REDESIGN OF A SIGNALIZED INTERSECTION USING NON-CONVENTIONAL LEFT TURN TREATMENTS TO OPTIMIZE LEVEL OF SERVICE AND DELAYS: WESTERN PLAZA CASE STUDY

By

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ABSTRACT

Congestion and safety problems at intersections have been on the rise due to the increased traffic volumes throughout mainline corridors in Puerto Rico, as well as in the United States. As a result, new and innovative intersection designs have baeen developed in order to mitigate these problems. Michigan Lefts include the elimination of direct left turns at intersections by removing left turn phases, which in turn will reduce delays and travel times.

A congested intersection in the municipality of Mayagüez, Puerto Rico was chosen as the study site in order to determine the benefits of changing it from a traditional intersection to a Michigan Left intersection. Traffic volume counts were collected at the study intersection as well as at the upstream and downstream intersections. A simulation model was developed in order to compare the delays across the study scenarios. The different scenarios studied included: the existing intersection geometry, Michigan Left applied to the mainline, Michigan Left applied to the side street, and Michigan Left applied to both the mainline and side street. Because the intersection currently has six approaches, it needs various phases in order to adequately service all the vehicles. The study intersection continued to operate under failing levels of service across all scenarios because of the need of numerous phases. Hence, a new model was developed that would essentially incorporate the Michigan Left principles by completely eliminating eastbound and westbound through movements. The new model separated the mainline roadway and the service road that runs parallel to the east, thus reducing signal phases from 7 to 4 at each intersection. In the last scenario, delays were greatly reduced, all approaches operated under acceptable levels of service during both peak hours, and queues were significantly reduced.

Numerous signal phases at signalized intersections may cause substantial delays and queues along the roadways, especially along arterials with heavy volumes. Hence, congested intersections may be studied in order to determine if a non-traditional intersection design would improve capacity and overall intersection operation.

RESUMEN EJECUTIVO

Los problemas de congestión y seguridad en las intersecciones han aumentado en los últimos años debido al creciente volumen de tráfico a lo largo de los carreteras principales en Puerto Rico, así como en los Estados Unidos. Como resultado, nuevos e innovadores diseños de intersecciones se han desarrollado con el fin de disminuir estos problemas. 'Michigan Lefts' prohiben los virajes directos a la izquierda mediante la eliminación de esas fases, que a su vez causarán una reducción en demoras y tiempos de viaje.

Una intersección congestionada en el municipio de Mayagüez, Puerto Rico fue seleccionada como la intersección de estudio con el fin de determinar los beneficios que pueda tener un 'Michigan Left'. Se tomaron conteos de volumenes de tráfico en la intersección de estudio, así como en las intersecciones de aguas arriba y aguas abajo. Un modelo de simulación fue desarrollado con el fin de comparar las demoras entre las diferentes situaciones estudiadas. Los diferentes escenarios evaluados incluyen: la geometría de la intersección existente, 'Michigan Left' aplicada a la vía principal, 'Michigan Left' aplicada a la calle secundaria, y 'Michigan Left' aplicada tanto a la vía principal y la calle secundaria. Debido a que la intersección existente tiene seis accesos, es necesario una gran cantidad de fases para que la intersección opere adecuadamente. La intersección de estudio continuó operando bajo niveles de servicio inadecuados a través de todos los escenarios debido a la necesidad de numerosas fases. Por lo tanto, un nuevo modelo fue desarrollado que incorpora los principios de 'Michigan Left' al eliminar por completo la conección este-oeste. El nuevo modelo separa la vía principal y la vía de servicio que discurre paralela al este, reduciendo así las fases de señal de 7 a 4 en cada intersección. En el último escenario, las demoras se redujeron en gran medida, todos los accesos operaban bajo niveles de servicion aceptables y las colas se redujeron significativamente.

Numerosas fases en las intersecciones semaforizadas pueden causar demoras considerables y colas, especialmente a lo largo de carreteras arteriales con volúmenes pesados. Por lo tanto, las intersecciones congestionadas deberian estudiarse con el fin de determinar si un diseño de intersección no-tradicional mejoraría la capacidad y el funcionamiento general de la intersección.

TABLE OF CONTENTS

ABSTRACT ..... **ii**
RESUMEN EJECUTIVO ..... **iii**
LIST OF TABLES ..... **vi**
LIST OF FIGURES ..... **vii**
Chapter 1 INTRODUCTION **1**
1.1. Background *1*
1.2. Problem Statement *4*
1.3. Research Objectives *4*
1.4. Report Organization *5*
Chapter 2 LITERATURE REVIEW **6**
2.1. Travel Time and Delay *6*
2.2. Safety *20*
2.3. Summary *25*
Chapter 3 METHODOLOGY **27**
3.1. Site Identification *27*
3.2. Data Collection *32*
3.2.1. Roadway Characteristics 34
3.2.2. Interesction Characteristics 35
3.2.3. Traffic Volumes 39
3.2.4. Peak Hour Factor 45
3.2.5. Heavy Vehicle Percentages 46
3.2.6. Signal Timings 46
3.3. Data Modeling *47*
Chapter 4 SIMULATION AND RESULTS **48**
4.1. Existing Conditions Scenario *48*
4.1.1. Description 48
4.1.2. Results 48

4.2. No Direct Left Turns on Either Major or Minor Approaches Scenario 50
4.2.1. Description 50
4.2.2. Results 52
4.3. No Direct Left Turns on Major Approaches Scenario 54
4.3.1. Description 54
4.3.2. Results 55
4.4. No Direct Left Turns on Minor Approaches Scenario 57
4.4.1. Description 57
4.4.2. Results 58
4.5. Separation of PR 2 and Frontage Road Scenario 60
4.5.1. Description 60
4.5.2. Results 61
4.6. Summary 63
Chapter 5 CONCLUSIONS AND RECOMMENDATIONS 65
REFERENCES 69
Appendix A ROADWAY GEOMETRY
Appendix B TRAFFIC COUNTS
Appendix C SIGNAL TIMINGS
Appendix D SYNCHRO REPORTS
Appendix D.1 EXISTING CONDITIONS
Appendix D.2 SCENARIO 1
Appendix D.3 SCENARIO 2
Appendix D.4 SCENARIO 3
Appendix D.5 SCENARIO 4

LIST OF TABLES

Table 1 Descriptive Statistics for Delay Data (Source: Liu et al., 2007) 7
Table 2 Delay Comparison for Various Driveway Left-turn Alternatives (Source: Liu et al., 2007) 8
Table 3 Average System MOEs by Geometry (Source: Reid and Hummer, 1999) 11
Table 4 Two-Way Interactions: MOEs by Geometry and Time-of-Day Factors (Source: Reid and Hummer, 1999) 12
Table 5 Variables of Interest (Source: Dorothy et al., 1997) 17
Table 6 Number of Crashes at the 46th Street and U-Turn Median Opening (Source: Zhou et al., 2003) 25
Table 7 Minimum Designs for U-turns (A Policy on Geometric Design of Highways and Streets, 2011) 28
Table 8 Peak Hour Factors 45
Table 9 Heavy Vehicle Percentages 46
Table 10 Existing Conditions Capacity Analysis 49
Table 11 Scenario 1 Capacity Analysis 53
Table 12 Scenario 2 Capacity Analysis 56
Table 13 Scenario 3 Capacity Analysis 59
Table 14 Scenario 4 Capacity Analysis 62
Table 15 Summary of Scenario Results – AM Peak Hour 64
Table 16 Summary of Scenario Results – PM Peak Hour 64
Table 17 Overall Network Delay Summary 67

LIST OF FIGURES

Figure 1 Vehicular Movements at a Michigan Left (Source: michiganhighways.org) 2
Figure 2 Vehicular Movements at a Superstreet (Source: texasturf.org)..... 2
Figure 3 Comparison of Conflict Points (Source: fhwa.dot.gov) 3
Figure 4 Travel Time Comparison for Different Driveway Left-turn Alternatives (Source: Liu et al., 2007) 9
Figure 5 Network Travel Time Derived from Simulation at 10% Left-Turn Volume (Source: Bared and Kaisar, 2002) 14
Figure 6 Network Travel Time Derived from Simulation at 20% Left-Turn Volume (Source: Bared and Kaisar, 2002) 14
Figure 7 Left Turn Total Time for 10% Left Turns, Indirect, Signalized (Source: Dorothy et al., 1997) 18
Figure 8 Left Turn Total Time for 25 Percent Left Turns, Indirect, Signalized (Source: Dorothy et al., 1997) 18
Figure 9 Left Turn Total Time for 10% Left Turns, Indirect, Stop Controlled (Source: Dorothy et al., 1997) 19
Figure 10 Types of Traffic Conflicts (Source: Pirinccioglu et al., 2006) 22
Figure 11 Conflicts by Time Period, Signalized Intersection (Source: Pirinccioglu et al., 2006) 23
Figure 12 Severity Comparison of DLT and RTUT Movements by ROC, Signalized Intersection (Source: Pirinccioglu et al., 2006) 23
Figure 13 Conflicts by Time Period, Median Opening (Source: Pirinccioglu et al., 2006) 24
Figure 14 Severity Comparison of DLT and RTUT Movements by ROC, Median Opening (Source: Pirinccioglu et al., 2006) 24
Figure 15 Survey Diagram for Question 1 29
Figure 16 Survey Diagram for Question 2 29
Figure 17 Survey Diagram for Question 3 30
Figure 18 Survey Results for Question 1 30
Figure 19 Survey Results for Question 2 31
Figure 20 Survey Results for Question 3 31

Figure 21 Aerial Image of Study Limits (Source: Google Maps) 33
Figure 22 Lane Configuration - PR 2 at PR 64/PR 342 35
Figure 23 Aerial Image of PR 2 at PR 64/PR 342 (Source: Google Maps) 36
Figure 24 Lane Configuration - PR 2 at Western Plaza/Calle Camino Cuba 37
Figure 25 Aerial Image of PR 2 at Western Plaza/Calle Camino Cuba (Source: Google Maps). 37
Figure 26 Lane Configuration - PR 2 at Ave. Algarrobo 38
Figure 27 Aerial Image of PR 2 at Ave. Algarrobo (Source: Google Maps) 38
Figure 28 Traffic Count Locations 40
Figure 29 Turning Movement Counts – PR 2 at Ave. Algarrobo 41
Figure 30 Turning Movement Counts – PR 2 at Western Plaza/Calle Camino Cuba 42
Figure 31 Turning Movement Counts – PR 2 at PR 64/PR 342 43
Figure 32 Turning Movement Counts – Marginal AAA/Marginal Shell at PR 342 44
Figure 33 Signal Timings and Phasing 47
Figure 34 Turning Movements for Scenario 1 51
Figure 35 Michigan North Lane Configuration and Phasing for Scenario 1 52
Figure 36 Michigan South Lane Configuration and Phasing for Scenario 1 52
Figure 37 Turning Movements for Scenario 2 55
Figure 38 Michigan North Lane Configuration for Scenario 3 57
Figure 39 Turning Movements for Scenario 3 58
Figure 40 Turning Movements for Scenario 4 60
Figure 41 Michigan South Lane Configuration for Scenario 4 61

Chapter 1 INTRODUCTION

1.1. BACKGROUND

As demand on highways increases, so do travel times and delays. Safety concerns and operational problems also arise due to this increase in demand. Some common solutions are: addition of lanes, reprogramming of traffic signal cycles, and geometric modifications to intersections or road sections. Although some of these solutions may be effective, they are usually costly and are not always possible due to the lack of space. The state of Michigan has successfully implemented a different type of intersection, which has helped greatly in reducing the number and severity of crashes due to left turn maneuvers. The Michigan Left, also known as an indirect left turn, has been in use since the late 1960's according to the Michigan Department of Transportation (MDOT). Not only has safety increased in these intersections, but also several studies show that travel times and delay have also decreased when compared to a traditional intersection.

A Michigan Left is an at-grade intersection design, which prohibits direct left turns (DLT) at signal-controlled locations with non-traversable medians. Drivers that wish to turn left from the major road onto a minor road must first travel through the intersection and execute a U-turn at the median opening downstream of the intersection, then turn right at the minor road. Drivers who wish to turn left from a minor road onto a major road must turn right at the signal-controlled intersection and then perform a U-turn at the downstream median opening in the major road. Figure 1 shows the movements performed by drivers in the major and minor roads that wish to make left turns. This treatment can be implemented in the major road approaches as well as the minor road approaches or both.

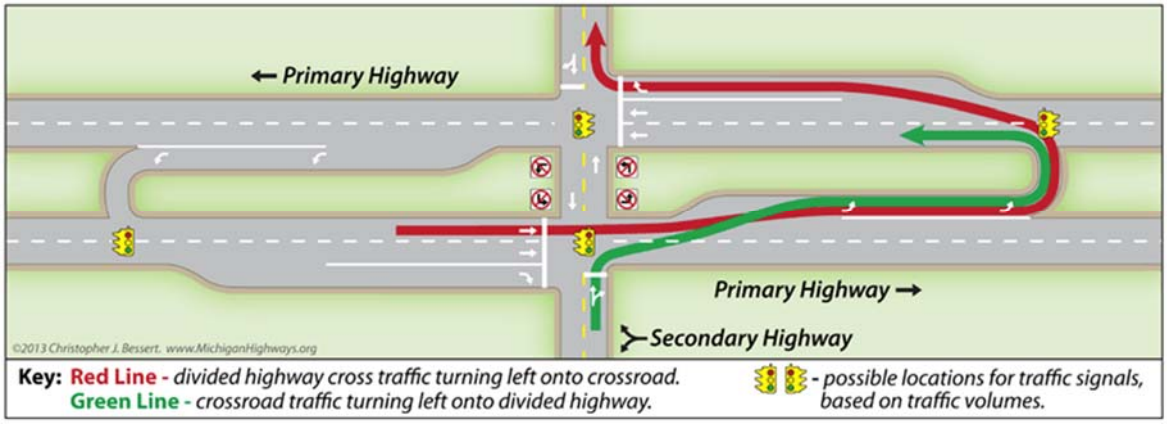


Figure 1 Vehicular Movements at a Michigan Left (Source: michiganhighways.org)

Superstreets, also known as restricted crossing U-turns (RCUT), are at-grade intersections that prohibit crossing movements along the minor street. Minor street through or left turn movements must first perform a right turn followed by a U-turn in order to access the opposite side of the intersection. Figure 2 shows the permitted turn movements performed in superstreet intersections.

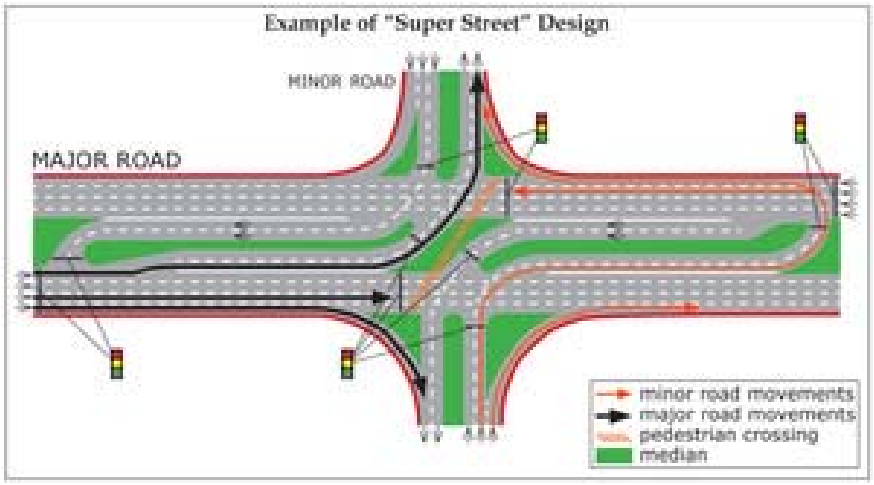
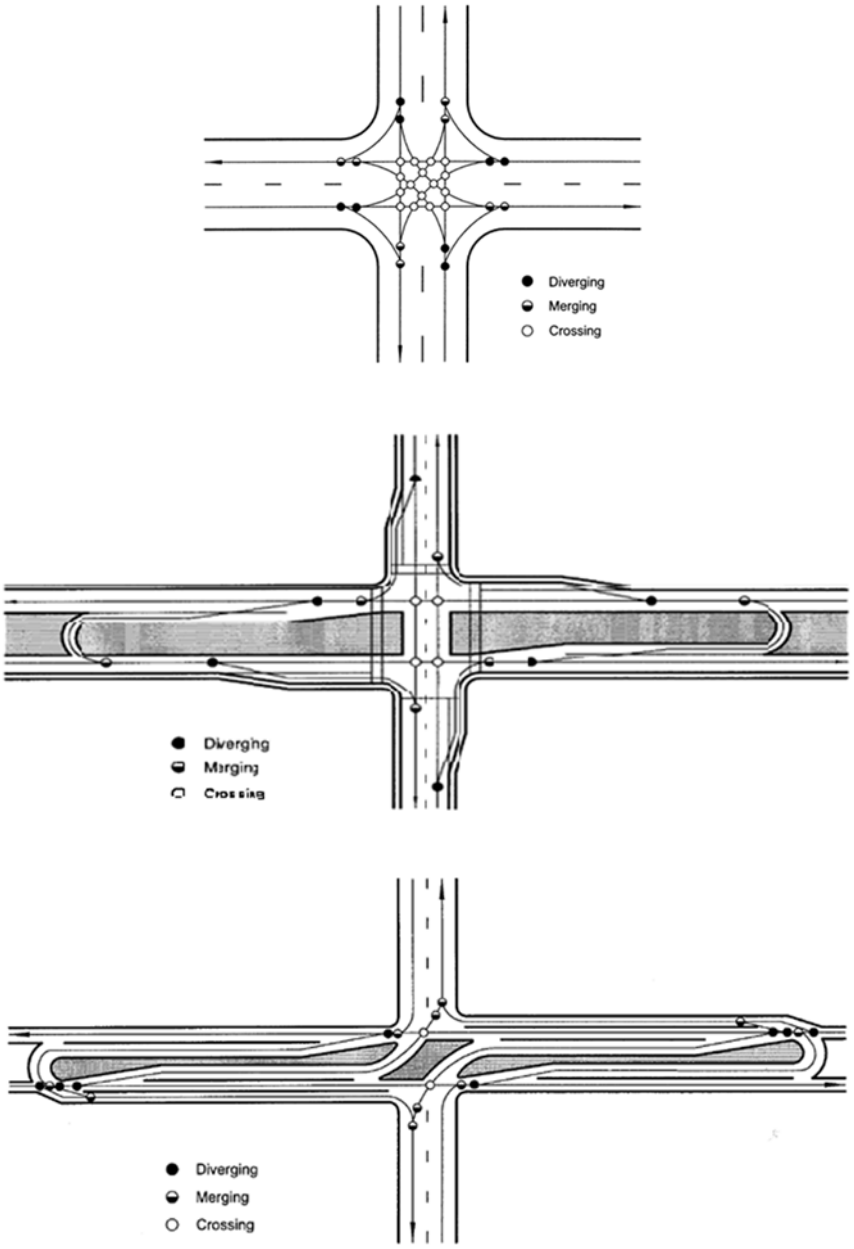


Figure 2 Vehicular Movements at a Superstreet (Source: texasturf.org)

Since the crossing or turning movements at traditional intersections are prohibited in the Michigan Lefts and Superstreets, conflict points are reduced, as shown in Figure 3.



Conflict Type	Four-Legged Signalized Intersection	Michigan Left	Superstreet
Merging/Diverging	16	12	18
Crossing (left turn)	12	0	2
Crossing (angle)	4	4	0
Total	**32**	**16**	**20**

Figure 3 Comparison of Conflict Points (Source: fhwa.dot.gov)

Of all three intersection designs, Michigan Lefts have the fewest amount of conflict points with a total of 16, followed by the Superstreet which has a total of 20. Traditional intersections have a total of 32 conflict points. Hence, unconventional intersections may be considered when safety and crashes are abundant at a traditional intersection.

1.2. PROBLEM STATEMENT

Puerto Rico Highway 2 is the primary road connecting the northwest and the southwest of the island extending from San Juan to Ponce, along the northern, western and part of the southern coast of the island. With 156 miles of extension, it is the longest highway in Puerto Rico. Due to the location and accessibility, it is the most transited roadway in the city of Mayagüez. With an average annual daily traffic of 50,000, it is prone to many crashes, especially at the signal-controlled intersections according to the crash database. During peak hours, PR-2 becomes heavily congested in Mayagüez, causing large delays and travel times.

Pirdavani et al. (2011) states that congested intersections are often caused by poor signal timing, high left turn demand or because they do not have the capacity necessary to service the vehicle demand at peak hours. When an intersection does not operate under optimal conditions, safety decreases which could become an issue of concern. One of the solutions to this problem is to redesign the intersection by limiting turning maneuvers. Liu et al. (2007) proved that intersections with indirect left turns can reduce delay and travel time (*0*). Since this type of intersection reduces the number of signal cycles and eliminates direct left turns, safety can increase by avoiding conflicts, thus reducing vehicle crashes at the location.

1.3. RESEARCH OBJECTIVES

The main purpose of this research was to conduct a detailed evaluation on the benefits of indirect left turn intersections through the use simulation software. More specifically, the objectives consisted of the following:

- Conducting an extensive literary review of relevant information about operational effects of indirect left turns and their safety aspects.

- Identifying an intersection in Mayagüez that was a potential candidate for redesign and implementation of indirect left turns.
- Collecting traffic data including vehicular volumes during congested periods, cycle lengths, signal phases, and roadway geometrics for each leg of the intersection in the current design.
- Performing delay analyses with Synchro Studio in order to compare level of service (LOS) for the current design and the proposed indirect left turn design.
- Documenting the results of the findings in a report including all operational and design aspects for the new intersection.

1.4. REPORT ORGANIZATION

This investigation report is divided into five different chapters that explain background, procedures and results for this study. Chapter 1 gives an thorough description of the different unconventional intersection designs that do not allow direct left turns. In addition, the problem statement and objectives are defined in this chapter. Chapter 2 presents and in-depth description of previous studies that have been made regarding Michigan Left intersections. Chapter 3 explains the methodology used to approach the problem and determine the data needed in order to develop possible solutions. Chapter 4 presents the different model simulations that were developed and results for each one. Finally, Chapter 5 will summarize all conclusions and recommendations based on the results obtained in all the simulation models.

Chapter 2 LITERATURE REVIEW

This chapter discusses previous studies that have been developed regarding indirect left turns. These have been categorized in two aspects according to the purpose of the studies: (1) travel time and delay, and (2) safety.

2.1. TRAVEL TIME AND DELAY

Reid and Hummer (1999) state that due to the increase in travel demand, many vehicles are saturating the roadways causing greater delays and increased travel time. A common solution that has been proven to reduce such delays and travel times includes the implementation of access management on the most crowded roads. The Federal Highway Administration (FHWA) defines access management as the techniques designed to increase the capacity of these roads, manage congestion, and reduce number of crashes. The state of Florida has been implementing access management on major arterials by installing non-traversable medians or directional median openings which prohibit DLT from driveways or cross streets. Vehicles wishing to do these maneuvers would have to make a right turn onto the arterial followed by a U-turn at a downstream median opening or signalized intersection.

Liu et al. (2007) conducted a study in which they evaluated the operational effects of right turns followed by U-turns (RTUT) as alternatives to direct left turns. One of the main objectives of the study was to compare delay and travel time between RTUT and traditional DLT intersections. In addition, the authors also estimated the average running time for vehicles making RTUT at different separation distances between driveways and U-turns. First, the authors defined the parameters for which the data was collected. For DLT, the vehicle delay was defined as the sum of the waiting delay at the driveway and the waiting delay at the median opening. Travel time included the waiting delay and the time from the moment the vehicle started moving at the driveway until it stopped at the median opening. For RTUT, vehicle delay included the delay at the driveway and the delay at the U-turn location. Travel time for RTUT was defined as the sum of the waiting delay and the time spent at the weaving section.

Data was collected between 2001 and 2004 in central Florida. A total of 34 roadways were selected based on the following criteria: (1) the roadway should have a raised-curb directional or full median openings at the driveways, (2) speed limit at the arterial should be 40 mph or more, (3) the median should be wide enough to store left-turning vehicles, (4) the driveway should have two lanes or a single lane with a flared curb such that right turning and left turning vehicles do not interfere, and (5) driveway volumes should be high. The 34 selected sites were divided into two groups; 16 were located in 4-lane divided roadways and 18 were located in 6- to 8-lane divided roadways. The reason for analyzing them separately is that in 6- to 8-lane divided roadways, U-turning vehicles have more space and can maneuver more easily. The equipment used for data collection were: video cameras and VCRs, scaffolds, and two Hi-star NC-97portable traffic analyzers. Video cameras were set up on the scaffolds at approximately 300 ft away from the driveways in order to eliminate driver distraction. Video footage was taken on weekdays between 7:00 a.m. and 7:00 p.m. under clear weather and during non-congestion hours. This footage was later reviewed in a lab in which the authors gathered information such as left turn volumes from both driveways and major roadways, number of vehicles making RTUT, waiting delay, and average running time. The authors presented the data obtained for delay time in Table 1.

Table 1 Descriptive Statistics for Delay Data (Source: Liu et al., 2007)

Number of Lanes	Left-turn Alternatives	*N*[a]	Descriptive Statistics (s)			
			Mean	Min	Max	Std. Error
4	Direct left-turn	464	26	6	84	12.2
	Median U-turn	358	20	8	45	7.0
	Signal U-turn	424	79	18	149	20.4
6-8	Direct left-turn	591	39	6	111	17.6
	Median U-turn	510	38	6	126	17.8
	Signal U-turn	650	77	35	156	20.5

[a]Number of observations

As expected, median U-turns have the lowest average delay time, followed by DLT and then by signal U-turns in both 4-lane and 6- to 8-lane roadways. Afterwards, the authors conducted a cross-sectional comparison in order to evaluate the effect of traffic volume in delay time, shown in Table 2.

Table 2 Delay Comparison for Various Driveway Left-turn Alternatives

(Source: Liu et al., 2007)

Number of lanes	Traffic volume (veh/h)		Average waiting delay (s)		
			U-turn		DLT
	Driveway	Major street	Signal	Median	
4	0–50	1,000–2,000	77	15	18
		2,000–3,000	83	19	25
		3,000–4,000	83	24	37
	≥50	1,000–2,000	76	18	19
		2,000–3,000	83	21	28
		3,000–4,000	83	30	37
6–8	0–50	2,000–3,000	77	18	27
		3,000–4,000	82	33	36
		4,000–5,000	92	35	48
	50–100	2,000–3,000	79	26	28
		3,000–4,000	97	35	50
		4,000–5,000	103	41	55
	≥100	2,000–3,000	N/A	29	30
		3,000–4,000	N/A	36	57
		4,000–5,000	N/A	40	64

When both traffic volumes in the driveway and major street are low, vehicles making RTUT at a median opening experienced between one and three seconds less delay than those making a DLT at the driveway. With the increase in volume in both major roadways and driveways, there was an increase in delay for DLT, in which could reach up to 24 more seconds than those making a RTUT at a median opening. The data also showed that those vehicles making RTUT at signalized intersections experienced significantly more delay than those making a DLT or a RTUT at a median opening. This increased delay may be influenced by conflicting volumes, left-turn traffic demand, and signal timing.

When evaluating total travel time, the authors developed a model that describes running time for drivers making RTUT, shown in Equation 1:

$$T = 22.0 + 0.106L - 3.701Lanes + 2.838Location - 0.184Speed \quad (1)$$

where:

- T = average running time for drivers making RTUT (s/vehicle),
- L = separation distance between a driveway and downstream U-turn location (m),
- Lanes = dummy variable (= 1 on 4-lane roadways, = 0 on 6- to 8-lane roadways),
- Location = dummy variable (= 1 if U-turns are provided at signalized intersections, = 0 if U-turns are provided at median openings), and
- Speed = major street speed limit (km/h).

From this model, the authors concluded that separation distance between the driveway and the downstream U-turn location significantly influences the running time: running time increases with separation distance and decreases with the major road speed limit. Figure 4 shows total travel time with respect to separation distance. When the median openings are located between 150 ft and 750 ft, total travel time between RTUT and DLT are not significantly different. However, U-turns at signalized intersections have notably higher total travel time at any separation when compared to the other left-turn alternatives.

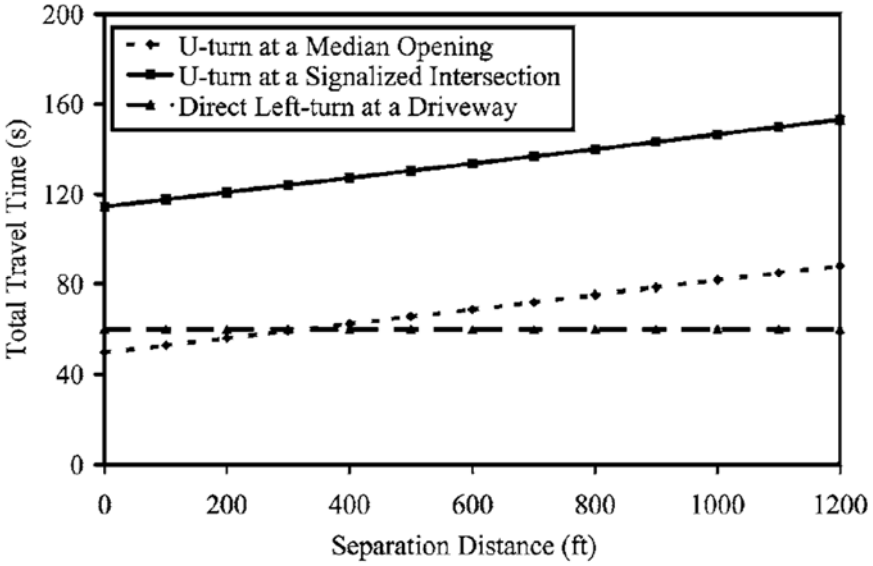


Figure 4 Travel Time Comparison for Different Driveway Left-turn Alternatives (Source: Liu et al., 2007)

In addition to the travel time and delay study, the authors studied the percentage of drivers selecting RTUT over DLT. This percentage was defined as the number of drivers making RTUT

divided by the sum of vehicles making DLT and RTUT at a 15-minute time interval. A binary logit model was developed to describe the number of drivers selecting RTUT over DLT, shown in Equation 2:

$$Logit(p) = -0.616 + 0.00018TV_1 + 0.0022LTD + 0.00085LTIN - 0.665Lanes - 1.746Location \quad (2)$$

where:

- p = percentage of drivers selecting RTUT,
- TV_1 = upstream through traffic flow rate (vehicles/h),
- LTD = left-turn demand from a driveway (LTD = DLTV + RUV),
- LTIN = flow rate of left-turn-in from major road (vehicles/h),
- Lanes = dummy variable (= 1 on 4-lane roadways, = 0 on 6- or 8-lane roadways), and
- Location = dummy variable (= 1 if U-turns are provided at signalized intersections, = 0 if U-turns are provided at median openings).

The negative coefficient of the intercept explains the general preference of making DLT over RTUT. The positive coefficient of the upstream through traffic flow rate indicates that with increased opposing traffic, more drivers choose to make a RTUT. Also, the model shows that more drivers prefer RTUT on 6- to 8-lane roadways than on 4-lane roadways because it is easier to make a DLT in fewer lanes. Finally, the negative coefficient of location explains that more drivers prefer making RTUT in median openings than in signalized intersections.

Reid and Hummer (1999) studied how alternative designs to DLT affect system travel times and other traffic operation measures of effectiveness (MOE). Among the alternative designs studied were the median U-turns (MUT) and superstreets (SSM). SSM are similar to MUT, but completely eliminate cross street through traffic, allowing signals in both directions on the arterial to operate independently. The authors did not consider issues like safety and construction costs, and focused solely on quantifying the advantages or disadvantages of the design alternative. The authors used the Federal Highway Administration CORSIM traffic modeling software for detailed network analysis.

The simulation model was based on Northwestern Highway, an arterial roadway located in a northwest suburb of Detroit, Michigan. Traffic count data was available from an operational study conducted in 1995 by the Michigan Department of Transportation. Northwest Highway has four lanes, two in each direction except for the eastern end, which has three lanes in each direction. The section of the corridor studied was 2.5 mi long with five major signalized intersections spaced 1,660 to 3,500 ft apart, and included a median width of 80 ft. Speed limit in the arterial was 50 mph while crossroad speed limits varied between 35 and 45 mph. Average daily traffic for the eastern end was of 60,000 vph and 52,000 vph for the western end. For morning peak hours, the primary directional flow was eastbound. For simplicity reasons, the corridor was modeled without intersection angles at the cross streets. With land use information, a visit to the site and aerial photographs, the authors were able to assign driveway volumes for four time periods: morning peak-hour, noon-hour, midday, and afternoon peak-hour. Signal timing was optimized using Synchro simulation software. Afterwards, the model was input into CORSIM and a test analysis was conducted. Table 3 shows the results for system travel time and speed for all three alternatives studied.

Table 3 Average System MOEs by Geometry (Source: Reid and Hummer, 1999)

Alternative Geometry	System Time (veh-hr)	Average Number of Stops per Vehicle	Average Speed (mph)
Conventional	251.0	1.8	19.6
Median U-turn	207.7	1.9	24.4
Superstreet	225.9	2.2	22.5

According to Table 3, MUT proved to have 17% less system time when compared to a conventional intersection. Also, average speed was 25% higher at median U-turn with similar number of stops. On the other hand, SSM showed a 10% decrease system time and a 15% increase in average speed. Table 4 shows system time and average speed for the three intersections studied divided into the four time periods.

Table 4 Two-Way Interactions: MOEs by Geometry and Time-of-Day Factors (Source: Reid and Hummer, 1999)

Geometry by Time of Day	Total System Time (veh-min)	Average Number of Stops	Average Speed (mph)
A.M. Peak			
Conventional	302.1	2.0	14.5
Median U-turn	254.3	2.0	22.4
Superstreet	282.7	2.4	18.2
Noon			
Conventional	136.4	1.5	25.9
Median U-turn	136.6	1.8	28.5
Superstreet	142.4	1.8	27.4
Mid-day			
Conventional	162.4	1.5	24.6
Median U-turn	158.8	1.8	27.3
Superstreet	164.3	1.9	27.0
P.M. Peak			
Conventional	402.8	2.1	13.3
Median U-turn	280.5	2.2	19.2
Superstreet	314.0	2.6	17.3

As seen in Table 4, when the volumes in the roadways were highest, total system time for MUT was 47.8 veh-hr lower in A.M. peak period and 122.3 veh-hr lower for P.M. peak period. As expected, average speed was also higher in both peak-hour periods in MUT when compared to the conventional intersections. The authors mentioned the importance of the off-peak MOE comparisons since MUT have been known to not work as efficiently with low volumes. The study demonstrated that during noon and mid-day periods, total system time was lower for MUT than for conventional intersections. In the same manner, average speeds for off-peak hours were higher at MUT. Therefore, for all time periods studied, system time was lower and average speed was higher in median U-turns. During morning and afternoon peak hours, SSM had less system time than the conventional intersection but more than MUT. However, for non-peak hours, it had the highest system time of all three alternatives. For all time periods, SSM had higher average speed than conventional intersections but lower than MUT and had the highest number of stops.

Bared and Kaisar (2002) also conducted a study where they evaluated the traffic operation of signalized U-turns by comparing network travel times in these unconventional intersections to conventional intersections with single and dual direct left turn lanes. The basic design they studied consisted of a four-lane major roadway with a speed limit of 40 mph intersecting a four-lane cross street with a speed limit of 35 mph. Three different scenarios were evaluated in the simulation tool CORSIM: (1) direct single left turn lane, (2) direct dual left turn lane, and (3) median U-turn. The authors determined that travel-time delay was not a comprehensive measure of effectiveness since the median U-turn design requires a longer travel distance than the direct left turns in a conventional intersection. Hence, network travel times were used to compare all three scenarios. For a more accurate comparison, all three scenarios had the same network length.

In the conventional intersection, all left turn lanes were assumed to be 350 ft in length and right turn lanes on the minor approaches were assumed to be 250 ft long. In the median U-turn scenario, the openings were positioned at 450 ft from the main intersection and had 400 ft long left turn lanes. For the median U-turn with the highest flow, the median openings were offset by 550 ft with 450 ft long left turn storage lanes. In the median U-turn scenarios, right turn lanes on the major road were extended upstream to the median openings in order to allow for U-turning vehicles to quickly merge into the outermost lane and later perform a right turn. Acceleration lanes on the minor road approaches were 400 ft long.

Cross street to major road traffic volume ratio varied from 20/80 to 40/60. Two different cases studied 10% and 20% of left-turning flows. Right turns were assumed at 10% in all approaches and 5% truck traffic in all movements. The conventional intersection scenarios had four phases at the main intersection while the median U-turns had three phases (one for the major road, one for the cross street left turns, and one for the cross street through) and two phases at the signalized median openings. Each scenario evaluated was set with an initialization period of 20 minutes in order to allow for loading of vehicles into the network and then recorded for an additional 20 minutes to obtain results. Results presented by the authors are shown in Figure 5 and Figure 6.

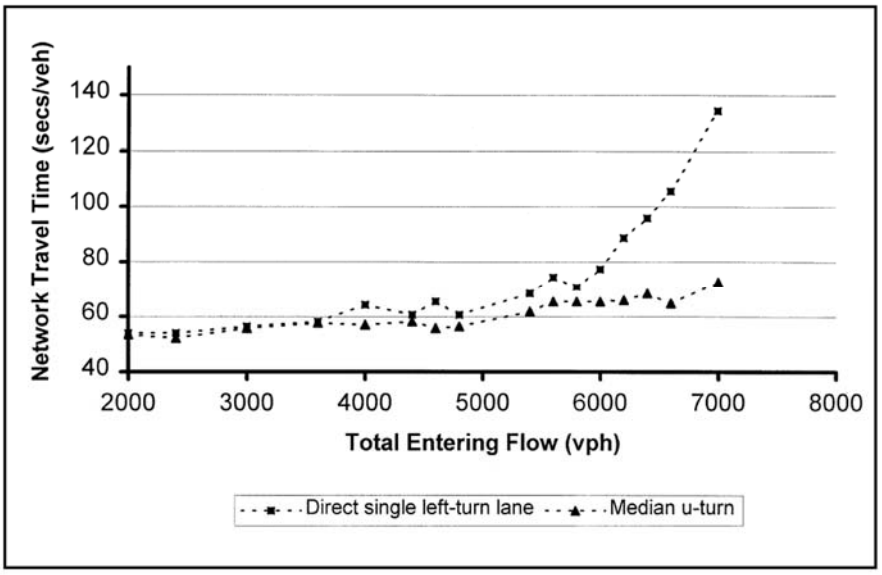


Figure 5 Network Travel Time Derived from Simulation at 10% Left-Turn Volume (Source: Bared and Kaisar, 2002)

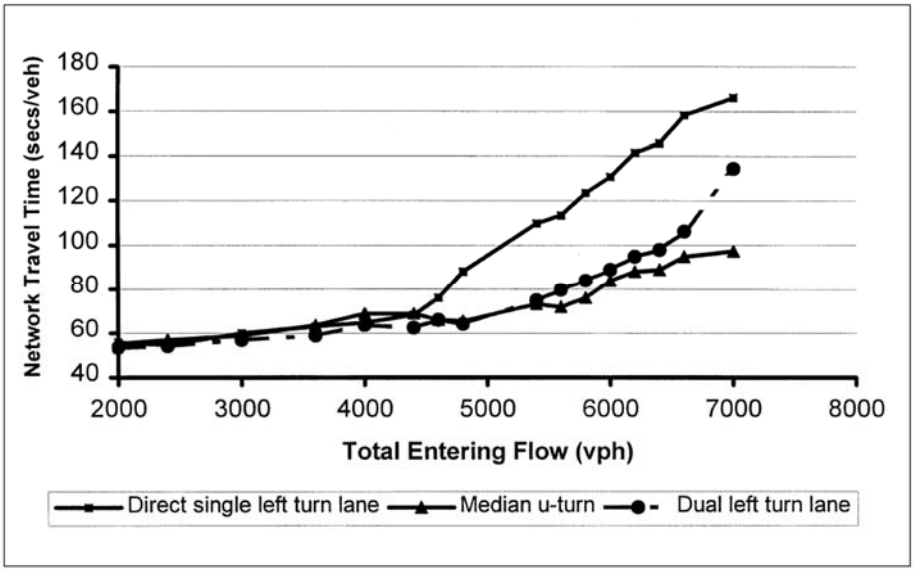


Figure 6 Network Travel Time Derived from Simulation at 20% Left-Turn Volume (Source: Bared and Kaisar, 2002)

Figure 5 shows the comparison between the direct single left turn lane scenario and the median U-turn scenario. The authors concluded that at or below 5,000 vph total entering flow, both scenarios had similar network travel time varying between 55 and 65 sec/veh. After 5,000 vph, the total network travel time increases drastically with over 135 sec/veh at 7,000 vph total

entering flow. In Figure 6, results for all three scenarios (one lane direct left turns, dual left direct turns, and median U-turns) with 30% left turns are shown. At a total entering flow below 4,500 vph, all scenarios have similar network travel times. Above 4,500 vph, the direct single left turn scenario will experience higher network travel times of about 40 seconds more than the other two scenarios. Both dual direct lefts and median U-turns have similar network travel times with the dual direct lefts being slightly higher than the median U-turn. Overall, the median U-turn scenarios had lower network travel times than the direct left turn scenarios.

In another study, Zhou et al. (2003) developed a model to pinpoint the location of median U-turn openings that will minimize the average delay for U-turn movements. Data was collected at several six-and eight-lane urban and suburban roadways in Tampa and Clearwater, Florida. In addition to having two or more unsignalized access points, the segments had to meet the following geometric criteria: (1) raised-curb median, (2) six or eight through traffic lanes, (3) ability of passenger cars to normally make U-turns along a divided six-lane arterial, (4) speed limit of 64 km/h or higher, and (5) spacing between the upstream and downstream signal of less than 3.2 km.

Video cameras were set up at the median openings of eight different sites and reviewed to determine the running time of each right-turn plus U-turn (RTUT) vehicle. The sites' weaving lengths ranged from 92 to 296 m. This time was then used to determine the average weaving speed in weaving segments of various lengths per Equation 3:

$$S_w = 21.5 + 0.082L \quad (3)$$

where:

- S_w = average weaving speed (km/h) and
- L = weaving length (m).

When plotted, the graph yielded an R^2 value of 0.88. Authors determined that the equation could be best used in sites that had a weaving length of 305 m or less. In addition, the authors also observed that 85% of the drivers in all eight sites selected a simultaneous gap in all through lanes in order to make a direct entry into the innermost lane. Using the offset of upstream and downstream signal timings gathered at the different sites, the authors developed Equation 4 which estimates the optimal weaving length for RTUT. This equation is determined by four factors: (1)

offset of upstream and downstream signal timing, (2) whole section length between upstream and downstream signalized intersections, (3) distance between the subject driveway and the upstream signalized intersection, and (4) posted speed limit on the major roadway.

$$L = \frac{\left[-\left(1-0.082\Delta t+\frac{21.5}{v}\right)+\sqrt{\left(1-0.082\Delta t+\frac{21.5}{v}\right)^2+7.05\frac{\Delta t}{v}}\right]}{\frac{0.164}{v}} \quad (4)$$

where:

- Δt = function of offset of upstream and downstream signal timing (s),
- L = whole section length (m), and
- v = posted speed limit (km/h).

In order to verify the model, field data was collected at the intersection of Fowler Avenue (major road) and 46th Street (cross street) in Tampa, Fl. This site has an exclusive U-turn median opening on 46th Street with a 236 m weaving length. Equation 4 estimates the optimal median opening at 221 m, just 15 m less than the actual location. Video cameras were set up to record the delays for the U-turning vehicles. Approximately 300 U-turning vehicles were recorded of which 60% had zero waiting delay. Of the U-turning vehicles that had some delay, 80% had a waiting delay of less than 10 seconds. Hence, that case study demonstrated that an RTUT design with an optimum weaving length estimated by Equation 4, has a fairly high percentage of U-turns with zero or small delays (*0*).

Dorothy et al. (1997) conducted a study in the State of Michigan where they analyzed the operational aspects of Michigan Lefts on divided highways. The basis of their study was to compare travel time and delay of traditional direct left turns on five-lane cross section intersections to indirect left turn boulevard intersections. Authors describe the two different types of cross sections for multilane trunk-line highways in Michigan:

- Five-lane: four through lanes with a continuous center two-way left-turn lane
- Boulevard: divided highway with a median that can range from 4 ft to more than 100 ft.

Five-lane cross section highways cannot have indirect left turns and therefore may experience more delays since they need an exclusive left turn phase. This additional phase will reduce green time on the main line and limit the capacity of the intersection. Due to the scarcity of field locations that meet all the criteria, a computer model was built using the microscopic software, TRAF-NETSIM. In order to build the six-intersection arterial model, several geometric factors were established. A signal spacing of 0.5 miles was selected for both the five-lane and boulevard scenarios since this represents the ideal geometry that allows optimal signal progression. Any distance over 0.5 miles would cause platoons to disburse and cause further delays. Optimal locations for the median breaks in the boulevard scenario was determined to be 1/8 of a mile. The next step involved determining the adequate signal timing to be used in the models. A cycle length of 80 seconds was selected for each intersection with a 5 second phase-change interval. Volume ratio assumed between the major street and the cross street was 60/40 respectively. With this assumption, the green splits between the arterial and cross street would also be 60/40. Two major variables that would affect the comparison were the traffic volumes for both the arterial and cross street, and the type of traffic control at the median openings. Hence a set of matrixes were developed based on the variables listed in Table 5.

Table 5 Variables of Interest (Source: Dorothy et al., 1997)

Variables			
Saturation [Arterial vph/Cross Street vph]	**% Left Turning Vehicles**	**Median Widths (ft)**	**Type of Traffic Control in Median Crossover**
30% [1,080/720]	10	40	Signal Control
50% [1,800/1,200]	15	60	Stop Control
70% [2,520/1,680]	20	80	
90% [3,240/2,160]	25	100	
100% [3,600/2,400]			

A total of 340 individual models were simulated over an hour of operation. The measure of effectiveness used in the comparison of all the models were network total time in minutes per vehicle and left turn total time in seconds per vehicle. Network total time represents the amount of time a vehicle spends in the network, which includes travel time and delays.

It is important to note that only the effects on the arterials were modeled in this study; cross street effects were not. The five-lane cross section scenario was plotted in all the graphs to be used as baseline for comparison. Figure 7, Figure 8, and Figure 9 show the results of the study.

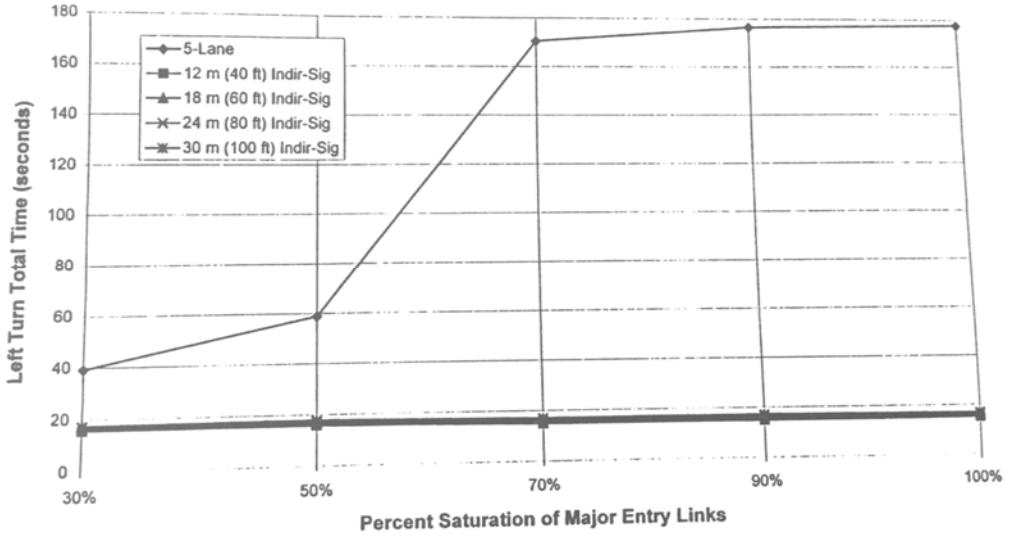


Figure 7 Left Turn Total Time for 10% Left Turns, Indirect, Signalized (Source: Dorothy et al., 1997)

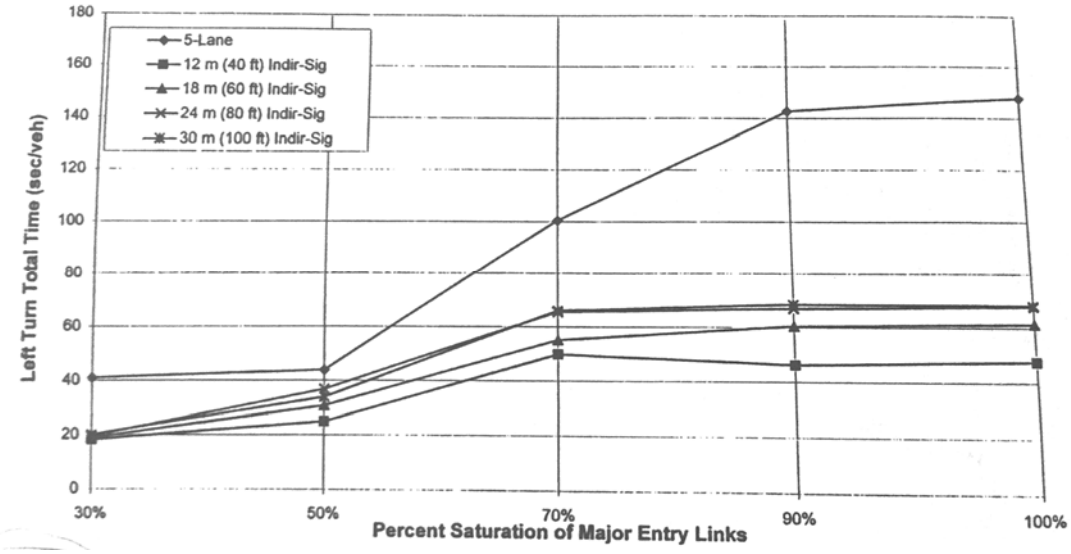


Figure 8 Left Turn Total Time for 25 Percent Left Turns, Indirect, Signalized (Source: Dorothy et al., 1997)

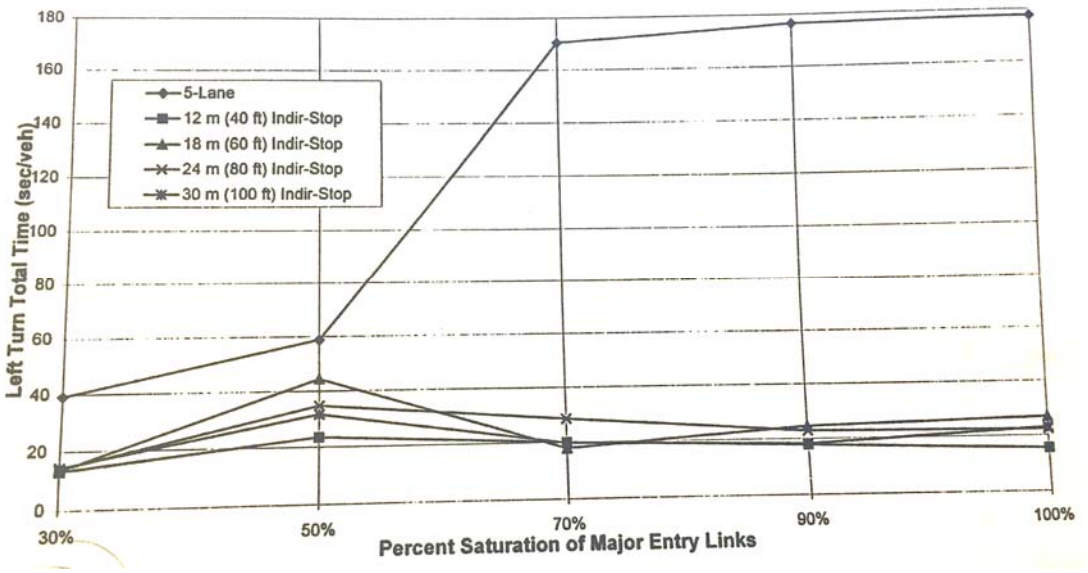


Figure 9 Left Turn Total Time for 10% Left Turns, Indirect, Stop Controlled (Source: Dorothy et al., 1997)

Figure 7 shows the left turn total time when the left turn volume was 10% of the total mainline volume in the signalized indirect left turn scenario. When compared to baseline, left turn total time was reduced by at least 150 seconds when the saturation levels were over 70%. Figure 8 shows the left turn total time for 25% of left turns, with signalized indirect left turns. In this scenario, left turn total times at 50% saturation were lower than baseline, but would not exceed a 20 second difference. However, the difference in left turn total time increased proportionally with saturation. At 100% of saturation, the scenario with a 40 ft median had around 100 seconds less left turn total time. Figure 9 shows the results for the scenario with 10% of left turns but with an unsignalized median opening. The figure shows that there were no significant differences in this scenario when compared to the signalized scenario presented in Figure 7. In the same manner, most left turn total times for the different median widths were below 40 seconds at all saturation levels.

The authors concluded that boulevard designs that used indirect left turn strategies at signalized median crossovers were superior to all other scenarios considered. They also concluded that with low percentages of left turns, both signalized and stop controlled median crossovers had similar operation.

2.2. SAFETY

Safety has been a growing issue on United States' roadways since the increase in demand is associated with a decrease in safety. Many traffic studies focus on ways to increase safety and have come up with various solutions. These conventional alternatives, such as exclusive turning lanes, are not always possible to implement since the available space can be too limited or the cost of implementation is too expensive. In those cases, access management can be implemented on the intersections in order to help reduce the number of conflicts. Transportation Research Board's (TRB) Access Management Manual states that some benefits of access management include: improved safety, improved traffic flow, increased capacity, reduced delay, reduced fuel emissions and better fuel economy (2003).

Pirinccioglu et al. (2006) developed a study in which they evaluated the safety effects of right turns followed by U-turns (RTUT) at both signalized intersections and unsignalized median openings. They specifically focused on the conflict analysis of maneuvers that involved traveling from driveways or side streets into a four-lane arterial. They compared both the conflict rates and severities for the entire study. Parker and Zegeer (1989) defined conflict as an evasive maneuver performed in order to avoid a collision. Unlike crashes, conflicts have no consequences, therefore, vehicles continue to flow afterwards. Examples of conflicts include applying the brakes and swerving.

For the study, a total of 16 sites in the state of Florida were analyzed, specifically in the Tampa Bay area and Plant City. Of these 16 sites, eight had the U-turns of RTUT at signalized intersections while the other eight locations had unsignalized median openings for the U-turn maneuvers. Some of the selection criteria were: (1) posted speed limit of 40 mph or higher in the major road, (2) a minimum spacing of 200 ft between the driveway or minor road and the upstream intersection of the major road, (3) no protective island or exclusive right turn lane on the crossroad, (4) right turn on red allowed at the signalized intersection where the U-turn can be performed, and (5) the downstream signal should have a protected left turn phase.

Data was collected though the use of video cameras set on 15 ft scaffolding located sufficiently far to avoid driver distraction but still able to capture all vehicle movements. All of the cameras at the intersections had to be synchronized within one second of each other to ensure

no movements were duplicated. Data was taken under normal traffic conditions, which included daylight, clear weather, and dry pavement. During congested traffic conditions, data was eliminated. The hours of study were supposed to extend from 7:00 a.m. to 6:00 p.m. but in this case, data was collected shortly before noon through the late afternoon since the sites of study were usually driveways from shopping plazas and activity centers, which have lower traffic during the early hours. A total of 11 different conflict types were observed in the study:

1. Right turn out of the driveway (RTUT1),
2. Slow-vehicle, same-direction conflict (RTUT2),
3. Lane change conflict (RTUT3),
4. U-turn conflict (RTUT4a),
5. U-turn conflict (RTUT4b),
6. U-turn and right-turn across the street (RTUT5a),
7. Slow U-turn vehicle, same-direction conflict (RTUT5b),
8. Left-turn out of driveway, conflict from right (DLT1),
9. DLT and left turn in from right conflict (DLT2),
10. DLT and left turn in from left conflict (DLT3), and
11. Left turn out of driveway, conflict from left (DLT4).

Figure 10 shows the different traffic conflicts studied. The data collected was analyzed in two ways: conflict rates and severity. Conflict rates were divided into conflicts per hour (CR_1) and conflicts per 1,000 involved vehicles (CR_2). For the severity analysis, a subjective score between 1 and 3 was given to each conflict; 3 being the highest risk of collision (ROC). The results are shown in Figure 11, Figure 12, Figure 13, and Figure 14.

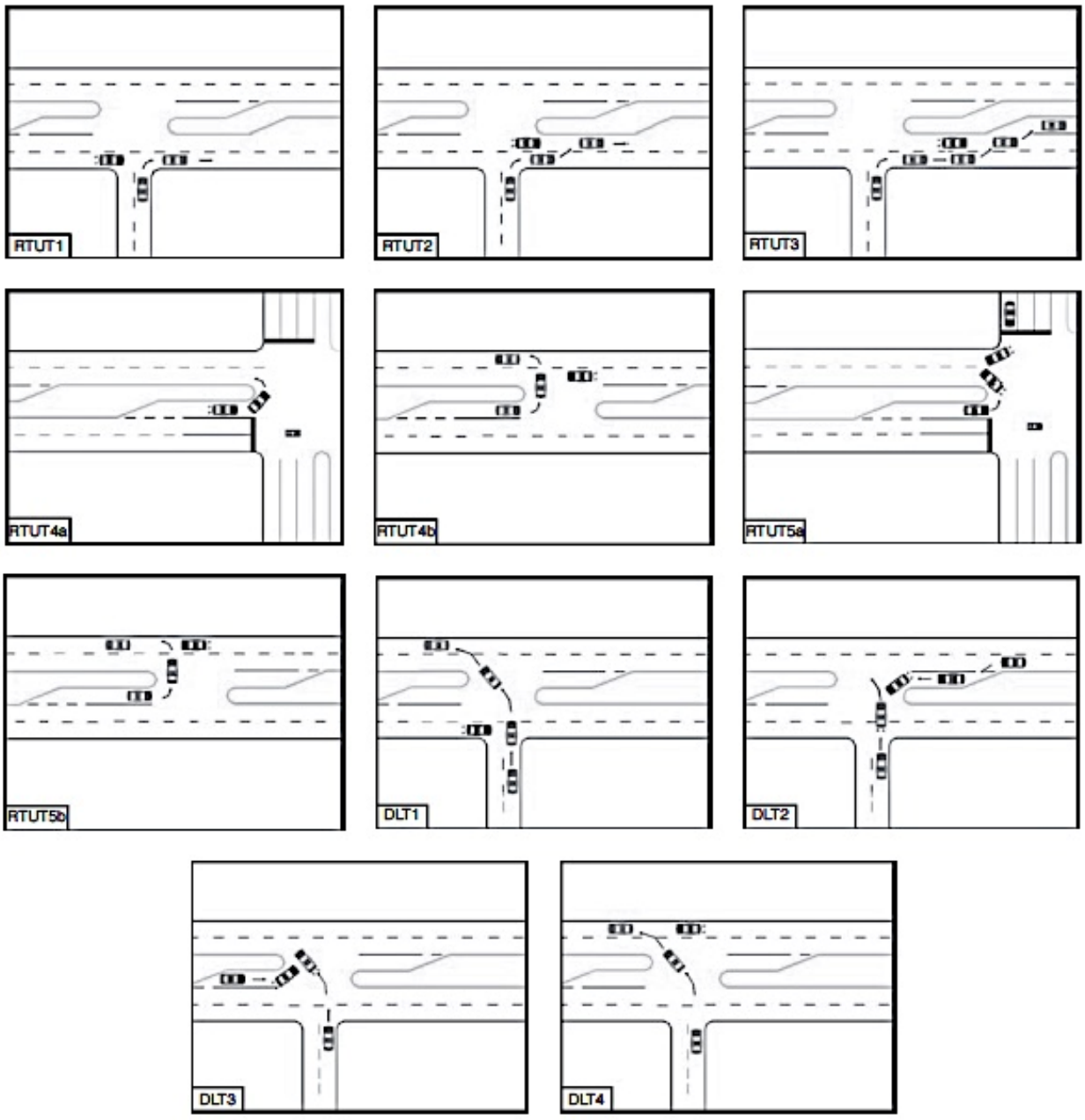


Figure 10 Types of Traffic Conflicts (Source: Pirinccioglu et al., 2006)

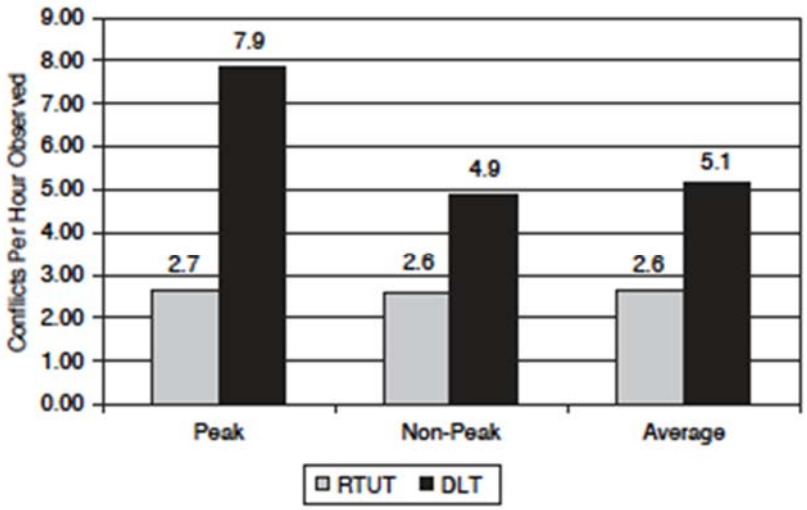


Figure 11 Conflicts by Time Period, Signalized Intersection (Source: Pirinccioglu et al., 2006)

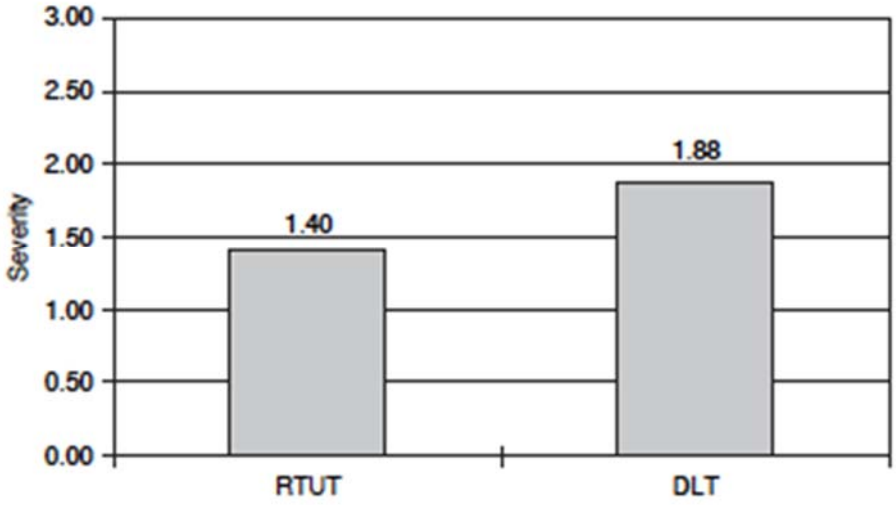


Figure 12 Severity Comparison of DLT and RTUT Movements by ROC, Signalized Intersection (Source: Pirinccioglu et al., 2006)

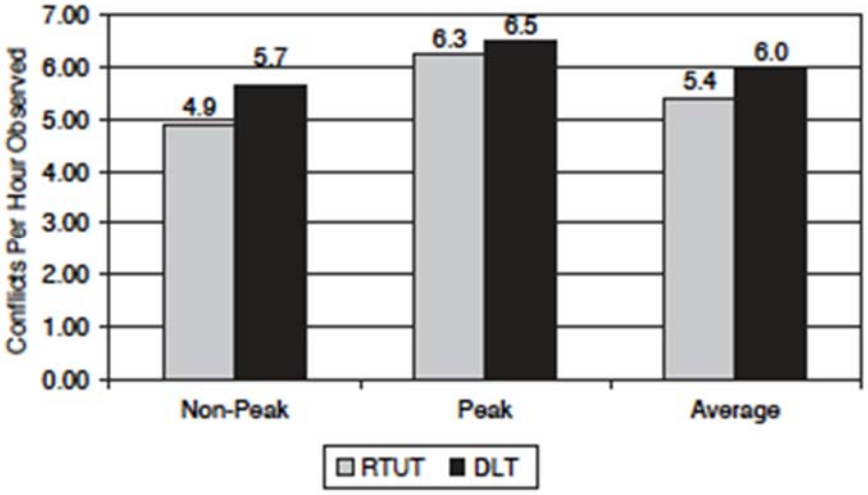


Figure 13 Conflicts by Time Period, Median Opening (Source: Pirinccioglu et al., 2006)

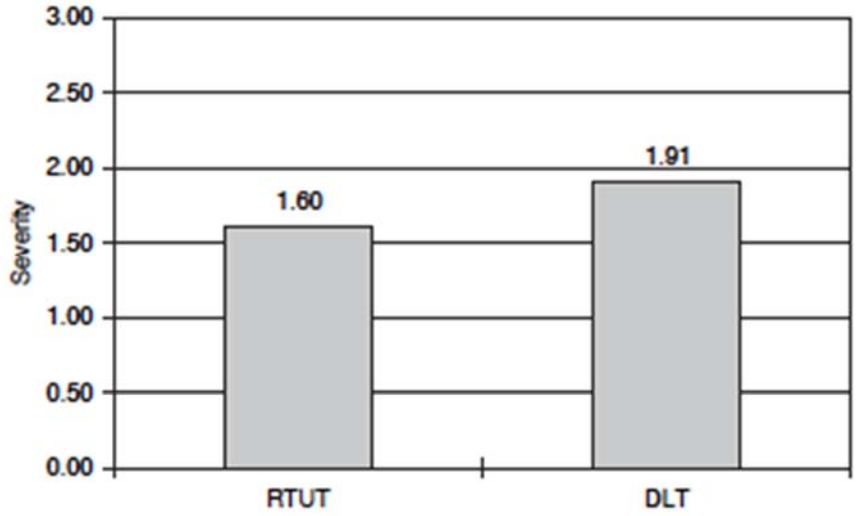


Figure 14 Severity Comparison of DLT and RTUT Movements by ROC, Median Opening (Source: Pirinccioglu et al., 2006)

As seen in Figure 11, conflict rates at signalized intersections were much higher in DLT (7.9 conflicts per hour) than in RTUT for peak hours, while in non-peak hours, DLT conflicts were 4.9 conflicts per hour and RTUT conflicts remained the same. Severity analysis for signalized intersections is shown in Figure 12. Figure 13 and Figure 14 show conflict rate and severity analysis for RTUT in median openings. At signalized intersections, DLT movements caused twice as many conflict rates than RTUT and also had higher average severity scores (Figure 11 and Figure 12). At median openings, DLT movements generated 10% higher conflict rates than RTUT

and also had higher severity scores (Figure 13 and Figure 14). Authors concluded that RTUT movements were safer than DLT.

Zhou et al. (2003) also studied the safety impacts of changing a full median opening into a directional median opening. At the same intersection used to validate Equation 4, the authors conducted a before-and-after crash analysis. In 1996, the full median opening on 46th Street was converted to a directional median opening. Crash data from four years before and after the modification was gathered at the median opening as well as the intersection with Fowler Avenue. Crash data is presented in Table 6.

Table 6 Number of Crashes at the 46th Street and U-Turn Median Opening (Source: Zhou et al., 2003)

	Before				After			
	1992	1993	1994	1995	1996	1997	1998	1999
46th Street	4	3	7	8	1	3	2	1
U-turn Median Opening	1	0	0	1	1	0	0	0

The average number of crashes at the intersection of 46th Street and Fowler Ave was 5.5 crashes per year before the conversion to a directional median opening. After the change, the average number of crashes was 1.75 crashes per year, which represents a reduction of approximately 68%.

2.3. SUMMARY

Lui et al. (2007), Reid and Hummer (1999), and Bared and Kaisar (2002) all compared traditional direct left turn intersections to unconventional designs that do not allow direct left turns either at the main road or side street. The purpose of all three studies was to determine whether the unconventional designs had less delays or total travel time than the traditional intersections. All authors used total system travel time as a measure of effectiveness since this result would not be affected by the distance traveled, given that the indirect left turning vehicles have to travel a longer distance to perform the desired maneuver. Lui et al. (2007) concluded that vehicles that performed RTUT at a median opening had lower delays but similar total travel time when compared to the traditional direct left turn. Reid and Hummer concluded that vehicles that performed indirect left turns at median U-turns had lower total system time than conventional and superstreet alternatives.

In addition, speeds were higher in the unconventional intersections. Bared and Kaisar (2002) determined that with higher entering flows, the network travel times increased in the scenarios with a direct single left turn lane. Network travel times were similar in scenarios where dual left turn lanes and median U-turns were used. In another study, Dorothy et al. (1997) concluded that boulevard designs that used indirect left turn strategies at signalized median crossovers were superior to all other scenarios when comparing left turn total time. In another study, Zhou et al. (2003) developed a formula to determine the optimal location of median openings for U-turning vehicles that would yield the lowest delays for this maneuver.

In their study, Zhou et al. (2003) also performed a before and after study where they examined crash frequency before and after a conversion of a full median opening to a directional median opening. The results proved that with the directional median opening, the crash frequency reduced at the intersection. Pirinccioglu et al. (2006) conducted a series of field observations with the purpose of determining safety effects of RTUT when compared to direct left turns. This study proved that the RTUT had less conflicts per hour and severity was lower than in the direct left turn scenarios.

Alternatives to direct left turns have proven to increase capacity, lower travel times and increase safety. In all studies, the authors concluded that Michigan Left scenarios were comparable or superior to direct left turn scenarios. Reid and Hummer (1999) suggest that these unconventional alternatives should be considered when improvements are necessary.

Chapter 3 METHODOLOGY

The methodology for this research includes the identification of the study site, data collection, and data modeling. Preliminary conditions are also discussed in this chapter.

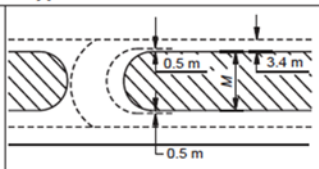
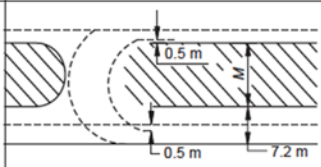
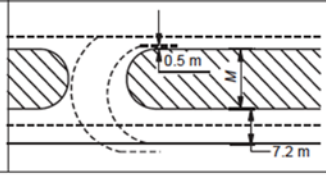
3.1. SITE IDENTIFICATION

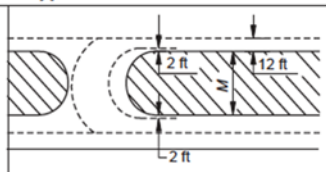
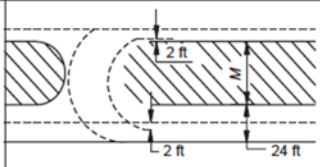
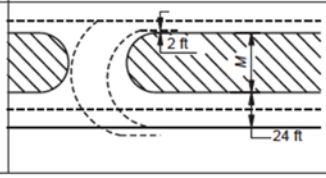
The first part of this study consisted of identifying congested intersections in Mayagüez and surrounding municipalities in order to select a potential candidate for geometric redesign. Field visits helped identify an intersection that had the most congestion and highest delay times. Perhaps the most important detail in site selection is the distance from upstream and downstream intersections to the study site. This is because according to AASHTO's A Policy on Geometric Design for Highways and Streets, the optimum location for the median U-turn opening should be at 660 ft from the main intersection (2011). Therefore, upstream and downstream intersections should be located sufficiently far so that they do not interfere with the U-turn roadways. In addition, adequate median width is needed in order to accommodate a tractor-semitrailer combination truck, the design vehicle for this type of highway. Minimum design requirements are presented in Table 7. In order to choose a possible candidate for an indirect left turn implementation, the following requirements must be met at the study intersection:

- High density of major-street through movements,
- Low-to-medium density of left turns from the major street,
- Low-to-medium density of left turns from the minor street,
- Significant delay times, and
- History of numerous rear-end and angle crashes.

Table 7 Minimum Designs for U-turns

(A Policy on Geometric Design of Highways and Streets, 2011)

Metric							
	M—Minimum Width of Median (m) for Design Vehicle						
	P	WB-12	SU-9	BUS	SU-12	WB-19	WB-20
	Length of Design Vehicle (m)						
Type of Maneuver	5.7	15.0	9.0	12.0	12.0	21.0	22.4
Inner Lane to Inner Lane 	9	18	19	19	23	21	21
Inner Lane to Outer Lane 	5	15	15	16	19	17	17
Inner Lane to Shoulder 	2	12	12	12	16	14	14

U.S. Customary							
	M—Minimum Width of Median (m) for Design Vehicle						
	P	WB-40	SU-30	BUS	SU-40	WB-62	WB-67
	Length of Design Vehicle (ft)						
Type of Maneuver	19	50	30	40	40	63	68
Inner Lane to Inner Lane 	30	61	63	63	76	69	69
Inner Lane to Outer Lane 	18	49	51	51	64	57	57
Inner Lane to Shoulder 	8	39	41	41	54	47	47

Data was gathered as part of a small study done for a University of Puerto Rico traffic engineering class. The information was gathered using the online survey software Survey Monkey and its purpose was to gather information as to how many people currently use the indirect left turn methodology in order to avoid the congestion and delay produced by the direct left turns. A total of 74 responses from people that are residents or frequently transit the intersection were gathered. The survey consisted of three questions accompanied by figures:

1. How many times do you take this route to enter Western Plaza (via service road)?

Figure 15 Survey Diagram for Question 1

2. How many times do you take this route to enter Western Plaza (via U-turn in the intersection with PR-64)?

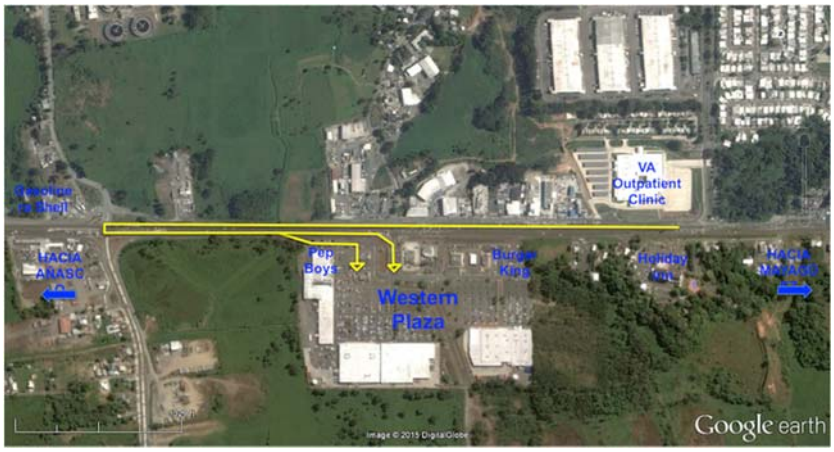


Figure 16 Survey Diagram for Question 2

3. How many times do you take this route to exit Western Plaza (via intersection with Ave. Algarrobo)?

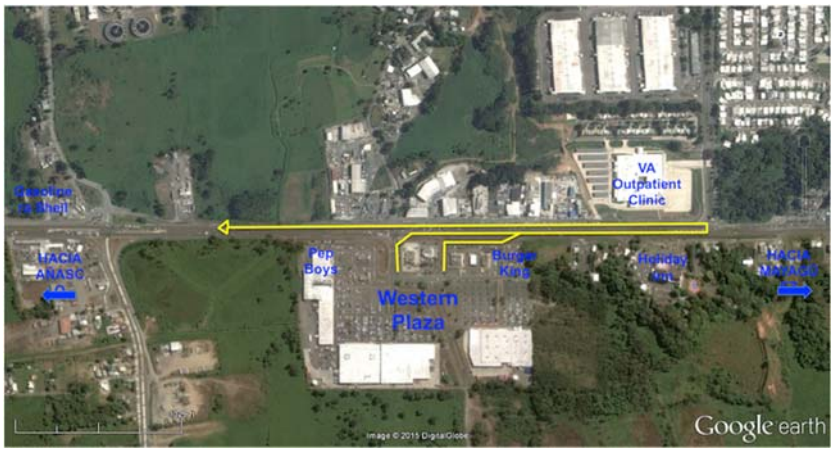


Figure 17 Survey Diagram for Question 3

The main purpose of the survey was to understand driver preferences as far as avoiding delays and long queue lines in left turn movements. The following figures show the results of the survey for each of the questions.

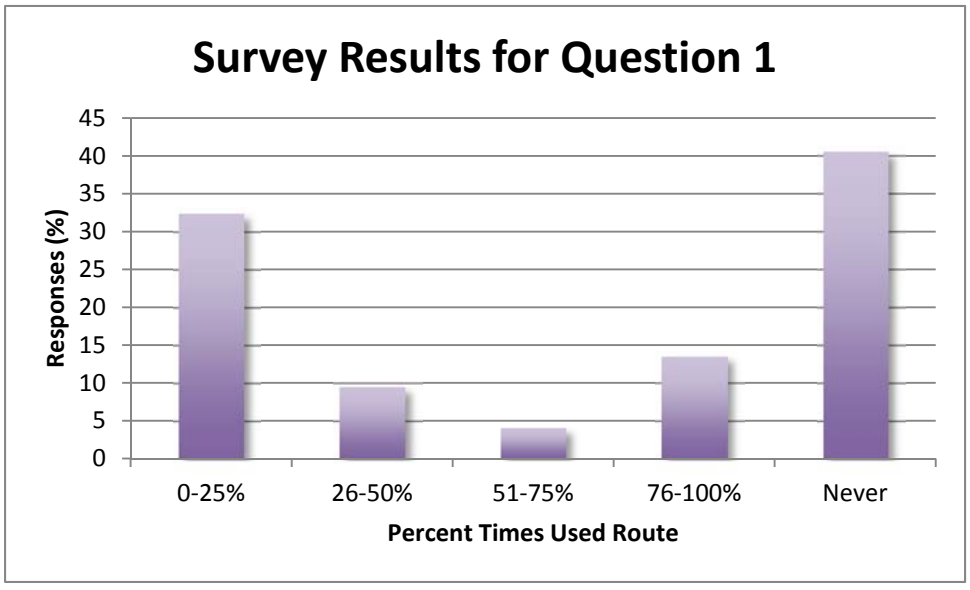


Figure 18 Survey Results for Question 1

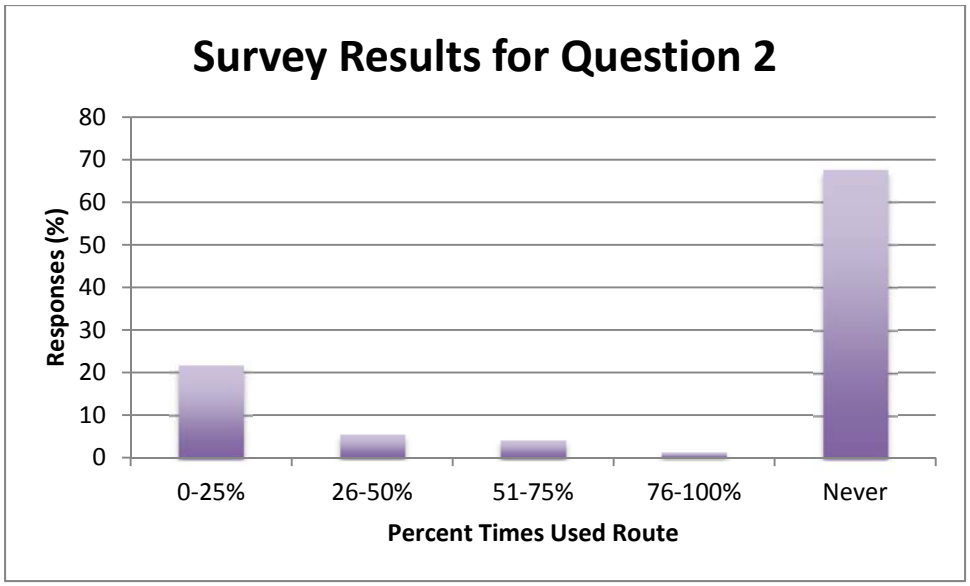


Figure 19 Survey Results for Question 2

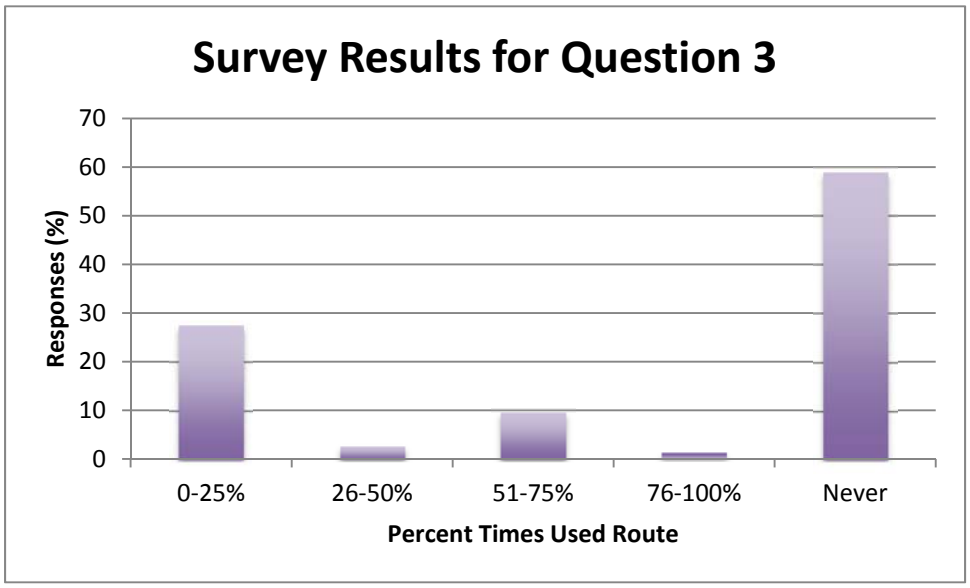


Figure 20 Survey Results for Question 3

Although the survey was not representative of a population, it was used for informational purposes in order to determine the possibility of drivers performing indirect left turns at the intersection. For the first question, 24 out of the 74 responses indicated that drivers chose the service road and then performed a left turn in order to enter the commercial plaza. This represents 32% of all the drivers surveyed. In the other hand, 41% of drivers have never used this route. The remaining percentages are distributed as follows: 9% of drivers used this route 26-50% of the

times, 4% of drivers used this route 51-75% of the times, and 14% of drivers used this route 76-100% of the times. For the second survey question, the drivers were asked to report what percentage of times they accessed the commercial plaza by performing a U-turn at the PR-64 intersection located downstream from the main intersection. Fifty out of the 74 drivers (67%) responded that they did not take that route to enter Western Plaza. Of the remaining, 16% admitted using this route between 0-25% of the times. Similarly, in the third survey question, a large number of drivers (59%) stated to never making a right turn followed by a U-turn at the intersection with Ave. Algarrobo, in order to avoid the congestion for the direct left turns exiting the commercial plaza. Otherwise, 27% drivers said that they pursued this option up to 25% of the times, while 10% of drivers used it between 51-75% of the times.

The intersection at Western Plaza/Calle Camino Cuba lies in the highly transited PR-2 with many surrounding stores and restaurants, which generate high volumes in the area. Since PR 2 is one of the main roadways that provides mobility to the entire west coast of Puerto Rico, high volumes and high potential of crashes are expected at many of its intersections. Therefore, the intersection of PR 2 and Western Plaza is a suitable candidate for a redesign into a Michigan Left. Sufficient spacing between signalized intersections upstream and downstream if this intersection will also allow for good progression of traffic flow.

3.2. DATA COLLECTION

In order to study the effect that proposed intersection models will have on the corridor, nearby signalized and unsignalized intersections, and driveways along the corridor must also be studied. These nearby intersections may be impacted by the change in geometry. Hence, traffic impact analysis must be performed to ensure that the proposed intersection designs will not negatively affect the capacity of nearby intersections. It was determined that the immediate signalized intersections to the north and to the south of the study location will be included in the analysis in order to have an idea of how the proposed designs affect the adjacent road network. To the north, at 0.44 miles lies the signalized intersection between PR 2 and PR 64/PR 342 while to the south lies the signalized intersection of PR 2 and Ave. Algarrobo (0.47 miles). The aerial image in Figure 21 shows the limits for this study.

Figure 21 Aerial Image of Study Limits (Source: Google Maps)

3.2.1. ROADWAY CHARACTERISTICS

Some of the roadway data collected include: number of lanes, lane widths, intersection spacing, type of intersection control, speed limits, and historic AADT (Average Annual Daily Traffic).

Puerto Rico Highway 2

Puerto Rico Highway 2 (PR 2) is a two-lane divided highway functionally classified as a principal arterial with a speed limit of 40 mph in the section of study. Historic traffic counts for PR 2 show an Average Annual Daily Traffic (AADT) of 49,465 vpd in 2012. Puerto Rico Highway 2 is the primary road connecting the northwest and the southwest of the island extending from San Juan to Ponce. This roadway runs for 156 miles along the northern, western and part of the southern coast of the island, making it the longest highway in Puerto Rico. Due to the location and accessibility, it is the most transited roadway in the city of Mayagüez.

Puerto Rico Highway 64

Puerto Rico Highway 64 (PR 64) is a four-lane divided roadway that connects PR 2 to the north with PR 102 to the south, running mostly parallel to PR 2 along the coast. This roadway is functionally classified as a collector and has an AADT of about 7,900 vpd as stated in the 2002 database. The speed limit in the section of roadway is 30 mph. This roadway is mostly used as a cut-through for vehicles trying to avoid the congestion along PR 2 during peak hours.

Puerto Rico Highway 342

Puerto Rico Highway 342 (PR 342) is a small two-lane undivided local roadway with an AADT of around 4,200 vpd. This roadway connects PR 2 with PR 108 providing access to the rural zones in northern Mayagüez. The speed limit in this roadway is 30 mph.

Calle Camino Cuba

Calle Camino Cuba is a small rural local roadway that connects PR 2 with PR 108. This two-lane undivided roadway provides access to local residents and businesses. The speed limit in this roadway is 30 mph.

Ave. Algarrobo

Ave. Algarrobo is a small four-lane divided roadway that runs east-west and connects PR 2 with a large residential development. This roadway does not have a posted speed limit, thus was analyzed as a 30 mph roadway.

3.2.2. INTERESCTION CHARACTERISTICS

Full lane configuration for all signalized and unsignalized intersections are included in Appendix A.

PR 2 at PR 64/PR 342

For the purposes of this study, PR 2 runs north-south and PR 64/PR 342 runs east-west. The intersection's eastern approach is PR 342 while the western approach is PR 64. About 165 miles to the east lies a stop controlled intersection between PR 342 and the service road that runs parallel to PR 2. This intersection has protected phasing for northbound and southbound left turns and split phasing for eastbound and westbound approaches. Figure 22 shows the existing lane configuration at this intersection while Figure 23 shows an aerial image.

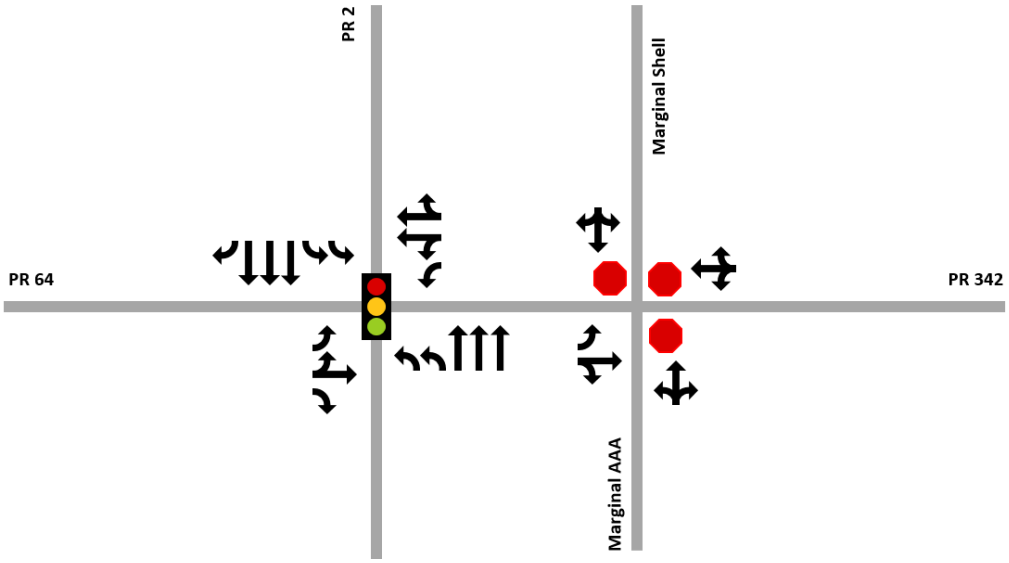


Figure 22 Lane Configuration - PR 2 at PR 64/PR 342

Figure 23 Aerial Image of PR 2 at PR 64/PR 342 (Source: Google Maps)

PR 2 at Western Plaza/Calle Camino Cuba

This six-legged intersection lies at the main entrance to the Western Plaza Shopping Center. The northbound and southbound approaches correspond to PR 2, the eastbound approach is the shopping center driveway, and the westbound approach is Calle Camino Cuba. Additionally, there is a service road that runs parallel to PR 2, which will be the northwest and southwest approaches for the purposes of this analysis. Northbound and southbound left turn lanes are protected while the eastbound and westbound approaches are split phased. Northwest and southwest approaches share a single phase. Lane configuration for this intersection is shown in Figure 24 and an aerial image in Figure 25.

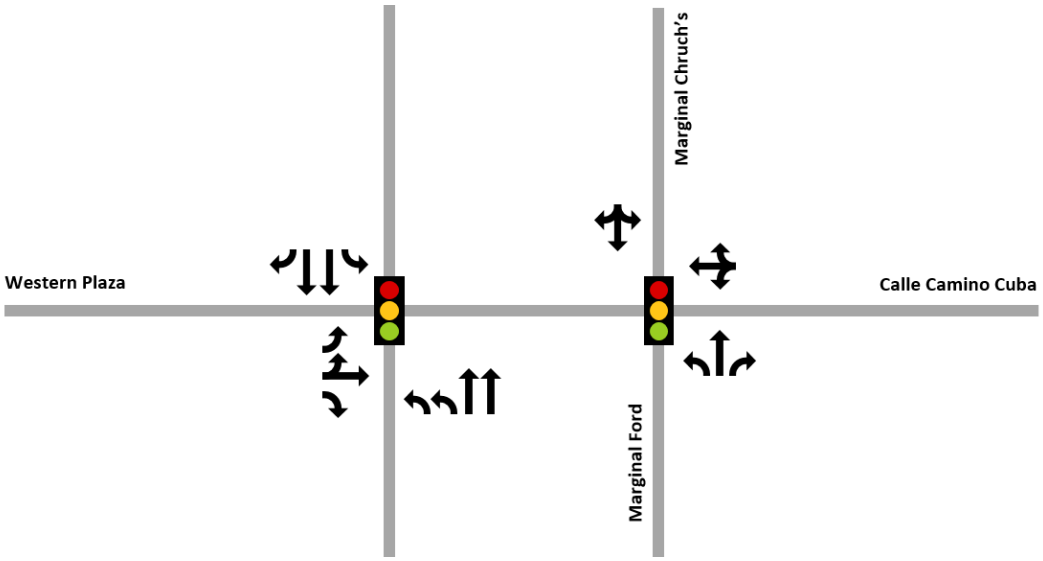


Figure 24 Lane Configuration - PR 2 at Western Plaza/Calle Camino Cuba

Figure 25 Aerial Image of PR 2 at Western Plaza/Calle Camino Cuba

(Source: Google Maps)

PR 2 at Ave. Algarrobo

The intersection at PR 2 and Ave Algarrobo is a three-phase intersection with a protected left turn for the southbound approach. Current lane configuration and an aerial image for this intersection are shown in Figure 26 and Figure 27 respectively.

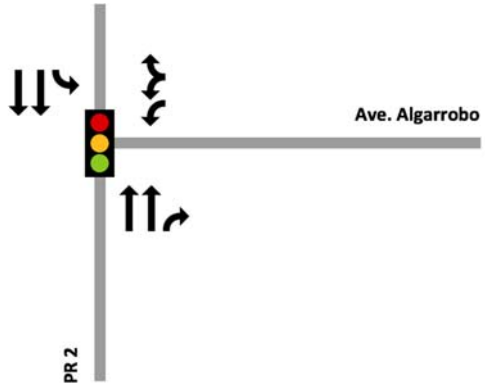


Figure 26 Lane Configuration - PR 2 at Ave. Algarrobo

Figure 27 Aerial Image of PR 2 at Ave. Algarrobo (Source: Google Maps)

3.2.3. TRAFFIC VOLUMES

Traffic volume data collection was conducted on three different days due to the lack of collection machines available. Two Tuesdays and one Thursday were selected in order to represent the typical workday volumes and operation. Traffic volumes were taken from 6:30 am to 8:30 am and 4:00 pm through 6:00 pm. These ranges of time will usually include the morning and afternoon peak congestion hours in the area of study. To ensure that no factors would affect the typical traffic expected at the intersections, data was taken under clear weather and dry pavement conditions. To be able to accurately model the intersection in study, the downstream and upstream vehicular volumes were also collected and studied. Turning movements in the major road were collected using Jamar Technologies TDC Ultra Hand-held Traffic Data Collectors. Volumes in the minor road or crossroads were collected with manual clipboard counters due to the lack of sufficient equipment. Volumes of service roads and channelized right turns recorded with MetroCount MC5600 Portable Tube Classifiers. Traffic volumes were collected in 5-minute intervals in order to determine the peak hour and peak hour factors. Turning movement counts (TMC) were collected at the following intersections:

- PR 2 at Ave. Algarrobo — Tuesday, March 3, 2015
- PR 2 at Western Plaza/Calle Camino Cuba — Thursday, March 5, 2015
- PR 2 at PR 64/PR 342 — Tuesday, March 10, 2015

Bi-directional tube counts were collected at the following driveways or side streets:

- Marginal Ford
- Marginal Church's
- Marginal Burger King
- Marginal Pep Boys
- Marginal Shell
- Marginal AAA

All counts performed were classification counts in order to obtain truck and heavy vehicle percentages for the intersections and segments of roadways. After data was gathered from the Traffic Data Collectors and Portable Tube Classifiers, it was entered into a Microsoft Excel sheet

for processing. Volumes were smoothed and balanced across the system to ensure a more accurate simulation. AM and PM peak hours were then calculated for the entire system and identified as 7:10 am – 8:10 am and 4:00 pm – 5:00 pm. TMC and ADT count locations are shown graphically in Figure 28. Summarized TMC volume diagrams are shown in Figure 29, Figure 30, Figure 31, and Figure 32. Full peak hour turning movement counts and ADTs are attached in Appendix B.

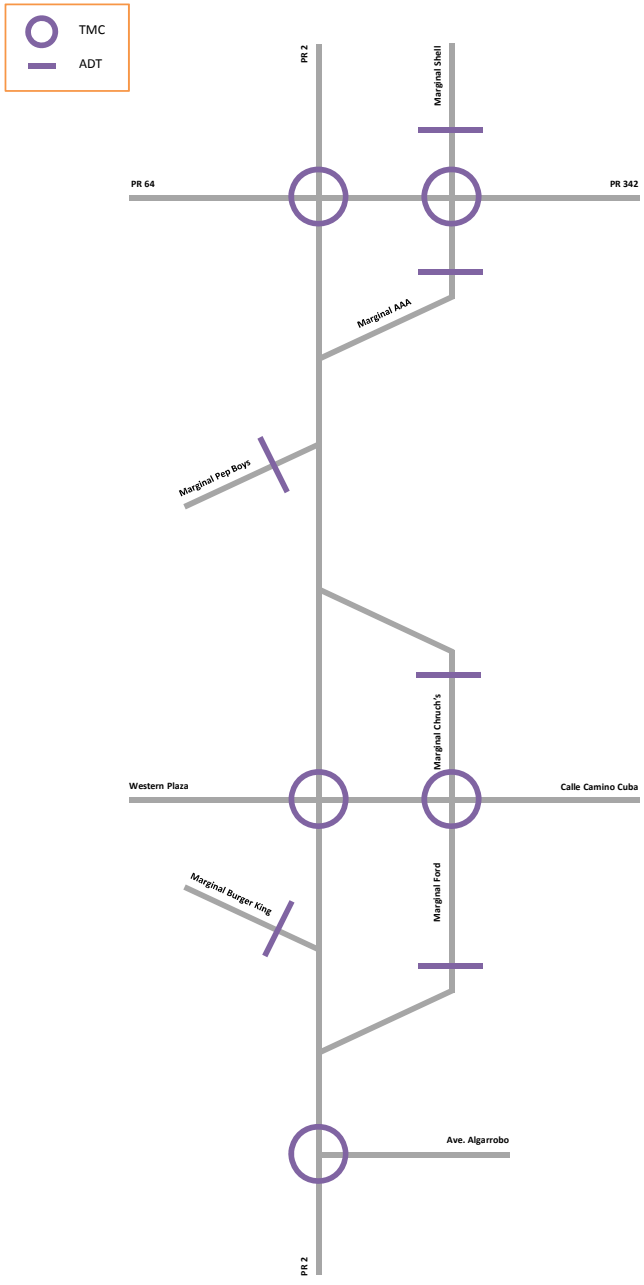


Figure 28 Traffic Count Locations

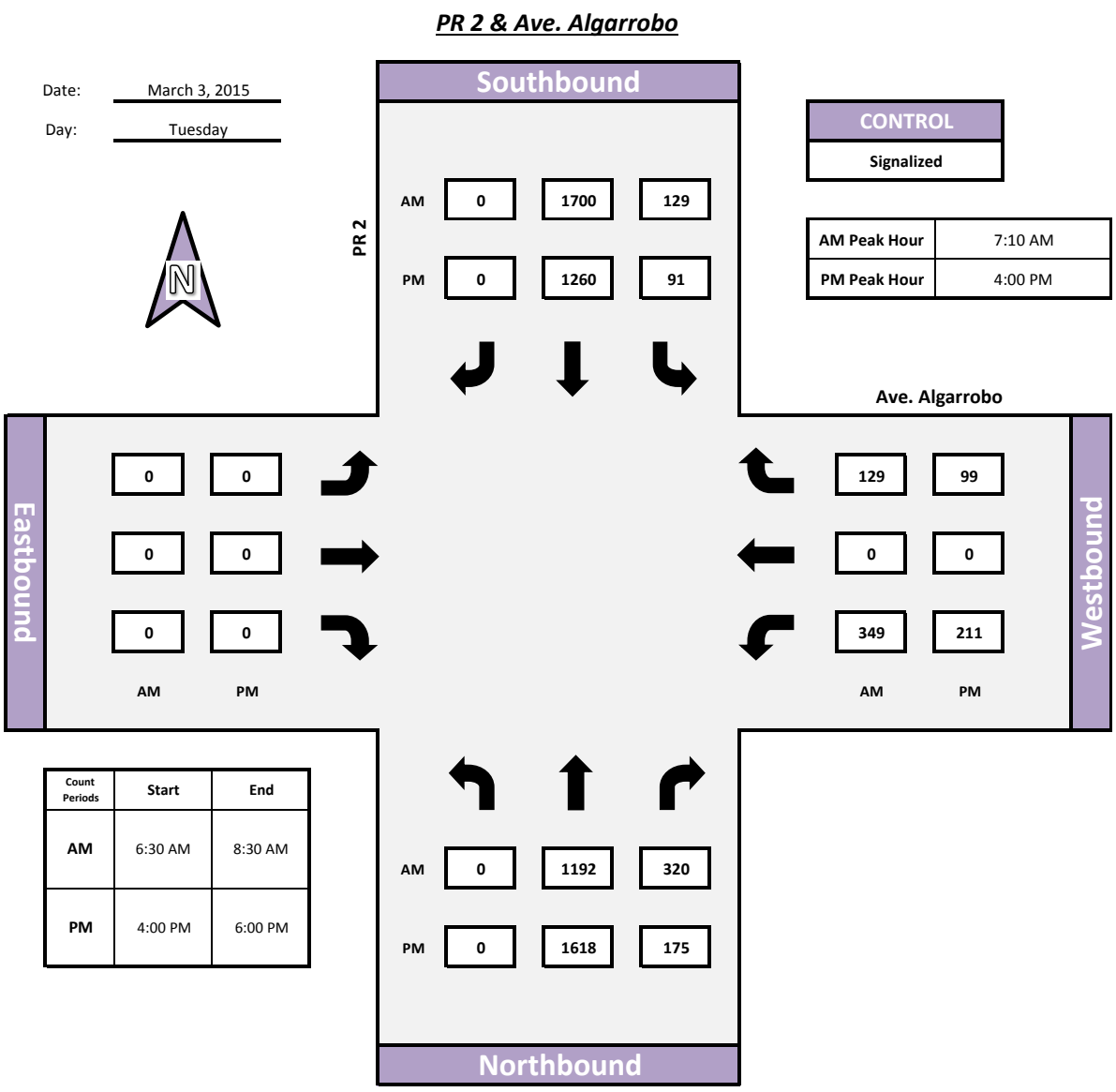


Figure 29 Turning Movement Counts – PR 2 at Ave. Algarrobo

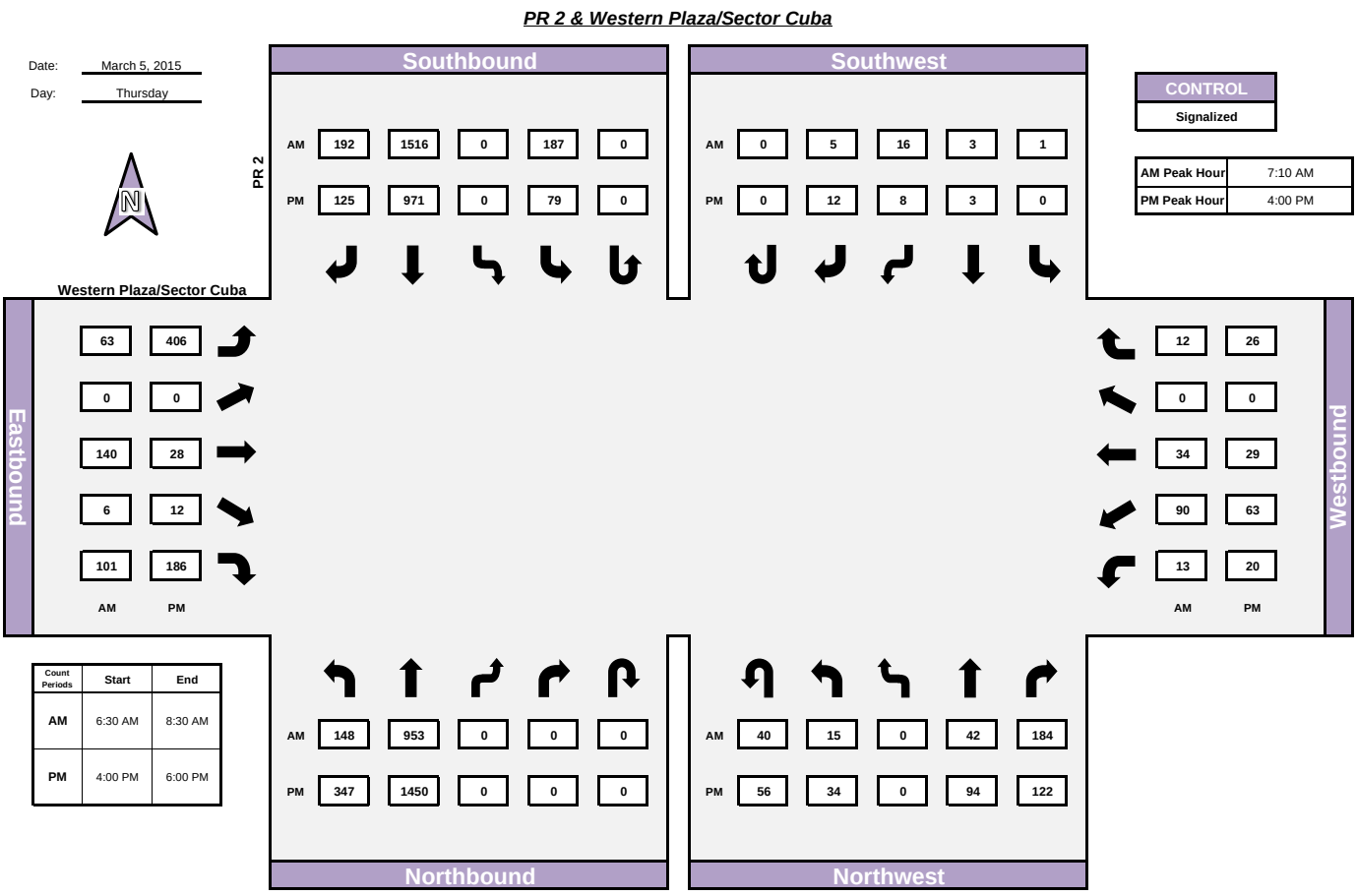


Figure 30 Turning Movement Counts – PR 2 at Western Plaza/Calle Camino Cuba

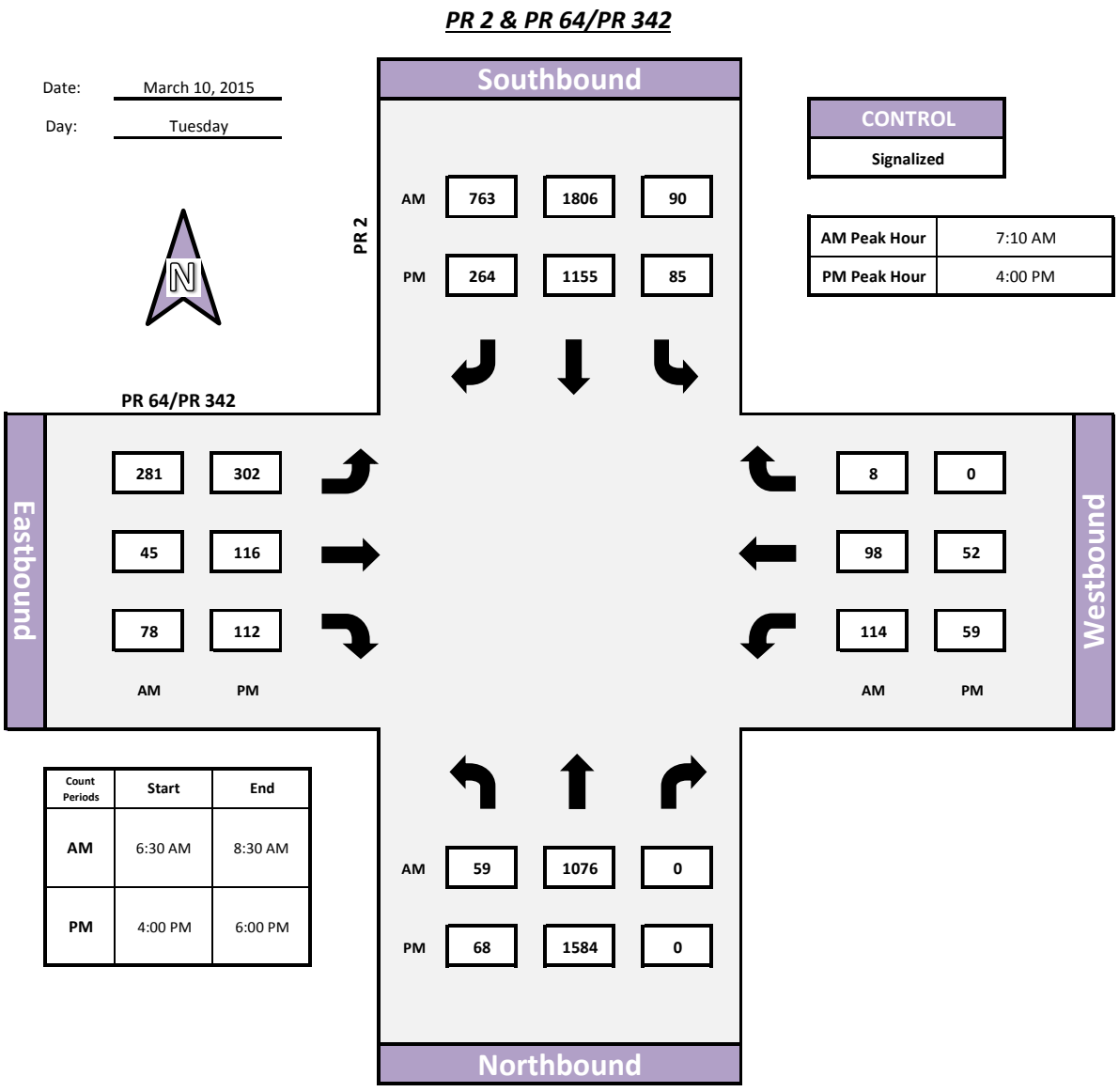


Figure 31 Turning Movement Counts – PR 2 at PR 64/PR 342

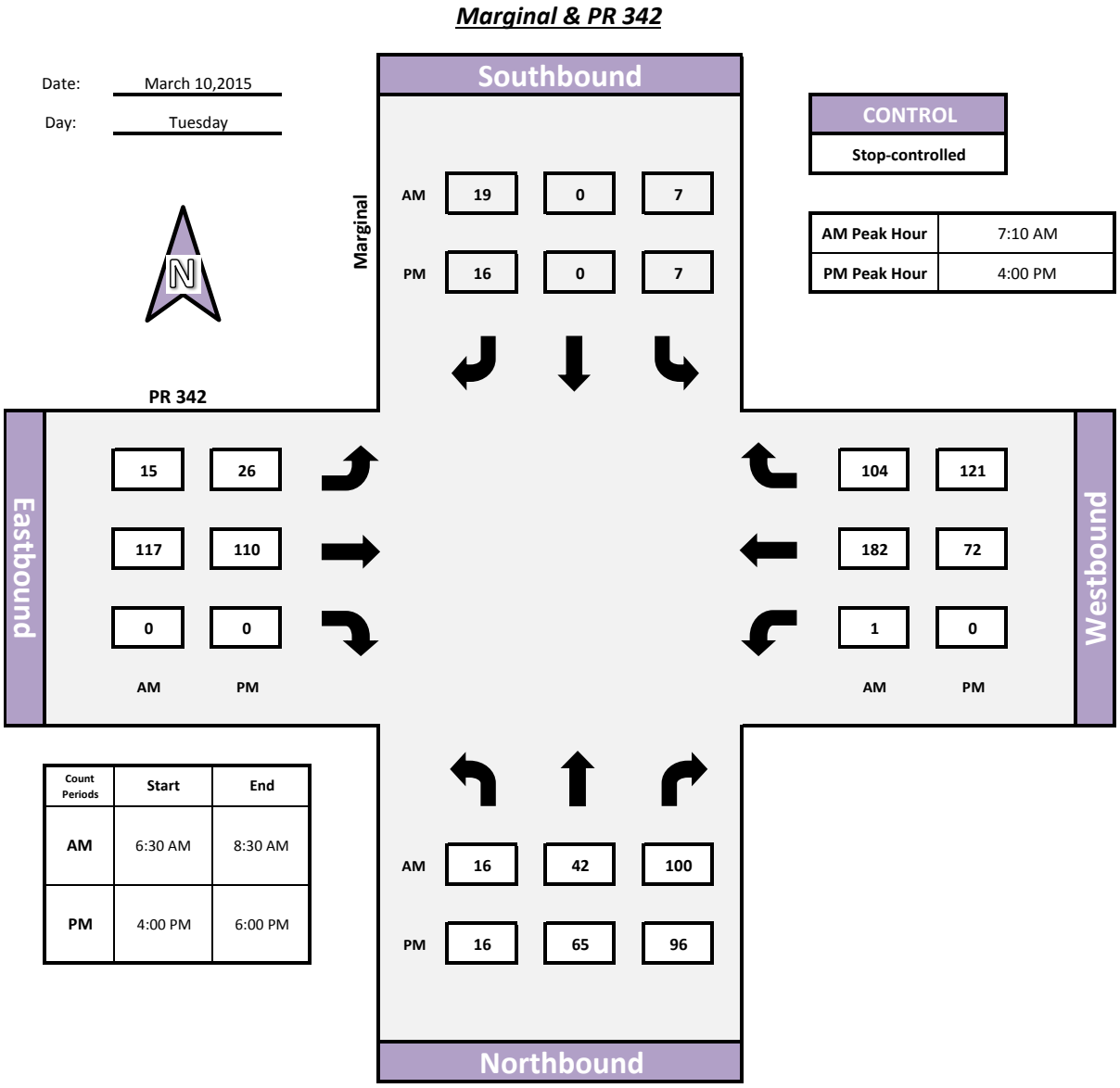


Figure 32 Turning Movement Counts – Marginal AAA/Marginal Shell at PR 342

3.2.4. PEAK HOUR FACTOR

Garber and Hoel (2009) define peak hour factor (PHF) as a measure of the variability of demand during the peak hour. This number varies between 0.25 and 1.0, where higher PHF values represent little variability of flow within the peak hour while lower PHF numbers represent greater variability. PHFs were calculated for each approach following Equation 5:

$$PHF = \frac{V}{(4 \times V_{15})} \quad (5)$$

where:

- V = peak hour volume (veh/hr), and
- V_{15} = volume during the peak 15 minutes of flow (veh/15 minutes).

Table 8 presents the PHFs for each intersection during each peak hour.

Table 8 Peak Hour Factors

Intersection	AM Peak Hour					
	NB	SB	EB	WB	NW	SW
AM Peak Hour						
PR 2 at PR 64/PR 342	0.804	0.888	0.727	0.688	N/A	N/A
PR 2 at Marginal Shell/Marginal AAA	0.790	0.650	0.717	0.635	N/A	N/A
PR 2 at Western Plaza/Calle Camino Cuba	0.810	0.889	0.783	0.631	0.689	0.481
PR 2 at Ave. Algarrobo	0.829	0.863	-	0.892	N/A	N/A
PM Peak Hour Factor						
PR 2 at PR 64/PR 342	0.929	0.870	0.774	0.712	N/A	N/A
PR 2 at Marginal Shell/Marginal AAA	0.714	0.639	0.723	0.754	N/A	N/A
PR 2 at Western Plaza/Calle Camino Cuba	0.908	0.885	0.888	0.663	0.797	0.575
PR 2 at Ave. Algarrobo	0.904	0.938	-	0.738	N/A	N/A

3.2.5. HEAVY VEHICLE PERCENTAGES

Heavy vehicle percentages were gathered from the turning movement classification counts performed at the intersections. Heavy vehicle percentages during each peak hour are summarized in Table 9. Full traffic counts are attached in Appendix B.

Table 9 Heavy Vehicle Percentages

Intersection	HV %					
	NB	SB	EB	WB	NW	SW
AM Peak Hour						
PR 2 at PR 64/PR 342	4%	7%	4%	3%	-	-
PR 2 at Marginal Shell/Marginal AAA	3%	0%	1%	1%	-	-
PR 2 at Western Plaza/Calle Camino Cuba	4%	3%	5%	9%	1%	0%
PR 2 at Ave. Algarrobo	4%	2%	-	2%	-	-
PM Peak Hour						
PR 2 at PR 64/PR 342	2%	12%	4%	2%	-	-
PR 2 at Marginal Shell/Marginal AAA	3%	0%	2%	2%	-	-
PR 2 at Western Plaza/Calle Camino Cuba	1%	3%	2%	5%	1%	0%
PR 2 at Ave. Algarrobo	2%	1%	-	2%	-	-

3.2.6. SIGNAL TIMINGS

Signal timings were provided by the Office of Traffic Signals in the Highway and Transportation Authority (ACT) of the Puerto Rico Department of Transportation and Public Works (DTOP). Signal timings for the three signalized intersections in the stretch of PR 2 from PR 64 to Ave. Algarrobo are presented in Appendix C. Signal timings and phasing are summarized in Figure 33.

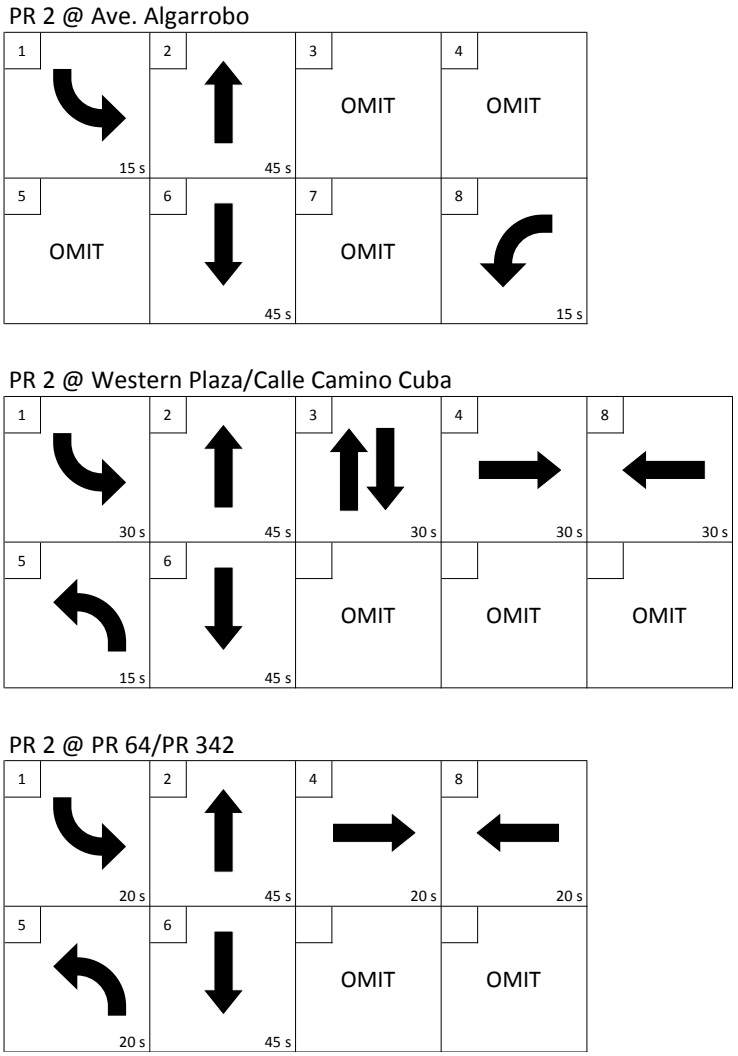


Figure 33 Signal Timings and Phasing

3.3. DATA MODELING

After all the volumes and signal cycles were gathered, an existing conditions model was constructed using Synchro Studio analysis and optimization software in order to analyze the capacity and queues of the existing corridor. Levels of service and delays in the proposed scenarios were then compared to the existing conditions capacity analysis in order to evaluate the effects and benefits of the Michigan Left intersections when compared to the existing intersection geometry.

Chapter 4 SIMULATION AND RESULTS

Synchro 8 and *SimTraffic 8* software was used to model all the studied scenarios and obtain capacity analysis for each. Delay, level of service (LOS), and 95th percentile queue lengths are based on the Highway Capacity Manual (HCM) 2000 criterion due to the shared lane configuration at some approaches, which HCM 2010 does not support. Existing and proposed conditions are described in detail in this chapter. Results for each simulation are also presented.

4.1. EXISTING CONDITIONS SCENARIO

4.1.1. DESCRIPTION

Under current conditions, the intersections along PR 2 at Ave Algarrobo, Western Plaza/Calle Camino Cuba, and PR 64/PR 342 are signal controlled. All other driveways and side streets along the section in study are stop controlled or yield controlled. Current signal timings as presented in Appendix C, were used in the model. Eastbound and westbound approaches at the intersection between PR 2 and PR 64/PR 342 are split phased as well as the EB and WB approaches at Western Plaza/Calle Camino Cuba. Existing lane configuration is shown in Appendix A.

4.1.2. RESULTS

Capacity analysis results for existing conditions are presented in Table 10. Full Synchro and SimTraffic reports are attached in Appendix D.1

Table 10 Existing Conditions Capacity Analysis

Intersection	Control Type	Lane Group Movement	AM			PM		
			Delay (s)	LOS	95th% Queue (ft)	Delay (s)	LOS	95th% Queue (ft)
PR 2 @ PR 64/PR342	Signal Control	EBL	52.2	D	156	46.1	D	168
		EBL/T	49.8	D	147	45	D	150
		EBR	32	C	0	29.9	C	0
		WBL	39.3	D	91	39.7	D	63
		WBL/T	38.3	D	90	39	D	64
		WBT/R	38.3	D	107	39	D	66
		NBL	41.4	D	61	39.3	D	54
		NBT	20.1	C	270	20.2	C	304
		SBL	41.5	D	103	39.4	D	87
		SBT	29.1	C	341	16.9	B	217
		SBR	28.6	C	111	13.9	B	0
PR 2 @ Western Plaza/Calle Camino Cuba	Signal Control	EBL	64.8	**E**	86	84.8	**F**	348
		EBL/T	84.9	**F**	213	84.1	**F**	303
		EBR	62.1	**E**	0	58	**E**	0
		NBL	73.6	**E**	308	78.2	**E**	578
		NBT	85.3	**F**	569	150.3	**F**	1147
		SBL	91.7	**F**	381	77.6	**E**	304
		SBT	173.5	**F**	739	74.1	**E**	441
		SBR	35.3	D	793	41.3	D	0
		WBL/T/R	86.9	**F**	205	92.3	**F**	228
		MNBL	89.5	**F**	116	91.2	**F**	164
		MNBT	70	**E**	174	69.8	**E**	216
		MNBR	71	**E**	83	65.3	**E**	86
		MSBL/T/R	69.9	**E**	59	66.6	**E**	68
PR 2 @ Ave. Algarrobo	Signal Control	WBL/R	84.1	**F**	209	34.9	A	162
		NBT	17.5	B	252	38.9	D	347
		NBR	9.6	A	116	7.6	A	119
		SBL	35.7	D	152	33.2	C	108
		SBT	8.4	A	248	5.3	A	171

Existing conditions capacity analysis shows that the intersection between PR 2 and PR 64/PR 342 will operate at an acceptable level of service during both peak hours. However, the intersection of PR 2 and Western Plaza/Calle Camino Cuba will have a failing level of service of E or worse during both peak hours for all approaches except for the SB right turning movement. Queue on the mainline will be high and occasionally will spill back towards the northern intersection of PR 2 at PR 64/PR 342 during the AM peak hour. In the same manner, the intersection between PR 2 and Western Plaza/Calle Camino Cuba will have NB through queues that will spill back to the next intersection to the south. WB left turning movements at Ave Algarrobo will have significant delays due to the high number of left turning movements.

4.2. NO DIRECT LEFT TURNS ON EITHER MAJOR OR MINOR APPROACHES SCENARIO

4.2.1. DESCRIPTION

In this scenario, referred to as Scenario 1, the intersection between PR 2 and Western Plaza/Calle Camino Cuba will be converted to a hybrid Michigan Left where direct left turns will be prohibited on the mainline and side streets, as well as the frontage road parallel to PR 2. It is considered a hybrid since traditional Michigan Lefts only have four approaches whereas this intersection will have six. The intersections PR 2 at PR 64/PR 342 and PR 2 at Ave Algarrobo kept the existing lane configuration. However, cycle lengths and split timings were optimized across the corridor. An exclusive right turn storage lane was modeled for the westbound approach of the PR 2 at Western Plaza intersection in order to avoid having right turning vehicles stacked behind through vehicles. Full lane configuration for this scenario is shown in Appendix A. Figure 34 shows the indirect left turn movements that will need to be performed on both approaches.

The frontage road was connected to the Michigan North median opening in order to avoid weaving between the intersection and the median opening. Vehicles that wish to turn left on PR 2 (blue line) will have to continue through the intersection, perform a U-turn at a signalized median opening to the north, and then make a right turn into Western Plaza. Vehicles on the westbound approach that wish to turn left onto SB PR 2 (red line) will now have to turn right, make a left at the median opening, and then continue straight. NB vehicles in the frontage road that wish to turn

left into Western Plaza (pink line), will need to continue along the frontage road, perform a left turn at the median opening to the north, and then make a right into the side street. The same principles will apply to vehicles in the opposite direction.

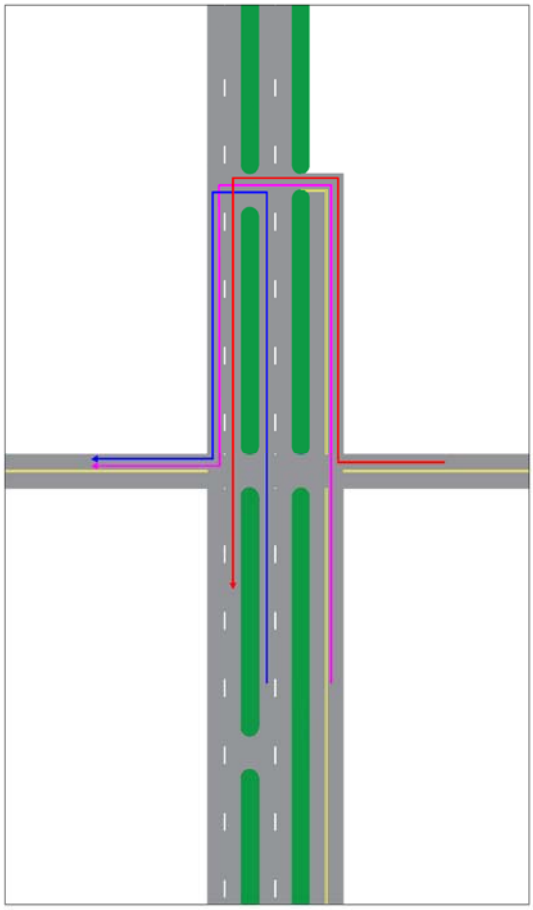


Figure 34 Turning Movements for Scenario 1

Median breaks to the north and south of the Western Plaza intersection are signalized in order to provide an exclusive phase for left turning or U-turning vehicles. These are referred to as Michigan North and Michigan South, respectively. Lane configuration and signal phasing for the signalized median openings is shown in Figure 35 and Figure 36

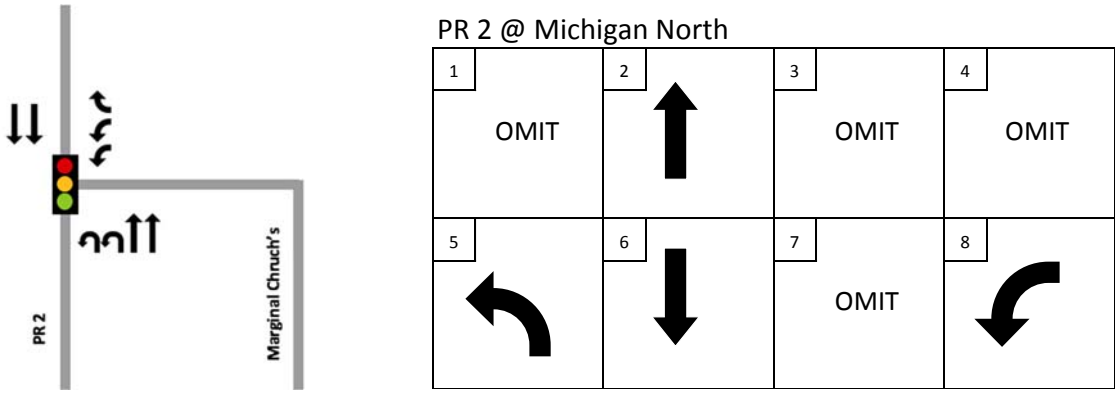


Figure 35 Michigan North Lane Configuration and Phasing for Scenario 1

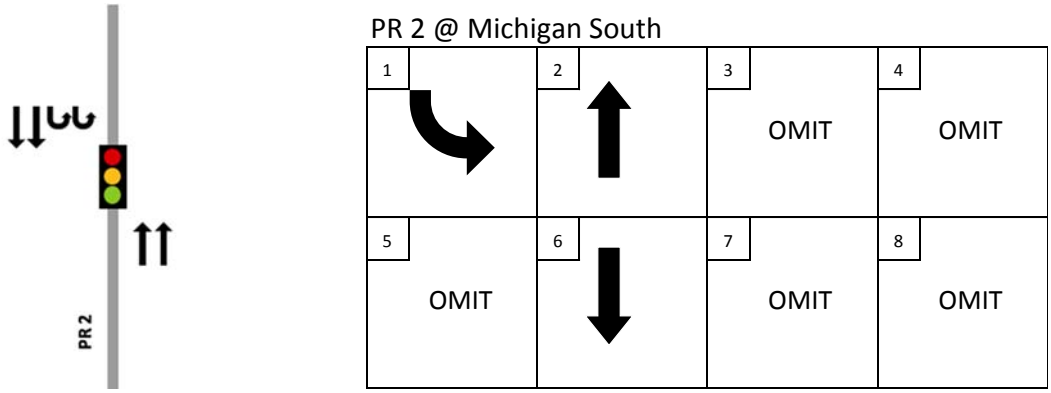


Figure 36 Michigan South Lane Configuration and Phasing for Scenario 1

Both Michigan North and Michigan South were modeled with two exclusive U-turn lanes with protected phasing. An exclusive right turn lane was also added to the westbound approach at the Michigan North intersection for vehicles to continue on to NB PR 2 without being stacked behind left turning vehicles.

4.2.2. RESULTS

Capacity analysis results for the scenario with prohibited direct left turns at both minor and major approaches are presented in Table 11. Full *Synchro* and *SimTraffic* reports for this scenario are presented in Appendix D.2.

Table 11 Scenario 1 Capacity Analysis

Intersection	Control Type	Lane Group Movement	AM			PM		
			Delay (s)	LOS	95th% Queue (ft)	Delay (s)	LOS	95th% Queue (ft)
PR 2 @ PR 64/PR342	Signal Control	EBL	52.2	D	186	46.1	D	177
		EBL/T	49.8	D	163	45	D	164
		EBR	32	C	0	29.9	D	0
		WBL	39.3	D	91	39.7	D	53
		WBL/T	38.3	D	88	39	D	73
		WBT/R	38.3	D	61	39	D	67
		NBL	41.4	D	64	39.3	D	51
		NBT	20.1	C	232	20.2	C	299
		SBL	41.5	D	110	39.4	D	83
		SBT	29.1	C	308	16.9	B	194
		SBR	28.6	C	270	13.9	B	0
PR 2 @ Michigan North	Signal Control	WBL	32.4	C	91	23.7	C	101
		WBR	33.5	C	0	23.2	C	0
		NBU	36.3	D	82	24	C	113
		NBT	3.6	A	115	6.8	A	219
		SBT	23.8	C	332	17.1	B	257
PR 2 @ Western Plaza/Calle Camino Cuba	Signal Control	EBT	112.4	F	141	49.3	D	93
		EBR	41.6	D	94	308	F	425
		NBT	23.4	C	295	142.1	F	647
		NBT/R	23.4	C	305	142.1	F	662
		SBT	49.8	D	508	24.3	C	276
		SBR	11.5	B	0	19.5	B	0
		WBT	49.9	D	68	85.2	F	91
		WBR	45	D	47	70.2	E	55
		MNBT	59.2	E	114	217.2	F	239
		MNBR	41.7	D	84	62.4	E	149
		MSBT/R	42.2	D	32	64.3	E	37
PR 2 @ Michigan South	Signal Control	NBT	5.1	A	119	10.1	B	189
		SBU	16.5	B	101	29.9	C	158
		SBT	0.6	A	0	0.3	A	157
PR 2 @ Ave. Algarrobo	Signal Control	WBL/R	45.2	D	177	34.9	C	136
		NBT	17.6	B	234	38.9	D	448
		NBR	8.8	A	82	7.6	A	259
		SBL	48.5	D	131	33.2	C	103
		SBT	9.8	A	166	5.3	A	135

Capacity analysis for this scenario shows that all intersections will operate at an acceptable level of service of D or better during both peak hours, except for the intersection of PR 2 and Western Plaza/Calle Camino. The most significant delays and queues are expected during the PM peak hour. The northbound and southbound approaches of the frontage road will be significantly delayed as well as the northbound through movement on the main line. Eastbound and westbound approaches will also experience significant delays.

4.3. NO DIRECT LEFT TURNS ON MAJOR APPROACHES SCENARIO

4.3.1. DESCRIPTION

This scenario, referred to as Scenario 2, models the intersection with prohibited left turns at the northbound and southbound approaches on PR 2. Also, the left turn on the northbound frontage road was prohibited since drivers would be expected to use this roadway as a cut through to access the shopping center. Lane configuration for the median openings, as well as the intersections between PR 2 at PR 64/PR 342 and PR 2 at Ave. Algarrobo were kept the same as in Scenario 1. An exclusive right turn storage lane was also provided for the westbound right turning vehicles at the PR 2 and Western Plaza intersection in order to avoid stacking behind through vehicles. Intersection cycle lengths were optimized in order to provide adequate traffic flow along the corridor. Full lane configuration for this scenario is shown in Appendix A. Turning movements for this scenario are shown graphically in Figure 37.

NB left turning vehicles on PR 2 will be able to make a direct left turn at the intersection with Western Plaza/Calle Camino Cuba (blue line). Vehicles that wish to make a left turn on the NB approach of the frontage road will have to continue on straight, make a left turn at the median opening and then make a right turn into Western Plaza (pink line). Vehicles that wish to make a left from the westbound approach will have to first make a right turn then turn left at the Michigan North median opening. The same principles will apply to vehicles in the opposite direction.

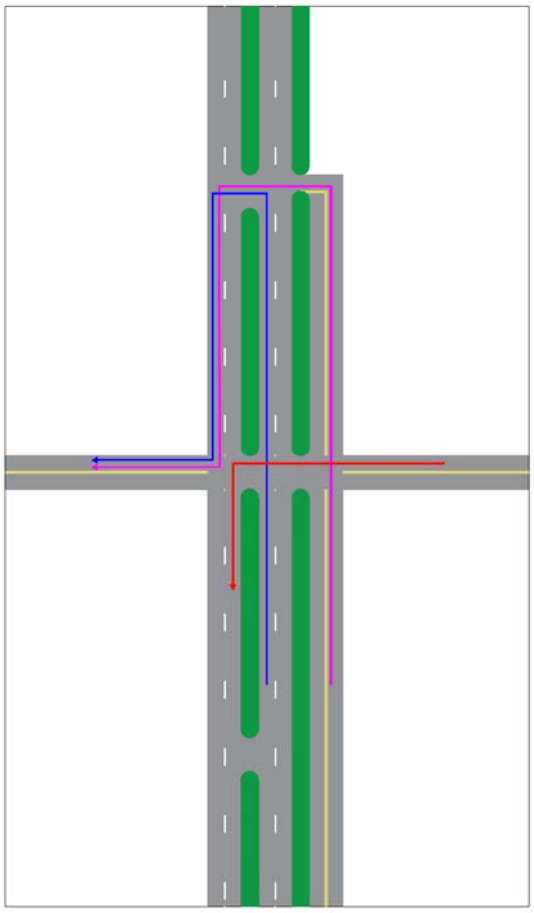


Figure 37 Turning Movements for Scenario 2

4.3.2. RESULTS

Capacity analysis results for Scenario 2 is summarized in Table 12. Full synchro reports are attached in Appendix D.3.

Capacity analysis for Scenario 2 shows that the intersections between PR 2 at PR 64/PR 342 and PR 2 sat Ave. Algarrobo will operate at failing levels of service during PM peak hours. Michigan Norte and Michigan Sur will operate at a level of service C or better during both peak hours. All approaches of the PR 2 at Western Plaza intersection will suffer high delays due to the split phasing nature of the eastbound, westbound, and frontage road approaches.

Table 12 Scenario 2 Capacity Analysis

Intersection	Control Type	Lane Group Movement	AM			PM		
			Delay (s)	LOS	95th% Queue (ft)	Delay (s)	LOS	95th% Queue (ft)
PR 2 @ PR 64/PR342	Signal Control	EBL	42.7	D	145	55.3	E	230
		EBL/T	40.7	D	138	54.5	D	216
		EBR	26	C	0	40.7	D	0
		WBL	38.3	D	79	55.1	E	65
		WBL/T	35.4	D	118	54.2	D	72
		WBT/R	35.4	D	84	54.2	D	57
		NBL	35.4	D	73	67.6	E	69
		NBT	18.4	B	200	21.3	C	305
		SBL	38.2	D	103	55.7	E	132
		SBT	25.7	C	281	16.1	B	218
		SBR	25.8	C	119	13.7	B	0
PR 2 @ Michigan North	Signal Control	WBL	28.9	C	47	24.7	C	87
		WBR	31.8	C	0	25.3	C	0
		NBU	35.2	D	108	24	C	144
		NBT	3.6	A	87	5.4	A	141
		SBT	26.7	C	338	20.7	C	299
PR 2 @ Western Plaza/Calle Camino Cuba	Signal Control	EBL	55.1	E	103	143	F	471
		EBL/T	116.7	E	226	139.3	F	455
		EBR	52	F	0	53.7	D	0
		NBT	32	D	384	69.1	E	648
		NBT/R	32	C	404	69.1	E	656
		SBT	58.1	E	539	24	C	283
		SBR	16.8	B	220	19.9	B	0
		WBL/T	122	F	255	99.1	F	144
		WBR	50.1	D	77	56.4	E	83
		MNBT	77.6	E	126	150.3	F	954
		MNBR	54.6	D	101	57.4	E	96
		MSBL/T/R	56.1	E	38	59.6	E	41
PR 2 @ Michigan South	Signal Control	NBT	0.4	A	128	4.4	A	122
		SBU	30.1	C	107	21.5	C	59
		SBT	0.6	A	123	0.3	A	64
PR 2 @ Ave. Algarrobo	Signal Control	WBL/R	40.7	D	189	61.4	E	198
		NBT	19.6	B	291	19.8	B	335
		NBR	10.4	B	118	7.5	A	148
		SBL	40.9	D	121	66.8	E	126
		SBT	10.3	B	215	5.4	A	168

4.4. NO DIRECT LEFT TURNS ON MINOR APPROACHES SCENARIO

4.4.1. DESCRIPTION

This scenario, referred to as Scenario 3, models the intersection between PR 2 and Western Plaza with prohibited left turns in the northbound and southbound approaches of the frontage road in addition to prohibited lefts on the eastbound and westbound approaches. Lane configuration for this scenario is shown in Appendix A. An exclusive right turn storage lane was provided for the westbound right turning vehicles in order to avoid stacking behind through vehicles. The intersections PR 2 at PR 64/PR 342 and PR 2 at Ave Algarrobo kept the existing lane configuration. Signal cycle lengths and splits were optimized along the corridor. The Michigan South lane configuration was kept the same as in Scenario 1, but the U-turn lanes at the Michigan North median openings were removed, as shown in Figure 38. Turning movements for this scenario are shown graphically in Figure 39.

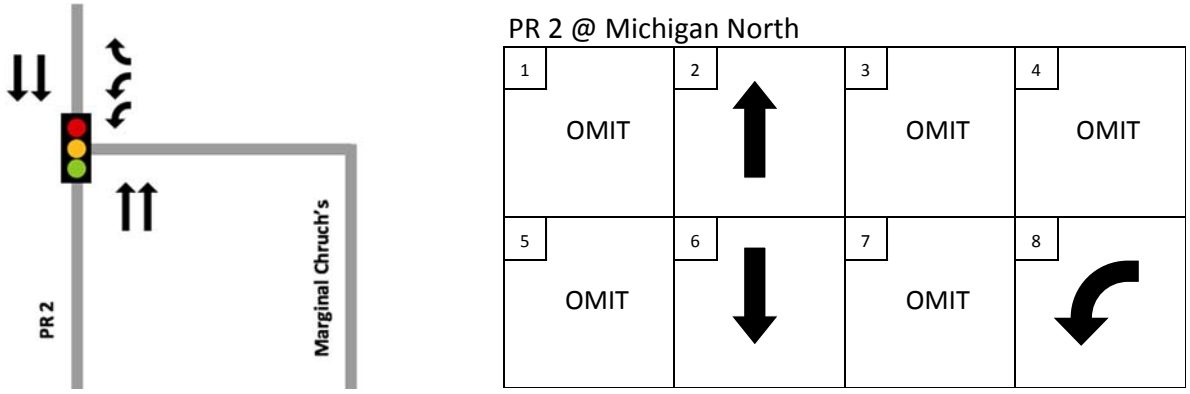


Figure 38 Michigan North Lane Configuration for Scenario 3

In this scenario, the WB and EB approaches will be able to make direct left turns at the PR 2 at Western Plaza intersection (red line). NB vehicles on PR 2 that wish to turn left into Western Plaza will have to go through the intersection, make a U-turn at the Michigan North median opening and then make a right turn into the shopping center (blue line). NB vehicles travelling in the frontage road will have to continue straight and make a left turn at the Michigan North median opening followed by a right turn into Western Plaza (pink line). The same principles will apply to vehicles in the opposite direction.

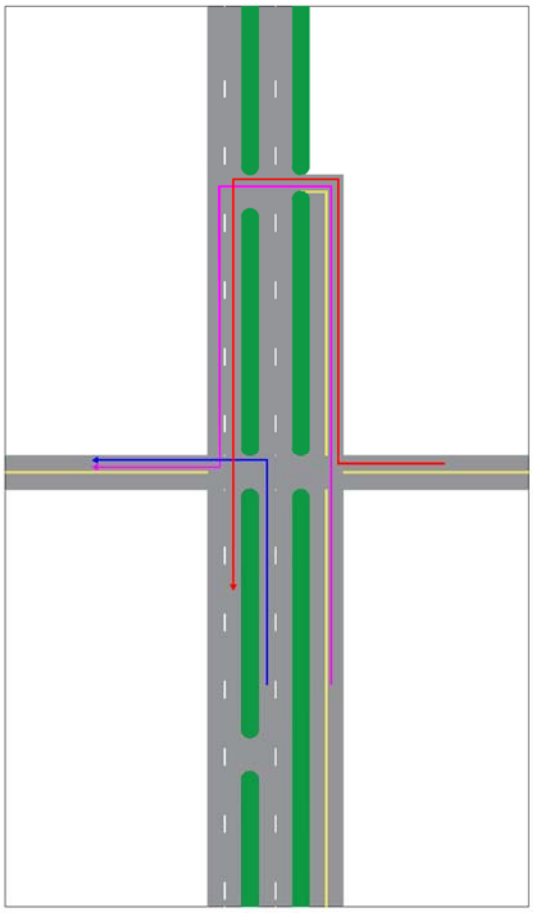


Figure 39 Turning Movements for Scenario 3

4.4.2. RESULTS

The capacity analysis results for this scenario are summarized in Table 13. Full synchro reports are attached in Appendix D.4.

Capacity analysis for this scenario shows that most turning movements at the intersection of PR 2 and PR 64/PR 342 will operate at a LOS of E during the AM peak hour. However, most turning movements will operate at LOS D or better during the PM peak hour with the exception of the NBL. The intersection at PR 2 at Western Plaza will experience heavy NBL and SBL delays. The NB and SB approaches of the frontage road will also experience delays and failing LOS. U-turning vehicles will experience delays of 82 seconds during the PM peak hour. The intersection of PR 2 and Ave. Algarrobo will operate at LOS E.

Table 13 Scenario 3 Capacity Analysis

Intersection	Control Type	Lane Group Movement	AM			PM		
			Delay (s)	LOS	95th% Queue (ft)	Delay (s)	LOS	95th% Queue (ft)
PR 2 @ PR 64/PR342	Signal Control	EBL	65.7	E	202	52.1	D	169
		EBL/T	62.7	E	193	51.5	D	163
		EBR	42.6	D	0	38.3	D	0
		WBL	63.9	E	104	51.4	D	56
		WBL/T	58.7	E	120	50.7	D	75
		WBT/R	58.7	E	95	50.7	D	70
		NBL	59	E	87	61.9	E	53
		NBT	17.7	B	187	20.7	C	246
		SBL	55.7	E	93	52.8	D	93
		SBT	20.9	C	314	16.1	B	223
		SBR	24.3	C	278	13.6	B	0
PR 2 @ Michigan North	Signal Control	WBL	22.1	C	78	22.5	C	98
		WBR	23.9	C	0	23.9	C	0
		NBT	4.6	A	146	7.8	A	227
		SBT	10.2	B	238	4.7	A	176
PR 2 @ Western Plaza/Calle Camino Cuba	Signal Control	EBT	204	F	307	50.7	D	76
		EBR	43.4	D	81	590.4	F	489
		NBL	185.2	F	193	73.1	E	205
		NBT	13.9	B	232	29.4	C	359
		SBL	157.6	F	213	347.1	F	200
		SBT	22.5	C	355	16	B	223
		SBR	9.1	A	0	11	B	0
		WBL/T	54.7	D	93	67	E	57
		WBR	45	D	51	60.1	E	50
		MNBT	59.2	E	252	214.1	F	1282
		MNBR	72.2	E	88	54.9	D	104
		MSBT/R	42.2	D	45	56	E	63
PR 2 @ Michigan South	Signal Control	NBT	0.3	A	27	0.5	A	0
		SBU	0.4	A	0	82.3	F	223
		SBT	0.6	A	0	0.3	A	227
PR 2 @ Ave. Algarrobo	Signal Control	WBL/R	56.1	E	246	60.6	E	179
		NBT	20.9	C	321	19.8	B	322
		NBR	13.2	B	173	7.5	A	230
		SBL	62	E	187	66.4	E	121
		SBT	11.8	B	290	5.4	A	148

4.5. SEPARATION OF PR 2 AND FRONTAGE ROAD SCENARIO

4.5.1. DESCRIPTION

Given that the proposed models with Michigan Left configurations do not significantly improve the overall intersection level of service and delay, a new model was developed. Scenario 4 models the PR 2 at Western Plaza/Calle Camino Cuba intersection as two separate signalized intersections with no link between them. In this scenario, both T-intersections will function on their own, therefore reducing the need of multiple phases for the entire intersection to four in the main line intersection and three in the frontage road intersection. Full lane configuration for this scenario is presented in Appendix A. Turning movements are shown graphically in Figure 40.

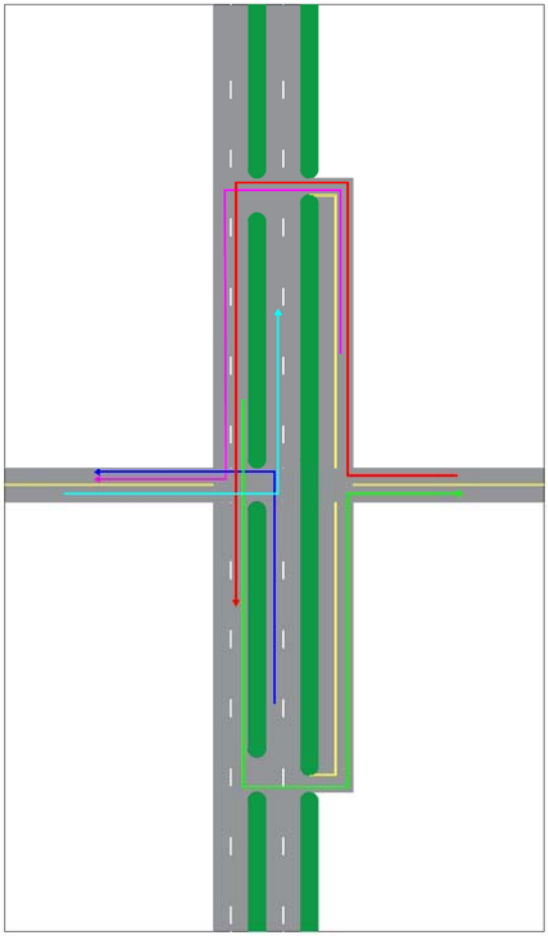


Figure 40 Turning Movements for Scenario 4

In this scenario, NB left (blue line) and EB left turning vehicles (cyan line) will be able to make a direct left turn at the main line intersection. SB vehicles on PR 2 that wish to access Calle Camino Cuba will need to continue straight, make a left turn at the median opening to the south and then turn right at the frontage road intersection (green line). WB vehicles that wish to turn into SB PR 2 will need to turn right at the frontage road intersection and then make a left into PR 2 south (red line). Finally, the vehicles that want to access Western Plaza from the frontage road will have to continue straight, make a left at the median opening to the north, and then make a right at Western Plaza (pink line).

Signalized median openings to the north and south of the intersection between PR 2 and Western Plaza will allow vehicles in the mainline to access the frontage road and vice versa. Lane configuration for the Michigan North median opening will be the same as in the Scenario 3. The Michigan South lane configuration is shown in Figure 41.

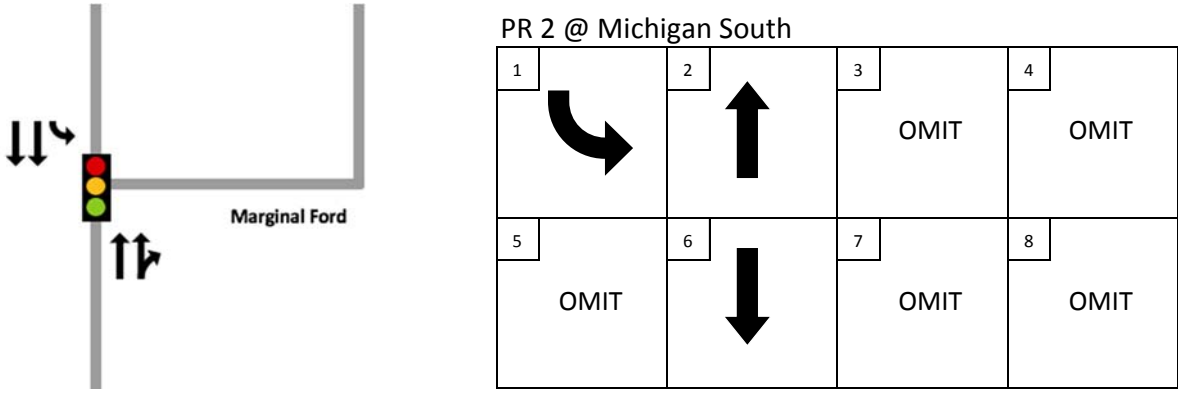


Figure 41 Michigan South Lane Configuration for Scenario 4

4.5.2. RESULTS

Capacity analysis results for Scenario 4 are presented in Table 14. Full Synchro and SimTraffic reports are attached in Appendix D.5.

Table 14 Scenario 4 Capacity Analysis

Intersection	Control Type	Lane Group Movement	AM			PM		
			Delay (s)	LOS	95th% Queue (ft)	Delay (s)	LOS	95th% Queue (ft)
PR 2 @ PR 64/PR342	Signal Control	EBL	61.4	E	182	48.7	D	208
		EBL/T	58.4	E	196	48.1	D	208
		EBR	37.6	D	0	35.5	D	0
		WBL	60.4	E	88	48.4	D	68
		WBL/T	54.4	D	96	47.6	D	83
		WBT/R	54.5	D	91	47.6	D	50
		NBL	42.6	D	69	49	D	66
		NBT	11.5	B	176	15.4	B	231
		SBL	49.2	D	126	52.2	D	39
		SBT	20.7	C	609	16.3	B	102
		SBR	23.6	C	94	13.7	B	202
PR 2 @ Michigan North	Signal Control	WBL	47.1	D	134	43.3	D	114
		WBR	48	D	0	43.5	D	0
		NBT	4.3	A	120	3.4	A	202
		SBT	5.2	A	110	3.3	A	142
PR 2 @ Western Plaza	Signal Control	EBL	48.1	D	217	48.7	D	253
		EBR	49.2	D	177	37.1	D	232
		NBL	42.4	D	100	36.7	D	169
		NBT	3.3	A	159	6.1	A	264
		SBT	5.8	A	259	9.4	A	242
		SBR	2.8	A	0	5.1	A	0
Marginal Ford/Marginal Church's @ Calle Camino Cuba	Signal Control	WBL	46.3	D	40	46.7	D	57
		WBR	46.2	D	54	46	D	46
		NBT	1.5	A	3	1.7	A	33
		NBR	2.5	A	58	1.5	A	30
		SBL/T	1.4	A	0	1.4	A	10
PR 2 @ Michigan South	Signal Control	NBT/R	2.8	A	148	1.1	A	218
		SBL	21.4	C	479	33.9	C	215
		SBT	0.4	A	610	0.3	A	0
PR 2 @ Ave. Algarrobo	Signal Control	WBL/R	50.7	D	245	63.7	E	177
		NBT	22.1	C	264	19	B	369
		NBR	13.3	B	170	6.9	A	147
		SBL	47.3	D	150	47	D	115
		SBT	12	B	254	5.4	A	187

Capacity analysis for this scenario shows that the EBL, EBL/T, and WBL turning movements at the intersection of PR 2 and PR 64/PR 342 operate at LOS E during the AM peak hour due to the split phase nature of these two approaches. All other turning movements operate at LOS D or better with minimal delays and queues. During the PM peak hour, all turning movements at this intersection operate under acceptable levels of service. At the Michigan North signalized intersection, all turning movements are expected to operate under acceptable levels of service during both peak hours. Both the mainline intersection of PR 2 and Western Plaza and the frontage road intersection are expected to operate at LOS D or better during both peak hours. The Michigan South intersection will operate at LOS A and C during both peak hours. The westbound approach at the intersection of PR 2 and Ave. Algarrobo will experience slightly higher delays and LOS E during the PM peak hours. All other turning movements will operate under acceptable levels of service.

4.6. SUMMARY

All scenarios were compared to determine if any of the unconventional designs would yield better operation than the existing conditions. Table 15 and Table 16 summarize levels of service at each signalized intersection during AM and PM peak hours, respectively, across all scenarios studied.

All analysis was based under the assumption that an acceptable level of service would be at D or better. During the AM peak hour, the existing scenario shows that the intersection of PR 2 at Western Plaza is operating at a deficient level of service F with heavy delays. During the PM peak hour, the intersection at Wester Plaza continues to operate at LOS F while the intersection of Marginal Ford/Marginal Church's at Calle Camino Cuba operates at LOS E.

Under Scenarios 1, 2, and 3, both the intersections at Western Plaza and Calle Camino Cuba operate under LOS E or F during the PM peak hour with heavy delays in many movements. However, those two intersections are expected to operate under LOS B in Scenario 4. This is due to the reduction in signal phases by eliminating crossing movements between the eastern and western halves of the intersection. During the AM peak hour, the intersection at Western Plaza improved from LOS F in the Existing Conditions Scenario to LOS B in Scenario 4.

Table 15 Summary of Scenario Results – AM Peak Hour

Intersection	Existing Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4
PR 2 @ PR 64/PR 342	D	C	C	C	C
PR 2 @ Michigan North	-	B	C	A	A
PR 2 @ Western Plaza	F	D	D	D	B
Marginal Ford/Marginal Church's @ Calle Camino Cuba	D	C	D	D	B
PR 2 @ Michigan South	-	A	A	A	A
PR 2 @ Ave. Algarrobo	C	B	B	C	C

Table 16 Summary of Scenario Results – PM Peak Hour

Intersection	Existing Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4
PR 2 @ PR 64/PR 342	C	C	C	C	C
PR 2 @ Michigan North	-	B	B	A	A
PR 2 @ Western Plaza	F	F	E	F	B
Marginal Ford/Marginal Church's @ Calle Camino Cuba	E	F	F	F	B
PR 2 @ Michigan South	-	A	A	A	A
PR 2 @ Ave. Algarrobo	C	C	B	B	B

Chapter 5 CONCLUSIONS AND RECOMMENDATIONS

Population growth in recent years has caused an increase in traffic as well. As roadways are filled with more vehicles, delays and travel times are expected to also increase. The Michigan Department of Transportation were the first to develop a new type of intersection that eliminated direct left turns (DLT) in an attempt to reduce travel time, delays, and increase safety. A Michigan Left is an at-grade intersection design, which prohibits direct left turns at signal-controlled locations with non-traversable medians. Drivers that wish to turn left from the major road onto a minor road must first travel through the intersection and execute a U-turn at the median opening downstream of the intersection, then turn right at the minor road. Drivers who wish to turn left from a minor road onto a major road must turn right at the signal-controlled intersection and then perform a U-turn at the downstream median opening in the major road. A Superstreet is an unconventional intersection design similar to the Michigan Left in the sense that it prohibits direct left turns in the minor road approaches. Also, it prohibits any crossing movements in the minor road, only allowing right turn movements. Similar to the Michigan Left, all vehicles that with to turn left or go through, have to then make a U-turn at a median opening and then perform a right turn or continue straight ahead.

Several studies have been conducted over the years to determine the benefits of replacing traditional intersections with Michigan Lefts. Liu et al. and Reid and Hummer concluded that eliminating direct left turns and replacing them with Michigan Lefts have the most potential to improve intersection capacity and reduce travel times as well as delay. Pirinccioglu et al. (2006) evaluated the safety effects of right turns followed by U-turns (RTUT) at both signalized intersections and unsignalized median openings. Authors in this study concluded that RTUT intersections were safer than intersections with direct left turns.

A survey conducted for a University of Puerto Rico undergraduate class was used to determine the amount of drivers that currently use the Michigan Left principles in order to avoid delays and queues at a highly congested intersection in Mayagüez, PR. That survey indicated that

some drivers performed either indirect left turns in or indirect left turns out of the shopping center due to the congestion during peak hours.

Peak hour turning movement counts were conducted at the following intersections: PR 2 at PR 64/PR 342, PR 2 at Western Plaza/Calle Camino Cuba, and PR 2 at Ave. Algarrobo. Tube counts were collected at the frontage along PR 2 and at the entrance and exit driveways to the shopping center. From these counts, peak hour and PHF was determined.

A simulation model was constructed with the collected data in order to determine the existing conditions intersections' levels of service. Existing conditions capacity analysis shows that the system will have average delays of 56 seconds during the AM peak hour and 52 seconds during the PM peak hour. With the exception of the southbound right turning movement, all other movements at the intersection of PR 2 and Western Plaza/Calle Camino Cuba are experiencing failing levels of service of E or F.

Four additional models were developed where the intersection between PR 2 and Western Plaza/Calle Camino Cuba was redesigned into different variations of the Michigan Left intersection. Each scenario is described below:

1. Scenario 1: This scenario models the intersection with prohibited direct left turns on both minor and major approaches. Two signalized median breaks were provided to the north and south of the intersection where turning vehicles could make a U-turn followed by a right turn or right turn followed by a U-turn.
2. Scenario 2: This scenario models the intersection with prohibited direct left turns on the major road only. Drivers on the minor road approaches were able to make direct lefts with the exception of the northbound approach of the frontage road which was also prohibited in order to avoid cut-through traffic.
3. Scenario 3: This scenario models the intersection with prohibited direct lefts on the minor approaches only, including the northbound approach of the frontage road.
4. Scenario 4: This scenario is based on dividing the PR 2 at Western Plaza/Calle Camino Cuba intersection into two separate T-intersections with the purpose of eliminating the need of multiple phases. The north and south ends of the frontage road were connected to the signalized median openings.

Overall turning movement delays along the corridor in all studied scenarios are summarized in Table 17.

Table 17 Overall Network Delay Summary

Scenario	AM Peak Hour		PM Peak Hour	
	Delays (s)	LOS	Delays (s)	LOS
Existing Conditions	56.0	E	52.5	D
Scenario 1	34.1	C	51.7	D
Scenario 2	37.9	D	47.7	D
Scenario 3	47.6	D	66.6	E
Scenario 4	29.4	C	27.5	C

Capacity analysis shows that all scenarios are expected to have lower overall delays when compared to the Existing Conditions scenario. Scenario 3 is the only model that will have higher overall delays than the Existing Conditions. However, Scenario 1, 2, and 3 will all have many turning movements that will operate at unacceptable levels of service during both peak hours.

Scenario 4 proved to be the most effective scenario in reducing delays and improving levels of service. Overall corridor delays were reduced by more than 26 and 25 seconds during the AM and PM peak hours, respectively. In this scenario, levels of service of the intersection of Western Plaza/Calle Camino Cuba at PR 2 were expected to improve from LOS F and E to LOS B during the PM peak hour. This is due to the reduction of phases at the mainline intersection which will allow for more green time therefore reducing delays. In addition, the coordination of the signals along the corridor will allow a smoother progression of traffic through the section in study.

Although Michigan Lefts and Superstreets are not widely used in many states, they are a great alternative where congestion and safety are an issue. They have been studied widely and results prove that they can decrease travel times while improving delays and preventing crashes. Due to geometric constraints, Michigan Lefts can be a challenge to implement since they need wide spaces to accommodate U-turning vehicles. Such is the case in this study intersection where there are various businesses adjacent to PR 2 and the frontage road. The frontage road that runs to the east of PR 2 also brings limitations due to the need of additional signal phases and split phasing timings. Hence, if implemented, considerations should be taken in order to accommodate all the turning movements. Additional studies should be conducted in order to determine the best

alternative that will reduce overall delays and improve safety. These other alternatives may include a grade-separated intersection providing continuous flow to PR 2, a roundabout, a superstreet, or any other non-traditional intersection.

In this study, it was determined that if the intersection between PR 2 and Western Plaza/Calle Camino Cuba was converted into a Superstreet Hybrid with two separate intersections and individual signals, delays would be greatly reduced and levels of service would improve. This alternative would not require significant geometric changes at the mainline intersection but it would involve connecting the north and south ends of the frontage road to the two median openings along PR 2. Since the frontage road would be connected perpendicular to the mainline, no significant turning radius would be needed for the design vehicle U-turn. This alternative would be a good option to consider in order to reduce congestion and improve safety at the study intersection.

Driver education is a big part of any new unconventional intersection since these designs might cause confusion and misunderstanding among drivers. In Michigan, news channels usually broadcast a segment discussing the intersection changes and how traffic patterns are expected to function in the new designs. Adequate signs and markings that explain what movements can be performed at the intersection, may help reduce driver confusion as well. It is recommended that driver education be enforced before and at the time of opening of a new intersection design in order to familiarize drivers and reduce confusion.

Additional analysis should be considered given the limitations present in this study. If available, data should be collected in a single day in order to eliminate the variations in traffic across all three signalized intersections. Also, it is recommended that a safety study be conducted in order to evaluate the safety benefits expected of an unconventional intersection when compared to a traditional direct left turn intersection.

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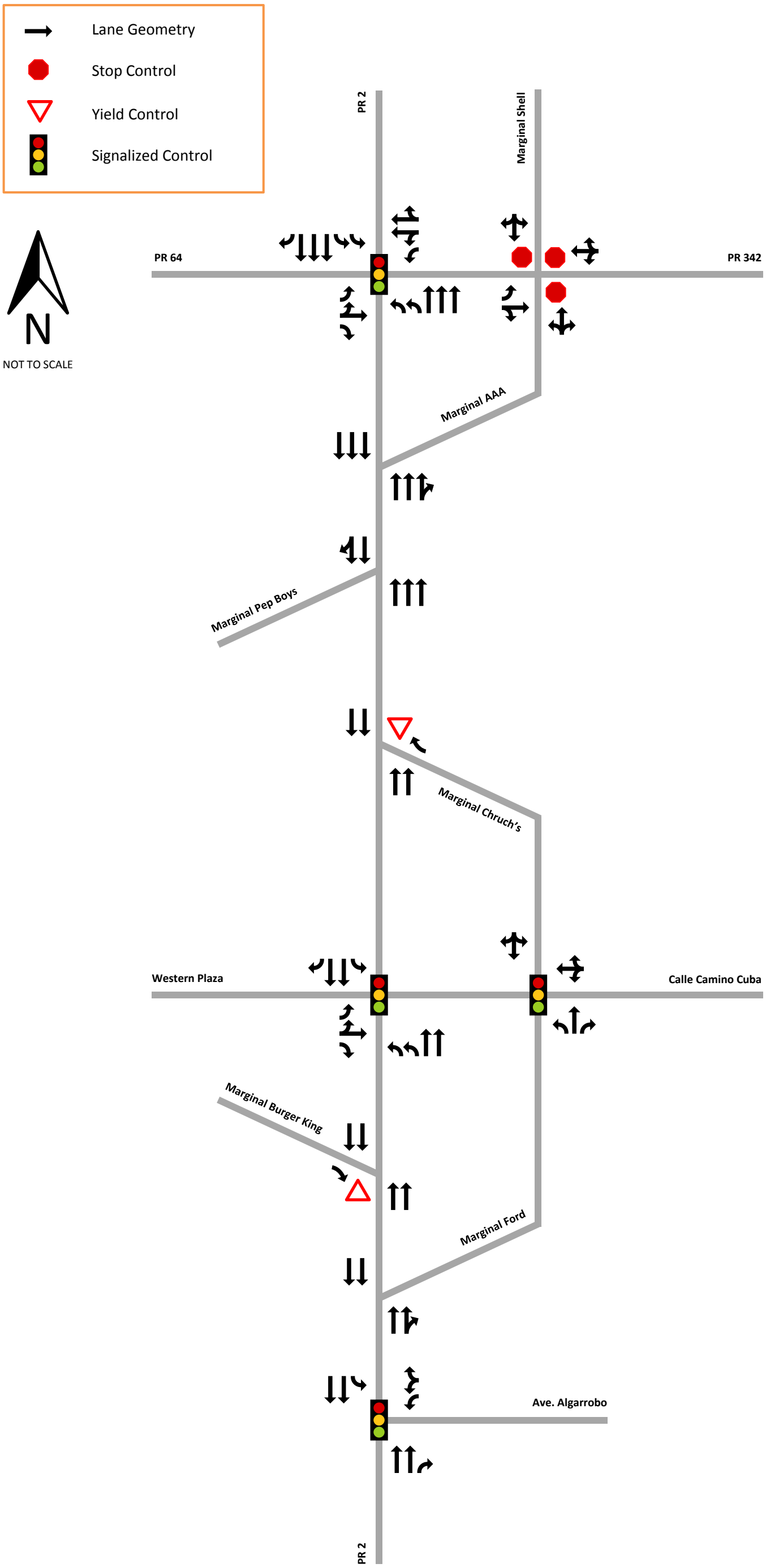
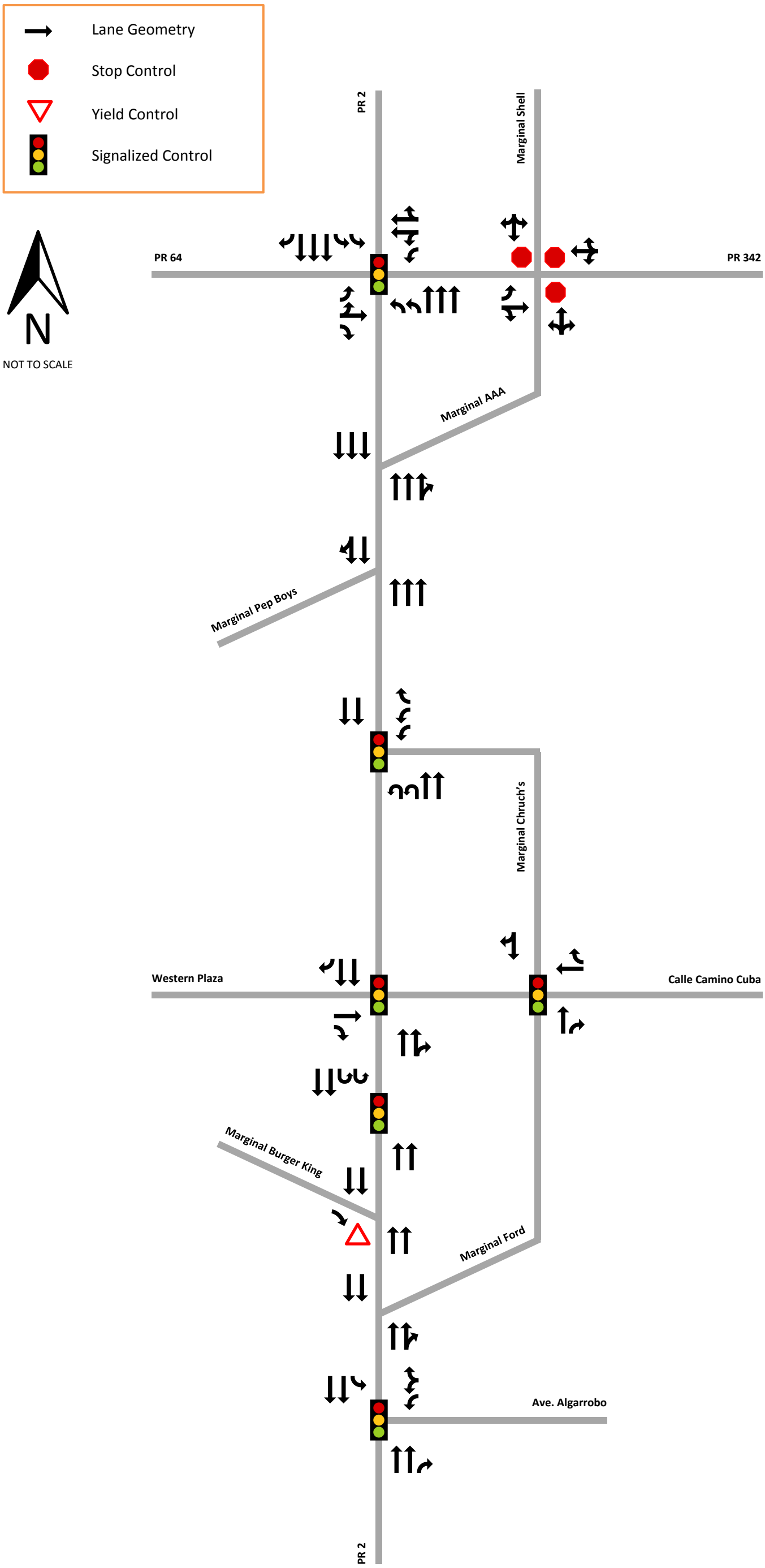
Appendix A ROADWAY GEOMETRY

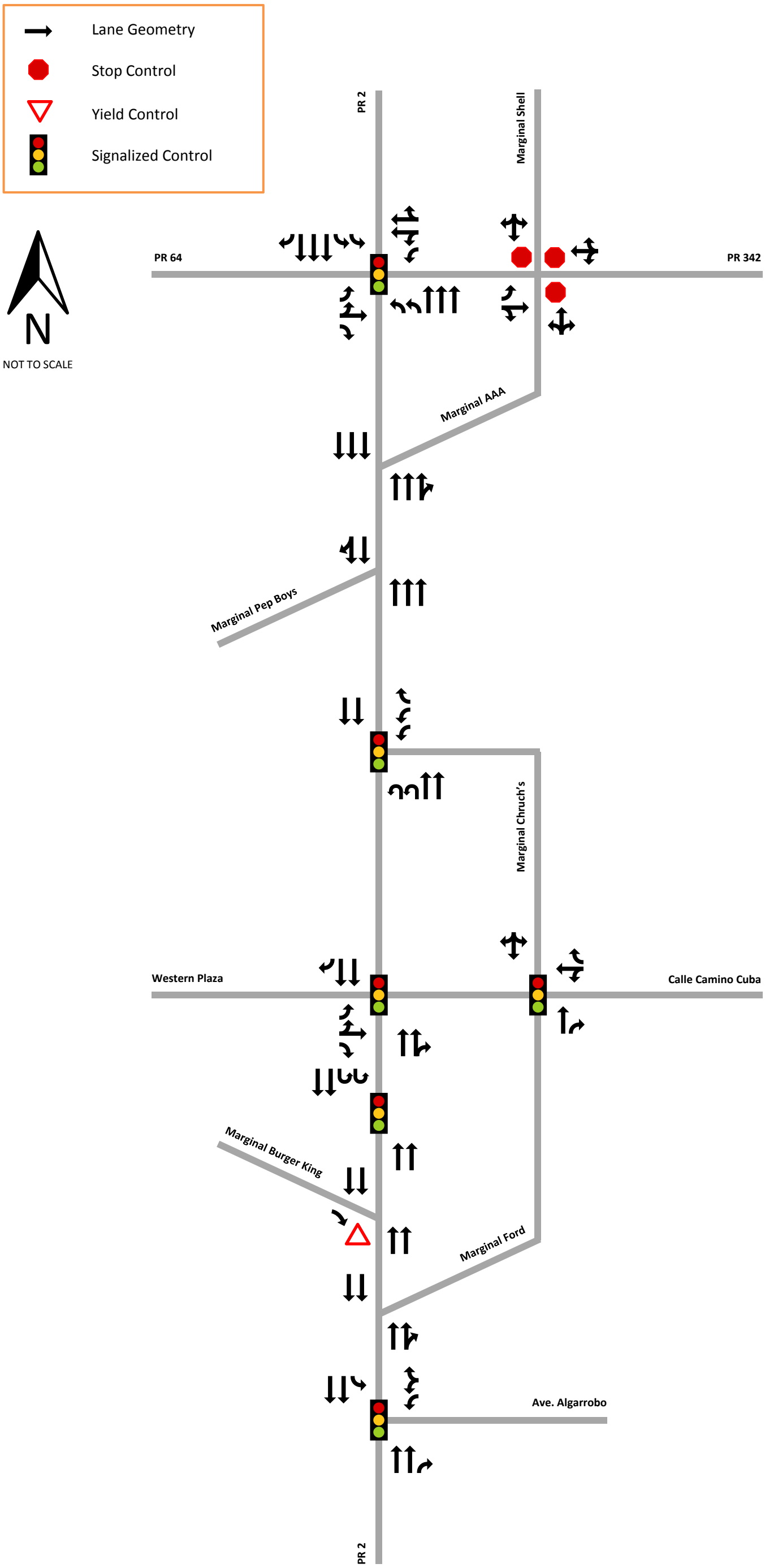
Existing Conditions Lane Configuration



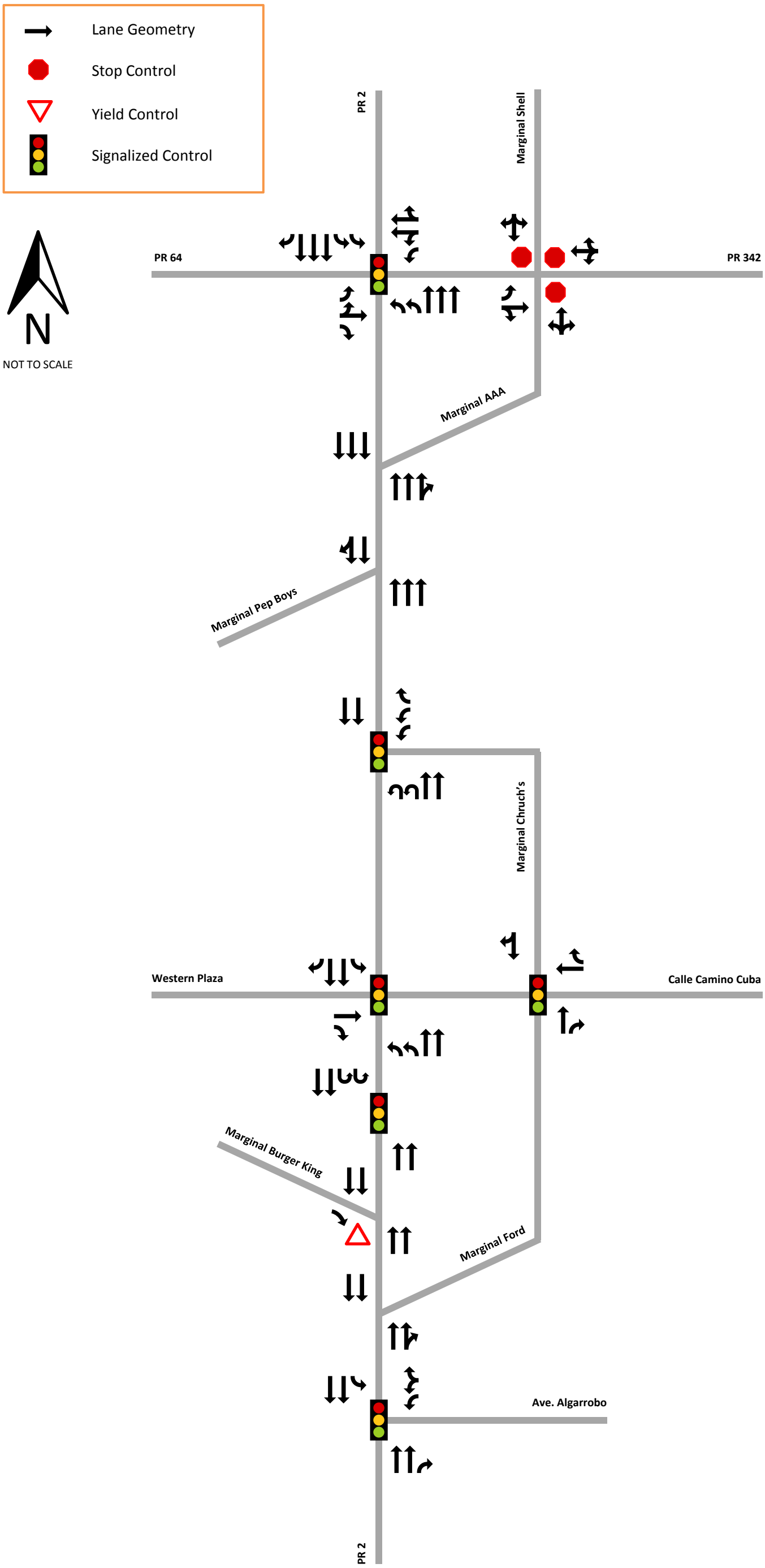
Scenario 1 Lane Configuration



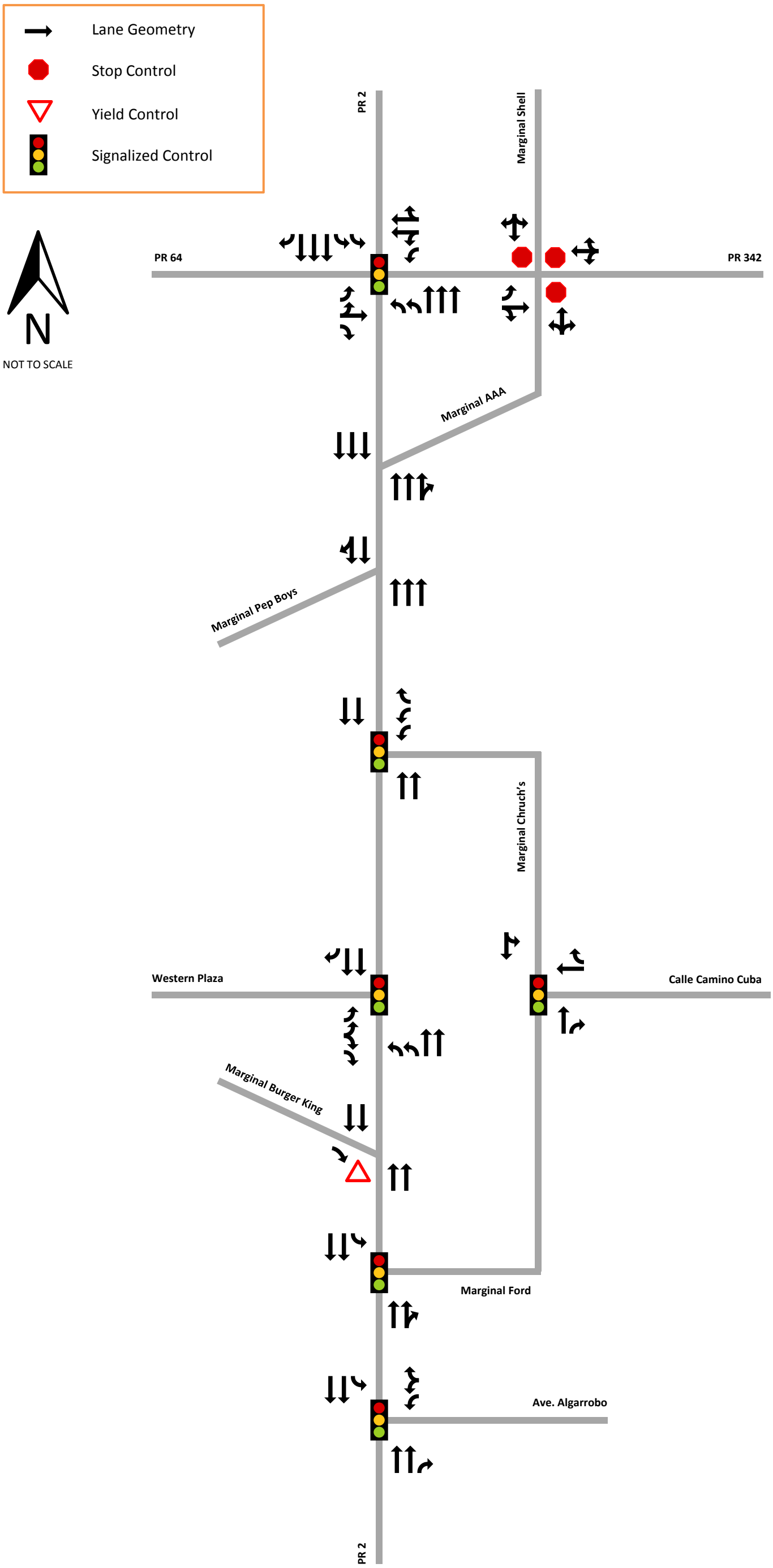
Scenario 2 Lane Configuration



Scenario 3 Lane Configuration



Scenario 4 Lane Configuration



Appendix B TRAFFIC COUNTS

AM

Streets:	PR 2			PR 2			Ave. Algarrobo			Ave. Algarrobo			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
7:10 AM	0	76	23	8	155	0	0	0	0	25	0	11	298
7:15 AM	0	99	16	8	165	0	0	0	0	32	0	7	327
7:20 AM	0	81	28	9	156	0	0	0	0	31	0	14	319
7:25 AM	0	87	37	15	173	0	0	0	0	22	0	10	344
7:30 AM	0	107	48	11	140	0	0	0	0	30	0	7	343
7:35 AM	0	108	35	10	143	0	0	0	0	21	0	9	326
7:40 AM	0	99	28	10	121	0	0	0	0	29	0	11	298
7:45 AM	0	115	25	10	137	0	0	0	0	33	0	14	334
7:50 AM	0	122	26	16	126	0	0	0	0	29	0	9	328
7:55 AM	0	94	22	9	106	0	0	0	0	33	0	12	276
8:00 AM	0	105	18	10	144	0	0	0	0	35	0	12	324
8:05 AM	0	99	14	13	134	0	0	0	0	29	0	13	302
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	5109	895	407	5871	0	0	0	0	955	0	377	13614
APPROACH %'s :	0.00%	85.09%	14.91%	6.48%	93.52%	0.00%	-	-	-	71.70%	0.00%	28.30%	
PEAK HR START TIME :	7:10	AM											TOTAL
PEAK HR VOL :	0	1192	320	129	1700	0	0	0	0	349	0	129	3819
PEAK 15 MIN VOL :	0	336	120	36	494	0	0	0	0	97	0	37	1120
TRUCK % :		4%			2%			0%			2%		
PEAK HR FACTOR :		0.829			0.863			-			0.892		0.852

CONTROL : Signal Control

PM

Streets:	PR 2			PR 2			Ave. Algarrobo			Ave. Algarrobo			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
4:00 PM	0	107	10	11	106	0	0	0	0	21	0	13	268
4:05 PM	0	132	11	9	114	0	0	0	0	34	0	13	313
4:10 PM	0	150	12	7	106	0	0	0	0	15	0	9	299
4:15 PM	0	125	12	11	113	0	0	0	0	19	0	9	289
4:20 PM	0	148	21	4	110	0	0	0	0	23	0	11	317
4:25 PM	0	155	17	2	110	0	0	0	0	20	0	6	310
4:30 PM	0	137	18	6	98	0	0	0	0	15	0	8	282
4:35 PM	0	130	17	11	102	0	0	0	0	20	0	5	285
4:40 PM	0	125	8	9	110	0	0	0	0	9	0	5	266
4:45 PM	0	142	21	5	96	0	0	0	0	12	0	7	283
4:50 PM	0	145	6	8	117	0	0	0	0	9	0	6	291
4:55 PM	0	122	22	8	78	0	0	0	0	14	0	7	251

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	5109	895	407	5871	0	0	0	0	955	0	377	13614
APPROACH %'s :	0.00%	85.09%	14.91%	6.48%	93.52%	0.00%	-	-	-	71.70%	0.00%	28.30%	

PEAK HR START TIME :	4:00	PM											TOTAL
PEAK HR VOL :	0	1618	175	91	1260	0	0	0	0	211	0	99	3454
PEAK 15 MIN VOL :	0	440	56	27	333	0	0	0	0	70	0	35	961
TRUCK % :		2%			1%			0%			2%		
PEAK HR FACTOR :		0.904			0.938			-			0.738		0.899

CONTROL : Signal Control

AM

Streets:	Marginal			Marginal			PR 342			PR 342			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
7:10 AM	1	9	10	1	0	1	1	5	0	0	17	8	53
7:15 AM	1	2	13	0	0	2	0	11	0	0	12	11	52
7:20 AM	1	1	8	0	0	2	2	17	0	0	11	12	54
7:25 AM	0	2	7	1	0	2	2	11	0	0	11	11	47
7:30 AM	1	5	15	0	0	0	1	6	0	1	32	16	77
7:35 AM	0	4	6	0	0	1	4	8	0	0	16	8	47
7:40 AM	3	2	5	1	0	1	1	17	0	0	25	11	66
7:45 AM	1	5	10	2	0	2	1	10	0	0	9	2	42
7:50 AM	1	1	10	1	0	3	1	10	0	0	24	6	57
7:55 AM	0	3	4	1	0	0	0	6	0	0	10	9	33
8:00 AM	5	4	5	0	0	2	0	10	0	0	7	6	39
8:05 AM	2	4	7	0	0	3	2	6	0	0	8	4	36

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	58	199	325	38	0	69	86	442	5	3	410	357	1992
APPROACH %'s :	9.97%	34.19%	55.84%	35.51%	0.00%	64.49%	16.14%	82.93%	0.94%	0.39%	53.25%	46.36%	

PEAK HR START TIME :	7:10 AM												TOTAL
PEAK HR VOL :	16	42	100	7	0	19	15	117	0	1	182	104	603
PEAK 15 MIN VOL :	7	12	31	4	0	6	7	39	0	1	73	39	219
TRUCK % :		3%			0%			1%			1%		
PEAK HR FACTOR :		0.790			0.650			0.717			0.635		0.688

CONTROL : Stop Control

PM

Streets:	Marginal			Marginal			PR 342			PR 342			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
4:00 PM	0	9	13	1	0	1	2	10	0	0	15	15	66
4:05 PM	3	6	6	1	0	1	1	15	0	0	7	7	47
4:10 PM	2	9	8	0	0	2	0	5	0	0	3	17	46
4:15 PM	1	5	6	1	0	1	2	7	0	0	8	3	34
4:20 PM	1	2	4	0	0	1	1	7	0	0	6	11	33
4:25 PM	1	6	3	0	0	0	1	8	0	0	6	7	32
4:30 PM	0	2	8	1	0	0	2	6	0	0	9	9	37
4:35 PM	3	2	8	0	0	2	2	15	0	0	2	11	45
4:40 PM	2	4	10	1	0	1	4	10	0	0	2	10	44
4:45 PM	1	6	10	0	0	3	5	11	0	0	7	9	52
4:50 PM	1	8	12	1	0	3	1	8	0	0	6	13	53
4:55 PM	1	6	8	1	0	1	5	8	0	0	1	9	40

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	58	199	325	38	0	69	86	442	5	3	410	357	1992
APPROACH %'s :	9.97%	34.19%	55.84%	35.51%	0.00%	64.49%	16.14%	82.93%	0.94%	0.39%	53.25%	46.36%	

PEAK HR START TIME :	4:00 PM												TOTAL
PEAK HR VOL :	16	65	96	7	0	16	26	110	0	0	72	121	529
PEAK 15 MIN VOL :	6	24	32	2	0	7	11	36	0	0	25	39	182
TRUCK % :		3%			0%			2%			2%		
PEAK HR FACTOR :		0.714			0.639			0.723			0.754		0.727

CONTROL : Stop Control

AM

Streets:	PR 2			PR 2			PR 64/PR 342			PR 64/PR 342			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
7:10 AM	4	70	0	5	158	55	22	1	2	10	9	0	336
7:15 AM	4	68	0	9	152	65	23	3	2	7	6	1	340
7:20 AM	4	83	0	14	128	73	26	4	4	11	1	0	348
7:25 AM	4	62	0	7	155	85	35	6	10	8	7	1	380
7:30 AM	3	97	0	2	163	73	30	5	5	15	15	1	409
7:35 AM	6	99	0	7	145	71	29	5	8	6	12	1	389
7:40 AM	5	97	0	13	162	74	21	4	8	17	11	0	412
7:45 AM	5	126	0	6	153	74	34	5	4	9	6	0	422
7:50 AM	3	109	0	8	173	61	14	3	11	12	9	0	403
7:55 AM	8	96	0	7	132	57	20	2	10	10	6	0	348
8:00 AM	7	81	0	7	138	32	14	3	8	6	10	1	307
8:05 AM	6	88	0	5	147	43	13	4	6	3	6	3	324
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	201	5058	0	376	5969	1545	988	164	314	297	235	15	15162
APPROACH %'s :	3.82%	96.18%	0.00%	4.77%	75.65%	19.58%	67.39%	11.19%	21.42%	54.30%	42.96%	2.74%	
PEAK HR START TIME :	7:10	AM											TOTAL
PEAK HR VOL :	59	1076	0	90	1806	763	281	45	78	114	98	8	4418
PEAK 15 MIN VOL :	21	332	0	30	488	231	94	16	29	38	38	4	1321
TRUCK % :		4%			7%			4%			3%		
PEAK HR FACTOR :		0.804			0.888			0.727			0.688		0.836

CONTROL : Signal Control

PM

Streets:	PR 2			PR 2			PR 64/PR 342			PR 64/PR 342			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
4:00 PM	4	133	0	9	105	20	33	6	7	10	2	0	329
4:05 PM	7	150	0	8	85	24	26	8	5	8	7	0	328
4:10 PM	6	146	0	3	91	21	21	3	13	5	3	0	312
4:15 PM	3	123	0	8	93	25	17	3	7	7	5	0	291
4:20 PM	8	136	0	6	94	28	25	2	9	4	4	0	316
4:25 PM	9	118	0	7	86	30	30	1	8	5	5	0	299
4:30 PM	8	150	0	7	107	14	32	0	6	6	1	0	331
4:35 PM	6	145	0	3	100	24	30	2	10	2	6	0	328
4:40 PM	3	144	0	8	115	20	18	5	17	2	5	0	337
4:45 PM	6	148	0	12	85	20	21	4	9	4	3	0	312
4:50 PM	7	134	0	7	104	15	18	4	13	4	8	0	314
4:55 PM	1	129	0	7	90	23	31	6	8	2	3	0	300
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	201	5058	0	376	5969	1545	988	164	314	297	235	15	15162
APPROACH %'s :	3.82%	96.18%	0.00%	4.77%	75.65%	19.58%	67.39%	11.19%	21.42%	54.30%	42.96%	2.74%	
PEAK HR START TIME :	4:00	PM											TOTAL
PEAK HR VOL :	68	1656	0	85	1155	264	302	44	112	59	52	0	3797
PEAK 15 MIN VOL :	25	439	0	27	322	83	92	17	39	23	16	0	1083
TRUCK % :		2%			12%			4%			2%		
PEAK HR FACTOR :		0.929			0.870			0.774			0.712		0.877

CONTROL : Signal Control

AM

Streets:	PR 2					PR 2					Western Plaza/Sector Cuba					Western Plaza/Sector Cuba					Marginal					Marginal					
	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					NORTHWEST					SOUTHWEST					
	NL2	NL	NT	NR	NR2	SL2	SL	ST	SR	SR2	EL2	EL	ET	ER	ER2	WL2	WL	WT	WR	WR2	NWL2	NWL	NWT	NWR	NWR2	SWL2	SWL	SWT	SWR	SWR2	TOTAL
7:10 AM	2	75	0	0	0	0	16	0	141	15	6	0	6	0	7	2	4	2	0	2	0	0	0	5	9	0	0	2	1	0	295
7:15 AM	8	76	0	0	0	0	7	0	127	12	6	0	10	0	5	2	3	1	0	0	0	3	0	2	13	0	0	0	0	0	275
7:20 AM	9	46	0	0	0	0	28	0	142	21	3	0	13	0	11	2	5	0	0	1	2	2	0	4	7	0	0	1	0	0	297
7:25 AM	15	65	0	0	0	0	18	0	142	10	4	0	8	0	11	1	3	1	0	4	1	2	0	1	22	0	0	1	0	0	309
7:30 AM	14	67	0	0	0	0	16	0	120	14	2	0	16	0	5	1	5	3	0	0	4	2	0	1	18	0	0	3	1	0	292
7:35 AM	9	90	0	0	0	0	8	0	105	13	3	0	12	0	6	0	11	5	0	1	2	0	0	3	23	0	1	0	1	0	293
7:40 AM	16	104	0	0	0	0	12	0	136	17	7	0	14	0	11	2	8	2	0	0	1	0	0	6	15	0	0	0	1	0	352
7:45 AM	16	64	0	0	0	0	23	0	120	17	2	0	17	1	8	0	10	5	0	2	8	1	0	4	24	0	0	1	1	0	324
7:50 AM	12	104	0	0	0	0	15	0	128	21	10	0	14	2	8	1	6	2	0	0	5	1	0	4	21	0	0	3	0	0	357
7:55 AM	17	65	0	0	0	0	18	0	117	22	7	0	13	2	9	2	9	3	0	1	4	1	0	3	15	1	1	3	0	0	313
8:00 AM	16	124	0	0	0	0	5	0	121	16	3	0	5	0	8	0	14	7	0	1	9	1	0	4	5	0	1	1	0	0	341
8:05 AM	14	73	0	0	0	0	21	0	117	14	10	0	12	1	12	0	12	3	0	0	4	2	0	5	12	0	0	1	0	0	313
	NL2	NL	NT	NR	NR2	SL2	SL	ST	SR	SR2	EL2	EL	ET	ER	ER2	WL2	WL	WT	WR	WR2	NWL2	NWL	NWT	NWR	NWR2	SWL2	SWL	SWT	SWR	SWR2	TOTAL
TOTAL VOLUMES :	966	4509	0	0	0	0	389	0	5028	496	923	0	231	40	520	48	234	107	0	66	169	103	0	245	485	2	9	39	22	0	14631
APPROACH %'s :	18%	82%	0%	0%	0%	0%	7%	0%	85%	8%	54%	0%	13%	2%	30%	11%	51%	24%	0%	15%	17%	10%	0%	24%	48%	3%	13%	54%	31%	0%	
PEAK HR START TIME :	7:10	AM																													TOTAL
PEAK HR VOL :	148	953	0	0	0	0	187	0	1516	192	63	0	140	6	101	13	90	34	0	12	40	15	0	42	184	1	3	16	5	0	3761
PEAK 15 MIN VOL :	47	293	0	0	0	0	62	0	411	60	20	0	45	5	29	6	35	13	0	5	18	7	0	14	63	1	2	7	3	0	1146
TRUCK % :			4%					3%					5%					9%					1%					0%			
PEAK HR FACTOR :			0.810					0.889					0.783					0.631					0.689					0.481			0.820462

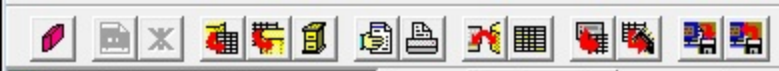
CONTROL : Signal Control

PM

Streets:	PR 2					PR 2					Western Plaza/Sector Cuba					Western Plaza/Sector Cuba					Marginal					Marginal					
	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					NORTHWEST					SOUTHWEST					
	NL2	NL	NT	NR	NR2	SL2	SL	ST	SR	SR2	EL2	EL	ET	ER	ER2	WL2	WL	WT	WR	WR2	NWL2	NWL	NWT	NWR	NWR2	SWL2	SWL	SWT	SWR	SWR2	TOTAL
4:00 PM	24	119	0	0	0	0	4	0	83	10	36	0	1	0	25	0	10	3	0	3	3	2	0	13	11	0	1	1	0	0	349
4:05 PM	24	137	0	0	0	0	7	0	90	5	35	0	5	2	12	2	5	3	0	4	10	2	0	7	14	0	0	1	3	0	368
4:10 PM	31	119	0	0	0	0	6	0	84	11	32	0	1	1	19	6	1	7	0	1	2	4	0	3	9	0	0	2	1	0	340
4:15 PM	25	128	0	0	0	0	2	0	75	8	32	0	2	1	13	1	10	0	0	4	2	3	0	11	17	0	0	0	0	0	334
4:20 PM	31	127	0	0	0	0	3	0	69	7	38	0	0	1	17	2	3	2	0	1	6	3	0	5	10	0	1	1	1	0	328
4:25 PM	25	136	0	0	0	0	7	0	63	12	33	0	4	1	14	2	5	2	0	2	4	3	0	8	8	0	0	0	1	0	330
4:30 PM	33	103	0	0	0	0	8	0	97	18	35	0	3	1	21	0	6	4	0	6	5	2	0	7	10	0	0	0	3	0	362
4:35 PM	30	112	0	0	0	0	9	0	84	17	27	0	1	2	14	1	7	3	0	2	5	5	0	14	11	0	1	1	0	0	346
4:40 PM	41	125	0	0	0	0	7	0	75	13	35	0	2	1	11	0	7	2	0	0	2	0	0	5	10	0	0	1	0	0	337
4:45 PM	16	117	0	0	0	0	2	0	99	7	36	0	7	1	15	1	2	1	0	2	6	3	0	8	8	0	0	0	3	0	334
4:50 PM	30	114	0	0	0	0	11	0	68	13	37	0	1	0	15	3	4	0	0	0	8	2	0	3	8	0	0	0	0	0	317
4:55 PM	37	113	0	0	0	0	13	0	84	4	30	0	1	1	10	2	3	2	0	1	3	5	0	10	6	0	0	1	0	0	326
	NL2	NL	NT	NR	NR2	SL2	SL	ST	SR	SR2	EL2	EL	ET	ER	ER2	WL2	WL	WT	WR	WR2	NWL2	NWL	NWT	NWR	NWR2	SWL2	SWL	SWT	SWR	SWR2	TOTAL
TOTAL VOLUMES :	966	4509	0	0	0	0	389	0	5028	496	923	0	231	40	520	48	234	107	0	66	169	103	0	245	485	2	9	39	22	0	14631
APPROACH %'s :	18%	82%	0%	0%	0%	0%	7%	0%	85%	8%	54%	0%	13%	2%	30%	11%	51%	24%	0%	15%	17%	10%	0%	24%	48%	3%	13%	54%	31%	0%	
PEAK HR START TIME :	7:10	AM																													TOTAL
PEAK HR VOL :	347	1450	0	0	0	0	79	0	971	125	406	0	28	12	186	20	63	29	0	26	56	34	0	94	122	0	3	8	12	0	4071
PEAK 15 MIN VOL :	104	391	0	0	0	0	26	0	258	48	108	0	10	4	56	9	20	13	0	10	17	10	0	29	40	0	1	4	5	0	1163
TRUCK % :	1%					3%					2%					5%					1%					0%					
PEAK HR FACTOR :	0.908					0.885					0.888					0.663					0.797					0.575					0.875107

CONTROL : Signal Control

Appendix C SIGNAL TIMINGS



23 - PR-2 and PR-342

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Phase Ring (MM) 1-1-1

Sequence: 1

Hardware Alternate Sequence Enable: No

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	B		B	B	B											
Ring 1	1	2	4	8	0	0	0	0	0	0	0	0	0	0	0	0
Ring 2	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ring 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ring 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	1	2	3	4	5	6	7	8
Ring	1	0	1	2	2	0	1	

	9	10	11	12	13	14	15	16
Ring	0	0	0	0	0	0	0	0

Phase Compatibility (MM) 1-1-2

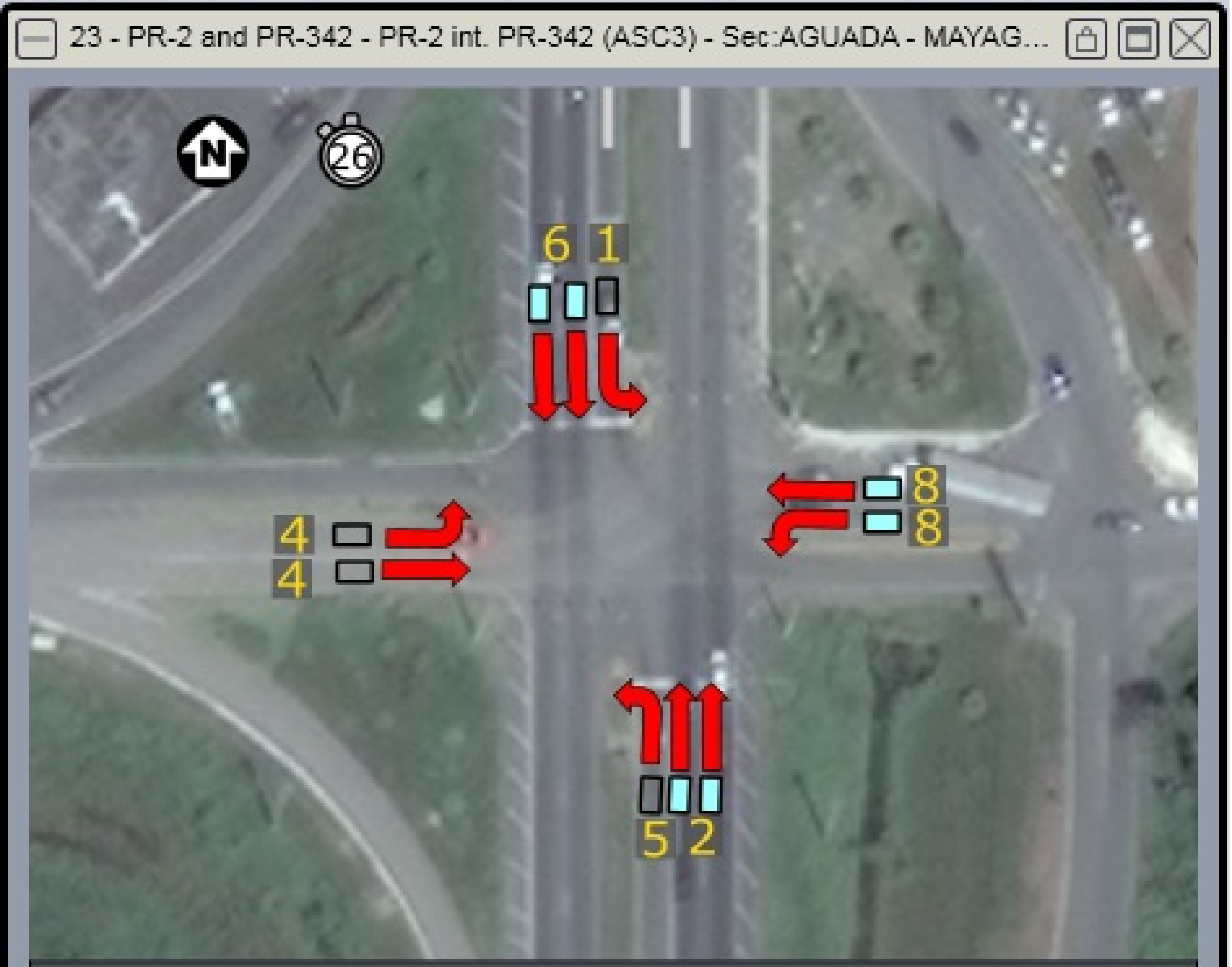
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
1											✓	✓			
2											✓	✓			
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															

Administration (MM) 1-7-1

Enable CRC Check of Database..... No

CRC (16 bit)... 28EE

Enable Automatic Backup to Datakey..... No


23 - PR-2 and PR-342 - PR-2 int. PR-342 (ASC3) - Sec:AGUADA - MAYAG...
N
26
6 1
4
4
8
8
5 2

21 - PR-2 and Alturas

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Timing Plan (MM) 2-1

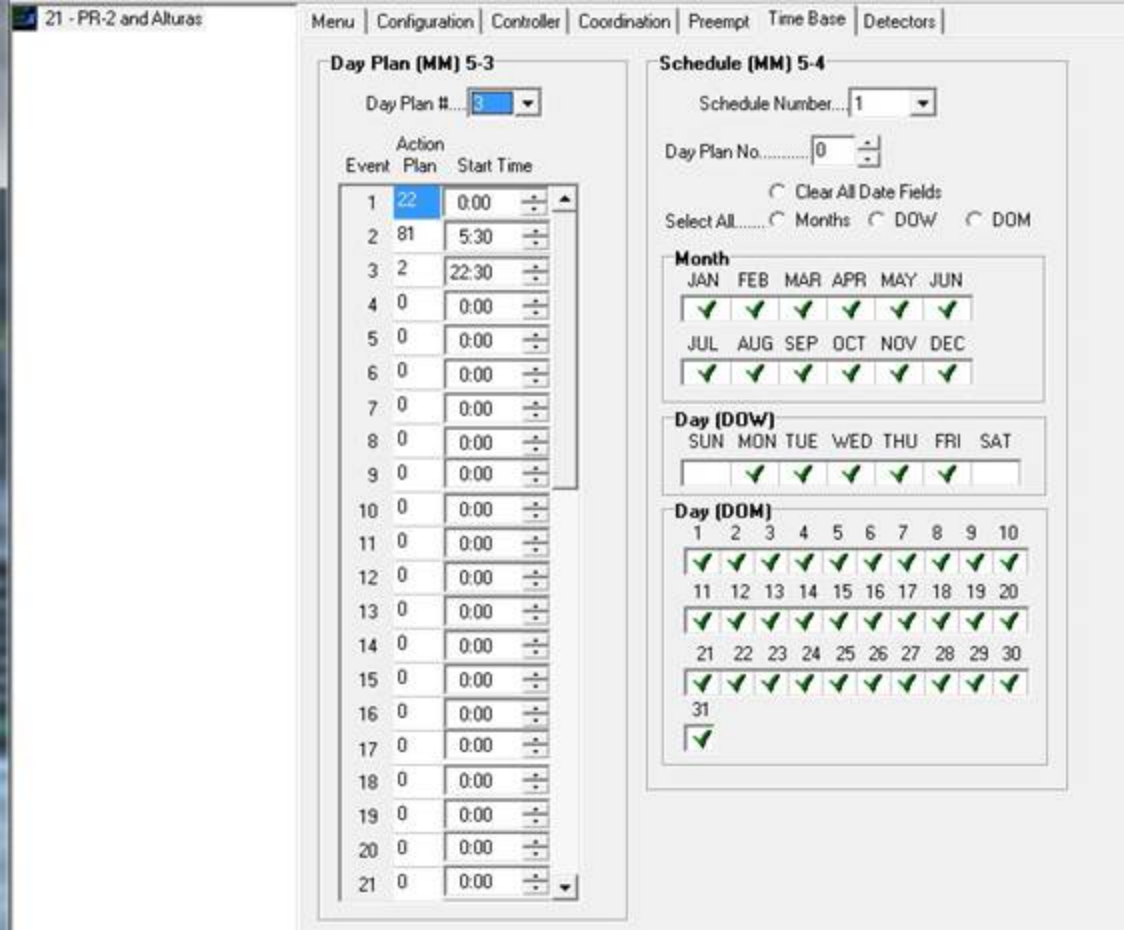
Plan #: 1

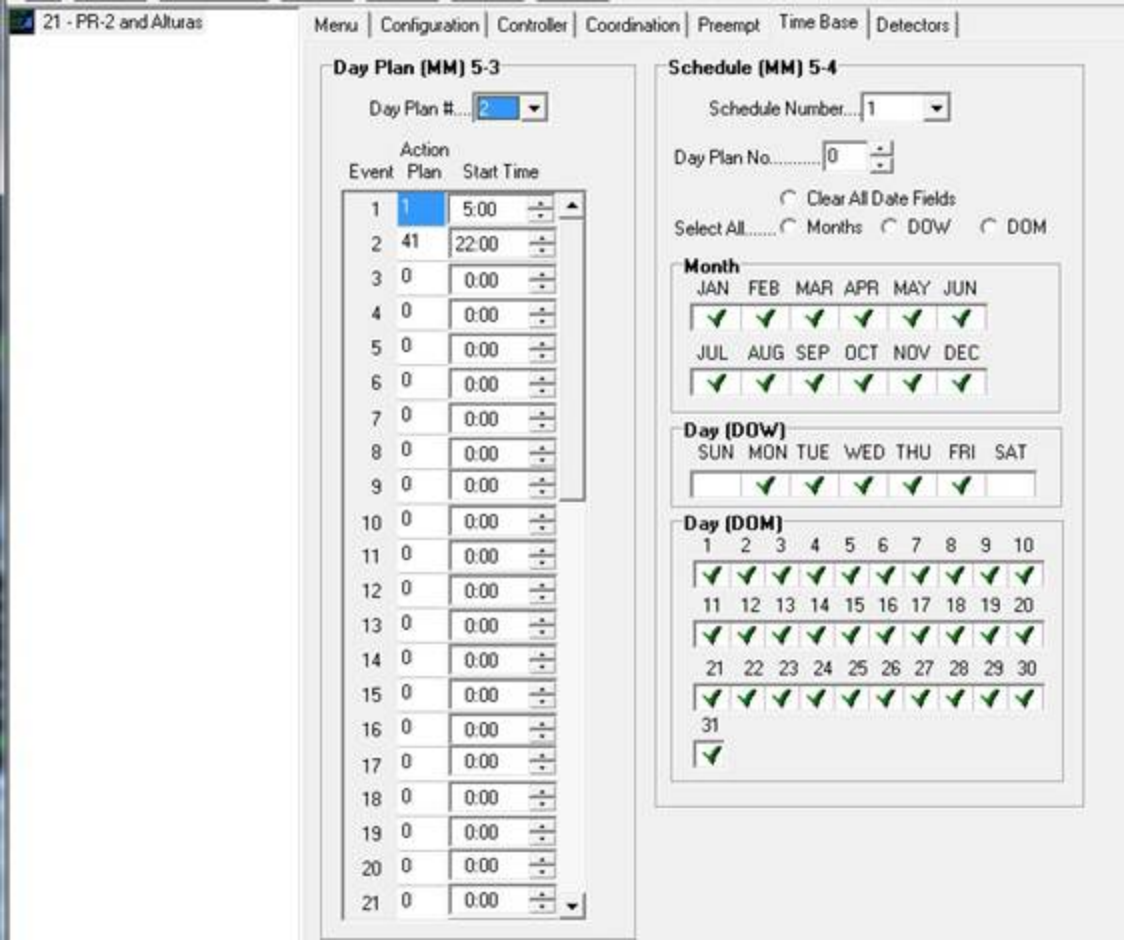
Phases	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Green	5	20	0	0	0	20	0	8	5	5	5	5	5	5	5	5
Bk Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delay Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped CD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Ext	3.0	6.0	0.0	0.0	0.0	6.0	0.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Ext 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max1	15	45	0	0	0	45	0	15	35	35	35	35	35	35	35	35
Max2	40	80	0	0	0	80	0	40	0	40	40	40	40	40	40	40
Max3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DYM Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DYM Stp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Red Clear	1.0	2.0	0.0	0.0	0.0	2.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Red Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Act B4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sec/Act	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Int	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time B4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Phase Descriptions

Phase	Direction	Overlap	Direction
1		A	
2		B	
3		C	
4		D	
5		E	
6		F	
7		G	
8		H	
9		I	
10		J	
11		K	
12		L	
13		M	
14		N	
15		O	
16		P	

If Enhanced Phase Overlaps are enabled:
Overlaps A - L are phase overlaps 1-12
Overlaps M - P are overlap outputs A - D


21 - PR-2 and Alturas
Menu
Configuration
Controller
Coordination
Preempt
Time Base
Detectors
Day Plan (MM) 5-3
Day Plan #....3
Event
Action Plan
Start Time
1 22 0:00
2 81 5:30
3 2 22:30
4 0 0:00
5 0 0:00
6 0 0:00
7 0 0:00
8 0 0:00
9 0 0:00
10 0 0:00
11 0 0:00
12 0 0:00
13 0 0:00
14 0 0:00
15 0 0:00
16 0 0:00
17 0 0:00
18 0 0:00
19 0 0:00
20 0 0:00
21 0 0:00
Schedule (MM) 5-4
Schedule Number....1
Day Plan No.....0
Clear All Date Fields
Select All..... Months DOW DOM
Month
JAN FEB MAR APR MAY JUN
JUL AUG SEP OCT NOV DEC
Day (DOW)
SUN MON TUE WED THU FRI SAT
Day (DOM)
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
31


21 - PR-2 and Alturas
Menu
Configuration
Controller
Coordination
Preempt
Time Base
Detectors
Day Plan (MM) 5-3
Day Plan #.... 2
Event
Action Plan
Start Time
1 1 5:00
2 41 22:00
3 0 0:00
4 0 0:00
5 0 0:00
6 0 0:00
7 0 0:00
8 0 0:00
9 0 0:00
10 0 0:00
11 0 0:00
12 0 0:00
13 0 0:00
14 0 0:00
15 0 0:00
16 0 0:00
17 0 0:00
18 0 0:00
19 0 0:00
20 0 0:00
21 0 0:00
Schedule (MM) 5-4
Schedule Number.... 1
Day Plan No..... 0
Clear All Date Fields
Select All..... Months DOW DOM
Month
JAN FEB MAR APR MAY JUN
JUL AUG SEP OCT NOV DEC
Day (DOW)
SUN MON TUE WED THU FRI SAT
Day (DOM)
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
31

21 - PR-2 and Alturas

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Day Plan (MM) 5-3

Day Plan #.... 1

Event	Action Plan	Start Time
1	1	5:00
2	21	10:00
3	1	15:00
4	41	22:00
5	0	0:00
6	0	0:00
7	0	0:00
8	0	0:00
9	0	0:00
10	0	0:00
11	0	0:00
12	0	0:00
13	0	0:00
14	0	0:00
15	0	0:00
16	0	0:00
17	0	0:00
18	0	0:00
19	0	0:00
20	0	0:00
21	0	0:00

Schedule (MM) 5-4

Schedule Number.... 1

Day Plan No..... 0

Clear All Date Fields

Select All..... Months DOW DOM

Month

JAN	FEB	MAR	APR	MAY	JUN
✓	✓	✓	✓	✓	✓

JUL	AUG	SEP	OCT	NOV	DEC
✓	✓	✓	✓	✓	✓

Day (DOW)

SUN	MON	TUE	WED	THU	FRI	SAT
	✓	✓	✓	✓	✓	

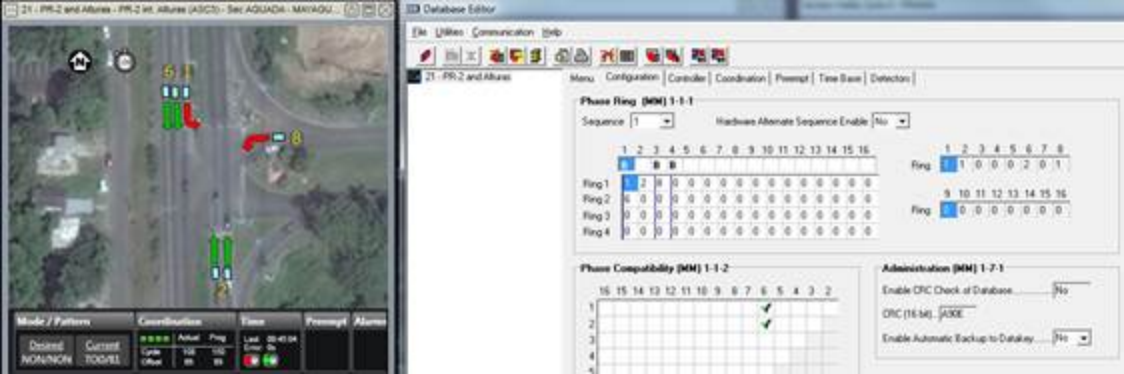
Day (DOM)

1	2	3	4	5	6	7	8	9	10
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

11	12	13	14	15	16	17	18	19	20
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

21	22	23	24	25	26	27	28	29	30
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

31
✓


21 - PR-2 and Alturas - PR-2 Int. Alturas (ASC3) - Sec AGUADA - MAYAGU...
Mode / Pattern
Coordination
Time
Preempt
Alarm
Desired
NON/NON
Current
TOD/01
Database Editor
File Utilities Communication Help
21 - PR-2 and Alturas
Menu Configuration Controller Coordination Preempt Time Base Detectors
Phase Ring (MM) 1-1-1
Sequence 1
Hardware Alternate Sequence Enable No
Ring 1
Ring 2
Ring 3
Ring 4
Ring 1 1 0 0 0 2 0 1
Ring 2 0 0 0 0 0 0 0 0
Phase Compatibility (MM) 1-1-2
Administration (MM) 1-7-1
Enable CRC Check of Database No
CRC (16-bit) A30E
Enable Automatic Backup to Datakey No

22 - PR-2 and Western Plaza

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Timing Plan (MM) 2-1

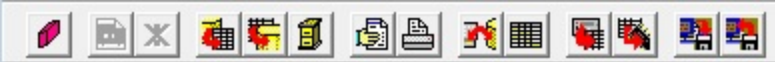
Plan #: 1

Phases	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Green	12	20	10	6	25	20	0	6	5	5	5	5	5	5	5	5
Bk Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delay Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped CO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Ext	6.0	6.0	4.0	3.0	6.0	6.0	0.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Ext 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max1	30	45	30	30	15	45	0	30	35	35	35	35	35	35	35	35
Max2	30	45	30	30	15	45	0	30	0	40	40	40	40	40	40	40
Max3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DYM Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DYM Stp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Red Clear	1.0	2.0	0.0	1.0	1.0	2.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Red Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Act B4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sec/Act	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Int	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time B4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Phase Descriptions

Phase	Direction	Overlap	Direction
1		A	
2		B	
3		C	
4		D	
5		E	
6		F	
7		G	
8		H	
9		I	
10		J	
11		K	
12		L	
13		M	
14		N	
15		O	
16		P	

If Enhanced Phase Overlaps are enabled:
Overlaps A - L are phase overlaps 1-12
Overlaps M - P are overlap outputs A - D



22 - PR-2 and Western Plaza

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Phase Ring (MM) 1-1-1

Sequence: 1

Hardware Alternate Sequence Enable: No

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	B		B			B										
Ring 1	1	2	4	8	3	0	0	0	0	0	0	0	0	0	0	0
Ring 2	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ring 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ring 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	1	2	3	4	5	6	7	8
Ring	1	1	1	1	2	2	0	1

	9	10	11	12	13	14	15	16
Ring	0	0	0	0	0	0	0	0

Phase Compatibility (MM) 1-1-2

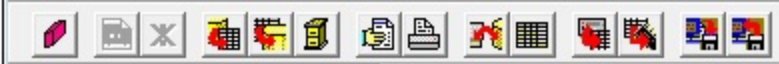
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
1											✓	✓			
2											✓	✓			
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															

Administration (MM) 1-7-1

Enable CRC Check of Database..... No

CRC (16 bit)... 6A05

Enable Automatic Backup to Datakey..... No



22 - PR-2 and Western Plaza

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Day Plan (MM) 5-3

Day Plan #.... 3

Event	Action Plan	Start Time
1	22	0:00
2	81	5:30
3	2	23:30
4	0	0:00
5	0	0:00
6	0	0:00
7	0	0:00
8	0	0:00
9	0	0:00
10	0	0:00
11	0	0:00
12	0	0:00
13	0	0:00
14	0	0:00
15	0	0:00
16	0	0:00
17	0	0:00
18	0	0:00
19	0	0:00
20	0	0:00
21	0	0:00

Schedule (MM) 5-4

Schedule Number.... 1

Day Plan No..... 0

Clear All Date Fields

Select All..... Months DOW DOM

Month

JAN	FEB	MAR	APR	MAY	JUN
✓	✓	✓	✓	✓	✓

JUL	AUG	SEP	OCT	NOV	DEC
✓	✓	✓	✓	✓	✓

Day (DOW)

SUN	MON	TUE	WED	THU	FRI	SAT
	✓	✓	✓	✓	✓	

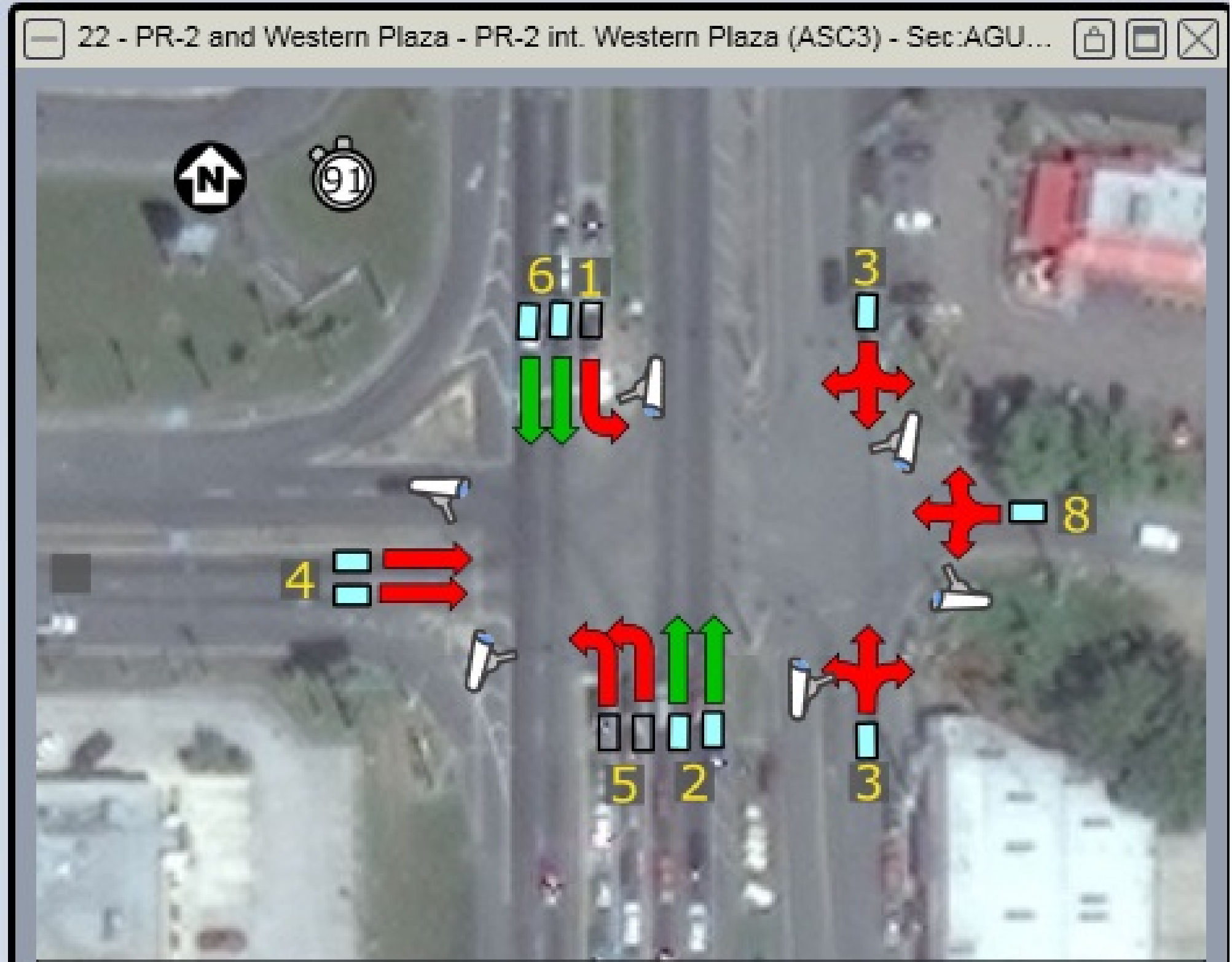
Day (DOM)

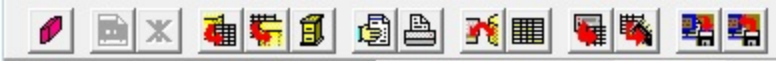
1	2	3	4	5	6	7	8	9	10
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

11	12	13	14	15	16	17	18	19	20
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

21	22	23	24	25	26	27	28	29	30
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

31
✓


22 - PR-2 and Western Plaza - PR-2 int. Western Plaza (ASC3) - Sec:AGU...
N
91
6
1
3
4
8
5
2
3



23 - PR-2 and PR-342

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Timing Plan (MM) 2-1

Plan #: 1

Phases	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Green	5	20	0	8	5	20	0	8	5	5	5	5	5	5	5	5
Bk Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delay Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped CO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Ext	3.0	6.0	0.0	4.0	3.0	6.0	0.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Ext 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max1	20	45	0	20	20	45	0	20	35	35	35	35	35	35	35	35
Max2	30	70	0	30	30	70	0	30	0	40	40	40	40	40	40	40
Max3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DYM Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DYM Stp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Red Clear	1.0	2.0	0.0	1.0	1.0	2.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Red Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Act B4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sec/Act	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Int	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time B4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Phase Descriptions

Phase	Direction	Overlap	Direction
1		A	
2		B	
3		C	
4		D	
5		E	
6		F	
7		G	
8		H	
9		I	
10		J	
11		K	
12		L	
13		M	
14		N	
15		O	
16		P	

If Enhanced Phase Overlaps are enabled:
Overlaps A - L are phase overlaps 1-12
Overlaps M - P are overlap outputs A - D

23 - PR-2 and PR-342

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Day Plan (MM) 5-3

Day Plan #.... 3

Event	Action Plan	Start Time
1	22	0:00
2	81	5:30
3	2	23:30
4	0	0:00
5	0	0:00
6	0	0:00
7	0	0:00
8	0	0:00
9	0	0:00
10	0	0:00
11	0	0:00
12	0	0:00
13	0	0:00
14	0	0:00
15	0	0:00
16	0	0:00
17	0	0:00
18	0	0:00
19	0	0:00
20	0	0:00
21	0	0:00

Schedule (MM) 5-4

Schedule Number.... 1

Day Plan No..... 0

Clear All Date Fields

Select All..... Months DOW DOM

Month

JAN	FEB	MAR	APR	MAY	JUN
✓	✓	✓	✓	✓	✓

JUL	AUG	SEP	OCT	NOV	DEC
✓	✓	✓	✓	✓	✓

Day (DOW)

SUN	MON	TUE	WED	THU	FRI	SAT
	✓	✓	✓	✓	✓	

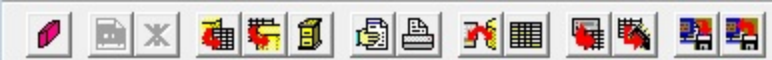
Day (DOM)

1	2	3	4	5	6	7	8	9	10
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

11	12	13	14	15	16	17	18	19	20
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

21	22	23	24	25	26	27	28	29	30
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

31
✓



23 - PR-2 and PR-342

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Day Plan (MM) 5-3

Day Plan #.... 2

Event	Action Plan	Start Time
1	1	5:00
2	41	22:00
3	0	0:00
4	0	0:00
5	0	0:00
6	0	0:00
7	0	0:00
8	0	0:00
9	0	0:00
10	0	0:00
11	0	0:00
12	0	0:00
13	0	0:00
14	0	0:00
15	0	0:00
16	0	0:00
17	0	0:00
18	0	0:00
19	0	0:00
20	0	0:00
21	0	0:00

Schedule (MM) 5-4

Schedule Number.... 1

Day Plan No..... 0

Clear All Date Fields

Select All..... Months DOW DOM

Month

JAN	FEB	MAR	APR	MAY	JUN
✓	✓	✓	✓	✓	✓

JUL	AUG	SEP	OCT	NOV	DEC
✓	✓	✓	✓	✓	✓

Day (DOW)

SUN	MON	TUE	WED	THU	FRI	SAT
	✓	✓	✓	✓	✓	

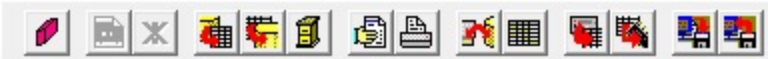
Day (DOM)

1	2	3	4	5	6	7	8	9	10
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

11	12	13	14	15	16	17	18	19	20
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

21	22	23	24	25	26	27	28	29	30
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

31
✓



23 - PR-2 and PR-342

Menu | Configuration | Controller | Coordination | Preempt | Time Base | Detectors

Day Plan (MM) 5-3

Day Plan #.... 1

Event	Action Plan	Start Time
1	1	5:00
2	21	10:00
3	1	15:00
4	41	22:00
5	0	0:00
6	0	0:00
7	0	0:00
8	0	0:00
9	0	0:00
10	0	0:00
11	0	0:00
12	0	0:00
13	0	0:00
14	0	0:00
15	0	0:00
16	0	0:00
17	0	0:00
18	0	0:00
19	0	0:00
20	0	0:00
21	0	0:00

Schedule (MM) 5-4

Schedule Number.... 1

Day Plan No..... 0

Clear All Date Fields

Select All..... Months DOW DOM

Month

JAN	FEB	MAR	APR	MAY	JUN
✓	✓	✓	✓	✓	✓

JUL	AUG	SEP	OCT	NOV	DEC
✓	✓	✓	✓	✓	✓

Day (DOW)

SUN	MON	TUE	WED	THU	FRI	SAT
	✓	✓	✓	✓	✓	

Day (DOM)

1	2	3	4	5	6	7	8	9	10
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

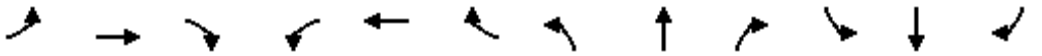
11	12	13	14	15	16	17	18	19	20
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

21	22	23	24	25	26	27	28	29	30
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

31
✓

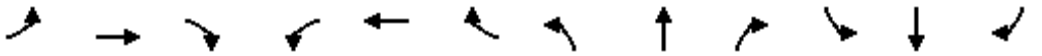
Appendix D SYNCHRO REPORTS

Appendix D.1 EXISTING CONDITIONS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
Future Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.73	0.73	0.73	0.69	0.69	0.69	0.80	0.80	0.80	0.89	0.89	0.89
Adj. Flow (vph)	385	62	123	174	142	12	56	1278	0	101	2056	857
RTOR Reduction (vph)	0	0	102	0	3	0	0	0	0	0	0	382
Lane Group Flow (vph)	223	224	21	108	217	0	56	1278	0	101	2056	475
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	15.4	15.4	15.4	11.7	11.7		5.6	40.4		6.6	41.4	41.4
Effective Green, g (s)	15.4	15.4	15.4	11.7	11.7		5.6	40.4		6.6	41.4	41.4
Actuated g/C Ratio	0.17	0.17	0.17	0.13	0.13		0.06	0.44		0.07	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	276	284	255	208	411		215	2212		248	2288	632
v/s Ratio Prot	c0.14	0.13		0.07	c0.07		0.02	0.26		c0.03	c0.41	
v/s Ratio Perm			0.01									0.34
v/c Ratio	0.81	0.79	0.08	0.52	0.53		0.26	0.58		0.41	0.90	0.75
Uniform Delay, d1	36.4	36.3	31.9	37.1	37.1		40.8	19.0		40.4	22.9	20.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.8	13.5	0.1	2.2	1.2		0.6	1.1		1.1	6.1	8.0
Delay (s)	52.2	49.8	32.0	39.3	38.3		41.4	20.1		41.5	29.1	28.6
Level of Service	D	D	C	D	D		D	C		D	C	C
Approach Delay (s)		46.9			38.6			21.0			29.4	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	91.1	Sum of lost time (s)	17.0
Intersection Capacity Utilization	68.9%	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												
Traffic Volume (vph)	63	146	101	146	54	0	148	953	0	187	1516	192
Future Volume (vph)	63	146	101	146	54	0	148	953	0	187	1516	192
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.96		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1764	1455		1797		3433	3438		1770	3539	1553
Flt Permitted	0.95	1.00	1.00		0.96		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1764	1455		1797		3433	3438		1770	3539	1553
Peak-hour factor, PHF	0.78	0.78	0.78	0.92	0.92	0.92	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	81	187	129	159	59	0	183	1177	0	210	1703	216
RTOR Reduction (vph)	0	0	111	0	0	0	0	0	0	0	0	82
Lane Group Flow (vph)	73	195	18	0	218	0	183	1177	0	210	1703	134
Heavy Vehicles (%)	5%	2%	11%	2%	2%	2%	2%	5%	2%	2%	2%	4%
Turn Type	Split	NA	Perm	custom	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4!	4!		Free!	Free!		5!	2!		1!	6!	
Permitted Phases		4!	4	Free!	Free!			2!			6!	6
Actuated Green, G (s)	23.0	23.0	23.0		165.0		15.7	55.6		23.2	63.1	63.1
Effective Green, g (s)	23.0	23.0	23.0		165.0		15.7	55.6		23.2	63.1	63.1
Actuated g/C Ratio	0.14	0.14	0.14		1.00		0.10	0.34		0.14	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0				4.0	5.0		4.0	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)	227	245	202		3594		326	1158		248	1353	593
v/s Ratio Prot	0.04	c0.11			0.06		0.05	0.34		c0.12	c0.48	
v/s Ratio Perm			0.01		c0.06							0.09
v/c Ratio	0.32	0.80	0.09		0.06		0.56	1.02		0.85	1.26	0.23
Uniform Delay, d1	64.0	68.7	61.9		0.0		71.4	54.7		69.2	51.0	34.5
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	16.2	0.2		0.0		2.2	30.6		22.5	122.6	0.9
Delay (s)	64.8	84.9	62.1		0.0		73.6	85.3		91.7	173.5	35.3
Level of Service	E	F	E		A		E	F		F	F	D
Approach Delay (s)		73.8			0.0			83.7			151.4	
Approach LOS		E			A			F			F	

Intersection Summary			
HCM 2000 Control Delay	113.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	327	6	13	124	12	55	42	184	1	3	21
Future Volume (vph)	0	327	6	13	124	12	55	42	184	1	3	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.0	3.0	3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00		1.00	
Frt		1.00			0.99		1.00	1.00	0.85		0.89	
Flt Protected		1.00			1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)		1858			1741		1787	1881	1599		1680	
Flt Permitted		1.00			1.00		0.61	1.00	1.00		0.99	
Satd. Flow (perm)		1858			1741		1139	1881	1599		1672	
Peak-hour factor, PHF	0.92	0.92	0.92	0.63	0.63	0.63	0.69	0.69	0.69	0.48	0.48	0.48
Adj. Flow (vph)	0	355	7	21	197	19	80	61	267	2	6	44
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	205	0	0	0
Lane Group Flow (vph)	0	362	0	0	235	0	80	61	62	0	52	0
Heavy Vehicles (%)	2%	2%	2%	0%	9%	0%	1%	1%	1%	0%	0%	0%
Turn Type		NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		Free!		10!	10			3!			3!	
Permitted Phases	Free!	Free!			10		3!	3!	3	3!	3!	
Actuated Green, G (s)		165.0			26.6		16.6	16.6	16.6		16.6	
Effective Green, g (s)		165.0			26.6		16.6	16.6	16.6		16.6	
Actuated g/C Ratio		1.00			0.16		0.10	0.10	0.10		0.10	
Clearance Time (s)					4.0		3.0	3.0	3.0		3.0	
Vehicle Extension (s)					3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		3716			280		114	189	160		168	
v/s Ratio Prot		0.10			c0.14			0.03				
v/s Ratio Perm		c0.10					c0.07		0.04		0.03	
v/c Ratio		0.10			0.84		0.70	0.32	0.39		0.31	
Uniform Delay, d1		0.0			67.1		71.8	69.0	69.4		68.9	
Progression Factor		1.00			1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2		0.0			19.8		17.7	1.0	1.6		1.1	
Delay (s)		0.0			86.9		89.5	70.0	71.0		69.9	
Level of Service		A			F		F	E	E		E	
Approach Delay (s)		0.0			86.9			74.5			69.9	
Approach LOS		A			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	51.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	349	140	1252	320	129	1700
Future Volume (vph)	349	140	1252	320	129	1700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.96		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3162		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3162		3471	1583	1770	3539
Peak-hour factor, PHF	0.89	0.89	0.83	0.83	0.86	0.86
Adj. Flow (vph)	392	157	1508	386	150	1977
RTOR Reduction (vph)	60	0	0	177	0	0
Lane Group Flow (vph)	489	0	1508	209	150	1977
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	11.0		40.0	40.0	9.9	53.9
Effective Green, g (s)	11.0		40.0	40.0	9.9	53.9
Actuated g/C Ratio	0.15		0.54	0.54	0.13	0.73
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	470		1878	856	237	2581
v/s Ratio Prot	c0.15		0.43		0.08	c0.56
v/s Ratio Perm				0.13		
v/c Ratio	1.04		0.80	0.24	0.63	0.77
Uniform Delay, d1	31.5		13.8	9.0	30.3	6.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	52.7		3.7	0.7	5.4	2.2
Delay (s)	84.1		17.5	9.6	35.7	8.4
Level of Service	F		B	A	D	A
Approach Delay (s)	84.1		15.9			10.3
Approach LOS	F		B			B

Intersection Summary			
HCM 2000 Control Delay	21.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	73.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	18	140	0	1	0
Future Vol, veh/h	0	18	140	0	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	20	152	0	1	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	152	152	0	0	152	152
Stage 1	152	-	-	-	0	0
Stage 2	0	-	-	-	152	152
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	840	894	-	-	840	740
Stage 1	876	-	-	-	-	-
Stage 2	-	-	-	-	876	772
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	840	894	-	-	840	0
Mov Cap-2 Maneuver	840	-	-	-	840	0
Stage 1	876	-	-	-	-	0
Stage 2	-	-	-	-	876	0

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	9.3
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	894	840
HCM Lane V/C Ratio	-	-	0.022	0.001
HCM Control Delay (s)	-	-	9.1	9.3
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection	
Int Delay, s/veh	7.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	25	137	54	0	0	0
Future Vol, veh/h	25	137	54	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	149	59	0	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	59	59	0	0
Stage 1	59	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	937	1007	-	-
Stage 1	953	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	937	1007	-	-
Mov Cap-2 Maneuver	937	-	-	-
Stage 1	953	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	9.4	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	996
HCM Lane V/C Ratio	-	-	0.177
HCM Control Delay (s)	-	-	9.4
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.6

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	22	259	32	22	0
Future Vol, veh/h	0	22	259	32	22	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	24	282	35	24	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	299	299	0	0	299	316
Stage 1	299	-	-	-	0	0
Stage 2	0	-	-	-	299	316
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	692	741	-	-	692	600
Stage 1	752	-	-	-	-	-
Stage 2	-	-	-	-	752	655
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	692	741	-	-	692	0
Mov Cap-2 Maneuver	692	-	-	-	692	0
Stage 1	752	-	-	-	-	0
Stage 2	-	-	-	-	752	0

Approach	WB	NB	SB
HCM Control Delay, s	10	0	10.4
HCM LOS	B		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	741	692
HCM Lane V/C Ratio	-	-	0.032	0.035
HCM Control Delay (s)	-	-	10	10.4
HCM Lane LOS	-	-	B	B
HCM 95th %tile Q(veh)	-	-	0.1	0.1

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	157	143	96	125	131	71	28	282	328	317	30	137
Average Queue (ft)	106	82	53	62	55	30	5	114	132	147	3	55
95th Queue (ft)	156	147	91	90	107	61	21	231	253	270	18	103
Link Distance (ft)	1281	1281	92	92	92			356	356	356		
Upstream Blk Time (%)			1	1	4							
Queuing Penalty (veh)			1	1	3							
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)								0				
Queuing Penalty (veh)								0				

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	349	354	328	337
Average Queue (ft)	255	245	190	11
95th Queue (ft)	340	341	311	111
Link Distance (ft)	1508	1508	1508	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				300
Storage Blk Time (%)	2		1	0
Queuing Penalty (veh)	2		5	2

Intersection: 12: PR 2 & Western Plaza/Interseccion

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	LT	LTR	L	L	T	T	L	T	T	R
Maximum Queue (ft)	113	237	56	136	449	634	668	300	764	746	550
Average Queue (ft)	41	132	7	56	120	340	358	239	728	728	456
95th Queue (ft)	86	213	27	117	308	553	569	381	739	736	793
Link Distance (ft)	932	932	10			1060	1060		668	668	
Upstream Blk Time (%)			9						51	49	
Queuing Penalty (veh)			18						486	463	
Storage Bay Dist (ft)				350	350			200			450
Storage Blk Time (%)						9		20	52	51	
Queuing Penalty (veh)						13		149	96	98	

Intersection: 13: Marginal Ford/Marginal Church's & Interseccion/Sector Cuba

Movement	WB	NB	NB	NB	SB
Directions Served	LTR	L	T	R	LTR
Maximum Queue (ft)	258	144	226	75	94
Average Queue (ft)	122	58	70	61	22
95th Queue (ft)	205	116	174	83	59
Link Distance (ft)	548		1527		545
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100		25	
Storage Blk Time (%)		6	41	30	
Queuing Penalty (veh)		13	98	29	

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	239	202	289	221	243	179	253	298
Average Queue (ft)	133	89	164	154	16	91	124	158
95th Queue (ft)	209	171	252	224	116	152	216	248
Link Distance (ft)	1021	1021	1135	1135			393	393
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				1	0		1	
Queuing Penalty (veh)				3	0		1	

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	98	95	57
Average Queue (ft)	54	40	18
95th Queue (ft)	82	65	42
Link Distance (ft)	894	553	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement	WB
Directions Served	R
Maximum Queue (ft)	31
Average Queue (ft)	16
95th Queue (ft)	40
Link Distance (ft)	621
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB	SB	B5	B5	B5	B5
Directions Served	T	T	T	T	T	T	
Maximum Queue (ft)	418	418	429	400	405	403	232
Average Queue (ft)	343	354	356	173	185	183	33
95th Queue (ft)	456	455	460	443	452	443	148
Link Distance (ft)	309	309	309	356	356	356	356
Upstream Blk Time (%)	45	56	58	2	3	2	
Queuing Penalty (veh)	308	382	396	8	14	12	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 18: Marginal Pep Boys & PR 2

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	447	448
Average Queue (ft)	414	419
95th Queue (ft)	429	441
Link Distance (ft)	304	304
Upstream Blk Time (%)	50	50
Queuing Penalty (veh)	507	513
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 19: PR 2 & Marginal Chrurch's

Movement	WB	SB	SB
Directions Served	R	T	T
Maximum Queue (ft)	96	435	436
Average Queue (ft)	27	417	418
95th Queue (ft)	69	425	433
Link Distance (ft)	115	295	295
Upstream Blk Time (%)	0	51	50
Queuing Penalty (veh)	0	483	470
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	122
Average Queue (ft)	45
95th Queue (ft)	79
Link Distance (ft)	445
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB
Directions Served	R
Maximum Queue (ft)	115
Average Queue (ft)	39
95th Queue (ft)	83
Link Distance (ft)	258
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: Marginal Ford & Ford

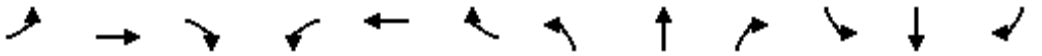
Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	30	31
Average Queue (ft)	21	10
95th Queue (ft)	42	34
Link Distance (ft)	284	1527
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement	NB
Directions Served	TR
Maximum Queue (ft)	32
Average Queue (ft)	2
95th Queue (ft)	12
Link Distance (ft)	393
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

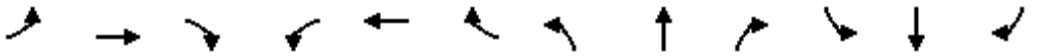
Network Summary

Network wide Queuing Penalty: 4573



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
Future Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.77	0.77	0.77	0.71	0.71	0.71	0.93	0.93	0.93	0.87	0.87	0.87
Adj. Flow (vph)	392	66	145	83	63	0	73	1703	0	98	1328	303
RTOR Reduction (vph)	0	0	119	0	0	0	0	0	0	0	0	158
Lane Group Flow (vph)	227	231	26	47	99	0	73	1703	0	98	1328	145
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	15.5	15.5	15.5	6.8	6.8		5.8	41.0		6.3	41.5	41.5
Effective Green, g (s)	15.5	15.5	15.5	6.8	6.8		5.8	41.0		6.3	41.5	41.5
Actuated g/C Ratio	0.18	0.18	0.18	0.08	0.08		0.07	0.47		0.07	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	292	301	270	127	252		234	2361		249	2413	667
v/s Ratio Prot	c0.14	0.14		0.03	c0.03		0.02	c0.34		c0.03	0.26	
v/s Ratio Perm			0.02									0.10
v/c Ratio	0.78	0.77	0.10	0.37	0.39		0.31	0.72		0.39	0.55	0.22
Uniform Delay, d1	33.9	33.8	29.7	37.9	37.9		38.5	18.2		38.3	16.0	13.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.2	11.1	0.2	1.8	1.0		0.8	1.9		1.0	0.9	0.7
Delay (s)	46.1	45.0	29.9	39.7	39.0		39.3	20.2		39.4	16.9	13.9
Level of Service	D	D	C	D	D		D	C		D	B	B
Approach Delay (s)		41.8			39.2			21.0			17.6	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	86.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	60.2%	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												
Traffic Volume (vph)	385	40	186	135	68	0	347	1338	0	79	916	125
Future Volume (vph)	385	40	186	135	68	0	347	1338	0	79	916	125
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.96	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1661	1455		1803		3433	3438		1770	3539	1553
Flt Permitted	0.95	0.96	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1661	1455		1803		3433	3438		1770	3539	1553
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.91	0.91	0.91	0.89	0.89	0.89
Adj. Flow (vph)	433	45	209	147	74	0	381	1470	0	89	1029	140
RTOR Reduction (vph)	0	0	173	0	0	0	0	0	0	0	0	97
Lane Group Flow (vph)	238	240	36	0	221	0	381	1470	0	89	1029	43
Heavy Vehicles (%)	5%	2%	11%	2%	2%	2%	2%	5%	2%	2%	2%	4%
Turn Type	Split	NA	Perm	custom	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4!	4!		Free!	Free!		5!	2!		1!	6!	
Permitted Phases		4!	4	Free!	Free!			2!			6!	6
Actuated Green, G (s)	28.7	28.7	28.7		165.0		22.9	58.9		14.4	50.4	50.4
Effective Green, g (s)	28.7	28.7	28.7		165.0		22.9	58.9		14.4	50.4	50.4
Actuated g/C Ratio	0.17	0.17	0.17		1.00		0.14	0.36		0.09	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0				4.0	5.0		4.0	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)	284	288	253		3606		476	1227		154	1081	474
v/s Ratio Prot	c0.15	0.14			0.06		c0.11	c0.43		0.05	0.29	
v/s Ratio Perm			0.02		c0.06							0.03
v/c Ratio	0.84	0.83	0.14		0.06		0.80	1.20		0.58	0.95	0.09
Uniform Delay, d1	65.9	65.8	57.7		0.0		68.8	53.0		72.4	56.1	40.9
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	18.9	18.3	0.3		0.0		9.3	97.3		5.2	18.0	0.4
Delay (s)	84.8	84.1	58.0		0.0		78.2	150.3		77.6	74.1	41.3
Level of Service	F	F	E		A		E	F		E	E	D
Approach Delay (s)		76.4			0.0			135.5			70.7	
Approach LOS		E			A			F			E	

Intersection Summary			
HCM 2000 Control Delay	97.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	107	12	20	92	36	90	84	80	1	3	21
Future Volume (vph)	0	107	12	20	92	36	90	84	80	1	3	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.0	3.0	3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00		1.00	
Frt		0.99			0.97		1.00	1.00	0.85		0.89	
Flt Protected		1.00			0.99		0.95	1.00	1.00		1.00	
Satd. Flow (prot)		1837			1770		1787	1881	1599		1681	
Flt Permitted		1.00			0.99		0.67	1.00	1.00		0.99	
Satd. Flow (perm)		1837			1770		1269	1881	1599		1672	
Peak-hour factor, PHF	0.92	0.92	0.92	0.66	0.66	0.66	0.80	0.80	0.80	0.58	0.58	0.58
Adj. Flow (vph)	0	116	13	30	139	55	112	105	100	2	5	36
RTOR Reduction (vph)	0	0	0	0	7	0	0	0	82	0	0	0
Lane Group Flow (vph)	0	129	0	0	217	0	113	105	18	0	43	0
Heavy Vehicles (%)	2%	2%	2%	0%	5%	0%	1%	1%	1%	0%	0%	0%
Turn Type		NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		Free!		10!	10			3!			3!	
Permitted Phases	Free!	Free!			10		3!	3!	3	3!	3!	
Actuated Green, G (s)		165.0			23.7		19.3	19.3	19.3		19.3	
Effective Green, g (s)		165.0			23.7		19.3	19.3	19.3		19.3	
Actuated g/C Ratio		1.00			0.14		0.12	0.12	0.12		0.12	
Clearance Time (s)					4.0		3.0	3.0	3.0		3.0	
Vehicle Extension (s)					3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		3674			254		148	220	187		195	
v/s Ratio Prot		0.04			c0.12			0.06				
v/s Ratio Perm		c0.04					c0.09		0.01		0.03	
v/c Ratio		0.04			0.85		0.76	0.48	0.10		0.22	
Uniform Delay, d1		0.0			69.0		70.6	68.1	65.1		66.0	
Progression Factor		1.00			1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2		0.0			23.4		20.5	1.6	0.2		0.6	
Delay (s)		0.0			92.3		91.2	69.8	65.3		66.6	
Level of Service		A			F		F	E	E		E	
Approach Delay (s)		0.0			92.3			76.0			66.6	
Approach LOS		A			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	66.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	165.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	211	99	1792	175	91	1329
Future Volume (vph)	211	99	1792	175	91	1329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.95		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3159		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3159		3471	1583	1770	3539
Peak-hour factor, PHF	0.74	0.74	0.90	0.90	0.94	0.94
Adj. Flow (vph)	285	134	1991	194	97	1414
RTOR Reduction (vph)	78	0	0	74	0	0
Lane Group Flow (vph)	341	0	1991	120	97	1414
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	10.5		40.4	40.4	7.4	51.8
Effective Green, g (s)	10.5		40.4	40.4	7.4	51.8
Actuated g/C Ratio	0.15		0.57	0.57	0.10	0.73
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	465		1966	896	183	2571
v/s Ratio Prot	c0.11		c0.57		0.05	c0.40
v/s Ratio Perm				0.08		
v/c Ratio	0.73		1.01	0.13	0.53	0.55
Uniform Delay, d1	29.1		15.4	7.2	30.3	4.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	5.9		23.5	0.3	2.9	0.9
Delay (s)	34.9		38.9	7.6	33.2	5.3
Level of Service	C		D	A	C	A
Approach Delay (s)	34.9		36.2			7.1
Approach LOS	C		D			A

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	0	177	14	0	0
Future Vol, veh/h	0	0	177	14	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	192	15	0	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	200	200	0	0	200	208
Stage 1	200	-	-	-	0	0
Stage 2	0	-	-	-	200	208
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	789	841	-	-	789	689
Stage 1	834	-	-	-	-	-
Stage 2	-	-	-	-	834	730
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	789	841	-	-	789	0
Mov Cap-2 Maneuver	789	-	-	-	789	0
Stage 1	834	-	-	-	-	0
Stage 2	-	-	-	-	834	0

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	25	0	120	0	0	0
Future Vol, veh/h	25	0	120	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	0	130	0	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	130	130	0	0
Stage 1	130	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	843	920	-	-
Stage 1	874	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	843	920	-	-
Mov Cap-2 Maneuver	843	-	-	-
Stage 1	874	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	9.4	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	843
HCM Lane V/C Ratio	-	-	0.032
HCM Control Delay (s)	-	-	9.4
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	48	206	0	35	0
Future Vol, veh/h	0	48	206	0	35	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	52	224	0	38	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	224	224	0	0	224	224
Stage 1	224	-	-	-	0	0
Stage 2	0	-	-	-	224	224
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	764	815	-	-	764	675
Stage 1	813	-	-	-	-	-
Stage 2	-	-	-	-	813	718
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	764	815	-	-	764	0
Mov Cap-2 Maneuver	764	-	-	-	764	0
Stage 1	813	-	-	-	-	0
Stage 2	-	-	-	-	813	0

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	10
HCM LOS	A		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	815	764
HCM Lane V/C Ratio	-	-	0.064	0.05
HCM Control Delay (s)	-	-	9.7	10
HCM Lane LOS	-	-	A	B
HCM 95th %tile Q(veh)	-	-	0.2	0.2

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	200	162	72	71	110	71	71	307	278	310	53	114
Average Queue (ft)	103	90	32	39	25	27	25	184	192	198	14	47
95th Queue (ft)	168	150	63	64	66	54	50	304	303	302	41	87
Link Distance (ft)	1281	1281	91	91	91			356	356	356		
Upstream Blk Time (%)			0	0	1							
Queuing Penalty (veh)			0	0	0							
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)								0				
Queuing Penalty (veh)								0				

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB
Directions Served	T	T	T
Maximum Queue (ft)	223	196	180
Average Queue (ft)	147	128	95
95th Queue (ft)	217	189	172
Link Distance (ft)	1508	1508	1508
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 12: PR 2 & Western Plaza/Interseccion

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	LTR	L	L	T	T	L	T	T
Maximum Queue (ft)	382	373	20	276	450	1087	1078	300	524	528
Average Queue (ft)	228	201	1	171	378	757	762	130	317	323
95th Queue (ft)	348	303	7	268	578	1147	1123	304	432	441
Link Distance (ft)	932	932	10			1056	1056		667	667
Upstream Blk Time (%)			0			1	1			
Queuing Penalty (veh)			0			8	7			
Storage Bay Dist (ft)				350	350			200		
Storage Blk Time (%)						43		1	32	1
Queuing Penalty (veh)						150		5	25	1

Intersection: 13: Marginal Ford/Marginal Church's & Interseccion/Sector Cuba

Movement	WB	NB	NB	NB	SB
Directions Served	LTR	L	T	R	LTR
Maximum Queue (ft)	300	149	288	75	74
Average Queue (ft)	130	94	109	45	37
95th Queue (ft)	228	164	216	86	68
Link Distance (ft)	548		1527		530
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100		25	
Storage Blk Time (%)		16	54	6	
Queuing Penalty (veh)		27	91	11	

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	233	131	332	325	250	140	182	196
Average Queue (ft)	96	44	220	200	17	57	65	85
95th Queue (ft)	162	95	347	319	119	108	158	171
Link Distance (ft)	1021	1021	1135	1135			393	393
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				5			0	
Queuing Penalty (veh)				9			0	

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	96	93	70
Average Queue (ft)	45	47	19
95th Queue (ft)	73	78	44
Link Distance (ft)	894	549	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	90	94
Average Queue (ft)	14	20
95th Queue (ft)	55	64
Link Distance (ft)	271	271
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: Marginal Pep Boys & PR 2

Movement	SB
Directions Served	TR
Maximum Queue (ft)	79
Average Queue (ft)	3
95th Queue (ft)	26
Link Distance (ft)	284
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 19: PR 2 & Marginal Chrurch's

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	50	369	416
Average Queue (ft)	10	12	14
95th Queue (ft)	37	122	137
Link Distance (ft)	112	667	667
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	24
95th Queue (ft)	42
Link Distance (ft)	444
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB	SB
Directions Served	R	T
Maximum Queue (ft)	182	29
Average Queue (ft)	62	1
95th Queue (ft)	128	10
Link Distance (ft)	280	1056
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 22: Marginal Ford & Ford

Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	52	55
Average Queue (ft)	23	28
95th Queue (ft)	47	52
Link Distance (ft)	284	1527
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 335

Appendix D.2 SCENARIO 1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	0	0	0	161	0	191	148	0	1016	0	0	1895
Future Volume (vph)	0	0	0	161	0	191	148	0	1016	0	0	1895
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				0.97		1.00	0.91	0.95	0.95			0.95
Frt				1.00		0.85	1.00	1.00	1.00			1.00
Flt Protected				0.95		1.00	0.95	0.95	1.00			1.00
Satd. Flow (prot)				3433		1583	1610	1681	3539			3539
Flt Permitted				0.95		1.00	0.95	0.95	1.00			1.00
Satd. Flow (perm)				3433		1583	1610	1681	3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	175	0	208	161	0	1104	0	0	2060
RTOR Reduction (vph)	0	0	0	0	0	118	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	175	0	90	80	81	1104	0	0	2060
Turn Type				Prot		Perm	Prot	Prot	NA			NA
Protected Phases				8			5	5	2			6
Permitted Phases						8						
Actuated Green, G (s)				10.5		10.5	8.1	8.1	61.5			49.4
Effective Green, g (s)				10.5		10.5	8.1	8.1	61.5			49.4
Actuated g/C Ratio				0.13		0.13	0.10	0.10	0.77			0.62
Clearance Time (s)				4.0		4.0	4.0	4.0	4.0			4.0
Vehicle Extension (s)				3.0		3.0	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)				450		207	163	170	2720			2185
v/s Ratio Prot				0.05			c0.05	0.05	0.31			c0.58
v/s Ratio Perm						c0.06						
v/c Ratio				0.39		0.43	0.49	0.48	0.41			0.94
Uniform Delay, d1				31.8		32.0	34.0	33.9	3.1			14.0
Progression Factor				1.00		1.00	1.00	1.00	1.00			1.00
Incremental Delay, d2				0.6		1.5	2.3	2.1	0.5			9.8
Delay (s)				32.4		33.5	36.3	36.0	3.6			23.8
Level of Service				C		C	D	D	A			C
Approach Delay (s)		0.0			33.0				7.7			23.8
Approach LOS		A			C				A			C

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

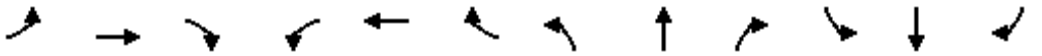
Movement	SBR
Lane Configurations	
Traffic Volume (vph)	0
Future Volume (vph)	0
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	0
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	0	0	1101	0	250	0	1763
Future Volume (vph)	0	0	1101	0	250	0	1763
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0		4.0	4.0	4.0
Lane Util. Factor			0.95		0.91	0.95	0.95
Frt			1.00		1.00	1.00	1.00
Flt Protected			1.00		0.95	0.95	1.00
Satd. Flow (prot)			3539		1610	1681	3539
Flt Permitted			1.00		0.95	0.95	1.00
Satd. Flow (perm)			3539		1610	1681	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1197	0	272	0	1916
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1197	0	136	136	1916
Turn Type			NA		Prot	Prot	NA
Protected Phases			2		1	1	6
Permitted Phases							
Actuated Green, G (s)			25.2		6.8	6.8	40.0
Effective Green, g (s)			25.2		6.8	6.8	40.0
Actuated g/C Ratio			0.63		0.17	0.17	1.00
Clearance Time (s)			4.0		4.0	4.0	4.0
Vehicle Extension (s)			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)			2229		273	285	3539
v/s Ratio Prot			0.34		0.08	0.08	c0.54
v/s Ratio Perm							
v/c Ratio			0.54		0.50	0.48	0.54
Uniform Delay, d1			4.1		15.1	15.0	0.0
Progression Factor			1.00		1.00	1.00	1.00
Incremental Delay, d2			0.9		1.4	1.3	0.6
Delay (s)			5.1		16.5	16.3	0.6
Level of Service			A		B	B	A
Approach Delay (s)	0.0		5.1				2.6
Approach LOS	A		A				A

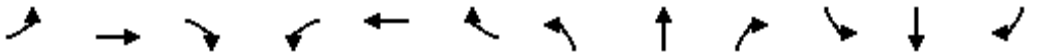
Intersection Summary			
HCM 2000 Control Delay	3.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
Future Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.73	0.73	0.73	0.69	0.69	0.69	0.80	0.80	0.80	0.89	0.89	0.89
Adj. Flow (vph)	385	62	123	174	142	12	56	1278	0	101	2056	857
RTOR Reduction (vph)	0	0	102	0	3	0	0	0	0	0	0	382
Lane Group Flow (vph)	223	224	21	108	217	0	56	1278	0	101	2056	475
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	15.4	15.4	15.4	11.7	11.7		5.6	40.4		6.6	41.4	41.4
Effective Green, g (s)	15.4	15.4	15.4	11.7	11.7		5.6	40.4		6.6	41.4	41.4
Actuated g/C Ratio	0.17	0.17	0.17	0.13	0.13		0.06	0.44		0.07	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	276	284	255	208	411		215	2212		248	2288	632
v/s Ratio Prot	c0.14	0.13		0.07	c0.07		0.02	0.26		c0.03	c0.41	
v/s Ratio Perm			0.01									0.34
v/c Ratio	0.81	0.79	0.08	0.52	0.53		0.26	0.58		0.41	0.90	0.75
Uniform Delay, d1	36.4	36.3	31.9	37.1	37.1		40.8	19.0		40.4	22.9	20.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.8	13.5	0.1	2.2	1.2		0.6	1.1		1.1	6.1	8.0
Delay (s)	52.2	49.8	32.0	39.3	38.3		41.4	20.1		41.5	29.1	28.6
Level of Service	D	D	C	D	D		D	C		D	C	C
Approach Delay (s)		46.9			38.6			21.0			29.4	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	91.1	Sum of lost time (s)	17.0
Intersection Capacity Utilization	68.9%	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		↑	↱		↑			↑↑			↑↑	↱
Traffic Volume (vph)	0	146	164	0	39	0	0	1164	187	0	1849	355
Future Volume (vph)	0	146	164	0	39	0	0	1164	187	0	1849	355
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			5.0			5.0	5.0
Lane Util. Factor		1.00	1.00		1.00			0.95			0.95	1.00
Frt		1.00	0.85		1.00			0.98			1.00	0.85
Flt Protected		1.00	1.00		1.00			1.00			1.00	1.00
Satd. Flow (prot)		1863	1455		1863			3380			3539	1553
Flt Permitted		1.00	1.00		1.00			1.00			1.00	1.00
Satd. Flow (perm)		1863	1455		1863			3380			3539	1553
Peak-hour factor, PHF	0.78	0.78	0.78	0.92	0.92	0.92	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	0	187	210	0	42	0	0	1437	231	0	2078	399
RTOR Reduction (vph)	0	0	189	0	0	0	0	13	0	0	0	172
Lane Group Flow (vph)	0	187	21	0	42	0	0	1655	0	0	2078	227
Heavy Vehicles (%)	5%	2%	11%	2%	2%	2%	2%	5%	2%	2%	2%	4%
Turn Type		NA	Perm		NA			NA			NA	Perm
Protected Phases		4			Free!			2!			6!	
Permitted Phases		4	4		Free!			2!			6!	6
Actuated Green, G (s)		10.0	10.0		100.0			57.0			57.0	57.0
Effective Green, g (s)		10.0	10.0		100.0			57.0			57.0	57.0
Actuated g/C Ratio		0.10	0.10		1.00			0.57			0.57	0.57
Clearance Time (s)		4.0	4.0					5.0			5.0	5.0
Vehicle Extension (s)		3.0	3.0					3.0			3.0	3.0
Lane Grp Cap (vph)		186	145		3726			1926			2017	885
v/s Ratio Prot		c0.10			0.01			0.49			c0.59	
v/s Ratio Perm			0.01		c0.01							0.15
v/c Ratio		1.01	0.14		0.01			0.86			1.03	0.26
Uniform Delay, d1		45.0	41.1		0.0			18.1			21.5	10.8
Progression Factor		1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2		67.4	0.5		0.0			5.3			28.3	0.7
Delay (s)		112.4	41.6		0.0			23.4			49.8	11.5
Level of Service		F	D		A			C			D	B
Approach Delay (s)		74.9			0.0			23.4			43.6	
Approach LOS		E			A			C			D	

Intersection Summary			
HCM 2000 Control Delay	38.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	327	6	0	34	115	0	97	185	0	17	5
Future Volume (vph)	0	327	6	0	34	115	0	97	185	0	17	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0		4.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		1.00			1.00	0.85		1.00	0.85		0.97	
Flt Protected		1.00			1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1858			1743	1615		1881	1599		1843	
Flt Permitted		1.00			1.00	1.00		1.00	1.00		1.00	
Satd. Flow (perm)		1858			1743	1615		1881	1599		1843	
Peak-hour factor, PHF	0.92	0.92	0.92	0.63	0.63	0.63	0.69	0.69	0.69	0.48	0.48	0.48
Adj. Flow (vph)	0	355	7	0	54	183	0	141	268	0	35	10
RTOR Reduction (vph)	0	0	0	0	0	172	0	0	241	0	0	0
Lane Group Flow (vph)	0	362	0	0	54	11	0	141	27	0	45	0
Heavy Vehicles (%)	2%	2%	2%	0%	9%	0%	1%	1%	1%	0%	0%	0%
Turn Type		NA			NA	Perm		NA	Perm		NA	
Protected Phases		Free!			10			3!			3!	
Permitted Phases		Free!			10	10		3!	3		3!	
Actuated Green, G (s)		100.0			6.0	6.0		10.0	10.0		10.0	
Effective Green, g (s)		100.0			6.0	6.0		10.0	10.0		10.0	
Actuated g/C Ratio		1.00			0.06	0.06		0.10	0.10		0.10	
Clearance Time (s)					4.0	4.0		4.0	4.0		4.0	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		3716			104	96		188	159		184	
v/s Ratio Prot		0.10			c0.03			c0.07			0.02	
v/s Ratio Perm		c0.10				0.01			0.02			
v/c Ratio		0.10			0.52	0.11		0.75	0.17		0.24	
Uniform Delay, d1		0.0			45.6	44.5		43.8	41.2		41.5	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			4.3	0.5		15.4	0.5		0.7	
Delay (s)		0.0			49.9	45.0		59.2	41.7		42.2	
Level of Service		A			D	D		E	D		D	
Approach Delay (s)		0.0			46.1			47.7			42.2	
Approach LOS		A			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	349	140	1252	320	129	1700
Future Volume (vph)	349	140	1252	320	129	1700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.96		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3162		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3162		3471	1583	1770	3539
Peak-hour factor, PHF	0.89	0.89	0.83	0.83	0.86	0.86
Adj. Flow (vph)	392	157	1508	386	150	1977
RTOR Reduction (vph)	75	0	0	187	0	0
Lane Group Flow (vph)	474	0	1508	199	150	1977
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	10.0		31.4	31.4	6.4	41.8
Effective Green, g (s)	10.0		31.4	31.4	6.4	41.8
Actuated g/C Ratio	0.16		0.52	0.52	0.11	0.69
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	520		1792	817	186	2433
v/s Ratio Prot	c0.15		0.43		0.08	c0.56
v/s Ratio Perm				0.13		
v/c Ratio	0.91		0.84	0.24	0.81	0.81
Uniform Delay, d1	25.0		12.6	8.1	26.6	6.7
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	20.2		5.0	0.7	21.9	3.1
Delay (s)	45.2		17.6	8.8	48.5	9.8
Level of Service	D		B	A	D	A
Approach Delay (s)	45.2		15.8			12.5
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	18	140	0	1	0
Future Vol, veh/h	0	18	140	0	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	20	152	0	1	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	152	152	0	0	152	152
Stage 1	152	-	-	-	0	0
Stage 2	0	-	-	-	152	152
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	840	894	-	-	840	740
Stage 1	876	-	-	-	-	-
Stage 2	-	-	-	-	876	772
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	840	894	-	-	840	0
Mov Cap-2 Maneuver	840	-	-	-	840	0
Stage 1	876	-	-	-	-	0
Stage 2	-	-	-	-	876	0

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	9.3
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	894	840
HCM Lane V/C Ratio	-	-	0.022	0.001
HCM Control Delay (s)	-	-	9.1	9.3
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	22	153	199	13	0	0
Future Vol, veh/h	22	153	199	13	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	166	216	14	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	223	223	0	0
Stage 1	223	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	733	817	-	-
Stage 1	780	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	733	817	-	-
Mov Cap-2 Maneuver	733	-	-	-
Stage 1	780	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	10.9	0
HCM LOS	B	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	805
HCM Lane V/C Ratio	-	-	0.236
HCM Control Delay (s)	-	-	10.9
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.9

Intersection	
Int Delay, s/veh	1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	23	259	32	23	0
Future Vol, veh/h	0	23	259	32	23	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	25	282	35	25	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	299	299	0	0	299	316
Stage 1	299	-	-	-	0	0
Stage 2	0	-	-	-	299	316
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	692	741	-	-	692	600
Stage 1	752	-	-	-	-	-
Stage 2	-	-	-	-	752	655
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	692	741	-	-	692	0
Mov Cap-2 Maneuver	692	-	-	-	692	0
Stage 1	752	-	-	-	-	0
Stage 2	-	-	-	-	752	0

Approach	WB	NB	SB
HCM Control Delay, s	10	0	10.4
HCM LOS	B		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	741	692
HCM Lane V/C Ratio	-	-	0.034	0.036
HCM Control Delay (s)	-	-	10	10.4
HCM Lane LOS	-	-	B	B
HCM 95th %tile Q(veh)	-	-	0.1	0.1

Intersection: 1: PR 2 & Marginal Chrurch's

Movement	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	U	UL	T	T	T	T
Maximum Queue (ft)	89	105	87	87	120	136	288	312
Average Queue (ft)	43	54	42	46	37	47	213	229
95th Queue (ft)	77	91	76	82	97	115	306	332
Link Distance (ft)	276	276			673	673	277	277
Upstream Blk Time (%)							1	2
Queuing Penalty (veh)							10	20
Storage Bay Dist (ft)			175	175				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 2: PR 2

Movement	NB	NB	SB	SB
Directions Served	T	T	U	UL
Maximum Queue (ft)	122	126	116	138
Average Queue (ft)	49	70	54	64
95th Queue (ft)	87	119	101	115
Link Distance (ft)	376	376		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			175	175
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	206	194	97	97	74	92	28	230	244	239	49	121
Average Queue (ft)	110	94	57	60	32	27	8	108	124	141	5	63
95th Queue (ft)	186	163	91	88	61	64	27	207	217	232	26	110
Link Distance (ft)	1281	1281	92	92	92			356	356	356		
Upstream Blk Time (%)			2	2	0							
Queuing Penalty (veh)			2	1	0							
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	358	348	302	267
Average Queue (ft)	212	207	167	9
95th Queue (ft)	308	302	270	88
Link Distance (ft)	1508	1508	1508	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				300
Storage Blk Time (%)	1		0	
Queuing Penalty (veh)	1		1	

Intersection: 12: PR 2 & Western Plaza/Interseccion

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	T	R	T	T	TR	T	T
Maximum Queue (ft)	164	233	24	390	328	555	557
Average Queue (ft)	94	13	1	171	181	326	314
95th Queue (ft)	141	94	8	295	305	508	493
Link Distance (ft)	933	933	17	647	647	673	673
Upstream Blk Time (%)			0				
Queuing Penalty (veh)			0				
Storage Bay Dist (ft)							
Storage Blk Time (%)							1
Queuing Penalty (veh)							4

Intersection: 13: Marginal Ford/Marginal Church's & Interseccion/Sector Cuba

Movement	EB	WB	WB	NB	NB	SB
Directions Served	TR	T	R	T	R	TR
Maximum Queue (ft)	31	88	63	118	78	44
Average Queue (ft)	8	31	27	64	55	10
95th Queue (ft)	30	68	47	114	84	32
Link Distance (ft)	17	556		1527		362
Upstream Blk Time (%)	1					
Queuing Penalty (veh)	2					
Storage Bay Dist (ft)			100		175	
Storage Blk Time (%)		0				
Queuing Penalty (veh)		0				

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	223	189	240	259	248	162	186	168
Average Queue (ft)	114	65	148	147	8	74	106	123
95th Queue (ft)	177	142	222	234	82	131	162	166
Link Distance (ft)	1021	1021	1135	1135			394	394
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				2			0	
Queuing Penalty (veh)				5			0	

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	156	75	42
Average Queue (ft)	64	40	10
95th Queue (ft)	112	65	30
Link Distance (ft)	894	553	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	31	31
Average Queue (ft)	12	1
95th Queue (ft)	35	10
Link Distance (ft)	621	553
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB	SB
Directions Served	T	T	T
Maximum Queue (ft)	157	177	182
Average Queue (ft)	53	101	101
95th Queue (ft)	150	173	172
Link Distance (ft)	309	309	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: Marginal Pep Boys & PR 2

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	290	283
Average Queue (ft)	39	56
95th Queue (ft)	147	178
Link Distance (ft)	304	304
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	96
Average Queue (ft)	44
95th Queue (ft)	75
Link Distance (ft)	432
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB
Directions Served	R
Maximum Queue (ft)	90
Average Queue (ft)	42
95th Queue (ft)	78
Link Distance (ft)	270
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: Marginal Ford & Ford

Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	31	55
Average Queue (ft)	14	16
95th Queue (ft)	38	48
Link Distance (ft)	290	1527
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement	NB
Directions Served	TR
Maximum Queue (ft)	55
Average Queue (ft)	12
95th Queue (ft)	43
Link Distance (ft)	394
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 46

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	0	120	347	0	1723	0	0	1120
Future Volume (vph)	0	0	0	169	0	120	347	0	1723	0	0	1120
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				0.97		1.00	0.91	0.95	0.95			0.95
Frt				1.00		0.85	1.00	1.00	1.00			1.00
Flt Protected				0.95		1.00	0.95	0.95	1.00			1.00
Satd. Flow (prot)				3433		1583	1610	1681	3539			3539
Flt Permitted				0.95		1.00	0.95	0.95	1.00			1.00
Satd. Flow (perm)				3433		1583	1610	1681	3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	184	0	130	377	0	1873	0	0	1217
RTOR Reduction (vph)	0	0	0	0	0	78	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	184	0	52	188	189	1873	0	0	1217
Turn Type				Prot		Perm	Prot	Prot	NA			NA
Protected Phases				8			5	5	2			6
Permitted Phases						8						
Actuated Green, G (s)				8.6		8.6	12.2	12.2	43.4			27.2
Effective Green, g (s)				8.6		8.6	12.2	12.2	43.4			27.2
Actuated g/C Ratio				0.14		0.14	0.20	0.20	0.72			0.45
Clearance Time (s)				4.0		4.0	4.0	4.0	4.0			4.0
Vehicle Extension (s)				3.0		3.0	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)				492		226	327	341	2559			1604
v/s Ratio Prot				c0.05			0.12	0.11	c0.53			0.34
v/s Ratio Perm						0.03						
v/c Ratio				0.37		0.23	0.57	0.55	0.73			0.76
Uniform Delay, d1				23.3		22.8	21.6	21.5	4.9			13.7
Progression Factor				1.00		1.00	1.00	1.00	1.00			1.00
Incremental Delay, d2				0.5		0.5	2.4	2.0	1.9			3.4
Delay (s)				23.7		23.3	24.0	23.4	6.8			17.1
Level of Service				C		C	C	C	A			B
Approach Delay (s)		0.0			23.6				9.6			17.1
Approach LOS		A			C				A			B

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

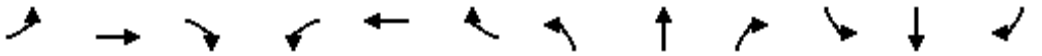
Movement	SBR
Lane Configurations	
Traffic Volume (vph)	0
Future Volume (vph)	0
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	0
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	0	0	1685	0	464	0	1237
Future Volume (vph)	0	0	1685	0	464	0	1237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0		4.0	4.0	4.0
Lane Util. Factor			0.95		0.91	0.95	0.95
Frt			1.00		1.00	1.00	1.00
Flt Protected			1.00		0.95	0.95	1.00
Satd. Flow (prot)			3539		1610	1681	3539
Flt Permitted			1.00		0.95	0.95	1.00
Satd. Flow (perm)			3539		1610	1681	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1832	0	504	0	1345
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1832	0	252	252	1345
Turn Type			NA		Prot	Prot	NA
Protected Phases			2		1	1	6
Permitted Phases							
Actuated Green, G (s)			35.6		11.4	11.4	55.0
Effective Green, g (s)			35.6		11.4	11.4	55.0
Actuated g/C Ratio			0.65		0.21	0.21	1.00
Clearance Time (s)			4.0		4.0	4.0	4.0
Vehicle Extension (s)			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)			2290		333	348	3539
v/s Ratio Prot			c0.52		c0.16	0.15	0.38
v/s Ratio Perm							
v/c Ratio			0.80		0.76	0.72	0.38
Uniform Delay, d1			7.1		20.5	20.3	0.0
Progression Factor			1.00		1.00	1.00	1.00
Incremental Delay, d2			3.0		9.4	7.3	0.3
Delay (s)			10.1		29.9	27.6	0.3
Level of Service			B		C	C	A
Approach Delay (s)	0.0		10.1				8.1
Approach LOS	A		B				A

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



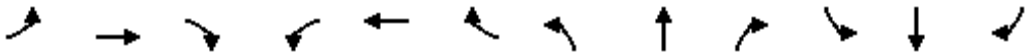
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
Future Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.77	0.77	0.77	0.71	0.71	0.71	0.93	0.93	0.93	0.87	0.87	0.87
Adj. Flow (vph)	392	66	145	83	63	0	73	1703	0	98	1328	303
RTOR Reduction (vph)	0	0	119	0	0	0	0	0	0	0	0	158
Lane Group Flow (vph)	227	231	26	47	99	0	73	1703	0	98	1328	145
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	15.5	15.5	15.5	6.8	6.8		5.8	41.0		6.3	41.5	41.5
Effective Green, g (s)	15.5	15.5	15.5	6.8	6.8		5.8	41.0		6.3	41.5	41.5
Actuated g/C Ratio	0.18	0.18	0.18	0.08	0.08		0.07	0.47		0.07	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	292	301	270	127	252		234	2361		249	2413	667
v/s Ratio Prot	c0.14	0.14		0.03	c0.03		0.02	c0.34		c0.03	0.26	
v/s Ratio Perm			0.02									0.10
v/c Ratio	0.78	0.77	0.10	0.37	0.39		0.31	0.72		0.39	0.55	0.22
Uniform Delay, d1	33.9	33.8	29.7	37.9	37.9		38.5	18.2		38.3	16.0	13.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.2	11.1	0.2	1.8	1.0		0.8	1.9		1.0	0.9	0.7
Delay (s)	46.1	45.0	29.9	39.7	39.0		39.3	20.2		39.4	16.9	13.9
Level of Service	D	D	C	D	D		D	C		D	B	B
Approach Delay (s)		41.8			39.2			21.0			17.6	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	86.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	60.2%	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												
Traffic Volume (vph)	0	40	571	0	34	0	0	2070	79	0	1130	506
Future Volume (vph)	0	40	571	0	34	0	0	2070	79	0	1130	506
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			5.0			5.0	5.0
Lane Util. Factor		1.00	1.00		1.00			0.95			0.95	1.00
Frt		1.00	0.85		1.00			0.99			1.00	0.85
Flt Protected		1.00	1.00		1.00			1.00			1.00	1.00
Satd. Flow (prot)		1863	1455		1863			3423			3539	1553
Flt Permitted		1.00	1.00		1.00			1.00			1.00	1.00
Satd. Flow (perm)		1863	1455		1863			3423			3539	1553
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.91	0.91	0.91	0.89	0.89	0.89
Adj. Flow (vph)	0	45	642	0	37	0	0	2275	87	0	1270	569
RTOR Reduction (vph)	0	0	202	0	0	0	0	2	0	0	0	250
Lane Group Flow (vph)	0	45	440	0	37	0	0	2360	0	0	1270	319
Heavy Vehicles (%)	5%	2%	11%	2%	2%	2%	2%	5%	2%	2%	2%	4%
Turn Type		NA	Perm		NA			NA			NA	Perm
Protected Phases		4			Free!			2!			6!	
Permitted Phases		4	4		Free!			2!			6!	6
Actuated Green, G (s)		30.0	30.0		150.0			84.0			84.0	84.0
Effective Green, g (s)		30.0	30.0		150.0			84.0			84.0	84.0
Actuated g/C Ratio		0.20	0.20		1.00			0.56			0.56	0.56
Clearance Time (s)		4.0	4.0					5.0			5.0	5.0
Vehicle Extension (s)		3.0	3.0					3.0			3.0	3.0
Lane Grp Cap (vph)		372	291		3726			1916			1981	869
v/s Ratio Prot		0.02			0.01			c0.69			0.36	
v/s Ratio Perm			c0.30		c0.01							0.21
v/c Ratio		0.12	1.51		0.01			1.23			0.64	0.37
Uniform Delay, d1		49.2	60.0		0.0			33.0			22.7	18.3
Progression Factor		1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2		0.1	248.0		0.0			109.1			1.6	1.2
Delay (s)		49.3	308.0		0.0			142.1			24.3	19.5
Level of Service		D	F		A			F			C	B
Approach Delay (s)		291.1			0.0			142.1			22.8	
Approach LOS		F			A			F			C	

Intersection Summary			
HCM 2000 Control Delay	117.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	107	12	0	29	119	0	174	81	0	24	5
Future Volume (vph)	0	107	12	0	29	119	0	174	81	0	24	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		3.0	3.0		3.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.99			1.00	0.85		1.00	0.85		0.98	
Flt Protected		1.00			1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1837			1810	1615		1881	1599		1854	
Flt Permitted		1.00			1.00	1.00		1.00	1.00		1.00	
Satd. Flow (perm)		1837			1810	1615		1881	1599		1854	
Peak-hour factor, PHF	0.92	0.92	0.92	0.66	0.66	0.66	0.80	0.80	0.80	0.58	0.58	0.58
Adj. Flow (vph)	0	116	13	0	44	180	0	218	101	0	41	9
RTOR Reduction (vph)	0	0	0	0	0	173	0	0	89	0	0	0
Lane Group Flow (vph)	0	129	0	0	44	7	0	218	12	0	50	0
Heavy Vehicles (%)	2%	2%	2%	0%	5%	0%	1%	1%	1%	0%	0%	0%
Turn Type		NA			NA	Perm		NA	Perm		NA	
Protected Phases		Free!			10			3!			3!	
Permitted Phases		Free!			10	10		3!	3		3!	
Actuated Green, G (s)		150.0			6.0	6.0		14.0	14.0		14.0	
Effective Green, g (s)		150.0			6.0	6.0		14.0	14.0		14.0	
Actuated g/C Ratio		1.00			0.04	0.04		0.09	0.09		0.09	
Clearance Time (s)					4.0	4.0		3.0	3.0		3.0	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		3674			72	64		175	149		173	
v/s Ratio Prot		0.04			c0.02			c0.12			0.03	
v/s Ratio Perm		c0.04				0.00			0.01			
v/c Ratio		0.04			0.61	0.11		1.25	0.08		0.29	
Uniform Delay, d1		0.0			70.9	69.4		68.0	62.1		63.4	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			14.4	0.8		149.2	0.2		0.9	
Delay (s)		0.0			85.2	70.2		217.2	62.4		64.3	
Level of Service		A			F	E		F	E		E	
Approach Delay (s)		0.0			73.2			168.2			64.3	
Approach LOS		A			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	101.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	211	99	1792	175	91	1329
Future Volume (vph)	211	99	1792	175	91	1329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.95		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3159		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3159		3471	1583	1770	3539
Peak-hour factor, PHF	0.74	0.74	0.90	0.90	0.94	0.94
Adj. Flow (vph)	285	134	1991	194	97	1414
RTOR Reduction (vph)	78	0	0	74	0	0
Lane Group Flow (vph)	341	0	1991	120	97	1414
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	10.5		40.4	40.4	7.4	51.8
Effective Green, g (s)	10.5		40.4	40.4	7.4	51.8
Actuated g/C Ratio	0.15		0.57	0.57	0.10	0.73
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	465		1966	896	183	2571
v/s Ratio Prot	c0.11		c0.57		0.05	c0.40
v/s Ratio Perm				0.08		
v/c Ratio	0.73		1.01	0.13	0.53	0.55
Uniform Delay, d1	29.1		15.4	7.2	30.3	4.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	5.9		23.5	0.3	2.9	0.9
Delay (s)	34.9		38.9	7.6	33.2	5.3
Level of Service	C		D	A	C	A
Approach Delay (s)	34.9		36.2			7.1
Approach LOS	C		D			A

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	0	177	14	0	0
Future Vol, veh/h	0	0	177	14	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	192	15	0	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	200	200	0	0	200	208
Stage 1	200	-	-	-	0	0
Stage 2	0	-	-	-	200	208
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	789	841	-	-	789	689
Stage 1	834	-	-	-	-	-
Stage 2	-	-	-	-	834	730
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	789	841	-	-	789	0
Mov Cap-2 Maneuver	789	-	-	-	789	0
Stage 1	834	-	-	-	-	0
Stage 2	-	-	-	-	834	0

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	29	6	283	10	0	0
Future Vol, veh/h	29	6	283	10	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	7	308	11	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	313	313	0	0
Stage 1	313	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	640	727	-	-
Stage 1	698	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	640	727	-	-
Mov Cap-2 Maneuver	640	-	-	-
Stage 1	698	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	10.9	0
HCM LOS	B	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	653
HCM Lane V/C Ratio	-	-	0.058
HCM Control Delay (s)	-	-	10.9
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.2

Intersection	
Int Delay, s/veh	2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	49	206	0	36	0
Future Vol, veh/h	0	49	206	0	36	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	53	224	0	39	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	224	224	0	0	224	224
Stage 1	224	-	-	-	0	0
Stage 2	0	-	-	-	224	224
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	764	815	-	-	764	675
Stage 1	813	-	-	-	-	-
Stage 2	-	-	-	-	813	718
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	764	815	-	-	764	0
Mov Cap-2 Maneuver	764	-	-	-	764	0
Stage 1	813	-	-	-	-	0
Stage 2	-	-	-	-	813	0

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	10
HCM LOS	A		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	815	764
HCM Lane V/C Ratio	-	-	0.065	0.051
HCM Control Delay (s)	-	-	9.7	10
HCM Lane LOS	-	-	A	B
HCM 95th %tile Q(veh)	-	-	0.2	0.2

Intersection: 1: PR 2 & Marginal Chrurch's

Movement	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	U	UL	T	T	T	T
Maximum Queue (ft)	96	113	151	173	263	222	222	264
Average Queue (ft)	48	54	62	86	78	106	121	147
95th Queue (ft)	85	101	113	150	173	219	226	257
Link Distance (ft)	287	287			678	678	272	272
Upstream Blk Time (%)								0
Queuing Penalty (veh)								0
Storage Bay Dist (ft)			175	175				
Storage Blk Time (%)				0	0			
Queuing Penalty (veh)				2	2			

Intersection: 2: PR 2

Movement	NB	NB	SB	SB
Directions Served	T	T	U	UL
Maximum Queue (ft)	205	207	181	178
Average Queue (ft)	130	132	99	104
95th Queue (ft)	186	189	158	157
Link Distance (ft)	370	370		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			175	175
Storage Blk Time (%)			0	0
Queuing Penalty (veh)			1	1

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	180	179	53	94	91	50	50	320	380	337	30	93
Average Queue (ft)	119	96	23	40	23	22	26	174	193	206	9	47
95th Queue (ft)	177	164	53	73	67	46	51	284	299	299	30	83
Link Distance (ft)	1281	1281	91	91	91			356	356	356		
Upstream Blk Time (%)				1	0				0	0		
Queuing Penalty (veh)				0	0				0	0		
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)								0				
Queuing Penalty (veh)								0				

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB
Directions Served	T	T	T
Maximum Queue (ft)	218	216	218
Average Queue (ft)	128	130	79
95th Queue (ft)	194	188	161
Link Distance (ft)	1508	1508	1508
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 12: PR 2 & Western Plaza/Interseccion

Movement	EB	EB	NB	NB	SB	SB
Directions Served	T	R	T	TR	T	T
Maximum Queue (ft)	96	581	657	692	310	258
Average Queue (ft)	53	147	421	432	164	117
95th Queue (ft)	93	425	647	662	276	229
Link Distance (ft)	933	933	648	648	678	678
Upstream Blk Time (%)			0	1		
Queuing Penalty (veh)			3	6		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 13: Marginal Ford/Marginal Church's & Interseccion/Sector Cuba

Movement	WB	WB	NB	NB	SB
Directions Served	T	R	T	R	TR
Maximum Queue (ft)	109	84	290	275	45
Average Queue (ft)	41	26	169	50	14
95th Queue (ft)	91	55	239	149	37
Link Distance (ft)	556		1527		362
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100		175	
Storage Blk Time (%)	1	0	12		
Queuing Penalty (veh)	1	0	10		

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	161	206	487	471	250	112	119	143
Average Queue (ft)	85	48	274	254	73	60	62	84
95th Queue (ft)	136	123	448	415	259	103	116	135
Link Distance (ft)	1021	1021	1135	1135			394	394
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				12				
Queuing Penalty (veh)				20				

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	96	99	47
Average Queue (ft)	48	41	10
95th Queue (ft)	75	72	33
Link Distance (ft)	894	549	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	44	79
Average Queue (ft)	7	10
95th Queue (ft)	31	47
Link Distance (ft)	271	271
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: Marginal Pep Boys & PR 2

Movement	SB
Directions Served	TR
Maximum Queue (ft)	61
Average Queue (ft)	3
95th Queue (ft)	23
Link Distance (ft)	284
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	52
Average Queue (ft)	20
95th Queue (ft)	45
Link Distance (ft)	433
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB
Directions Served	R
Maximum Queue (ft)	110
Average Queue (ft)	52
95th Queue (ft)	89
Link Distance (ft)	292
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: Marginal Ford & Ford

Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	55	55
Average Queue (ft)	28	22
95th Queue (ft)	45	52
Link Distance (ft)	290	1527
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 46

Appendix D.3 SCENARIO 2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	0	0	0	55	0	191	148	0	1016	0	0	1895
Future Volume (vph)	0	0	0	55	0	191	148	0	1016	0	0	1895
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				0.97		1.00	0.91	0.95	0.95			0.95
Frt				1.00		0.85	1.00	1.00	1.00			1.00
Flt Protected				0.95		1.00	0.95	0.95	1.00			1.00
Satd. Flow (prot)				3433		1583	1610	1681	3539			3539
Flt Permitted				0.95		1.00	0.95	0.95	1.00			1.00
Satd. Flow (perm)				3433		1583	1610	1681	3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	60	0	208	161	0	1104	0	0	2060
RTOR Reduction (vph)	0	0	0	0	0	111	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	60	0	97	80	81	1104	0	0	2060
Turn Type				Prot		Perm	Prot	Prot	NA			NA
Protected Phases				8			5	5	2			6
Permitted Phases						8						
Actuated Green, G (s)				9.9		9.9	7.2	7.2	57.1			45.9
Effective Green, g (s)				9.9		9.9	7.2	7.2	57.1			45.9
Actuated g/C Ratio				0.13		0.13	0.10	0.10	0.76			0.61
Clearance Time (s)				4.0		4.0	4.0	4.0	4.0			4.0
Vehicle Extension (s)				3.0		3.0	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)				453		208	154	161	2694			2165
v/s Ratio Prot				0.02			0.05	0.05	c0.31			c0.58
v/s Ratio Perm						c0.06						
v/c Ratio				0.13		0.47	0.52	0.50	0.41			0.95
Uniform Delay, d1				28.8		30.1	32.3	32.2	3.1			13.5
Progression Factor				1.00		1.00	1.00	1.00	1.00			1.47
Incremental Delay, d2				0.1		1.6	2.9	2.5	0.5			6.8
Delay (s)				28.9		31.8	35.2	34.7	3.6			26.7
Level of Service				C		C	D	C	A			C
Approach Delay (s)		0.0			31.1				7.6			26.7
Approach LOS		A			C				A			C

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

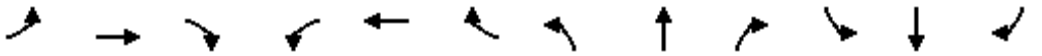
c Critical Lane Group

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	0
Future Volume (vph)	0
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	0
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	0	0	1101	0	187	0	1763
Future Volume (vph)	0	0	1101	0	187	0	1763
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0		4.0	4.0	4.0
Lane Util. Factor			0.95		0.91	0.95	0.95
Frt			1.00		1.00	1.00	1.00
Flt Protected			1.00		0.95	0.95	1.00
Satd. Flow (prot)			3539		1610	1681	3539
Flt Permitted			1.00		0.95	0.95	1.00
Satd. Flow (perm)			3539		1610	1681	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1197	0	203	0	1916
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1197	0	101	102	1916
Turn Type			NA		Prot	Prot	NA
Protected Phases			2		1	1	6
Permitted Phases							
Actuated Green, G (s)			55.8		11.2	11.2	75.0
Effective Green, g (s)			55.8		11.2	11.2	75.0
Actuated g/C Ratio			0.74		0.15	0.15	1.00
Clearance Time (s)			4.0		4.0	4.0	4.0
Vehicle Extension (s)			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)			2633		240	251	3539
v/s Ratio Prot			0.34		0.06	0.06	c0.54
v/s Ratio Perm							
v/c Ratio			0.45		0.42	0.41	0.54
Uniform Delay, d1			3.7		29.0	28.9	0.0
Progression Factor			0.02		1.00	1.00	1.00
Incremental Delay, d2			0.3		1.2	1.1	0.6
Delay (s)			0.4		30.1	30.0	0.6
Level of Service			A		C	C	A
Approach Delay (s)	0.0		0.4				3.4
Approach LOS	A		A				A

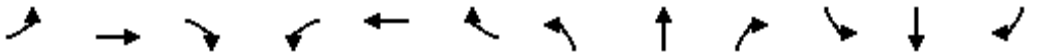
Intersection Summary			
HCM 2000 Control Delay	2.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
Future Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.73	0.73	0.73	0.69	0.69	0.69	0.80	0.80	0.80	0.89	0.89	0.89
Adj. Flow (vph)	385	62	123	174	142	12	56	1278	0	101	2056	857
RTOR Reduction (vph)	0	0	102	0	5	0	0	0	0	0	0	379
Lane Group Flow (vph)	223	224	21	108	215	0	56	1278	0	101	2056	478
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	13.1	13.1	13.1	8.1	8.1		3.0	32.8		4.0	33.8	33.8
Effective Green, g (s)	13.1	13.1	13.1	8.1	8.1		3.0	32.8		4.0	33.8	33.8
Actuated g/C Ratio	0.17	0.17	0.17	0.11	0.11		0.04	0.44		0.05	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	285	293	263	175	346		140	2181		183	2269	627
v/s Ratio Prot	c0.14	0.13		0.07	c0.07		0.02	0.26		c0.03	c0.41	
v/s Ratio Perm			0.01									0.34
v/c Ratio	0.78	0.76	0.08	0.62	0.62		0.40	0.59		0.55	0.91	0.76
Uniform Delay, d1	29.6	29.5	25.9	32.0	32.0		35.1	16.0		34.6	19.1	17.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.96	1.08		1.00	1.00	1.00
Incremental Delay, d2	13.1	11.3	0.1	6.3	3.4		1.8	1.1		3.6	6.6	8.5
Delay (s)	42.7	40.7	26.0	38.3	35.4		35.4	18.4		38.2	25.7	25.8
Level of Service	D	D	C	D	D		D	B		D	C	C
Approach Delay (s)		38.3			36.4			19.1			26.2	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	68.9%	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												
Traffic Volume (vph)	63	146	101	106	39	0	0	1101	187	0	1743	355
Future Volume (vph)	63	146	101	106	39	0	0	1101	187	0	1743	355
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			5.0			5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00			0.95			0.95	1.00
Frt	1.00	1.00	0.85		1.00			0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00		0.96			1.00			1.00	1.00
Satd. Flow (prot)	1633	1764	1455		1797			3377			3539	1553
Flt Permitted	0.95	1.00	1.00		0.96			1.00			1.00	1.00
Satd. Flow (perm)	1633	1764	1455		1797			3377			3539	1553
Peak-hour factor, PHF	0.78	0.78	0.78	0.92	0.92	0.92	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	81	187	129	115	42	0	0	1359	231	0	1958	399
RTOR Reduction (vph)	0	0	115	0	0	0	0	11	0	0	0	184
Lane Group Flow (vph)	73	195	14	0	157	0	0	1579	0	0	1958	215
Heavy Vehicles (%)	5%	2%	11%	2%	2%	2%	2%	5%	2%	2%	2%	4%
Turn Type	Perm	NA	Perm	Perm	NA			NA			NA	Perm
Protected Phases		4			Free!			2!			6!	
Permitted Phases	4	4	4	Free!	Free!			2!			6!	6
Actuated Green, G (s)	14.6	14.6	14.6		130.0			70.0			70.0	70.0
Effective Green, g (s)	14.6	14.6	14.6		130.0			70.0			70.0	70.0
Actuated g/C Ratio	0.11	0.11	0.11		1.00			0.54			0.54	0.54
Clearance Time (s)	4.0	4.0	4.0					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)	183	198	163		3594			1818			1905	836
v/s Ratio Prot					0.04			0.47			c0.55	
v/s Ratio Perm	0.04	0.11	0.01		c0.04							0.14
v/c Ratio	0.40	0.98	0.09		0.04			0.87			1.03	0.26
Uniform Delay, d1	53.6	57.6	51.7		0.0			26.0			30.0	16.1
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2	1.4	59.1	0.2		0.0			6.0			28.1	0.7
Delay (s)	55.1	116.7	52.0		0.0			32.0			58.1	16.8
Level of Service	E	F	D		A			C			E	B
Approach Delay (s)		84.3			0.0			32.0			51.1	
Approach LOS		F			A			C			D	

Intersection Summary			
HCM 2000 Control Delay	45.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	327	6	13	124	12	0	97	184	1	3	21
Future Volume (vph)	0	327	6	13	124	12	0	97	184	1	3	21
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		1.00	1.00		1.00	
Frt		1.00			1.00	0.85		1.00	0.85		0.89	
Flt Protected		1.00			1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1858			1749	1615		1881	1599		1680	
Flt Permitted		1.00			1.00	1.00		1.00	1.00		0.99	
Satd. Flow (perm)		1858			1749	1615		1881	1599		1665	
Peak-hour factor, PHF	0.92	0.92	0.92	0.63	0.63	0.63	0.69	0.69	0.69	0.48	0.48	0.48
Adj. Flow (vph)	0	355	7	21	197	19	0	141	267	2	6	44
RTOR Reduction (vph)	0	0	0	0	0	17	0	0	242	0	0	0
Lane Group Flow (vph)	0	362	0	0	218	2	0	141	25	0	52	0
Heavy Vehicles (%)	2%	2%	2%	0%	9%	0%	1%	1%	1%	0%	0%	0%
Turn Type		NA		Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		Free!			10			3!			3!	
Permitted Phases	Free!	Free!		10	10	10		3!	3	3!	3!	
Actuated Green, G (s)		130.0			16.0	16.0		12.4	12.4		12.4	
Effective Green, g (s)		130.0			16.0	16.0		12.4	12.4		12.4	
Actuated g/C Ratio		1.00			0.12	0.12		0.10	0.10		0.10	
Clearance Time (s)					4.0	4.0		4.0	4.0		4.0	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		3716			215	198		179	152		158	
v/s Ratio Prot		0.10						c0.07				
v/s Ratio Perm		c0.10			0.12	0.00			0.02		0.03	
v/c Ratio		0.10			1.01	0.01		0.79	0.17		0.33	
Uniform Delay, d1		0.0			57.0	50.1		57.5	54.1		54.9	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			65.0	0.0		20.1	0.5		1.2	
Delay (s)		0.0			122.0	50.1		77.6	54.6		56.1	
Level of Service		A			F	D		E	D		E	
Approach Delay (s)		0.0			116.3			62.5			56.1	
Approach LOS		A			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	52.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	349	140	1252	320	129	1700
Future Volume (vph)	349	140	1252	320	129	1700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.96		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3162		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3162		3471	1583	1770	3539
Peak-hour factor, PHF	0.89	0.89	0.83	0.83	0.86	0.86
Adj. Flow (vph)	392	157	1508	386	150	1977
RTOR Reduction (vph)	60	0	0	184	0	0
Lane Group Flow (vph)	489	0	1508	202	150	1977
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	13.7		39.3	39.3	9.0	52.3
Effective Green, g (s)	13.7		39.3	39.3	9.0	52.3
Actuated g/C Ratio	0.18		0.52	0.52	0.12	0.70
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	577		1818	829	212	2467
v/s Ratio Prot	c0.15		0.43		0.08	c0.56
v/s Ratio Perm				0.13		
v/c Ratio	0.85		0.83	0.24	0.71	0.80
Uniform Delay, d1	29.6		15.0	9.7	31.7	7.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	11.0		4.5	0.7	9.2	2.5
Delay (s)	40.7		19.6	10.4	40.9	10.3
Level of Service	D		B	B	D	B
Approach Delay (s)	40.7		17.7			12.5
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	18	140	0	1	0
Future Vol, veh/h	0	18	140	0	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	20	152	0	1	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	152	152	0	0	152	152
Stage 1	152	-	-	-	0	0
Stage 2	0	-	-	-	152	152
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	840	894	-	-	840	740
Stage 1	876	-	-	-	-	-
Stage 2	-	-	-	-	876	772
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	840	894	-	-	840	0
Mov Cap-2 Maneuver	840	-	-	-	840	0
Stage 1	876	-	-	-	-	0
Stage 2	-	-	-	-	876	0

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	9.3
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	894	840
HCM Lane V/C Ratio	-	-	0.022	0.001
HCM Control Delay (s)	-	-	9.1	9.3
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection	
Int Delay, s/veh	5.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	25	137	109	0	0	0
Future Vol, veh/h	25	137	109	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	149	118	0	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	118	118	0	0
Stage 1	118	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	858	934	-	-
Stage 1	887	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	858	934	-	-
Mov Cap-2 Maneuver	858	-	-	-
Stage 1	887	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	9.8	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	921
HCM Lane V/C Ratio	-	-	0.191
HCM Control Delay (s)	-	-	9.8
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.7

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	22	259	32	22	0
Future Vol, veh/h	0	22	259	32	22	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	24	282	35	24	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	299	299	0	0	299	316
Stage 1	299	-	-	-	0	0
Stage 2	0	-	-	-	299	316
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	692	741	-	-	692	600
Stage 1	752	-	-	-	-	-
Stage 2	-	-	-	-	752	655
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	692	741	-	-	692	0
Mov Cap-2 Maneuver	692	-	-	-	692	0
Stage 1	752	-	-	-	-	0
Stage 2	-	-	-	-	752	0

Approach	WB	NB	SB
HCM Control Delay, s	10	0	10.4
HCM LOS	B		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	741	692
HCM Lane V/C Ratio	-	-	0.032	0.035
HCM Control Delay (s)	-	-	10	10.4
HCM Lane LOS	-	-	B	B
HCM 95th %tile Q(veh)	-	-	0.1	0.1

Intersection: 1: PR 2 & Marginal Chrurch's

Movement	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	U	UL	T	T	T	T
Maximum Queue (ft)	71	63	125	110	70	98	312	343
Average Queue (ft)	11	23	48	65	16	31	181	185
95th Queue (ft)	40	47	94	108	52	87	321	338
Link Distance (ft)	276	276			667	667	277	277
Upstream Blk Time (%)							1	1
Queuing Penalty (veh)							9	13
Storage Bay Dist (ft)			175	175				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 2: PR 2

Movement	NB	NB	SB	SB
Directions Served	T	T	U	UL
Maximum Queue (ft)	126	140	121	136
Average Queue (ft)	48	59	57	77
95th Queue (ft)	111	128	107	123
Link Distance (ft)	376	376		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			175	175
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	158	197	90	140	142	93	28	226	239	218	49	137
Average Queue (ft)	99	77	47	66	39	33	5	107	120	129	8	55
95th Queue (ft)	145	138	79	118	84	73	23	193	199	200	31	103
Link Distance (ft)	1281	1281	92	92	92			356	356	356		
Upstream Blk Time (%)			0	6	1							
Queuing Penalty (veh)			0	4	1							
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	303	284	245	362
Average Queue (ft)	208	195	146	12
95th Queue (ft)	281	267	244	119
Link Distance (ft)	1508	1508	1508	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				300
Storage Blk Time (%)	0			0
Queuing Penalty (veh)	0			2

Intersection: 12: PR 2 & Western Plaza/Interseccion

Movement	EB	EB	WB	NB	NB	SB	SB	SB
Directions Served	L	LT	LTR	T	TR	T	T	R
Maximum Queue (ft)	134	269	31	444	452	559	578	550
Average Queue (ft)	51	135	8	261	274	383	381	30
95th Queue (ft)	103	226	28	384	404	539	532	220
Link Distance (ft)	933	933	16	642	642	667	667	
Upstream Blk Time (%)			11					
Queuing Penalty (veh)			16					
Storage Bay Dist (ft)								450
Storage Blk Time (%)							3	
Queuing Penalty (veh)							11	

Intersection: 13: Marginal Ford/Marginal Church's & Interseccion/Sector Cuba

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	LT	R	T	R	LTR
Maximum Queue (ft)	92	317	150	138	122	46
Average Queue (ft)	8	139	17	72	59	13
95th Queue (ft)	39	255	77	126	101	38
Link Distance (ft)	16	556		1527		363
Upstream Blk Time (%)	1					
Queuing Penalty (veh)	3					
Storage Bay Dist (ft)			100		175	
Storage Blk Time (%)		24				
Queuing Penalty (veh)		3				

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	205	187	361	345	250	118	192	206
Average Queue (ft)	131	97	173	150	16	76	108	145
95th Queue (ft)	189	176	291	247	118	121	180	215
Link Distance (ft)	1021	1021	1135	1135			394	394
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				2			0	
Queuing Penalty (veh)				6			0	

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	136	112	72
Average Queue (ft)	65	41	17
95th Queue (ft)	108	71	44
Link Distance (ft)	894	553	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement	WB
Directions Served	R
Maximum Queue (ft)	31
Average Queue (ft)	12
95th Queue (ft)	36
Link Distance (ft)	621
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB	SB	B5	B5
Directions Served	T	T	T	T	T
Maximum Queue (ft)	94	132	144	368	370
Average Queue (ft)	8	57	67	14	12
95th Queue (ft)	49	112	122	123	122
Link Distance (ft)	309	309	309	356	356
Upstream Blk Time (%)				0	0
Queuing Penalty (veh)				0	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 18: Marginal Pep Boys & PR 2

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	71
Average Queue (ft)	37
95th Queue (ft)	57
Link Distance (ft)	432
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB
Directions Served	R
Maximum Queue (ft)	157
Average Queue (ft)	38
95th Queue (ft)	88
Link Distance (ft)	270
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: Marginal Ford & Ford

Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	31	51
Average Queue (ft)	15	19
95th Queue (ft)	39	45
Link Distance (ft)	290	1527
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement	NB
Directions Served	T
Maximum Queue (ft)	67
Average Queue (ft)	3
95th Queue (ft)	26
Link Distance (ft)	394
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 70

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	0	0	0	90	0	120	347	0	1723	0	0	1120
Future Volume (vph)	0	0	0	90	0	120	347	0	1723	0	0	1120
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				0.97		1.00	0.91	0.95	0.95			0.95
Frt				1.00		0.85	1.00	1.00	1.00			1.00
Flt Protected				0.95		1.00	0.95	0.95	1.00			1.00
Satd. Flow (prot)				3433		1583	1610	1681	3539			3539
Flt Permitted				0.95		1.00	0.95	0.95	1.00			1.00
Satd. Flow (perm)				3433		1583	1610	1681	3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	98	0	130	377	0	1873	0	0	1217
RTOR Reduction (vph)	0	0	0	0	0	81	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	98	0	49	188	189	1873	0	0	1217
Turn Type				Prot		Perm	Prot	Prot	NA			NA
Protected Phases				8			5	5	2			6
Permitted Phases						8						
Actuated Green, G (s)				6.7		6.7	12.2	12.2	45.3			29.1
Effective Green, g (s)				6.7		6.7	12.2	12.2	45.3			29.1
Actuated g/C Ratio				0.11		0.11	0.20	0.20	0.75			0.49
Clearance Time (s)				4.0		4.0	4.0	4.0	4.0			4.0
Vehicle Extension (s)				3.0		3.0	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)				383		176	327	341	2671			1716
v/s Ratio Prot				0.03			0.12	0.11	c0.53			0.34
v/s Ratio Perm						c0.03						
v/c Ratio				0.26		0.28	0.57	0.55	0.70			0.71
Uniform Delay, d1				24.4		24.4	21.6	21.5	3.8			12.1
Progression Factor				1.00		1.00	1.00	1.00	1.00			1.51
Incremental Delay, d2				0.4		0.9	2.4	2.0	1.6			2.3
Delay (s)				24.7		25.3	24.0	23.4	5.4			20.7
Level of Service				C		C	C	C	A			C
Approach Delay (s)		0.0			25.1				8.5			20.7
Approach LOS		A			C				A			C

Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

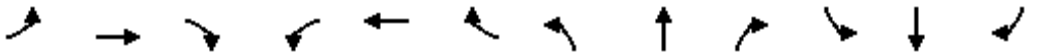
Movement	SBR
Lane Configurations	
Traffic Volume (vph)	0
Future Volume (vph)	0
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	0
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations			↑↑				↑↑
Traffic Volume (vph)	0	0	1685	0	79	0	1237
Future Volume (vph)	0	0	1685	0	79	0	1237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0		4.0	4.0	4.0
Lane Util. Factor			0.95		0.91	0.95	0.95
Frt			1.00		1.00	1.00	1.00
Flt Protected			1.00		0.95	0.95	1.00
Satd. Flow (prot)			3539		1610	1681	3539
Flt Permitted			1.00		0.95	0.95	1.00
Satd. Flow (perm)			3539		1610	1681	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1832	0	86	0	1345
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1832	0	43	43	1345
Turn Type			NA		Prot	Prot	NA
Protected Phases			2		1	1	6
Permitted Phases							
Actuated Green, G (s)			29.6		2.4	2.4	40.0
Effective Green, g (s)			29.6		2.4	2.4	40.0
Actuated g/C Ratio			0.74		0.06	0.06	1.00
Clearance Time (s)			4.0		4.0	4.0	4.0
Vehicle Extension (s)			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)			2618		96	100	3539
v/s Ratio Prot			c0.52		0.03	0.03	c0.38
v/s Ratio Perm							
v/c Ratio			0.70		0.45	0.43	0.38
Uniform Delay, d1			2.8		18.2	18.1	0.0
Progression Factor			1.00		1.00	1.00	1.00
Incremental Delay, d2			1.6		3.3	3.0	0.3
Delay (s)			4.4		21.5	21.1	0.3
Level of Service			A		C	C	A
Approach Delay (s)	0.0		4.4				1.6
Approach LOS	A		A				A

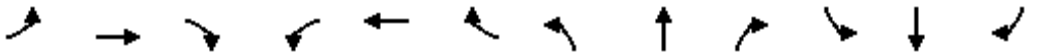
Intersection Summary			
HCM 2000 Control Delay	3.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
Future Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.77	0.77	0.77	0.71	0.71	0.71	0.93	0.93	0.93	0.87	0.87	0.87
Adj. Flow (vph)	392	66	145	83	63	0	73	1703	0	98	1328	303
RTOR Reduction (vph)	0	0	111	0	0	0	0	0	0	0	0	132
Lane Group Flow (vph)	227	231	35	47	99	0	73	1703	0	98	1328	171
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	22.5	22.5	22.5	8.9	8.9		4.0	64.0		7.6	67.6	67.6
Effective Green, g (s)	22.5	22.5	22.5	8.9	8.9		4.0	64.0		7.6	67.6	67.6
Actuated g/C Ratio	0.19	0.19	0.19	0.07	0.07		0.03	0.53		0.06	0.56	0.56
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	306	315	282	120	238		116	2660		217	2836	784
v/s Ratio Prot	c0.14	0.14		0.03	c0.03		0.02	c0.34		0.03	c0.26	
v/s Ratio Perm			0.02									0.12
v/c Ratio	0.74	0.73	0.12	0.39	0.42		0.63	0.64		0.45	0.47	0.22
Uniform Delay, d1	46.0	45.9	40.5	53.0	53.1		57.3	19.8		54.2	15.5	13.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.04	1.03		1.00	1.00	1.00
Incremental Delay, d2	9.3	8.5	0.2	2.1	1.2		7.8	0.9		1.5	0.6	0.6
Delay (s)	55.3	54.5	40.7	55.1	54.2		67.6	21.3		55.7	16.1	13.7
Level of Service	E	D	D	E	D		E	C		E	B	B
Approach Delay (s)		51.5			54.5			23.2			17.9	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	60.2%	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												
Traffic Volume (vph)	385	40	186	79	34	0	0	1685	79	0	1051	506
Future Volume (vph)	385	40	186	79	34	0	0	1685	79	0	1051	506
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			5.0			5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00			0.95			0.95	1.00
Frt	1.00	1.00	0.85		1.00			0.99			1.00	0.85
Flt Protected	0.95	0.96	1.00		0.97			1.00			1.00	1.00
Satd. Flow (prot)	1633	1661	1455		1800			3419			3539	1553
Flt Permitted	0.95	0.96	1.00		0.97			1.00			1.00	1.00
Satd. Flow (perm)	1633	1661	1455		1800			3419			3539	1553
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.91	0.91	0.91	0.89	0.89	0.89
Adj. Flow (vph)	433	45	209	86	37	0	0	1852	87	0	1181	569
RTOR Reduction (vph)	0	0	181	0	0	0	0	2	0	0	0	263
Lane Group Flow (vph)	238	240	28	0	123	0	0	1937	0	0	1181	306
Heavy Vehicles (%)	5%	2%	11%	2%	2%	2%	2%	5%	2%	2%	2%	4%
Turn Type	Perm	NA	Perm	Perm	NA			NA			NA	Perm
Protected Phases		4			Free!			2!			6!	
Permitted Phases	4	4	4	Free!	Free!			2!			6!	6
Actuated Green, G (s)	19.0	19.0	19.0		140.0			75.3			75.3	75.3
Effective Green, g (s)	19.0	19.0	19.0		140.0			75.3			75.3	75.3
Actuated g/C Ratio	0.14	0.14	0.14		1.00			0.54			0.54	0.54
Clearance Time (s)	4.0	4.0	4.0					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)	221	225	197		3600			1838			1903	835
v/s Ratio Prot					0.03			c0.57			0.33	
v/s Ratio Perm	c0.15	0.14	0.02		c0.03							0.20
v/c Ratio	1.08	1.07	0.14		0.03			1.05			0.62	0.37
Uniform Delay, d1	60.5	60.5	53.3		0.0			32.4			22.4	18.6
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2	82.5	78.8	0.3		0.0			36.8			1.5	1.2
Delay (s)	143.0	139.3	53.7		0.0			69.1			24.0	19.9
Level of Service	F	F	D		A			E			C	B
Approach Delay (s)		114.5			0.0			69.1			22.6	
Approach LOS		F			A			E			C	

Intersection Summary			
HCM 2000 Control Delay	56.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	107	12	20	92	36	0	174	80	1	3	21
Future Volume (vph)	0	107	12	20	92	36	0	174	80	1	3	21
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		3.0	3.0		3.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.99			1.00	0.85		1.00	0.85		0.89	
Flt Protected		1.00			0.99	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1837			1809	1615		1881	1599		1681	
Flt Permitted		1.00			0.99	1.00		1.00	1.00		0.69	
Satd. Flow (perm)		1837			1809	1615		1881	1599		1165	
Peak-hour factor, PHF	0.92	0.92	0.92	0.66	0.66	0.66	0.80	0.80	0.80	0.58	0.58	0.58
Adj. Flow (vph)	0	116	13	30	139	55	0	218	100	2	5	36
RTOR Reduction (vph)	0	0	0	0	0	49	0	0	70	0	0	0
Lane Group Flow (vph)	0	129	0	0	169	6	0	218	30	0	43	0
Heavy Vehicles (%)	2%	2%	2%	0%	5%	0%	1%	1%	1%	0%	0%	0%
Turn Type		NA		Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		Free!			10			3!			3!	
Permitted Phases	Free!	Free!		10	10	10		3!	3	3!	3!	
Actuated Green, G (s)		140.0			14.7	14.7		15.0	15.0		15.0	
Effective Green, g (s)		140.0			14.7	14.7		15.0	15.0		15.0	
Actuated g/C Ratio		1.00			0.10	0.10		0.11	0.11		0.11	
Clearance Time (s)					4.0	4.0		3.0	3.0		3.0	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		3674			189	169		201	171		124	
v/s Ratio Prot		0.04						c0.12				
v/s Ratio Perm		c0.04			0.09	0.00			0.02		0.04	
v/c Ratio		0.04			0.89	0.03		1.08	0.18		0.35	
Uniform Delay, d1		0.0			61.9	56.3		62.5	56.9		58.0	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			37.2	0.1		87.8	0.5		1.7	
Delay (s)		0.0			99.1	56.4		150.3	57.4		59.6	
Level of Service		A			F	E		F	E		E	
Approach Delay (s)		0.0			88.6			121.1			59.6	
Approach LOS		A			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	85.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	211	99	1792	175	91	1329
Future Volume (vph)	211	99	1792	175	91	1329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.95		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3159		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3159		3471	1583	1770	3539
Peak-hour factor, PHF	0.74	0.74	0.90	0.90	0.94	0.94
Adj. Flow (vph)	285	134	1991	194	97	1414
RTOR Reduction (vph)	50	0	0	48	0	0
Lane Group Flow (vph)	369	0	1991	146	97	1414
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	17.1		80.3	80.3	9.6	93.9
Effective Green, g (s)	17.1		80.3	80.3	9.6	93.9
Actuated g/C Ratio	0.14		0.67	0.67	0.08	0.78
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	450		2322	1059	141	2769
v/s Ratio Prot	c0.12		c0.57		c0.05	0.40
v/s Ratio Perm				0.09		
v/c Ratio	0.82		0.86	0.14	0.69	0.51
Uniform Delay, d1	50.0		15.4	7.2	53.7	4.7
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	11.4		4.4	0.3	13.1	0.7
Delay (s)	61.4		19.8	7.5	66.8	5.4
Level of Service	E		B	A	E	A
Approach Delay (s)	61.4		18.7			9.3
Approach LOS	E		B			A

Intersection Summary				
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	74.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	0	177	14	0	0
Future Vol, veh/h	0	0	177	14	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	192	15	0	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	200	200	0	0	200	208
Stage 1	200	-	-	-	0	0
Stage 2	0	-	-	-	200	208
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	789	841	-	-	789	689
Stage 1	834	-	-	-	-	-
Stage 2	-	-	-	-	834	730
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	789	841	-	-	789	0
Mov Cap-2 Maneuver	789	-	-	-	789	0
Stage 1	834	-	-	-	-	0
Stage 2	-	-	-	-	834	0

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	25	25	185	25	0	0
Future Vol, veh/h	25	25	185	25	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	27	201	27	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	215	215	0	0
Stage 1	215	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	742	825	-	-
Stage 1	787	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	742	825	-	-
Mov Cap-2 Maneuver	742	-	-	-
Stage 1	787	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	10	0
HCM LOS	B	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	781
HCM Lane V/C Ratio	-	-	0.07
HCM Control Delay (s)	-	-	10
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.2

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	48	206	0	35	0
Future Vol, veh/h	0	48	206	0	35	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	52	224	0	38	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	224	224	0	0	224	224
Stage 1	224	-	-	-	0	0
Stage 2	0	-	-	-	224	224
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	764	815	-	-	764	675
Stage 1	813	-	-	-	-	-
Stage 2	-	-	-	-	813	718
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	764	815	-	-	764	0
Mov Cap-2 Maneuver	764	-	-	-	764	0
Stage 1	813	-	-	-	-	0
Stage 2	-	-	-	-	813	0

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	10
HCM LOS	A		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	815	764
HCM Lane V/C Ratio	-	-	0.064	0.05
HCM Control Delay (s)	-	-	9.7	10
HCM Lane LOS	-	-	A	B
HCM 95th %tile Q(veh)	-	-	0.2	0.2

Intersection: 1: PR 2 & Marginal Chrurch's

Movement	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	U	UL	T	T	T	T
Maximum Queue (ft)	94	81	129	174	154	160	314	335
Average Queue (ft)	36	45	56	84	46	62	167	183
95th Queue (ft)	66	87	105	144	117	141	297	299
Link Distance (ft)	287	287			672	672	272	272
Upstream Blk Time (%)							1	1
Queuing Penalty (veh)							3	6
Storage Bay Dist (ft)			175	175				
Storage Blk Time (%)				0				
Queuing Penalty (veh)				2				

Intersection: 2: PR 2

Movement	NB	NB	SB	SB
Directions Served	T	T	U	UL
Maximum Queue (ft)	123	141	72	74
Average Queue (ft)	64	60	27	34
95th Queue (ft)	122	121	59	64
Link Distance (ft)	370	370		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			175	175
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	275	294	89	92	54	94	71	274	295	305	50	155
Average Queue (ft)	155	144	32	46	32	32	30	181	190	195	13	73
95th Queue (ft)	230	216	65	72	57	69	67	281	286	305	40	132
Link Distance (ft)	1281	1281	91	91	91			356	356	356		
Upstream Blk Time (%)			0	0								
Queuing Penalty (veh)			0	0								
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)		0										
Queuing Penalty (veh)		0										

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB
Directions Served	T	T	T
Maximum Queue (ft)	222	221	200
Average Queue (ft)	134	142	102
95th Queue (ft)	206	218	200
Link Distance (ft)	1508	1508	1508
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 12: PR 2 & Western Plaza/Interseccion

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	LT	T	TR	T	T
Maximum Queue (ft)	468	456	662	669	291	291
Average Queue (ft)	338	307	462	466	197	186
95th Queue (ft)	471	455	648	656	279	283
Link Distance (ft)	933	933	642	642	672	672
Upstream Blk Time (%)			0	1		
Queuing Penalty (veh)			4	6		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 13: Marginal Ford/Marginal Church's & Interseccion/Sector Cuba

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	LT	R	T	R	LTR
Maximum Queue (ft)	30	172	150	986	75	47
Average Queue (ft)	2	93	26	603	43	15
95th Queue (ft)	14	144	83	954	96	41
Link Distance (ft)	15	556		1527		362
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	1					
Storage Bay Dist (ft)			100		25	
Storage Blk Time (%)		10		87	4	
Queuing Penalty (veh)		4		70	7	

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	245	192	376	356	250	155	230	224
Average Queue (ft)	136	83	240	217	25	75	60	82
95th Queue (ft)	198	167	335	321	148	126	158	168
Link Distance (ft)	1021	1021	1135	1135			394	394
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				6			0	
Queuing Penalty (veh)				10			0	

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	116	74	44
Average Queue (ft)	51	42	14
95th Queue (ft)	82	67	34
Link Distance (ft)	894	549	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB	B5
Directions Served	T	T	T
Maximum Queue (ft)	89	108	120
Average Queue (ft)	28	29	4
95th Queue (ft)	77	90	40
Link Distance (ft)	271	271	356
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: Marginal Pep Boys & PR 2

Movement	SB
Directions Served	TR
Maximum Queue (ft)	446
Average Queue (ft)	17
95th Queue (ft)	149
Link Distance (ft)	284
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	50
Average Queue (ft)	25
95th Queue (ft)	46
Link Distance (ft)	433
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB
Directions Served	R
Maximum Queue (ft)	195
Average Queue (ft)	57
95th Queue (ft)	114
Link Distance (ft)	292
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: Marginal Ford & Ford

Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	48	53
Average Queue (ft)	27	23
95th Queue (ft)	44	51
Link Distance (ft)	290	1527
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement	NB
Directions Served	TR
Maximum Queue (ft)	66
Average Queue (ft)	2
95th Queue (ft)	22
Link Distance (ft)	394
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 113

Appendix D.4 SCENARIO 3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	161	0	191	0	1016	0	0	1895	0
Future Volume (vph)	0	0	0	161	0	191	0	1016	0	0	1895	0
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	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3433		1583		3539			3539	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3433		1583		3539			3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	175	0	208	0	1104	0	0	2060	0
RTOR Reduction (vph)	0	0	0	0	0	79	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	175	0	129	0	1104	0	0	2060	0
Turn Type				Prot		Perm		NA			NA	
Protected Phases				8				2			6	
Permitted Phases						8						
Actuated Green, G (s)				10.2		10.2		41.8			41.8	
Effective Green, g (s)				10.2		10.2		41.8			41.8	
Actuated g/C Ratio				0.17		0.17		0.70			0.70	
Clearance Time (s)				4.0		4.0		4.0			4.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				583		269		2465			2465	
v/s Ratio Prot				0.05				0.31			c0.58	
v/s Ratio Perm						c0.08						
v/c Ratio				0.30		0.48		0.45			0.84	
Uniform Delay, d1				21.8		22.5		4.0			6.6	
Progression Factor				1.00		1.00		1.00			1.00	
Incremental Delay, d2				0.3		1.4		0.6			3.5	
Delay (s)				22.1		23.9		4.6			10.2	
Level of Service				C		C		A			B	
Approach Delay (s)		0.0			23.0			4.6			10.2	
Approach LOS		A			C			A			B	

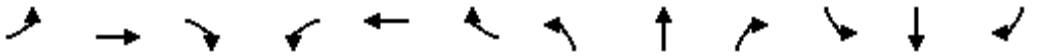
Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	0	0	1101	0	63	0	1763
Future Volume (vph)	0	0	1101	0	63	0	1763
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0		4.0	4.0	4.0
Lane Util. Factor			0.95		0.91	0.95	0.95
Frt			1.00		1.00	1.00	1.00
Flt Protected			1.00		0.95	0.95	1.00
Satd. Flow (prot)			3539		1610	1681	3539
Flt Permitted			1.00		0.24	0.24	1.00
Satd. Flow (perm)			3539		399	417	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1197	0	68	0	1916
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1197	0	34	34	1916
Turn Type			NA		Perm	Perm	NA
Protected Phases			2				6
Permitted Phases					6	6	
Actuated Green, G (s)			40.0		40.0	40.0	40.0
Effective Green, g (s)			40.0		40.0	40.0	40.0
Actuated g/C Ratio			1.00		1.00	1.00	1.00
Clearance Time (s)			4.0		4.0	4.0	4.0
Vehicle Extension (s)			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)			3539		399	417	3539
v/s Ratio Prot			0.34				c0.54
v/s Ratio Perm					0.09	0.08	
v/c Ratio			0.34		0.09	0.08	0.54
Uniform Delay, d1			0.0		0.0	0.0	0.0
Progression Factor			1.00		1.00	1.00	1.00
Incremental Delay, d2			0.3		0.4	0.4	0.6
Delay (s)			0.3		0.4	0.4	0.6
Level of Service			A		A	A	A
Approach Delay (s)	0.0		0.3				0.6
Approach LOS	A		A				A

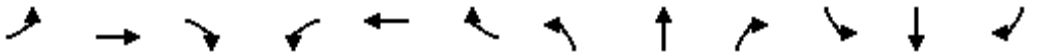
Intersection Summary			
HCM 2000 Control Delay	0.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
Future Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.73	0.73	0.73	0.69	0.69	0.69	0.80	0.80	0.80	0.89	0.89	0.89
Adj. Flow (vph)	385	62	123	174	142	12	56	1278	0	101	2056	857
RTOR Reduction (vph)	0	0	76	0	4	0	0	0	0	0	0	304
Lane Group Flow (vph)	223	224	47	108	216	0	56	1278	0	101	2056	553
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	19.5	19.5	19.5	11.3	11.3		3.9	62.9		6.9	65.9	65.9
Effective Green, g (s)	19.5	19.5	19.5	11.3	11.3		3.9	62.9		6.9	65.9	65.9
Actuated g/C Ratio	0.17	0.17	0.17	0.10	0.10		0.03	0.53		0.06	0.56	0.56
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	270	278	250	156	307		116	2667		201	2822	780
v/s Ratio Prot	c0.14	0.13		0.07	c0.07		0.02	0.26		c0.03	c0.41	
v/s Ratio Perm			0.03									0.40
v/c Ratio	0.83	0.81	0.19	0.69	0.70		0.48	0.48		0.50	0.73	0.71
Uniform Delay, d1	47.4	47.2	42.2	51.5	51.5		55.9	17.1		53.7	19.2	18.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	18.3	15.5	0.4	12.5	7.2		3.1	0.6		2.0	1.7	5.4
Delay (s)	65.7	62.7	42.6	63.9	58.7		59.0	17.7		55.7	20.9	24.3
Level of Service	E	E	D	E	E		E	B		E	C	C
Approach Delay (s)		59.5			60.4			19.5			23.0	
Approach LOS		E			E			B			C	

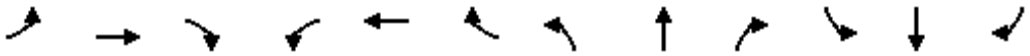
Intersection Summary			
HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	117.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	146	164	0	39	0	148	1016	0	187	1662	207
Future Volume (vph)	0	146	164	0	39	0	148	1016	0	187	1662	207
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		5.0	5.0		5.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00		0.97	0.95		1.00	0.95	1.00
Frt		1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1863	1455		1863		3433	3438		1770	3539	1553
Flt Permitted		1.00	1.00		1.00		0.07	1.00		0.16	1.00	1.00
Satd. Flow (perm)		1863	1455		1863		241	3438		289	3539	1553
Peak-hour factor, PHF	0.78	0.78	0.78	0.92	0.92	0.92	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	0	187	210	0	42	0	183	1254	0	210	1867	233
RTOR Reduction (vph)	0	0	193	0	0	0	0	0	0	0	0	93
Lane Group Flow (vph)	0	187	17	0	42	0	183	1254	0	210	1867	140
Heavy Vehicles (%)	5%	2%	11%	2%	2%	2%	2%	5%	2%	2%	2%	4%
Turn Type		NA	Perm		NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			Free!			2!			6!	
Permitted Phases		4	4		Free!		2!	2!		6!	6!	6
Actuated Green, G (s)		8.0	8.0		100.0		60.0	60.0		60.0	60.0	60.0
Effective Green, g (s)		8.0	8.0		100.0		60.0	60.0		60.0	60.0	60.0
Actuated g/C Ratio		0.08	0.08		1.00		0.60	0.60		0.60	0.60	0.60
Clearance Time (s)		4.0	4.0				5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0				3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		149	116		3726		144	2062		173	2123	931
v/s Ratio Prot		c0.10			0.01			0.36			0.53	
v/s Ratio Perm			0.01		c0.01		c0.76			0.73		0.09
v/c Ratio		1.26	0.14		0.01		1.27	0.61		1.21	0.88	0.15
Uniform Delay, d1		46.0	42.8		0.0		20.0	12.6		20.0	16.9	8.8
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		158.0	0.6		0.0		165.2	1.3		137.6	5.6	0.3
Delay (s)		204.0	43.4		0.0		185.2	13.9		157.6	22.5	9.1
Level of Service		F	D		A		F	B		F	C	A
Approach Delay (s)		119.0			0.0			35.7			33.5	
Approach LOS		F			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	327	6	0	39	115	0	97	185	0	17	5
Future Volume (vph)	0	327	6	0	39	115	0	97	185	0	17	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		3.0	3.0		3.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		1.00			1.00	0.85		1.00	0.85		0.97	
Flt Protected		1.00			1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1858			1743	1615		1881	1599		1843	
Flt Permitted		1.00			1.00	1.00		1.00	1.00		1.00	
Satd. Flow (perm)		1858			1743	1615		1881	1599		1843	
Peak-hour factor, PHF	0.92	0.92	0.92	0.63	0.63	0.63	0.69	0.69	0.69	0.48	0.48	0.48
Adj. Flow (vph)	0	355	7	0	62	183	0	141	268	0	35	10
RTOR Reduction (vph)	0	0	0	0	0	172	0	0	137	0	0	0
Lane Group Flow (vph)	0	362	0	0	62	11	0	141	131	0	45	0
Heavy Vehicles (%)	2%	2%	2%	0%	9%	0%	1%	1%	1%	0%	0%	0%
Turn Type		NA			NA	Perm		NA	Perm		NA	
Protected Phases		Free!			10			3!			3!	
Permitted Phases		Free!		10	10	10		3!	3		3!	
Actuated Green, G (s)		100.0			6.0	6.0		10.0	10.0		10.0	
Effective Green, g (s)		100.0			6.0	6.0		10.0	10.0		10.0	
Actuated g/C Ratio		1.00			0.06	0.06		0.10	0.10		0.10	
Clearance Time (s)					4.0	4.0		3.0	3.0		3.0	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		3716			104	96		188	159		184	
v/s Ratio Prot		0.10			c0.04			0.07			0.02	
v/s Ratio Perm		c0.10				0.01			c0.08			
v/c Ratio		0.10			0.60	0.11		0.75	0.83		0.24	
Uniform Delay, d1		0.0			45.8	44.5		43.8	44.1		41.5	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			8.9	0.5		15.4	28.0		0.7	
Delay (s)		0.0			54.7	45.0		59.2	72.2		42.2	
Level of Service		A			D	D		E	E		D	
Approach Delay (s)		0.0			47.5			67.7			42.2	
Approach LOS		A			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	38.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	349	140	1252	320	129	1700
Future Volume (vph)	349	140	1252	320	129	1700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.96		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3162		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3162		3471	1583	1770	3539
Peak-hour factor, PHF	0.89	0.89	0.83	0.83	0.86	0.86
Adj. Flow (vph)	392	157	1508	386	150	1977
RTOR Reduction (vph)	38	0	0	123	0	0
Lane Group Flow (vph)	511	0	1508	263	150	1977
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	22.6		68.3	68.3	13.8	86.1
Effective Green, g (s)	22.6		68.3	68.3	13.8	86.1
Actuated g/C Ratio	0.19		0.58	0.58	0.12	0.73
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	607		2014	918	207	2588
v/s Ratio Prot	c0.16		0.43		0.08	c0.56
v/s Ratio Perm				0.17		
v/c Ratio	0.84		0.75	0.29	0.72	0.76
Uniform Delay, d1	45.8		18.3	12.4	50.1	9.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	10.3		2.6	0.8	11.9	2.2
Delay (s)	56.1		20.9	13.2	62.0	11.8
Level of Service	E		C	B	E	B
Approach Delay (s)	56.1		19.4			15.4
Approach LOS	E		B			B

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	117.7	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	18	140	0	1	0
Future Vol, veh/h	0	18	140	0	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	20	152	0	1	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	152	152	0	0	152	152
Stage 1	152	-	-	-	0	0
Stage 2	0	-	-	-	152	152
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	840	894	-	-	840	740
Stage 1	876	-	-	-	-	-
Stage 2	-	-	-	-	876	772
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	840	894	-	-	840	0
Mov Cap-2 Maneuver	840	-	-	-	840	0
Stage 1	876	-	-	-	-	0
Stage 2	-	-	-	-	876	0

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	9.3
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	894	840
HCM Lane V/C Ratio	-	-	0.022	0.001
HCM Control Delay (s)	-	-	9.1	9.3
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	22	153	199	13	0	0
Future Vol, veh/h	22	153	199	13	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	166	216	14	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	223	223	0	0
Stage 1	223	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	733	817	-	-
Stage 1	780	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	733	817	-	-
Mov Cap-2 Maneuver	733	-	-	-
Stage 1	780	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	10.9	0
HCM LOS	B	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	805
HCM Lane V/C Ratio	-	-	0.236
HCM Control Delay (s)	-	-	10.9
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.9

Intersection	
Int Delay, s/veh	1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	23	259	32	23	0
Future Vol, veh/h	0	23	259	32	23	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	25	282	35	25	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	299	299	0	0	299	316
Stage 1	299	-	-	-	0	0
Stage 2	0	-	-	-	299	316
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	692	741	-	-	692	600
Stage 1	752	-	-	-	-	-
Stage 2	-	-	-	-	752	655
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	692	741	-	-	692	0
Mov Cap-2 Maneuver	692	-	-	-	692	0
Stage 1	752	-	-	-	-	0
Stage 2	-	-	-	-	752	0

Approach	WB	NB	SB
HCM Control Delay, s	10	0	10.4
HCM LOS	B		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	741	692
HCM Lane V/C Ratio	-	-	0.034	0.036
HCM Control Delay (s)	-	-	10	10.4
HCM Lane LOS	-	-	B	B
HCM 95th %tile Q(veh)	-	-	0.1	0.1

Intersection: 1: PR 2 & Marginal Chrurch's

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	71	93	169	210	270	232
Average Queue (ft)	36	43	43	55	135	133
95th Queue (ft)	65	78	112	146	238	218
Link Distance (ft)	283	283	661	661	290	290
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: PR 2

Movement	SB	SB
Directions Served	U	UL
Maximum Queue (ft)	31	53
Average Queue (ft)	8	27
95th Queue (ft)	29	53
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	175	175
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	226	250	110	136	112	111	68	241	221	194	52	111
Average Queue (ft)	128	103	64	78	54	44	19	91	100	103	13	50
95th Queue (ft)	202	193	104	120	95	87	50	179	187	184	41	93
Link Distance (ft)	1281	1281	92	92	92			356	356	356		
Upstream Blk Time (%)			4	7	3							
Queuing Penalty (veh)			3	5	2							
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	350	285	500	400
Average Queue (ft)	216	199	174	59
95th Queue (ft)	314	276	304	278
Link Distance (ft)	1508	1508	1508	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				300
Storage Blk Time (%)	1			2
Queuing Penalty (veh)	1			12

Intersection: 12: PR 2 & Western Plaza/Interseccion

Movement	EB	EB	NB	NB	NB	NB	SB	SB	SB
Directions Served	T	R	L	L	T	T	L	T	T
Maximum Queue (ft)	356	190	264	240	233	230	298	353	394
Average Queue (ft)	190	11	97	116	123	146	116	213	221
95th Queue (ft)	307	81	181	193	223	232	213	349	355
Link Distance (ft)	932	932			647	647		661	661
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			350	350			200		
Storage Blk Time (%)							2	9	
Queuing Penalty (veh)							16	16	

Intersection: 13: Marginal Ford/Marginal Church's & Interseccion/Sector Cuba

Movement	EB	WB	WB	NB	NB	SB
Directions Served	TR	LT	R	T	R	TR
Maximum Queue (ft)	68	109	63	264	75	66
Average Queue (ft)	2	42	28	121	69	16
95th Queue (ft)	22	93	51	252	88	45
Link Distance (ft)	17	556		1527		362
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)			100		25	
Storage Blk Time (%)		1		66	26	
Queuing Penalty (veh)		1		122	25	

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	242	243	329	357	250	222	292	285
Average Queue (ft)	167	135	199	195	33	108	135	149
95th Queue (ft)	245	246	307	321	173	187	276	290
Link Distance (ft)	1021	1021	1135	1135			394	394
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				4		1	2	
Queuing Penalty (veh)				14		5	3	

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	81	72	60
Average Queue (ft)	56	42	19
95th Queue (ft)	78	63	41
Link Distance (ft)	894	553	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	31	31
Average Queue (ft)	14	1
95th Queue (ft)	38	10
Link Distance (ft)	621	553
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB	SB
Directions Served	T	T	T
Maximum Queue (ft)	129	149	183
Average Queue (ft)	24	69	75
95th Queue (ft)	93	130	150
Link Distance (ft)	309	309	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: Marginal Pep Boys & PR 2

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	114
Average Queue (ft)	42
95th Queue (ft)	80
Link Distance (ft)	432
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB
Directions Served	R
Maximum Queue (ft)	73
Average Queue (ft)	31
95th Queue (ft)	61
Link Distance (ft)	270
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: Marginal Ford & Ford

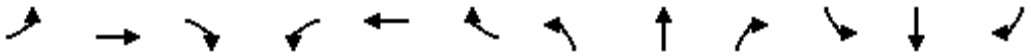
Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	31	32
Average Queue (ft)	17	16
95th Queue (ft)	41	42
Link Distance (ft)	290	1527
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 227



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	0	120	0	1723	0	0	1120	0
Future Volume (vph)	0	0	0	169	0	120	0	1723	0	0	1120	0
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	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3433		1583		3539			3539	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3433		1583		3539			3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	184	0	130	0	1873	0	0	1217	0
RTOR Reduction (vph)	0	0	0	0	0	15	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	184	0	115	0	1873	0	0	1217	0
Turn Type				Prot		Perm		NA			NA	
Protected Phases				8				2			6	
Permitted Phases						8						
Actuated Green, G (s)				9.8		9.8		42.2			42.2	
Effective Green, g (s)				9.8		9.8		42.2			42.2	
Actuated g/C Ratio				0.16		0.16		0.70			0.70	
Clearance Time (s)				4.0		4.0		4.0			4.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				560		258		2489			2489	
v/s Ratio Prot				0.05				c0.53			0.34	
v/s Ratio Perm						c0.07						
v/c Ratio				0.33		0.45		0.75			0.49	
Uniform Delay, d1				22.2		22.6		5.6			4.0	
Progression Factor				1.00		1.00		1.00			1.00	
Incremental Delay, d2				0.3		1.2		2.2			0.7	
Delay (s)				22.5		23.9		7.8			4.7	
Level of Service				C		C		A			A	
Approach Delay (s)		0.0			23.1			7.8			4.7	
Approach LOS		A			C			A			A	

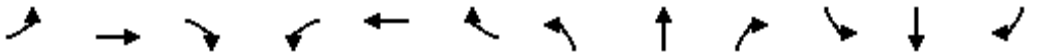
Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	0	0	1685	0	385	0	1237
Future Volume (vph)	0	0	1685	0	385	0	1237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0		4.0	4.0	4.0
Lane Util. Factor			0.95		0.91	0.95	0.95
Frt			1.00		1.00	1.00	1.00
Flt Protected			1.00		0.95	0.95	1.00
Satd. Flow (prot)			3539		1610	1681	3539
Flt Permitted			1.00		0.12	0.12	1.00
Satd. Flow (perm)			3539		209	218	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1832	0	418	0	1345
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1832	0	209	209	1345
Turn Type			NA		Perm	Perm	NA
Protected Phases			2				6
Permitted Phases					6	6	
Actuated Green, G (s)			40.0		40.0	40.0	40.0
Effective Green, g (s)			40.0		40.0	40.0	40.0
Actuated g/C Ratio			1.00		1.00	1.00	1.00
Clearance Time (s)			4.0		4.0	4.0	4.0
Vehicle Extension (s)			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)			3539		209	218	3539
v/s Ratio Prot			0.52				0.38
v/s Ratio Perm					c1.00	0.96	
v/c Ratio			0.52		1.00	0.96	0.38
Uniform Delay, d1			0.0		20.0	0.0	0.0
Progression Factor			1.00		1.00	1.00	1.00
Incremental Delay, d2			0.5		62.3	51.1	0.3
Delay (s)			0.5		82.3	51.1	0.3
Level of Service			A		F	D	A
Approach Delay (s)	0.0		0.5				16.0
Approach LOS	A		A				B

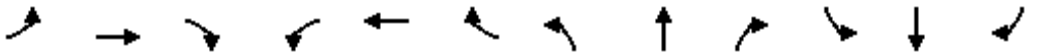
Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
Future Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.77	0.77	0.77	0.71	0.71	0.71	0.93	0.93	0.93	0.87	0.87	0.87
Adj. Flow (vph)	392	66	145	83	63	0	73	1703	0	98	1328	303
RTOR Reduction (vph)	0	0	107	0	0	0	0	0	0	0	0	136
Lane Group Flow (vph)	227	231	38	47	99	0	73	1703	0	98	1328	167
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	21.2	21.2	21.2	8.6	8.6		3.9	59.0		6.9	62.0	62.0
Effective Green, g (s)	21.2	21.2	21.2	8.6	8.6		3.9	59.0		6.9	62.0	62.0
Actuated g/C Ratio	0.19	0.19	0.19	0.08	0.08		0.03	0.52		0.06	0.55	0.55
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	307	316	283	124	245		121	2611		210	2770	765
v/s Ratio Prot	c0.14	0.14		0.03	c0.03		0.02	c0.34		c0.03	c0.26	
v/s Ratio Perm			0.03									0.12
v/c Ratio	0.74	0.73	0.13	0.38	0.40		0.60	0.65		0.47	0.48	0.22
Uniform Delay, d1	43.1	43.1	38.1	49.5	49.6		53.6	19.4		51.1	15.5	13.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.0	8.4	0.2	1.9	1.1		8.2	1.3		1.6	0.6	0.7
Delay (s)	52.1	51.5	38.3	51.4	50.7		61.9	20.7		52.8	16.1	13.6
Level of Service	D	D	D	D	D		E	C		D	B	B
Approach Delay (s)		48.6			50.9			22.4			17.7	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	112.7	Sum of lost time (s)	17.0
Intersection Capacity Utilization	60.2%	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												
Traffic Volume (vph)	0	40	571	0	34	0	347	1723	0	79	1051	159
Future Volume (vph)	0	40	571	0	34	0	347	1723	0	79	1051	159
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		5.0	5.0		5.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00		0.97	0.95		1.00	0.95	1.00
Frt		1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1863	1455		1863		3433	3438		1770	3539	1553
Flt Permitted		1.00	1.00		1.00		0.17	1.00		0.05	1.00	1.00
Satd. Flow (perm)		1863	1455		1863		625	3438		94	3539	1553
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.91	0.91	0.91	0.89	0.89	0.89
Adj. Flow (vph)	0	45	642	0	37	0	381	1893	0	89	1181	179
RTOR Reduction (vph)	0	0	234	0	0	0	0	0	0	0	0	70
Lane Group Flow (vph)	0	45	408	0	37	0	381	1893	0	89	1181	109
Heavy Vehicles (%)	5%	2%	11%	2%	2%	2%	2%	5%	2%	2%	2%	4%
Turn Type		NA	Perm		NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			Free!			2!			6!	
Permitted Phases		4	4		Free!		2!	2!		6!	6!	6
Actuated Green, G (s)		17.0	17.0		130.0		79.0	79.0		79.0	79.0	79.0
Effective Green, g (s)		17.0	17.0		130.0		79.0	79.0		79.0	79.0	79.0
Actuated g/C Ratio		0.13	0.13		1.00		0.61	0.61		0.61	0.61	0.61
Clearance Time (s)		4.0	4.0				5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0				3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		243	190		3726		379	2089		57	2150	943
v/s Ratio Prot		0.02			0.01			0.55			0.33	
v/s Ratio Perm			c0.28		c0.01		0.61			c0.94		0.07
v/c Ratio		0.19	2.15		0.01		1.01	0.91		1.56	0.55	0.12
Uniform Delay, d1		50.3	56.5		0.0		25.5	22.3		25.5	15.0	10.8
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.4	533.9		0.0		47.6	7.1		321.6	1.0	0.2
Delay (s)		50.7	590.4		0.0		73.1	29.4		347.1	16.0	11.0
Level of Service		D	F		A		E	C		F	B	B
Approach Delay (s)		555.0			0.0			36.7			35.7	
Approach LOS		F			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	116.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.40		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	107	12	0	29	119	0	174	81	0	24	5
Future Volume (vph)	0	107	12	0	29	119	0	174	81	0	24	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		3.0	3.0		3.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.99			1.00	0.85		1.00	0.85		0.98	
Flt Protected		1.00			1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1837			1810	1615		1881	1599		1854	
Flt Permitted		1.00			1.00	1.00		1.00	1.00		1.00	
Satd. Flow (perm)		1837			1810	1615		1881	1599		1854	
Peak-hour factor, PHF	0.92	0.92	0.92	0.66	0.66	0.66	0.80	0.80	0.80	0.58	0.58	0.58
Adj. Flow (vph)	0	116	13	0	44	180	0	218	101	0	41	9
RTOR Reduction (vph)	0	0	0	0	0	172	0	0	76	0	0	0
Lane Group Flow (vph)	0	129	0	0	44	8	0	218	25	0	50	0
Heavy Vehicles (%)	2%	2%	2%	0%	5%	0%	1%	1%	1%	0%	0%	0%
Turn Type		NA			NA	Perm		NA	Perm		NA	
Protected Phases		Free!			10			3!			3!	
Permitted Phases		Free!		10	10	10		3!	3		3!	
Actuated Green, G (s)		130.0			6.0	6.0		12.0	12.0		12.0	
Effective Green, g (s)		130.0			6.0	6.0		12.0	12.0		12.0	
Actuated g/C Ratio		1.00			0.05	0.05		0.09	0.09		0.09	
Clearance Time (s)					4.0	4.0		3.0	3.0		3.0	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		3674			83	74		173	147		171	
v/s Ratio Prot		0.04			c0.02			c0.12			0.03	
v/s Ratio Perm		c0.04				0.01			0.02			
v/c Ratio		0.04			0.53	0.11		1.26	0.17		0.29	
Uniform Delay, d1		0.0			60.6	59.4		59.0	54.4		55.0	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			6.4	0.7		155.1	0.5		1.0	
Delay (s)		0.0			67.0	60.1		214.1	54.9		56.0	
Level of Service		A			E	E		F	D		E	
Approach Delay (s)		0.0			61.5			163.7			56.0	
Approach LOS		A			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	95.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	211	99	1792	175	91	1329
Future Volume (vph)	211	99	1792	175	91	1329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.95		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3159		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3159		3471	1583	1770	3539
Peak-hour factor, PHF	0.74	0.74	0.90	0.90	0.94	0.94
Adj. Flow (vph)	285	134	1991	194	97	1414
RTOR Reduction (vph)	50	0	0	48	0	0
Lane Group Flow (vph)	369	0	1991	146	97	1414
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	17.0		79.5	79.5	9.5	93.0
Effective Green, g (s)	17.0		79.5	79.5	9.5	93.0
Actuated g/C Ratio	0.14		0.67	0.67	0.08	0.78
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	451		2318	1057	141	2765
v/s Ratio Prot	c0.12		c0.57		c0.05	0.40
v/s Ratio Perm				0.09		
v/c Ratio	0.82		0.86	0.14	0.69	0.51
Uniform Delay, d1	49.5		15.4	7.2	53.3	4.7
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	11.1		4.4	0.3	13.1	0.7
Delay (s)	60.6		19.8	7.5	66.4	5.4
Level of Service	E		B	A	E	A
Approach Delay (s)	60.6		18.7			9.3
Approach LOS	E		B			A

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	119.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	0	177	14	0	0
Future Vol, veh/h	0	0	177	14	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	192	15	0	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	200	200	0	0	200	208
Stage 1	200	-	-	-	0	0
Stage 2	0	-	-	-	200	208
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	789	841	-	-	789	689
Stage 1	834	-	-	-	-	-
Stage 2	-	-	-	-	834	730
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	789	841	-	-	789	0
Mov Cap-2 Maneuver	789	-	-	-	789	0
Stage 1	834	-	-	-	-	0
Stage 2	-	-	-	-	834	0

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	29	6	283	10	0	0
Future Vol, veh/h	29	6	283	10	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	7	308	11	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	313	313	0	0
Stage 1	313	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	640	727	-	-
Stage 1	698	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	640	727	-	-
Mov Cap-2 Maneuver	640	-	-	-
Stage 1	698	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	10.9	0
HCM LOS	B	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	653
HCM Lane V/C Ratio	-	-	0.058
HCM Control Delay (s)	-	-	10.9
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.2

Intersection	
Int Delay, s/veh	2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	49	206	0	36	0
Future Vol, veh/h	0	49	206	0	36	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	53	224	0	39	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	224	224	0	0	224	224
Stage 1	224	-	-	-	0	0
Stage 2	0	-	-	-	224	224
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	764	815	-	-	764	675
Stage 1	813	-	-	-	-	-
Stage 2	-	-	-	-	813	718
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	764	815	-	-	764	0
Mov Cap-2 Maneuver	764	-	-	-	764	0
Stage 1	813	-	-	-	-	0
Stage 2	-	-	-	-	813	0

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	10
HCM LOS	A		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	815	764
HCM Lane V/C Ratio	-	-	0.065	0.051
HCM Control Delay (s)	-	-	9.7	10
HCM Lane LOS	-	-	A	B
HCM 95th %tile Q(veh)	-	-	0.2	0.2

Intersection: 1: PR 2 & Marginal Chrurch's

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	96	97	242	232	146	136
Average Queue (ft)	62	52	87	116	53	47
95th Queue (ft)	96	98	193	227	123	113
Link Distance (ft)	292	292	665	665	288	288
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: PR 2

Movement	SB	SB	SB	SB
Directions Served	U	UL	T	T
Maximum Queue (ft)	225	274	434	416
Average Queue (ft)	120	124	37	24
95th Queue (ft)	200	223	227	176
Link Distance (ft)			648	648
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	175	175		
Storage Blk Time (%)	5	7		
Queuing Penalty (veh)	34	42		

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	182	160	53	94	115	51	50	265	267	258	94	115
Average Queue (ft)	121	104	35	40	25	27	25	151	154	158	22	53
95th Queue (ft)	169	163	56	75	70	53	49	229	235	246	65	93
Link Distance (ft)	1281	1281	91	91	91			356	356	356		
Upstream Blk Time (%)				0	1							
Queuing Penalty (veh)				0	0							
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB
Directions Served	T	T	T
Maximum Queue (ft)	226	238	205
Average Queue (ft)	154	133	83
95th Queue (ft)	223	214	174
Link Distance (ft)	1508	1508	1508
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 12: PR 2 & Western Plaza/Interseccion

Movement	EB	EB	NB	NB	NB	NB	SB	SB	SB
Directions Served	T	R	L	L	T	T	L	T	T
Maximum Queue (ft)	74	570	224	241	385	379	240	248	183
Average Queue (ft)	36	191	106	125	206	216	98	122	95
95th Queue (ft)	76	480	194	205	353	359	200	223	184
Link Distance (ft)	932	932			648	648		665	665
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			350	350			200		
Storage Blk Time (%)					0		5	1	
Queuing Penalty (veh)					1		27	1	

Intersection: 13: Marginal Ford/Marginal Church's & Interseccion/Sector Cuba

Movement	WB	WB	NB	NB	SB
Directions Served	LT	R	T	R	TR
Maximum Queue (ft)	67	62	1363	75	87
Average Queue (ft)	22	27	700	58	30
95th Queue (ft)	57	50	1282	104	63
Link Distance (ft)	556		1527		362
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100		25	
Storage Blk Time (%)			90	7	
Queuing Penalty (veh)			73	12	

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	231	211	334	309	250	140	154	168
Average Queue (ft)	116	73	223	198	58	68	58	94
95th Queue (ft)	179	175	322	292	230	121	119	148
Link Distance (ft)	1021	1021	1135	1135			394	394
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				4				
Queuing Penalty (veh)				7				

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	75	64	45
Average Queue (ft)	39	38	15
95th Queue (ft)	61	59	38
Link Distance (ft)	894	549	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	121	196
Average Queue (ft)	9	11
95th Queue (ft)	51	72
Link Distance (ft)	271	271
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: Marginal Pep Boys & PR 2

Movement	SB
Directions Served	TR
Maximum Queue (ft)	56
Average Queue (ft)	2
95th Queue (ft)	18
Link Distance (ft)	284
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	51
Average Queue (ft)	25
95th Queue (ft)	43
Link Distance (ft)	433
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB
Directions Served	R
Maximum Queue (ft)	113
Average Queue (ft)	56
95th Queue (ft)	96
Link Distance (ft)	292
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: Marginal Ford & Ford

Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	31	76
Average Queue (ft)	26	27
95th Queue (ft)	43	59
Link Distance (ft)	290	1527
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement	NB	NB
Directions Served	T	TR
Maximum Queue (ft)	102	69
Average Queue (ft)	5	2
95th Queue (ft)	39	23
Link Distance (ft)	394	394
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

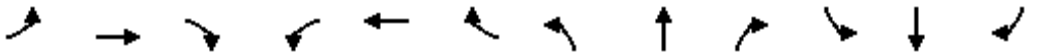
Network wide Queuing Penalty: 197

Appendix D.5 SCENARIO 4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	200	0	191	0	1016	0	0	1895	0
Future Volume (vph)	0	0	0	200	0	191	0	1016	0	0	1895	0
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	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3433		1583		3539			3539	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3433		1583		3539			3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	217	0	208	0	1104	0	0	2060	0
RTOR Reduction (vph)	0	0	0	0	0	144	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	217	0	64	0	1104	0	0	2060	0
Turn Type				Prot		Perm		NA			NA	
Protected Phases				8				2			6	
Permitted Phases						8						
Actuated Green, G (s)				12.2		12.2		85.8			85.8	
Effective Green, g (s)				12.2		12.2		85.8			85.8	
Actuated g/C Ratio				0.12		0.12		0.81			0.81	
Clearance Time (s)				4.0		4.0		4.0			4.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				395		182		2864			2864	
v/s Ratio Prot				c0.06				0.31			c0.58	
v/s Ratio Perm						0.04						
v/c Ratio				0.55		0.35		0.39			0.72	
Uniform Delay, d1				44.3		43.2		2.8			4.6	
Progression Factor				1.03		1.08		1.40			0.90	
Incremental Delay, d2				1.6		1.2		0.4			1.1	
Delay (s)				47.1		48.0		4.3			5.2	
Level of Service				D		D		A			A	
Approach Delay (s)		0.0			47.5			4.3			5.2	
Approach LOS		A			D			A			A	

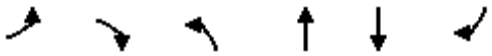
Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
Future Volume (vph)	281	45	90	120	98	8	45	1022	0	90	1830	763
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1681	1509	1626	3204		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.73	0.73	0.73	0.69	0.69	0.69	0.80	0.80	0.80	0.89	0.89	0.89
Adj. Flow (vph)	385	62	123	174	142	12	56	1278	0	101	2056	857
RTOR Reduction (vph)	0	0	103	0	4	0	0	0	0	0	0	321
Lane Group Flow (vph)	223	224	20	108	216	0	56	1278	0	101	2056	536
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	17.5	17.5	17.5	10.0	10.0		4.0	54.6		6.9	57.5	57.5
Effective Green, g (s)	17.5	17.5	17.5	10.0	10.0		4.0	54.6		6.9	57.5	57.5
Actuated g/C Ratio	0.17	0.17	0.17	0.09	0.09		0.04	0.52		0.07	0.54	0.54
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	269	277	249	153	302		132	2569		223	2731	755
v/s Ratio Prot	c0.14	0.13		0.07	c0.07		0.02	c0.26		0.03	c0.41	
v/s Ratio Perm			0.01									0.38
v/c Ratio	0.83	0.81	0.08	0.71	0.72		0.42	0.50		0.45	0.75	0.71
Uniform Delay, d1	42.8	42.6	37.4	46.6	46.6		49.9	16.8		47.7	18.8	18.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.81	0.65		1.00	1.00	1.00
Incremental Delay, d2	18.6	15.8	0.1	13.8	7.9		2.1	0.7		1.5	2.0	5.6
Delay (s)	61.4	58.4	37.6	60.4	54.5		42.6	11.5		49.2	20.7	23.6
Level of Service	E	E	D	E	D		D	B		D	C	C
Approach Delay (s)		55.1			56.4			12.8			22.5	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	63	247	148	953	1849	246
Future Volume (vph)	63	247	148	953	1849	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.97	0.95	0.95	1.00
Frt	0.90	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	2996	1324	3433	3438	3539	1553
Flt Permitted	0.98	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	2996	1324	3433	3438	3539	1553
Peak-hour factor, PHF	0.78	0.78	0.81	0.81	0.89	0.89
Adj. Flow (vph)	81	317	183	1177	2078	276
RTOR Reduction (vph)	102	102	0	0	0	79
Lane Group Flow (vph)	138	56	183	1177	2078	197
Heavy Vehicles (%)	5%	11%	2%	5%	2%	4%
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4		2	6	6
Actuated Green, G (s)	9.3	9.3	8.0	87.7	75.7	75.7
Effective Green, g (s)	9.3	9.3	8.0	87.7	75.7	75.7
Actuated g/C Ratio	0.09	0.09	0.08	0.83	0.71	0.71
Clearance Time (s)	4.0	4.0	4.0	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)	262	116	259	2844	2527	1109
v/s Ratio Prot	c0.05		c0.05	0.34	c0.59	
v/s Ratio Perm		0.04				0.13
v/c Ratio	0.53	0.48	0.71	0.41	0.82	0.18
Uniform Delay, d1	46.2	46.1	47.9	2.4	10.5	5.0
Progression Factor	1.00	1.00	0.75	1.25	0.33	0.51
Incremental Delay, d2	1.9	3.1	6.5	0.3	2.4	0.3
Delay (s)	48.1	49.2	42.4	3.3	5.8	2.8
Level of Service	D	D	D	A	A	A
Approach Delay (s)	48.6			8.6	5.4	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	13	136	97	511	1	3
Future Volume (vph)	13	136	97	511	1	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0		5.0
Lane Util. Factor	1.00	1.00	1.00	1.00		1.00
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		0.99
Satd. Flow (prot)	1805	1615	1881	1599		1877
Flt Permitted	0.95	1.00	1.00	1.00		0.98
Satd. Flow (perm)	1805	1615	1881	1599		1853
Peak-hour factor, PHF	0.63	0.63	0.69	0.69	0.48	0.48
Adj. Flow (vph)	21	216	141	741	2	6
RTOR Reduction (vph)	0	199	0	120	0	0
Lane Group Flow (vph)	21	17	141	621	0	8
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	8.1	8.1	88.9	88.9		88.9
Effective Green, g (s)	8.1	8.1	88.9	88.9		88.9
Actuated g/C Ratio	0.08	0.08	0.84	0.84		0.84
Clearance Time (s)	4.0	4.0	5.0	5.0		5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	137	123	1577	1341		1554
v/s Ratio Prot	c0.01		0.07			
v/s Ratio Perm		0.01		c0.39		0.00
v/c Ratio	0.15	0.13	0.09	0.46		0.01
Uniform Delay, d1	45.7	45.7	1.5	2.3		1.4
Progression Factor	1.00	1.00	0.93	0.64		1.00
Incremental Delay, d2	0.5	0.5	0.1	1.0		0.0
Delay (s)	46.3	46.2	1.5	2.5		1.4
Level of Service	D	D	A	A		A
Approach Delay (s)	46.2		2.3			1.4
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	349	140	1252	320	129	1700
Future Volume (vph)	349	140	1252	320	129	1700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.96		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3162		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3162		3471	1583	1770	3539
Peak-hour factor, PHF	0.89	0.89	0.83	0.83	0.86	0.86
Adj. Flow (vph)	392	157	1508	386	150	1977
RTOR Reduction (vph)	43	0	0	144	0	0
Lane Group Flow (vph)	506	0	1508	242	150	1977
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	20.4		58.6	58.6	14.0	76.6
Effective Green, g (s)	20.4		58.6	58.6	14.0	76.6
Actuated g/C Ratio	0.19		0.55	0.55	0.13	0.72
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	608		1918	875	233	2557
v/s Ratio Prot	c0.16		0.43		0.08	c0.56
v/s Ratio Perm				0.15		
v/c Ratio	0.83		0.79	0.28	0.64	0.77
Uniform Delay, d1	41.2		18.7	12.5	43.6	9.2
Progression Factor	1.00		1.00	1.00	0.97	1.08
Incremental Delay, d2	9.5		3.3	0.8	5.2	2.0
Delay (s)	50.7		22.1	13.3	47.3	12.0
Level of Service	D		C	B	D	B
Approach Delay (s)	50.7		20.3			14.5
Approach LOS	D		C			B

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	18	140	0	1	0
Future Vol, veh/h	0	18	140	0	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	20	152	0	1	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	152	152	0	0	152	152
Stage 1	152	-	-	-	0	0
Stage 2	0	-	-	-	152	152
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	840	894	-	-	840	740
Stage 1	876	-	-	-	-	-
Stage 2	-	-	-	-	876	772
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	840	894	-	-	840	0
Mov Cap-2 Maneuver	840	-	-	-	840	0
Stage 1	876	-	-	-	-	0
Stage 2	-	-	-	-	876	0

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	9.3
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	894	840
HCM Lane V/C Ratio	-	-	0.022	0.001
HCM Control Delay (s)	-	-	9.1	9.3
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	4	158	233	0	0	0
Future Vol, veh/h	4	158	233	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	1081	827328
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	172	253	0	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	253	253	0	0
Stage 1	253	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	700	786	-	-
Stage 1	751	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	700	786	-	-
Mov Cap-2 Maneuver	700	-	-	-
Stage 1	751	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	10.9	0
HCM LOS	B	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	784
HCM Lane V/C Ratio	-	-	0.225
HCM Control Delay (s)	-	-	10.9
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.9

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	22	586	38	16	0
Future Vol, veh/h	0	22	586	38	16	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	24	637	41	17	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	658	658	0	0	658	678
Stage 1	658	-	-	-	0	0
Stage 2	0	-	-	-	658	678
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	429	464	-	-	429	374
Stage 1	515	-	-	-	-	-
Stage 2	-	-	-	-	515	452
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	429	464	-	-	429	0
Mov Cap-2 Maneuver	429	-	-	-	429	0
Stage 1	515	-	-	-	-	0
Stage 2	-	-	-	-	515	0

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	13.7
HCM LOS	B		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	464	429
HCM Lane V/C Ratio	-	-	0.052	0.041
HCM Control Delay (s)	-	-	13.2	13.7
HCM Lane LOS	-	-	B	B
HCM 95th %tile Q(veh)	-	-	0.2	0.1

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	1101	291	333	1829	0	0
Future Volume (vph)	1101	291	333	1829	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frt	0.97		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3428		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3428		1770	3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1197	316	362	1988	0	0
RTOR Reduction (vph)	22	0	0	0	0	0
Lane Group Flow (vph)	1491	0	362	1988	0	0
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	63.0		35.0	106.0		
Effective Green, g (s)	63.0		35.0	106.0		
Actuated g/C Ratio	0.59		0.33	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	2037		584	3539		
v/s Ratio Prot	c0.43		0.20	c0.56		
v/s Ratio Perm						
v/c Ratio	0.73		0.62	0.56		
Uniform Delay, d1	15.4		29.9	0.0		
Progression Factor	0.09		0.68	1.00		
Incremental Delay, d2	1.4		1.2	0.4		
Delay (s)	2.8		21.4	0.4		
Level of Service	A		C	A		
Approach Delay (s)	2.8			3.6	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	3.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 1: PR 2 & Marginal Chrurch's

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	150	140	114	119	160	151
Average Queue (ft)	76	78	49	74	33	41
95th Queue (ft)	134	127	101	120	101	110
Link Distance (ft)	289	289	651	651	290	290
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	194	208	96	118	112	85	71	175	196	206	53	203
Average Queue (ft)	128	119	55	67	50	33	8	80	97	103	10	74
95th Queue (ft)	182	196	88	96	91	69	35	142	162	176	35	126
Link Distance (ft)	1281	1281	92	92	92			356	356	356		
Upstream Blk Time (%)			0	3	1							
Queuing Penalty (veh)			0	2	1							
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	266	338	1508	285
Average Queue (ft)	204	199	202	10
95th Queue (ft)	259	266	609	94
Link Distance (ft)	1508	1508	1508	
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				300
Storage Blk Time (%)				0
Queuing Penalty (veh)				0

Intersection: 12: PR 2 & Western Plaza

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB
Directions Served	L	LR	R	L	L	T	T	T	T
Maximum Queue (ft)	126	249	195	74	119	219	205	268	278
Average Queue (ft)	51	135	80	31	65	61	82	146	150
95th Queue (ft)	109	217	177	69	100	142	159	251	259
Link Distance (ft)	933	933	933			1053	1053	651	651
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				350	350				
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 13: Marginal Ford/Marginal Church's & Sector Cuba

Movement	WB	WB	NB	NB
Directions Served	L	R	T	R
Maximum Queue (ft)	46	47	56	68
Average Queue (ft)	14	32	6	16
95th Queue (ft)	40	54	31	58
Link Distance (ft)	556	556	1522	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				25
Storage Blk Time (%)			1	2
Queuing Penalty (veh)			3	2

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	320	268	271	263	250	165	259	262
Average Queue (ft)	168	144	179	177	33	82	156	165
95th Queue (ft)	251	245	264	255	170	150	248	254
Link Distance (ft)	1021	1021	1135	1135			394	394
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				4			2	
Queuing Penalty (veh)				13			2	

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	126	74	47
Average Queue (ft)	56	41	15
95th Queue (ft)	90	67	39
Link Distance (ft)	894	553	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement	WB
Directions Served	R
Maximum Queue (ft)	31
Average Queue (ft)	8
95th Queue (ft)	30
Link Distance (ft)	621
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB	SB
Directions Served	T	T	T
Maximum Queue (ft)	135	154	137
Average Queue (ft)	21	63	62
95th Queue (ft)	82	123	125
Link Distance (ft)	309	309	309
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: Marginal Pep Boys & PR 2

Movement	SB
Directions Served	T
Maximum Queue (ft)	50
Average Queue (ft)	5
95th Queue (ft)	27
Link Distance (ft)	304
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	74
Average Queue (ft)	37
95th Queue (ft)	60
Link Distance (ft)	432
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB	SB
Directions Served	R	T
Maximum Queue (ft)	115	74
Average Queue (ft)	45	2
95th Queue (ft)	84	24
Link Distance (ft)	258	1053
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 22: Marginal Ford & Ford

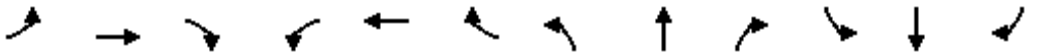
Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	53	56
Average Queue (ft)	18	17
95th Queue (ft)	45	52
Link Distance (ft)	290	1522
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement	NB	NB	SB	SB	SB
Directions Served	T	TR	L	T	T
Maximum Queue (ft)	128	213	450	817	749
Average Queue (ft)	53	71	301	168	103
95th Queue (ft)	106	148	479	610	491
Link Distance (ft)	394	394		757	757
Upstream Blk Time (%)				2	0
Queuing Penalty (veh)				17	0
Storage Bay Dist (ft)			350		
Storage Blk Time (%)			19	0	
Queuing Penalty (veh)			174	0	

Network Summary

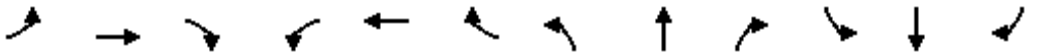
Network wide Queuing Penalty: 215



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	203	0	120	0	1723	0	0	1120	0
Future Volume (vph)	0	0	0	203	0	120	0	1723	0	0	1120	0
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	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3433		1583		3539			3539	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3433		1583		3539			3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	221	0	130	0	1873	0	0	1217	0
RTOR Reduction (vph)	0	0	0	0	0	33	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	221	0	97	0	1873	0	0	1217	0
Turn Type				Prot		Perm		NA			NA	
Protected Phases				8				2			6	
Permitted Phases						8						
Actuated Green, G (s)				12.6		12.6		85.4			85.4	
Effective Green, g (s)				12.6		12.6		85.4			85.4	
Actuated g/C Ratio				0.12		0.12		0.81			0.81	
Clearance Time (s)				4.0		4.0		4.0			4.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				408		188		2851			2851	
v/s Ratio Prot				c0.06				c0.53			0.34	
v/s Ratio Perm						0.06						
v/c Ratio				0.54		0.51		0.66			0.43	
Uniform Delay, d1				44.0		43.8		4.3			3.1	
Progression Factor				0.95		0.94		0.57			0.94	
Incremental Delay, d2				1.5		2.3		1.0			0.4	
Delay (s)				43.3		43.5		3.4			3.3	
Level of Service				D		D		A			A	
Approach Delay (s)		0.0			43.4			3.4			3.3	
Approach LOS		A			D			A			A	

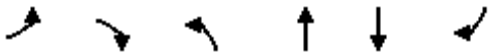
Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
Future Volume (vph)	302	51	112	59	45	0	68	1584	0	85	1155	264
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	5.0		4.0	5.0	5.0
Lane Util. Factor	0.95	0.95	1.00	0.91	0.91		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Flt Permitted	0.95	0.97	1.00	0.95	0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1683	1509	1626	3221		3502	4988		3433	5036	1392
Peak-hour factor, PHF	0.77	0.77	0.77	0.71	0.71	0.71	0.93	0.93	0.93	0.87	0.87	0.87
Adj. Flow (vph)	392	66	145	83	63	0	73	1703	0	98	1328	303
RTOR Reduction (vph)	0	0	117	0	0	0	0	0	0	0	0	141
Lane Group Flow (vph)	227	231	28	47	99	0	73	1703	0	98	1328	162
Heavy Vehicles (%)	5%	0%	7%	1%	8%	0%	0%	4%	2%	2%	3%	16%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	20.2	20.2	20.2	8.2	8.2		4.0	55.0		5.6	56.6	56.6
Effective Green, g (s)	20.2	20.2	20.2	8.2	8.2		4.0	55.0		5.6	56.6	56.6
Actuated g/C Ratio	0.19	0.19	0.19	0.08	0.08		0.04	0.52		0.05	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	311	320	287	125	249		132	2588		181	2689	743
v/s Ratio Prot	c0.14	0.14		0.03	c0.03		0.02	c0.34		0.03	c0.26	
v/s Ratio Perm			0.02									0.12
v/c Ratio	0.73	0.72	0.10	0.38	0.40		0.55	0.66		0.54	0.49	0.22
Uniform Delay, d1	40.3	40.3	35.4	46.5	46.5		50.1	18.6		48.9	15.6	13.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.90	0.77		1.00	1.00	1.00
Incremental Delay, d2	8.3	7.8	0.1	1.9	1.0		3.8	1.0		3.3	0.7	0.7
Delay (s)	48.7	48.1	35.5	48.4	47.6		49.0	15.4		52.2	16.3	13.7
Level of Service	D	D	D	D	D		D	B		D	B	B
Approach Delay (s)		45.3			47.8			16.8			17.9	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	385	226	347	1338	1130	193
Future Volume (vph)	385	226	347	1338	1130	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.97	0.95	0.95	1.00
Frt	0.99	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3297	1324	3433	3438	3539	1553
Flt Permitted	0.96	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3297	1324	3433	3438	3539	1553
Peak-hour factor, PHF	0.89	0.89	0.91	0.91	0.89	0.89
Adj. Flow (vph)	433	254	381	1470	1270	217
RTOR Reduction (vph)	7	175	0	0	0	98
Lane Group Flow (vph)	467	38	381	1470	1270	119
Heavy Vehicles (%)	5%	11%	2%	5%	2%	4%
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	7		5	2	6	
Permitted Phases		7		2	6	6
Actuated Green, G (s)	19.0	19.0	16.1	78.0	57.9	57.9
Effective Green, g (s)	19.0	19.0	16.1	78.0	57.9	57.9
Actuated g/C Ratio	0.18	0.18	0.15	0.74	0.55	0.55
Clearance Time (s)	4.0	4.0	4.0	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)	590	237	521	2529	1933	848
v/s Ratio Prot	c0.14		c0.11	0.43	c0.36	
v/s Ratio Perm		0.03				0.08
v/c Ratio	0.79	0.16	0.73	0.58	0.66	0.14
Uniform Delay, d1	41.6	36.8	42.9	6.5	17.0	11.8
Progression Factor	1.00	1.00	0.77	0.84	0.46	0.40
Incremental Delay, d2	7.1	0.3	3.5	0.6	1.6	0.3
Delay (s)	48.7	37.1	36.7	6.1	9.4	5.1
Level of Service	D	D	D	A	A	A
Approach Delay (s)	45.1			12.4	8.8	
Approach LOS	D			B	A	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	20	128	174	187	1	3
Future Volume (vph)	20	128	174	187	1	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0		5.0
Lane Util. Factor	1.00	1.00	1.00	1.00		1.00
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		0.99
Satd. Flow (prot)	1805	1615	1881	1599		1873
Flt Permitted	0.95	1.00	1.00	1.00		0.97
Satd. Flow (perm)	1805	1615	1881	1599		1837
Peak-hour factor, PHF	0.66	0.66	0.80	0.80	0.58	0.58
Adj. Flow (vph)	30	194	218	234	2	5
RTOR Reduction (vph)	0	179	0	38	0	0
Lane Group Flow (vph)	30	15	218	196	0	7
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		4	2	2	6	
Actuated Green, G (s)	8.2	8.2	88.8	88.8		88.8
Effective Green, g (s)	8.2	8.2	88.8	88.8		88.8
Actuated g/C Ratio	0.08	0.08	0.84	0.84		0.84
Clearance Time (s)	4.0	4.0	5.0	5.0		5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	139	124	1575	1339		1538
v/s Ratio Prot	c0.02		0.12			
v/s Ratio Perm		0.01		c0.12		0.00
v/c Ratio	0.22	0.12	0.14	0.15		0.00
Uniform Delay, d1	45.9	45.5	1.6	1.6		1.4
Progression Factor	1.00	1.00	0.98	0.82		1.00
Incremental Delay, d2	0.8	0.4	0.2	0.2		0.0
Delay (s)	46.7	46.0	1.7	1.5		1.4
Level of Service	D	D	A	A		A
Approach Delay (s)	46.1		1.6			1.4
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	211	99	1792	175	91	1329
Future Volume (vph)	211	99	1792	175	91	1329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	4.0	5.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.95		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3159		3471	1583	1770	3539
Flt Permitted	0.97		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3159		3471	1583	1770	3539
Peak-hour factor, PHF	0.74	0.74	0.90	0.90	0.94	0.94
Adj. Flow (vph)	285	134	1991	194	97	1414
RTOR Reduction (vph)	56	0	0	57	0	0
Lane Group Flow (vph)	363	0	1991	137	97	1414
Heavy Vehicles (%)	10%	2%	4%	2%	2%	2%
Turn Type	Prot		NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases				2		
Actuated Green, G (s)	13.9		70.1	70.1	9.0	83.1
Effective Green, g (s)	13.9		70.1	70.1	9.0	83.1
Actuated g/C Ratio	0.13		0.66	0.66	0.08	0.78
Clearance Time (s)	4.0		5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	414		2295	1046	150	2774
v/s Ratio Prot	c0.12		c0.57		c0.05	0.40
v/s Ratio Perm				0.09		
v/c Ratio	0.88		0.87	0.13	0.65	0.51
Uniform Delay, d1	45.2		14.3	6.7	47.0	4.1
Progression Factor	1.00		1.00	1.00	0.82	1.16
Incremental Delay, d2	18.5		4.8	0.3	8.5	0.6
Delay (s)	63.7		19.0	6.9	47.0	5.4
Level of Service	E		B	A	D	A
Approach Delay (s)	63.7		17.9			8.1
Approach LOS	E		B			A

Intersection Summary				
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.85			
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	74.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	0	177	14	0	0
Future Vol, veh/h	0	0	177	14	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	192	15	0	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	200	200	0	0	200	208
Stage 1	200	-	-	-	0	0
Stage 2	0	-	-	-	200	208
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	789	841	-	-	789	689
Stage 1	834	-	-	-	-	-
Stage 2	-	-	-	-	834	730
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	789	841	-	-	789	0
Mov Cap-2 Maneuver	789	-	-	-	789	0
Stage 1	834	-	-	-	-	0
Stage 2	-	-	-	-	834	0

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		A

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	4	21	302	0	0	0
Future Vol, veh/h	4	21	302	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	1081	827328
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	23	328	0	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	328	328	0	0
Stage 1	328	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.12	6.22	-	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-
Pot Cap-1 Maneuver	625	713	-	-
Stage 1	685	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	625	713	-	-
Mov Cap-2 Maneuver	625	-	-	-
Stage 1	685	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	10.4	0
HCM LOS	B	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	697
HCM Lane V/C Ratio	-	-	0.039
HCM Control Delay (s)	-	-	10.4
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	48	313	12	23	0
Future Vol, veh/h	0	48	313	12	23	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	52	340	13	25	0

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	347	347	0	0	347	353
Stage 1	347	-	-	-	0	0
Stage 2	0	-	-	-	347	353
Critical Hdwy	6.42	6.22	-	-	6.42	6.52
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	5.42	5.52
Follow-up Hdwy	3.518	3.318	-	-	3.518	4.018
Pot Cap-1 Maneuver	650	696	-	-	650	572
Stage 1	716	-	-	-	-	-
Stage 2	-	-	-	-	716	631
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	650	696	-	-	650	0
Mov Cap-2 Maneuver	650	-	-	-	650	0
Stage 1	716	-	-	-	-	0
Stage 2	-	-	-	-	716	0

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	10.8
HCM LOS	B		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBLn1
Capacity (veh/h)	-	-	696	650
HCM Lane V/C Ratio	-	-	0.075	0.038
HCM Control Delay (s)	-	-	10.6	10.8
HCM Lane LOS	-	-	B	B
HCM 95th %tile Q(veh)	-	-	0.2	0.1

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	1685	206	119	1420	0	0
Future Volume (vph)	1685	206	119	1420	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frt	0.98		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3481		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3481		1770	3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1832	224	129	1543	0	0
RTOR Reduction (vph)	9	0	0	0	0	0
Lane Group Flow (vph)	2047	0	129	1543	0	0
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	83.0		15.0	106.0		
Effective Green, g (s)	83.0		15.0	106.0		
Actuated g/C Ratio	0.78		0.14	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	2725		250	3539		
v/s Ratio Prot	c0.59		0.07	c0.44		
v/s Ratio Perm						
v/c Ratio	0.75		0.52	0.44		
Uniform Delay, d1	6.1		42.1	0.0		
Progression Factor	0.03		0.77	1.00		
Incremental Delay, d2	0.9		1.5	0.3		
Delay (s)	1.1		33.9	0.3		
Level of Service	A		C	A		
Approach Delay (s)	1.1			2.9	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	1.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 1: PR 2 & Marginal Chrurch's

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	115	116	208	277	190	175
Average Queue (ft)	67	73	76	98	74	73
95th Queue (ft)	101	114	170	202	142	137
Link Distance (ft)	298	298	654	654	289	289
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: PR 2 & PR 64/PR 342

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	L	LT	TR	L	L	T	T	T	L	L
Maximum Queue (ft)	252	267	85	94	68	90	72	280	266	263	52	115
Average Queue (ft)	136	128	29	45	17	30	34	151	156	163	15	58
95th Queue (ft)	208	208	68	83	50	66	62	231	216	222	39	102
Link Distance (ft)	1281	1281	91	91	91			356	356	356		
Upstream Blk Time (%)			0	1								
Queuing Penalty (veh)			0	0								
Storage Bay Dist (ft)						300	300				300	300
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 11: PR 2 & PR 64/PR 342

Movement	SB	SB	SB
Directions Served	T	T	T
Maximum Queue (ft)	208	212	179
Average Queue (ft)	147	130	88
95th Queue (ft)	202	192	167
Link Distance (ft)	1508	1508	1508
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 12: PR 2 & Western Plaza

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB
Directions Served	L	LR	R	L	L	T	T	T	T
Maximum Queue (ft)	301	281	179	181	178	301	310	315	297
Average Queue (ft)	161	160	64	97	117	149	180	145	143
95th Queue (ft)	253	232	162	156	169	244	264	242	229
Link Distance (ft)	933	933	933			1050	1050	654	654
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				350	350				
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 13: Marginal Ford/Marginal Church's & Sector Cuba

Movement	WB	WB	NB	NB	SB
Directions Served	L	R	T	R	LT
Maximum Queue (ft)	66	45	69	31	31
Average Queue (ft)	19	28	6	9	1
95th Queue (ft)	57	46	33	30	10
Link Distance (ft)	556		1522		369
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100		100	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 14: PR 2 & Ave. Algarrobo

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	225	202	479	410	250	136	202	209
Average Queue (ft)	107	69	239	219	25	62	92	122
95th Queue (ft)	177	160	369	350	147	115	162	187
Link Distance (ft)	1021	1021	1135	1135			394	394
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200	200		
Storage Blk Time (%)				7			0	
Queuing Penalty (veh)				12			0	

Intersection: 15: Marginal AAA/Marginal Shell & PR 342

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	96	74	43
Average Queue (ft)	49	38	13
95th Queue (ft)	80	62	33
Link Distance (ft)	894	549	621
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 16: Marginal AAA & AAA

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 17: PR 2 & Marginal AAA

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	66	92
Average Queue (ft)	10	15
95th Queue (ft)	40	61
Link Distance (ft)	271	271
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: Marginal Pep Boys & PR 2

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 20: Marginal Church's/Marginal Chrurch's & Church's

Movement	WB
Directions Served	LR
Maximum Queue (ft)	29
Average Queue (ft)	15
95th Queue (ft)	37
Link Distance (ft)	433
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: PR 2 & Marginal Burger King

Movement	EB	SB
Directions Served	R	T
Maximum Queue (ft)	154	22
Average Queue (ft)	68	2
95th Queue (ft)	120	12
Link Distance (ft)	280	1050
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 22: Marginal Ford & Ford

Movement	WB	SB
Directions Served	R	L
Maximum Queue (ft)	49	73
Average Queue (ft)	22	16
95th Queue (ft)	45	52
Link Distance (ft)	290	1522
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 23: PR 2 & Marginal Ford

Movement	NB	NB	SB
Directions Served	T	TR	L
Maximum Queue (ft)	256	273	222
Average Queue (ft)	98	107	122
95th Queue (ft)	217	218	215
Link Distance (ft)	394	394	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			350
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 12