AGENDA

EAST GRAND RAPIDS TRAFFIC COMMISSION
September 28, 2015
Community Center – Commission Chambers
5:30 PM

1. Call to Order

2. Approval of Minutes: November 24, 2014

3. Election of Chairman and Vice-chairman (Action Requested)

4. Presentation by URS - Proposed Lake Drive, Lakeside Drive and Breton Road Intersection (No Action Requested)

5. Public Comment

6. Next Scheduled Meeting Date: October 26, 2015

PROCEEDINGS OF THE TRAFFIC COMMISSION
City of East Grand Rapids, Michigan
November 24, 2014
East Grand Rapids Community Center – Commission Chambers

Present: Commissioners Reynolds Brander, Vasiliy Gagin, Hunter Meriwether, Laura Roy, Bob Saltsman, Phil Skaggs and Frank Spies

Also Present: Public Safety Director Mark Herald and City Engineer Joe Slonecki

1. CALL TO ORDER

Chairman Saltsman called the meeting to order at 5:33 PM.

2. APPROVAL OF MINUTES – Meeting held July 28, 2014

A motion was made by Commissioner Skaggs and supported by Commission Spies to approve the minutes as written.

Yeas: Commissioners Brander, Gagin, Meriwether, Saltsman, Skaggs and Spies – 6

Nays: -0-

3. TRAFFIC COMMISSION UPDATE AND TRAINING

Public Safety Director Mark Herald reviewed changes this year in the Traffic Commission and with City staff (listed below). Because of the numerous changes in the commission, the meeting will be a training/information session presented by Mr. Ray Schneider of URS Corporation.

- Former Public Works Director Ken Feldt resigned and the director portion of the position was temporarily filled by Public Safety Captain Chuck Lark until October 3, 2014.
- The City Engineer position was given to Staff Engineer Joe Slonecki.
- The Public Works Director title was changed to Assistant City Manager and the person hired to fill this position, Doug LaFave, will be starting on December 15, 2014. Mr. LaFave will be taking over as the Traffic Commission's staff liaison.
- A new chairman, Bob Saltsman and new vice-chair, Frank Spies, were elected. Two new commissioners, Vasiliy Gagin and Reynolds Brander have been appointed to replace Jan Huff and Camille Donnelly who resigned.

Director Herald introduced Mr. Schneider who offered some background on himself, URS, his knowledge of East Grand Rapids and projects he had worked on for the City. Mr. Schneider then gave a PowerPoint presentation on the basics of traffic signs, traffic control, traffic calming and pedestrian/bike traffic.

Commissioner Gagin asked if there was something that could be done about the two entries to the middle school and the traffic backups at the Lake Drive/Lakeside intersection from cars trying to turn left off of Lake into the Lake Drive entrance. Mr. Schneider responded that it might be possible to restrict access, but to make it work would need to be consistent throughout the day, not just at certain times. City Engineer Joe Slonecki offered that the Lake Drive/Lakeside intersection is scheduled to be redone in 2016. He said this would be a good time to address the issue.

Heidi Leonard – 1148 Orchard Avenue

She asked about the possibility of putting a four-way stop at Lake Drive and Bagley Avenue. She is concerned about the heavy traffic and the danger for those turning left off Bagley onto Lake. Chief Herald responded that stopping all the traffic on Lake Drive would not be a good idea. Mr. Schneider commented that the City could do a four-way stop warrant study.

Chief Herald reviewed the guidelines and forms that are used for resident initiated projects.

4. REPORT OF THE CITY COMMISSION

Commissioner Skaggs reported the following:

- The new Assistant City Manager, Doug LaFave, will be starting on December 15.
- The Croswell Townhomes were approved. These townhomes are two two-unit structures.
- The Mayor has formed a streets and sidewalk task force. Staff recommendation is for consideration of a millage for roads, sidewalks and other mobility issues.

5. NEXT SCHEDULED MEETING – December 22, 2014

6. ADJOURNMENT

A motion was made by Commissioner Meriwether and supported by Commissioner Spies to adjourn the meeting at 6:58 PM.

Yeas: Commissioners Brander, Gagin, Meriwether, Saltsman, Skaggs and Spies – 6

Nays: -0-

Respectfully submitted,

Lynda Taylor
Recording Secretary

CITY OF
EAST GRAND RAPIDS

750 LAKESIDE DRIVE SE-EAST GRAND RAPIDS, MICHIGAN 49506

DOUG LA FAVE
ASSISTANT CITY MANAGER

MEMORANDUM

TO: Traffic Commission
FROM: Doug La Fave, Assistant City Manager
DATE: 9/23/2015

RE: 2016 Lake Drive Project-Lake/Lakeside/Breton Intersection

Action Requested: There is no action requested at this time. The Meeting will include an informational presentation by URS.

Background:
City streets are classified into two categories, local streets and major streets. Local streets receive very limited state funding and are otherwise funded by property tax revenues. Major streets receive a higher percentage of state funding, local funding and for a select few, federal funding. The City is eligible to receive federal funds towards a street project that is classified as a major street-federal aid eligible this next year. Lake Drive is one of nine City streets within this classification. The section of Lake Drive that is planned to be reconstructed as part of this project is the section between Conlon and Bagley. The total cost of the project is estimated at $1,166,802, with federal participation at $371,888 and the local participation at $794,914.

As part of this project, the traffic signal and design of the Lake/Lakeside/Breton is currently being reviewed for traffic improvements. This past spring the City contracted with URS to conduct a traffic study of this intersection with proposed recommendations. This report has had preliminary review by City staff in conjunction with EGRPS staff.

The Traffic Commission will be charged with review of recommendations by URS with respect to the following:

- Extension of "no parking zone" in the south bound lane of Breton Road that is south of the intersection to eliminate 1 parking spot.
- Extend the northbound left turn lane of Breton Road south of the intersection from 110 feet to 200 feet.
- Construct a center median to prohibit east bound traffic on Lake Drive east of the intersection with signage to prohibit left turn movements into the middle school property.

URS will present the traffic study/analysis of the intersection at the meeting and answer questions from the Traffic Commission and general public in attendance. Formal recommendations with respect to changes at the intersection will take place at a future Traffic Commission meeting.

_____
Brian Donovan, City Manager

PROJECT MEMORANDUM

Client:	**City of East Grand Rapids**
Project Name:	**Lake Dr./Breton Rd./Lakeside Dr.**
Location:	**East Grand Rapids, MI**
Project Number:	**12945147**
Issue Date:	**June 26, 2015**

TO: **Doug La Fave**
Brian Bigorowski

FROM: **Nick LaCroix, PE PTOE**
Mike DeVries, PE

SUBJECT: **Lake Drive/Breton Road/Lakeside Drive Traffic Analysis**
DRAFT REPORT

INTRODUCTION

The City of East Grand Rapids is planning to reconstruct the intersection of Lake Drive/Breton Avenue/Lakeside Drive in 2016. The existing lanes are narrow and the city intends to widen the lanes to improve capacity. East Grand Rapids Middle School is located in the northeast quadrant of the intersection and generates a significant amount of traffic that impacts intersection operations. The City desires a traffic study of intersection operations to determine whether any intersection improvements could be incorporated into the reconstruction project that would improve traffic flow and safety.

EXISTING CONDITIONS

Study Area

The study area for the traffic analysis includes the Lake Drive/Breton Road/Lakeside Drive intersection along with the three (3) existing driveways for the East Grand Rapids Middle School. **Figure 1** shows a map of the study area. **Figure 2** shows the existing lane configurations at all intersections within the study area.

Lake Drive is a 2-lane, collector street running through the City providing access to the adjacent residential and commercial developments along the corridor. The Average Daily Traffic (ADT) is approximately 10,700 vehicles per day west of Breton Road. The speed limit is 25 mph within the study area.

Breton Road/Lakeside Drive is a 2-lane, collector street running through the City providing access to the adjacent residential and commercial developments along the corridor. The Average Daily Traffic (ADT) is approximately 9,900 vehicles per day south of Lake Drive and 8,600 vehicles per day north of Lake Drive. The speed limit is 25 mph within the study area.

The middle school site currently has three (3) driveways to Lake Drive and Lakeside Drive as follows:

- Entrance only on Lake Drive approximately 300 feet east of the Lake Drive/Breton Road/Lakeside Drive intersection.

- Entrance only on Lakeside Drive approximately 100 feet north of the Lake Drive/Breton Road/Lakeside Drive intersection.
- Exit only on Lakeside Drive approximately 330 feet north of the Lake Drive/Breton Road/Lakeside Drive intersection.

Capacity Analysis

URS collected peak-hour turning movement counts on Thursday, May 7, 2015 from 7:00-9:00 AM and 2:30-6:00 PM at all study area intersections. The existing weekday AM, School PM, and PM peak-hour traffic and pedestrian volumes are depicted in **Figure 3.** Detailed peak-hour count reports are included in **Appendix A**.

In order to quantify intersection traffic operations at the unsignalized and signalized study-area intersections, existing Level-of-Service (LOS) values were determined using the industry-standard methodology presented in the Highway Capacity Manual (2000), published by the Transportation Research Board (TRB). *Synchro®* traffic analysis software (version 9), based on the Highway Capacity Manual (2000) methodologies, was used in the analysis.

The term "Level-of-Service" denotes how well (or poorly) a traffic movement operates under given traffic demands, lane configurations, and traffic controls. Each level is determined by the average amount of control delay per vehicle. Control delay is the total delay associated with stopping for a traffic signal or stop sign, and includes four components; deceleration delay, queue move up time, stopped delay and final acceleration delay.

As shown in **Table 1**, LOS "A" indicates small average control delays (less than ten seconds per vehicle) whereas LOS "F" indicates intersection failure, resulting in extensive vehicular queues and long delays (over 80 seconds per vehicle at a signalized intersection). LOS "D" (or better) is typically considered acceptable performance for urban communities like the City of East Grand Rapids, and lower LOS values are tolerable for short time periods or during peak hours when heavier traffic volumes are expected. The volume-to-capacity ratio (V/C ratio) is another measure of the efficiency of an intersection. The ratio indicates the amount of congestion for each lane group. A V/C ratio greater than or equal to 1 indicates that the approach is operating at, or above, capacity.

Table 1. Level of Service Criteria at Intersections

	Average Control Delay (seconds/vehicle)	
Level-of-Service	**Signalized Intersections**	**Unsignalized Intersections**
A	⩽10	⩽10
B	10 – 20	10 – 15
C	20 – 35	15 – 25
D	35 – 55	25 – 35
E	55 – 80	35 – 50
F	>80	>50

Source: Highway Capacity Manual, TRB, (2000)

The existing peak-hour capacity analyses reveal that during the AM, School PM, and PM peak-hours, the signalized intersection of Lake Drive/Breton Road/Lakeside Drive operates at an overall LOS "C". During the same periods, the individual movements at the site driveways to the middle school operate at an LOS "D" or better, except for the westbound left-turn at the Lakeside Drive exit during the AM peak-hour which operates at an LOS "E". **Table 2** shows the existing conditions at the intersections for the AM, School PM, and PM peak-hours.

Table 2. Existing (2015) Intersection Peak-Hour Levels-of-Service

Intersection	AM Peak		School PM Peak		PM Peak	
	Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)
Lake Dr/Breton Rd/Lakeside Dr	C	28.7	C	27.3	C	25.6
Lake Dr/School Entrance (EBL)	A	1.2	A	0.4	A	0.1
Lakeside Dr/School Entrance (SBL)	A	5.5	A	1.9	A	1.8
Lakeside Dr/School Exit (WBL)	**E**	**42.7**	D	31.1	D	28.4

Note: LOS values of "E" or "F" are shown in **bold**.
Source: URS, June 2015

Movement-by-movement LOS values are shown on Figure 3 and in Appendix B for the existing weekday AM, School PM, and weekday PM peak-hours. As shown on Figure 3, all individual movements at the Lake Drive/Breton Road/Lakeside Drive intersection function at LOS "D" or better during the peak-hour analysis periods.

For the existing 2015 conditions, a queuing analysis at the Lake Drive/Breton Road/Lakeside Drive intersection was performed to determine the 95th percentile queue. *Synchro®* traffic analysis software (version 9), based on the Highway Capacity Manual (2000) methodologies, was used in the analysis. **Table 3** shows a comparison of the calculated results with the collected field observations. Detailed results of the HCM queuing analysis are included in Appendix B. Appendix A includes the observed queue analysis.

As shown in Table 3, the observed queues for the northbound and southbound left-turn at the Lake Drive/Breton Road/Lakeside Drive intersection are greater than the existing available storage within the left-turn lane for several of the peak-hour analysis periods. The levels-of-service for these movements shown on Figure 3 may be worse than indicated based on the left-turn queue spilling back into the through lanes during these peak-hours.

Table 3. Existing (2015) 95th Percentile Queue Lengths (Feet)

Movement	Storage Length	AM Peak		School PM Peak		PM Peak	
		HCM	Observed	HCM	Observed	HCM	Observed
NBL	110	105	183	69	88	114	125
NBT/R	-	196	150	202	113	252	150
SBL	165	53	108	82	175	76	100
SBT	-	170	233	206	238	201	213
SBR	165	47	50	42	50	44	50
EBL	220	36	58	39	25	46	63
EBT/R	-	191	133	266	163	247	200
WBL	185	19	33	10	25	16	25
WBT	-	183	265	119	125	233	188
WBR	185	47	58	68	75	33	88

1. Observed queue lengths assume average vehicle length of 25 feet.
2. Shaded values indicate where queue lengths exceed the available storage lane.

Source: URS, June 2015

PROPOSED CONDITIONS

Improvement Options

Several options were considered for improving the traffic operations at the Lake Drive/Breton Avenue intersection and the adjacent middle school driveway approaches. These options included the following:

- Roundabout
- Signal Timing
- Modernize Signal Equipment
- Geometric Improvements

Roundabout

The option for a roundabout was not fully evaluated as a preliminary review of the required geometrics showed the required right-of-way to construct a roundabout would have significant impacts to adjacent properties including residences, the middle school property (northeast corner) and/or the high school property (northwest corner). A roundabout would also have significant impacts to the existing site circulation of the middle school.

Signal Timing

The Lake Drive/Breton Avenue/Lakeside Avenue signal operates with an 80-second cycle length during the weekday AM, School PM, and the weekday PM peak-hours. The left-turn movements for the eastbound and westbound approaches operate as permissive movements, while the northbound and southbound left-turn movements operate as permissive/protected with a lagging protected left-turn phase. The northbound and southbound approaches are coordinated with the traffic signal at the Breton Road/Hall Street intersection located approximately 1,950 feet to the south.

Based on the analyses performed with varying cycle lengths and splits, the existing signal timings appear to provide optimal results while maintaining coordination with the traffic signal at the intersection of Breton Road/Hall Street. Running the signal uncoordinated reduced delay at the signal slightly, but would impact progression along Breton Road. **Table 4** below shows the existing signal timings that were utilized for the proposed capacity analysis.

Table 4. Existing Signal Timing Splits

Condition	AM Peak	School PM Peak	PM Peak
Existing	Cycle = 80 sec 35/13/32 NB-SB/NBL-SBL/EB-WB	Cycle = 80 sec 30/13/37 NB-SB/NBL-SBL/EB-WB	Cycle = 80 sec 32/13/35 NB-SB/NBL-SBL/EB-WB

Modernize Signal Equipment

The signal heads for the intersection include the standard 3-section head (red, yellow, green balls) for all through, permissive-only left-turn, and right-turn movements. The permissive/protected northbound and southbound left-turn movements include a 3-section head (red ball, yellow arrow, green arrow) with the red ball flashing during the permissive phase.

In the current configuration, only the northbound left-turn and southbound left-turn have detectors to indicate the presence of vehicles. However, the timing permit received from the City of Grand Rapids indicates the loop detector for the southbound left-turn lane has been disconnected. As the loop detector is not being utilized, the intersection essentially operates on a pre-timed basis with all movements receiving the maximum green times programmed into the controller whether or not vehicles are present.

Upgrades to the existing signal equipment would include the following:

- Place vehicle detection in all lanes to fully actuate the traffic signal
- Replace existing 3-section left-turn signal heads with the new 4-section (red arrow, yellow arrow, yellow flashing arrow, green arrow).

Fully actuating the traffic signal would allow the movements with lower traffic volumes to gap out and provide the excess green time to the northbound and southbound coordinated movements.

Geometric Improvements

Several geometric improvements that would increase the safety and help alleviate congestion at the Lake Drive/Breton Road/Lakeside Drive intersection were examined. **Figure 4** shows the proposed geometric improvements. These improvements include the following:

- *Widen lanes on the east leg* – The existing pavement width on the east leg of the intersection is approximately 40 feet. This includes an approximate 12-foot eastbound lane, a 10-foot westbound left-turn lane, a 9-foot westbound thru lane, and a 9-foot westbound right-turn lane. The east leg should be widened to a total of 44 feet to accommodate a 12-foot eastbound lane, 10-foot westbound left-turn and thru lanes, and a 12-foot westbound right-turn lane.

- *Extend northbound left-turn lane* – The existing northbound left-turn lane provides approximately 110 feet of storage. Based on the modeling and queue observations, this turn lane should be extended to at least 200 feet. One (1) on-street parking spot on the west side of Breton Road would need to be eliminated in order to accommodate the lengthened left-turn lane.

- *Prohibit eastbound left-turn into the school entrance on Lake Drive* – Based on discussions with the City and East Grand Rapids Middle School staff, the eastbound left-turn into the school entrance on Lake Drive creates backups into the Lake Drive/Breton Road/Lakeside Drive intersection. Traffic counts indicate this movement represents only 10% of the trips entering the middle school during both the AM and School PM peak-hours (25 left-turns in the AM peak-hour, 9 left-turns in the School PM peak-hour). To prohibit left-turns into the driveway, a center median would need to be constructed along Lake Drive. The driveway and center median would need to be relocated slightly to the west to avoid impacting residential driveways on the south side of Lake Drive. Based on the queuing analysis, the westbound left-turn lane at the Lake Drive/Breton Road/Lakeside Drive intersection should be maintained to provide a minimum of 150 feet of left-turn storage.

Capacity Analysis

The capacity analysis of the proposed conditions assumed the implementation of the signal timing, signal modernization, and geometric improvements discussed above. The existing eastbound left-turn traffic at the middle school driveway on Lake Drive was reassigned to the northbound right-turn at the middle school driveway on Lakeside Drive. It was assumed these trips originated from the west on Lake Drive and were therefore also assigned to the eastbound left-turn at the Lake Drive/Breton Road/Lakeside Drive intersection. **Figure 5** shows the resulting traffic volumes assuming the eastbound left-turn at the middle school driveway to Lake Drive was prohibited.

The proposed peak-hour capacity analyses reveal that during the AM, School PM, and PM peak-hours, the signalized intersection of Lake Drive/Breton Road/Lakeside Drive operates at an overall LOS “C”. During the

same periods, the individual movements at the site driveways to the middle school operate at an LOS "D" or better, except for the westbound left-turn at the Lakeside Drive exit during the AM peak-hour which operates at an LOS "E". **Table 5** shows the proposed conditions at the intersections for the AM, School PM, and PM peak-hours.

Table 5. Proposed (2015) Intersection Peak-Hour Levels-of-Service

Intersection	AM Peak		School PM Peak		PM Peak	
	Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)
Lake Dr/Breton Rd/Lakeside Dr	C	28.1	C	24.2	C	24.3
Lakeside Dr/School Entrance (SBL)	A	5.6	A	1.9	A	1.8
Lakeside Dr/School Exit (WBL)	**E**	**43.1**	D	31.0	D	28.3

Note: LOS values of "E" or "F" are shown in **bold**.
Source: URS, June 2015

Movement-by-movement LOS values are shown on Figure 5 and in Appendix C for the proposed weekday AM, School PM, and weekday PM peak-hours. As shown on Figure 5, all individual movements at the Lake Drive/Breton Road/Lakeside Drive intersection function at LOS "D" or better during the peak-hour analysis periods.

The above capacity analysis was performed based on traffic data collected during the spring season when the weather was warm. It is likely more school children walk to school during warmer weather conditions than during the winter months. This would increase the amount of traffic at the Lake Drive/Breton Road/Lakeside Drive intersection during these time periods. URS attempted to estimate this additional traffic based on the volume of pedestrian crossings at the intersection. Based on this analysis, the average delay at the intersection could be greater during the winter months than the average delays shown in this study. Approximately 20 additional eastbound left-turns at the intersection during the AM peak-hour would result in the movement failing at LOS "F". These 20 vehicles are in addition to the vehicles already added to the eastbound left-turn resulting from eliminating the left-turn at the Lake Drive school entrance. Approximately 100 additional eastbound left-turns could be accommodated during the School PM peak-hour.

For the proposed conditions, a queuing analysis at the Lake Drive/Breton Road/Lakeside Drive intersection was performed to determine the 95th percentile queue. The analysis was performed in the same manner as the existing conditions. **Table 6** shows the calculated results of the queuing analysis. Detailed results are included in Appendix C.

Table 6. Proposed HCM (2015) 95th Percentile Queue Lengths (Feet)

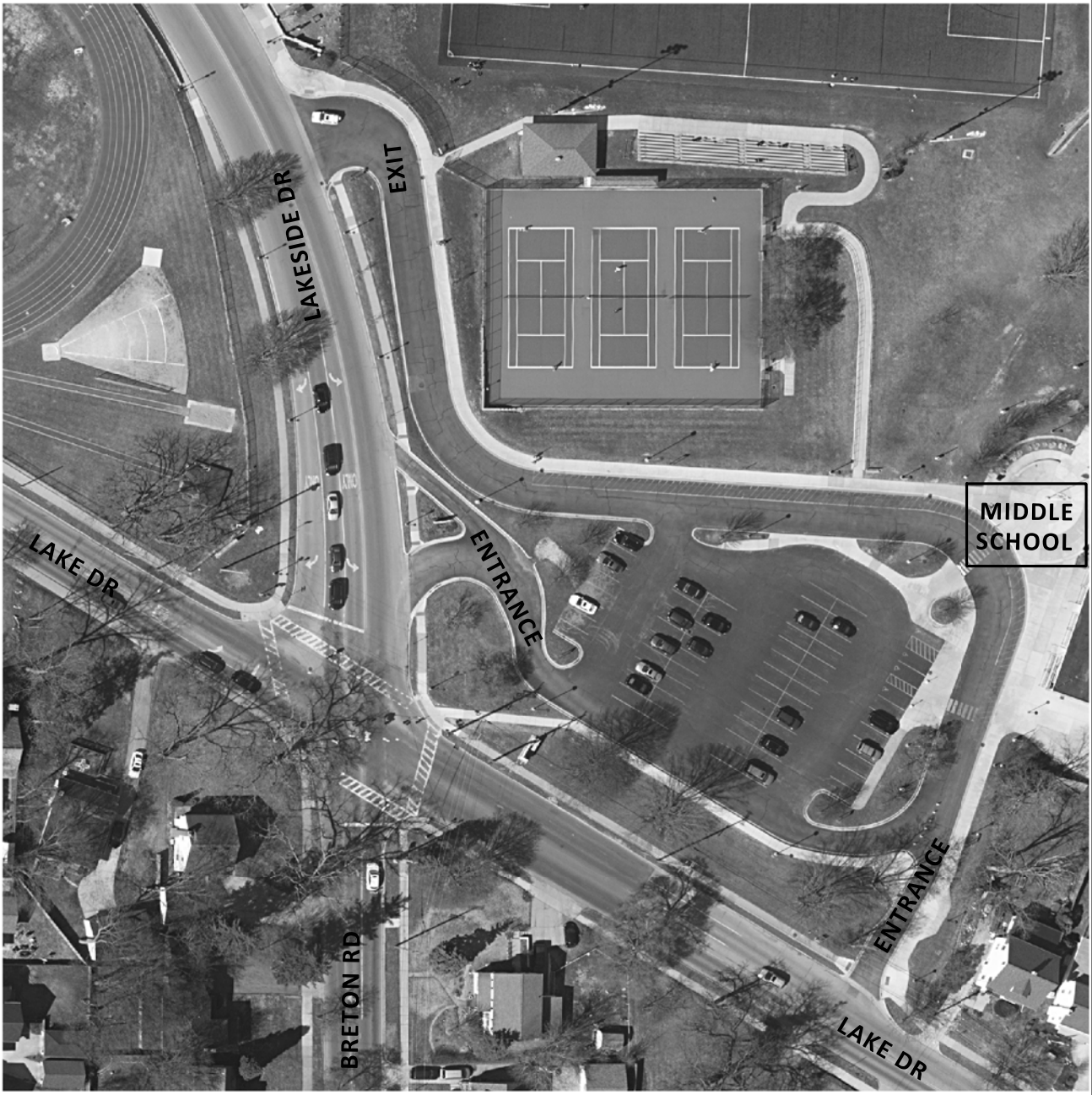
Movement	Storage Length	AM Peak	School PM Peak	PM Peak
NBL	200	105	69	114
NBT/R	-	197	202	252
SBL	165	53	82	76
SBT	-	170	206	201
SBR	165	47	42	44
EBL	220	62	47	50
EBT/R	-	191	266	247
WBL	185	20	10	16
WBT	-	183	119	233
WBR	185	47	68	33

Source: URS, June 2015

CONCLUSIONS & RECOMMENDATIONS

Based on the analyses performed as part of this study the following are a list of recommendations to increase the safety and traffic operations within the study area:

1. The existing traffic signal equipment should be upgraded to include vehicle detection on all approaches to the intersection.
2. The existing signal heads for the northbound and southbound left-turn movements should be upgraded to the new 4-section, flashing yellow arrow signal head.
3. The eastbound left-turn at the middle school driveway on Lake Drive should be prohibited. To adequately deter left-turn movements, a center median should be constructed along Lake Drive. The center median should be placed to maintain a minimum 150 foot westbound left-turn lane at the Lake Drive/Breton Road/Lakeside Drive intersection. It should also be placed to minimize impacts to the residential driveways on the south side of Lake Drive. This will likely require the existing middle school driveway to be shifted slightly to the west.
4. Prohibiting the eastbound left-turn movement at the Lake Drive school entrance will increase the number of eastbound left-turns at the Lake Drive/Breton Road/Lakeside Drive intersection. During the AM and School PM peak-hour, this may result in increased delay (LOS "F") for short periods of time (10-20 minutes) before and after school begins and ends, especially during the winter months when more parents drive their children to school.
5. The existing northbound left-turn lane approaching the Lake Drive/Breton Road/Lakeside Drive intersection should be extended to provide a total of 200 feet of storage. The existing "No Parking" zone on the west side of Breton Road will need to be extended approximately 60 feet to the south to accommodate the additional length. Based on driveway locations in this area, only one (1) on-street parking spot would be eliminated.
6. The existing signal timings are anticipated to be adequate to provide acceptable levels-of-service on all approaches assuming the above recommendations are implemented.



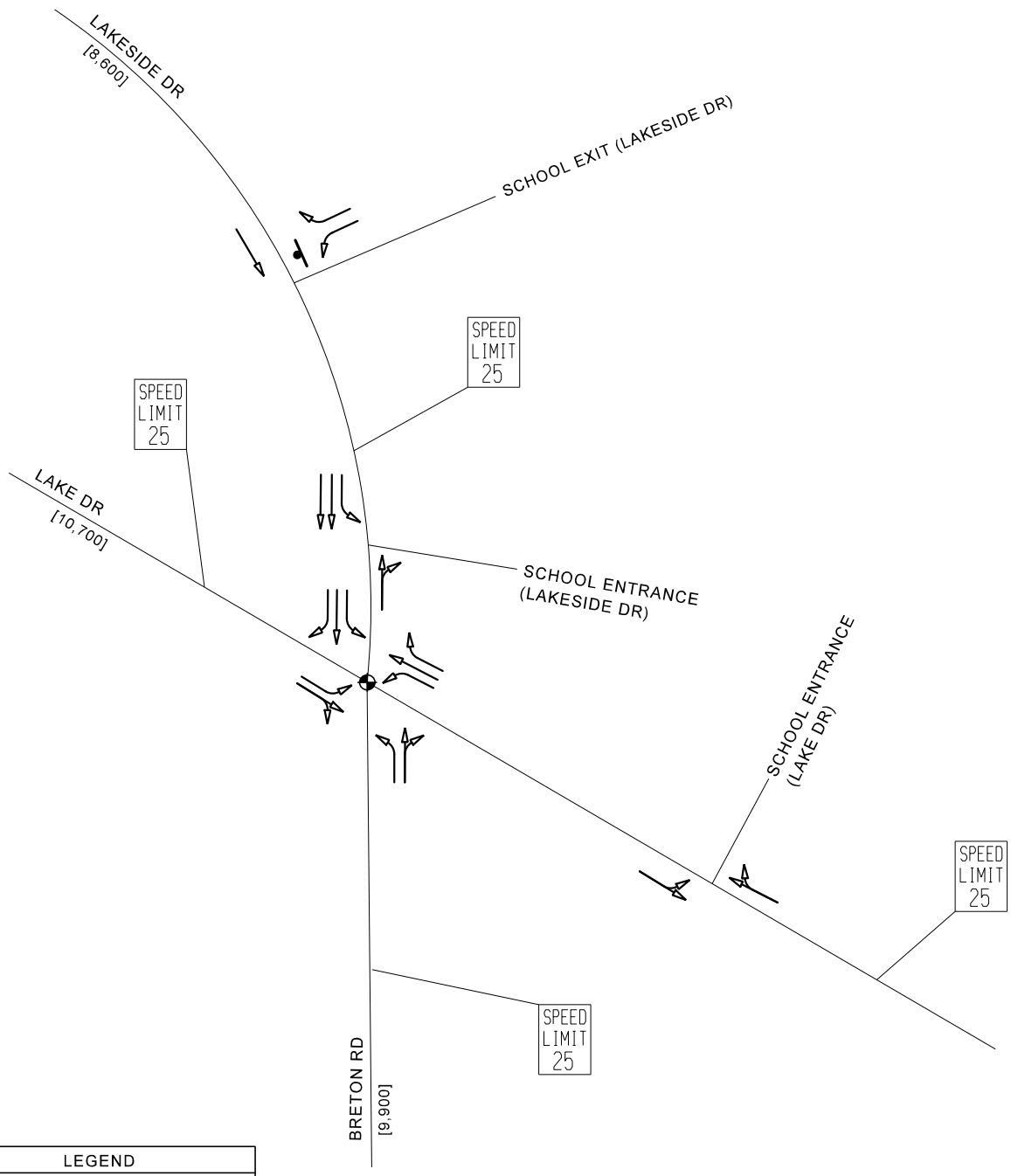
LAKE DR / BRETON RD / LAKESIDE DR

URS

SITE LOCATION

FIGURE 1

M:/PROJECTS/12945147/CADD/TRAFFIC/1_SITE LOCATION.DGN



LEGEND
- TRAFFIC SIGNAL
- STOP SIGN
- LANE CONFIGURATION
[X,XXX] - AVERAGE DAILY TRAFFIC

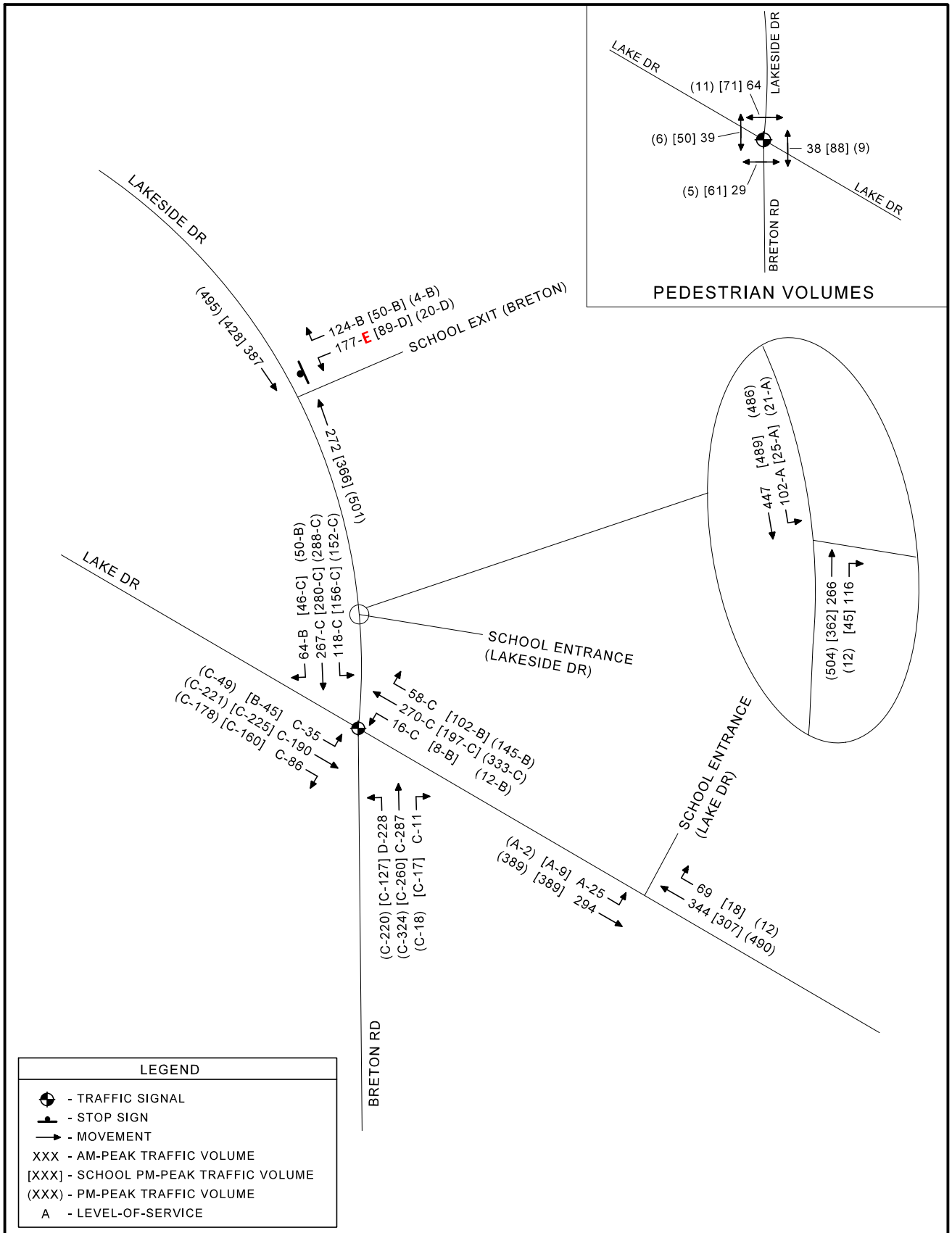
LAKE DR / BRETON RD / LAKESIDE DR

URS

EXISTING TRAFFIC OPERATIONS

FIGURE 2

M:/PROJECTS/12945147/CADD/TRAFFIC/2_EXISTING (2015) TRAFFIC OPERATIONS.DGN



LAKE DR / BRETON RD / LAKESIDE DR

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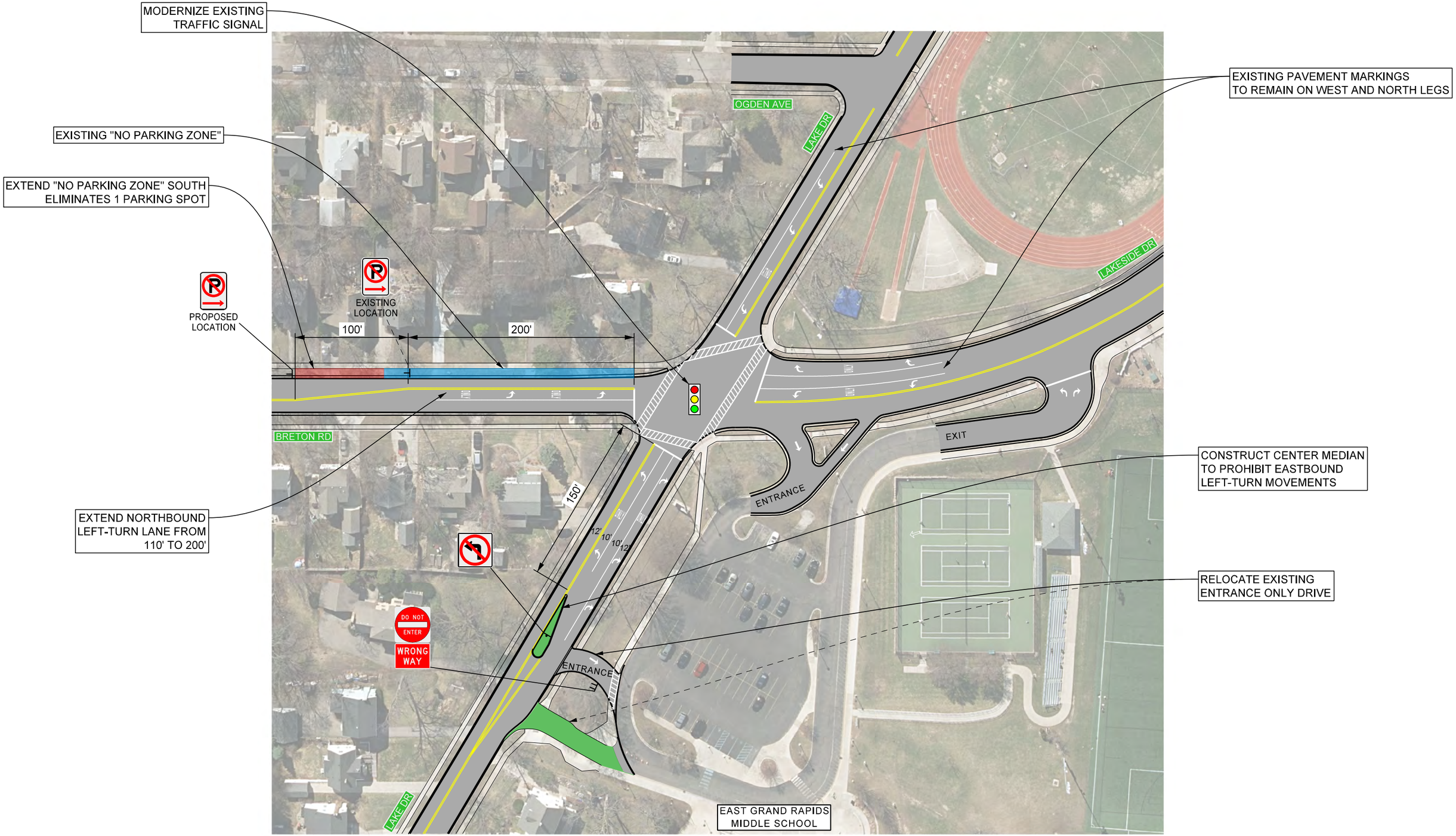
EXISTING (2015) PEAK-HOUR VOLUMES AND LEVEL OF SERVICE

FIGURE 3

M:/PROJECTS/12945147/CADD/TRAFFIC/3_EXISTING (2015) PEAK-HOUR VOLUMES AND LEVEL OF SERVICE.DGN



LAKE DR / BRETON RD / LAKESIDE DR

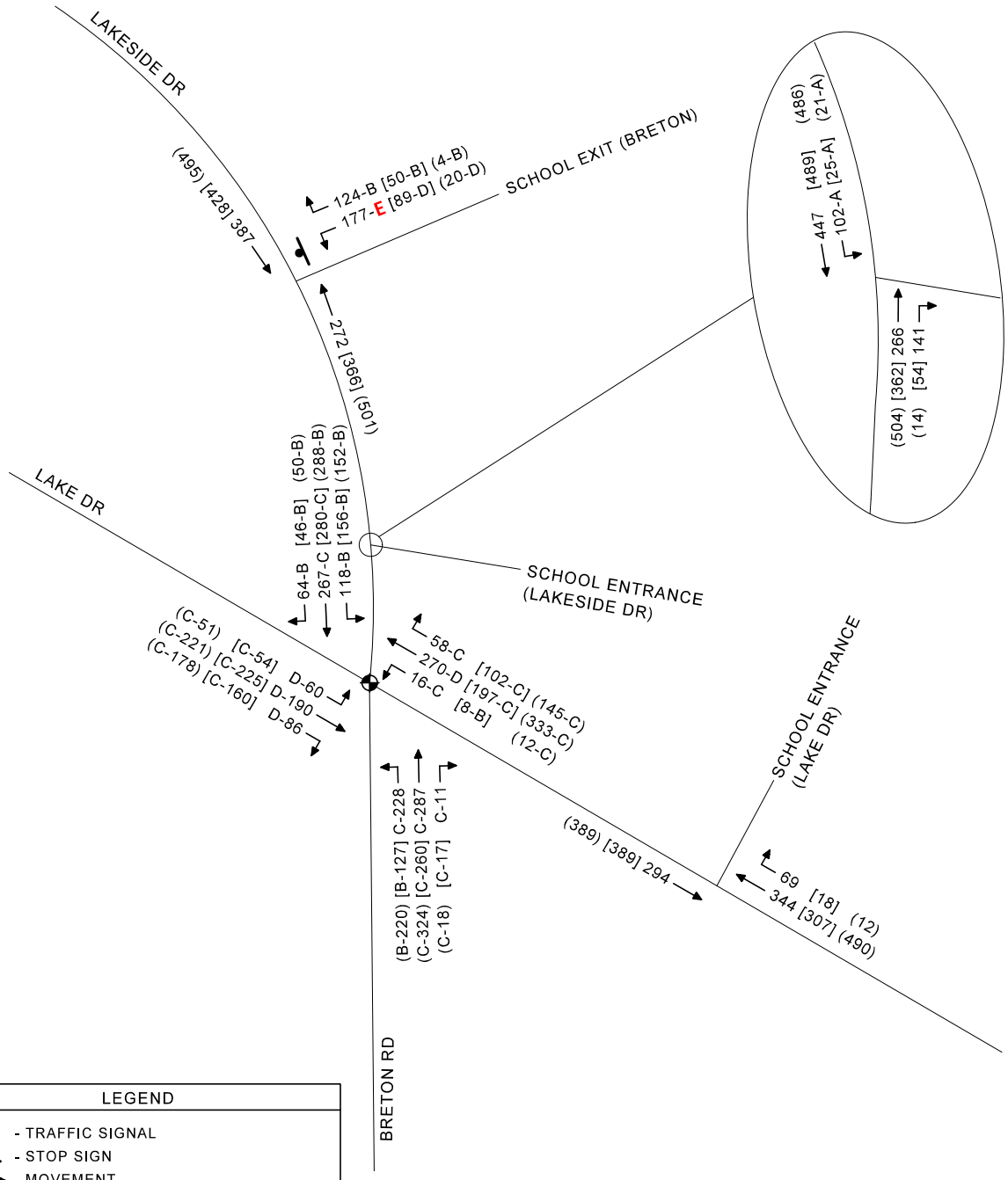
URS
Surface Transportation
Grand Rapids . Southfield . Traverse City

PROPOSED INTERSECTION CONFIGURATION
LAKE DRIVE / BRETON ROAD / LAKESIDE DRIVE

0 HORZ. (FT) 80

CS:	FIGURE
JN: 12945147	4
DATE: 2015-06-24	

M:/PROJECTS/12945147/CADD/EXHIBITS/12945147_INTERSECTION CONFIGURATION.DGN/4_PROPOSED INTERSECTION CONFIGURATION



LEGEND	
	- TRAFFIC SIGNAL
	- STOP SIGN
→	- MOVEMENT
XXX	- AM-PEAK TRAFFIC VOLUME
[XXX]	- SCHOOL PM-PEAK TRAFFIC VOLUME
(XXX)	- PM-PEAK TRAFFIC VOLUME
A	- LEVEL-OF-SERVICE

LAKE DR / BRETON RD / LAKESIDE DR

URS

PROPOSED (2015) PEAK-HOUR VOLUMES AND LEVEL OF SERVICE

FIGURE 5

M:/PROJECTS/12945147/CADD/TRAFFIC/4_PROPOSED (2015) PEAK-HOUR VOLUMES AND LEVEL OF SERVICE.DGN

Appendix A – Existing (2015) Conditions

- **Turning Movement Counts**
- **Observed Queue Analysis**

URS Corporation

3950 Sparks Drive SE
Grand Rapids, MI 49546
(616) 574-8500

File Name : Breton Rd @ School Entrance
Site Code :
Start Date : 5/7/2015
Page No : 1

Groups Printed- Lights - Buses - Trucks - Pedestrians

	Breton Rd Southbound				School Entrance Driveway Westbound				Breton Rd Northbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	1	47	0	48	0	0	2	2	38	6	0	44	94
07:15 AM	13	62	0	75	0	0	2	2	55	12	0	67	144
07:30 AM	59	166	0	225	0	0	1	1	76	39	0	115	341
07:45 AM	30	156	0	186	0	0	1	1	63	56	0	119	306
Total	103	431	0	534	0	0	6	6	232	113	0	345	885
08:00 AM	0	63	0	63	0	0	5	5	72	9	0	81	149
08:15 AM	0	44	0	44	0	0	10	10	81	2	0	83	137
08:30 AM	0	47	0	47	0	0	8	8	71	2	25	98	153
08:45 AM	0	47	0	47	0	0	8	8	84	3	0	87	142
Total	0	201	0	201	0	0	31	31	308	16	25	349	581
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	70	1	71	0	0	2	2	81	9	1	91	164
02:45 PM	1	97	0	98	0	0	3	3	75	18	0	93	194
Total	1	167	1	169	0	0	5	5	156	27	1	184	358
03:00 PM	0	141	0	141	0	0	6	6	96	15	8	119	266
03:15 PM	0	155	0	155	0	0	8	8	95	8	0	103	266
03:30 PM	0	96	0	96	0	0	5	5	96	4	4	104	205
03:45 PM	2	104	0	106	0	0	3	3	114	2	4	120	229
Total	2	496	0	498	0	0	22	22	401	29	16	446	966

URS Corporation

3950 Sparks Drive SE
Grand Rapids, MI 49546
(616) 574-8500

File Name : Breton Rd @ School Entrance
Site Code :
Start Date : 5/7/2015

Groups Printed- Lights - Buses - Trucks - Pedestrians

	Breton Rd Southbound				School Entrance Driveway Westbound				Breton Rd Northbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	1	97	0	98	0	0	5	5	117	3	4	124	227
04:15 PM	1	104	0	105	0	0	4	4	108	1	1	110	219
04:30 PM	2	116	0	118	0	0	8	8	107	3	5	115	241
04:45 PM	0	87	0	87	0	0	5	5	97	2	5	104	196
Total	4	404	0	408	0	0	22	22	429	9	15	453	883
05:00 PM	2	123	0	125	1	0	2	3	98	2	3	103	231
05:15 PM	8	112	0	120	0	0	10	10	149	1	2	152	282
05:30 PM	9	126	0	135	0	0	4	4	144	5	2	151	290
05:45 PM	2	125	0	127	0	0	7	7	113	4	0	117	251
Total	21	486	0	507	1	0	23	24	504	12	7	523	1054
Grand Total	131	2185	1	2317	1	0	109	110	2030	206	64	2300	4727
Apprch %	5.7	94.3	0		0.9	0	99.1		88.3	9	2.8		
Total %	2.8	46.2	0	49	0	0	2.3	2.3	42.9	4.4	1.4	48.7	
Lights	131	2140	0	2271	1	0	0	1	1991	206	0	2197	4469
% Lights	100	97.9	0	98	100	0	0	0.9	98.1	100	0	95.5	94.5
Buses	0	28	0	28	0	0	0	0	25	0	0	25	53
% Buses	0	1.3	0	1.2	0	0	0	0	1.2	0	0	1.1	1.1
Trucks	0	17	0	17	0	0	0	0	14	0	0	14	31
% Trucks	0	0.8	0	0.7	0	0	0	0	0.7	0	0	0.6	0.7
Pedestrians	0	0	1	1	0	0	109	109	0	0	64	64	174
% Pedestrians	0	0	100	0	0	0	100	99.1	0	0	100	2.8	3.7

URS Corporation

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File Name : Breton Rd @ School Entrance
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	Breton Rd Southbound				School Entrance Driveway Westbound				Breton Rd Northbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	13	62	0	75	0	0	2	2	55	12	0	67	144
07:30 AM	**59**	**166**	0	**225**	0	0	1	1	**76**	39	0	115	**341**
07:45 AM	30	156	0	186	0	0	1	1	63	**56**	0	**119**	306
08:00 AM	0	63	0	63	0	0	**5**	**5**	72	9	0	81	149
Total Volume	102	447	0	549	0	0	9	9	266	116	0	382	940
% App. Total	18.6	81.4	0		0	0	100		69.6	30.4	0		
PHF	.432	.673	.000	.610	.000	.000	.450	.450	.875	.518	.000	.803	.689
Peak Hour Analysis From 02:45 PM to 03:30 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:45 PM													
02:45 PM	**1**	97	0	98	0	0	3	3	75	**18**	0	93	194
03:00 PM	0	141	0	141	0	0	6	6	**96**	15	**8**	**119**	**266**
03:15 PM	0	**155**	0	**155**	0	0	**8**	**8**	95	8	0	103	266
03:30 PM	0	96	0	96	0	0	5	5	96	4	4	104	205
Total Volume	1	489	0	490	0	0	22	22	362	45	12	419	931
% App. Total	0.2	99.8	0		0	0	100		86.4	10.7	2.9		
PHF	.250	.789	.000	.790	.000	.000	.688	.688	.943	.625	.375	.880	.875
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	2	123	0	125	**1**	0	2	3	98	2	**3**	103	231
05:15 PM	8	112	0	120	0	0	**10**	**10**	**149**	1	2	**152**	282
05:30 PM	**9**	**126**	0	**135**	0	0	4	4	144	**5**	2	151	**290**
05:45 PM	2	125	0	127	0	0	7	7	113	4	0	117	251
Total Volume	21	486	0	507	1	0	23	24	504	12	7	523	1054
% App. Total	4.1	95.9	0		4.2	0	95.8		96.4	2.3	1.3		
PHF	.583	.964	.000	.939	.250	.000	.575	.600	.846	.600	.583	.860	.909

URS Corporation

3950 Sparks Drive SE
Grand Rapids, MI 49546
(616) 574-8500

File Name : Breton Rd @ School Exit
Site Code :
Start Date : 5/7/2015
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Groups Printed- Lights - Buses - Trucks - Pedestrians

	Breton Rd Southbound			School Exit Driveway Westbound				Breton Rd Northbound			
Start Time	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Peds	App. Total	Int. Total
07:00 AM	43	0	43	6	6	3	15	38	1	39	97
07:15 AM	80	0	80	19	16	1	36	58	0	58	174
07:30 AM	170	0	170	66	66	1	133	81	0	81	384
07:45 AM	90	0	90	80	41	1	122	59	0	59	271
Total	383	0	383	171	129	6	306	236	1	237	926
08:00 AM	47	0	47	12	1	9	22	74	0	74	143
08:15 AM	39	0	39	3	1	9	13	79	0	79	131
08:30 AM	49	0	49	1	2	9	12	79	0	79	140
08:45 AM	44	0	44	5	4	9	18	81	0	81	143
Total	179	0	179	21	8	36	65	313	0	313	557
09:00 AM	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	79	0	79	1	1	3	5	84	0	84	168
02:45 PM	95	0	95	12	4	4	20	70	0	70	185
Total	174	0	174	13	5	7	25	154	0	154	353
03:00 PM	126	0	126	48	36	12	96	96	0	96	318
03:15 PM	114	0	114	22	6	9	37	94	0	94	245
03:30 PM	93	0	93	7	4	3	14	106	0	106	213

URS Corporation

3950 Sparks Drive SE
Grand Rapids, MI 49546
(616) 574-8500

File Name : Breton Rd @ School Exit
Site Code :
Start Date : 5/7/2015
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Groups Printed- Lights - Buses - Trucks - Pedestrians

	Breton Rd Southbound			School Exit Driveway Westbound				Breton Rd Northbound			
Start Time	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Peds	App. Total	Int. Total
03:45 PM	103	0	103	11	3	4	18	113	0	113	234
Total	436	0	436	88	49	28	165	409	0	409	1010
04:00 PM	89	0	89	2	2	6	10	113	0	113	212
04:15 PM	98	0	98	1	5	4	10	104	0	104	212
04:30 PM	119	2	121	6	1	10	17	105	0	105	243
04:45 PM	75	0	75	0	2	4	6	102	0	102	183
Total	381	2	383	9	10	24	43	424	0	424	850
05:00 PM	138	0	138	2	1	3	6	104	0	104	248
05:15 PM	113	0	113	4	0	15	19	152	0	152	284
05:30 PM	122	0	122	8	2	5	15	129	0	129	266
05:45 PM	122	0	122	6	1	6	13	116	0	116	251
Total	495	0	495	20	4	29	53	501	0	501	1049
Grand Total	2048	2	2050	322	205	130	657	2037	1	2038	4745
Apprch %	99.9	0.1		49	31.2	19.8		100	0		
Total %	43.2	0	43.2	6.8	4.3	2.7	13.8	42.9	0	43	
Lights	2000	0	2000	321	205	0	526	1997	0	1997	4523
% Lights	97.7	0	97.6	99.7	100	0	80.1	98	0	98	95.3
Buses	31	0	31	0	0	0	0	26	0	26	57
% Buses	1.5	0	1.5	0	0	0	0	1.3	0	1.3	1.2
Trucks	17	0	17	1	0	0	1	14	0	14	32
% Trucks	0.8	0	0.8	0.3	0	0	0.2	0.7	0	0.7	0.7
Pedestrians	0	2	2	0	0	130	130	0	1	1	133
% Pedestrians	0	100	0.1	0	0	100	19.8	0	100	0	2.8

URS Corporation

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(616) 574-8500

File Name : Breton Rd @ School Exit
Site Code :
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	Breton Rd Southbound			School Exit Driveway Westbound				Breton Rd Northbound			
Start Time	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 07:15 AM											
07:15 AM	80	0	80	19	16	1	36	58	0	58	174
07:30 AM	**170**	0	**170**	66	**66**	1	**133**	**81**	0	**81**	**384**
07:45 AM	90	0	90	**80**	41	1	122	59	0	59	271
08:00 AM	47	0	47	12	1	**9**	22	74	0	74	143
Total Volume	387	0	387	177	124	12	313	272	0	272	972
% App. Total	100	0		56.5	39.6	3.8		100	0		
PHF	.569	.000	.569	.553	.470	.333	.588	.840	.000	.840	.633
Peak Hour Analysis From 02:45 PM to 03:30 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 02:45 PM											
02:45 PM	95	0	95	12	4	4	20	70	0	70	185
03:00 PM	**126**	0	**126**	**48**	**36**	**12**	**96**	96	0	96	**318**
03:15 PM	114	0	114	22	6	9	37	94	0	94	245
03:30 PM	93	0	93	7	4	3	14	**106**	0	**106**	213
Total Volume	428	0	428	89	50	28	167	366	0	366	961
% App. Total	100	0		53.3	29.9	16.8		100	0		
PHF	.849	.000	.849	.464	.347	.583	.435	.863	.000	.863	.756
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 05:00 PM											
05:00 PM	**138**	0	**138**	2	1	3	6	104	0	104	248
05:15 PM	113	0	113	4	0	**15**	**19**	**152**	0	**152**	**284**
05:30 PM	122	0	122	**8**	**2**	5	15	129	0	129	266
05:45 PM	122	0	122	6	1	6	13	116	0	116	251
Total Volume	495	0	495	20	4	29	53	501	0	501	1049
% App. Total	100	0		37.7	7.5	54.7		100	0		
PHF	.897	.000	.897	.625	.500	.483	.697	.824	.000	.824	.923

URS Corporation

3950 Sparks Drive SE
Grand Rapids, MI 49546
(616) 574-8500

File Name : Lake Dr @ Breton Rd
Site Code :
Start Date : 5/7/2015
Page No : 1

Groups Printed- Lights - Buses - Trucks - Pedestrians

	Breton Rd Southbound					Lake Dr Westbound					Breton Rd Northbound					Lake Dr Eastbound					
Start Time		Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	10	26	8	1	45	0	25	11	1	37	30	30	1	1	62	4	26	14	1	45	189
07:15 AM	16	33	11	10	70	2	74	15	2	93	82	50	2	0	134	2	26	11	4	43	340
07:30 AM	45	88	30	35	198	5	103	13	25	146	64	89	2	22	177	11	45	25	25	106	627
07:45 AM	42	103	17	17	179	3	52	18	9	82	42	83	5	7	137	18	76	23	9	126	524
Total	113	250	66	63	492	10	254	57	37	358	218	252	10	30	510	35	173	73	39	320	1680
08:00 AM	15	43	6	2	66	6	41	12	2	61	40	65	2	0	107	4	43	27	1	75	309
08:15 AM	14	28	2	5	49	5	44	20	1	70	69	63	6	2	140	2	49	21	3	75	334
08:30 AM	16	28	4	40	88	4	29	22	0	55	36	47	3	0	86	4	42	14	0	60	289
08:45 AM	8	29	8	1	46	1	34	19	8	62	38	59	2	1	100	7	55	31	2	95	303
Total	53	128	20	48	249	16	148	73	11	248	183	234	13	3	433	17	189	93	6	305	1235
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	12	46	10	7	75	2	50	19	1	72	36	60	1	0	97	11	42	22	2	77	321
02:45 PM	33	55	12	2	102	0	54	25	4	83	26	52	6	4	88	14	53	44	1	112	385
Total	45	101	22	9	177	2	104	44	5	155	62	112	7	4	185	25	95	66	3	189	706
03:00 PM	37	73	15	60	185	3	55	30	67	155	33	75	3	38	149	10	57	31	21	119	608
03:15 PM	59	90	11	7	167	4	52	27	8	91	30	66	5	7	108	8	58	47	16	129	495
03:30 PM	27	62	8	2	99	1	36	20	9	66	38	67	3	12	120	13	57	38	12	120	405
03:45 PM	37	55	8	8	108	1	70	31	6	108	51	63	3	1	118	13	51	36	2	102	436
Total	160	280	42	77	559	9	213	108	90	420	152	271	14	58	495	44	223	152	51	470	1944

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3950 Sparks Drive SE
Grand Rapids, MI 49546
(616) 574-8500

File Name : Lake Dr @ Breton Rd
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Groups Printed- Lights - Buses - Trucks - Pedestrians

	Breton Rd Southbound					Lake Dr Westbound					Breton Rd Northbound					Lake Dr Eastbound					
Start Time		Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	30	62	9	5	106	2	49	26	0	77	42	86	2	1	131	12	39	53	2	106	420
04:15 PM	26	71	6	0	103	0	48	29	0	77	45	67	1	1	114	11	46	34	5	96	390
04:30 PM	34	72	10	8	124	4	53	31	2	90	51	76	1	2	130	5	49	42	5	101	445
04:45 PM	26	53	2	8	89	5	53	25	1	84	48	63	1	1	113	5	55	47	0	107	393
Total	116	258	27	21	422	11	203	111	3	328	186	292	5	5	488	33	189	176	12	410	1648
05:00 PM	31	85	13	3	132	2	66	31	1	100	51	67	3	0	121	9	60	49	1	119	472
05:15 PM	33	72	7	3	115	2	100	40	4	146	56	98	4	1	159	11	53	49	3	116	536
05:30 PM	44	66	15	4	129	4	80	48	1	133	51	84	5	4	144	16	57	41	2	116	522
05:45 PM	44	65	15	1	125	4	87	26	3	120	62	75	6	0	143	13	51	39	0	103	491
Total	152	288	50	11	501	12	333	145	9	499	220	324	18	5	567	49	221	178	6	454	2021
Grand Total	639	1305	227	229	2400	60	1255	538	155	2008	1021	1485	67	105	2678	203	1090	738	117	2148	9234
Apprch %	26.6	54.4	9.5	9.5		3	62.5	26.8	7.7		38.1	55.5	2.5	3.9		9.5	50.7	34.4	5.4		
Total %	6.9	14.1	2.5	2.5	26	0.6	13.6	5.8	1.7	21.7	11.1	16.1	0.7	1.1	29	2.2	11.8	8	1.3	23.3	
Lights	629	1274	222	0	2125	60	1243	530	0	1833	1013	1456	67	0	2536	201	1074	728	0	2003	8497
% Lights	98.4	97.6	97.8	0	88.5	100	99	98.5	0	91.3	99.2	98	100	0	94.7	99	98.5	98.6	0	93.2	92
Buses	3	21	4	0	28	0	4	4	0	8	5	22	0	0	27	0	7	4	0	11	74
% Buses	0.5	1.6	1.8	0	1.2	0	0.3	0.7	0	0.4	0.5	1.5	0	0	1	0	0.6	0.5	0	0.5	0.8
Trucks	7	10	1	0	18	0	8	4	0	12	3	7	0	0	10	2	9	6	0	17	57
% Trucks	1.1	0.8	0.4	0	0.8	0	0.6	0.7	0	0.6	0.3	0.5	0	0	0.4	1	0.8	0.8	0	0.8	0.6
Pedestrians	0	0	0	229	229	0	0	0	155	155	0	0	0	105	105	0	0	0	117	117	606
% Pedestrians	0	0	0	100	9.5	0	0	0	100	7.7	0	0	0	100	3.9	0	0	0	100	5.4	6.6

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File Name : Lake Dr @ Breton Rd
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	Breton Rd Southbound					Lake Dr Westbound					Breton Rd Northbound					Lake Dr Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	16	33	11	10	70	2	74	15	2	93	**82**	50	2	0	134	2	26	11	4	43	340
07:30 AM	**45**	88	**30**	**35**	**198**	5	**103**	13	**25**	**146**	64	**89**	2	**22**	**177**	11	45	25	**25**	106	**627**
07:45 AM	42	**103**	17	17	179	3	52	**18**	9	82	42	83	**5**	7	137	**18**	**76**	23	9	**126**	524
08:00 AM	15	43	6	2	66	**6**	41	12	2	61	40	65	2	0	107	4	43	**27**	1	75	309
Total Volume	118	267	64	64	513	16	270	58	38	382	228	287	11	29	555	35	190	86	39	350	1800
% App. Total	23	52	12.5	12.5		4.2	70.7	15.2	9.9		41.1	51.7	2	5.2		10	54.3	24.6	11.1		
PHF	.656	.648	.533	.457	.648	.667	.655	.806	.380	.654	.695	.806	.550	.330	.784	.486	.625	.796	.390	.694	.718
Peak Hour Analysis From 02:45 PM to 03:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:45 PM																					
02:45 PM	33	55	12	2	102	0	54	25	4	83	26	52	**6**	4	88	**14**	53	44	1	112	385
03:00 PM	37	73	**15**	**60**	**185**	3	**55**	**30**	**67**	**155**	33	**75**	3	**38**	**149**	10	57	31	**21**	119	**608**
03:15 PM	**59**	**90**	11	7	167	**4**	52	27	8	91	30	66	5	7	108	8	**58**	**47**	16	**129**	495
03:30 PM	27	62	8	2	99	1	36	20	9	66	**38**	67	3	12	120	13	57	38	12	120	405
Total Volume	156	280	46	71	553	8	197	102	88	395	127	260	17	61	465	45	225	160	50	480	1893
% App. Total	28.2	50.6	8.3	12.8		2	49.9	25.8	22.3		27.3	55.9	3.7	13.1		9.4	46.9	33.3	10.4		
PHF	.661	.778	.767	.296	.747	.500	.895	.850	.328	.637	.836	.867	.708	.401	.780	.804	.970	.851	.595	.930	.778
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	31	**85**	13	3	**132**	2	66	31	1	100	51	67	3	0	121	9	**60**	**49**	1	**119**	472
05:15 PM	33	72	7	3	115	2	**100**	40	**4**	**146**	56	**98**	4	1	**159**	11	53	49	**3**	116	**536**
05:30 PM	**44**	66	**15**	**4**	129	**4**	80	**48**	1	133	51	84	5	**4**	144	**16**	57	41	2	116	522
05:45 PM	44	65	15	1	125	4	87	26	3	120	**62**	75	**6**	0	143	13	51	39	0	103	491
Total Volume	152	288	50	11	501	12	333	145	9	499	220	324	18	5	567	49	221	178	6	454	2021
% App. Total	30.3	57.5	10	2.2		2.4	66.7	29.1	1.8		38.8	57.1	3.2	0.9		10.8	48.7	39.2	1.3		
PHF	.864	.847	.833	.688	.949	.750	.833	.755	.563	.854	.887	.827	.750	.313	.892	.766	.921	.908	.500	.954	.943

URS Corporation

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File Name : Lake Dr @ School Entrance
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Groups Printed- Lights - Buses - Trucks - Pedestrians

	School Entrance Southbound				Lake Dr Westbound				Lake Dr Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	4	0	4	1	0	0	1	5
07:15 AM	0	0	0	0	0	15	0	15	3	0	0	3	18
07:30 AM	0	0	0	0	0	30	0	30	9	0	0	9	39
07:45 AM	0	0	0	0	0	21	0	21	13	0	0	13	34
Total	0	0	0	0	0	70	0	70	26	0	0	26	96
08:00 AM	0	0	0	0	0	3	0	3	0	0	0	0	3
08:15 AM	0	0	0	0	0	2	0	2	0	0	0	0	2
08:30 AM	0	0	0	0	0	2	0	2	1	0	0	1	3
08:45 AM	0	0	0	0	0	3	0	3	2	0	0	2	5
Total	0	0	0	0	0	10	0	10	3	0	0	3	13
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	2	0	2	0	0	0	0	2
02:45 PM	0	0	0	0	0	10	0	10	3	0	0	3	13
Total	0	0	0	0	0	12	0	12	3	0	0	3	15
03:00 PM	0	0	0	0	0	4	0	4	4	0	0	4	8
03:15 PM	0	0	0	0	0	3	0	3	2	0	0	2	5
03:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
03:45 PM	0	0	0	0	0	8	0	8	2	0	0	2	10
Total	0	0	0	0	0	16	0	16	8	0	0	8	24

URS Corporation

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File Name : Lake Dr @ School Entrance
Site Code :
Start Date : 5/7/2015

Groups Printed- Lights - Buses - Trucks - Pedestrians

	School Entrance Southbound				Lake Dr Westbound				Lake Dr Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
04:15 PM	0	0	0	0	0	1	0	1	1	0	0	1	2
04:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
04:45 PM	0	0	0	0	0	3	0	3	0	0	0	0	3
Total	0	0	0	0	0	6	0	6	1	0	0	1	7
05:00 PM	0	0	0	0	0	3	0	3	0	0	0	0	3
05:15 PM	0	0	0	0	0	4	0	4	0	0	0	0	4
05:30 PM	0	0	0	0	0	3	0	3	1	0	0	1	4
05:45 PM	0	0	0	0	0	2	0	2	1	0	0	1	3
Total	0	0	0	0	0	12	0	12	2	0	0	2	14
Grand Total	0	0	0	0	0	126	0	126	43	0	0	43	169
Apprch %	0	0	0		0	100	0		100	0	0		
Total %	0	0	0	0	0	74.6	0	74.6	25.4	0	0	25.4	
Lights	0	0	0	0	0	126	0	126	43	0	0	43	169
% Lights	0	0	0	0	0	100	0	100	100	0	0	100	100
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

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	School Entrance Southbound				Lake Dr Westbound				Lake Dr Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	0	0	0	0	0	4	0	4	1	0	0	1	5
07:15 AM	0	0	0	0	0	15	0	15	3	0	0	3	18
07:30 AM	0	0	0	0	0	**30**	0	**30**	9	0	0	9	**39**
07:45 AM	0	0	0	0	0	21	0	21	**13**	0	0	**13**	34
Total Volume	0	0	0	0	0	70	0	70	26	0	0	26	96
% App. Total	0	0	0		0	100	0		100	0	0		
PHF	.000	.000	.000	.000	.000	.583	.000	.583	.500	.000	.000	.500	.615
Peak Hour Analysis From 02:45 PM to 03:30 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:45 PM													
02:45 PM	0	0	0	0	0	**10**	0	**10**	3	0	0	3	**13**
03:00 PM	0	0	0	0	0	4	0	4	**4**	0	0	**4**	8
03:15 PM	0	0	0	0	0	3	0	3	2	0	0	2	5
03:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Volume	0	0	0	0	0	18	0	18	9	0	0	9	27
% App. Total	0	0	0		0	100	0		100	0	0		
PHF	.000	.000	.000	.000	.000	.450	.000	.450	.563	.000	.000	.563	.519
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:30 PM													
02:30 PM	0	0	0	0	0	2	0	2	0	0	0	0	2
02:45 PM	0	0	0	0	0	**10**	0	**10**	3	0	0	3	**13**
03:00 PM	0	0	0	0	0	4	0	4	**4**	0	0	**4**	8
03:15 PM	0	0	0	0	0	3	0	3	2	0	0	2	5
Total Volume	0	0	0	0	0	19	0	19	9	0	0	9	28
% App. Total	0	0	0		0	100	0		100	0	0		
PHF	.000	.000	.000	.000	.000	.475	.000	.475	.563	.000	.000	.563	.538

OBSERVED BACK OF QUEUE - ***AM PEAK PERIOD (7:15 to 8:15 AM)*** **5/7/2015**

Location: Lake/Breton

Observation #	***# of Vehicles in Queue - for Each Movement's Beginning of Green***																			
	Breton/Lakeside										***Lake***									
	NBL		**NBT/R**		**SBL**		**SBT**		**SBR**		**EBL**		**EBT/R**		**WBL**		**WBT**		**WBR**	
	Veh	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**
1	4	100	7	175	0	0	0	0	0	0	1	25	1	25	0	0	5	125	0	0
2	3	75	2	50	1	25	3	75	1	25	0	0	2	50	0	0	0	0	0	0
3	0	0	1	25	1	25	2	50	1	25	0	0	2	50	0	0	3	75	1	25
4	1	25	2	50	0	0	3	75	1	25	0	0	2	50	0	0	4	100	1	25
5	1	25	3	75	0	0	2	50	1	25	0	0	5	125	0	0	3	75	0	0
6	6	150	3	75	3	75	3	75	1	25	0	0	2	50	0	0	4	100	2	50
7	6	150	6	150	0	0	3	75	0	0	0	0	3	75	0	0	5	125	0	0
8	7	175	3	75	5	125	4	100	3	75	0	0	3	75	0	0	12	300	0	0
9	8	200	4	100	3	75	4	100	1	25	2	50	2	50	0	0	10	250	2	50
10	7	175	3	75	1	25	4	100	2	50	1	25	3	75	0	0	7	175	4	100
11	8	200	4	100	2	50	10	250	2	50	0	0	4	100	0	0	12	300	3	75
12	6	150	3	75	2	50	5	125	0	0	1	25	3	75	0	0	8	200	1	25
13	1	25	2	50	5	125	10	250	0	0	1	25	4	100	3	75	6	150	0	0
14	1	25	3	75	4	100	3	75	0	0	2	50	5	125	1	25	3	75	0	0
15	1	25	4	100	3	75	8	200	2	50	1	25	3	75	2	50	4	100	2	50
16	1	25	4	100	3	75	9	225	0	0	3	75	3	75	1	25	4	100	2	50
17	0	0	3	75	2	50	4	100	1	25	3	75	4	100	0	0	3	75	0	0
18	6	150	6	150	3	75	7	175	2	50	1	25	5	125	1	25	6	150	1	25
19	1	25	5	125	1	25	6	150	2	50	2	50	3	75	0	0	2	50	1	25
20	0	0	3	75	2	50	5	125	0	0	2	50	3	75	0	0	2	50	2	50
21	1	25	3	75	2	50	5	125	0	0	2	50	1	25	0	0	3	75	1	25
22	1	25	2	50	1	25	4	100	1	25	0	0	3	75	0	0	1	25	1	25
23	0	0	3	75	1	25	5	125	0	0	0	0	4	100	1	25	1	25	1	25
24	1	25	2	50	1	25	1	25	0	0	0	0	6	150	1	25	1	25	0	0
25	0	0	2	50	1	25	2	50	1	25	0	0	3	75	0	0	3	75	0	0
26	0	0	4	100	0	0	2	50	0	0	0	0	2	50	0	0	3	75	2	50
27	1	25	5	125	1	25	1	25	0	0	0	0	5	125	1	25	2	50	0	0
28	1	25	2	50	1	25	3	75	1	25	2	50	4	100	1	25	2	50	1	25
29	0	0	1	25	1	25	1	25	0	0	1	25	4	100	0	0	1	25	1	25
30	0	0	0	0	2	50	1	25	0	0	0	0	4	100	0	0	2	50	1	25
31	0	0	3	75	0	0	3	75	0	0	0	0	4	100	0	0	3	75	0	0
32	3	75	4	100	1	25	1	25	0	0	0	0	2	50	1	25	2	50	2	50
33	0	0	5	125	2	50	3	75	0	0	0	0	1	25	1	25	2	50	0	0
34	0	0	2	50	2	50	1	25	0	0	0	0	1	25	1	25	5	125	1	25
35	0	0	2	50	1	25	2	50	0	0	0	0	8	200	0	0	4	100	0	0
95th Percentile		**183**		**150**		**108**		**233**		**50**		**58**		**133**		**33**		**265**		**58**

*Assumes 25 feet/vehicle

OBSERVED BACK OF QUEUE - SCHOOL P*M PEAK PERIOD (2:45 to 3:45 PM)* **5/7/2015**

Location: Lake/Breton

Observation #	*# of Vehicles in Queue - for Each Movement's Beginning of Green*																			
	Breton/Lakeside										***Lake***									
	NBL		**NBT/R**		**SBL**		**SBT**		**SBR**		**EBL**		**EBT/R**		**WBL**		**WBT**		**WBR**	
	Veh	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**
1	0	0	1	25	1	25	1	25	0	0	0	0	4	100	0	0	5	125	4	100
2	1	25	4	100	1	25	2	50	0	0	1	25	3	75	0	0	3	75	1	25
3	4	100	2	50	3	75	2	50	0	0	1	25	3	75	0	0	2	50	1	25
4	1	25	3	75	0	0	3	75	0	0	0	0	5	125	0	0	5	125	0	0
5	0	0	1	25	0	0	5	125	1	25	0	0	5	125	0	0	4	100	1	25
6	0	0	0	0	0	0	1	25	0	0	2	50	5	125	0	0	1	25	1	25
7	0	0	1	25	3	75	3	75	2	50	1	25	4	100	0	0	4	100	0	0
8	0	0	0	0	1	25	2	50	0	0	1	25	2	50	0	0	1	25	1	25
9	0	0	2	50	0	0	3	75	0	0	0	0	2	50	0	0	4	100	2	50
10	0	0	0	0	4	100	1	25	1	25	0	0	3	75	0	0	2	50	1	25
11	2	50	4	100	2	50	4	100	0	0	1	25	4	100	0	0	5	125	2	50
12	2	50	4	100	0	0	5	125	0	0	0	0	7	175	1	25	4	100	3	75
13	1	25	4	100	2	50	4	100	1	25	1	25	3	75	0	0	6	150	1	25
14	1	25	1	25	1	25	4	100	1	25	1	25	6	150	0	0	5	125	1	25
15	1	25	3	75	2	50	12	300	1	25	1	25	4	100	0	0	5	125	1	25
16	1	25	4	100	8	200	10	250	1	25	1	25	4	100	1	25	2	50	1	25
17	3	75	4	100	6	150	5	125	2	50	0	0	5	125	0	0	4	100	3	75
18	1	25	4	100	4	100	9	225	0	0	0	0	6	150	0	0	3	75	2	50
19	2	50	3	75	8	200	7	175	0	0	0	0	5	125	0	0	2	50	2	50
20	0	0	2	50	2	50	8	200	1	25	0	0	3	75	0	0	5	125	3	75
21	1	25	4	100	2	50	6	150	0	0	1	25	3	75	1	25	4	100	1	25
22	0	0	6	150	3	75	4	100	0	0	0	0	4	100	0	0	4	100	0	0
23	1	25	3	75	1	25	4	100	1	25	0	0	3	75	0	0	3	75	3	75
24	2	50	2	50	1	25	3	75	0	0	0	0	1	25	0	0	2	50	1	25
25	0	0	5	125	0	0	2	50	2	50	0	0	3	75	0	0	2	50	1	25
26	1	25	3	75	2	50	1	25	0	0	1	25	3	75	0	0	2	50	1	25
27	1	25	0	0	3	75	5	125	0	0	0	0	6	150	0	0	1	25	0	0
28	0	0	1	25	1	25	3	75	1	25	1	25	4	100	0	0	3	75	3	75
29	1	25	4	100	2	50	7	175	0	0	1	25	4	100	0	0	2	50	1	25
30	2	50	4	100	3	75	3	75	1	25	1	25	7	175	0	0	2	50	0	0
31	4	100	3	75	4	100	3	75	1	25	0	0	6	150	0	0	0	0	0	0
95th Percentile		**88**		**113**		**175**		**238**		**50**		**25**		**163**		**25**		**125**		**75**

*Assumes 25 feet/vehicle

OBSERVED BACK OF QUEUE - P*M PEAK PERIOD (5:00 to 6:00 PM)* **5/7/2015**

Location: Lake/Breton

Observation #	*# of Vehicles in Queue - for Each Movement's Beginning of Green*																			
	Breton/Lakeside										***Lake***									
	NBL		**NBT/R**		**SBL**		**SBT**		**SBR**		**EBL**		**EBT/R**		**WBL**		**WBT**		**WBR**	
	Veh	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**	**Veh**	**Ft**
1	4	100	1	25	1	25	2	50	1	25	0	0	7	175	1	25	2	50	3	75
2	3	75	3	75	0	0	10	250	0	0	0	0	3	75	0	0	3	75	1	25
3	3	75	3	75	1	25	8	200	1	25	0	0	5	125	0	0	7	175	1	25
4	5	125	7	175	2	50	6	150	0	0	1	25	2	50	0	0	2	50	1	25
5	7	175	6	150	3	75	4	100	0	0	1	25	11	275	0	0	2	50	1	25
6	1	25	3	75	2	50	6	150	1	25	1	25	8	200	0	0	4	100	0	0
7	1	25	2	50	0	0	2	50	0	0	0	0	8	200	0	0	6	150	2	50
8	3	75	1	25	1	25	2	50	1	25	0	0	2	50	1	25	3	75	1	25
9	1	25	3	75	4	100	7	175	0	0	1	25	4	100	0	0	6	150	1	25
10	1	25	6	150	1	25	6	150	0	0	0	0	3	75	0	0	4	100	2	50
11	2	50	3	75	1	25	5	125	3	75	0	0	4	100	0	0	4	100	2	50
12	3	75	3	75	3	75	2	50	1	25	3	75	6	150	1	25	5	125	2	50
13	5	125	4	100	2	50	4	100	0	0	1	25	4	100	0	0	6	150	1	25
14	3	75	5	125	1	25	6	150	1	25	1	25	5	125	0	0	3	75	0	0
15	1	25	2	50	0	0	2	50	1	25	1	25	4	100	0	0	3	75	2	50
16	2	50	6	150	2	50	5	125	0	0	1	25	7	175	0	0	3	75	3	75
17	3	75	4	100	2	50	4	100	1	25	4	100	5	125	0	0	5	125	2	50
18	5	125	6	150	6	150	5	125	1	25	2	50	4	100	0	0	5	125	2	50
19	2	50	2	50	4	100	2	50	0	0	1	25	4	100	0	0	5	125	0	0
20	3	75	4	100	3	75	6	150	0	0	0	0	3	75	1	25	3	75	1	25
21	2	50	3	75	4	100	2	50	0	0	0	0	6	150	0	0	7	175	1	25
22	3	75	4	100	1	25	2	50	1	25	1	25	4	100	0	0	7	175	2	50
23	3	75	4	100	2	50	4	100	0	0	0	0	8	200	0	0	2	50	4	100
24	2	50	2	50	3	75	5	125	0	0	0	0	1	25	1	25	3	75	0	0
25	1	25	3	75	4	100	5	125	1	25	1	25	3	75	0	0	4	100	4	100
26	4	100	4	100	3	75	9	225	0	0	0	0	3	75	0	0	8	200	1	25
27	0	0	4	100	1	25	2	50	0	0	1	25	5	125	0	0	3	75	2	50
28	0	0	4	100	2	50	4	100	2	50	1	25	6	150	0	0	4	100	0	0
29	5	125	6	150	0	0	2	50	0	0	0	0	7	175	0	0	2	50	1	25
30	1	25	4	100	4	100	2	50	2	50	1	25	6	150	0	0	5	125	1	25
31	1	25	2	50	0	0	4	100	1	25	0	0	4	100	0	0	8	200	3	75
95th Percentile		**125**		**150**		**100**		**213**		**50**		**63**		**200**		**25**		**188**		**88**

*Assumes 25 feet/vehicle

Appendix B – Existing (2015) Conditions

- **Synchro Reports**

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	51	400	25	415	89	292	382	182	411	98
v/c Ratio	0.30	0.72	0.14	0.74	0.22	0.75	0.58	0.44	0.66	0.19
Control Delay	26.5	32.7	21.8	34.0	21.7	31.8	24.9	16.7	27.5	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	32.7	21.8	34.0	21.7	31.8	24.9	16.7	27.5	18.9
Queue Length 50th (ft)	19	175	9	183	32	76	151	44	169	33
Queue Length 95th (ft)	36	191	19	183	47	105	196	53	170	47
Internal Link Dist (ft)		494		240			327		37	
Turn Bay Length (ft)	220		185		185	110				
Base Capacity (vph)	168	556	183	558	404	391	664	412	626	514
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.72	0.14	0.74	0.22	0.75	0.58	0.44	0.66	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	190	86	16	270	58	228	287	11	118	267	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	10	10	10	12	12	10	10	12
Total Lost time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.90
Flpb, ped/bikes	0.95	1.00		0.97	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1562	1732		1609	1739	1260	1633	1846		1630	1739	1429
Flt Permitted	0.32	1.00		0.34	1.00	1.00	0.36	1.00		0.39	1.00	1.00
Satd. Flow (perm)	522	1732		572	1739	1260	618	1846		676	1739	1429
Peak-hour factor, PHF	0.69	0.69	0.69	0.65	0.65	0.65	0.78	0.78	0.78	0.65	0.65	0.65
Adj. Flow (vph)	51	275	125	25	415	89	292	368	14	182	411	98
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	51	400	0	25	415	89	292	382	0	182	411	98
Confl. Peds. (#/hr)	64		29	29		64	39		38	38		39
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		3			3		2	1		2	1	
Permitted Phases	3			3		3	1			1		1
Actuated Green, G (s)	25.7	25.7		25.7	25.7	25.7	36.8	28.8		36.8	28.8	28.8
Effective Green, g (s)	25.7	25.7		25.7	25.7	25.7	36.8	28.8		36.8	28.8	28.8
Actuated g/C Ratio	0.32	0.32		0.32	0.32	0.32	0.46	0.36		0.46	0.36	0.36
Clearance Time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
Lane Grp Cap (vph)	167	556		183	558	404	385	664		406	626	514
v/s Ratio Prot		0.23			c0.24		c0.08	0.21		0.04	0.24	
v/s Ratio Perm	0.10			0.04		0.07	c0.27			0.16		0.07
v/c Ratio	0.31	0.72		0.14	0.74	0.22	0.76	0.58		0.45	0.66	0.19
Uniform Delay, d1	20.4	24.0		19.3	24.2	19.8	23.8	20.7		20.1	21.5	17.6
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	4.7	7.8		1.6	8.7	1.3	13.1	3.6		3.6	5.3	0.8
Delay (s)	25.1	31.8		20.8	32.9	21.1	36.9	24.3		23.7	26.8	18.4
Level of Service	C	C		C	C	C	D	C		C	C	B
Approach Delay (s)		31.0			30.4			29.7			24.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	25	294	344	69	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.65	0.65	0.65	0.92	0.92
Hourly flow rate (vph)	38	452	529	106	0	0
Pedestrians					10	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320				
pX, platoon unblocked					0.79	
vC, conflicting volume	645				1122	592
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	645				1023	592
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				100	100
cM capacity (veh/h)	940				199	506

Direction, Lane #	EB 1	WB 1
Volume Total	491	635
Volume Left	38	0
Volume Right	0	106
cSH	940	1700
Volume to Capacity	0.04	0.37
Queue Length 95th (ft)	3	0
Control Delay (s)	1.2	0.0
Lane LOS	A	
Approach Delay (s)	1.2	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	177	124	272	0	0	387
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.60	0.60	0.84	0.84	0.60	0.92
Hourly flow rate (vph)	295	207	324	0	0	421
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			335			
pX, platoon unblocked	0.91	0.91			0.91	
vC, conflicting volume	756	336			336	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	682	220			220	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	21	72			100	
cM capacity (veh/h)	373	737			1213	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	295	207	324	421
Volume Left	295	0	0	0
Volume Right	0	207	0	0
cSH	373	737	1700	1700
Volume to Capacity	0.79	0.28	0.19	0.25
Queue Length 95th (ft)	168	29	0	0
Control Delay (s)	42.7	11.8	0.0	0.0
Lane LOS	E	B		
Approach Delay (s)	29.9		0.0	0.0
Approach LOS	D			

Intersection Summary			
Average Delay	12.1		
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	266	116	102	447
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.80	0.80	0.61	0.61
Hourly flow rate (vph)	0	0	332	145	167	733
Pedestrians	9					
Lane Width (ft)	0.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			117			
pX, platoon unblocked	0.83	0.83			0.83	
vC, conflicting volume	993	414			486	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	888	190			277	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			84	
cM capacity (veh/h)	198	680			1063	

Direction, Lane #	NB 1	SB 1	SB 2	SB 3
Volume Total	478	314	293	293
Volume Left	0	167	0	0
Volume Right	145	0	0	0
cSH	1700	1063	1700	1700
Volume to Capacity	0.28	0.16	0.17	0.17
Queue Length 95th (ft)	0	14	0	0
Control Delay (s)	0.0	5.5	0.0	0.0
Lane LOS		A		
Approach Delay (s)	0.0	1.9		
Approach LOS				

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	48	414	12	308	159	163	355	208	373	61
v/c Ratio	0.16	0.66	0.05	0.46	0.33	0.47	0.65	0.59	0.72	0.15
Control Delay	18.0	26.3	16.4	21.3	20.0	22.2	31.3	26.6	34.6	21.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	26.3	16.4	21.3	20.0	22.2	31.3	26.6	34.6	21.9
Queue Length 50th (ft)	15	166	4	113	55	45	154	60	166	22
Queue Length 95th (ft)	39	266	10	119	68	69	202	82	206	42
Internal Link Dist (ft)		494		240			555		37	
Turn Bay Length (ft)	220		185		185	110				
Base Capacity (vph)	305	631	237	667	475	344	542	350	517	415
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.66	0.05	0.46	0.33	0.47	0.65	0.59	0.72	0.15

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	225	160	8	197	102	127	260	17	156	280	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	10	10	10	12	12	10	10	12
Total Lost time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.94		1.00	1.00	0.84	1.00	0.99		1.00	1.00	0.88
Flpb, ped/bikes	0.92	1.00		0.95	1.00	1.00	0.99	1.00		0.97	1.00	1.00
Frt	1.00	0.94		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1512	1644		1561	1739	1239	1627	1823		1602	1739	1395
Flt Permitted	0.50	1.00		0.38	1.00	1.00	0.35	1.00		0.37	1.00	1.00
Satd. Flow (perm)	796	1644		620	1739	1239	595	1823		630	1739	1395
Peak-hour factor, PHF	0.93	0.93	0.93	0.64	0.64	0.64	0.78	0.78	0.78	0.75	0.75	0.75
Adj. Flow (vph)	48	242	172	12	308	159	163	333	22	208	373	61
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	48	414	0	12	308	159	163	355	0	208	373	61
Confl. Peds. (#/hr)	71		61	61		71	50		88	88		50
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		3			3		2	1		2	1	
Permitted Phases	3			3		3	1			1		1
Actuated Green, G (s)	30.7	30.7		30.7	30.7	30.7	31.8	23.8		31.8	23.8	23.8
Effective Green, g (s)	30.7	30.7		30.7	30.7	30.7	31.8	23.8		31.8	23.8	23.8
Actuated g/C Ratio	0.38	0.38		0.38	0.38	0.38	0.40	0.30		0.40	0.30	0.30
Clearance Time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
Lane Grp Cap (vph)	305	630		237	667	475	339	542		347	517	415
v/s Ratio Prot		c0.25			0.18		0.05	0.19		c0.06	c0.21	
v/s Ratio Perm	0.06			0.02		0.13	0.14			0.18		0.04
v/c Ratio	0.16	0.66		0.05	0.46	0.33	0.48	0.65		0.60	0.72	0.15
Uniform Delay, d1	16.2	20.3		15.5	18.5	17.4	24.4	24.5		25.1	25.1	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	1.1	5.3		0.4	2.3	1.9	4.8	6.1		7.5	8.4	0.7
Delay (s)	17.3	25.6		15.9	20.8	19.3	29.2	30.6		32.6	33.6	21.4
Level of Service	B	C		B	C	B	C	C		C	C	C
Approach Delay (s)		24.7			20.2			30.2			32.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	9	389	307	18	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.65	0.65	0.65	0.92	0.92
Hourly flow rate (vph)	14	598	472	28	0	0
Pedestrians					10	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320				
pX, platoon unblocked					0.91	
vC, conflicting volume	510				1122	496
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	510				1087	496
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	1055				216	574

Direction, Lane #	EB 1	WB 1
Volume Total	612	500
Volume Left	14	0
Volume Right	0	28
cSH	1055	1700
Volume to Capacity	0.01	0.29
Queue Length 95th (ft)	1	0
Control Delay (s)	0.4	0.0
Lane LOS	A	
Approach Delay (s)	0.4	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	89	50	366	0	0	428
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.60	0.60	0.86	0.86	0.85	0.85
Hourly flow rate (vph)	148	83	426	0	0	504
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			335			
pX, platoon unblocked	0.87	0.87			0.87	
vC, conflicting volume	941	438			438	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	860	284			284	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	47	87			100	
cM capacity (veh/h)	282	652			1104	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	148	83	426	504
Volume Left	148	0	0	0
Volume Right	0	83	0	0
cSH	282	652	1700	1700
Volume to Capacity	0.53	0.13	0.25	0.30
Queue Length 95th (ft)	71	11	0	0
Control Delay (s)	31.1	11.3	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	24.0		0.0	0.0
Approach LOS	C			

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	362	45	25	489
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.88	0.88	0.81	0.81
Hourly flow rate (vph)	0	0	411	51	31	604
Pedestrians	22					
Lane Width (ft)	0.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			117			
pX, platoon unblocked	0.84	0.84			0.84	
vC, conflicting volume	722	459			484	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	574	261			292	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			97	
cM capacity (veh/h)	366	620			1065	

Direction, Lane #	NB 1	SB 1	SB 2	SB 3
Volume Total	462	152	241	241
Volume Left	0	31	0	0
Volume Right	51	0	0	0
cSH	1700	1065	1700	1700
Volume to Capacity	0.27	0.03	0.14	0.14
Queue Length 95th (ft)	0	2	0	0
Control Delay (s)	0.0	1.9	0.0	0.0
Lane LOS		A		
Approach Delay (s)	0.0	0.5		
Approach LOS				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	52	420	14	392	171	247	384	160	303	53
v/c Ratio	0.22	0.65	0.06	0.63	0.28	0.56	0.65	0.43	0.54	0.11
Control Delay	21.0	23.9	18.0	26.7	4.4	21.2	29.2	18.8	26.6	19.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	23.9	18.0	26.7	4.4	21.2	29.2	18.8	26.6	19.9
Queue Length 50th (ft)	18	149	5	159	0	69	162	42	123	18
Queue Length 95th (ft)	46	247	16	233	33	114	252	76	201	44
Internal Link Dist (ft)		494		240			327		37	
Turn Bay Length (ft)	220		185		185	110				
Base Capacity (vph)	236	651	216	623	617	438	594	373	560	494
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.65	0.06	0.63	0.28	0.56	0.65	0.43	0.54	0.11

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	49	221	178	12	333	145	220	324	18	152	288	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	10	10	10	12	12	10	10	12
Total Lost time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1635	1715		1644	1739	1416	1647	1845		1647	1739	1533
Flt Permitted	0.38	1.00		0.35	1.00	1.00	0.47	1.00		0.36	1.00	1.00
Satd. Flow (perm)	659	1715		604	1739	1416	813	1845		621	1739	1533
Peak-hour factor, PHF	0.95	0.95	0.95	0.85	0.85	0.85	0.89	0.89	0.89	0.95	0.95	0.95
Adj. Flow (vph)	52	233	187	14	392	171	247	364	20	160	303	53
RTOR Reduction (vph)	0	36	0	0	0	110	0	0	0	0	0	0
Lane Group Flow (vph)	52	384	0	14	392	61	247	384	0	160	303	53
Confl. Peds. (#/hr)	11		5	5		11	6		9	9		6
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		3			3		2	1		2	1	
Permitted Phases	3			3		3	1			1		1
Actuated Green, G (s)	28.7	28.7		28.7	28.7	28.7	33.8	25.8		33.8	25.8	25.8
Effective Green, g (s)	28.7	28.7		28.7	28.7	28.7	33.8	25.8		33.8	25.8	25.8
Actuated g/C Ratio	0.36	0.36		0.36	0.36	0.36	0.42	0.32		0.42	0.32	0.32
Clearance Time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
Lane Grp Cap (vph)	236	615		216	623	507	426	595		364	560	494
v/s Ratio Prot		0.22			c0.23		c0.06	c0.21		0.04	0.17	
v/s Ratio Perm	0.08			0.02		0.04	0.19			0.14		0.03
v/c Ratio	0.22	0.62		0.06	0.63	0.12	0.58	0.65		0.44	0.54	0.11
Uniform Delay, d1	17.9	21.2		16.8	21.2	17.2	21.6	23.2		22.6	22.2	19.0
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	2.1	4.7		0.6	4.8	0.5	5.7	5.3		3.8	3.7	0.4
Delay (s)	20.0	25.9		17.4	26.0	17.7	27.2	28.5		26.4	26.0	19.5
Level of Service	C	C		B	C	B	C	C		C	C	B
Approach Delay (s)		25.3			23.3			28.0			25.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	389	490	12	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	423	533	13	0	0
Pedestrians					10	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320				
pX, platoon unblocked					0.95	
vC, conflicting volume	556				976	549
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	556				947	549
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1015				274	535

Direction, Lane #	EB 1	WB 1
Volume Total	425	546
Volume Left	2	0
Volume Right	0	13
cSH	1015	1700
Volume to Capacity	0.00	0.32
Queue Length 95th (ft)	0	0
Control Delay (s)	0.1	0.0
Lane LOS	A	
Approach Delay (s)	0.1	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	20	4	501	0	0	495
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.70	0.70	0.82	0.82	0.90	0.90
Hourly flow rate (vph)	29	6	611	0	0	550
Pedestrians	29					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	3					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			335			
pX, platoon unblocked	0.83	0.83			0.83	
vC, conflicting volume	1190	640			640	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1125	461			461	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	99			100	
cM capacity (veh/h)	182	483			885	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	29	6	611	550
Volume Left	29	0	0	0
Volume Right	0	6	0	0
cSH	182	483	1700	1700
Volume to Capacity	0.16	0.01	0.36	0.32
Queue Length 95th (ft)	14	1	0	0
Control Delay (s)	28.4	12.5	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	25.7		0.0	0.0
Approach LOS	D			

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	504	12	21	486
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.86	0.86	0.94	0.94
Hourly flow rate (vph)	0	0	586	14	22	517
Pedestrians	23					
Lane Width (ft)	0.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			117			
pX, platoon unblocked	0.81	0.81			0.81	
vC, conflicting volume	833	616			623	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	680	414			422	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			98	
cM capacity (veh/h)	305	478			922	

Direction, Lane #	NB 1	SB 1	SB 2	SB 3
Volume Total	600	126	207	207
Volume Left	0	22	0	0
Volume Right	14	0	0	0
cSH	1700	922	1700	1700
Volume to Capacity	0.35	0.02	0.12	0.12
Queue Length 95th (ft)	0	2	0	0
Control Delay (s)	0.0	1.8	0.0	0.0
Lane LOS		A		
Approach Delay (s)	0.0	0.4		
Approach LOS				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C – Proposed (2015) Conditions

- Synchro Reports

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	87	400	25	415	89	292	382	182	411	98
v/c Ratio	0.69	0.81	0.18	0.84	0.25	0.69	0.53	0.39	0.59	0.17
Control Delay	53.6	40.3	23.5	42.7	22.8	26.4	23.5	14.3	24.3	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.6	40.3	23.5	42.7	22.8	26.4	23.5	14.3	24.3	18.0
Queue Length 50th (ft)	37	179	9	188	33	73	152	42	164	32
Queue Length 95th (ft)	62	191	20	183	47	105	197	53	170	47
Internal Link Dist (ft)		494		240			555		37	
Turn Bay Length (ft)	220		185		185	200				
Base Capacity (vph)	143	556	160	558	404	427	733	475	696	572
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.72	0.16	0.74	0.22	0.68	0.52	0.38	0.59	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	190	86	16	270	58	228	287	11	118	267	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	10	10	10	12	12	10	10	12
Total Lost time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.90
Flpb, ped/bikes	0.95	1.00		0.97	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1564	1732		1610	1739	1260	1631	1846		1628	1739	1429
Flt Permitted	0.27	1.00		0.29	1.00	1.00	0.39	1.00		0.42	1.00	1.00
Satd. Flow (perm)	449	1732		499	1739	1260	664	1846		717	1739	1429
Peak-hour factor, PHF	0.69	0.69	0.69	0.65	0.65	0.65	0.78	0.78	0.78	0.65	0.65	0.65
Adj. Flow (vph)	87	275	125	25	415	89	292	368	14	182	411	98
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	87	400	0	25	415	89	292	382	0	182	411	98
Confl. Peds. (#/hr)	64		29	29		64	39		38	38		39
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	22.8	22.8		22.8	22.8	22.8	38.8	31.1		40.6	32.0	32.0
Effective Green, g (s)	22.8	22.8		22.8	22.8	22.8	38.8	31.1		40.6	32.0	32.0
Actuated g/C Ratio	0.29	0.29		0.29	0.29	0.29	0.48	0.39		0.51	0.40	0.40
Clearance Time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
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)	127	493		142	495	359	415	717		461	695	571
v/s Ratio Prot		0.23			c0.24		c0.07	0.21		0.04	0.24	
v/s Ratio Perm	0.19			0.05		0.07	c0.27			0.16		0.07
v/c Ratio	0.69	0.81		0.18	0.84	0.25	0.70	0.53		0.39	0.59	0.17
Uniform Delay, d1	25.4	26.6		21.5	26.9	22.0	22.4	18.8		16.8	18.9	15.5
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	14.2	9.8		0.6	11.8	0.4	5.3	2.8		0.6	3.7	0.7
Delay (s)	39.6	36.4		22.1	38.7	22.4	27.7	21.7		17.3	22.5	16.1
Level of Service	D	D		C	D	C	C	C		B	C	B
Approach Delay (s)		37.0			35.2			24.3			20.3	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	294	344	69	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.65	0.65	0.65	0.92	0.92
Hourly flow rate (vph)	0	452	529	106	0	0
Pedestrians					10	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320				
pX, platoon unblocked					0.80	
vC, conflicting volume	645				1045	592
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	645				934	592
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	940				237	506

Direction, Lane #	EB 1	WB 1
Volume Total	452	635
Volume Left	0	0
Volume Right	0	106
cSH	1700	1700
Volume to Capacity	0.27	0.37
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	177	124	272	0	0	387
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.60	0.60	0.84	0.84	0.60	0.92
Hourly flow rate (vph)	295	207	324	0	0	421
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			335			
pX, platoon unblocked	0.95	0.95			0.95	
vC, conflicting volume	756	336			336	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	716	273			273	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	21	71			100	
cM capacity (veh/h)	372	718			1210	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	295	207	324	421
Volume Left	295	0	0	0
Volume Right	0	207	0	0
cSH	372	718	1700	1700
Volume to Capacity	0.79	0.29	0.19	0.25
Queue Length 95th (ft)	169	30	0	0
Control Delay (s)	43.1	12.0	0.0	0.0
Lane LOS	E	B		
Approach Delay (s)	30.3		0.0	0.0
Approach LOS	D			

Intersection Summary			
Average Delay	12.2		
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	266	141	102	447
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.80	0.80	0.61	0.61
Hourly flow rate (vph)	0	0	332	176	167	733
Pedestrians	9					
Lane Width (ft)	0.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			117			
pX, platoon unblocked	0.81	0.81			0.81	
vC, conflicting volume	1008	430			518	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	897	187			295	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			84	
cM capacity (veh/h)	191	671			1030	

Direction, Lane #	NB 1	SB 1	SB 2	SB 3
Volume Total	509	314	293	293
Volume Left	0	167	0	0
Volume Right	176	0	0	0
cSH	1700	1030	1700	1700
Volume to Capacity	0.30	0.16	0.17	0.17
Queue Length 95th (ft)	0	14	0	0
Control Delay (s)	0.0	5.6	0.0	0.0
Lane LOS		A		
Approach Delay (s)	0.0	2.0		
Approach LOS				

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	58	414	12	308	159	163	355	208	373	61
v/c Ratio	0.26	0.81	0.08	0.57	0.41	0.39	0.51	0.49	0.55	0.11
Control Delay	21.8	37.7	18.0	26.6	23.9	16.6	23.9	19.1	25.1	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	37.7	18.0	26.6	23.9	16.6	23.9	19.1	25.1	19.3
Queue Length 50th (ft)	21	186	4	126	62	39	132	51	142	19
Queue Length 95th (ft)	47	266	10	119	68	69	202	82	206	42
Internal Link Dist (ft)		494		240			555		37	
Turn Bay Length (ft)	220		185		185	200				
Base Capacity (vph)	278	631	194	667	475	445	701	451	675	542
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.66	0.06	0.46	0.33	0.37	0.51	0.46	0.55	0.11

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	225	160	8	197	102	127	260	17	156	280	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	10	10	10	12	12	10	10	12
Total Lost time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.94		1.00	1.00	0.84	1.00	0.99		1.00	1.00	0.88
Flpb, ped/bikes	0.92	1.00		0.95	1.00	1.00	0.98	1.00		0.96	1.00	1.00
Frt	1.00	0.94		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1516	1644		1566	1739	1239	1619	1823		1588	1739	1395
Flt Permitted	0.46	1.00		0.31	1.00	1.00	0.42	1.00		0.44	1.00	1.00
Satd. Flow (perm)	728	1644		507	1739	1239	723	1823		744	1739	1395
Peak-hour factor, PHF	0.93	0.93	0.93	0.64	0.64	0.64	0.78	0.78	0.78	0.75	0.75	0.75
Adj. Flow (vph)	58	242	172	12	308	159	163	333	22	208	373	61
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	58	414	0	12	308	159	163	355	0	208	373	61
Confl. Peds. (#/hr)	71		61	61		71	50		88	88		50
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	24.9	24.9		24.9	24.9	24.9	37.3	30.8		37.9	31.1	31.1
Effective Green, g (s)	24.9	24.9		24.9	24.9	24.9	37.3	30.8		37.9	31.1	31.1
Actuated g/C Ratio	0.31	0.31		0.31	0.31	0.31	0.47	0.39		0.47	0.39	0.39
Clearance Time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
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)	226	511		157	541	385	409	701		424	676	542
v/s Ratio Prot		c0.25			0.18		0.03	0.19		c0.04	c0.21	
v/s Ratio Perm	0.08			0.02		0.13	0.15			0.19		0.04
v/c Ratio	0.26	0.81		0.08	0.57	0.41	0.40	0.51		0.49	0.55	0.11
Uniform Delay, d1	20.6	25.4		19.4	23.1	21.8	18.4	18.8		18.6	19.0	15.6
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	0.6	9.4		0.2	1.4	0.7	0.6	2.6		0.9	3.2	0.4
Delay (s)	21.2	34.8		19.6	24.4	22.5	19.1	21.4		19.5	22.3	16.0
Level of Service	C	C		B	C	C	B	C		B	C	B
Approach Delay (s)		33.1			23.7			20.7			20.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	389	307	18	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.65	0.65	0.65	0.92	0.92
Hourly flow rate (vph)	0	598	472	28	0	0
Pedestrians					10	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320				
pX, platoon unblocked					0.93	
vC, conflicting volume	510				1095	496
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	510				1063	496
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1055				229	574

Direction, Lane #	EB 1	WB 1
Volume Total	598	500
Volume Left	0	0
Volume Right	0	28
cSH	1700	1700
Volume to Capacity	0.35	0.29
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	89	50	366	0	0	428
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.60	0.60	0.86	0.86	0.85	0.85
Hourly flow rate (vph)	148	83	426	0	0	504
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			335			
pX, platoon unblocked	0.90	0.90			0.90	
vC, conflicting volume	941	438			438	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	878	318			318	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	48	87			100	
cM capacity (veh/h)	283	642			1104	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	148	83	426	504
Volume Left	148	0	0	0
Volume Right	0	83	0	0
cSH	283	642	1700	1700
Volume to Capacity	0.52	0.13	0.25	0.30
Queue Length 95th (ft)	71	11	0	0
Control Delay (s)	30.9	11.4	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	23.9		0.0	0.0
Approach LOS	C			

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	362	54	25	489
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.88	0.88	0.81	0.81
Hourly flow rate (vph)	0	0	411	61	31	604
Pedestrians	22					
Lane Width (ft)	0.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			117			
pX, platoon unblocked	0.85	0.85			0.85	
vC, conflicting volume	727	464			495	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	595	287			322	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			97	
cM capacity (veh/h)	361	606			1054	

Direction, Lane #	NB 1	SB 1	SB 2	SB 3
Volume Total	473	152	241	241
Volume Left	0	31	0	0
Volume Right	61	0	0	0
cSH	1700	1054	1700	1700
Volume to Capacity	0.28	0.03	0.14	0.14
Queue Length 95th (ft)	0	2	0	0
Control Delay (s)	0.0	1.9	0.0	0.0
Lane LOS		A		
Approach Delay (s)	0.0	0.5		
Approach LOS				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	54	420	14	392	171	247	384	160	303	53
v/c Ratio	0.35	0.79	0.10	0.78	0.32	0.47	0.51	0.36	0.43	0.09
Control Delay	27.5	33.1	20.2	37.1	5.0	15.9	22.3	14.4	21.5	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.5	33.1	20.2	37.1	5.0	15.9	22.3	14.4	21.5	18.0
Queue Length 50th (ft)	21	164	5	176	0	59	142	36	108	16
Queue Length 95th (ft)	50	247	16	233	33	114	252	76	201	44
Internal Link Dist (ft)		494		240			555		37	
Turn Bay Length (ft)	220		185		185	200				
Base Capacity (vph)	191	651	167	623	617	545	756	472	703	620
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.65	0.08	0.63	0.28	0.45	0.51	0.34	0.43	0.09

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	221	178	12	333	145	220	324	18	152	288	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	10	10	10	12	12	10	10	12
Total Lost time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.96	1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1635	1715		1645	1739	1416	1646	1845		1646	1739	1533
Flt Permitted	0.31	1.00		0.27	1.00	1.00	0.52	1.00		0.43	1.00	1.00
Satd. Flow (perm)	536	1715		468	1739	1416	893	1845		737	1739	1533
Peak-hour factor, PHF	0.95	0.95	0.95	0.85	0.85	0.85	0.89	0.89	0.89	0.95	0.95	0.95
Adj. Flow (vph)	54	233	187	14	392	171	247	364	20	160	303	53
RTOR Reduction (vph)	0	40	0	0	0	122	0	0	0	0	0	0
Lane Group Flow (vph)	54	380	0	14	392	49	247	384	0	160	303	53
Confl. Peds. (#/hr)	11		5	5		11	6		9	9		6
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	23.1	23.1		23.1	23.1	23.1	39.8	32.8		39.0	32.4	32.4
Effective Green, g (s)	23.1	23.1		23.1	23.1	23.1	39.8	32.8		39.0	32.4	32.4
Actuated g/C Ratio	0.29	0.29		0.29	0.29	0.29	0.50	0.41		0.49	0.40	0.40
Clearance Time (s)	6.3	6.3		6.3	6.3	6.3	5.0	6.2		5.0	6.2	6.2
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)	154	495		135	502	408	510	756		434	704	620
v/s Ratio Prot		0.22			c0.23		c0.04	c0.21		0.03	0.17	
v/s Ratio Perm	0.10			0.03		0.03	0.20			0.15		0.03
v/c Ratio	0.35	0.77		0.10	0.78	0.12	0.48	0.51		0.37	0.43	0.09
Uniform Delay, d1	22.5	26.0		20.9	26.1	21.0	15.8	17.6		17.1	17.2	14.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.4	7.0		0.3	7.7	0.1	0.7	2.4		0.5	1.9	0.3
Delay (s)	23.9	33.0		21.2	33.9	21.1	16.5	20.0		17.7	19.1	14.9
Level of Service	C	C		C	C	C	B	C		B	B	B
Approach Delay (s)		32.0			29.8			18.7			18.2	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	389	490	12	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	423	533	13	0	0
Pedestrians					10	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320				
pX, platoon unblocked					0.96	
vC, conflicting volume	556				972	549
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	556				948	549
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1015				277	535

Direction, Lane #	EB 1	WB 1
Volume Total	423	546
Volume Left	0	0
Volume Right	0	13
cSH	1700	1700
Volume to Capacity	0.25	0.32
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	20	4	501	0	0	495
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.70	0.70	0.82	0.82	0.90	0.90
Hourly flow rate (vph)	29	6	611	0	0	550
Pedestrians	29					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	3					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			335			
pX, platoon unblocked	0.85	0.85			0.85	
vC, conflicting volume	1190	640			640	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1136	490			490	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	99			100	
cM capacity (veh/h)	185	479			889	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	29	6	611	550
Volume Left	29	0	0	0
Volume Right	0	6	0	0
cSH	185	479	1700	1700
Volume to Capacity	0.15	0.01	0.36	0.32
Queue Length 95th (ft)	13	1	0	0
Control Delay (s)	28.0	12.6	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	25.4		0.0	0.0
Approach LOS	D			

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	504	14	21	486
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.86	0.86	0.94	0.94
Hourly flow rate (vph)	0	0	586	16	22	517
Pedestrians	23					
Lane Width (ft)	0.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			117			
pX, platoon unblocked	0.83	0.83			0.83	
vC, conflicting volume	834	617			625	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	700	439			449	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			98	
cM capacity (veh/h)	303	471			922	

Direction, Lane #	NB 1	SB 1	SB 2	SB 3
Volume Total	602	126	207	207
Volume Left	0	22	0	0
Volume Right	16	0	0	0
cSH	1700	922	1700	1700
Volume to Capacity	0.35	0.02	0.12	0.12
Queue Length 95th (ft)	0	2	0	0
Control Delay (s)	0.0	1.8	0.0	0.0
Lane LOS		A		
Approach Delay (s)	0.0	0.4		
Approach LOS				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	30.8%	ICU Level of Service	A
Analysis Period (min)	15		