	900	30	30	0	20	5	0	5
Peak Hour Factor	0.92	0.92	0.92	0.75	0.75	0.75	0.73	0.73	0.73	0.50	0.50	0.50
Hourly flow rate (vph)	43	467	11	27	1200	40	41	0	27	10	0	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1240			478			1823	1853	473	1855	1839	1220
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1240			478			1823	1853	473	1855	1839	1220
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			98			22	100	95	80	100	95
cM capacity (veh/h)	562			1084			52	67	591	50	68	220

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	43	478	27	1240	68	20
Volume Left	43	0	27	0	41	10
Volume Right	0	11	0	40	27	10
cSH	562	1700	1084	1700	83	81
Volume to Capacity	0.08	0.28	0.02	0.73	0.83	0.25
Queue Length 95th (ft)	6	0	2	0	107	22
Control Delay (s)	11.9	0.0	8.4	0.0	143.4	63.3
Lane LOS	B		A		F	F
Approach Delay (s)	1.0		0.2		143.4	63.3
Approach LOS					F	F

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	170	240	640	1440	1000	240
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.93	0.93
Adj. Flow (vph)	193	273	727	1636	1075	258
RTOR Reduction (vph)	0	22	0	0	0	152
Lane Group Flow (vph)	193	251	727	1636	1075	106
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	4.3	19.5	15.2	41.1	21.9	21.9
Effective Green, g (s)	4.3	19.5	15.2	41.1	21.9	21.9
Actuated g/C Ratio	0.08	0.37	0.28	0.77	0.41	0.41
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	276	697	977	2724	1451	649
v/s Ratio Prot	c0.06	0.10	c0.21	0.46	c0.30	
v/s Ratio Perm		0.06				0.07
v/c Ratio	0.70	0.36	0.74	0.60	0.74	0.16
Uniform Delay, d1	23.9	12.4	17.3	2.6	13.3	10.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.5	0.3	3.1	0.4	2.1	0.1
Delay (s)	31.4	12.7	20.4	3.0	15.4	10.1
Level of Service	C	B	C	A	B	B
Approach Delay (s)	20.5			8.4	14.4	
Approach LOS	C			A	B	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1783		1770	1863	1583	1770	1858		1770	1858	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1783		1770	1863	1583	1770	1858		1770	1858	
Volume (vph)	40	300	120	110	220	420	30	1060	20	300	1100	20
Peak-hour factor, PHF	0.83	0.83	0.83	0.84	0.84	0.84	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	48	361	145	131	262	500	32	1128	21	319	1170	21
RTOR Reduction (vph)	0	9	0	0	0	184	0	1	0	0	0	0
Lane Group Flow (vph)	48	497	0	131	262	316	32	1148	0	319	1191	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	5.0	32.0		9.0	36.0	36.0	3.2	72.8		21.0	90.6	
Effective Green, g (s)	5.0	32.0		9.0	36.0	36.0	3.2	72.8		21.0	90.6	
Actuated g/C Ratio	0.03	0.21		0.06	0.24	0.24	0.02	0.48		0.14	0.60	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	59	378		106	445	378	38	897		246	1116	
v/s Ratio Prot	0.03	c0.28		c0.07	0.14		0.02	c0.62		c0.18	0.64	
v/s Ratio Perm						c0.20						
v/c Ratio	0.81	1.31		1.24	0.59	0.84	0.84	1.28		1.30	1.07	
Uniform Delay, d1	72.4	59.4		70.9	50.8	54.6	73.5	39.0		64.9	30.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	55.7	158.8		163.8	2.0	14.7	85.4	134.7		160.2	46.7	
Delay (s)	128.1	218.2		234.7	52.8	69.3	158.9	173.7		225.1	76.8	
Level of Service	F	F		F	D	E	F	F		F	E	
Approach Delay (s)		210.4			88.7			173.3			108.1	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	136.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	150.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	116.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.90		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	1850		1770	1849		1770	1684		1770	1816	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1850		1770	1849		1770	1684		1770	1816	
Volume (vph)	20	640	30	90	570	30	170	90	160	80	50	10
Peak-hour factor, PHF	0.94	0.94	0.94	0.84	0.84	0.84	0.89	0.89	0.89	0.85	0.85	0.85
Adj. Flow (vph)	21	681	32	107	679	36	191	101	180	94	59	12
RTOR Reduction (vph)	0	2	0	0	2	0	0	93	0	0	11	0
Lane Group Flow (vph)	21	711	0	107	713	0	191	188	0	94	60	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.4	29.5		5.3	33.4		9.0	11.6		3.6	6.2	
Effective Green, g (s)	1.4	29.5		5.3	33.4		9.0	11.6		3.6	6.2	
Actuated g/C Ratio	0.02	0.45		0.08	0.51		0.14	0.18		0.05	0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	38	827		142	936		241	296		97	171	
v/s Ratio Prot	0.01	c0.38		c0.06	c0.39		c0.11	c0.11		0.05	0.03	
v/s Ratio Perm												
v/c Ratio	0.55	0.86		0.75	0.76		0.79	0.63		0.97	0.35	
Uniform Delay, d1	32.0	16.4		29.7	13.1		27.6	25.2		31.1	28.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.2	8.9		20.0	3.7		16.2	4.4		80.3	1.3	
Delay (s)	48.2	25.3		49.7	16.8		43.8	29.6		111.5	29.3	
Level of Service	D	C		D	B		D	C		F	C	
Approach Delay (s)		25.9			21.1			35.4			76.1	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.86		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	1817		1770	1851		1770	1604		1770	1811	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1817		1770	1851		1770	1604		1770	1811	
Volume (vph)	10	670	130	130	460	20	120	20	240	30	20	5
Peak-hour factor, PHF	0.93	0.93	0.93	0.88	0.88	0.88	0.89	0.89	0.89	0.91	0.91	0.91
Adj. Flow (vph)	11	720	140	148	523	23	135	22	270	33	22	5
RTOR Reduction (vph)	0	7	0	0	2	0	0	244	0	0	5	0
Lane Group Flow (vph)	11	853	0	148	544	0	135	48	0	33	22	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.6	40.9		7.1	47.4		7.1	7.0		1.9	1.8	
Effective Green, g (s)	0.6	40.9		7.1	47.4		7.1	7.0		1.9	1.8	
Actuated g/C Ratio	0.01	0.56		0.10	0.65		0.10	0.10		0.03	0.02	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	15	1019		172	1204		172	154		46	45	
v/s Ratio Prot	0.01	c0.47		c0.08	0.29		c0.08	c0.03		0.02	0.01	
v/s Ratio Perm												
v/c Ratio	0.73	0.84		0.86	0.45		0.78	0.31		0.72	0.49	
Uniform Delay, d1	36.1	13.2		32.4	6.3		32.2	30.7		35.2	35.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	103.2	6.1		32.9	0.3		20.5	1.2		41.5	8.2	
Delay (s)	139.3	19.3		65.3	6.6		52.7	31.9		76.7	43.3	
Level of Service	F	B		E	A		D	C		E	D	
Approach Delay (s)		20.8			19.1			38.4			61.7	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	72.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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		1.00	0.85		1.00	0.85	
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	1858		1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1858		1770	1583		1770	1583	
Volume (vph)	30	900	5	5	570	10	25	0	20	40	0	80
Peak-hour factor, PHF	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.70	0.70	0.70
Adj. Flow (vph)	37	1098	6	5	620	11	27	0	22	57	0	114
RTOR Reduction (vph)	0	0	2	0	1	0	0	22	0	0	108	0
Lane Group Flow (vph)	37	1098	4	5	630	0	27	0	0	57	6	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	1.4	41.5	41.5	0.4	40.5		1.2	1.3		3.2	3.3	
Effective Green, g (s)	1.4	41.5	41.5	0.4	40.5		1.2	1.3		3.2	3.3	
Actuated g/C Ratio	0.02	0.67	0.67	0.01	0.65		0.02	0.02		0.05	0.05	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	40	1239	1053	11	1206		34	33		91	84	
v/s Ratio Prot	c0.02	c0.59		0.00	0.34		0.02	0.00		c0.03	c0.00	
v/s Ratio Perm			0.00									
v/c Ratio	0.93	0.89	0.00	0.45	0.52		0.79	0.01		0.63	0.07	
Uniform Delay, d1	30.4	8.5	3.5	30.9	5.8		30.5	29.9		29.0	28.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	112.0	7.9	0.0	27.0	0.4		75.1	0.2		12.7	0.4	
Delay (s)	142.5	16.4	3.5	57.9	6.2		105.6	30.1		41.7	28.5	
Level of Service	F	B	A	E	A		F	C		D	C	
Approach Delay (s)		20.5			6.6			71.7			32.9	
Approach LOS		C			A			E			C	

Intersection Summary			
HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	62.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	910	30	50	540	5	10	0	20	20	0	20
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.68	0.68	0.68	0.56	0.56	0.56
Hourly flow rate (vph)	6	1138	38	55	593	5	15	0	29	36	0	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	599			1175			1908	1878	1156	1885	1894	596
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	599			1175			1908	1878	1156	1885	1894	596
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			91			67	100	88	18	100	93
cM capacity (veh/h)	978			594			45	64	239	44	63	503

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	6	1175	55	599	44	71
Volume Left	6	0	55	0	15	36
Volume Right	0	38	0	5	29	36
cSH	978	1700	594	1700	97	80
Volume to Capacity	0.01	0.69	0.09	0.35	0.45	0.89
Queue Length 95th (ft)	0	0	8	0	48	116
Control Delay (s)	8.7	0.0	11.7	0.0	69.5	161.1
Lane LOS	A		B		F	F
Approach Delay (s)	0.0		1.0		69.5	161.1
Approach LOS					F	F

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	200	730	390	1260	1520	190
Peak-hour factor, PHF	0.80	0.80	0.93	0.93	0.91	0.91
Adj. Flow (vph)	250	912	419	1355	1670	209
RTOR Reduction (vph)	0	5	0	0	0	79
Lane Group Flow (vph)	250	907	419	1355	1670	130
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	9.0	56.0	47.0	113.0	62.0	62.0
Effective Green, g (s)	9.0	56.0	47.0	113.0	62.0	62.0
Actuated g/C Ratio	0.07	0.43	0.36	0.87	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	238	731	1241	3076	1688	755
v/s Ratio Prot	0.07	c0.45	0.12	0.38	c0.47	
v/s Ratio Perm		0.12				0.08
v/c Ratio	1.05	1.24	0.34	0.44	0.99	0.17
Uniform Delay, d1	60.5	37.0	30.2	1.8	33.7	19.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	72.2	119.7	0.2	0.1	19.2	0.1
Delay (s)	132.7	156.7	30.3	1.9	52.8	19.5
Level of Service	F	F	C	A	D	B
Approach Delay (s)	151.6			8.6	49.1	
Approach LOS	F			A	D	

Intersection Summary			
HCM Average Control Delay	58.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX G

CUMULATIVE PLUS PROJECT
LEVEL OF SERVICE CALCULATION WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1801		1770	1863	1583	1770	1844		1770	1860	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1801		1770	1863	1583	1770	1844		1770	1860	
Volume (vph)	20	319	90	90	341	312	80	720	52	362	1120	10
Peak-hour factor, PHF	0.88	0.88	0.88	0.85	0.85	0.85	0.85	0.85	0.85	0.96	0.96	0.96
Adj. Flow (vph)	23	362	102	106	401	367	94	847	61	377	1167	10
RTOR Reduction (vph)	0	7	0	0	0	252	0	2	0	0	0	0
Lane Group Flow (vph)	23	457	0	106	401	115	94	906	0	377	1177	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	2.4	31.6		7.0	36.2	36.2	6.0	62.0		25.0	81.0	
Effective Green, g (s)	2.4	31.6		7.0	36.2	36.2	6.0	62.0		25.0	81.0	
Actuated g/C Ratio	0.02	0.22		0.05	0.26	0.26	0.04	0.44		0.18	0.57	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	30	402		88	476	405	75	807		313	1064	
v/s Ratio Prot	0.01	c0.25		c0.06	0.22		0.05	0.49		c0.21	c0.63	
v/s Ratio Perm						0.07						
v/c Ratio	0.77	1.14		1.20	0.84	0.28	1.25	1.12		1.20	1.11	
Uniform Delay, d1	69.3	55.0		67.3	50.0	42.3	67.8	39.8		58.3	30.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	72.7	87.7		160.9	12.7	0.4	186.6	71.2		118.3	61.3	
Delay (s)	142.0	142.7		228.2	62.7	42.7	254.4	111.0		176.6	91.6	
Level of Service	F	F		F	E	D	F	F		F	F	
Approach Delay (s)		142.7			74.4			124.5			112.3	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM Average Control Delay	110.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	141.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.92		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	1832		1770	1841		1770	1711		1770	1816	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1832		1770	1841		1770	1711		1770	1816	
Volume (vph)	5	643	80	90	583	50	90	70	83	41	50	10
Peak-hour factor, PHF	0.82	0.82	0.82	0.89	0.89	0.89	0.75	0.75	0.75	0.84	0.84	0.84
Adj. Flow (vph)	6	784	98	101	655	56	120	93	111	49	60	12
RTOR Reduction (vph)	0	7	0	0	4	0	0	73	0	0	11	0
Lane Group Flow (vph)	6	875	0	101	707	0	120	131	0	49	61	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.8	31.5		4.0	34.7		4.5	7.5		2.3	5.3	
Effective Green, g (s)	0.8	31.5		4.0	34.7		4.5	7.5		2.3	5.3	
Actuated g/C Ratio	0.01	0.51		0.07	0.57		0.07	0.12		0.04	0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	23	941		115	1042		130	209		66	157	
v/s Ratio Prot	0.00	c0.48		c0.06	c0.38		c0.07	c0.08		0.03	0.03	
v/s Ratio Perm												
v/c Ratio	0.26	0.93		0.88	0.68		0.92	0.63		0.74	0.39	
Uniform Delay, d1	30.0	13.9		28.4	9.4		28.2	25.6		29.2	26.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.0	15.2		47.8	1.8		55.6	5.8		35.8	1.6	
Delay (s)	35.9	29.1		76.2	11.1		83.8	31.4		65.0	28.1	
Level of Service	D	C		E	B		F	C		E	C	
Approach Delay (s)		29.1			19.2			50.8			43.0	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	61.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.87		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1837		1770	1845		1770	1629		1770	1765	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1837		1770	1845		1770	1629		1770	1765	
Volume (vph)	5	497	50	111	593	40	90	30	157	10	10	5
Peak-hour factor, PHF	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.75	0.75	0.75
Adj. Flow (vph)	5	546	55	123	659	44	101	34	176	13	13	7
RTOR Reduction (vph)	0	5	0	0	3	0	0	158	0	0	7	0
Lane Group Flow (vph)	5	596	0	123	700	0	101	52	0	13	13	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.6	22.3		4.2	25.9		3.4	5.0		0.6	2.2	
Effective Green, g (s)	0.6	22.3		4.2	25.9		3.4	5.0		0.6	2.2	
Actuated g/C Ratio	0.01	0.46		0.09	0.54		0.07	0.10		0.01	0.05	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	22	852		155	993		125	169		22	81	
v/s Ratio Prot	0.00	0.32		c0.07	c0.38		c0.06	c0.03		0.01	0.01	
v/s Ratio Perm												
v/c Ratio	0.23	0.70		0.79	0.70		0.81	0.31		0.59	0.16	
Uniform Delay, d1	23.5	10.2		21.5	8.3		22.0	20.0		23.6	22.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	2.5		23.7	2.3		30.5	1.0		36.0	1.0	
Delay (s)	28.7	12.8		45.2	10.6		52.5	21.0		59.6	23.0	
Level of Service	C	B		D	B		D	C		E	C	
Approach Delay (s)		12.9			15.7			31.2			37.4	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	48.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.99		1.00	0.85		1.00	0.85	
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	1845		1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1845		1770	1583		1770	1583	
Volume (vph)	164	420	30	20	910	62	5	0	5	12	0	24
Peak-hour factor, PHF	0.89	0.89	0.89	0.73	0.73	0.73	0.92	0.92	0.92	0.78	0.78	0.78
Adj. Flow (vph)	184	472	34	27	1247	85	5	0	5	15	0	31
RTOR Reduction (vph)	0	0	6	0	1	0	0	5	0	0	30	0
Lane Group Flow (vph)	184	472	28	27	1331	0	5	0	0	15	1	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	17.3	119.4	119.4	4.0	106.1		0.7	2.1		1.8	3.2	
Effective Green, g (s)	17.3	119.4	119.4	4.0	106.1		0.7	2.1		1.8	3.2	
Actuated g/C Ratio	0.12	0.83	0.83	0.03	0.74		0.00	0.01		0.01	0.02	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	214	1552	1319	49	1366		9	23		22	35	
v/s Ratio Prot	c0.10	0.25		0.02	c0.72		0.00	0.00		c0.01	c0.00	
v/s Ratio Perm			0.02									
v/c Ratio	0.86	0.30	0.02	0.55	0.97		0.56	0.00		0.68	0.02	
Uniform Delay, d1	61.8	2.7	2.0	68.8	17.3		71.1	69.6		70.5	68.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	27.3	0.1	0.0	12.7	18.3		58.1	0.1		62.1	0.2	
Delay (s)	89.2	2.8	2.0	81.5	35.7		129.3	69.6		132.6	68.7	
Level of Service	F	A	A	F	D		F	E		F	E	
Approach Delay (s)		25.8			36.6			99.4			89.6	
Approach LOS		C			D			F			F	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	143.3	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			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	40	432	10	20	912	30	30	0	20	5	0	5
Peak Hour Factor	0.92	0.92	0.92	0.75	0.75	0.75	0.73	0.73	0.73	0.50	0.50	0.50
Hourly flow rate (vph)	43	470	11	27	1216	40	41	0	27	10	0	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1256			480			1841	1871	475	1873	1857	1236
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1256			480			1841	1871	475	1873	1857	1236
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			98			19	100	95	79	100	95
cM capacity (veh/h)	554			1082			51	65	590	48	66	215

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	43	480	27	1256	68	20
Volume Left	43	0	27	0	41	10
Volume Right	0	11	0	40	27	10
cSH	554	1700	1082	1700	80	79
Volume to Capacity	0.08	0.28	0.02	0.74	0.85	0.25
Queue Length 95th (ft)	6	0	2	0	110	23
Control Delay (s)	12.1	0.0	8.4	0.0	152.6	65.5
Lane LOS	B		A		F	F
Approach Delay (s)	1.0		0.2		152.6	65.5
Approach LOS					F	F

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	171	241	647	1440	1000	245
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.93	0.93
Adj. Flow (vph)	194	274	735	1636	1075	263
RTOR Reduction (vph)	0	22	0	0	0	156
Lane Group Flow (vph)	194	252	735	1636	1075	107
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	4.3	19.6	15.3	41.1	21.8	21.8
Effective Green, g (s)	4.3	19.6	15.3	41.1	21.8	21.8
Actuated g/C Ratio	0.08	0.37	0.29	0.77	0.41	0.41
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	276	700	984	2724	1445	646
v/s Ratio Prot	c0.06	0.10	c0.21	0.46	c0.30	
v/s Ratio Perm		0.06				0.07
v/c Ratio	0.70	0.36	0.75	0.60	0.74	0.17
Uniform Delay, d1	23.9	12.3	17.3	2.6	13.4	10.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.9	0.3	3.1	0.4	2.1	0.1
Delay (s)	31.8	12.6	20.4	3.0	15.5	10.2
Level of Service	C	B	C	A	B	B
Approach Delay (s)	20.6			8.4	14.5	
Approach LOS	C			A	B	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1783		1770	1863	1583	1770	1858		1770	1858	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1783		1770	1863	1583	1770	1858		1770	1858	
Volume (vph)	40	302	120	111	226	428	30	1060	20	302	1100	20
Peak-hour factor, PHF	0.83	0.83	0.83	0.84	0.84	0.84	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	48	364	145	132	269	510	32	1128	21	321	1170	21
RTOR Reduction (vph)	0	9	0	0	0	184	0	1	0	0	0	0
Lane Group Flow (vph)	48	500	0	132	269	326	32	1148	0	321	1191	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	5.0	32.0		9.0	36.0	36.0	3.2	72.8		21.0	90.6	
Effective Green, g (s)	5.0	32.0		9.0	36.0	36.0	3.2	72.8		21.0	90.6	
Actuated g/C Ratio	0.03	0.21		0.06	0.24	0.24	0.02	0.48		0.14	0.60	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	59	378		106	445	378	38	897		246	1116	
v/s Ratio Prot	0.03	c0.28		c0.07	0.14		0.02	c0.62		c0.18	0.64	
v/s Ratio Perm						c0.21						
v/c Ratio	0.81	1.32		1.25	0.60	0.86	0.84	1.28		1.30	1.07	
Uniform Delay, d1	72.4	59.4		70.9	51.1	55.0	73.5	39.0		64.9	30.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	55.7	162.2		167.3	2.3	17.9	85.4	134.7		163.5	46.7	
Delay (s)	128.1	221.6		238.2	53.4	72.9	158.9	173.7		228.4	76.8	
Level of Service	F	F		F	D	E	F	F		F	E	
Approach Delay (s)		213.5			91.1			173.3			109.0	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	137.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	150.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	116.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.90		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	1850		1770	1849		1770	1684		1770	1816	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1850		1770	1849		1770	1684		1770	1816	
Volume (vph)	20	644	30	92	585	31	170	90	160	80	50	10
Peak-hour factor, PHF	0.94	0.94	0.94	0.84	0.84	0.84	0.89	0.89	0.89	0.85	0.85	0.85
Adj. Flow (vph)	21	685	32	110	696	37	191	101	180	94	59	12
RTOR Reduction (vph)	0	2	0	0	2	0	0	93	0	0	11	0
Lane Group Flow (vph)	21	715	0	110	731	0	191	188	0	94	60	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.4	29.6		5.3	33.5		9.0	11.6		3.6	6.2	
Effective Green, g (s)	1.4	29.6		5.3	33.5		9.0	11.6		3.6	6.2	
Actuated g/C Ratio	0.02	0.45		0.08	0.51		0.14	0.18		0.05	0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	37	828		142	937		241	296		96	170	
v/s Ratio Prot	0.01	c0.39		c0.06	c0.40		c0.11	c0.11		0.05	0.03	
v/s Ratio Perm												
v/c Ratio	0.57	0.86		0.77	0.78		0.79	0.63		0.98	0.35	
Uniform Delay, d1	32.1	16.4		29.8	13.3		27.6	25.3		31.2	28.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	18.4	9.3		22.7	4.2		16.2	4.4		84.1	1.3	
Delay (s)	50.5	25.7		52.5	17.5		43.8	29.7		115.3	29.3	
Level of Service	D	C		D	B		D	C		F	C	
Approach Delay (s)		26.4			22.0			35.4			78.3	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM Average Control Delay	30.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	66.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.86		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	1818		1770	1851		1770	1604		1770	1811	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1818		1770	1851		1770	1604		1770	1811	
Volume (vph)	10	674	130	135	478	20	120	20	241	30	20	5
Peak-hour factor, PHF	0.93	0.93	0.93	0.88	0.88	0.88	0.89	0.89	0.89	0.91	0.91	0.91
Adj. Flow (vph)	11	725	140	153	543	23	135	22	271	33	22	5
RTOR Reduction (vph)	0	7	0	0	1	0	0	245	0	0	5	0
Lane Group Flow (vph)	11	858	0	153	565	0	135	48	0	33	22	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.6	41.3		7.2	47.9		7.1	7.0		1.9	1.8	
Effective Green, g (s)	0.6	41.3		7.2	47.9		7.1	7.0		1.9	1.8	
Actuated g/C Ratio	0.01	0.56		0.10	0.65		0.10	0.10		0.03	0.02	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	14	1023		174	1208		171	153		46	44	
v/s Ratio Prot	0.01	c0.47		c0.09	0.30		c0.08	c0.03		0.02	0.01	
v/s Ratio Perm												
v/c Ratio	0.79	0.84		0.88	0.47		0.79	0.31		0.72	0.50	
Uniform Delay, d1	36.3	13.3		32.7	6.4		32.4	31.0		35.5	35.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	130.6	6.1		35.9	0.3		21.1	1.2		41.5	8.8	
Delay (s)	166.9	19.4		68.6	6.7		53.5	32.1		77.0	44.1	
Level of Service	F	B		E	A		D	C		E	D	
Approach Delay (s)		21.3			19.8			38.9			62.2	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM Average Control Delay	25.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	73.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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		1.00	0.85		1.00	0.85	
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	1857		1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	1857		1770	1583		1770	1583	
Volume (vph)	35	900	5	5	570	12	25	0	20	47	0	103
Peak-hour factor, PHF	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.70	0.70	0.70
Adj. Flow (vph)	43	1098	6	5	620	13	27	0	22	67	0	147
RTOR Reduction (vph)	0	0	2	0	1	0	0	21	0	0	135	0
Lane Group Flow (vph)	43	1098	4	5	632	0	27	1	0	67	12	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	1.5	42.3	42.3	0.4	41.2		1.2	3.1		3.4	5.3	
Effective Green, g (s)	1.5	42.3	42.3	0.4	41.2		1.2	3.1		3.4	5.3	
Actuated g/C Ratio	0.02	0.65	0.65	0.01	0.63		0.02	0.05		0.05	0.08	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	41	1209	1027	11	1173		33	75		92	129	
v/s Ratio Prot	c0.02	c0.59		0.00	0.34		0.02	0.00		c0.04	c0.01	
v/s Ratio Perm			0.00									
v/c Ratio	1.05	0.91	0.00	0.45	0.54		0.82	0.01		0.73	0.09	
Uniform Delay, d1	31.9	9.8	4.0	32.3	6.7		31.9	29.6		30.4	27.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	155.3	10.0	0.0	27.0	0.5		84.2	0.1		24.8	0.3	
Delay (s)	187.2	19.8	4.0	59.3	7.2		116.1	29.7		55.2	28.0	
Level of Service	F	B	A	E	A		F	C		E	C	
Approach Delay (s)		26.0			7.6			77.3			36.5	
Approach LOS		C			A			E			D	

Intersection Summary			
HCM Average Control Delay	22.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	65.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	917	30	50	542	5	10	0	20	20	0	20
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.68	0.68	0.68	0.56	0.56	0.56
Hourly flow rate (vph)	6	1146	38	55	596	5	15	0	29	36	0	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	601			1184			1919	1888	1165	1896	1904	598
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	601			1184			1919	1888	1165	1896	1904	598
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			91			66	100	88	17	100	93
cM capacity (veh/h)	976			590			44	63	236	43	62	502

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	6	1184	55	601	44	71
Volume Left	6	0	55	0	15	36
Volume Right	0	38	0	5	29	36
cSH	976	1700	590	1700	96	79
Volume to Capacity	0.01	0.70	0.09	0.35	0.46	0.91
Queue Length 95th (ft)	0	0	8	0	49	118
Control Delay (s)	8.7	0.0	11.7	0.0	71.3	167.6
Lane LOS	A		B		F	F
Approach Delay (s)	0.0		1.0		71.3	167.6
Approach LOS					F	F

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	3539	3539	1583
Volume (vph)	203	734	391	1260	1520	191
Peak-hour factor, PHF	0.80	0.80	0.93	0.93	0.91	0.91
Adj. Flow (vph)	254	918	420	1355	1670	210
RTOR Reduction (vph)	0	5	0	0	0	80
Lane Group Flow (vph)	254	913	420	1355	1670	130
Turn Type		pm+ov	Prot			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	9.0	56.0	47.0	113.0	62.0	62.0
Effective Green, g (s)	9.0	56.0	47.0	113.0	62.0	62.0
Actuated g/C Ratio	0.07	0.43	0.36	0.87	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	238	731	1241	3076	1688	755
v/s Ratio Prot	0.07	c0.45	0.12	0.38	c0.47	
v/s Ratio Perm		0.12				0.08
v/c Ratio	1.07	1.25	0.34	0.44	0.99	0.17
Uniform Delay, d1	60.5	37.0	30.2	1.8	33.7	19.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	77.3	123.2	0.2	0.1	19.2	0.1
Delay (s)	137.8	160.2	30.4	1.9	52.8	19.5
Level of Service	F	F	C	A	D	B
Approach Delay (s)	155.3			8.6	49.1	
Approach LOS	F			A	D	

Intersection Summary			
HCM Average Control Delay	60.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	94.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX H

QUEUE LENGTH CALCULATION WORKSHEETS
EAST NATOMA STREET/PRISON ROAD

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		100	150		0	150		0	85		85
Storage Lanes	1		1	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2185			2041			1206			1194	
Travel Time (s)		49.7			46.4			27.4			27.1	
Volume (vph)	124	338	26	18	688	42	4	0	2	6	0	18
Peak Hour Factor	0.89	0.89	0.89	0.73	0.73	0.73	0.92	0.92	0.92	0.78	0.78	0.78
Lane Group Flow (vph)	139	380	29	25	1000	0	4	2	0	8	23	0
v/c Ratio	0.52	0.23	0.02	0.19	0.75		0.04	0.00		0.08	0.05	
Control Delay	36.7	3.6	1.9	40.3	16.7		40.0	0.0		40.8	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	36.7	3.6	1.9	40.3	16.7		40.0	0.0		40.8	0.2	
Queue Length 50th (ft)	50	0	0	9	184		2	0		3	0	
Queue Length 95th (ft)	126	123	8	31	490		13	0		17	0	
Internal Link Dist (ft)		2105			1961			1126			1114	
Turn Bay Length (ft)	200		100	150			150			85		
Base Capacity (vph)	379	1630	1389	131	1339		105	682		105	459	
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	0.37	0.23	0.02	0.19	0.75		0.04	0.00		0.08	0.05	

Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	85		85
Storage Lanes	1		1	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2185			2041			1334			1194	
Travel Time (s)		49.7			46.4			30.3			27.1	
Volume (vph)	23	717	5	3	468	7	24	0	16	32	0	75
Peak Hour Factor	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.70	0.70	0.70
Lane Group Flow (vph)	28	874	6	3	517	0	26	17	0	46	107	0
v/c Ratio	0.12	0.62	0.00	0.02	0.38		0.13	0.04		0.18	0.18	
Control Delay	26.3	10.5	3.8	28.0	8.0		27.7	0.2		24.9	0.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.3	10.5	3.8	28.0	8.0		27.7	0.2		24.9	0.7	
Queue Length 50th (ft)	5	86	0	1	37		5	0		9	0	
Queue Length 95th (ft)	30	#366	4	8	198		32	0		36	0	
Internal Link Dist (ft)		2105			1961			1254			1114	
Turn Bay Length (ft)	200									85		
Base Capacity (vph)	237	1447	1231	192	1402		195	460		254	604	
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	0.12	0.60	0.00	0.02	0.37		0.13	0.04		0.18	0.18	

Intersection Summary

Area Type: Other

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		100	150		0	150		0	85		85
Storage Lanes	1		1	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2185			2041			1206			1194	
Travel Time (s)		49.7			46.4			27.4			27.1	
Volume (vph)	158	338	26	18	688	54	4	0	2	8	0	22
Peak Hour Factor	0.89	0.89	0.89	0.73	0.73	0.73	0.92	0.92	0.92	0.78	0.78	0.78
Lane Group Flow (vph)	178	380	29	25	1016	0	4	2	0	10	28	0
v/c Ratio	0.63	0.23	0.02	0.22	0.83		0.04	0.00		0.11	0.07	
Control Delay	40.8	3.5	1.9	42.3	20.1		41.0	0.0		42.5	0.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.8	3.5	1.9	42.3	20.1		41.0	0.0		42.5	0.3	
Queue Length 50th (ft)	69	0	0	10	219		2	0		4	0	
Queue Length 95th (ft)	158	123	8	31	505		13	0		19	0	
Internal Link Dist (ft)		2105			1961			1126			1114	
Turn Bay Length (ft)	200		100	150			150			85		
Base Capacity (vph)	351	1630	1389	113	1230		90	665		90	442	
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	0.51	0.23	0.02	0.22	0.83		0.04	0.00		0.11	0.06	

Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	85		85
Storage Lanes	1		1	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2185			2041			1334			1194	
Travel Time (s)		49.7			46.4			30.3			27.1	
Volume (vph)	28	717	5	3	468	9	24	0	16	39	0	98
Peak Hour Factor	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.70	0.70	0.70
Lane Group Flow (vph)	34	874	6	3	519	0	26	17	0	56	140	0
v/c Ratio	0.14	0.62	0.00	0.02	0.38		0.13	0.04		0.22	0.24	
Control Delay	26.4	10.5	3.8	28.0	8.0		27.7	0.2		26.8	0.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.4	10.5	3.8	28.0	8.0		27.7	0.2		26.8	0.9	
Queue Length 50th (ft)	7	86	0	1	38		5	0		11	0	
Queue Length 95th (ft)	34	#366	4	8	199		32	0		42	0	
Internal Link Dist (ft)		2105			1961			1254			1114	
Turn Bay Length (ft)	200									85		
Base Capacity (vph)	237	1447	1231	192	1401		195	454		254	604	
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	0.14	0.60	0.00	0.02	0.37		0.13	0.04		0.22	0.23	

Intersection Summary

Area Type: Other

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		100	150		0	150		0	85		85
Storage Lanes	1		1	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2185			2041			1206			1194	
Travel Time (s)		49.7			46.4			27.4			27.1	
Volume (vph)	130	420	30	20	910	50	5	0	5	10	0	20
Peak Hour Factor	0.89	0.89	0.89	0.73	0.73	0.73	0.92	0.92	0.92	0.78	0.78	0.78
Lane Group Flow (vph)	146	472	34	27	1315	0	5	5	0	13	26	0
v/c Ratio	0.73	0.29	0.02	0.33	0.92		0.10	0.01		0.24	0.09	
Control Delay	79.4	3.1	1.0	76.3	25.9		74.6	0.0		79.2	0.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	79.4	3.1	1.0	76.3	25.9		74.6	0.0		79.2	0.6	
Queue Length 50th (ft)	128	81	0	24	888		5	0		12	0	
Queue Length 95th (ft)	212	154	7	48	860		20	0		32	0	
Internal Link Dist (ft)		2105			1961			1126			1114	
Turn Bay Length (ft)	200		100	150			150			85		
Base Capacity (vph)	244	1651	1407	89	1435		50	587		55	313	
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	0.60	0.29	0.02	0.30	0.92		0.10	0.01		0.24	0.08	

Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	85		85
Storage Lanes	1		1	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2185			2041			1334			1194	
Travel Time (s)		49.7			46.4			30.3			27.1	
Volume (vph)	30	900	5	5	570	10	25	0	20	40	0	80
Peak Hour Factor	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.70	0.70	0.70
Lane Group Flow (vph)	37	1098	6	5	631	0	27	22	0	57	114	0
v/c Ratio	0.17	0.72	0.00	0.03	0.43		0.14	0.06		0.24	0.21	
Control Delay	41.9	10.7	2.6	45.8	6.9		43.4	0.3		39.8	0.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	41.9	10.7	2.6	45.8	6.9		43.4	0.3		39.8	0.9	
Queue Length 50th (ft)	10	168	0	1	60		8	0		15	0	
Queue Length 95th (ft)	55	563	3	16	267		48	0		63	0	
Internal Link Dist (ft)		2105			1961			1254			1114	
Turn Bay Length (ft)	200									85		
Base Capacity (vph)	230	1599	1360	160	1558		197	398		270	603	
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	0.16	0.69	0.00	0.03	0.41		0.14	0.06		0.21	0.19	

Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		100	150		0	150		0	85		85
Storage Lanes	1		1	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2185			2041			1206			1194	
Travel Time (s)		49.7			46.4			27.4			27.1	
Volume (vph)	164	420	30	20	910	62	5	0	5	12	0	24
Peak Hour Factor	0.89	0.89	0.89	0.73	0.73	0.73	0.92	0.92	0.92	0.78	0.78	0.78
Lane Group Flow (vph)	184	472	34	27	1332	0	5	5	0	15	31	0
v/c Ratio	0.82	0.29	0.02	0.33	0.94		0.10	0.01		0.28	0.10	
Control Delay	86.7	3.1	1.0	77.0	30.4		74.8	0.0		81.8	0.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	86.7	3.1	1.0	77.0	30.4		74.8	0.0		81.8	0.7	
Queue Length 50th (ft)	165	81	0	24	1013		5	0		14	0	
Queue Length 95th (ft)	#299	154	7	48	890		20	0		35	0	
Internal Link Dist (ft)		2105			1961			1126			1114	
Turn Bay Length (ft)	200		100	150			150			85		
Base Capacity (vph)	244	1651	1407	88	1410		50	584		54	312	
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	0.75	0.29	0.02	0.31	0.94		0.10	0.01		0.28	0.10	

Intersection Summary

Area Type: Other

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		0	85		85
Storage Lanes	1		1	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2185			2041			1334			1194	
Travel Time (s)		49.7			46.4			30.3			27.1	
Volume (vph)	35	900	5	5	570	12	25	0	20	47	0	103
Peak Hour Factor	0.82	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.70	0.70	0.70
Lane Group Flow (vph)	43	1098	6	5	633	0	27	22	0	67	147	0
v/c Ratio	0.22	0.78	0.01	0.04	0.47		0.16	0.06		0.30	0.27	
Control Delay	42.6	13.1	2.6	45.8	7.8		43.6	0.3		41.3	1.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	42.6	13.1	2.6	45.8	7.8		43.6	0.3		41.3	1.3	
Queue Length 50th (ft)	12	168	0	1	60		8	0		18	0	
Queue Length 95th (ft)	61	563	3	16	268		48	0		72	0	
Internal Link Dist (ft)		2105			1961			1254			1114	
Turn Bay Length (ft)	200									85		
Base Capacity (vph)	204	1543	1312	141	1501		174	381		242	590	
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	0.21	0.71	0.00	0.04	0.42		0.16	0.06		0.28	0.25	

Intersection Summary	
Area Type:	Other