EXHIBIT A.C.

Final Report

TOWN OF MORAGA
LOCAL TRANSPORTATION MITIGATION FEE STUDY

Prepared for:

Town of Moraga

August 2007

FEHR & PEERS
TRANSPORTATION CONSULTANTS

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1. INTRODUCTION

BACKGROUND

Pursuant to the *Mitigation Fee Act*, California Government Code Section 66000, et seq. (also known as AB 1600), a local agency is authorized to charge a fee to development applicants in connection with approval of a development project for the purpose of defraying all or a portion of the costs of public facilities related to the development project. The capital improvements funded through a fee program are typically those required to mitigate the traffic impacts of new development within the study area. Specifically, the purpose of the fee is to maintain adequate level of service standards at intersections throughout the study area. The fee is not imposed to improve or correct deficiencies in baseline service levels, or to mitigate the impacts of regional (through) traffic.

Transportation impact fees are commonly collected in many jurisdictions in the Bay Area and throughout California to aid in financing transportation infrastructure required by new development. Currently, the Town of Moraga does not collect a local transportation-related impact fees for new developments.

PURPOSE

The purpose of this study is to provide the technical basis for a comprehensive Town of Moraga Local Transportation Mitigation Fee (LTMF) program. The focus of the program is to support an overall transportation system in Moraga that serves the expected future demand, based on changes in local land use projections, planned and approved development projects, and associated changes to capital improvements and cost estimates.

This report documents the analytical approach for determining the nexus between the fees and the local impact created by anticipated development in Moraga. A traffic and fair-share cost analysis is conducted to equitably distribute the costs of the necessary improvements to development that causes the impacts, per the provisions of AB 1600. The most up-to-date versions of the available analytical tools and techniques have been used to ensure the highest level of consistency with current standards.

USE OF THE LOCAL TRANSPORTATION MITIGATION FEE

AB 1600 requires that mitigation fee programs comply with certain basic requirements, including:

- Identifying the purpose of the fee
- Identifying how the fee will be used and the facilities to be funded through the fee
- Determining a reasonable relationship between the fee's use and the type of development on which the fee is imposed
- Determining a reasonable relationship between the need for the public facility and the type of development on which the fee is imposed

- Determining a reasonable relationship between the amount of the fee and the cost of the public facility (or portion of facility) attributable to new development

These items are addressed throughout this study and are summarized in the final chapter.

STUDY AREA

As shown on Figure 1, the study area includes the entire Town of Moraga. The goal of the study is to calculate a fee that would be collected on new development in all parts of the Town.

STUDY PROCESS

This study was developed under the direction of Town of Moraga staff. After review and public hearing, the Town Council will consider approval of the study and adoption of a fee schedule.

ORGANIZATION OF THE REPORT

This report contains a total of six chapters including this introductory chapter.

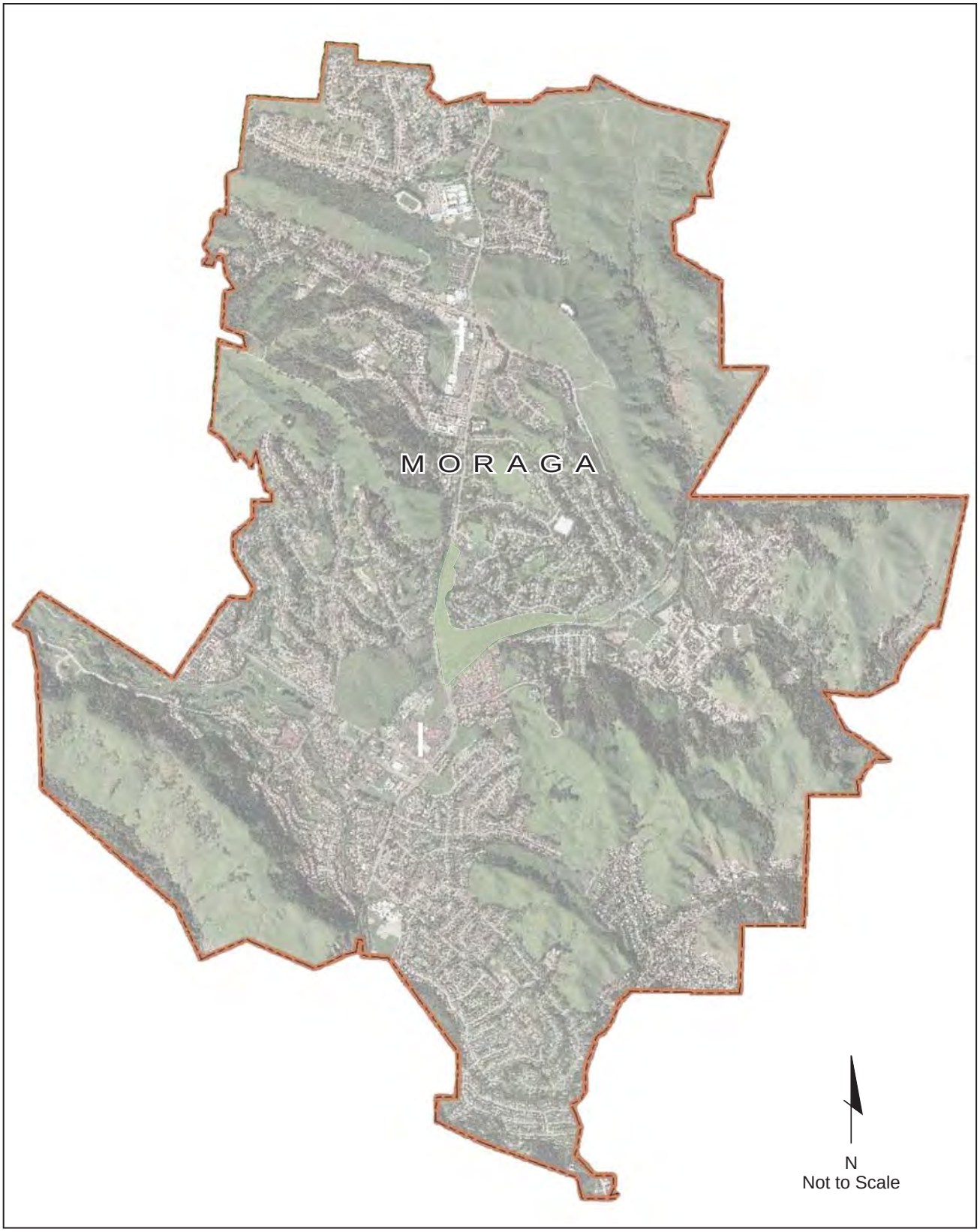
- *Chapter 2* – Fee Program Background provides an overview of fee programs, the factors considered in this analysis, and describes the projects proposed to be included in the LTMF program.

- *Chapter 3* – Analysis Methodology describes the methods used in conducting the technical analysis necessary to establish the nexus.

- *Chapter 4* – Analysis Results describes the results of the nexus analysis.

- *Chapter 5* – LTMF Program Funding Considerations discusses the effect of the impact fees on the financing of the Town's transportation improvement program.

- *Chapter 6* – Program Summary provides a brief summary of the study results presented here and reviews the requirements of AB 1600.



Town of Moraga Local Transportation Mitigation Fee Study

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STUDY AREA

August 2007
WC06-2362_1

Figure 1

2. FEE PROGRAM BACKGROUND

The nexus analysis presented in the subsequent chapters is based on recent interest in financing improvement projects through a fee program. The improvement projects to be considered in the proposed fee program include:

- Signalization of the Moraga Road/Ascot Drive intersection
- Signalization of the Moraga Road/Corliss Drive intersection

The improvements included in this fee study have been identified based on the analysis presented in Chapter 4 of this report, which considers intersection capacity standards outlined in the *Town of Moraga General Plan* (June 2002).

Other improvements alternatives were considered at these locations. One option was to increase the capacity of each intersection by adding traffic lanes. There is no available right-of-way to provide additional lanes at either intersection. Another alternative considered was to prohibit left turning traffic by installing median islands that would restrict left turn movements at the intersections. Restricting left turn movements at either intersection would significantly reduce the mobility of the residents who live in the Ascot Drive or Corliss Drive neighborhoods, and would result in the need for u-turns at adjacent intersections on Moraga Road. There is insufficient right-of-way to widen Moraga Road to accommodate u-turn maneuvers. Other alternatives such as high visibility crosswalks and curb-extensions would improve the level of safety at the intersections, but would not resolve the issue of insufficient capacity as defined in the *Town of Moraga General Plan* (June 2002). As a result, the installation of traffic signals was determined to be the most cost effective solution to increase the capacity at the two locations.

Although not required by law, it is recommended that prior to the installation of a traffic signal, a complete traffic signal warrant analysis be conducted to verify that the location in question meets Federal Highway Administration *Manual on Uniform Traffic Control Devices* (MUTCD) signal warrants. The Town of Moraga should undertake regular monitoring of actual traffic conditions and accident data, and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.

All public roads within the Town of Moraga's jurisdiction are considered part of the local transportation network, and are thus eligible for funding through the LTMF program. However, while all facilities in the local transportation network are eligible for LTMF funding, not all improvements on all facilities will be part of the LTMF program. The projects selected for inclusion in the LTMF program are those that improve city-wide transportation conditions by serving traffic from multiple development areas, typically on major or minor arterial streets.

The nexus analysis presented in the following chapters calculates the fees that could be collected to support these projects.

3. ANALYSIS METHODOLOGY

This chapter describes the methodology used to determine the nexus between the impact from new development in Moraga and the needed improvements. The focus of the fee program is on developing an overall transportation system that will accommodate the Town's expected future traffic demand.

The technical analysis for this study was completed through a series of five steps. Each is listed below, along with a brief description. The next chapter describes how these steps were applied to the Town of Moraga and the results of the fee calculations.

Step 1 – Summarize Capital Improvements and Estimate Costs

As described in Chapter 4, a set of transportation projects necessary to provide the capacity to accommodate future growth in the Town were determined based on the results of an intersection capacity analysis for the current and future conditions. Estimated costs for each of the improvements were developed by Fehr & Peers. A three percent fee was included in the estimated costs to cover administrative costs of implementing the fee program.

Step 2 – Identify Existing Deficiencies on Local Network

By definition, a fee program charges fees to new development to fund transportation improvements necessary to serve the demand and impacts generated by that new development. The following procedure was used to determine if any of the transportation projects identified in Step 1 are on facilities that experience current traffic problems, as defined by the Town.

New traffic data was collected at several intersections around the Town for the AM (7 to 9 AM) and PM (4 to 6 PM) peak periods. The resulting intersection turning movement data was used to evaluate the existing level of service (LOS) at intersections that would be affected by the planned transportation improvements in the Town's LTMF program. These results were compared to the Town's LOS thresholds to determine if any of the study intersections have existing deficiencies.

Intersections that did not meet the Town's standards were flagged as having an existing deficiency.

Step 3 – Summarize the Amount of New Development Expected in Moraga

A localized traffic model was used in this study to analyze the transportation effects of new development. The model is based upon forecasts of residential and commercial growth provided by the Town. These forecasts were converted into the units necessary for fee calculation, known as Equivalent Dwelling Units (EDUs).

The concept of EDUs is commonly used in fee studies to account for the fact that different development types generate traffic with different characteristics and with different levels of impact on the local transportation system. For purposes of this LTMF, we applied a set of EDU conversion factors, based on those used in other recently-completed nexus studies, which account for peak hour trip generation and the effects of pass-by trips. The EDU conversion process accounts for these differences in impact on the transportation system. All EDUs are normalized to the single-family residential rate.

Step 4 – Calculate Project Costs Attributable to New Development

For improvement projects on facilities that are not subject to an existing deficiency (as defined in Step 2), the need for the improved facility is generated by new development rather than by existing transportation problems. Therefore, all of the estimated project costs could potentially be included in the fee program.

For projects on facilities that have been identified as experiencing existing deficiencies, the cost of the improvement would be divided between existing development and new development. The cost share attributable to new development, and therefore eligible for inclusion in the fee program, would be calculated as follows:

1. Quantify the existing deficiency by determining the current traffic volume that exceeds the available capacity. For example, if a facility with a theoretical capacity of 2,000 vehicles is currently carrying 2,200 vehicles, the existing deficiency would be calculated as 2,200 – 2,000 = 200. The theoretical capacity was based on the maximum volume that would meet the applicable LOS standard.

2. Determine the future traffic growth by subtracting the current traffic volumes from the forecasted future traffic volumes. For example, if the future demand on the facility is projected to be 2,500 vehicles, the future traffic growth would be calculated as 2,500 – 2,200 = 300.

3. Define the "overall benefit" of the project as the correction of the existing deficiency (from number 1 above) plus the accommodation of future growth (from number 2). In our example, the overall benefit of improving the road would be to correct the existing deficiency of 200 vehicles and to accommodate the future growth of 300 vehicles, for a total benefit of 500.

4. Calculate new development's share of the benefit as the result of number 2 divided by number 3. In this case, the share of the benefit to new development would be 60%, or 300 divided by 500. Therefore, 60% of the project cost would be included in the fee program. The remaining 40% of the project cost would need to be funded through other sources.

Step 5 – Determine Fee Amounts

The total cost to be contributed by new development (Step 4) was then divided by the total number of new EDUs (Step 3) to determine the appropriate fee amount for each land use category.

4. ANALYSIS RESULTS

This chapter summarizes the results of the nexus analysis steps outlined in Chapter 3. Further detail on technical calculations is provided in the Appendix.

Step 1 – Summarize Capital Improvements and Estimate Costs

A comprehensive set of transportation projects that would provide the capacity estimated to accommodate future growth in the Town was determined based on the results of an intersection capacity analysis for the current and future conditions. Table 1 provides a list of the improvements, along with estimated costs provided by the Town.

TABLE 1
2006 LTMF - PROJECT LIST

Project	Description	Total Cost
Traffic Signal Projects		
Moraga Road at Ascot Drive	Signalize Moraga Road at Ascot Drive, including curb, gutter, and median improvements	$529,800
Moraga Road at Corliss Drive	Signalize Moraga Road at Corliss Drive, including curb, gutter, and median improvements	$450,100
	Total	$979,900

Source: Fehr & Peers, 2007.

Step 2 – Identify Existing Deficiencies on Roadway Network

The traffic analysis determined if deficiencies exist at locations with the planned roadway improvements listed on Table 1 above.

For Town of Moraga routes, acceptable operations at signalized intersections are defined as LOS C or better based on the *Town of Moraga General Plan* (June 2002). For unsignalized intersections, acceptable operations are defined as LOS C or better for the overall intersection and LOS E or better for the side-street approaches, as outlined in the *Town of Moraga Available Capacity Study* (Robert L. Harrison Transportation Planning, January 1999).

Traffic counts at a number of study intersections throughout the Town were assembled as described in Chapter 3, and the results of the level of service analysis are shown in Table 2. All intersections currently operate within acceptable standards except two unsignalized intersections with side-street levels that operate at LOS F. These intersections include:

- *Moraga Road at Ascot Drive* – the side street operates at LOS F during both the weekday AM and PM peak hours.

- *Moraga Road at Corliss Drive* – the side street operates at LOS F during both the weekday AM and PM peak hours.

TABLE 2
EXISTING CONDITIONS LEVEL OF SERVICE ANALYSIS

ID	Intersection	Control[1]	AM Peak Hour		PM Peak Hour		Existing Deficiency?
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	
1	Moraga Way/Moraga Road	Signal	26	C	34	C	No
2	Campolindo Drive/Moraga Road	Signal	22	C	15	B	No
3	Rheem Boulevard/Moraga Road	Signal	24	C	23	C	No
4	Moraga Road/St. Mary's Road (South)	Signal	13	B	12	B	No
5	Bollinger Canyon Road/St. Mary's Road	SSS	1 (20)	A (C)	1 (17)	A (C)	No
6	Rheem Boulevard/St. Mary's Road	SSS	4 (20)	A (C)	5 (25)	A (C)	No
7	St. Mary's Parkway/St. Mary's Road	SSS	3 (14)	A (B)	6 (14)	A (B)	No
8	Center Street/Rheem Boulevard	Signal	11	B	11	B	No
9	Moraga Road/Ascot Drive	SSS	24 (**>50**)	C (**F**)	5 (**>50**)	A (**F**)	**Yes**
10	Moraga Road/Donald Drive	Signal	13	B	7	A	No
11	Moraga Road/Corliss Drive	SSS	12 (**>50**)	B (**F**)	8 (**>50**)	A (**F**)	**Yes**
12	Moraga Way/St.Andrews Drive	Signal	12	B	12	B	No
13	Moraga Way/School Street	Signal	10	A	11	B	No

Notes: **Bold** = Exceeds acceptable Town level of service standards

1. SSS = Side-Street Stop
2. For signalized intersections information presented is intersection average control delay. For unsignalized intersections, information presented is intersection average control delay (followed by worst approach delay in parentheses) expressed in seconds per vehicle.
3. For unsignalized intersections, information presented is intersection average LOS (followed by worst approach LOS in parentheses).

Source: Fehr & Peers, 2007.

Step 3 – Summarize the Amount of New Development Expected in Moraga

Chapter 3 described the sources of information used to estimate the amount of new development expected in Moraga. This section provides additional detail on how those development projections were derived.

The Town provided forecasts of future development including 624 single-family units, 70 multi-family units, 200 senior-housing units, 70,000 square feet of commercial space, and an 80-unit hotel.

TABLE 3A
CUMULATIVE LEVEL OF SERVICE ANALYSIS – AM PEAK HOUR

ID	Intersection	Control[1]	Without Improvements		With Improvements	
			Delay[2]	LOS[3]	Delay[2]	LOS[3]
1	Moraga Way/Moraga Road	Signal	22	C	22	C
2	Campolindo Drive/Moraga Road	Signal	24	C	24	C
3	Rheem Boulevard/Moraga Road	Signal	24	C	24	C
4	Moraga Road/St. Mary's Road (South)	Signal	15	B	15	B
5	Bollinger Canyon Road/St. Mary's Road	SSS	2 (23)	A (C)	2 (23)	A (C)
6	Rheem Boulevard/St. Mary's Road	SSS	6 (31)	A (D)	6 (31)	A (D)
7	St. Mary's Parkway/St. Mary's Road	SSS	3 (15)	A (B)	3 (15)	A (B)
8	Center Street/Rheem Boulevard	Signal	11	B	11	B
9	Moraga Road/Ascot Drive	SSS	**35** (**>50**)	**D** (**F**)	7	A
10	Moraga Road/Donald Drive	Signal	13	B	13	B
11	Moraga Road/Corliss Drive	SSS	21 (**>50**)	C (**F**)	7	A
12	Moraga Way/St.Andrews Drive	Signal	13	B	13	B
13	Moraga Way/School Street	Signal	10	A	10	A

Notes: **Bold** = Exceeds acceptable Town level of service standards

1. SSS = Side-Street Stop
2. For signalized intersections information presented is intersection average control delay. For unsignalized intersections, information presented is intersection average control delay (followed by worst approach delay in parentheses) expressed in seconds per vehicle.
3. For unsignalized intersections, information presented is intersection average LOS (followed by worst approach LOS in parentheses).

Source: Fehr & Peers, 2007.

For the analysis of future traffic conditions, peak hour trips from new development in the Town were generated using rates from two sources. The peak hour trip generation for the residential (single-family) land use was based on trip generation rates presented in the *Town of Moraga Available Capacity Study* (Robert L. Harrison Transportation Planning, January 1999). The peak hour trip generation for all other land uses was based on rates presented in the Institute of Transportation Engineers (ITE) *Trip Generation, 7th Edition*. The trips generated by all future growth were added to the existing traffic volumes. The purpose of this analysis was to confirm that traffic from the new developments in the Town would cause the need for improvements at the study intersections; in order to isolate the effects of new local development, no growth in traffic from outside Town was assumed.

The resulting future (or cumulative) peak hour traffic volumes were analyzed at each of the study intersections, both with and without the specified improvements, and the results are shown in Tables 3A and 3B. The results indicate that, with the addition of traffic from the new development in Town, all signalized intersections would operate at acceptable levels of service. The unsignalized intersections of Moraga Road with Ascot Drive and Corliss Drive would operate poorly, with side-street levels of service worse than LOS E.

These two locations are considered for improvements as part of the Fee Program. When the improvement measures were applied, these two intersections would operate at LOS C or better, which is consistent with the Town's standards. Thus, the capital improvements identified for inclusion in the LTMF will mitigate the traffic effects of new development on these facilities.

As described in Chapter 3, the land use forecasts were converted to EDUs to account for the fact that different development types generate traffic with different characteristics and levels of impact on the Town's transportation system. Table 4 presents the conversion factors used to calculate EDUs in this study. Please note that these factors are consistent with those used in other recent fee studies completed by Fehr & Peers and reflect the most recent trip generation information available from the national reference source, the Institute of Transportation Engineers (ITE). The results of the EDU conversion are presented in Table 5.

TABLE 3B
CUMULATIVE LEVEL OF SERVICE ANALYSIS – PM PEAK HOUR

ID	Intersection	Control[1]	Without Improvements		With Improvements	
			Delay[2]	LOS[3]	Delay[2]	LOS[3]
1	Moraga Way/Moraga Road	Signal	29	C	29	C
2	Campolindo Drive/Moraga Road	Signal	16	B	16	B
3	Rheem Boulevard/Moraga Road	Signal	24	C	24	C
4	Moraga Road/St. Mary's Road (South)	Signal	15	B	15	B
5	Bollinger Canyon Road/St. Mary's Road	SSS	2 (19)	A (C)	2 (19)	A (C)
6	Rheem Boulevard/St. Mary's Road	SSS	8 (42)	A (E)	8 (42)	A (E)
7	St. Mary's Parkway/St. Mary's Road	SSS	6 (15)	A (B)	6 (15)	A (B)
8	Center Street/Rheem Boulevard	Signal	12	B	12	B
9	Moraga Road/Ascot Drive	SSS	8 (**>50**)	A (**F**)	5	A
10	Moraga Road/Donald Drive	Signal	7	A	7	A
11	Moraga Road/Corliss Drive	SSS	16 (**>50**)	C (**F**)	7	A
12	Moraga Way/St.Andrews Drive	Signal	13	B	13	B
13	Moraga Way/School Street	Signal	12	B	12	B

Notes: **Bold** = Exceeds acceptable Town level of service standards

1. SSS = Side-Street Stop
2. For signalized intersections information presented is intersection average control delay. For unsignalized intersections, information presented is intersection average control delay (followed by worst approach delay in parentheses) expressed in seconds per vehicle.
3. For unsignalized intersections, information presented is intersection average LOS (followed by worst approach LOS in parentheses).

Source: Fehr & Peers, 2007.

TABLE 4
EDU CONVERSION FACTORS

Land Use Category	Unit	Peak Hour Trip Rate	% New Trips[3]	EDU per Unit
Single-Family	DU	1.23[1]	100	1.00
Multi-Family	DU	0.62[2]	100	0.50
Senior Housing	DU	0.26[2]	100	0.21
Commercial	1,000 SF	3.75[2]	50	1.52
Office	1,000 SF	1.49[2]	65	0.79
Hotel	Rooms	0.59[2]	60	0.29

Notes:

1. *Town of Moraga Available Capacity Study,* Robert L Harrison Transportation Planners, 1999.
2. *ITE Trip Generation*, (7th Edition), 2003.
3. *SANDAG Brief Guide of Vehicular Traffic Generation Rates*, April 2002.

Source: Fehr & Peers, 2007.

TABLE 5
GROWTH IN EDUS

Land Use Category	Total Growth	EDU Per Unit	Growth Converted to EDUs
Single-family units	624	1.00	624
Multi-family units	70	0.50	35
Senior Housing units	200	0.21	42
Total Residential	***894***		***701***
Commercial (1,000 square feet)	70	1.52	106
Total Commercial	***70***		***106***
Office(1,000 square feet)	0	0.79	0
Total Office	***0***		***0***
Hotel Rooms[1]	80	0.29	23
Total Hotel	***80***		***23***
		TOTAL EDUs	***830***

Notes:

1. Assuming a 2.2 acre (95,832 square-feet) 80-room hotel.

Source: Fehr & Peers, 2007.

Step 4 – Calculate Project Costs Attributable to New Development

As described in Chapter 3, if a facility is not subject to an existing deficiency, then the need for improvement is generated by new development rather than by existing transportation problems and all of the estimated improvement costs are included in the fee program. As shown in Table 2 above, there are currently two study locations that operate with existing deficiencies. Tables 3A and 3B show that the need for the improvements at these intersections is exacerbated by new local development. The proportion of the cost attributable to new development was calculated as detailed in Chapter 3. Table 6 summarizes these calculations and shows the resulting amounts that would be included in the fee program in the column titled Potential Fee Contribution.

TABLE 6
POTENTIAL FEE CONTRIBUTIONS

Project	Total Cost	Funding from Alternative Sources	Potential Fees	Adjustment for Existing Deficiencies	Total Fees
Traffic Signal: Moraga Road at Ascot Drive[1, 2]	$529,800	$476,100	$66,000	67%	$44,200
Traffic Signal: Moraga Road at Corliss Drive[2]	$450,100	$0	$450,100	78%	$351,100
Total Cost	$979,900	$476,100	$516,100		$395,300

Notes:

1. The Town received grant money to complete this improvement project. As part of the grant requirements, the Town must provide local funds of $66,000.
2. Locations with existing deficiencies. For projects addressing existing deficiencies, the Adjustment for Existing Deficiency column shows the proportion of project costs attributable to traffic generated by future development.

Source: Fehr & Peers, 2007.

Step 5 – Determine Fee Amounts

Table 7 displays the calculated impact fees. These fees have been calculated based on the complete list of projects included in the proposed LTMF program as shown in Table 1, and the adjustments for existing deficiencies as shown in Table 6. The total cost shown in Table 6 ($979,900) was adjusted to reflect the fact that the Town recently obtained partial funding for the traffic signal work at the Moraga Road/Ascot Drive intersection. The adjusted value ($395,300) was divided by the total number of Equivalent Dwelling Units (EDUs) expected in Moraga (830) to calculate the resulting fee per EDU ($476). These figures do not reflect any reductions or subsidies that the Town may choose to implement.

TABLE 7
PRELIMINARY FEE CALCULATIONS

Land Use Category	EDU	Potential Fees
Single-Family	1.00	$476/D.U.
Multi-Family	0.50	$238/D.U.
Senior Housing	0.21	$100/D.U.
Commercial	1.52	$724/Thousand S.F.
Office	0.79	$376/Thousand S.F.
Hotel[1]	0.29	$138/Thousand S.F.

Notes:
1. Assuming a 2.2 acre (95,832 square-feet) 80-room hotel, the potential fee per room would be $115.

Source: Fehr & Peers, 2007.

5. LTMF PROGRAM FUNDING CONSIDERATIONS

This chapter describes some of the other sources of funds that may be used to complement LTMF revenues in completing the capital improvements addressed in this study.

FUNDING OF LTMF PROJECTS

The fee revenue from the LTMF program will pay a portion of the total cost of all the identified improvements. The Town Council also has the choice to further discount the fees beyond the adjustment due to existing facility deficiencies. As a result, funding will need to be generated from other sources to supplement the LTMF revenues. The following describes some of the other sources of funds that could be applied to improvements in the LTMF program:

Measure C/Measure J – Approved by Contra Costa County voters in 1988, Measure C imposed a one-half cent sales tax to help pay for transportation improvements over a 20-year period. The sales tax was reauthorized as Measure J in November 2004. The Town of Moraga will be eligible to receive some Measure C/Measure J funds to help construct improvements to the local transportation network.

Grant Programs – The Town of Moraga can apply for grants through various state and federal programs (such as the Congestion Mitigation and Air Quality, or CMAQ program) to help finance public infrastructure. The timing and amount of these grants can vary substantially from year to year, depending on the availability of funds at the granting agency and the number of applicants. The Town recently obtained a grant to complete the Moraga Road/Ascot Drive traffic signal improvements (with a local match requirement). The fees presented in this report have been adjusted accordingly.

LTMF PROGRAM ADMINISTRATION

The LTMF can be adjusted annually to reflect changes in construction costs. The Town would track trends in project costs over time (for example, through use of the Construction Cost Index published in the Engineering News Record) and use that information to assist in determining appropriate adjustments to the LTMF program, which could take the form of fee reductions if project costs decline or fee increases if costs escalate.

6. PROGRAM SUMMARY

This report provides a detailed discussion of the elements of the proposed Moraga LTMF program and explains the analytical techniques used to develop this nexus study. The report addresses all of the fee program elements required by AB 1600, as described below.

- *Identifying the purpose of the fee*

  The purpose of the LTMF program is to mitigate the traffic impacts of new development within the Town, consistent with the land use and transportation policies of the General Plan, by developing an overall transportation system that will accommodate the Town's expected future traffic demand.

- *Identifying how the fee will be used and the facilities to be funded through the fee*

  The fee will be used to help fund capital improvement projects necessary to accommodate future traffic demand in Moraga. Table 1 describes the projects to be funded through the fee.

- *Determining a reasonable relationship between the fee's use and the type of development on which the fee is imposed*

  As described in the report, different types of development generate traffic with different characteristics. The calculations presented in Tables 4 and 5 account for these different characteristics by applying different per-unit fee factors to each type of development. These considerations account for the differential impacts on the local transportation system generated by different development types.

- *Determining a reasonable relationship between the need for the public facility and the type of development on which the fee is imposed*

  The need for the facilities listed in Table 1 has been established through discussions with Town staff and the analysis in Chapter 4. Table 2 shows that there are two intersections that operate with existing deficiencies on facilities that are included in this LTMF program, and Tables 3A and 3B indicate that future local development will exacerbate the existing deficiencies at both locations. The proposed improvements mitigate those impacts to the Town's applicable operational standards.

- *Determining a reasonable relationship between the amount of the fee and the cost of the public facility (or portion of facility) attributable to new development*

  The nexus analysis presented in this report accounts for existing deficiencies in the local transportation system and does not include the costs of rectifying those deficiencies in the fee program. Thus, the LTMF program is targeted toward the costs of public improvements attributable to new development within Moraga; Table 6 and 7 provide detailed information on these calculations.

Technical Appendix

Town of Moraga Local Transportation Mitigation Fee Study

August 2007

WC06-2362

FEHR & PEERS
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Appendix A
Traffic Volume Data

FEHR & PEERS
TRANSPORTATION CONSULTANTS

WILTEC

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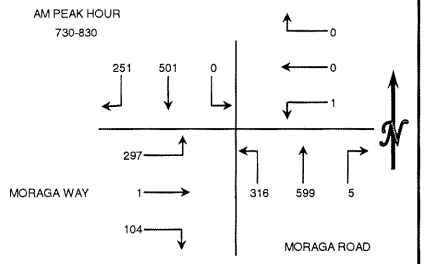
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

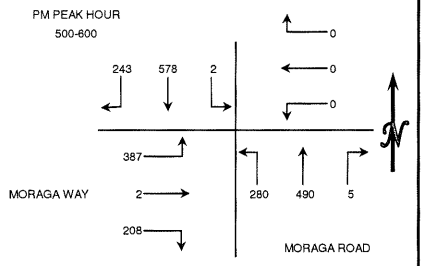
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: TUESDAY, MAY 3RD, 2005
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S MORAGA ROAD
E/W MORAGA WAY

	AM	PM
	0.85	0.971

15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	38	35	0	0	2	0	0	50	42	10	0	15	192
715-730	53	85	0	0	1	0	1	95	51	20	0	47	353
730-745	65	144	0	0	0	1	1	184	79	20	1	80	575
745-800	75	122	0	0	0	0	0	180	98	28	0	77	580
800-815	57	118	0	0	0	0	4	107	62	27	0	67	442
815-830	54	117	0	0	0	0	0	128	77	29	0	73	478
830-845	54	91	0	0	0	0	0	123	95	37	0	72	472
845-900	54	109	1	0	0	0	2	114	93	38	1	87	499
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	231	386	0	0	3	1	2	509	270	78	1	219	1700
715-815	250	469	0	0	1	1	6	566	290	95	1	271	1950
730-830	251	501	0	0	0	1	5	599	316	104	1	297	2075
745-845	240	448	0	0	0	0	4	538	332	121	0	289	1972
800-900	219	435	1	0	0	0	6	472	327	131	1	299	1891



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	80	119	0	0	0	1	1	128	52	35	2	107	525
415-430	56	123	1	1	0	0	0	126	55	36	1	104	503
430-445	66	135	0	1	0	1	0	117	41	35	0	73	469
445-500	64	139	3	0	0	1	4	121	68	43	0	96	539
500-515	61	141	0	0	0	0	1	128	97	42	1	94	565
515-530	56	138	0	0	0	0	2	113	61	52	0	95	517
530-545	68	151	2	0	0	0	2	124	66	51	1	97	562
545-600	58	148	0	0	0	0	0	125	56	63	0	101	551
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	266	516	4	2	0	3	5	492	216	149	3	380	2036
415-515	247	538	4	2	0	2	5	492	261	156	2	367	2076
430-530	247	553	3	1	0	2	7	479	267	172	1	358	2090
445-545	249	569	5	0	0	1	9	486	292	188	2	382	2183
500-600	243	578	2	0	0	0	5	490	280	208	2	387	2195



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WILTEC

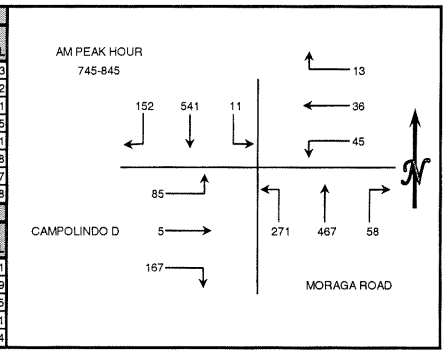
Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

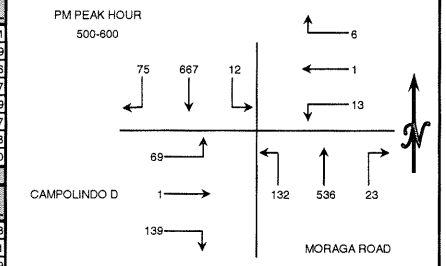
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: WEDNESDAY, APRIL 27TH, 2005
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S MORAGA ROAD
E/W CAMPOLINDO DRIVE

	AM	PM
	0.906	0.91

15 MIN COUNTS					7:00 AM TO 9:00 AM								
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	12	78	0	7	0	3	0	96	6	24	0	7	233
715-730	30	126	1	4	0	3	2	131	21	26	0	18	362
730-745	21	114	0	2	0	10	5	115	17	27	0	10	321
745-800	21	128	3	3	0	6	6	121	43	24	0	20	375
800-815	41	134	5	4	4	13	12	113	91	69	1	24	511
815-830	48	137	1	1	23	18	22	116	82	41	1	18	508
830-845	42	142	2	5	9	8	18	117	55	33	3	23	457
845-900	20	126	1	3	3	3	0	98	26	18	0	10	308
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	84	446	4	16	0	22	13	463	87	101	0	55	1291
715-815	113	502	9	13	4	32	25	480	172	146	1	72	1569
730-830	131	513	9	10	27	47	45	465	233	161	2	72	1715
745-845	152	541	11	13	36	45	58	467	271	167	5	85	1851
800-900	151	539	9	13	39	42	52	444	254	161	5	75	1784



15 MIN COUNTS					4:00 PM TO 6:00 PM								
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	24	147	0	0	0	1	0	150	34	31	0	14	401
415-430	14	139	1	0	2	3	5	150	23	29	1	12	379
430-445	14	140	4	0	0	1	2	149	14	25	0	7	356
445-500	15	136	4	2	0	5	0	135	38	18	0	14	367
500-515	18	153	6	3	1	1	5	134	25	22	0	11	379
515-530	14	157	2	2	0	2	6	129	30	31	1	13	387
530-545	19	177	1	1	0	5	3	137	32	46	0	27	448
545-600	24	180	3	0	0	5	9	136	45	40	0	18	460
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	67	562	9	2	2	10	7	584	109	103	1	47	1503
415-515	61	568	15	5	3	10	12	568	100	94	1	44	1481
430-530	61	586	16	7	1	9	13	547	107	96	1	45	1489
445-545	66	623	13	8	1	13	14	535	125	117	1	65	1581
500-600	75	667	12	6	1	13	23	536	132	139	1	69	1674



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WILTEC

Phone: (925) 706-9911 Fax: (925) 706-9914

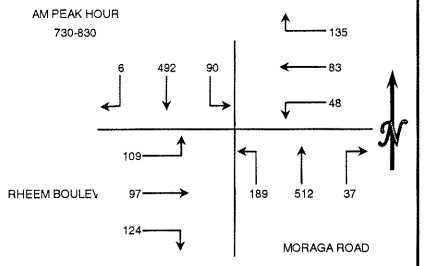
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: TUESDAY, MAY 10TH 2005
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S MORAGA ROAD
E/W RHEEM BOULEVARD

AM	PM
0.846	0.893

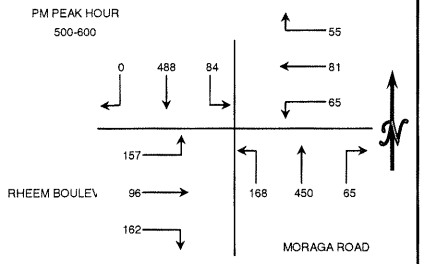
15 MIN COUNTS — 7:00 AM TO 9:00 AM

PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	1	54	1	12	19	2	1	84	18	11	1	15	219
715-730	1	82	3	29	15	6	8	117	29	15	26	23	354
730-745	3	129	19	63	19	5	6	122	27	43	31	33	500
745-800	1	128	33	58	23	9	9	143	42	41	18	23	528
800-815	2	125	23	10	27	14	11	134	65	20	17	32	480
815-830	0	110	15	4	14	20	11	113	55	20	31	21	414
830-845	2	71	9	16	16	10	13	123	54	14	11	26	365
845-900	1	87	18	13	14	8	13	95	40	18	19	29	355
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	6	393	56	162	76	22	24	466	116	110	76	94	1601
715-815	7	464	78	160	84	34	34	516	163	119	92	111	1862
730-830	6	492	90	135	83	48	37	512	189	124	97	109	1922
745-845	5	434	80	88	80	53	44	513	216	95	77	102	1787
800-900	5	393	65	43	71	52	48	465	214	72	78	108	1614



15 MIN COUNTS — 4:00 PM TO 6:00 PM

PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	1	110	12	10	22	25	8	92	33	22	13	49	397
415-430	0	122	13	8	14	18	13	113	28	27	14	25	395
430-445	0	126	14	19	24	17	15	101	33	27	19	64	459
445-500	1	122	15	10	25	8	16	104	33	27	10	30	401
500-515	0	115	23	18	19	18	12	110	37	39	27	41	459
515-530	0	137	15	12	20	19	22	119	37	36	17	36	470
530-545	0	111	13	11	19	10	21	104	48	31	20	30	418
545-600	0	125	33	14	23	18	10	117	46	56	32	50	524
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	2	480	54	47	85	68	52	410	127	103	56	168	1652
415-515	1	485	65	55	82	61	56	428	131	120	70	160	1714
430-530	1	500	67	59	88	62	65	434	140	129	73	171	1789
445-545	1	485	66	51	83	55	71	437	155	133	74	137	1748
500-600	0	488	84	55	81	65	65	450	168	162	96	157	1871



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WILTEC

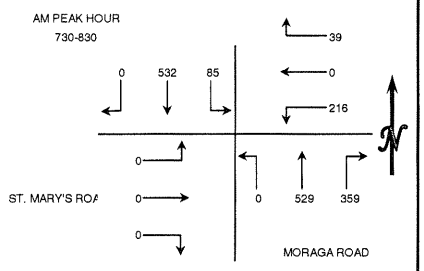
Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

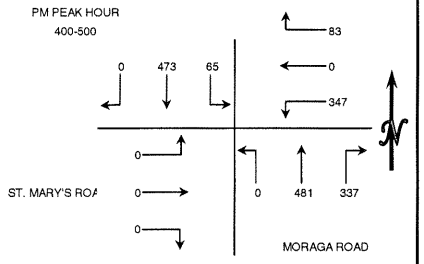
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: TUESDAY, MAY 3RD, 2005
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S MORAGA ROAD
E/W ST. MARY'S ROAD (SOUTH)

	AM	PM
	0.903	0.969

15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	0	53	7	2	0	32	26	99	0	0	0	0	219
715-730	0	105	7	6	0	64	50	140	0	0	0	0	372
730-745	0	127	12	4	0	64	86	163	0	0	0	0	456
745-800	0	130	32	6	0	50	84	168	0	0	0	0	470
800-815	0	141	14	19	0	50	94	104	0	0	0	0	422
815-830	0	134	27	10	0	52	95	94	0	0	0	0	412
830-845	0	110	18	13	0	67	91	94	0	0	0	0	393
845-900	0	105	21	25	0	54	95	93	0	0	0	0	393
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	0	415	58	18	0	210	246	570	0	0	0	0	1517
715-815	0	503	65	35	0	228	314	575	0	0	0	0	1720
730-830	0	532	85	39	0	216	359	529	0	0	0	0	1760
745-845	0	515	91	48	0	219	364	460	0	0	0	0	1697
800-900	0	490	80	67	0	223	375	385	0	0	0	0	1620



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	0	115	23	27	0	74	85	123	0	0	0	0	447
415-430	0	116	15	11	0	87	86	115	0	0	0	0	430
430-445	0	118	12	19	0	93	79	121	0	0	0	0	442
445-500	0	124	15	26	0	93	87	122	0	0	0	0	467
500-515	0	119	17	11	0	66	76	138	0	0	0	0	427
515-530	0	129	10	13	0	68	78	144	0	0	0	0	442
530-545	0	125	18	20	0	50	68	136	0	0	0	0	417
545-600	0	129	14	9	0	55	93	128	0	0	0	0	428
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	0	473	65	83	0	347	337	481	0	0	0	0	1786
415-515	0	477	59	67	0	339	328	496	0	0	0	0	1766
430-530	0	490	54	69	0	320	320	525	0	0	0	0	1778
445-545	0	497	60	70	0	277	309	540	0	0	0	0	1753
500-600	0	502	59	53	0	239	315	546	0	0	0	0	1714



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WILTEC

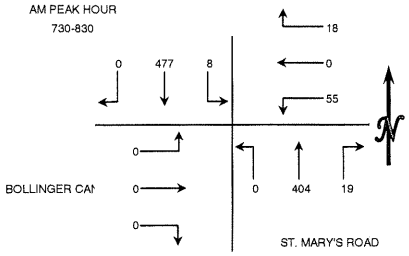
Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

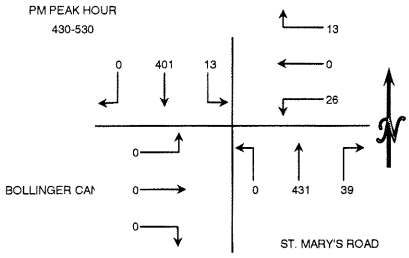
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: TUESDAY, MAY 10TH, 2005
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S ST. MARY'S ROAD
E/W BOLLINGER CANYON ROAD

	AM	PM
	0.869	0.945

15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	0	55	1	3	0	7	2	44	0	0	0	0	112
715-730	0	69	0	10	0	13	0	55	0	0	0	0	147
730-745	0	119	3	4	0	19	7	97	0	0	0	0	249
745-800	0	134	1	5	0	13	6	109	0	0	0	0	268
800-815	0	118	2	3	0	13	4	102	0	0	0	0	242
815-830	0	106	2	6	0	10	2	96	0	0	0	0	222
830-845	0	106	1	3	0	7	5	78	0	0	0	0	200
845-900	0	94	0	3	0	8	3	84	0	0	0	0	192
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	0	377	5	22	0	52	15	305	0	0	0	0	776
715-815	0	440	6	22	0	58	17	363	0	0	0	0	906
730-830	0	477	8	18	0	55	19	404	0	0	0	0	981
745-845	0	464	6	17	0	43	17	385	0	0	0	0	932
800-900	0	424	5	15	0	38	14	360	0	0	0	0	856



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	0	108	4	5	0	4	5	98	0	0	0	0	224
415-430	0	93	5	1	0	5	4	103	0	0	0	0	211
430-445	0	101	2	2	0	6	10	120	0	0	0	0	241
445-500	0	111	2	4	0	4	10	97	0	0	0	0	228
500-515	0	98	4	3	0	6	6	102	0	0	0	0	219
515-530	0	91	5	4	0	10	13	112	0	0	0	0	235
530-545	0	91	4	3	0	7	9	96	0	0	0	0	210
545-600	0	91	6	4	0	4	9	110	0	0	0	0	224
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	0	413	13	12	0	19	29	418	0	0	0	0	904
415-515	0	403	13	10	0	21	30	422	0	0	0	0	899
430-530	0	401	13	13	0	26	39	431	0	0	0	0	923
445-545	0	391	15	14	0	27	38	407	0	0	0	0	892
500-600	0	371	19	14	0	27	37	420	0	0	0	0	888



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WILTEC

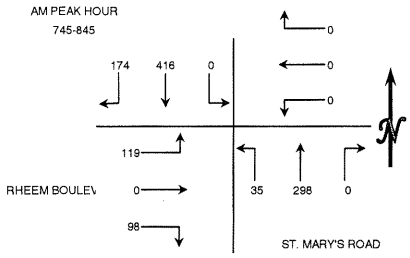
Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

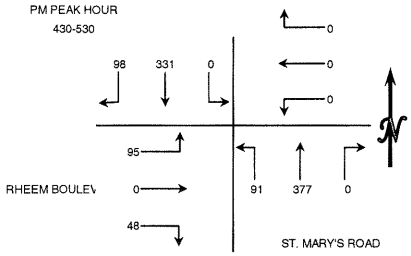
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: TUESDAY, MAY 10TH, 2005
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S ST. MARY'S ROAD
E/W RHEEM BOULEVARD

AM	PM
0.853	0.937

15 MIN COUNTS					7:00 AM TO 9:00 AM								
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	23	44	0	0	0	0	0	36	3	6	0	13	125
715-730	25	68	0	0	0	0	0	40	9	6	0	25	173
730-745	48	86	0	0	0	0	0	88	15	16	0	27	280
745-800	47	107	0	0	0	0	0	71	9	56	0	44	334
800-815	42	102	0	0	0	0	0	57	11	16	0	35	263
815-830	35	100	0	0	0	0	0	81	8	8	0	19	251
830-845	50	107	0	0	0	0	0	89	7	18	0	21	292
845-900	27	87	0	0	0	0	0	61	7	16	0	25	223
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	143	305	0	0	0	0	0	235	36	84	0	109	912
715-815	162	363	0	0	0	0	0	256	44	94	0	131	1050
730-830	172	395	0	0	0	0	0	297	43	96	0	125	1128
745-845	174	416	0	0	0	0	0	298	35	98	0	119	1140
800-900	154	396	0	0	0	0	0	288	33	58	0	100	1029



15 MIN COUNTS					4:00 PM TO 6:00 PM								
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	29	92	0	0	0	0	0	68	21	13	0	16	239
415-430	18	77	0	0	0	0	0	82	26	14	0	13	230
430-445	22	73	0	0	0	0	0	99	23	7	0	20	244
445-500	25	94	0	0	0	0	0	85	23	17	0	18	262
500-515	27	86	0	0	0	0	0	97	22	14	0	25	271
515-530	24	78	0	0	0	0	0	96	23	10	0	32	263
530-545	23	82	0	0	0	0	0	76	17	12	0	30	240
545-600	23	82	0	0	0	0	0	77	18	15	0	27	242
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	94	336	0	0	0	0	0	334	93	51	0	67	975
415-515	92	330	0	0	0	0	0	363	94	52	0	76	1007
430-530	98	331	0	0	0	0	0	377	91	48	0	95	1040
445-545	99	340	0	0	0	0	0	354	85	53	0	105	1036
500-600	97	328	0	0	0	0	0	346	80	51	0	114	1016



#37

A39

WILTEC

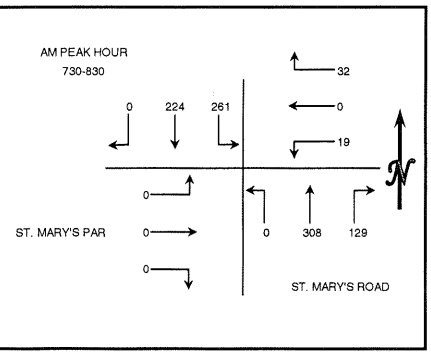
Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

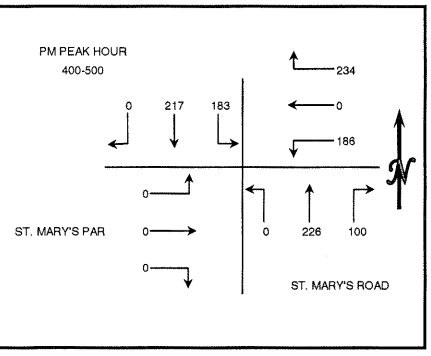
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: TUESDAY, MAY 10TH, 2005
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S ST. MARY'S ROAD
E/W ST. MARY'S PARKWAY

	AM	PM
	0.794	0.888

15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	0	22	13	1	0	5	10	26	0	0	0	0	77
715-730	0	43	38	6	0	14	12	49	0	0	0	0	162
730-745	0	49	61	9	0	6	31	76	0	0	0	0	232
745-800	0	58	92	10	0	3	46	89	0	0	0	0	298
800-815	0	57	62	8	0	2	32	67	0	0	0	0	228
815-830	0	60	46	5	0	8	20	76	0	0	0	0	215
830-845	0	50	57	5	0	8	29	57	0	0	0	0	206
845-900	0	43	44	3	0	2	31	56	0	0	0	0	179
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	0	172	204	26	0	28	99	240	0	0	0	0	769
715-815	0	207	253	33	0	25	121	281	0	0	0	0	920
730-830	0	224	261	32	0	19	129	308	0	0	0	0	973
745-845	0	225	257	28	0	21	127	289	0	0	0	0	947
800-900	0	210	209	21	0	20	112	256	0	0	0	0	828



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	0	54	72	57	0	52	27	58	0	0	0	0	320
415-430	0	47	42	61	0	42	17	46	0	0	0	0	255
430-445	0	51	21	66	0	47	22	52	0	0	0	0	259
445-500	0	65	48	50	0	45	34	70	0	0	0	0	312
500-515	0	55	55	58	0	35	31	73	0	0	0	0	307
515-530	0	48	34	43	0	36	28	56	0	0	0	0	245
530-545	0	47	30	45	0	29	40	61	0	0	0	0	252
545-600	0	49	42	51	0	40	39	66	0	0	0	0	287
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	0	217	183	234	0	186	100	226	0	0	0	0	1146
415-515	0	218	166	235	0	169	104	241	0	0	0	0	1133
430-530	0	219	158	217	0	163	115	251	0	0	0	0	1123
445-545	0	215	167	196	0	145	133	260	0	0	0	0	1116
500-600	0	199	161	197	0	140	138	256	0	0	0	0	1091



#38
#39

TDS

Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: THURSDAY OCTOBER 26, 2006
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S MORAGA RD
E/W ASCOT DRIVE/DRIVEWAY

	AM	PM
	0.95	0.961

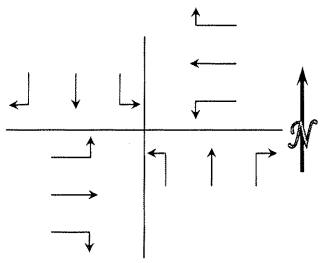
*Pedestrians were counted, see other sheet

15 MIN COUNTS — 7:00 AM TO 9:00 AM

PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	5	72	7	0	1	4	3	85	1	7	0	21	206
715-730	9	98	2	0	2	4	6	151	2	20	4	41	339
730-745	8	223	3	2	0	5	7	343	8	12	3	33	647
745-800	8	146	6	0	1	5	12	143	10	15	1	36	383
800-815	7	166	4	1	2	2	6	140	4	10	1	28	371
815-830	6	124	0	0	1	3	3	191	4	10	1	27	370
830-845	4	120	5	3	1	2	6	142	4	4	3	38	332
845-900	3	117	2	0	0	0	4	141	2	11	2	20	302

HOUR TOTALS

TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	30	539	18	2	4	18	28	722	21	54	8	131	1575
715-815	32	633	15	3	5	16	31	777	24	57	9	138	1740
730-830	29	659	13	3	4	15	28	817	26	47	6	124	1771
745-845	25	556	15	4	5	12	27	616	22	39	6	129	1456
800-900	20	527	11	4	4	7	19	614	14	35	7	113	1375

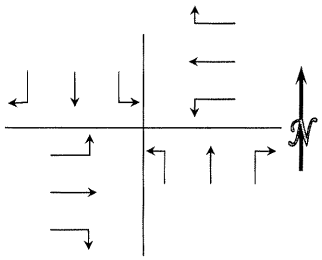


15 MIN COUNTS — 4:00 PM TO 6:00 PM

PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	15	168	3	1	0	2	8	164	10	15	0	23	409
415-430	17	153	4	3	0	2	5	173	10	4	1	14	386
430-445	21	169	2	0	0	3	3	175	5	1	1	17	397
445-500	27	181	1	3	0	1	5	156	10	16	3	23	426
500-515	27	196	8	1	0	0	2	178	14	10	1	17	454
515-530	29	185	2	1	0	8	4	176	10	3	3	14	435
530-545	28	183	5	1	2	2	5	169	13	10	1	17	436
545-600	25	194	6	0	1	2	3	154	8	14	1	12	420

HOUR TOTALS

TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	80	671	10	7	0	8	21	668	35	36	5	77	1618
415-515	92	699	15	7	0	6	15	682	39	31	6	71	1663
430-530	104	731	13	5	0	12	14	685	39	30	8	71	1712
445-545	111	745	16	6	2	11	16	679	47	39	8	71	1751
500-600	109	758	21	3	3	12	14	677	45	37	6	60	1745



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TDS

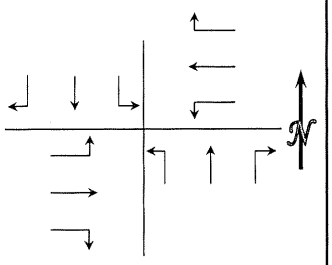
Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

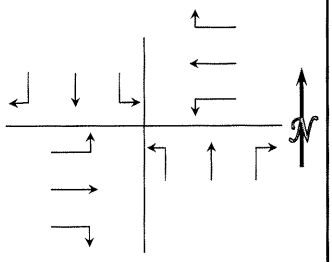
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: THURSDAY OCTOBER 26, 2006
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S MORAGA RD
E/W DONALD DRIVE

	AM	PM
	0.982	0.962

15 MIN COUNTS					7:00 AM TO 9:00 AM								
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	6	80	0	1	1	0	1	70	1	4	1	6	171
715-730	6	108	1	3	0	2	0	129	4	4	0	16	273
730-745	8	222	2	5	0	2	1	331	8	4	0	11	594
745-800	18	136	1	4	0	0	2	133	9	5	0	15	323
800-815	17	98	1	1	7	3	0	108	24	11	1	55	326
815-830	12	89	0	1	1	0	0	126	11	17	4	65	326
830-845	5	113	1	5	0	0	0	122	9	7	1	42	305
845-900	6	108	2	3	1	4	0	113	10	7	2	23	279
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	38	546	4	13	1	4	4	663	22	17	1	48	1361
715-815	49	564	5	13	7	7	3	701	45	24	1	97	1516
730-830	55	545	4	11	8	5	3	698	52	37	5	146	1569
745-845	52	436	3	11	8	3	2	489	53	40	6	177	1280
800-900	40	408	4	10	9	7	0	469	54	42	8	185	1236



15 MIN COUNTS					4:00 PM TO 6:00 PM								
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	9	174	0	1	1	0	1	150	6	15	4	18	379
415-430	7	144	1	3	0	1	0	159	4	13	6	15	353
430-445	13	167	4	1	0	0	1	189	8	3	0	10	396
445-500	8	183	1	1	1	0	0	169	11	7	2	16	399
500-515	14	173	3	2	0	0	2	167	9	11	0	12	393
515-530	18	162	5	1	0	1	0	186	13	8	0	10	404
530-545	12	166	1	0	0	0	0	160	6	10	6	11	372
545-600	12	181	0	2	0	0	1	173	2	9	1	4	385
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	37	668	6	6	2	1	2	667	29	38	12	59	1527
415-515	42	667	9	7	1	1	3	684	32	34	8	53	1541
430-530	53	685	13	5	1	1	3	711	41	29	2	48	1592
445-545	52	684	10	4	1	1	2	682	39	36	8	49	1568
500-600	56	682	9	5	0	1	3	686	30	38	7	37	1554



#48

TDS

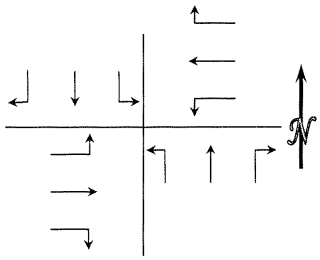
Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

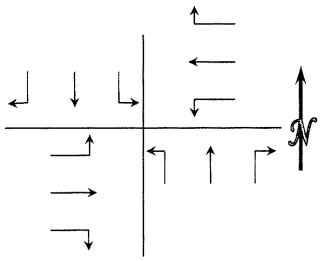
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: THURSDAY OCTOBER 26, 2006
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S MORAGA RD
E/W CORLISS DR

	AM	PM
	0.791	0.947

15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	18	76	0	0	0	0	0	62	3	7	0	26	192
715-730	24	96	0	0	0	0	0	101	1	6	0	41	269
730-745	41	136	0	0	0	0	0	235	2	3	0	56	473
745-800	35	145	0	0	0	0	0	123	6	4	0	35	348
800-815	42	92	0	0	0	0	0	91	16	8	0	33	282
815-830	12	98	0	0	0	0	0	90	3	6	0	34	243
830-845	9	91	0	0	0	0	0	91	6	5	0	26	228
845-900	18	104	0	0	0	0	0	109	7	6	0	22	266
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	118	453	0	0	0	0	0	521	12	20	0	158	1282
715-815	142	469	0	0	0	0	0	550	25	21	0	165	1372
730-830	130	471	0	0	0	0	0	539	27	21	0	158	1346
745-845	98	426	0	0	0	0	0	395	31	23	0	128	1101
800-900	81	385	0	0	0	0	0	381	32	25	0	115	1019



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	22	145	0	0	0	0	0	153	2	3	0	22	347
415-430	18	137	0	0	0	0	0	133	6	3	0	23	320
430-445	28	120	0	0	0	0	0	163	4	3	0	21	339
445-500	26	162	0	0	0	0	0	173	6	6	0	22	395
500-515	17	136	0	0	0	0	0	175	6	10	0	32	376
515-530	26	157	0	0	0	0	0	169	9	9	0	21	391
530-545	25	144	0	0	0	0	0	154	8	5	0	29	365
545-600	40	181	0	0	0	0	0	139	16	4	0	26	406
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	94	564	0	0	0	0	0	622	18	15	0	88	1401
415-515	89	555	0	0	0	0	0	644	22	22	0	98	1430
430-530	97	575	0	0	0	0	0	680	25	28	0	96	1501
445-545	94	599	0	0	0	0	0	671	29	30	0	104	1527
500-600	108	618	0	0	0	0	0	637	39	28	0	108	1538



#49

TDS

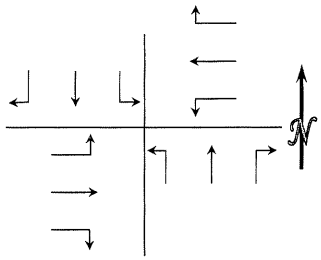
Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

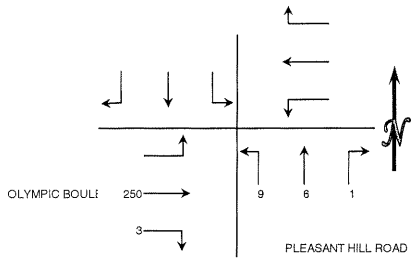
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: THURSDAY OCTOBER 26, 2006
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S ST ANDREWS/CAMINO RICARDO
E/W MORAGA WAY

AM	PM
0.939	0.94

15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	9	12	8	9	119	2	8	6	35	15	63	0	286
715-730	8	14	4	5	120	1	10	3	50	13	79	8	315
730-745	18	17	15	4	127	3	7	19	44	10	69	3	336
745-800	17	3	5	12	138	1	11	8	28	12	75	3	313
800-815	10	11	15	21	70	5	9	12	24	13	116	9	315
815-830	11	15	22	17	104	7	13	8	20	15	62	5	299
830-845	9	5	8	8	95	3	10	3	21	17	73	4	256
845-900	10	8	8	9	95	10	5	2	22	21	122	5	317
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	52	46	32	30	504	7	36	36	157	50	286	14	1250
715-815	53	45	39	42	455	10	37	42	146	48	339	23	1279
730-830	56	46	57	54	439	16	40	47	116	50	322	20	1263
745-845	47	34	50	58	407	16	43	31	93	57	326	21	1183
800-900	40	39	53	55	364	25	37	25	87	66	373	23	1187



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	7	8	11	9	113	17	14	10	16	21	106	9	341
415-430	1	5	14	18	105	9	15	5	26	20	93	4	315
430-445	6	11	10	17	113	9	15	2	9	29	111	9	341
445-500	5	13	10	22	106	11	15	8	14	30	108	10	352
500-515	7	6	18	14	102	4	10	12	23	16	104	9	325
515-530	7	5	10	21	90	2	20	4	18	29	150	4	360
530-545	7	11	16	18	97	12	14	12	18	23	129	11	368
545-600	3	8	10	6	96	8	13	4	15	28	132	7	330
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	19	37	45	66	437	46	59	25	65	100	418	32	1349
415-515	19	35	52	71	426	33	55	27	72	95	416	32	1333
430-530	25	35	48	74	411	26	60	26	64	104	473	32	1378
445-545	26	35	54	75	395	29	59	36	73	98	491	34	1405
500-600	24	30	54	59	385	26	57	32	74	96	515	31	1383



#50

TDS

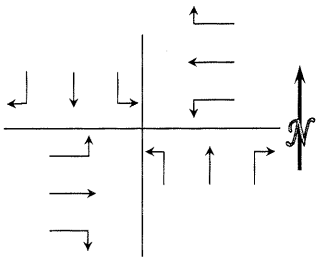
Phone: (925) 706-9911 Fax: (925) 706-9914

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

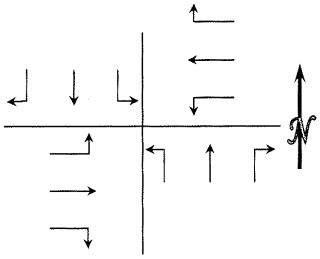
CLIENT: FEHR & PEERS TRANSPORTATION COUNSULTANTS
PROJECT: CONTRA COSTA COUNTY
DATE: THURSDAY OCTOBER 26, 2006
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S SCHOOL ST
E/W MORAGA WAY

AM	PM
0.91	0.93

15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	12	3	2	4	123	0	3	1	6	3	86	2	245
715-730	7	1	0	4	110	0	4	2	4	3	69	8	212
730-745	15	3	3	4	115	3	9	0	5	5	99	3	264
745-800	11	2	3	2	126	6	10	0	3	1	82	8	254
800-815	13	1	0	1	103	4	17	3	3	8	127	6	286
815-830	12	3	1	2	92	8	17	2	14	4	82	10	247
830-845	17	5	5	3	101	6	14	5	6	9	79	4	254
845-900	13	1	5	0	88	0	20	0	10	6	111	4	258
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	45	9	8	14	474	9	26	3	18	12	336	21	975
715-815	46	7	6	11	454	13	40	5	15	17	377	25	1016
730-830	51	9	7	9	436	21	53	5	25	18	390	27	1051
745-845	53	11	9	8	422	24	58	10	26	22	370	28	1041
800-900	55	10	11	6	384	18	68	10	33	27	399	24	1045



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	14	2	9	2	105	2	12	4	10	4	127	8	299
415-430	28	4	5	3	97	2	11	6	6	5	102	12	281
430-445	21	5	14	1	118	3	15	5	13	9	109	11	324
445-500	31	5	4	1	89	1	19	8	13	4	139	7	321
500-515	14	3	11	2	95	4	13	5	13	6	131	13	310
515-530	15	9	8	2	98	4	8	0	5	0	168	14	331
530-545	25	3	4	1	90	1	8	2	4	1	149	7	295
545-600	24	6	6	2	83	3	6	6	4	2	141	12	295
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	94	16	32	7	409	8	57	23	42	22	477	38	1225
415-515	94	17	34	7	399	10	58	24	45	24	481	43	1236
430-530	81	22	37	6	400	12	55	18	44	19	547	45	1286
445-545	85	20	27	6	372	10	48	15	35	11	587	41	1257
500-600	78	21	29	7	366	12	35	13	26	9	589	46	1231



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Appendix B
Existing Conditions LOS Analysis

FEHR & PEERS
TRANSPORTATION CONSULTANTS

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	
Lane Util. Factor		1.00	1.00				1.00	0.95			0.95	
Frpb, ped/bikes		1.00	1.00				1.00	1.00			0.99	
Flpb, ped/bikes		1.00	1.00				1.00	1.00			1.00	
Frt		1.00	0.85				1.00	1.00			0.95	
Flt Protected		0.95	1.00				0.95	1.00			1.00	
Satd. Flow (prot)		1770	1583				1770	3535			3324	
Flt Permitted		0.76	1.00				0.95	1.00			1.00	
Satd. Flow (perm)		1410	1583				1770	3535			3324	
Volume (vph)	291	0	130	0	0	0	358	563	4	0	464	245
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	327	0	146	0	0	0	402	633	4	0	521	275
RTOR Reduction (vph)	0	0	104	0	0	0	0	0	0	0	69	0
Lane Group Flow (vph)	0	327	42	0	0	0	402	637	0	0	727	0
Confl. Peds. (#/hr)						10			10			10
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		22.6	22.6				22.2	49.9			22.7	
Effective Green, g (s)		23.6	23.6				23.2	50.9			23.7	
Actuated g/C Ratio		0.29	0.29				0.28	0.62			0.29	
Clearance Time (s)		5.0	5.0				5.0	5.0			5.0	
Vehicle Extension (s)		3.0	3.0				3.0	3.0			3.0	
Lane Grp Cap (vph)		403	453				498	2181			955	
v/s Ratio Prot							c0.23	0.18			c0.24	
v/s Ratio Perm		c0.23	0.09									
v/c Ratio		0.81	0.09				0.81	0.29			0.76	
Uniform Delay, d1		27.4	21.6				27.6	7.4			26.8	
Progression Factor		1.00	1.00				1.00	1.00			1.00	
Incremental Delay, d2		11.7	0.1				9.3	0.1			3.6	
Delay (s)		39.1	21.7				36.9	7.5			30.4	
Level of Service		D	C				D	A			C	
Approach Delay (s)		33.7			0.0			18.8			30.4	
Approach LOS		C			A			B			C	

Intersection Summary			
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	82.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.6%	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	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.96		0.99		1.00	1.00	0.95	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1779	1521		1725		1770	1863	1506	1770	1863	1583
Flt Permitted		0.58	1.00		0.78		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1081	1521		1381		1770	1863	1506	1770	1863	1583
Volume (vph)	85	5	167	94	36	48	271	475	74	23	545	152
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	96	6	188	106	40	54	304	534	83	26	612	171
RTOR Reduction (vph)	0	0	157	0	16	0	0	0	26	0	0	41
Lane Group Flow (vph)	0	102	31	0	184	0	304	534	57	26	612	130
Confl. Peds. (#/hr)			10			10			10			
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Actuated Green, G (s)		11.4	11.4		11.4		16.2	48.0	48.0	1.9	33.7	33.7
Effective Green, g (s)		12.4	12.4		12.4		17.2	49.0	49.0	2.9	34.7	34.7
Actuated g/C Ratio		0.16	0.16		0.16		0.23	0.64	0.64	0.04	0.45	0.45
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		176	247		224		399	1196	967	67	847	720
v/s Ratio Prot							c0.17	0.29		0.01	c0.33	
v/s Ratio Perm		0.09	0.12		c0.14				0.06			0.11
v/c Ratio		0.58	0.12		0.82		0.76	0.45	0.06	0.39	0.72	0.18
Uniform Delay, d1		29.5	27.3		30.9		27.6	6.8	5.1	35.8	16.9	12.4
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		4.6	0.2		20.9		8.4	0.3	0.0	3.7	3.1	0.1
Delay (s)		34.1	27.5		51.8		36.0	7.1	5.1	39.5	20.0	12.5
Level of Service		C	C		D		D	A	A	D	B	B
Approach Delay (s)		29.8			51.8			16.5			19.0	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	76.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.7%	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		0.95	1.00		0.95		1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85		0.94		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.97	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3438	1583		3287		1770	3539	1583	1770	3539	
Flt Permitted		0.97	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		3438	1583		3287		1770	3539	1583	1770	3539	
Volume (vph)	110	77	96	53	80	89	217	529	44	82	463	0
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	124	87	108	60	90	100	244	594	49	92	520	0
RTOR Reduction (vph)	0	0	86	0	88	0	0	0	33	0	0	0
Lane Group Flow (vph)	0	211	22	0	162	0	244	594	16	92	520	0
Turn Type	Split		Perm	Split			Prot		Perm	Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)		13.4	13.4		7.4		13.9	22.3	22.3	6.9	15.3	
Effective Green, g (s)		14.4	14.4		8.4		14.9	23.3	23.3	7.9	16.3	
Actuated g/C Ratio		0.21	0.21		0.12		0.21	0.33	0.33	0.11	0.23	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		707	326		394		377	1178	527	200	824	
v/s Ratio Prot		0.06			c0.08		c0.14	0.17		0.05	c0.15	
v/s Ratio Perm			0.07						0.03			
v/c Ratio		0.30	0.07		0.41		0.65	0.50	0.03	0.46	0.63	
Uniform Delay, d1		23.5	22.4		28.5		25.2	18.7	15.7	29.1	24.1	
Progression Factor		0.91	0.71		1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.1	0.4		0.7		3.8	0.3	0.0	1.7	1.6	
Delay (s)		22.5	16.4		29.2		28.9	19.1	15.8	30.7	25.7	
Level of Service		C	B		C		C	B	B	C	C	
Approach Delay (s)		20.4			29.2			21.6			26.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
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	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1523	1863	1517	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1523	1863	1517	1770	1863
Volume (vph)	221	48	480	370	91	538
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	248	54	539	416	102	604
RTOR Reduction (vph)	0	42	0	216	0	0
Lane Group Flow (vph)	248	12	539	200	102	604
Confl. Peds. (#/hr)		10		10		
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	12.6	12.6	27.1	27.1	4.1	36.2
Effective Green, g (s)	13.6	13.6	28.1	28.1	5.1	37.2
Actuated g/C Ratio	0.23	0.23	0.48	0.48	0.09	0.63
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	409	352	890	725	154	1179
v/s Ratio Prot	c0.14		c0.29		c0.06	0.32
v/s Ratio Perm		0.04		0.27		
v/c Ratio	0.61	0.04	0.61	0.28	0.66	0.51
Uniform Delay, d1	20.2	17.5	11.3	9.2	26.0	5.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	0.0	1.2	0.2	10.2	0.4
Delay (s)	22.7	17.6	12.5	9.4	36.2	6.2
Level of Service	C	B	B	A	D	A
Approach Delay (s)	21.8		11.1			10.6
Approach LOS	C		B			B

Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	47	17	404	18	6	505
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	53	19	454	20	7	567
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1035	454			474	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1035	454			474	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	79	97			99	
cM capacity (veh/h)	255	606			1088	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	53	19	454	20	574
Volume Left	53	0	0	0	7
Volume Right	0	19	0	20	0
cSH	255	606	1700	1700	1088
Volume to Capacity	0.21	0.03	0.27	0.01	0.01
Queue Length 95th (ft)	19	2	0	0	0
Control Delay (s)	22.7	11.1	0.0	0.0	0.2
Lane LOS	C	B			A
Approach Delay (s)	19.7		0.0		0.2
Approach LOS	C				

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	121	98	35	304	390	163
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	136	110	39	342	438	183
Pedestrians	10					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)		2				
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	960	540	631			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	960	540	631			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	50	80	96			
cM capacity (veh/h)	271	537	943			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	246	381	621
Volume Left	136	39	0
Volume Right	110	0	183
cSH	490	943	1700
Volume to Capacity	0.50	0.04	0.37
Queue Length 95th (ft)	69	3	0
Control Delay (s)	19.5	1.3	0.0
Lane LOS	C	A	
Approach Delay (s)	19.5	1.3	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	21	29	305	127	261	232
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	24	33	343	143	293	261
Pedestrians						10
Lane Width (ft)						12.0
Walking Speed (ft/s)						4.0
Percent Blockage						1
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	2					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1190	353			485	
vC1, stage 1 conf vol	343					
vC2, stage 2 conf vol	847					
vCu, unblocked vol	1190	353			485	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	95			73	
cM capacity (veh/h)	290	685			1077	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	24	33	343	143	293	261
Volume Left	24	0	0	0	293	0
Volume Right	0	33	0	143	0	0
cSH	290	685	1700	1700	1077	1700
Volume to Capacity	0.08	0.05	0.20	0.08	0.27	0.15
Queue Length 95th (ft)	7	4	0	0	28	0
Control Delay (s)	18.5	10.5	0.0	0.0	9.6	0.0
Lane LOS	C	B			A	
Approach Delay (s)	13.9		0.0		5.1	
Approach LOS	B					

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

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	
Lane Util. Factor		0.95			0.95		1.00		1.00		1.00	
Frpb, ped/bikes		1.00			1.00		1.00		1.00		0.98	
Flpb, ped/bikes		1.00			1.00		1.00		1.00		1.00	
Frt		0.99			1.00		1.00		0.85		0.90	
Flt Protected		1.00			1.00		0.95		1.00		1.00	
Satd. Flow (prot)		3497			3528		1770		1583		1641	
Flt Permitted		1.00			0.93		0.51		1.00		1.00	
Satd. Flow (perm)		3497			3289		943		1583		1641	
Volume (vph)	0	226	20	20	277	0	48	0	54	0	36	116
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor (vph)	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	0	254	22	22	311	0	54	0	61	0	40	130
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	54	0	115	0
Lane Group Flow (vph)	0	273	0	0	333	0	54	0	7	0	55	0
Confl. Peds. (#/hr)												10
Turn Type				Perm			custom		custom			
Protected Phases		4			8						6	
Permitted Phases				8			2		2			
Actuated Green, G (s)		53.1			53.1		6.9		6.9		6.9	
Effective Green, g (s)		54.1			54.1		7.9		7.9		7.9	
Actuated g/C Ratio		0.77			0.77		0.11		0.11		0.11	
Clearance Time (s)		5.0			5.0		5.0		5.0		5.0	
Vehicle Extension (s)		3.0			3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)		2703			2542		106		179		185	
v/s Ratio Prot		0.08									c0.10	
v/s Ratio Perm					c0.10		0.06		0.04			
v/c Ratio		0.10			0.13		0.51		0.04		0.30	
Uniform Delay, d1		2.0			2.0		29.2		27.7		28.5	
Progression Factor		1.00			0.11		1.00		1.00		1.00	
Incremental Delay, d2		0.1			0.1		3.8		0.1		0.9	
Delay (s)		2.0			0.3		33.0		27.8		29.4	
Level of Service		A			A		C		C		C	
Approach Delay (s)		2.0			0.3			30.2			29.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	129	6	40	13	5	4	25	689	30	15	623	25
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	145	7	45	15	6	4	28	774	34	17	700	28
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			3									
Median type		None			None							
Median storage veh)												
Upstream signal (ft)								438				
pX, platoon unblocked												
vC, conflicting volume	1198	1612	364	1234	1609	404	728			808		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1198	1612	364	1234	1609	404	728			808		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	93	93	87	94	99	97			98		
cM capacity (veh/h)	129	98	633	112	98	596	871			813		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	197	25	28	516	292	17	467	261
Volume Left	145	15	28	0	0	17	0	0
Volume Right	45	4	0	0	34	0	0	28
cSH	158	127	871	1700	1700	813	1700	1700
Volume to Capacity	1.24	0.19	0.03	0.30	0.17	0.02	0.27	0.15
Queue Length 95th (ft)	283	17	2	0	0	2	0	0
Control Delay (s)	207.9	40.1	9.3	0.0	0.0	9.5	0.0	0.0
Lane LOS	F	E	A			A		
Approach Delay (s)	207.9	40.1	0.3			0.2		
Approach LOS	F	E						

Intersection Summary			
Average Delay	23.5		
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		

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	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.95	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777	1583		1726		1770	3537		1770	3498	
Flt Permitted		0.72	1.00		0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1333	1583		1673		1770	3537		1770	3498	
Volume (vph)	177	6	50	3	8	11	56	556	3	3	621	52
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	199	7	56	3	9	12	63	625	3	3	698	58
RTOR Reduction (vph)	0	0	42	0	9	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	206	14	0	15	0	63	628	0	3	750	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		13.8	13.8		13.8		4.7	30.4		0.9	26.6	
Effective Green, g (s)		14.8	14.8		14.8		5.7	31.4		1.9	27.6	
Actuated g/C Ratio		0.25	0.25		0.25		0.09	0.52		0.03	0.46	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		328	390		412		168	1848		56	1606	
v/s Ratio Prot							c0.04	c0.18		0.00	c0.22	
v/s Ratio Perm		c0.15	0.04		0.01							
v/c Ratio		0.63	0.04		0.04		0.38	0.34		0.05	0.47	
Uniform Delay, d1		20.2	17.2		17.2		25.5	8.3		28.2	11.2	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.7	0.0		0.0		1.4	0.1		0.4	0.2	
Delay (s)		23.9	17.3		17.3		26.9	8.4		28.6	11.4	
Level of Service		C	B		B		C	A		C	B	
Approach Delay (s)		22.5			17.3			10.1			11.5	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	130	24	36	493	604	99
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	146	27	40	554	679	111
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1313	679	790			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1313	679	790			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	12	94	95			
cM capacity (veh/h)	166	452	830			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	173	40	554	679	111
Volume Left	146	40	0	0	0
Volume Right	27	0	0	0	111
cSH	184	830	1700	1700	1700
Volume to Capacity	0.94	0.05	0.33	0.40	0.07
Queue Length 95th (ft)	185	4	0	0	0
Control Delay (s)	102.7	9.6	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	102.7	0.7		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	11.7		
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

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	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1750			1809	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.78			0.76	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1395			1414	1583
Volume (vph)	21	336	57	17	476	60	93	31	43	50	34	47
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	24	378	64	19	535	67	104	35	48	56	38	53
RTOR Reduction (vph)	0	0	28	0	0	25	0	16	0	0	0	42
Lane Group Flow (vph)	24	378	36	19	535	42	0	171	0	0	94	11
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	2.2	32.0	32.0	1.0	30.8	30.8		11.2			11.2	11.2
Effective Green, g (s)	3.2	33.0	33.0	2.0	31.8	31.8		12.2			12.2	12.2
Actuated g/C Ratio	0.05	0.56	0.56	0.03	0.54	0.54		0.21			0.21	0.21
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	96	1038	882	60	1001	850		287			291	326
v/s Ratio Prot	c0.01	0.20		0.01	c0.29							
v/s Ratio Perm			0.04			0.04		c0.13			0.07	0.03
v/c Ratio	0.25	0.36	0.04	0.32	0.53	0.05		0.60			0.32	0.03
Uniform Delay, d1	26.8	7.3	5.9	27.9	8.9	6.5		21.3			20.0	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	1.4	0.2	0.0	3.0	0.6	0.0		3.3			0.6	0.0
Delay (s)	28.2	7.5	6.0	31.0	9.4	6.5		24.6			20.6	18.8
Level of Service	C	A	A	C	A	A		C			C	B
Approach Delay (s)		8.3			9.8			24.6			20.0	
Approach LOS		A			A			C			B	

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	59.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.8%	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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85		0.92			0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	1847		1770	1863	1583		1684			1669	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.92			0.96	
Satd. Flow (perm)	1770	1847		1770	1863	1583		1563			1613	
Volume (vph)	28	379	22	24	474	8	26	10	58	9	11	53
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	31	426	25	27	533	9	29	11	65	10	12	60
RTOR Reduction (vph)	0	2	0	0	0	3	0	57	0	0	53	0
Lane Group Flow (vph)	31	449	0	27	533	6	0	48	0	0	29	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	2.5	40.8		1.2	39.5	39.5		6.4			6.4	
Effective Green, g (s)	3.5	41.8		2.2	40.5	40.5		7.4			7.4	
Actuated g/C Ratio	0.06	0.66		0.03	0.64	0.64		0.12			0.12	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	98	1218		61	1190	1011		182			188	
v/s Ratio Prot	c0.02	0.24		0.02	c0.29							
v/s Ratio Perm						0.01		c0.07			0.05	
v/c Ratio	0.32	0.37		0.44	0.45	0.01		0.26			0.15	
Uniform Delay, d1	28.8	4.9		30.0	5.8	4.2		25.5			25.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	1.9	0.2		5.1	0.3	0.0		0.8			0.4	
Delay (s)	30.7	5.1		35.1	6.1	4.2		26.3			25.6	
Level of Service	C	A		D	A	A		C			C	
Approach Delay (s)		6.7			7.4			26.3			25.6	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	63.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.1%	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	
Lane Util. Factor		1.00	1.00				1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	1.00				1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00				1.00	1.00		1.00	1.00	
Frt		1.00	0.85				1.00	1.00		1.00	0.96	
Flt Protected		0.95	1.00				0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1774	1583				1770	3533		1770	3357	
Flt Permitted		0.73	1.00				0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1355	1583				1770	3533		1770	3357	
Volume (vph)	393	2	238	0	0	0	298	514	5	2	609	247
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	418	2	253	0	0	0	317	547	5	2	648	263
RTOR Reduction (vph)	0	0	169	0	0	0	0	0	0	0	42	0
Lane Group Flow (vph)	0	420	84	0	0	0	317	552	0	2	869	0
Confl. Peds. (#/hr)						10			10			10
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		30.3	30.3				18.3	48.1		1.1	30.9	
Effective Green, g (s)		31.3	31.3				19.3	49.1		2.1	31.9	
Actuated g/C Ratio		0.33	0.33				0.20	0.52		0.02	0.34	
Clearance Time (s)		5.0	5.0				5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0				3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		449	524				361	1836		39	1133	
v/s Ratio Prot							c0.18	0.16		0.00	c0.27	
v/s Ratio Perm		c0.31	0.16									
v/c Ratio		0.94	0.16				0.88	0.30		0.05	0.77	
Uniform Delay, d1		30.6	22.3				36.5	12.9		45.2	28.0	
Progression Factor		1.00	1.00				1.00	1.00		1.00	1.00	
Incremental Delay, d2		26.8	0.1				20.7	0.1		0.5	3.2	
Delay (s)		57.4	22.5				57.1	13.0		45.8	31.1	
Level of Service		E	C				E	B		D	C	
Approach Delay (s)		44.3			0.0			29.1			31.2	
Approach LOS		D			A			C			C	

Intersection Summary			
HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	94.5	Sum of lost time (s)	12.0
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	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.96		0.98		1.00	1.00	0.95	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.95	1.00		0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1775	1522		1676		1770	1863	1508	1770	1863	1583
Flt Permitted		0.74	1.00		0.77		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1371	1522		1333		1770	1863	1508	1770	1863	1583
Volume (vph)	69	1	139	46	1	29	132	542	79	52	677	75
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	73	1	148	49	1	31	140	577	84	55	720	80
RTOR Reduction (vph)	0	0	129	0	27	0	0	0	24	0	0	15
Lane Group Flow (vph)	0	74	19	0	54	0	140	577	60	55	720	65
Confl. Peds. (#/hr)			10			10			10			
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Actuated Green, G (s)		8.1	8.1		8.1		8.2	45.3	45.3	4.0	41.1	41.1
Effective Green, g (s)		9.1	9.1		9.1		9.2	46.3	46.3	5.0	42.1	42.1
Actuated g/C Ratio		0.13	0.13		0.13		0.13	0.64	0.64	0.07	0.58	0.58
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		172	191		168		225	1191	964	122	1083	921
v/s Ratio Prot							c0.08	0.31		0.03	c0.39	
v/s Ratio Perm		0.05	0.10		0.06				0.06			0.05
v/c Ratio		0.43	0.10		0.32		0.62	0.48	0.06	0.45	0.66	0.07
Uniform Delay, d1		29.3	28.0		28.8		30.0	6.8	4.9	32.4	10.3	6.6
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.7	0.2		1.1		5.3	0.3	0.0	2.6	1.6	0.0
Delay (s)		31.0	28.2		29.9		35.2	7.1	4.9	35.0	11.9	6.6
Level of Service		C	C		C		D	A	A	D	B	A
Approach Delay (s)		29.2			29.9			11.8			12.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	72.4	Sum of lost time (s)	12.0
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												
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		0.95	1.00		0.95		1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85		0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.97	1.00		0.98		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3427	1583		3336		1770	3539	1583	1770	3539	
Flt Permitted		0.97	1.00		0.98		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		3427	1583		3336		1770	3539	1583	1770	3539	
Volume (vph)	182	96	163	65	81	57	169	485	65	86	513	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	194	102	173	69	86	61	180	516	69	91	546	0
RTOR Reduction (vph)	0	0	133	0	54	0	0	0	48	0	0	0
Lane Group Flow (vph)	0	296	40	0	162	0	180	516	21	91	546	0
Turn Type	Split		Perm	Split			Prot		Perm	Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)		15.0	15.0		7.5		11.5	20.6	20.6	6.9	16.0	
Effective Green, g (s)		16.0	16.0		8.5		12.5	21.6	21.6	7.9	17.0	
Actuated g/C Ratio		0.23	0.23		0.12		0.18	0.31	0.31	0.11	0.24	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		783	362		405		316	1092	488	200	859	
v/s Ratio Prot		0.09			c0.06		c0.10	0.15		0.05	c0.15	
v/s Ratio Perm			0.11						0.04			
v/c Ratio		0.38	0.11		0.40		0.57	0.47	0.04	0.46	0.64	
Uniform Delay, d1		22.8	21.4		28.4		26.3	19.6	17.0	29.0	23.7	
Progression Factor		0.89	0.64		1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.4	0.6		0.7		2.4	0.3	0.0	1.6	1.5	
Delay (s)		21.7	14.2		29.1		28.6	19.9	17.0	30.7	25.3	
Level of Service		C	B		C		C	B	B	C	C	
Approach Delay (s)		18.9			29.1			21.7			26.0	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
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	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1523	1863	1517	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1523	1863	1517	1770	1863
Volume (vph)	246	53	576	319	59	578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	262	56	613	339	63	615
RTOR Reduction (vph)	0	43	0	159	0	0
Lane Group Flow (vph)	262	13	613	180	63	615
Confl. Peds. (#/hr)		10		10		
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	12.7	12.7	27.7	27.7	3.1	35.8
Effective Green, g (s)	13.7	13.7	28.7	28.7	4.1	36.8
Actuated g/C Ratio	0.23	0.23	0.49	0.49	0.07	0.63
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	415	357	914	744	124	1172
v/s Ratio Prot	c0.15		c0.33		0.04	c0.33
v/s Ratio Perm		0.04		0.22		
v/c Ratio	0.63	0.04	0.67	0.24	0.51	0.52
Uniform Delay, d1	20.1	17.3	11.3	8.6	26.2	6.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	0.0	1.9	0.2	3.3	0.4
Delay (s)	23.3	17.3	13.3	8.8	29.5	6.4
Level of Service	C	B	B	A	C	A
Approach Delay (s)	22.2		11.7			8.6
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	58.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	29	14	441	38	19	402
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	31	15	469	40	20	428
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	937	469			510	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	937	469			510	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	89	97			98	
cM capacity (veh/h)	288	594			1056	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	31	15	469	40	448
Volume Left	31	0	0	0	20
Volume Right	0	15	0	40	0
cSH	288	594	1700	1700	1056
Volume to Capacity	0.11	0.03	0.28	0.02	0.02
Queue Length 95th (ft)	9	2	0	0	1
Control Delay (s)	19.0	11.2	0.0	0.0	0.6
Lane LOS	C	B			A
Approach Delay (s)	16.5		0.0		0.6
Approach LOS	C				

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	115	51	87	365	335	99
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	122	54	93	388	356	105
Pedestrians	10					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)		2				
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	992	419	472			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	992	419	472			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	50	91	91			
cM capacity (veh/h)	247	629	1081			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	177	481	462
Volume Left	122	93	0
Volume Right	54	0	105
cSH	356	1081	1700
Volume to Capacity	0.50	0.09	0.27
Queue Length 95th (ft)	66	7	0
Control Delay (s)	24.6	2.4	0.0
Lane LOS	C	A	
Approach Delay (s)	24.6	2.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	140	197	260	138	167	214
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	149	210	277	147	178	228
Pedestrians						10
Lane Width (ft)						12.0
Walking Speed (ft/s)						4.0
Percent Blockage						1
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	2					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	860	287			423	
vC1, stage 1 conf vol	277					
vC2, stage 2 conf vol	583					
vCu, unblocked vol	860	287			423	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	66	72			84	
cM capacity (veh/h)	440	746			1136	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	149	210	277	147	178	228
Volume Left	149	0	0	0	178	0
Volume Right	0	210	0	147	0	0
cSH	440	746	1700	1700	1136	1700
Volume to Capacity	0.34	0.28	0.16	0.09	0.16	0.13
Queue Length 95th (ft)	37	29	0	0	14	0
Control Delay (s)	17.3	11.7	0.0	0.0	8.8	0.0
Lane LOS	C	B			A	
Approach Delay (s)	14.0		0.0		3.8	
Approach LOS	B					

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

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	
Lane Util. Factor		0.95			0.95		1.00		1.00		1.00	
Frpb, ped/bikes		1.00			1.00		1.00		1.00		0.99	
Flpb, ped/bikes		1.00			1.00		1.00		1.00		1.00	
Frt		0.97			1.00		1.00		0.85		0.94	
Flt Protected		1.00			0.99		0.95		1.00		1.00	
Satd. Flow (prot)		3439			3517		1770		1583		1730	
Flt Permitted		1.00			0.88		0.36		1.00		1.00	
Satd. Flow (perm)		3439			3115		676		1583		1730	
Volume (vph)	0	335	78	32	219	0	48	0	99	0	119	101
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	356	83	34	233	0	51	0	105	0	127	107
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	88	0	73	0
Lane Group Flow (vph)	0	426	0	0	267	0	51	0	17	0	161	0
Confl. Peds. (#/hr)												10
Turn Type				Perm			custom		custom	Perm		
Protected Phases		4			8						6	
Permitted Phases				8			2		2	6		
Actuated Green, G (s)		49.4			49.4		10.6		10.6		10.6	
Effective Green, g (s)		50.4			50.4		11.6		11.6		11.6	
Actuated g/C Ratio		0.72			0.72		0.17		0.17		0.17	
Clearance Time (s)		5.0			5.0		5.0		5.0		5.0	
Vehicle Extension (s)		3.0			3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)		2476			2243		112		262		287	
v/s Ratio Prot		c0.13									c0.14	
v/s Ratio Perm					0.09		0.08		0.07			
v/c Ratio		0.17			0.12		0.46		0.07		0.56	
Uniform Delay, d1		3.1			3.0		26.3		24.6		26.9	
Progression Factor		1.00			0.14		1.00		1.00		1.00	
Incremental Delay, d2		0.2			0.1		2.9		0.1		2.5	
Delay (s)		3.3			0.5		29.3		24.7		29.4	
Level of Service		A			A		C		C		C	
Approach Delay (s)		3.3			0.5			26.2			29.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	60	6	37	12	3	3	40	683	14	21	729	109
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	64	6	39	13	3	3	43	727	15	22	776	116
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			3									
Median type		None			None							
Median storage veh)												
Upstream signal (ft)								438				
pX, platoon unblocked												
vC, conflicting volume	1331	1705	446	1255	1755	371	891			741		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1331	1705	446	1255	1755	371	891			741		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	37	92	93	88	96	99	94			97		
cM capacity (veh/h)	102	83	560	105	77	626	756			861		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	110	19	43	484	257	22	517	374
Volume Left	64	13	43	0	0	22	0	0
Volume Right	39	3	0	0	15	0	0	116
cSH	156	114	756	1700	1700	861	1700	1700
Volume to Capacity	0.70	0.17	0.06	0.28	0.15	0.03	0.30	0.22
Queue Length 95th (ft)	103	14	4	0	0	2	0	0
Control Delay (s)	69.5	42.7	10.0	0.0	0.0	9.3	0.0	0.0
Lane LOS	F	E	B			A		
Approach Delay (s)	69.5	42.7	0.5			0.2		
Approach LOS	F	E						

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

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	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.89		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1787	1583		1640		1770	3537		1770	3498	
Flt Permitted		0.75	1.00		0.95		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1405	1583		1570		1770	3537		1770	3498	
Volume (vph)	37	7	38	1	0	5	30	695	3	10	708	60
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	39	7	40	1	0	5	32	739	3	11	753	64
RTOR Reduction (vph)	0	0	36	0	4	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	46	4	0	2	0	32	742	0	11	813	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		6.5	6.5		6.5		3.7	46.9		1.6	44.8	
Effective Green, g (s)		7.5	7.5		7.5		4.7	47.9		2.6	45.8	
Actuated g/C Ratio		0.11	0.11		0.11		0.07	0.68		0.04	0.65	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		151	170		168		119	2420		66	2289	
v/s Ratio Prot							c0.02	0.21		0.01	c0.23	
v/s Ratio Perm		c0.03	0.03		0.00							
v/c Ratio		0.30	0.03		0.01		0.27	0.31		0.17	0.36	
Uniform Delay, d1		28.8	28.0		27.9		31.0	4.4		32.7	5.4	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.1	0.1		0.0		1.2	0.1		1.2	0.1	
Delay (s)		30.0	28.0		28.0		32.2	4.5		33.8	5.5	
Level of Service		C	C		C		C	A		C	A	
Approach Delay (s)		29.1			28.0			5.6			5.9	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	7.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	110	26	41	588	611	110
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	117	28	44	626	650	117
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1363	650	767			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1363	650	767			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	24	94	95			
cM capacity (veh/h)	155	469	847			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	145	44	626	650	117
Volume Left	117	44	0	0	0
Volume Right	28	0	0	0	117
cSH	177	847	1700	1700	1700
Volume to Capacity	0.82	0.05	0.37	0.38	0.07
Queue Length 95th (ft)	140	4	0	0	0
Control Delay (s)	79.7	9.5	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	79.7	0.6		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	7.6		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

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	0.85		0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1734			1804	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.81			0.71	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1440			1328	1583
Volume (vph)	31	558	96	26	402	59	74	32	59	55	30	24
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	594	102	28	428	63	79	34	63	59	32	26
RTOR Reduction (vph)	0	0	30	0	0	28	0	26	0	0	0	21
Lane Group Flow (vph)	33	594	72	28	428	35	0	150	0	0	91	5
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	1.9	32.9	32.9	1.9	32.9	32.9		10.4			10.4	10.4
Effective Green, g (s)	2.9	33.9	33.9	2.9	33.9	33.9		11.4			11.4	11.4
Actuated g/C Ratio	0.05	0.56	0.56	0.05	0.56	0.56		0.19			0.19	0.19
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	85	1049	891	85	1049	891		273			251	300
v/s Ratio Prot	c0.02	c0.32		0.02	0.23							
v/s Ratio Perm			0.06			0.04		c0.12			0.07	0.02
v/c Ratio	0.39	0.57	0.08	0.33	0.41	0.04		0.55			0.36	0.02
Uniform Delay, d1	27.8	8.4	6.0	27.7	7.5	5.9		22.1			21.2	19.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	2.9	0.7	0.0	2.3	0.3	0.0		2.3			0.9	0.0
Delay (s)	30.7	9.1	6.1	30.0	7.7	5.9		24.3			22.1	19.9
Level of Service	C	A	A	C	A	A		C			C	B
Approach Delay (s)		9.7			8.7			24.3			21.6	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.1%	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	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.94			0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1859		1770	1863	1583		1715			1690	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.87			0.91	
Satd. Flow (perm)	1770	1859		1770	1863	1583		1526			1557	
Volume (vph)	46	617	9	12	383	7	26	13	35	29	21	78
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	49	656	10	13	407	7	28	14	37	31	22	83
RTOR Reduction (vph)	0	0	0	0	0	3	0	31	0	0	70	0
Lane Group Flow (vph)	49	666	0	13	407	4	0	48	0	0	66	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	2.0	33.7		0.7	32.4	32.4		8.4			8.4	
Effective Green, g (s)	3.0	34.7		1.7	33.4	33.4		9.4			9.4	
Actuated g/C Ratio	0.05	0.60		0.03	0.58	0.58		0.16			0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	92	1116		52	1077	915		248			253	
v/s Ratio Prot	c0.03	c0.36		0.01	0.22							
v/s Ratio Perm						0.00		0.05			c0.09	
v/c Ratio	0.53	0.60		0.25	0.38	0.00		0.19			0.26	
Uniform Delay, d1	26.7	7.2		27.4	6.6	5.2		20.9			21.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	5.8	0.9		2.5	0.2	0.0		0.4			0.6	
Delay (s)	32.5	8.1		29.9	6.8	5.2		21.3			21.7	
Level of Service	C	A		C	A	A		C			C	
Approach Delay (s)		9.7			7.5			21.3			21.7	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	57.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Warrant 3B: Peak Hour Volume

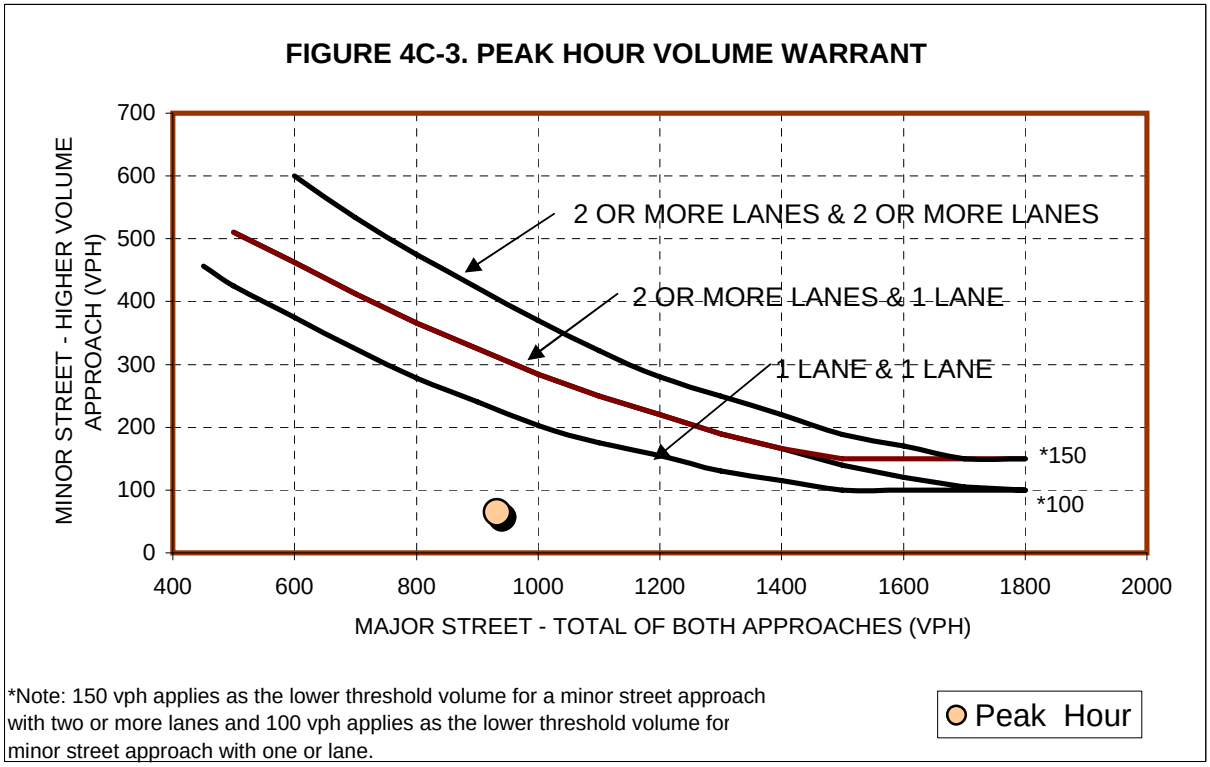
The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

Analysis

	No of lanes
Major Street	2
Minor Street	2

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
8:00 AM	933	64



Warrant	Not Met

Warrant 3B: Peak Hour Volume

The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

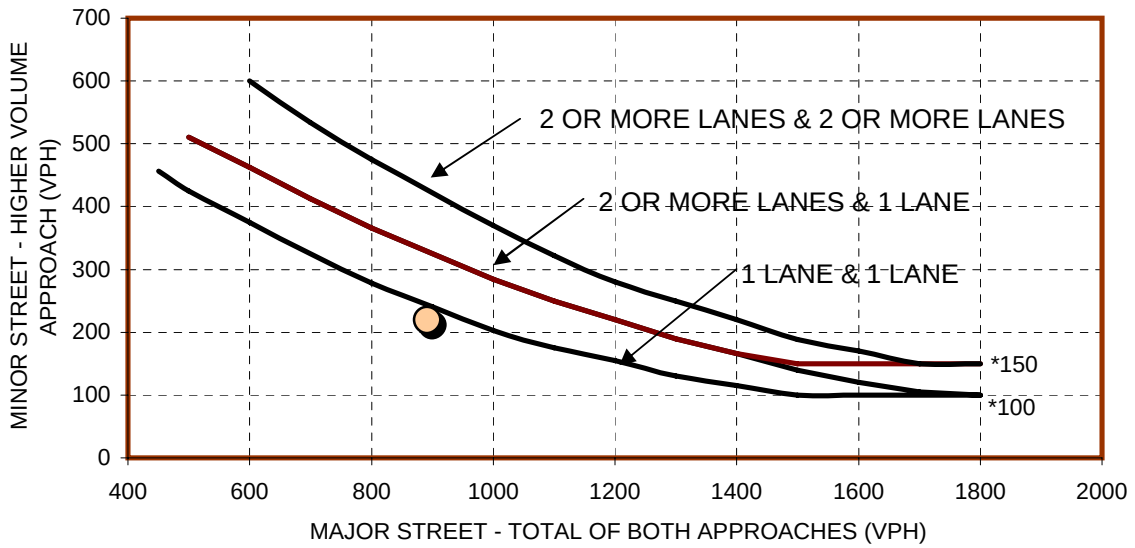
Analysis

	No of lanes
Major Street	1
Minor Street	2

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
8:00 AM	892	219

FIGURE 4C-3. PEAK HOUR VOLUME WARRANT



*Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for minor street approach with one or lane.

Peak Hour

Warrant	Not Met

Warrant 3B: Peak Hour Volume

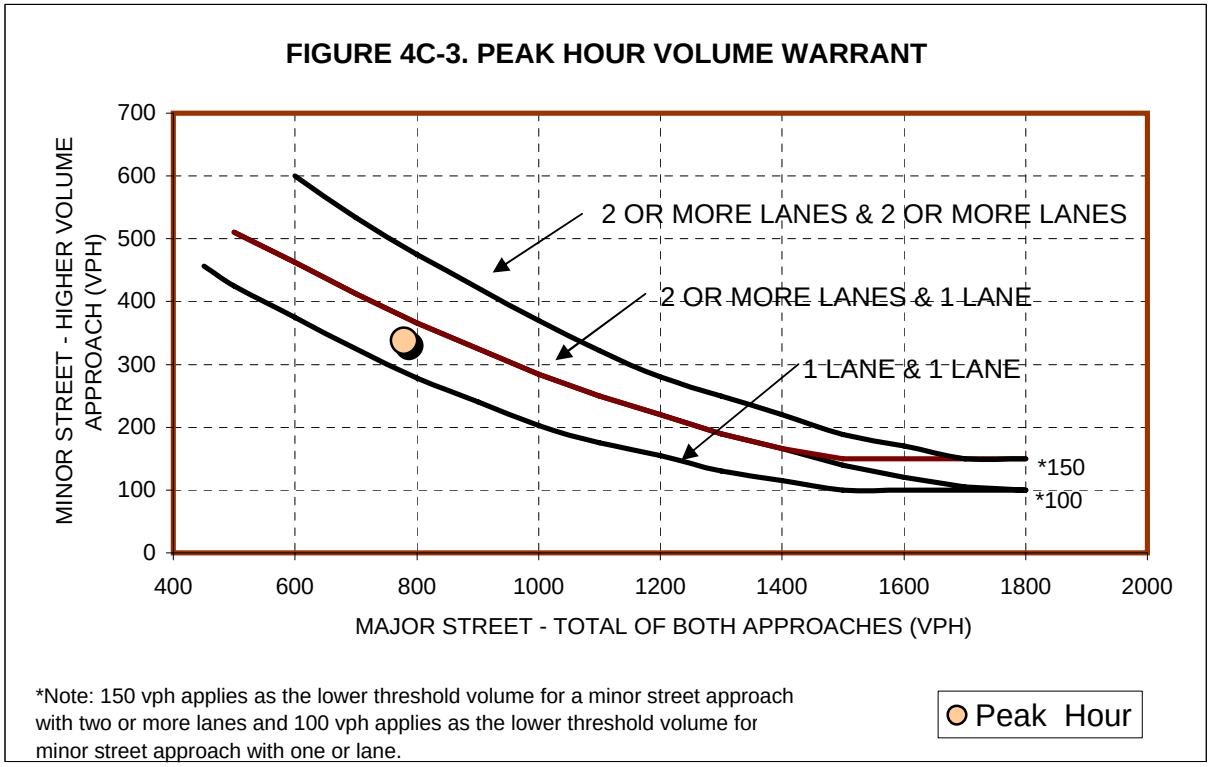
The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

Analysis

	No of lanes
Major Street	2
Minor Street	2

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
6:00 PM	779	337



Warrant	Not Met

Warrant 3B: Peak Hour Volume

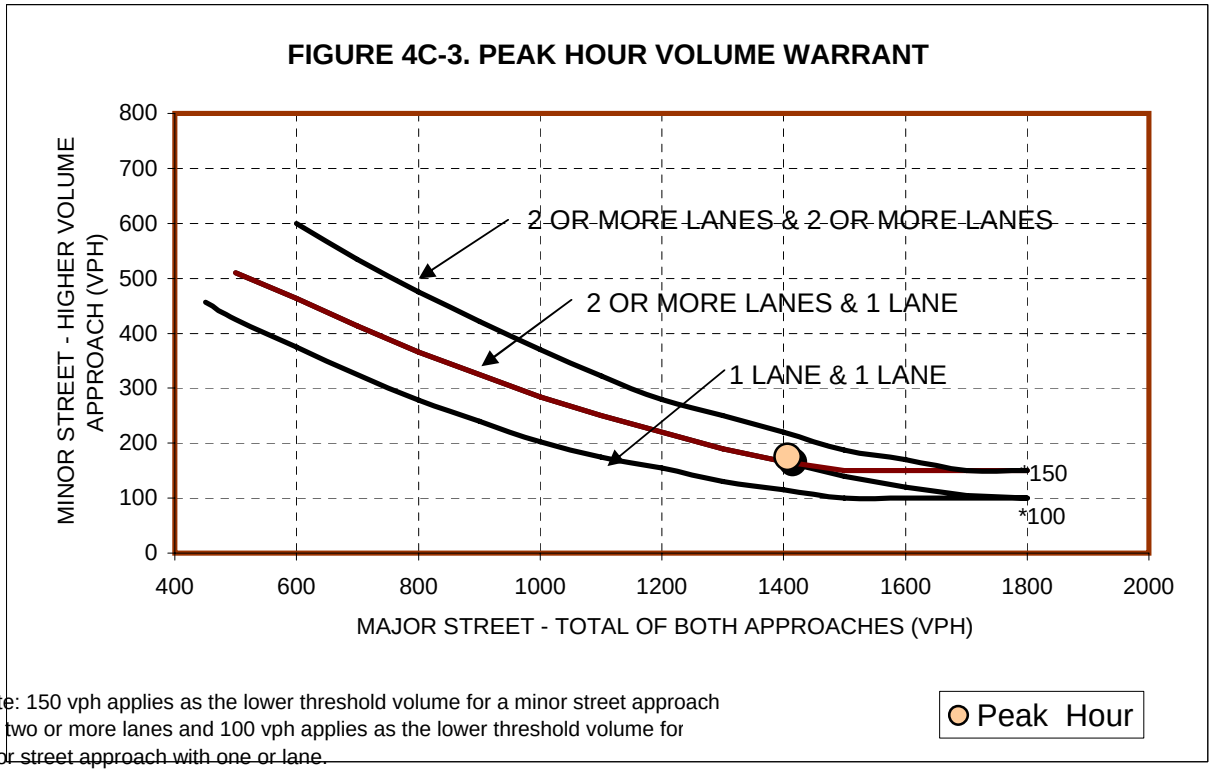
The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

Analysis

	No of lanes
Major Street	2
Minor Street	2

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
8:00 AM	1,407	175



*Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for minor street approach with one or lane.

Warrant	Not Met

Warrant 3B: Peak Hour Volume

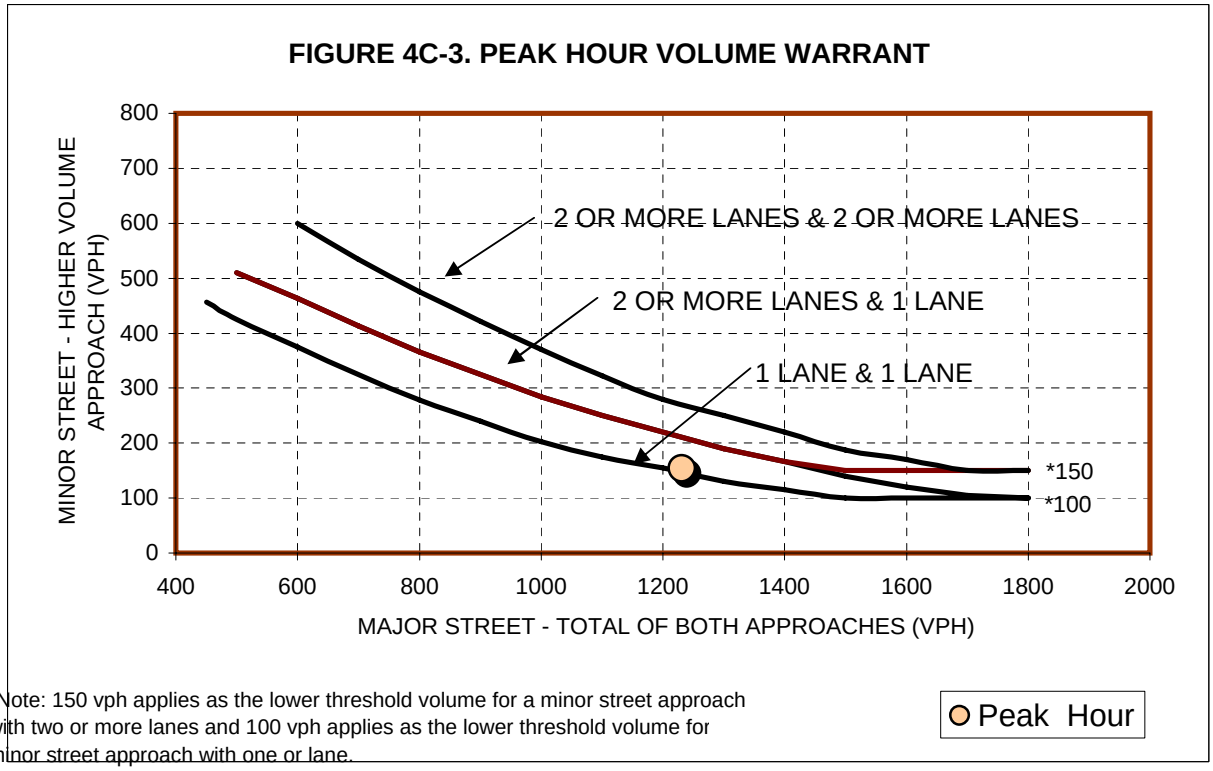
The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

Analysis

	No of lanes
Major Street	2
Minor Street	1

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
8:00 AM	1,232	154



Warrant	Not Met

Appendix C
Cumulative Intersection LOS Calculations

FEHR & PEERS
TRANSPORTATION CONSULTANTS

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	
Lane Util. Factor		1.00	1.00				1.00	0.95			0.95	
Frpb, ped/bikes		1.00	1.00				1.00	1.00			0.99	
Flpb, ped/bikes		1.00	1.00				1.00	1.00			1.00	
Frt		1.00	0.85				1.00	1.00			0.96	
Flt Protected		0.95	1.00				0.95	1.00			1.00	
Satd. Flow (prot)		1770	1583				1770	3535			3390	
Flt Permitted		0.76	1.00				0.95	1.00			1.00	
Satd. Flow (perm)		1410	1583				1770	3535			3390	
Volume (vph)	202	0	159	0	0	0	414	624	4	0	509	161
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	227	0	179	0	0	0	465	701	4	0	572	181
RTOR Reduction (vph)	0	0	139	0	0	0	0	0	0	0	30	0
Lane Group Flow (vph)	0	227	40	0	0	0	465	705	0	0	723	0
Confl. Peds. (#/hr)						10			10			10
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		16.4	16.4				24.2	50.6			21.4	
Effective Green, g (s)		17.4	17.4				25.2	51.6			22.4	
Actuated g/C Ratio		0.23	0.23				0.33	0.67			0.29	
Clearance Time (s)		5.0	5.0				5.0	5.0			5.0	
Vehicle Extension (s)		3.0	3.0				3.0	3.0			3.0	
Lane Grp Cap (vph)		319	358				579	2369			986	
v/s Ratio Prot							c0.26	0.20			c0.22	
v/s Ratio Perm		c0.16	0.11									
v/c Ratio		0.71	0.11				0.80	0.30			0.73	
Uniform Delay, d1		27.5	23.7				23.6	5.2			24.6	
Progression Factor		1.00	1.00				1.00	1.00			1.00	
Incremental Delay, d2		7.3	0.1				7.9	0.1			2.9	
Delay (s)		34.8	23.8				31.6	5.3			27.5	
Level of Service		C	C				C	A			C	
Approach Delay (s)		29.9			0.0			15.7			27.5	
Approach LOS		C			A			B			C	

Intersection Summary			
HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.3%	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
Frpb, ped/bikes		1.00	0.96		0.99		1.00	1.00	0.95	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1779	1518		1726		1770	1863	1502	1770	1863	1583
Flt Permitted		0.57	1.00		0.76		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1063	1518		1350		1770	1863	1502	1770	1863	1583
Volume (vph)	87	5	170	95	37	48	276	555	75	23	583	155
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	98	6	191	107	42	54	310	624	84	26	655	174
RTOR Reduction (vph)	0	0	161	0	13	0	0	0	21	0	0	37
Lane Group Flow (vph)	0	104	30	0	190	0	310	624	63	26	655	137
Confl. Peds. (#/hr)			10			10			10			
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Actuated Green, G (s)		12.2	12.2		12.2		18.3	54.5	54.5	1.6	37.8	37.8
Effective Green, g (s)		13.2	13.2		13.2		19.3	55.5	55.5	2.6	38.8	38.8
Actuated g/C Ratio		0.16	0.16		0.16		0.23	0.67	0.67	0.03	0.47	0.47
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		168	241		214		410	1241	1001	55	868	737
v/s Ratio Prot							c0.18	0.33		0.01	c0.35	
v/s Ratio Perm		0.10	0.13		c0.15				0.06			0.11
v/c Ratio		0.62	0.13		0.89		0.76	0.50	0.06	0.47	0.75	0.19
Uniform Delay, d1		32.7	30.1		34.3		29.8	7.0	4.8	39.7	18.3	13.0
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		6.6	0.2		32.3		7.8	0.3	0.0	6.3	3.8	0.1
Delay (s)		39.3	30.3		66.6		37.6	7.3	4.9	46.0	22.1	13.1
Level of Service		D	C		E		D	A	A	D	C	B
Approach Delay (s)		33.5			66.6			16.3			21.0	
Approach LOS		C			E			B			C	

Intersection Summary			
HCM Average Control Delay	24.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	83.3	Sum of lost time (s)	12.0
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		0.95	1.00		0.95		1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85		0.94		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.97	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3439	1583		3280		1770	3539	1583	1770	3539	
Flt Permitted		0.97	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		3439	1583		3280		1770	3539	1583	1770	3539	
Volume (vph)	117	83	93	63	87	105	229	578	57	99	494	0
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	131	93	104	71	98	118	257	649	64	111	555	0
RTOR Reduction (vph)	0	0	84	0	104	0	0	0	42	0	0	0
Lane Group Flow (vph)	0	224	20	0	183	0	257	649	22	111	555	0
Turn Type	Split		Perm	Split			Prot		Perm	Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)		12.6	12.6		7.5		14.2	23.5	23.5	6.4	15.7	
Effective Green, g (s)		13.6	13.6		8.5		15.2	24.5	24.5	7.4	16.7	
Actuated g/C Ratio		0.19	0.19		0.12		0.22	0.35	0.35	0.11	0.24	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		668	308		398		384	1239	554	187	844	
v/s Ratio Prot		0.07			c0.09		c0.15	0.18		0.06	c0.16	
v/s Ratio Perm			0.07						0.04			
v/c Ratio		0.34	0.07		0.46		0.67	0.52	0.04	0.59	0.66	
Uniform Delay, d1		24.3	23.0		28.6		25.1	18.1	15.0	29.9	24.1	
Progression Factor		0.91	0.72		1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.4	0.4		0.8		4.4	0.4	0.0	5.0	1.9	
Delay (s)		23.4	17.0		29.5		29.5	18.5	15.0	34.8	25.9	
Level of Service		C	B		C		C	B	B	C	C	
Approach Delay (s)		21.4			29.5			21.2			27.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	24.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
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	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	0.95	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1519	1863	1511	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1519	1863	1511	1770	1863
Volume (vph)	254	51	579	413	93	598
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	285	57	651	464	104	672
RTOR Reduction (vph)	0	44	0	185	0	0
Lane Group Flow (vph)	285	13	651	279	104	672
Confl. Peds. (#/hr)		10		10		
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	14.5	14.5	32.0	32.0	5.9	42.9
Effective Green, g (s)	15.5	15.5	33.0	33.0	6.9	43.9
Actuated g/C Ratio	0.23	0.23	0.49	0.49	0.10	0.65
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	407	349	912	740	181	1213
v/s Ratio Prot	c0.16		c0.35		0.06	c0.36
v/s Ratio Perm		0.04		0.31		
v/c Ratio	0.70	0.04	0.71	0.38	0.57	0.55
Uniform Delay, d1	23.8	20.2	13.5	10.8	28.9	6.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.4	0.0	2.7	0.3	4.4	0.6
Delay (s)	29.2	20.2	16.2	11.1	33.2	7.0
Level of Service	C	C	B	B	C	A
Approach Delay (s)	27.7		14.1			10.5
Approach LOS	C		B			B

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	67.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	65	27	442	24	9	523
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	73	30	497	27	10	588
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1104	497			524	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1104	497			524	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	68	95			99	
cM capacity (veh/h)	231	573			1043	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	73	30	497	27	598
Volume Left	73	0	0	0	10
Volume Right	0	30	0	27	0
cSH	231	573	1700	1700	1043
Volume to Capacity	0.32	0.05	0.29	0.02	0.01
Queue Length 95th (ft)	33	4	0	0	1
Control Delay (s)	27.6	11.6	0.0	0.0	0.3
Lane LOS	D	B			A
Approach Delay (s)	22.9		0.0		0.3
Approach LOS	C				

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	129	101	38	346	413	179
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	145	113	43	389	464	201
Pedestrians	10					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)		2				
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1049	575	675			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1049	575	675			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	39	78	95			
cM capacity (veh/h)	238	514	909			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	258	431	665
Volume Left	145	43	0
Volume Right	113	0	201
cSH	387	909	1700
Volume to Capacity	0.67	0.05	0.39
Queue Length 95th (ft)	117	4	0
Control Delay (s)	31.1	1.4	0.0
Lane LOS	D	A	
Approach Delay (s)	31.1	1.4	0.0
Approach LOS	D		

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	21	30	350	130	266	253
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	24	34	393	146	299	284
Pedestrians						10
Lane Width (ft)						12.0
Walking Speed (ft/s)						4.0
Percent Blockage						1
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	2					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1275	403			539	
vC1, stage 1 conf vol	393					
vC2, stage 2 conf vol	882					
vCu, unblocked vol	1275	403			539	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	95			71	
cM capacity (veh/h)	271	642			1029	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	24	34	393	146	299	284
Volume Left	24	0	0	0	299	0
Volume Right	0	34	0	146	0	0
cSH	271	642	1700	1700	1029	1700
Volume to Capacity	0.09	0.05	0.23	0.09	0.29	0.17
Queue Length 95th (ft)	7	4	0	0	30	0
Control Delay (s)	19.5	10.9	0.0	0.0	9.9	0.0
Lane LOS	C	B			A	
Approach Delay (s)	14.5		0.0		5.1	
Approach LOS	B					

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

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	
Lane Util. Factor		0.95			0.95		1.00		1.00		1.00	
Frpb, ped/bikes		1.00			1.00		1.00		1.00		0.98	
Flpb, ped/bikes		1.00			1.00		1.00		1.00		1.00	
Frt		0.99			1.00		1.00		0.85		0.90	
Flt Protected		1.00			1.00		0.95		1.00		1.00	
Satd. Flow (prot)		3497			3522		1770		1583		1641	
Flt Permitted		1.00			0.91		0.49		1.00		1.00	
Satd. Flow (perm)		3497			3224		920		1583		1641	
Volume (vph)	0	228	20	30	286	0	49	0	59	0	40	130
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor (vph)	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	0	256	22	34	321	0	55	0	66	0	45	146
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	58	0	129	0
Lane Group Flow (vph)	0	275	0	0	355	0	55	0	8	0	62	0
Confl. Peds. (#/hr)												10
Turn Type				Perm			custom		custom			
Protected Phases		4			8						6	
Permitted Phases				8			2		2			
Actuated Green, G (s)		52.9			52.9		7.1		7.1		7.1	
Effective Green, g (s)		53.9			53.9		8.1		8.1		8.1	
Actuated g/C Ratio		0.77			0.77		0.12		0.12		0.12	
Clearance Time (s)		5.0			5.0		5.0		5.0		5.0	
Vehicle Extension (s)		3.0			3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)		2693			2482		106		183		190	
v/s Ratio Prot		0.08									c0.12	
v/s Ratio Perm					c0.11		0.06		0.04			
v/c Ratio		0.10			0.14		0.52		0.04		0.33	
Uniform Delay, d1		2.0			2.1		29.1		27.5		28.4	
Progression Factor		1.00			0.12		1.00		1.00		1.00	
Incremental Delay, d2		0.1			0.1		4.2		0.1		1.0	
Delay (s)		2.1			0.3		33.4		27.6		29.4	
Level of Service		A			A		C		C		C	
Approach Delay (s)		2.1			0.3			30.2			29.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	132	6	41	13	5	4	26	775	31	15	662	26
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	148	7	46	15	6	4	29	871	35	17	744	29
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			3									
Median type		None			None							
Median storage veh)												
Upstream signal (ft)								438				
pX, platoon unblocked												
vC, conflicting volume	1293	1756	387	1356	1753	453	773			906		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1293	1756	387	1356	1753	453	773			906		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	92	92	84	93	99	97			98		
cM capacity (veh/h)	108	79	612	89	80	554	838			747		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	201	25	29	581	325	17	496	277
Volume Left	148	15	29	0	0	17	0	0
Volume Right	46	4	0	0	35	0	0	29
cSH	132	102	838	1700	1700	747	1700	1700
Volume to Capacity	1.52	0.24	0.03	0.34	0.19	0.02	0.29	0.16
Queue Length 95th (ft)	349	22	3	0	0	2	0	0
Control Delay (s)	328.2	51.2	9.5	0.0	0.0	9.9	0.0	0.0
Lane LOS	F	F	A			A		
Approach Delay (s)	328.2	51.2	0.3			0.2		
Approach LOS	F	F						

Intersection Summary			
Average Delay	34.7		
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

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	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.95	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777	1583		1726		1770	3537		1770	3499	
Flt Permitted		0.72	1.00		0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1333	1583		1673		1770	3537		1770	3499	
Volume (vph)	181	6	51	3	8	11	57	640	3	3	660	53
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	203	7	57	3	9	12	64	719	3	3	742	60
RTOR Reduction (vph)	0	0	43	0	9	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	210	14	0	15	0	64	722	0	3	796	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		14.1	14.1		14.1		4.5	31.0		0.9	27.4	
Effective Green, g (s)		15.1	15.1		15.1		5.5	32.0		1.9	28.4	
Actuated g/C Ratio		0.25	0.25		0.25		0.09	0.52		0.03	0.47	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		330	392		414		160	1855		55	1629	
v/s Ratio Prot							c0.04	c0.20		0.00	c0.23	
v/s Ratio Perm		c0.16	0.04		0.01							
v/c Ratio		0.64	0.04		0.04		0.40	0.39		0.05	0.49	
Uniform Delay, d1		20.5	17.4		17.4		26.2	8.7		28.7	11.3	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		4.0	0.0		0.0		1.6	0.1		0.4	0.2	
Delay (s)		24.5	17.5		17.5		27.8	8.8		29.1	11.5	
Level of Service		C	B		B		C	A		C	B	
Approach Delay (s)		23.0			17.5			10.3			11.6	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	133	24	37	593	667	101
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	149	27	42	666	749	113
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1499	749	863			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1499	749	863			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	93	95			
cM capacity (veh/h)	127	412	779			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	176	42	666	749	113
Volume Left	149	42	0	0	0
Volume Right	27	0	0	0	113
cSH	142	779	1700	1700	1700
Volume to Capacity	1.24	0.05	0.39	0.44	0.07
Queue Length 95th (ft)	263	4	0	0	0
Control Delay (s)	214.1	9.9	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	214.1	0.6		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	21.9		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

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	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1750			1809	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.77			0.75	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1392			1390	1583
Volume (vph)	21	390	58	17	614	61	95	32	44	51	35	48
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	24	438	65	19	690	69	107	36	49	57	39	54
RTOR Reduction (vph)	0	0	26	0	0	21	0	15	0	0	0	43
Lane Group Flow (vph)	24	438	39	19	690	48	0	177	0	0	96	11
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	1.5	36.5	36.5	0.7	35.7	35.7		11.6			11.6	11.6
Effective Green, g (s)	2.5	37.5	37.5	1.7	36.7	36.7		12.6			12.6	12.6
Actuated g/C Ratio	0.04	0.59	0.59	0.03	0.58	0.58		0.20			0.20	0.20
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	69	1095	930	47	1072	911		275			275	313
v/s Ratio Prot	c0.01	0.24		0.01	c0.37							
v/s Ratio Perm			0.04			0.04		c0.14			0.07	0.03
v/c Ratio	0.35	0.40	0.04	0.40	0.64	0.05		0.64			0.35	0.03
Uniform Delay, d1	29.9	7.1	5.6	30.6	9.1	5.9		23.5			22.1	20.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	3.0	0.2	0.0	5.6	1.3	0.0		5.1			0.8	0.0
Delay (s)	32.9	7.3	5.6	36.2	10.5	6.0		28.6			22.8	20.7
Level of Service	C	A	A	D	B	A		C			C	C
Approach Delay (s)		8.3			10.7			28.6			22.1	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	63.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.3%	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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85		0.92			0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	1849		1770	1863	1583		1684			1668	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.91			0.95	
Satd. Flow (perm)	1770	1849		1770	1863	1583		1560			1598	
Volume (vph)	29	433	22	24	612	8	27	10	59	9	11	54
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	33	487	25	27	688	9	30	11	66	10	12	61
RTOR Reduction (vph)	0	1	0	0	0	3	0	59	0	0	54	0
Lane Group Flow (vph)	33	511	0	27	688	6	0	48	0	0	29	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	2.2	41.4		2.2	41.4	41.4		5.9			5.9	
Effective Green, g (s)	3.2	42.4		3.2	42.4	42.4		6.9			6.9	
Actuated g/C Ratio	0.05	0.66		0.05	0.66	0.66		0.11			0.11	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	88	1215		88	1225	1041		167			171	
v/s Ratio Prot	c0.02	0.28		0.02	c0.37							
v/s Ratio Perm						0.01		c0.07			0.05	
v/c Ratio	0.38	0.42		0.31	0.56	0.01		0.29			0.17	
Uniform Delay, d1	29.7	5.2		29.6	6.0	3.8		26.5			26.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	2.7	0.2		2.0	0.6	0.0		1.0			0.5	
Delay (s)	32.4	5.5		31.6	6.6	3.8		27.5			26.6	
Level of Service	C	A		C	A	A		C			C	
Approach Delay (s)		7.1			7.5			27.5			26.6	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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	
Lane Util. Factor		1.00	1.00				1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	1.00				1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00				1.00	1.00		1.00	1.00	
Frt		1.00	0.85				1.00	1.00		1.00	0.97	
Flt Protected		0.95	1.00				0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1775	1583				1770	3533		1770	3421	
Flt Permitted		0.73	1.00				0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1355	1583				1770	3533		1770	3421	
Volume (vph)	315	2	302	0	0	0	347	579	5	2	685	160
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	335	2	321	0	0	0	369	616	5	2	729	170
RTOR Reduction (vph)	0	0	232	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	337	89	0	0	0	369	621	0	2	877	0
Confl. Peds. (#/hr)						10			10			10
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		22.4	22.4				19.3	46.5		0.9	28.1	
Effective Green, g (s)		23.4	23.4				20.3	47.5		1.9	29.1	
Actuated g/C Ratio		0.28	0.28				0.24	0.56		0.02	0.34	
Clearance Time (s)		5.0	5.0				5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0				3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		374	437				424	1979		40	1174	
v/s Ratio Prot							c0.21	0.18		0.00	c0.26	
v/s Ratio Perm		c0.25	0.20									
v/c Ratio		0.90	0.20				0.87	0.31		0.05	0.75	
Uniform Delay, d1		29.6	23.5				31.0	10.0		40.6	24.6	
Progression Factor		1.00	1.00				1.00	1.00		1.00	1.00	
Incremental Delay, d2		23.9	0.2				17.4	0.1		0.5	2.6	
Delay (s)		53.5	23.8				48.4	10.0		41.1	27.2	
Level of Service		D	C				D	B		D	C	
Approach Delay (s)		39.0			0.0			24.3			27.3	
Approach LOS		D			A			C			C	

Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	84.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.7%	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	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.96		0.98		1.00	1.00	0.95	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.95	1.00		0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1775	1518		1674		1770	1863	1503	1770	1863	1583
Flt Permitted		0.72	1.00		0.77		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1333	1518		1330		1770	1863	1503	1770	1863	1583
Volume (vph)	70	1	142	46	1	29	136	605	79	52	772	77
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	74	1	151	49	1	31	145	644	84	55	821	82
RTOR Reduction (vph)	0	0	133	0	22	0	0	0	19	0	0	12
Lane Group Flow (vph)	0	75	18	0	59	0	145	644	65	55	821	70
Confl. Peds. (#/hr)			10			10			10			
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Actuated Green, G (s)		8.6	8.6		8.6		9.2	53.9	53.9	4.2	48.9	48.9
Effective Green, g (s)		9.6	9.6		9.6		10.2	54.9	54.9	5.2	49.9	49.9
Actuated g/C Ratio		0.12	0.12		0.12		0.12	0.67	0.67	0.06	0.61	0.61
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		157	178		156		221	1252	1010	113	1138	967
v/s Ratio Prot							c0.08	0.35		0.03	c0.44	
v/s Ratio Perm		0.06	0.10		0.06				0.06			0.05
v/c Ratio		0.48	0.10		0.38		0.66	0.51	0.06	0.49	0.72	0.07
Uniform Delay, d1		33.7	32.2		33.3		34.1	6.7	4.6	37.0	11.1	6.5
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.3	0.2		1.5		6.8	0.4	0.0	3.3	2.3	0.0
Delay (s)		36.0	32.4		34.8		40.9	7.1	4.6	40.2	13.3	6.5
Level of Service		D	C		C		D	A	A	D	B	A
Approach Delay (s)		33.6			34.8			12.5			14.3	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	81.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.1%	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		0.95	1.00		0.95		1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85		0.95		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.97	1.00		0.98		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3427	1583		3316		1770	3539	1583	1770	3539	
Flt Permitted		0.97	1.00		0.98		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		3427	1583		3316		1770	3539	1583	1770	3539	
Volume (vph)	202	105	172	83	89	80	172	529	83	112	567	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	215	112	183	88	95	85	183	563	88	119	603	0
RTOR Reduction (vph)	0	0	142	0	75	0	0	0	61	0	0	0
Lane Group Flow (vph)	0	327	41	0	193	0	183	563	27	119	603	0
Turn Type	Split		Perm	Split			Prot		Perm	Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)		14.6	14.6		7.6		12.2	20.7	20.7	7.1	15.6	
Effective Green, g (s)		15.6	15.6		8.6		13.2	21.7	21.7	8.1	16.6	
Actuated g/C Ratio		0.22	0.22		0.12		0.19	0.31	0.31	0.12	0.24	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		764	353		407		334	1097	491	205	839	
v/s Ratio Prot		0.10			c0.08		0.10	c0.16		0.07	c0.17	
v/s Ratio Perm			0.12						0.06			
v/c Ratio		0.43	0.12		0.48		0.55	0.51	0.06	0.58	0.72	
Uniform Delay, d1		23.4	21.7		28.6		25.7	19.8	17.0	29.3	24.6	
Progression Factor		0.90	0.74		1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.7	0.7		0.9		1.8	0.4	0.0	4.1	3.0	
Delay (s)		22.7	16.7		29.5		27.5	20.2	17.0	33.5	27.5	
Level of Service		C	B		C		C	C	B	C	C	
Approach Delay (s)		20.5			29.5			21.5			28.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	24.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
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	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1520	1863	1513	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1520	1863	1513	1770	1863
Volume (vph)	294	55	672	364	62	697
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	313	59	715	387	66	741
RTOR Reduction (vph)	0	44	0	138	0	0
Lane Group Flow (vph)	313	15	715	249	66	741
Confl. Peds. (#/hr)		10		10		
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	15.1	15.1	31.7	31.7	3.4	40.1
Effective Green, g (s)	16.1	16.1	32.7	32.7	4.4	41.1
Actuated g/C Ratio	0.25	0.25	0.50	0.50	0.07	0.63
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	437	375	934	759	119	1174
v/s Ratio Prot	c0.18		c0.38		0.04	c0.40
v/s Ratio Perm		0.04		0.26		
v/c Ratio	0.72	0.04	0.77	0.33	0.55	0.63
Uniform Delay, d1	22.5	18.7	13.1	9.7	29.5	7.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	0.0	3.8	0.3	5.5	1.1
Delay (s)	28.0	18.7	16.9	10.0	35.0	8.5
Level of Service	C	B	B	A	C	A
Approach Delay (s)	26.5		14.5			10.7
Approach LOS	C		B			B

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	65.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	41	21	466	59	30	440
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	44	22	496	63	32	468
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1028	496			559	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1028	496			559	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	96			97	
cM capacity (veh/h)	251	574			1012	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	44	22	496	63	500
Volume Left	44	0	0	0	32
Volume Right	0	22	0	63	0
cSH	251	574	1700	1700	1012
Volume to Capacity	0.17	0.04	0.29	0.04	0.03
Queue Length 95th (ft)	15	3	0	0	2
Control Delay (s)	22.3	11.5	0.0	0.0	0.9
Lane LOS	C	B			A
Approach Delay (s)	18.7		0.0		0.9
Approach LOS	C				

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	134	55	91	398	380	113
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	143	59	97	423	404	120
Pedestrians	10					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)		2				
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1091	474	534			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1091	474	534			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	33	90	91			
cM capacity (veh/h)	213	585	1025			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	201	520	524
Volume Left	143	97	0
Volume Right	59	0	120
cSH	288	1025	1700
Volume to Capacity	0.70	0.09	0.31
Queue Length 95th (ft)	120	8	0
Control Delay (s)	42.0	2.6	0.0
Lane LOS	E	A	
Approach Delay (s)	42.0	2.6	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	143	201	292	141	170	259
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	152	214	311	150	181	276
Pedestrians						10
Lane Width (ft)						12.0
Walking Speed (ft/s)						4.0
Percent Blockage						1
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	2					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	948	321			461	
vC1, stage 1 conf vol	311					
vC2, stage 2 conf vol	637					
vCu, unblocked vol	948	321			461	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	63	70			84	
cM capacity (veh/h)	410	714			1100	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	152	214	311	150	181	276
Volume Left	152	0	0	0	181	0
Volume Right	0	214	0	150	0	0
cSH	410	714	1700	1700	1100	1700
Volume to Capacity	0.37	0.30	0.18	0.09	0.16	0.16
Queue Length 95th (ft)	42	31	0	0	15	0
Control Delay (s)	18.9	12.2	0.0	0.0	8.9	0.0
Lane LOS	C	B			A	
Approach Delay (s)	15.0		0.0		3.5	
Approach LOS	B					

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

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	
Lane Util. Factor		0.95			0.95		1.00		1.00		1.00	
Frpb, ped/bikes		1.00			1.00		1.00		1.00		0.99	
Flpb, ped/bikes		1.00			1.00		1.00		1.00		1.00	
Frt		0.97			1.00		1.00		0.85		0.94	
Flt Protected		1.00			0.99		0.95		1.00		1.00	
Satd. Flow (prot)		3442			3512		1770		1583		1725	
Flt Permitted		1.00			0.85		0.34		1.00		1.00	
Satd. Flow (perm)		3442			3025		633		1583		1725	
Volume (vph)	0	356	80	40	220	0	50	0	115	0	123	111
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	379	85	43	234	0	53	0	122	0	131	118
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	101	0	74	0
Lane Group Flow (vph)	0	451	0	0	277	0	53	0	21	0	175	0
Confl. Peds. (#/hr)												10
Turn Type				Perm			custom		custom	Perm		
Protected Phases		4			8						6	
Permitted Phases				8			2		2	6		
Actuated Green, G (s)		48.9			48.9		11.1		11.1		11.1	
Effective Green, g (s)		49.9			49.9		12.1		12.1		12.1	
Actuated g/C Ratio		0.71			0.71		0.17		0.17		0.17	
Clearance Time (s)		5.0			5.0		5.0		5.0		5.0	
Vehicle Extension (s)		3.0			3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)		2454			2156		109		274		298	
v/s Ratio Prot		c0.13									c0.14	
v/s Ratio Perm					0.09		0.08		0.08			
v/c Ratio		0.18			0.13		0.49		0.08		0.59	
Uniform Delay, d1		3.3			3.2		26.1		24.3		26.6	
Progression Factor		1.00			0.13		1.00		1.00		1.00	
Incremental Delay, d2		0.2			0.1		3.4		0.1		2.9	
Delay (s)		3.5			0.5		29.5		24.4		29.6	
Level of Service		A			A		C		C		C	
Approach Delay (s)		3.5			0.5			25.9			29.6	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.6%	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		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	61	6	38	12	3	3	41	752	14	21	822	111
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	65	6	40	13	3	3	44	800	15	22	874	118
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			3									
Median type		None			None							
Median storage veh)												
Upstream signal (ft)								438				
pX, platoon unblocked												
vC, conflicting volume	1470	1880	496	1380	1932	407	993			815		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1470	1880	496	1380	1932	407	993			815		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	18	90	92	84	95	99	94			97		
cM capacity (veh/h)	79	64	519	82	60	593	692			808		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	112	19	44	533	282	22	583	410
Volume Left	65	13	44	0	0	22	0	0
Volume Right	40	3	0	0	15	0	0	118
cSH	119	89	692	1700	1700	808	1700	1700
Volume to Capacity	0.94	0.21	0.06	0.31	0.17	0.03	0.34	0.24
Queue Length 95th (ft)	151	19	5	0	0	2	0	0
Control Delay (s)	135.1	55.9	10.5	0.0	0.0	9.6	0.0	0.0
Lane LOS	F	F	B			A		
Approach Delay (s)	135.1	55.9	0.5			0.2		
Approach LOS	F	F						

Intersection Summary				
Average Delay	8.4			
Intersection Capacity Utilization	47.3%	ICU Level of Service	A	
Analysis Period (min)	15			

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	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.89		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1787	1583		1640		1770	3537		1770	3502	
Flt Permitted		0.75	1.00		0.95		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1404	1583		1570		1770	3537		1770	3502	
Volume (vph)	38	7	39	1	0	5	31	764	3	10	801	61
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	40	7	41	1	0	5	33	813	3	11	852	65
RTOR Reduction (vph)	0	0	37	0	4	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	47	4	0	2	0	33	816	0	11	913	0
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		6.5	6.5		6.5		3.4	48.5		1.5	46.6	
Effective Green, g (s)		7.5	7.5		7.5		4.4	49.5		2.5	47.6	
Actuated g/C Ratio		0.10	0.10		0.10		0.06	0.69		0.03	0.67	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		147	166		165		109	2449		62	2331	
v/s Ratio Prot							c0.02	0.23		0.01	c0.26	
v/s Ratio Perm		c0.03	0.03		0.00							
v/c Ratio		0.32	0.03		0.01		0.30	0.33		0.18	0.39	
Uniform Delay, d1		29.6	28.7		28.7		32.1	4.4		33.5	5.4	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.3	0.1		0.0		1.6	0.1		1.4	0.1	
Delay (s)		30.9	28.8		28.7		33.7	4.5		34.9	5.5	
Level of Service		C	C		C		C	A		C	A	
Approach Delay (s)		29.9			28.7			5.6			5.9	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	7.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	71.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	112	27	42	685	733	112
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	119	29	45	729	780	119
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1598	780	899			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1598	780	899			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	93	94			
cM capacity (veh/h)	110	395	756			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	148	45	729	780	119
Volume Left	119	45	0	0	0
Volume Right	29	0	0	0	119
cSH	128	756	1700	1700	1700
Volume to Capacity	1.15	0.06	0.43	0.46	0.07
Queue Length 95th (ft)	220	5	0	0	0
Control Delay (s)	193.7	10.1	0.0	0.0	0.0
Lane LOS	F	B			
Approach Delay (s)	193.7	0.6		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	16.0		
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

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	0.85		0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1734			1805	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.81			0.69	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1439			1277	1583
Volume (vph)	32	700	98	27	490	60	75	33	60	56	31	24
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	34	745	104	29	521	64	80	35	64	60	33	26
RTOR Reduction (vph)	0	0	21	0	0	22	0	20	0	0	0	21
Lane Group Flow (vph)	34	745	83	29	521	42	0	159	0	0	93	5
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	2.3	41.3	41.3	2.3	41.3	41.3		11.5			11.5	11.5
Effective Green, g (s)	3.3	42.3	42.3	3.3	42.3	42.3		12.5			12.5	12.5
Actuated g/C Ratio	0.05	0.60	0.60	0.05	0.60	0.60		0.18			0.18	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	83	1124	955	83	1124	955		257			228	282
v/s Ratio Prot	c0.02	c0.40		0.02	0.28							
v/s Ratio Perm			0.07			0.04		c0.12			0.07	0.02
v/c Ratio	0.41	0.66	0.09	0.35	0.46	0.04		0.62			0.41	0.02
Uniform Delay, d1	32.5	9.2	5.8	32.4	7.7	5.7		26.6			25.5	23.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	3.3	1.5	0.0	2.5	0.3	0.0		4.4			1.2	0.0
Delay (s)	35.7	10.7	5.9	34.9	8.0	5.7		31.0			26.7	23.8
Level of Service	D	B	A	C	A	A		C			C	C
Approach Delay (s)		11.1			9.0			31.0			26.1	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	70.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.7%	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	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.94			0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1859		1770	1863	1583		1714			1690	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.82			0.93	
Satd. Flow (perm)	1770	1859		1770	1863	1583		1425			1584	
Volume (vph)	47	760	9	12	470	7	27	13	36	30	21	80
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	809	10	13	500	7	29	14	38	32	22	85
RTOR Reduction (vph)	0	0	0	0	0	3	0	33	0	0	59	0
Lane Group Flow (vph)	50	819	0	13	500	4	0	48	0	0	80	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	2.9	43.9		0.8	41.8	41.8		8.5			8.5	
Effective Green, g (s)	3.9	44.9		1.8	42.8	42.8		9.5			9.5	
Actuated g/C Ratio	0.06	0.66		0.03	0.63	0.63		0.14			0.14	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	101	1224		47	1169	993		198			221	
v/s Ratio Prot	c0.03	c0.44		0.01	0.27							
v/s Ratio Perm						0.00		0.06			c0.09	
v/c Ratio	0.50	0.67		0.28	0.43	0.00		0.24			0.36	
Uniform Delay, d1	31.2	7.1		32.6	6.5	4.7		26.2			26.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	3.8	1.4		3.2	0.3	0.0		0.6			1.0	
Delay (s)	35.0	8.5		35.8	6.7	4.7		26.8			27.6	
Level of Service	C	A		D	A	A		C			C	
Approach Delay (s)		10.0			7.4			26.8			27.6	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	68.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Warrant 3B: Peak Hour Volume

The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

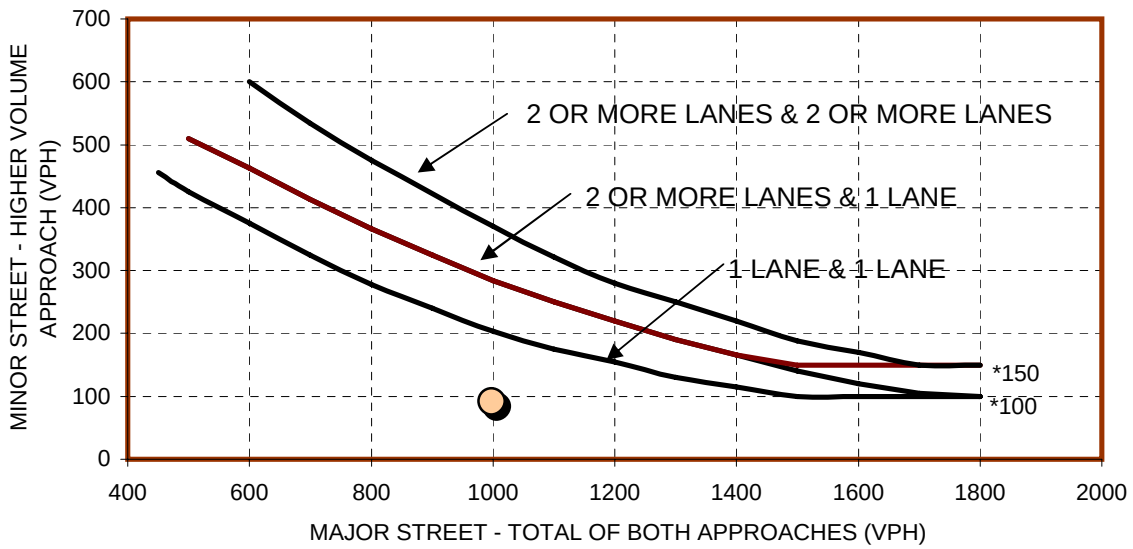
Analysis

	No of lanes
Major Street	2
Minor Street	2

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
8:00 AM	998	92

FIGURE 4C-3. PEAK HOUR VOLUME WARRANT



*Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for minor street approach with one or lane.

Peak Hour

Warrant	Not Met

Warrant 3B: Peak Hour Volume

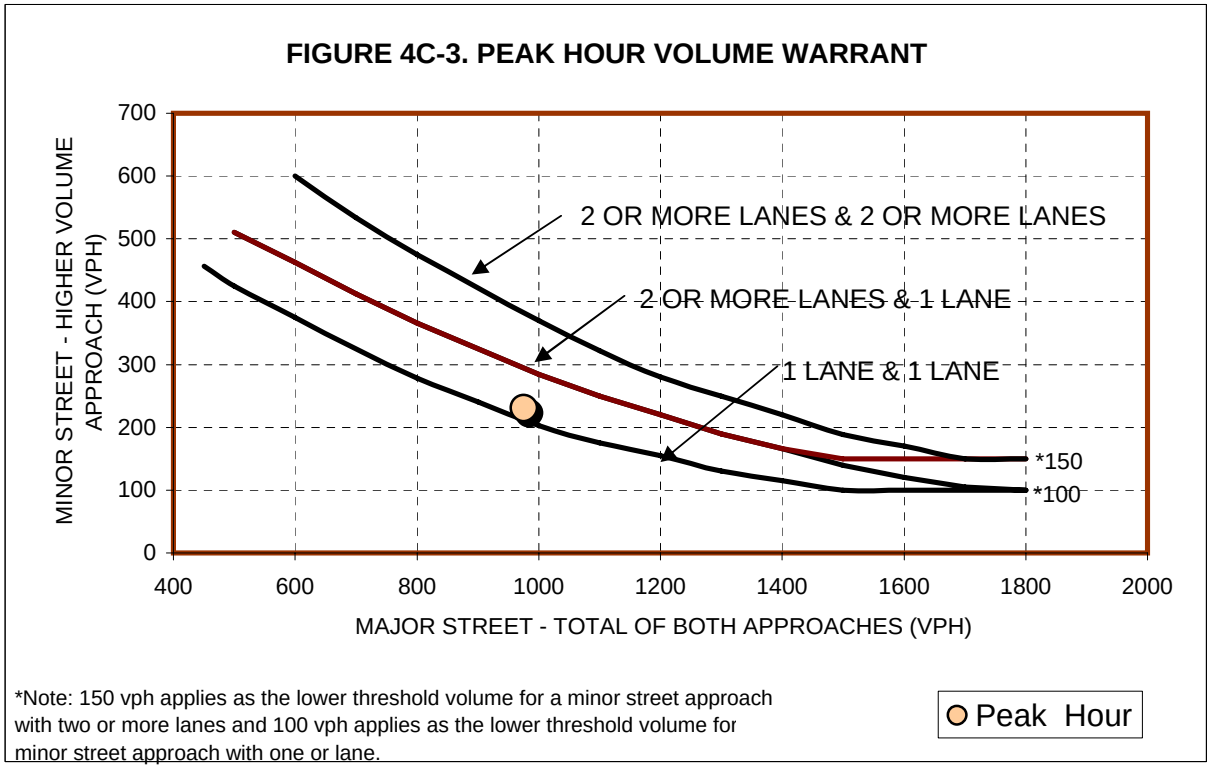
The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

Analysis

	No of lanes
Major Street	1
Minor Street	2

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
8:00 AM	976	230



Warrant	Not Met

Warrant 3B: Peak Hour Volume

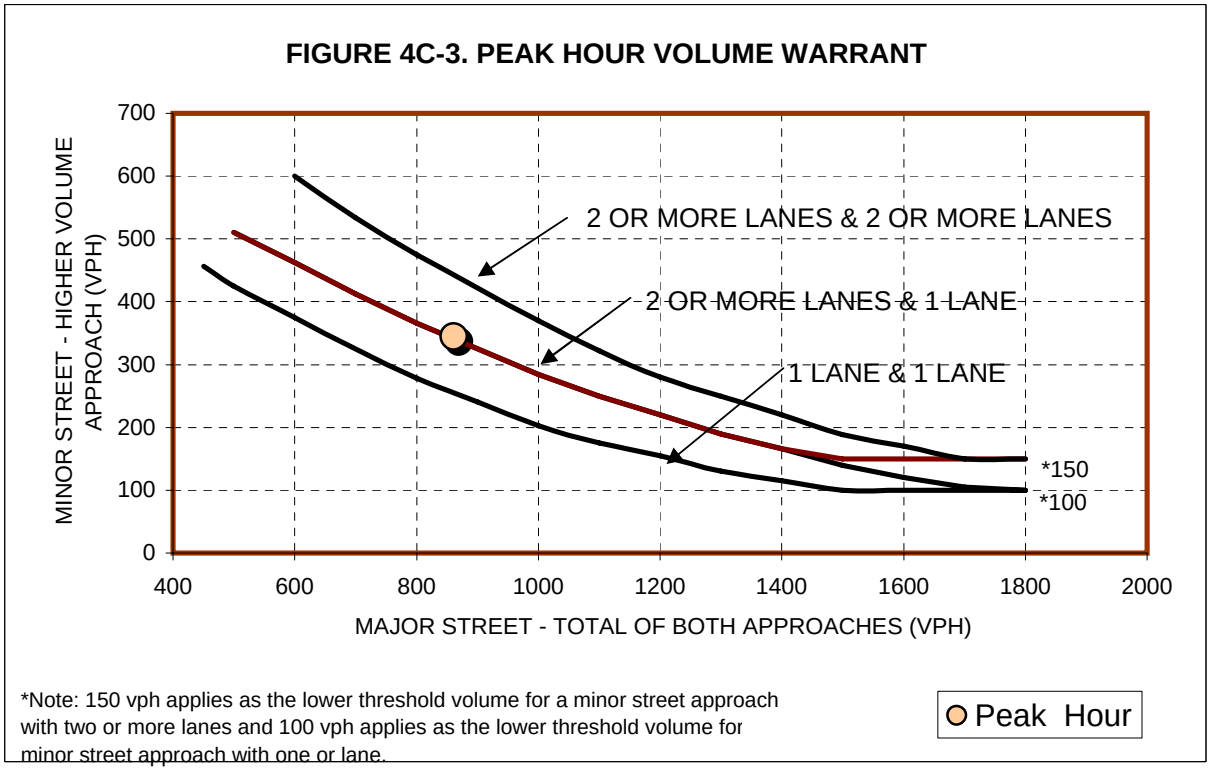
The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

Analysis

	No of lanes
Major Street	2
Minor Street	2

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
6:00 PM	862	344



Warrant	Not Met

Warrant 3B: Peak Hour Volume

The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

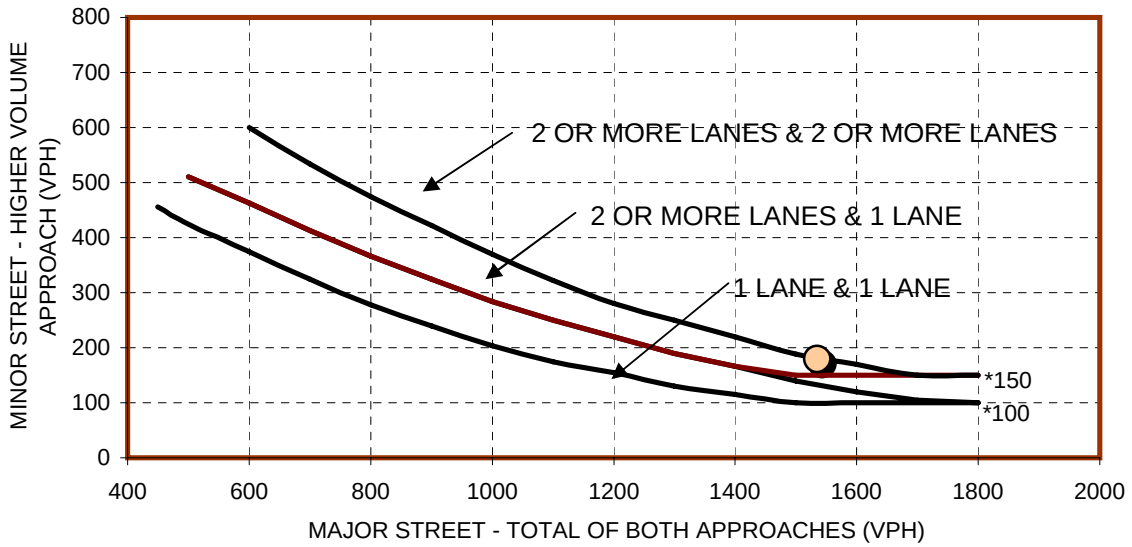
Analysis

	No of lanes
Major Street	2
Minor Street	2

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
8:00 AM	1,535	179

FIGURE 4C-3. PEAK HOUR VOLUME WARRANT



*Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for minor street approach with one or lane.

Peak Hour

Warrant	Met

Warrant 3B: Peak Hour Volume

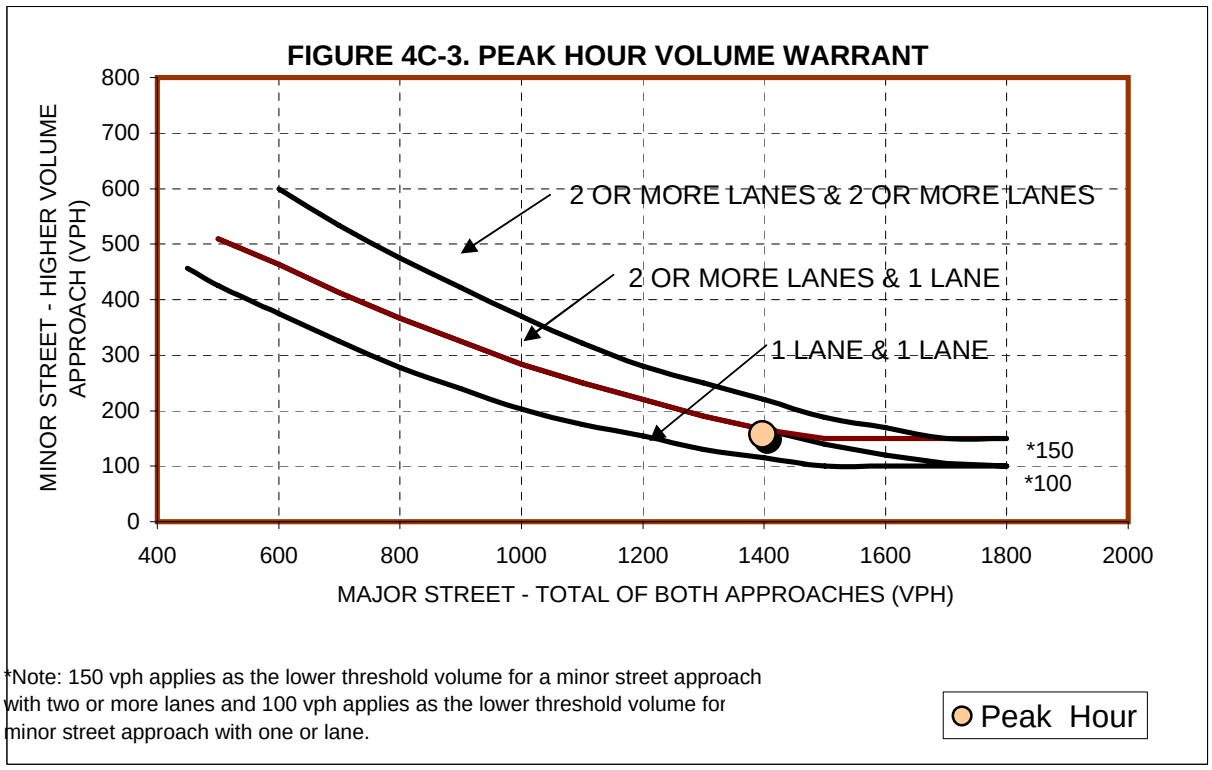
The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lanes.

Analysis

	No of lanes
Major Street	2
Minor Street	1

Peak Hour

Time	Vehicles Per Hour	
	Major Street (Sum of both approaches)	Minor street (High volume approach)
8:00 AM	1,398	157



Warrant	Met

Appendix D
Cumulative Mitigated Intersection LOS Calculations

FEHR & PEERS
TRANSPORTATION CONSULTANTS

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	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.95	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1778	1583		1769		1770	3519		1770	3519	
Flt Permitted		0.72	1.00		0.82		0.34	1.00		0.28	1.00	
Satd. Flow (perm)		1336	1583		1488		630	3519		527	3519	
Volume (vph)	132	6	41	13	5	4	26	775	31	15	662	26
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	148	7	46	15	6	4	29	871	35	17	744	29
RTOR Reduction (vph)	0	0	35	0	3	0	0	3	0	0	3	0
Lane Group Flow (vph)	0	155	11	0	22	0	29	903	0	17	770	0
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		10.9	10.9		10.9		30.7	30.7		30.7	30.7	
Effective Green, g (s)		11.9	11.9		11.9		31.7	31.7		31.7	31.7	
Actuated g/C Ratio		0.23	0.23		0.23		0.61	0.61		0.61	0.61	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		308	365		343		387	2162		324	2162	
v/s Ratio Prot								c0.26			0.22	
v/s Ratio Perm		c0.12	0.03		0.02		0.05			0.03		
v/c Ratio		0.50	0.03		0.06		0.07	0.42		0.05	0.36	
Uniform Delay, d1		17.3	15.4		15.5		4.0	5.2		4.0	4.9	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.3	0.0		0.1		0.1	0.1		0.1	0.1	
Delay (s)		18.6	15.4		15.6		4.1	5.3		4.0	5.0	
Level of Service		B	B		B		A	A		A	A	
Approach Delay (s)		17.8			15.6			5.3			5.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	6.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	51.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750		1770	1863	1863	1583
Flt Permitted	0.96		0.28	1.00	1.00	1.00
Satd. Flow (perm)	1750		516	1863	1863	1583
Volume (vph)	133	24	37	593	667	101
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	149	27	42	666	749	113
RTOR Reduction (vph)	10	0	0	0	0	39
Lane Group Flow (vph)	166	0	42	666	749	74
Turn Type			Perm			Perm
Protected Phases	4			2	6	
Permitted Phases			2			6
Actuated Green, G (s)	10.5		35.3	35.3	35.3	35.3
Effective Green, g (s)	11.5		36.3	36.3	36.3	36.3
Actuated g/C Ratio	0.21		0.65	0.65	0.65	0.65
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	361		336	1212	1212	1030
v/s Ratio Prot	c0.10			0.36	c0.40	
v/s Ratio Perm			0.08			0.07
v/c Ratio	0.46		0.12	0.55	0.62	0.07
Uniform Delay, d1	19.4		3.7	5.3	5.7	3.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9		0.2	0.5	0.9	0.0
Delay (s)	20.3		3.9	5.8	6.6	3.6
Level of Service	C		A	A	A	A
Approach Delay (s)	20.3			5.7	6.2	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.6%	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												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.98		1.00	1.00		1.00	0.98	
Flt Protected		0.96	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1781	1583		1763		1770	3529		1770	3476	
Flt Permitted		0.73	1.00		0.79		0.27	1.00		0.33	1.00	
Satd. Flow (perm)		1360	1583		1448		505	3529		624	3476	
Volume (vph)	61	6	38	12	3	3	41	752	14	21	822	111
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	65	6	40	13	3	3	44	800	15	22	874	118
RTOR Reduction (vph)	0	0	34	0	3	0	0	1	0	0	9	0
Lane Group Flow (vph)	0	71	6	0	16	0	44	814	0	22	983	0
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		7.7	7.7		7.7		44.2	44.2		44.2	44.2	
Effective Green, g (s)		8.7	8.7		8.7		45.2	45.2		45.2	45.2	
Actuated g/C Ratio		0.14	0.14		0.14		0.73	0.73		0.73	0.73	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		191	222		204		369	2577		456	2538	
v/s Ratio Prot								0.23			c0.29	
v/s Ratio Perm		c0.05	0.03		0.01		0.09			0.04		
v/c Ratio		0.37	0.03		0.08		0.12	0.32		0.05	0.39	
Uniform Delay, d1		24.1	22.9		23.1		2.5	2.9		2.3	3.1	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.2	0.0		0.2		0.1	0.1		0.0	0.1	
Delay (s)		25.3	23.0		23.3		2.6	3.0		2.4	3.2	
Level of Service		C	C		C		A	A		A	A	
Approach Delay (s)		24.5			23.3			3.0			3.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1743		1770	1863	1863	1583
Flt Permitted	0.96		0.29	1.00	1.00	1.00
Satd. Flow (perm)	1743		532	1863	1863	1583
Volume (vph)	112	27	42	685	733	112
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	119	29	45	729	780	119
RTOR Reduction (vph)	15	0	0	0	0	35
Lane Group Flow (vph)	133	0	45	729	780	84
Turn Type			Perm			Perm
Protected Phases	4			2	6	
Permitted Phases			2			6
Actuated Green, G (s)	9.2		42.3	42.3	42.3	42.3
Effective Green, g (s)	10.2		43.3	43.3	43.3	43.3
Actuated g/C Ratio	0.17		0.70	0.70	0.70	0.70
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	289		375	1312	1312	1115
v/s Ratio Prot	c0.08			0.39	c0.42	
v/s Ratio Perm			0.08			0.08
v/c Ratio	0.46		0.12	0.56	0.59	0.08
Uniform Delay, d1	23.2		2.9	4.4	4.6	2.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2		0.1	0.5	0.7	0.0
Delay (s)	24.3		3.1	4.9	5.4	2.9
Level of Service	C		A	A	A	A
Approach Delay (s)	24.3			4.8	5.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	6.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Appendix E
Cost Estimates

FEHR & PEERS
TRANSPORTATION CONSULTANTS

PRELIMINARY ENGINEER'S ESTIMATE
TRAFFIC INTERSECTION IMPROVEMENTS - Corliss Drive/Moraga Road
Moraga Fee Study
Moraga, California

19-Dec-06

Item	Description	Quantity	Unit		Unit Price		Amount
	Corliss Drive/Moraga Road						
	IMPROVEMENTS						
	Street Work						
1	Median Construction (includes: curb, gutter, signs, landscaping, and irrigation)	300	LF	$	90.00	$	27,000.00
	Subtotal					$	27,000.00
	Signalization						
2	Traffic Signal (includes: traffic signal, lighting, minor curb and gutter, pedestrian ramps, signage, and striping)	1	LS	$	250,000.00	$	250,000.00
	Subtotal					$	250,000.00
	TOTAL					**$**	**277,000.00**
	25% CONTINGENCY	**25%**					**$69,250**
	ENGINEERING STUDIES	**3%**					**$10,388**
	ENVIRONMENTAL STUDIES	**3%**					**$10,388**
	DESIGN ENGINEERING	**12%**					**$41,550**
	MANAGEMENT	**12%**					**$41,550**
	TOTAL *(rounded to nearest $100)*					**$**	**450,100.00**

Town of Moraga

PRELIMINARY ENGINEER'S ESTIMATE 19-Dec-06
TRAFFIC INTERSECTION IMPROVEMENTS - Ascott Drive/Moraga Road
Moraga Fee Study
Moraga, California

Item	Description	Quantity	Unit		Unit Price		Amount
	Ascott Drive/Moraga Road						
	IMPROVEMENTS						
	Street Work						
1	Median Construction (includes: curb, gutter, signs, landscaping, and irrigation)	845	LF	$	90.00	$	76,050.00
	Subtotal					$	76,050.00
	Signalization						
2	Traffic Signal (includes: traffic signal, lighting, minor curb and gutter, pedestrian ramps, signage, and striping)	1	LS	$	250,000.00	$	250,000.00
	Subtotal					$	250,000.00
	TOTAL					**$**	**326,050.00**
	25% CONTINGENCY	**25%**					**$81,513**
	ENGINEERING STUDIES	**3%**					**$12,227**
	ENVIRONMENTAL STUDIES	**3%**					**$12,227**
	DESIGN ENGINEERING	**12%**					**$48,908**
	MANAGEMENT	**12%**					**$48,908**
	TOTAL *(rounded to nearest $100)*					**$**	**529,800.00**

Appendix F
Existing Intersection Deficiency Calculations

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TRANSPORTATION CONSULTANTS

Appendix E

Existing Deficiency Calculations

1. Quantify the existing deficiency by determining the current traffic volume that exceeds the available capacity. The theoretical capacity was based on the maximum volume that would meet the applicable LOS standard, in this case, LOS E.

   Moraga Road at Ascot Drive:

   Existing Capacity: 1,539 cars Existing Deficiency: 65 cars

   Moraga Road at Corliss Drive:

   Existing Capacity: 1,338 cars Existing Deficiency: 48 cars

2. Determine the future traffic growth by subtracting the current traffic volumes from the forecasted future traffic volumes.

   Moraga Road at Ascot Drive:

   Future Demand: 1736 cars Future Traffic Growth: 132 cars

   Moraga Road at Corliss Drive:

   Future Demand: 1555 cars Future Traffic Growth: 169 cars

3. Define the "overall benefit" of the project as the correction of the existing deficiency (from number 1 above) plus the accommodation of future growth (from number 2).

   Moraga Road at Ascot Drive:

   Total Benefit: 65+132 = 197

   Moraga Road at Corliss Drive:

   Total Benefit: 48+169 = 217

4. Calculate new development's share of the benefit as the result of number 2 divided by number 3.

   Moraga Road at Ascot Drive:

   Fee Study Contribution: 132/197 = 67%

   Moraga Road at Corliss Drive:

   Fee Study Contribution: 169/217 = 78%

Existing Deficiency Calc.

7/17/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	64	6	40	13	5	4	25	689	30	15	623	25
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	72	7	45	15	6	4	28	774	34	17	700	28
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			3									
Median type		None			None							
Median storage veh)												
Upstream signal (ft)								438				
pX, platoon unblocked	0.93	0.93		0.93	0.93	0.93				0.93		
vC, conflicting volume	1198	1612	364	1234	1609	404	728			808		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1135	1581	364	1173	1578	277	728			713		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	46	93	93	87	94	99	97			98		
cM capacity (veh/h)	133	95	633	115	95	667	871			818		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	124	25	28	516	292	17	467	261
Volume Left	72	15	28	0	0	17	0	0
Volume Right	45	4	0	0	34	0	0	28
cSH	203	128	871	1700	1700	818	1700	1700
Volume to Capacity	0.61	0.19	0.03	0.30	0.17	0.02	0.27	0.15
Queue Length 95th (ft)	86	17	2	0	0	2	0	0
Control Delay (s)	47.7	39.6	9.3	0.0	0.0	9.5	0.0	0.0
Lane LOS	E	E	A			A		
Approach Delay (s)	47.7	39.6	0.3			0.2		
Approach LOS	E	E						

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Deficiency Calc.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	82	24	36	493	604	99
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	92	27	40	554	679	111
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1313	679	790			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1313	679	790			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	45	94	95			
cM capacity (veh/h)	166	452	830			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	119	40	554	679	111
Volume Left	92	40	0	0	0
Volume Right	27	0	0	0	111
cSH	194	830	1700	1700	1700
Volume to Capacity	0.61	0.05	0.33	0.40	0.07
Queue Length 95th (ft)	87	4	0	0	0
Control Delay (s)	49.3	9.6	0.0	0.0	0.0
Lane LOS	E	A			
Approach Delay (s)	49.3	0.7		0.0	
Approach LOS	E				

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		