



Short Term Transportation Action Plan Update

November 2013

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EXECUTIVE SUMMARY









MMM Group was commissioned by the Municipality of Leamington to update the Short Term Transportation Action Plan originally prepared in 2007. The recommendations presented in the 2007 report were revisited in light of actions taken by the Municipality since the original report and in light of current traffic conditions documented in the first half of 2013.













The report provides updated analysis of existing conditions and recommendations for specific operational issues, intersections and corridors of specific concern, uncontrolled pedestrian crossings, policies for establishing posted speed limits, guidelines for curb extensions as well as other policy issues such as traffic calming, on-street parking, bike lanes, bridge warning signs, rural private entrances and community safety zones.









Recommendations

The recommendations of the report have been summarized in **Table 1**. Each recommendation has been ranked according to its priority, cost and level of effort required for implementation.

Table 1: Prioritization of Recommendations

Recommendation	Rank ¹	Cost ²	Effort ³	Action(s) Recommended
Operational Issues of Signalized Intersections				
Erie Street at Wilkinson Drive	1	\$		<ul style="list-style-type: none">Optimize signal timings
Erie Street at Oak Street				
Erie Street at Seaclyff Drive				
Talbot Street at Oak Street / Fraser Road				
Talbot Street at Lutsch Avenue				
Operational Issues of Unsignalized Intersections				
Erie Street at Marlborough Street	--	--	--	<ul style="list-style-type: none">Based on analysis, do not install traffic signals
Danforth Avenue at Oak Street				
Sherk Street at Seaclyff Drive				
Lutsch Avenue at Oak Street				
Intersections and Corridors of Specific Concern				
Oak Street at Wigle Street	2	\$\$\$		<ul style="list-style-type: none">Install Intersection Pedestrian Signal
Erie Street at Clark Street	2	\$\$\$		<ul style="list-style-type: none">Signalize intersection
Seaclyff Drive at Sherk Street	2	\$\$\$		<ul style="list-style-type: none">Consider traffic calming measures such as narrowing Coronation Avenue by installing pedestrian and cycling infrastructure and lane markings
Sherk Access for Kinsmen Recreational Complex	1	\$\$		<ul style="list-style-type: none">Install centre median, explore the option of removing access at William Ave.
Erie Street South Turn Around	1	\$\$\$		<ul style="list-style-type: none">Redesign the Erie St. turnaround
Northbound Left Turn Restrictions at Erie and John Street and Erie and Russell Streets	1	\$		<ul style="list-style-type: none">Prohibit left turns during the peak hours
Aiuto Drive Extension	3	\$\$		<ul style="list-style-type: none">Consider acquisition of easement lands to construct a pedestrian linkage

Recommendation	Rank ¹	Cost ²	Effort ³	Action(s) Recommended
Elliott Street	2	\$		<ul style="list-style-type: none"> Prohibit on-street parking during peak traffic hours (i.e. Monday to Friday, from 7 a.m. to 9 a.m., 11:30 a.m. to 1:30 p.m. and 4 p.m. to 6 p.m.)
Heinz Access on Oak Street near Victoria Avenue	3	\$\$\$		<ul style="list-style-type: none"> Direct trucks to use designated truck route, consider shifting access east to align with Victoria Avenue
Left Turn Slip-Around Treatment for Seaciff at Sherk and Seaciff at Fraser T-Intersection	3	\$\$\$		<ul style="list-style-type: none"> Construct left turn slip around treatments
County Road 37 at Deer Run Road	2	\$		<ul style="list-style-type: none"> Designate stretch of Fox Run Rd. eastbound only
Deer Run Road at Mersea Road 21	2	\$\$\$		<ul style="list-style-type: none"> Acquire land and maintain to improve sight lines
Fox Run Road at Lakeshore Drive	2	\$\$\$		<ul style="list-style-type: none"> Acquire land and maintain to improve sight lines, install hidden intersection signs
Mersea Road 12 at Point Pelee Drive (County Road 33)	2	\$\$		<ul style="list-style-type: none"> Re-define intersection by removing excess pavement, curbing and painting travel lanes
Bevel Line (County Road 33) Speed Limit	2	\$		<ul style="list-style-type: none"> The speed limit on Bevel Line for the section from Seaciff Drive to the limit of the urban area should be maintained at 50 km/h. The speed limit for remaining portion of Bevel Line to its intersection with Point Pelee Drive should be considered to be reduced to 50 km/h
Mersea Road 12 at Talbot Road	3	\$\$\$		<ul style="list-style-type: none"> Realign intersection by shifting Mersea Rd. 12
Signal Cycle Lengths				
Signal Coordination	1	\$		<ul style="list-style-type: none"> Coordinate signals
Speeding				
Conduct speed studies	2	\$\$		<ul style="list-style-type: none"> Conduct speed studies
Traffic Calming				
Implement traffic calming warrant	1	\$		<ul style="list-style-type: none"> Implement traffic calming warrant
On Street Parking				
Parking controls	1	\$		<ul style="list-style-type: none"> Implement parking controls
Bike Lanes				
Prepare Active Transportation Master Plan	1	\$		<ul style="list-style-type: none"> Prepare Active Transportation Master Plan
Bridge Warning Signs				
Complete pavement markings	1	\$		<ul style="list-style-type: none"> Complete pavement markings
Rural Private Entrances				
Implement Design Standard	3	\$		<ul style="list-style-type: none"> Implement a design standard requiring 4:1 end slope
Community Safety Zones				
Prepare Community Safety Zone Policy	1	\$		<ul style="list-style-type: none"> Prepare a Community Safety Zone Policy and warrant
Uncontrolled Pedestrian Crossing Facilities				
Queens Avenue at Trail	1	\$		<ul style="list-style-type: none"> Install courtesy crossing signage Post speed limit in vicinity of uncontrolled crossing
Talbot Street West at Leamington District Secondary School	1	\$		<ul style="list-style-type: none"> Maintain pedestrian crossing Replace current signage Update school speed zone signs

Recommendation	Rank ¹	Cost ²	Effort ³	Action(s) Recommended
Talbot Street East at Cedar Drive	1	\$		<ul style="list-style-type: none"> Remove pavement markings
Princess Street at The Princess Centre (south of Mill Street East)	1	\$		<ul style="list-style-type: none"> Install courtesy crossing signage Post speed limit in vicinity of uncontrolled crossing
Erie Street South at Heinz Plant	1	\$		<ul style="list-style-type: none"> Short term: <ul style="list-style-type: none"> Install courtesy crossing signage Repaint the crossing Post speed limits in vicinity of uncontrolled crossing Long Term: <ul style="list-style-type: none"> Conduct a mid-block pedestrian crossing assessment to inform the construction of the pedestrian signal at this mid-block crossing location.
Pulford Avenue at Trail	2	\$		<ul style="list-style-type: none"> Post speed limit in vicinity of uncontrolled crossing
Robson Road at Trail	2	\$		<ul style="list-style-type: none"> Post speed limit in vicinity of uncontrolled crossing
Robson Road at Erie Shores Golf Club	1	\$		<ul style="list-style-type: none"> Install courtesy crossing signage Post speed limit in vicinity of uncontrolled crossing
Policies for Establishing Posted Speed Limits				
Make Adjustments to Policy for Establishing Posted Speed Limits	1	\$		<ul style="list-style-type: none"> Changes in speed limit to be in 10km/h increments Where speed limit changes at an intersection, signage should be installed before and after intersection
General Design and Application Guidelines for Curb Extensions				
Install as Appropriate	2	\$\$		<ul style="list-style-type: none"> Install curb extensions at appropriate locations

Notes:




1. Rank

1 – Most important, begin immediately
2 – More important, make necessary plans for implementation
3 – Important, complete after more important projects are completed

2. Cost

\$ - Low financial cost of improvement/implementation is minimal (0 ≥ 25k)
\$\$ - Low to moderate financial cost of improvement/implementation (25 ≥ 50k)
\$\$\$ - High financial cost of improvement/implementation (> 50k)

3. Effort/Time to Complete

 - Implementation ready, little effort required for implementation (0-3 months)
 - Moderate effort required for implementation (3-6 months)
 - Large effort required, additional study may be required (6+ months)

1 INTRODUCTION

Leamington, located in Essex County, Ontario, is a stable municipality experiencing modest growth with a healthy downtown centre surrounded by a varied residential environment of older and newer residential neighbourhoods. As with any growing municipality, the Municipality of Leamington is feeling the pressures of traffic congestion and other transportation issues due to population growth and the accompanying increased level of auto traffic. Based on census data obtained from Statistics Canada, the Municipality grew by approximately 4.3 % from 2001 to 2011 with a current population of 28,400 people. The 2012 *County of Essex Official Plan Review* identified the Municipality of Leamington as a primary settlement area for the County and as a potential high density housing market as the County plans for growth to year 2031. As expressed in Background Report for the County of Essex Official Plan Review (November 2012), it is forecast that Leamington will experience a steady growth in households and employment leading up to the year 2031.

The growth of traffic volumes in Leamington is constrained by the fact that Erie Street is the only continuous north/south arterial, and is the main corridor that carries all north/south traffic movements through the downtown core. Erie Street must accommodate numerous conflicting demands including through traffic destined into or out of town, commercial traffic related to the stores along Erie Street itself and tourist traffic heading to the Leamington Dock. Congestion on main routes such as Erie Street tends to push traffic into neighbourhoods, creating the potential for conflicts with residents. Many of the older streets have narrow right-of-way widths, which carry limited opportunities for road improvements.

1.1 Scope of the Report

MMM Group Ltd. has been commissioned by the Municipality of Leamington to prepare this update of the short term and long range transportation plans. The original transportation plans were prepared by MMM Group in June of 2007.

This study provides an updated analysis of the transportation network defined in the original study and reflects current (year 2013) conditions with respect to traffic volumes, recent developments and road improvements. Road issues and recommendations identified in the original study have been reviewed to determine if further improvements are required to address any new or previously identified operational concerns.

This report documents the following:

- Road and transit network for the study area;
- Data collection process;
- An analysis of existing traffic conditions at the 41 specified intersections using the Synchro 8 traffic analysis software in order to define baseline conditions. The baseline conditions will provide an existing benchmark against which future conditions can be compared. This is crucial in order to determine the impacts of future network improvement recommendations included as part of this document as well as the long term modeling of future transportation conditions;
- An update of the 2007 short term action plan, including recommendations on the following topics:
 - Operational issues at signalized and unsignalized intersections;

- Intersections and corridors of specific concern;
- Signal cycle lengths;
- Speeding issues;
- Traffic calming;
- On-street parking;
- Bike lanes;
- Bridge warning signs;
- Rural private entrances;
- Community safety zones;
- Uncontrolled pedestrian crossing facilities;
- Signalized pedestrian crossing facilities;
- Policies for establishing posted speed limits; and
- General design and application guidelines for curb extensions.

2 EXISTING ROAD AND TRANSIT NETWORK

This section summarizes the existing road and transit networks in Leamington.

2.1 Road Network

Streets perform a variety of functions, ranging from the provision of direct access to adjoining properties, to the provision of capacity to accommodate through traffic over longer distances. These functions are recognized by the application of different road classifications: highway, freeway, arterial, collector and local. For this assessment, the focus has been on the County and Municipality road network, comprised primarily of arterial and collector roads. The details of the study area road network are summarized in **Table 2**.

Table 2: Summary of Study Area Road Network

Road	Cross-Section	Abutting Land Use / Form of Access
Highways		
Highway 3	2 lanes	Mixed commercial/residential; Direct access
Highway 77	2 lanes	Mixed commercial/residential; Mixture of direct and consolidated access
Arterial Roads		
Erie Street	2 to 4 lanes	Primarily commercial; Direct access
Talbot Street (County Road 34)	2 lanes to 3 lanes (approx. 2 ½ km section)	Mixed commercial/residential; Mixture of direct and consolidated access
Oak Street West (County Road 48)	2 lanes to 4 lanes (approx. 500m section)	Mixed commercial/residential; Mixture of direct and consolidated access
Oak Street East	2 lanes	Mixed commercial/residential; Mixture of direct and consolidated access
Seacliff Drive (County Road 20)	2 lanes to 3 lanes (approx. 700m section)	Primarily residential; Direct access
Bevel Line (County Road 33)	2 lanes	Mixed recreational/agricultural; Direct access
County Road 33 (Pelee Island Road)	2 lanes	Residential/agricultural; Direct access
Fraser Road	2 lanes	Residential/agricultural; Direct access
Sherk Street	2 lanes	Mixed industrial/commercial/residential; Direct access
Morse Road	2 lanes	Primarily agricultural; Direct access
Collector Roads		
Robson Road	2 lanes	Direct access
Danforth Avenue	2 lanes	Direct access
Wigle Street	2 lanes	Direct access
Pulford Avenue	2 lanes	Direct access
Victoria Street	2 lanes	Direct access
Deer Run Road	2 lanes	Direct access

2.2 Transit Network

The Municipality of Leamington, through Leamington Transit, provides transit service on regular routes from 7 a.m. to 7 p.m., Monday to Saturday, with no transit service provided on Sundays or public holidays. Service is provided hourly and connects points of interest within the Municipality's urban area. The primary transit route is shown in **Figure 1**. Erie Shores Community Transit service provides door-to-door transit service for the elderly and disabled to destinations within Essex County.

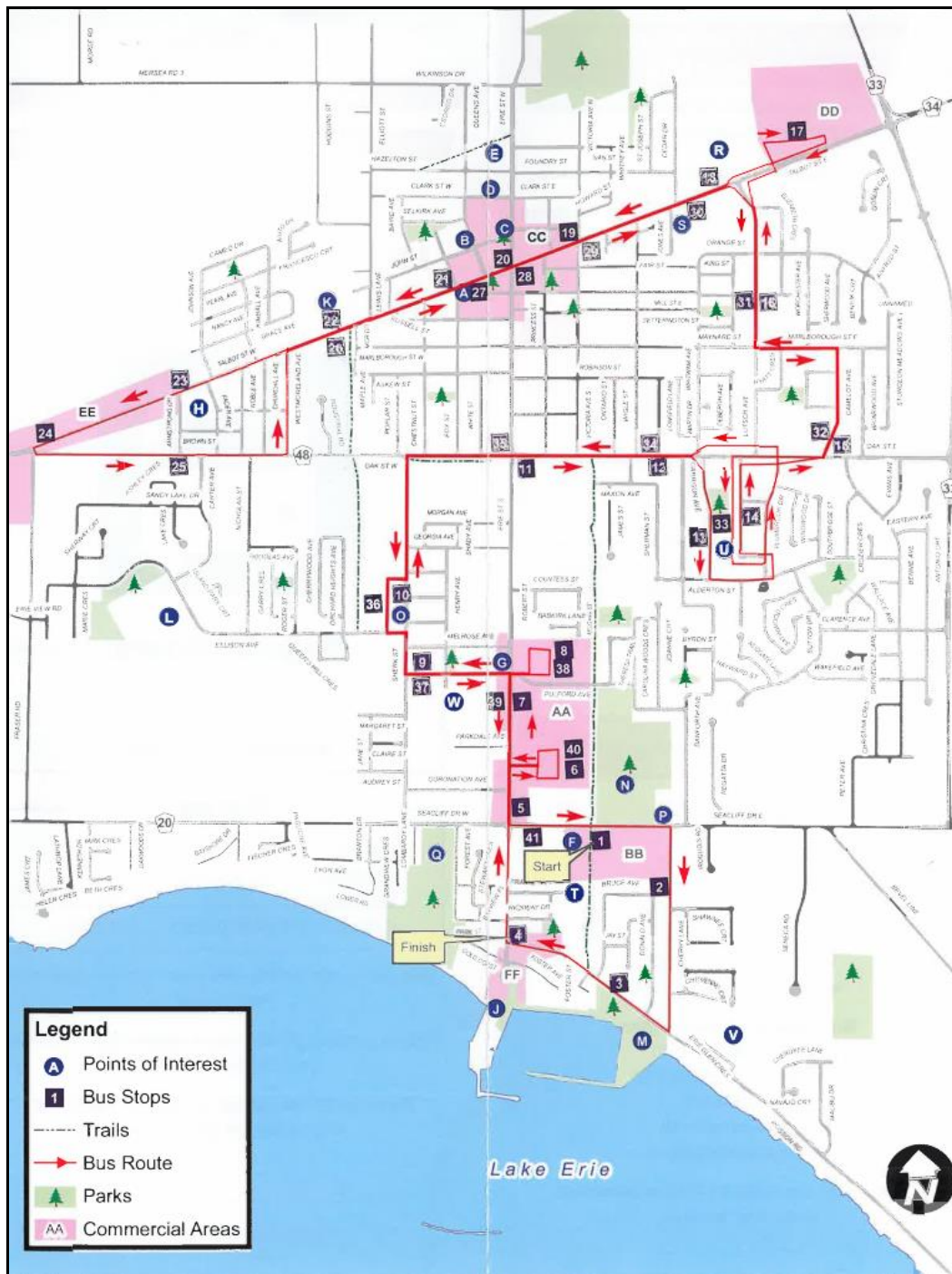


Figure 1: Leamington Transit Route

3 DATA COLLECTION

A significant amount of data collection was undertaken in order to obtain peak hour traffic volumes at numerous key intersections. Key intersections were selected according to traffic volumes, public dissatisfaction or at strategic locations required for the purpose of the long-term transportation model. Peak period traffic counts were undertaken from 7 a.m. to 9 a.m. and 4 p.m. to 6 p.m. for each of the intersections.

Table 3 summarizes the intersections for which turning movement counts (TMCs) were collected as well as the date that the counts were undertaken. Due to all counts being collected in the winter season, all traffic volumes collected were adjusted to account for seasonal variation. Seasonal variation refers to the fact that traffic volumes are typically lower during the winter months relative to the summer months. The traffic volumes were increased by 10% based on a comparison of the Ontario Ministry of Transportation's (MTO) annual average daily traffic (AADT) data and the summer annual daily traffic (SADT) data along Highway 3 in Leamington.

Figure 2 identifies the intersection locations of the traffic counts. It should be noted that some of the count locations are not identified since they were completed in rural areas, outside the boundaries of the map.

Table 3: Intersection Turning Movement Counts

#	Intersection	Count Date	#	Intersection	Count Date
1	Erie Street at Highway 3 (Bypass)	Jan. 15, 2013	21	Princess Street at Robinson Street	Jan. 17, 2013
2	Erie Street at Wilkinson Drive	Jan. 17, 2013	22	Lutsch Avenue at Mill Street	Jan. 24, 2013
3	Erie Street at Talbot Street	Jan. 15, 2013	23	Worcester Avenue at Orange Street	Jan. 23, 2013
4	Erie Street at Mill Street	Jan. 17, 2013	24	Wigle Street at Oak Street	Jan. 16, 2013
5	Erie Street at Oak Street	Jan. 31, 2013	25	Danforth Avenue at Oak Street	Jan. 17, 2013
6	Erie Street at Pulford Avenue	Jan. 16, 2013	26	Erie Street at Robson Road	Jan. 17, 2013
7	Erie Street at Seaclyff Drive	Jan. 16, 2013	27	Erie Street at Park Street	Jan. 15, 2013
8	Sherk Street at Oak Street	Jan. 24, 2013	28	Sherk Street at Seaclyff Drive	Jan. 23, 2013
9	Elliott Street at Talbot Street	Jan. 24, 2013	29	Lutsch Avenue at Oak Street	Jan. 16, 2013
10	Talbot Street at Oak Street at Fraser Road	Jan. 15, 2013	30	Talbot Street at MCR Drive	Jan. 17, 2013
11	Lutsch Avenue at Talbot Street	Jan. 23, 2013	31	Seaclyff Drive at Bevel Line Road	Jan. 30, 2013
12	Sherk Street at Ellison Avenue	Jan. 31, 2013	32	Elliott Street at Wilkinson Drive	Jan. 16, 2013
13	Theresa Trail at Pulford Avenue	Jan. 31, 2013	33	Fox Run Road at Deer Run Road (South Talbot Road)	Jan. 15, 2013
14	Danforth Avenue at Seaclyff Drive	Jan. 23, 2013	34	Morse Road at County Road 18 (4 th Concession)	Jan. 15, 2013
15	Cherry Lane at Seaclyff Drive	Jan. 17, 2013	35	Mersea Road 12 at Mersea Road 2 (Oak Street)	Jan. 30, 2013
16	Victoria Street at Oak Street	Jan. 15, 2013	36	Mersea Road 12 (Noble Sideroad) at County Road 33 (Pelee Drive)	Jan. 30, 2013
17	Erie Street at Clark Street	Jan. 16, 2013	37	County Road 37 at Fox Run Road	Jan. 23, 2013
18	Westmoreland Avenue at Talbot Street	Jan. 15, 2013	38	Lakeshore Drive at Fox Run Road	Jan. 24, 2013
19	Highway 3 (Bypass) at Talbot Street	Jan. 17, 2013	39	Mersea Road 21 (Watson Sideroad) at Deer Run Road	Jan. 23, 2013
20	Erie Street at Marlborough Street	Jan. 16, 2013	40	Mersea Road 12 at Mersea Road 5	Jan. 24, 2013
			41	Lutsch Avenue at Marlborough Street	Jan. 22, 2013

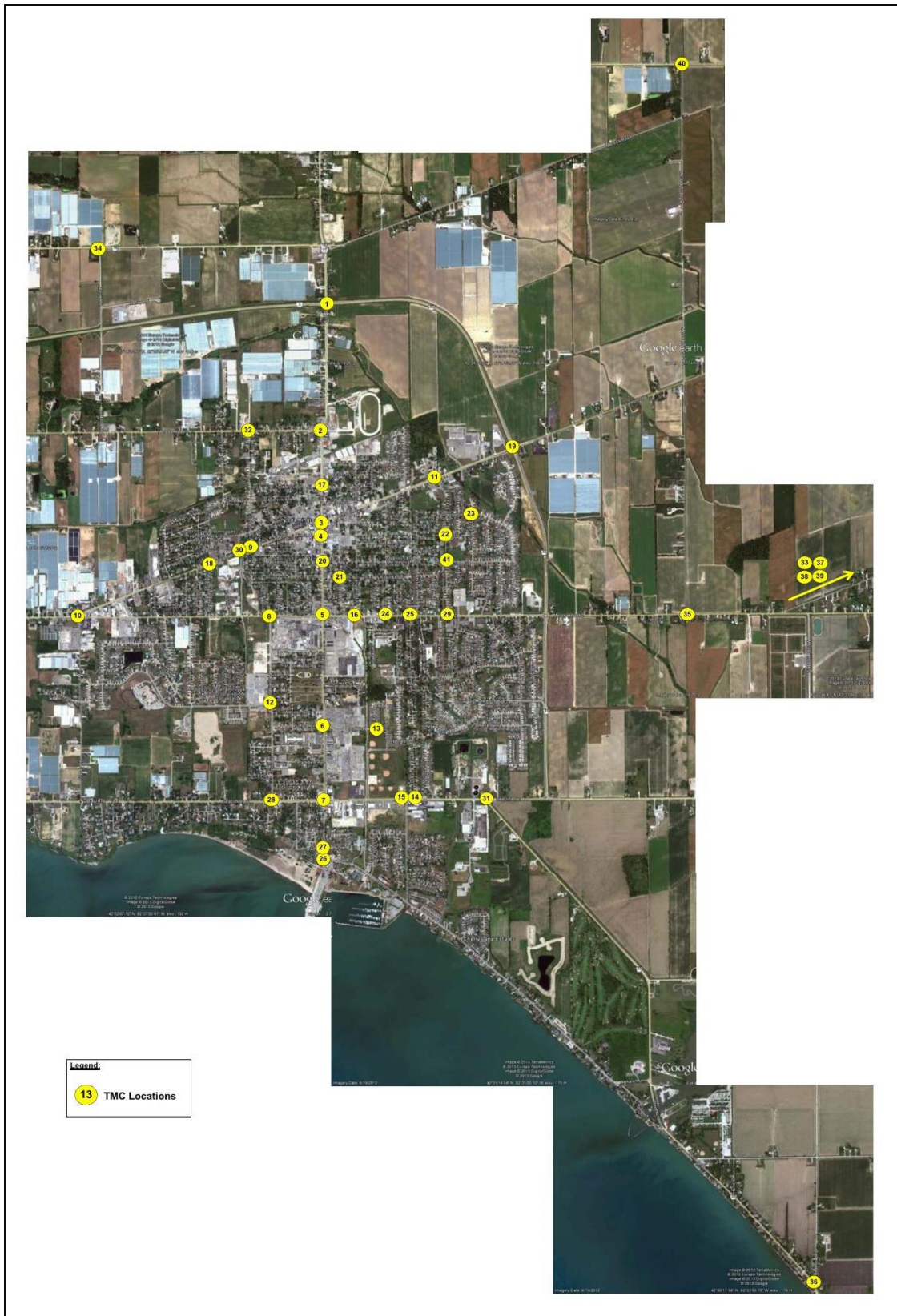


Figure 2: Turning Movement Count Locations

4 ASSESSMENT OF EXISTING TRAFFIC OPERATIONS

Intersection capacity analyses were completed using the Synchro 8 software package in order to analyze existing traffic operations in the study area. The analysis was undertaken to analyze traffic conditions during the weekday a.m. and p.m. peak hours. The analysis was based on January 2013 turning movement count data, adjusted for seasonal variation. For signalized intersections, signal timing information was provided by the Municipality of Leamington, County of Essex and MTO.

The Level of Service (LOS) for an intersection provides an indication of the quality of traffic operations and is based upon vehicle delay. For smaller municipalities such as Leamington, Levels of Service of 'A', 'B' or 'C' are considered to represent acceptable intersection operations. Levels of Service 'D', 'E' or 'F' are considered to represent more congested intersection conditions with longer vehicle delays. Improvements should be considered to these intersections in order to improve the levels of service. The Level of Service based on the intersection delay is quantitatively defined in the HCM 2010, as shown in **Table 4** for signalized and unsignalized intersections. Further definitions of LOS at signalized and unsignalized intersections are provided in **Appendix A**.

Table 4: Level of Service Criteria for Signalized and Unsignalized Intersections

Level of Service	Delay per Vehicle (in seconds per Vehicle)	
	Signalized Intersection	Unsignalized Intersection
A	< (or equal to) 10 seconds	< (or equal to) 10 seconds
B	> 10 to 20 seconds	> 10 to 15 seconds
C	> 20 to 35 seconds	> 15 to 25 seconds
D	> 35 to 55 seconds	> 25 to 35 seconds
E	> 55 to 80 seconds	> 35 to 50 seconds
F	> 80 seconds	> 50 seconds

Intersections are also assessed based on volume-to-capacity ratios of specific movements. The volume-to-capacity (v/c) ratio is a measure of the volume of traffic in a particular lane or group of lanes compared to the capacity of that lane or group of lanes. The theoretical capacity of a single lane is based on the maximum number of vehicles that can use the lane in one hour. This theoretical capacity decreases as a result of external factors such as narrow roads, traffic signals and on-street parking. Any v/c ratio greater than or equal to 1.0 indicates that the approach is operating above capacity. A v/c ratio of 0.85 or higher is seen as a critical movement. Improvements should be considered to provide additional capacity at these intersections.

The analysis of signalized intersection operations for the Leamington area under existing conditions is summarized in **Table 5**. The detailed results of the Synchro analysis for the a.m. and p.m. peak hours under existing conditions are presented in **Appendix B**.

Table 5: Intersection Capacity Analysis – Signalized Intersections

No.	Intersection	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS (Delay in seconds)	Critical Movements ¹ (V/C Ratio)	LOS (Delay in seconds)	Critical Movements ¹ (V/C Ratio)
1	Erie Street at Highway 3 (Bypass)	B (14)		B (18)	
2	Erie Street at Wilkinson Drive	C (25)		C (33)	SB-T (1.01)
3	Erie Street at Talbot Street	C (21)		C (27)	
4	Erie Street at Mill Street	A (7)		C (22)	
5	Erie Street at Oak Street	D (45)	WB-L (1.22) NB-L (0.91) NB-T (1.01)	D (45)	WB-L (1.17) NB-T (1.07)
6	Erie Street at Pulford Avenue	B (13)		B (15)	
7	Erie Street at Seacliff Drive	B (19)		C (35)	SB-L (0.86)
8	Sherk Street at Oak Street	B (15)		B (17)	
9	Elliott Street at Talbot Street	A (9)		B (18)	
10	Talbot Street at Oak Street at Fraser Road	D (41)	EB-L (0.89)	D (45)	WB-T (0.85)
11	Lutsch Avenue at Talbot Street	B (15)		D (45)	EB-T (1.11)
19	Highway 3 (Bypass) at Talbot Street	B (19)		C (21)	

Notes: 1. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection

Most of the signalized intersections in the study area are expected to operate at satisfactory overall Levels of Service. The three intersections that carry a LOS of D are located along the municipality's major arterial roads that carry the highest traffic volumes. Improvements for these intersections are discussed in **Section 5**.

Two intersections, Erie Street at Wilkinson Drive and Erie Street at Seacliff Drive, report acceptable LOS but have movements approaching capacity. Improvements for these intersections are discussed in **Section 5.1**. A new intersection layout has gone to tender for the Erie Street at Oak Street intersection. This layout, shown in **Appendix C**, is expected to address the intersection's delay and capacity issues. The Talbot Street at Oak Street and Fraser Road intersection is a five-legged intersection. The signal phasing required limits its capacity. Options to address this intersection are being assessed with the long term transportation model and will be presented in the Long Term Action Plan report.

The analysis of unsignalized intersection operations under existing conditions is summarized in **Table 6**. The detailed results of the Synchro analysis for the a.m. and p.m. peak hours under existing conditions are presented in **Appendix D**.

Table 6: Intersection Capacity Analysis – Unsignalized Intersections

No.	Intersection	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS (Delay in seconds)	Critical Movements ¹ (V/C Ratio)	LOS (Delay in seconds)	Critical Movements ¹ (V/C Ratio)
12	Sherk Street at Ellison Avenue	C (22)		C (23)	
13	Theresa Trail at Pulford Avenue	A (10)		A (10)	
14	Danforth Avenue at Seacliff Drive	B (12)		B (13)	
15	Cherry Lane at Seacliff Drive	B (13)		C (19)	
16	Victoria Street at Oak Street	A (10)		A (10)	
17	Erie Street at Clark Street	C (15)		D (31)	
18	Westmoreland Avenue at Talbot Street	B (15)		B (14)	
20	Erie Street at Marlborough Street	C (18)		F (57)	EB-LTR (0.34) WB-LTR (0.32)
21	Princess Street at Robinson Street	A (8)		A (8)	
22	Lutsch Avenue at Mill Street	A (9)		A (9)	
23	Worcester Avenue at Orange Street	B (10)		A (10)	
24	Wigle Street at Oak Street	B (14)		C (24)	
25	Danforth Avenue at Oak Street	D (27)		D (30)	
26	Erie Street at Robson Road	A (9)		A (9)	
27	Erie Street at Park Street	B (11)		B (12)	
28	Sherk Street at Seacliff Drive	C (20)		D (28)	
29	Lutsch Avenue at Oak Street	C (20)		D (26)	
30	Talbot Street at MCR Drive	B (14)		B (15)	
31	Seacliff Drive at Bevel Line Road	B (14)		C (16)	
32	Elliott Street at Wilkinson Drive	C (18)		C (17)	
33	Fox Run Road at Deer Run Road (South Talbot Road)	A (9)		A (9)	
34	Morse Road at County Road 18 (4 th Concession)	A (9)		A (10)	
35	Mersea Road 12 at Mersea Road 2 (Oak Street)	A (0)		A (0)	
36	Mersea Road 12 (Noble Sideroad) at County Road 33	A (9)		A (9)	

No.	Intersection	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS (Delay in seconds)	Critical Movements ¹ (V/C Ratio)	LOS (Delay in seconds)	Critical Movements ¹ (V/C Ratio)
	(Pelee Drive)				
37	County Road 37 at Fox Run Road	A (9)		A (9)	
38	Lakeshore Drive at Fox Run Road	A (9)		A (9)	
39	Mersea Road 21 (Watson Sideroad) at Deer Run Road	A (9)		A (0)	
40	Mersea Road 12 at Mersea Road 5	A (9)		A (9)	
41	Lutsch Avenue at Marlborough Street	B (11)		B (12)	

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.

2. Critical movements are those with a LOS of 'E' or 'F' for an unsignalized intersection

The majority of the unsignalized intersections in the study area operate at acceptable Levels of Service during the a.m. and p.m. peak hours. There are a few intersections along Erie Street and Oak Street that operate with long delays for vehicles on the minor cross streets. These intersections include the Erie Street at Marlborough Street, Oak Street at Danforth Avenue, as well as the intersection at Talbot Street and MCR Drive. At the intersection at Erie Street and Marlborough Street, the eastbound and westbound movements are performing at unacceptable Levels of Service. Signal warrants, which are used to determine the need for signalization, were completed at each of these intersections and the results are detailed in **Section 5.2**.

4.1 Comparison of 2013 and 2005 Intersection Analyses

MMM conducted an analysis of 2005 traffic conditions as part of its 2007 Short Term Action Plan for the Municipality. The levels of service for the years 2013 and 2005 at signalized intersections are compared in **Table 7**.

Table 7: Comparison Signalized Intersection Capacity Analysis – 2013 and 2005

No.	Intersection	Weekday AM Peak Hour LOS		Weekday PM Peak Hour LOS	
		2013	2005	2013	2005
1	Erie Street at Highway 3 (Bypass)	B (14)	B (18)	B (18)	B (18)
2	Erie Street at Wilkinson Drive	C (25)	B (16)	C (33)	B (18)
3	Erie Street at Talbot Street	C (21)	C (21)	C (27)	C (28)
4	Erie Street at Mill Street	A (7)	B (11)	C (22)	B (13)
5	Erie Street at Oak Street	D (45)	C (21)	D (45)	D (35)
6	Erie Street at Pulford Avenue	B (13)	A (9)	B (15)	B (13)
7	Erie Street at Seaclyff Drive	B (19)	B (18)	C (35)	C (24)
8	Sherk Street at Oak Street	B (15)	A (10)	B (17)	B (11)
9	Elliott Street at Talbot Street	A (9)	B (15)	B (18)	B (15)
10	Talbot Street at Oak Street at Fraser Road	D (41)	D (43)	D (45)	D (50)
11	Lutsch Avenue at Talbot Street	B (15)	B (12)	D (45)	B (18)
19	Highway 3 (Bypass) at Talbot Street	B (19)	B (14)*	C (21)	C (24)*

*Unsignalized in the year 2005

Levels of service and delays have remained constant for the majority of the signalized intersections. The intersections of Erie Street at Oak Street and Lutsch Avenue at Talbot Street both have seen delays increase so that now they report LOS D. The new intersection layout at Erie Street and Oak Street, reported in Section 4, is expected to address concerns at this intersection. Improvements to the intersection of Lutsch Avenue and Talbot Street are discussed in Section 5.

A comparison of the levels of service at the unsignalized intersections for the years 2013 and 2005 is shown in **Table 8**. Similar to the analysis of the signalized intersections, the levels of service for the unsignalized intersections largely have stayed the same or improved from 2005 to 2013.

Table 8: Comparison of Unsignalized Intersection Capacity Analysis – 2013 and 2005

No.	Intersection	Weekday AM Peak Hour LOS		Weekday PM Peak Hour LOS	
		2013	2005	2013	2005
12	Sherk Street at Ellison Avenue	C (22)	C (15)	C (23)	C (20)
13	Theresa Trail at Pulford Avenue	A (10)	A (9)	A (10)	A (10)
14	Danforth Avenue at Seaciff Drive	B (12)	B (12)	B (13)	C (16)
15	Cherry Lane at Seaciff Drive	B (13)	B (12)	C (19)	C (16)
16	Victoria Street at Oak Street	A (10)	A (10)	A (10)	A (10)
17	Erie Street at Clark Street	C (15)	C (16)	D (31)	D (25)
18	Westmoreland Avenue at Talbot Street	B (15)	C (17)	B (14)	C (19)
20	Erie Street at Marlborough Street	C (18)	C (15)	F (57)	F (117)
21	Princess Street at Robinson Street	A (8)	B (10)	A (8)	B (11)
22	Lutsch Avenue at Mill Street	A (9)	A (10)	A (9)	B (11)
23	Worcester Avenue at Orange Street	B (10)	A (9)	A (10)	A (10)
24	Wigle Street at Oak Street	B (14)	C (22)	C (24)	E (40)
25	Danforth Avenue at Oak Street	D (27)	E (40)	D (30)	F (355)
26	Erie Street at Robson Road	A (9)	A (9)	A (9)	A (9)
27	Erie Street at Park Street	B (11)	B (10)	B (12)	B (12)
28	Sherk Street at Seaciff Drive	C (20)	C (19)	D (28)	E (35)
29	Lutsch Avenue at Oak Street	C (20)	C (19)	D (26)	F (159)
30	Talbot Street at MCR Drive	B (14)	C (22)	B (15)	C (22)
31	Seaciff Drive at Bevel Line Road	B (14)	--	C (16)	--
32	Elliott Street at Wilkinson Drive	C (18)	C (15)	C (17)	C (16)
33	Fox Run Road at Deer Run Road (South Talbot Road)	A (9)	--	A (9)	--
34	Morse Road at County Road 18 (4 th Concession)	A (9)	A (9)	A (10)	A (9)
35	Mersea Road 12 at Mersea Road 2 (Oak Street)	A (0)	A (10)	A (0)	B (10)
36	Mersea Road 12 (Noble Sideroad) at County Road 33 (Peelee Drive)	A (9)	A (9)	A (9)	A (9)
37	County Road 37 at Fox Run Road	A (9)	A (9)	A (9)	A (9)
38	Lakeshore Drive at Fox Run Road	A (9)	A (9)	A (9)	A (9)
39	Mersea Road 21 (Watson Sideroad) at Deer Run Road	A (9)	A (9)	A (0)	A (9)
40	Mersea Road 12 at Mersea Road 5	A (9)	A (9)	A (9)	A (9)
41	Lutsch Avenue at Marlborough Street	B (11)	B (12)	B (12)	B (14)

5 SHORT TERM ACTION PLAN UPDATE

As the Municipality's population continues to grow and traffic volumes increase, transportation issues such as congestion, speeding, safety, and parking become more prevalent. Motorists are forced to share limited road capacity with large trucks, parked vehicles, cyclists and pedestrians. The need to address vehicle shortcutting, traffic infiltration, speeding, larger trucks on downtown streets and on-street parking has been raised in complaints from the public as well as concerns noted by Municipal staff.

The analysis of existing traffic operations shows that most of the signalized and unsignalized intersections in the study area are operating acceptably from an intersection capacity perspective; however, there are a number of specific operational issues and concerns raised by residents and municipal staff that cannot be completely identified and addressed through intersection capacity analyses.

The short-term action plan provides specific recommendations to address a number of existing concerns and, where appropriate, provides strategies to address others. Some of the issues will be addressed again through the Long Term Action Plan Update, which addresses more strategic network improvements.

Any recommended improvements must also recognize the importance of promoting alternate modes of transportation other than private automobiles. Increased use of transit and non-motorized modes of travel such as bikes and walking should be encouraged whenever possible throughout the Municipality. Decreased dependence on private automobiles for area travel will ensure the sustainability of the area road network.

At the end of the action plan update, recommended actions have been summarized and ranked according to priority. An indication of the likely financial cost and time to implement the improvements also is provided.

5.1 Operational Issues of Signalized Intersections

Five signalized intersections were identified as having inadequate levels of service and/or critical movements in the analysis of existing conditions. These intersections included:

- Erie Street at Wilkinson Drive;
- Erie Street at Oak Street;
- Erie Street at Seacliff Drive;
- Talbot Street at Oak Street / Fraser Road; and
- Talbot Street at Lutsch Avenue.

The intersection of Erie Street and Oak Street is scheduled to be reconstructed in 2013. No further intersection improvements are recommended here until such time as the operations of the new intersection layout can be assessed through site observation, data collection and analysis. The other four signalized intersections were reviewed in greater detail to identify possible solutions to address delay and capacity concerns. A signal timing optimization exercise was undertaken, with the results summarized in **Table 9**. The detailed results of the Synchro analysis for the a.m. and p.m. peak hours under existing conditions are presented in **Appendix E**.

Table 9: Analysis of Optimized Signal Timings

No.	Intersections	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS (Delay in seconds)	Critical Movements ¹ (V/C Ratio)	LOS (Delay in seconds)	Critical Movements ¹ (V/C Ratio)
2	Erie Street at Wilkinson Drive	C (25)		C (30)	SB-T (0.98)
5	Erie Street at Oak Street	D (45)	WB-L (1.22) NB-L (0.91) NB-T (1.01)	D (45)	WB-L (1.17) NB-T (1.07) NB-L (0.85)
7	Erie Street at Seacliff Drive	B (19)		C (29)	
10	Talbot Street at Oak Street at Fraser Road	D (41)		D (45)	
11	Lutsch Avenue at Talbot Street	B (15)		C (30)	EB-T (1.00)

Notes: 1. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection

Optimization of signal timings improves the performance of the intersection by reducing delays and increasing capacity, however, some delays are expected to remain and certain movements may approach capacity during peak hours.

The analysis of the intersection of Erie Street at Wilkinson Drive reports moderate delays but capacity concerns on the southbound through movement, with only one lane for vehicle traffic. Widening this approach to two lanes could infringe on the existing bike lane. Widening also likely would require property acquisition to provide a second receiving lane heading south on Erie Street. In order to maintain the existing urban fabric of the municipality, no further physical improvements are recommended at this time.

The southbound left turning movement from Erie Street onto Seacliff Drive is reported to begin to approach capacity after signal optimization. Extending the number of seconds assigned to the advanced phase for the southbound left movement would alleviate this concern while still maintaining an adequate level of service.

Talbot Street at Oak Street and Fraser Road is a five legged signalized intersection whose geometry presents challenges for safe and efficient traffic operations. A roundabout was considered as a solution for this intersection but was eliminated from further analysis. The intersection is not conducive to control by a roundabout due to unbalanced traffic volumes, land acquisition requirements and pedestrian volumes. A long term solution to improve performance at this intersection, including realigning the road and removing one leg from the intersection, is recommended in the long range action plan that accompanies this report.

The analysis of the intersection of Lutsch Avenue and Talbot Street reports moderate delays and adequate levels of service. There is a capacity concern with the eastbound through movement on Talbot Street. Widening this intersection to add capacity would increase the time and distance for pedestrians to cross Talbot Street. Given the location of St. Louis Catholic School on southwest corner of this intersection and pedestrian traffic associated with the school, no widening is recommended.

Recommendations: Optimize signal timings. Extend the advanced phase for the southbound left turn at the intersection of Erie Street at Seacliff Drive.

5.2 Operational Issues of Unsignalized Intersections

The analysis of existing unsignalized intersections identified four intersections that exhibit LOS D or worse in at least one peak hour. These intersections included:

- Erie Street at Marlborough Street;
- Danforth Avenue at Oak Street;
- Sherk Street at Seacliff Drive; and
- Lutsch Avenue at Oak Street.

Two additional unsignalized intersections were studied due to safety concerns:

- The intersection of Oak Street and Wile Street was reviewed for a signal warrant as traffic volumes at this intersection are compounded by high pedestrian volumes accessing two schools south of this intersection; and
- The intersection of Erie Street and Clark Street also was reviewed as there are safety issues related to the intersection in addition to concerns about traffic volumes.

Traffic volumes at these six intersections were reviewed further to determine if traffic signals are warranted. Warrants 1 and 2 from the Ontario Traffic Manual (OTM) Book 12 were used. Based on OTM Book 12, if Warrant 1 or Warrant 2 is 100% fulfilled, then the need for a traffic signal must be considered. However, if neither Warrant 1 nor Warrant 2 surpass 100%, but both are satisfied to the extent of 80% or more, then traffic signals may also be warranted. Signal warrants at existing intersections should be based on eight-hour counts, as stipulated in OTM Book 12; however, the data collected for purposes of this study are based on four-hour counts. Intersections that do not meet the warrant based on the busiest four-hour count data would not be expected to meet the warrant based on the busiest eight-hour count.

According to OTM Book 12, Warrant 1 represents the minimum vehicular volume justification, which is intended for applications where the principal reason to consider the installation of a traffic signal is the cumulative delay produced by a large volume of intersecting traffic at an unsignalized intersection.

OTM Book 12 further states that Warrant 2 represents the delay to cross traffic justification, which is intended for application where the traffic volume on the main road is so heavy that traffic on the minor road suffers excessive delay or hazard in entering or crossing the main road.

The results of the warrant analyses are summarized in **Table 10**. Detailed summaries of the signal warrant analysis are included in **Appendix F**.

Table 10: Signal Warrant Compliance

Intersections	Warrant 1	Warrant 2	Signals Warrant
Erie Street at Marlborough Street	29%	35%	No
Erie Street at Clark Street	30%	28%	No
Oak Street at Danforth Avenue	28%	47%	No
Seacliff Drive at Sherk Street	58%	77%	No
Oak Street at Lutsch Avenue	52%	51%	No
Oak Street at Wigle Street	59%	55%	No

The analysis shows that none of the intersections studied meet the traffic signal warrants. The Oak Street at Wigle Street intersection is analyzed in further detail in Section 5.3.1 due to additional operational concerns. Similarly, the Erie Street at Clark Street intersection is analyzed in further detail in Section 5.3.2.

Traffic volumes should be monitored every few years to test whether changing conditions (i.e. increased vehicle or pedestrian volumes) may result in the warrants being met. Traffic counts within Leamington should be undertaken and updated every three to five years depending on the specific location. Intersections located within the downtown area should be counted at three year intervals and traffic located in more suburban and rural areas of the Municipality should be undertaken every five years. Ideally the counts should be conducted Tuesday through Thursday and should be adjusted to reflect seasonal variation if the counts are not completed between April and August. Counts should be undertaken more frequently for intersections that receive a large number of complaints or experience an increase in the number or severity of collisions.

Recommendation: Monitor traffic volumes. Do not signalize any of the intersections analyzed.

5.3 Intersections and Corridors of Specific Concern

This section updates the previous 2007 study by reviewing previous recommendations for intersections and corridors of specific concern to see if conditions have changed that warrant different action or to determine if the previous recommendations remain valid.

5.3.1 Oak Street and Wigle Street

Oak Street at Wigle Street was identified as an intersection of concern in the 2007 report and remains a concern today. There is a high volume of pedestrians crossing Oak Street at Wigle Street during the peak hours to travel between the residential areas to the north of Oak Street and the two elementary schools located to the south, which are accessed by Wigle Street. This intersection is offset, with one-way southbound traffic on Wigle Street intersecting Oak Street east of the two-way northbound traffic on Wigle Street.



Photo 1: Looking east on Oak Street at its intersection with Wigle Street. A crossing guard is stationed on the north side of Oak Street.

Crossing guards are stationed on the eastbound approach at the Oak Street and Wigle Street intersection. There are no crossing guards stationed on the westbound approach on Oak Street as there is not a connecting sidewalk on the east side of Wigle Street.

Vehicle delays have been reported on the northbound and southbound approaches on Wigle Street, although the overall intersection level of service has been calculated to be LOS B in the a.m. peak and LOS C in the p.m. peak. Issues with motorists not stopping / obeying crossing guards have also been reported.

For pedestrian safety, an Intersection Pedestrian Signal (IPS) should be installed at the Oak Street and northbound Wigle Street intersection. The IPS would stop east-west traffic on Oak Street to allow pedestrians to safely cross. A new crosswalk should be constructed on the east side of the Wigle Street northbound crossing at Oak Street. Additionally, a new crosswalk should be constructed at Wigle Street and Maxon Avenue to facilitate access to the Queen Elizabeth Public School.

The intersection of Wigle Street at Oak Street would continue to operate with stop controls on the Wigle Street north and south approaches. With the new crosswalk on the east side of Wigle northbound at Oak Street, northbound left turning traffic and southbound left turning traffic could proceed, after stopping, when the Oak Street traffic was stopped by the IPS. This could improve intersection performance as the north and southbound left turning vehicles are the ones experiencing the most delay. Widening Wigle Street northbound to accommodate a left turn lane and a right turn lane is recommended to improve traffic operations with the IPS. The presence of an IPS at Wigle Street would likely improve operations at the Oak Street at Danforth Avenue intersection by creating more gaps in traffic along Oak Street.

A full traffic signal, which would provide a phase for traffic on Wigle Street, would attract traffic away from Danforth Avenue to utilize the signal on Wigle Street. This is not desirable given the presence of two elementary schools on Wigle Street.

The proposed revised layout of this intersection is shown in **Figure 3**.

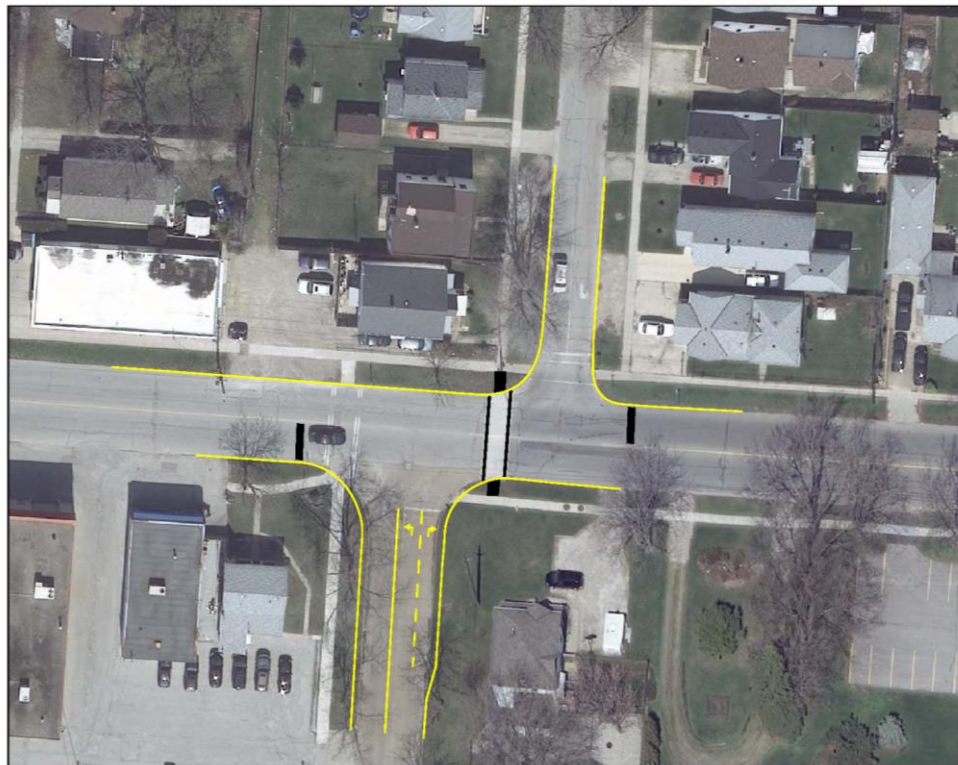


Figure 3: Improvements to the Oak Street at Wigle Street Intersection

Recommendation: Install Intersection Pedestrian Signal at the Oak Street and northbound Wigle Street intersection.

5.3.2 Erie Street at Clark Street

This intersection has been identified for operational concerns, primarily due to poor sightlines associated with the location of a building on the northwest corner of this intersection.



Photo 2: Standing on the southwest corner looking north on Erie Street at its intersection with Clark Street

The level of service at this intersection has remained the same from the 2007 report to the present – the intersection is exhibiting LOS C in the AM peak and LOS D in the PM peak, with increasing delays in the PM peak. The 2007 report also looked at this intersection and recommended that traffic signals be installed in order to address the deficient sight lines on the west approach. The intersection remains unsignalized today and the building in question also remains in place.

Signalization of this intersection would help to address the safety concerns. Even though traffic signal warrants have not been met, delays have been increasing and the PM peak level of service, LOS D, is seen as unsatisfactory for Leamington. Right turn departure sight lines should be checked to decide whether or not right turns on reds should be prohibited at this intersection, since the signals do not change the poor sightlines and only regulate the flow of traffic.

Recommendation: Signalize the intersection.

5.3.3 Oak Street at Danforth Avenue

Oak Street at Danforth Avenue is a three-way stop controlled intersection. Northbound traffic on Danforth Avenue stops for free-flowing east- and westbound traffic on Oak Street. Analysis of existing traffic volumes shows that the intersection operates at LOS D in both the a.m. and p.m. peak hours.

Given the poor level of service, existing traffic volumes were reviewed to determine whether or not traffic signals would be warranted at this intersection. As reported in Section 5.2, this intersection did not reach 50% of either Warrant 1 or Warrant 2. No traffic signal is recommended at this intersection. The presence of an Intersection Pedestrian Signal at Wigle Street, recommended in Section 5.3.1, would be expected to improve operations at the Oak and Danforth intersection by creating more gaps in traffic along Oak Street.

Recommendation: Maintain intersection layout and stop controls. Install a pedestrian half-signal at the Oak Street and northbound Wigle Street intersection, which would help to improve performance at the Oak Street and Danforth Avenue intersection.

5.3.4 Seacliff Drive at Sherk Street – Traffic Infiltration

Traffic is shortcutting on Coronation Avenue in order to avoid the intersections of Erie Street and Seacliff Drive and Sherk Street and Seacliff Drive. Coronation Avenue is a residential street with one lane in each direction but with no pavement markings, a very wide paved surface, no sidewalks or bicycle lanes, houses set back from the road and no intersections between Erie Street and Sherk Street. These conditions all support speeding and shortcutting traffic.

In order to reduce speeds and reduce the desirability of this route as a shortcutting option, traffic calming measures should be considered. One possible solution to calm traffic would be to narrow the road. Possible ways to do so include:

- Construct sidewalks;
- Construct bike lanes;
- Use lane markings to clearly define lanes as well as to make the visual impression that the road is narrow and slower speeds are necessary.

Recommendation: Consider traffic calming measures such as narrowing Coronation Avenue by installing pedestrian and cycling infrastructure and lane markings.

5.3.5 *Sherk Access for Kinsmen Recreation Complex*

The vehicle exit from the north corner of the Kinsmen Recreation Complex on Sherk Street is limited to right turns only, with buses excepted. Left or through movements are prohibited due to the change in elevation and resulting poor sight distance to see oncoming northbound vehicles on Sherk Street. Buses are allowed to make left turns because the driver sits high enough to see and be seen by oncoming vehicles. Even though the intersection is signed for right turns only, in practice, vehicles often make the eastbound left turn and head north on Sherk Street.



Photo 3: Looking south on Sherk Street at its intersection with the recreation centre access.

This intersection was reviewed in the 2007 report and a centre median on Sherk Street, from the south limit of William Avenue to south of the right-out only access was recommended. This recommendation still stands as a viable solution.

Alternatively, this right out should be closed completely, as adequate sight distance cannot be achieved. Vehicles accessing the site from the north mostly likely want to return in the same direction, hence the observations that vehicles make illegal eastbound left turns from this right out only location. If vehicles wish to travel north, they should exit the site from the main access point on Ellison Avenue and then travel north on either Sherk Street to the east or Nicholas Street to the west.

The right in could be maintained to provide inbound access from the north. However, the entry radius should be reduced as vehicles enter the recreation complex at a high speed from Sherk Street. Redesign of the right-in to accommodate a smaller radius would result in vehicles entering the site at a lower speed.

Recommendation: Install a centre median on Sherk Street. Alternatively, close the right-out at this location and redesign the right-in with a smaller radius.

5.3.6 Erie Street South Turn Around

Erie Street south of Robson Road is four lanes wide providing access to the Leamington dock. There are two lanes around the turnaround island. This configuration contributes to the following:

1. Vehicles travelling in and out of the turnaround travel at increased rates of speed. Speeding is encouraged as a result of the wide pavement surface. There are currently two lanes available with only one lane generally occupied by traffic.
2. The parking lot on the east side serves as a hangout for the area youth and as a result, drivers race out of the turnaround northbound exhibiting typical cruising behavior.
3. The speeds in the turnaround area are incompatible with the pedestrian/tourism uses in the area.

The area around the dock is a busy tourism area where walking is encouraged. The waterfront walkway ends in this area with access to the beach; however, due to the general lack of pedestrian facilities around the turnaround and commercial areas, pedestrians are forced to walk unprotected amongst vehicular traffic using the turnaround.

The parking for commercial uses on the west side of Erie Street consists of angled parking spaces backing onto the southbound through lanes. When a vehicle backs out of one of these spaces, they cannot see traffic in the nearest lane. Additionally, the access to the dock is a straight line from the southbound lanes, which results in high speeds. There also is no sidewalk on the west side of Erie Street south of Gold Coast Street / Foster Avenue, which forces pedestrians to walk in the vehicular travel lanes or cut through the parking lot, if the spaces are not occupied.

The 2007 report recommended that only one lane should be allocated for the turnaround south of Robson Road. This turnaround area should be designed for truck movements with a raised apron to accommodate truck turning manoeuvres. This configuration is expected to make available the boulevard area for the provision of pedestrian facilities south of Gold Coast Street, provide sight lines for the parking spaces on the west side of Erie, and would physically encourage traffic to proceed at lower speeds due to limited pavement width.

New sidewalks around proposed for the west side of the dock area, fronting the existing Gaspard's Café and Burgess Refreshments stand. One through lane is maintained on Erie Street south of the intersection with Robson Road. A centre median could be installed on Erie Street between Robson Road and Foster Avenue to create a gateway to the dock area. The Erie Street turnaround area south of Robson Road, currently two lanes wide, is recommended to be reduced to one lane and the parking access on the east side of the turnaround area is recommended to be shifted north. A more detailed study should be undertaken to determine the design details of entrance gateway along Erie Street and the redesigned turnaround, including pedestrian and cycling facilities. A functional sketch of the recommendation is shown in **Figure 4**.



Figure 4: Functional Redesign of the Erie Street Turnaround

Recommendation: Redesign the Erie Street Turnaround to reduce vehicle travel lanes and provide cyclist and pedestrian infrastructure.

5.3.7 Northbound Left Turn Restrictions at Erie and John Streets and Erie and Russell Streets

A number of vehicles make a northbound left turn from Erie Street to either Russell Street or John Street in order to avoid the busy Erie/Talbot intersection. Along this section of Erie Street (Russell Street to John Street) there is on-street parking on both sides of the road, resulting in only one travel lane in either direction for vehicular traffic.

The northbound left turning vehicles at these two intersections further reduce the capacity available for through traffic. The John Street at Erie Street intersection is located only 100 m north of the Erie Street at Talbot Street intersection. The close proximity between these two intersections can also cause further delays due to “spillback”. Spillback occurs as northbound vehicle queues extend south from the John Street intersection and impede operations at Erie Street intersections to the south, such as the Erie/Talbot intersection.

In the 2007 report, it was recommended that northbound left turning maneuvers be prohibited during the peak hours (i.e. Monday to Friday, from 7 a.m. to 9 a.m. and 4 p.m. to 6 p.m.) at the Erie Street at Russell Street and Erie Street at John Street intersections. This recommendation is confirmed and is expanded also to include prohibition of left turning maneuvers during the lunchtime peak, from 11:30am through 1:30pm.

On-street parking currently is located throughout the downtown on Erie Street and side streets. Parking is located on the east side of Erie Street through the T-intersections with John Street and Russell Street. Parking in these spaces is considered a safety concern. There is a point of conflict with the potential for an eastbound left turning vehicle to collide with a northbound through vehicle that is reversing into a parallel parking space. Parking spaces located within these two intersections should be removed. The parking spaces to be removed are shown in **Figure 5**.



Figure 5: Parking Spaces Recommended for Removal

Outside of these two intersections, parking spaces through other T-intersections in the Municipality should be removed to address safety concerns.

On-street parking and the possible implementation of curb extensions to better define the on-street parking was reviewed as part of this report. From an urban planning perspective, the on-street parking provides a buffer between pedestrian activity and vehicle traffic in this downtown location. The on-street parking also provides direct access to commercial establishments, which most likely is valued by businesses and their customers. The on-street parking serves to lower speeds in this stretch of Erie Street. Lower speeds and protecting pedestrians walking, sitting on benches or even sitting at a sidewalk café are seen as positive impacts. The on-street parking should remain.

Curb extensions would better define the parking spaces and the travel path for through traffic and provide a safer crossing environment for pedestrians. Curb extensions are appropriate at these intersections. Curb extensions are discussed in greater detail in **Section 5.15**.

Recommendations:

- **Prohibit left turning maneuvers during the peak hours (i.e. Monday to Friday, from 7 a.m. to 9 a.m., 11:30 a.m. to 1:30 p.m. and 4 p.m. to 6 p.m.) at the Erie Street at Russell Street and Erie Street at John Street intersections.**
- **Eliminate on-street parking on Erie Street that is located within the intersections of Erie Street with John Street and Russell Street.**
- **Eliminate on-street parking that is located within other intersections throughout the Municipality.**
- **Keep on-street parking that does not conflict with intersections.**
- **Construct curb extensions.**

5.3.8 Aiuto Drive Extension

At the time of the 2007 report, a number of vehicles were crossing the grass as a shortcut between Aiuto Drive and Hodgins Street. The shortcut was so well used that permanent tire tracks on the grass were observed during the site visit.

Since that time, Aiuto Drive has been curbed to form a cul-de-sac and bollards have been installed on Hodgins Street to help prevent shortcutting automobile traffic. This link would be a natural connection for active transportation uses between the two subdivisions. Construction of a pedestrian linkage should be considered.

Recommendation: Consider acquisition of easement lands in order to construct a pedestrian linkage.

5.3.9 Melrose Avenue at Erie Street

In the 2007 report, it was observed that a number of vehicles use the Leamington Fair Mall driveway, which opens onto Erie Street, to exit the Mall complex. Some of these exiting vehicles are headed to destinations northwest of the mall. In order to access Sherk Street, these vehicles make an unsafe northbound left turn at the intersection of Erie Street and Melrose Avenue. This movement allows drivers to bypass congestion on Erie Street and to avoid more circuitous routes to the northwest. The northbound left turn is unsafe since it is made from the southbound left turn lane, which is provided for the Pulford Avenue at Erie Street intersection. Northbound left turns have no turning lane and vehicles either queue in the southbound left

turning lane or in the yellow striped road paint area, which is painted in a way to indicate that left turns are not allowed. This situation creates dangerous conflict points.

Closing Melrose Avenue to westbound through traffic was proposed in the 2007 report. A review of current complaints of shortcutting traffic and the intersection layout suggests that this measure is too drastic. Vehicles making a northbound left movement from the southbound left lane are making an illegal movement. The Municipality is recommended to work with local law enforcement officials to ticket vehicles making this illegal movement.

As redevelopment occurs along Erie Street, consideration should be given to closing the direct access from the commercial land uses to Erie Street and consolidating the access to align with Melrose Avenue.

Recommendation: Work with law enforcement officials to ticket vehicles making illegal moves as a way to improve safety at this intersection.

5.3.10 Elliott Street

Elliott Street is a two lane road connecting Talbot Street and Wilkinson Drive with an average pavement width of approximately 6.7 metres. Currently, on-street parking is permitted throughout the day, including the peak periods. The narrow pavement width on Elliott Street presents safety concerns related to parking maneuvers. Additionally, these parking maneuvers coupled with high peak hour volumes are expected to increase peak hour travel times. To facilitate safer mobility along Elliott Street, parking needs to be restricted to off-peak traffic hours.

Recommendation: Prohibit on-street parking during peak traffic hours (i.e. Monday to Friday, from 7 a.m. to 9 a.m., 11:30 a.m. to 1:30 p.m. and 4 p.m. to 6 p.m.).

5.3.11 Heinz Access on Oak Street near Victoria Avenue

In the 2007 study, a traffic issue was identified at the Heinz plant signalized truck access located on Oak Street, west of Victoria Avenue. The turn radii for the access were deemed too small to accommodate the large trucks. As a result, eastbound right turning trucks were forced to swing into the westbound lane on Oak Street in order to complete their turn into the access in one movement. These right-turning trucks were forced to stop on Oak Street, blocking the road for other eastbound vehicles, while it waits for a sufficient gap in westbound traffic.

Since the time of the 2007 study, County Road 33 has been completed and trucks related to the Heinz plant generally are not travelling north on Victoria Avenue. A truck route has been implemented that directs trucks away from Erie Street via County Road 33. This new truck route has alleviated the problems identified in the 2007 report.

If operational problems persist and further action is deemed necessary, there are two options to address this issue. The first option involves widening the access and increasing the turn radii so that trucks are not forced into oncoming traffic in order to safely complete the eastbound right turn from Oak Street.

The second option involves shifting the signalized access further east, to align with Victoria Avenue. Victoria Avenue operates as a one-way northbound street. Some trucks exiting from the Oak Street access use Victoria Street to access a re-packaging facility located at the north end of the street. It is recognized that shifting the access further east would require relocation

of truck scales on the Heinz property. This would be an expensive undertaking and, given the success of the County Road 33 truck route, should only occur if operational issues deteriorate in the future.

Shifting the signalized access further east to align with Victoria Avenue would provide a number of benefits. The outbound movement for trucks destined to Victoria Avenue is simplified and trucks destined to the re-packaging facility located at the north end of Victoria Street (at Ivan Street) will likely continue to use this route. The benefits of the signalized intersection can be maximized by also converting the section of Victoria Avenue, between Oak Street and Robinson Street, to allow for two-way traffic. This provides a controlled opportunity for vehicles to access Oak Street, which is very busy during the peak periods, from the north. Increasing the spacing between adjacent signalized intersections can also improve traffic progression along Oak Street. As part of the realignment, the eastbound right turning access on Oak Street can be widened so that trucks are not forced into oncoming westbound traffic.

Recommendation: Direct trucks to use the designated truck route to access the Heinz plant. Monitor operational conditions and consider shifting the Heinz access east to align with Victoria Avenue if operational conditions deteriorate in the future.

5.3.12 Left Turn Slip-Around Treatment for Seacliff at Sherk and Seacliff at Fraser T-Intersections

In the 2007 report, the construction of left turn slip around treatment was considered for the T-intersections of Seacliff Avenue at Sherk Street and Seacliff Avenue at Fraser Road.

The left turn slip around treatment has been constructed at the Seacliff Avenue/Sherk Street intersection. This intersection is operating at an acceptable LOS C in the AM peak hour. This is a similar level of service as stated in the 2007 report. In the PM peak hour, the performance has shown an improvement, from LOS E in the original 2007 report to LOS D in current conditions. Although no turning movement counts were undertaken in 2013 or 2005, traffic operations at the intersection of Seacliff Avenue/Fraser Road are expected to be similar and a left turn slip around treatment would be expected to have a similar positive impact on intersection operations.

Separating slow moving or stopped left turn vehicles from through traffic minimizes the potential for rear-end collisions. The turning movement count data for 2005 and 2013 at the intersection of Seacliff Avenue at Sherk Street show that eastbound left turns comprise over 30 percent of the total approach volume during the a.m. and p.m. peak hours in both study years. The pattern is expected to be similar at the intersection of Seacliff Avenue at Fraser Road. Therefore, based on safety aspects, left turn slip around treatments recommended in the 2007 report remain a viable solution and should be implemented at the Seacliff at Fraser intersection. A typical left turn slip around treatment is shown below in **Figure 6** from the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads.

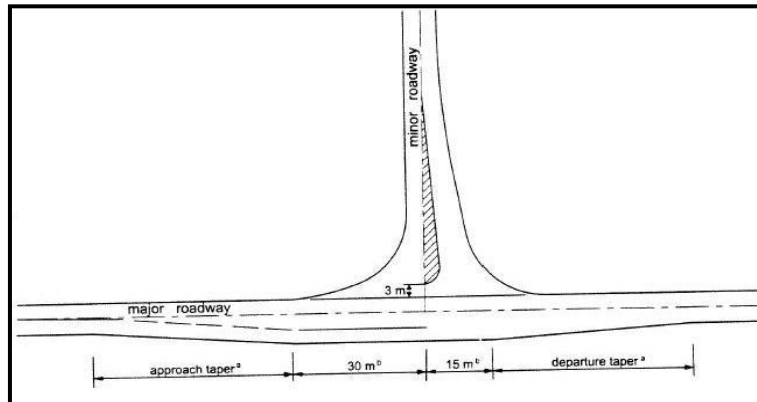


Figure 6: Example of a Left Turn Slip Around Treatment

Recommendation: Construct left turn slip around treatment at the intersection of Seaclyff Avenue at Fraser Road.

5.3.13 Mersea Road 19 at Deer Run Road

Traffic operations at the Mersea Road 19 at Deer Run Road intersection are problematic because of the awkward intersection angles at the west and north corners. The intersection layout also creates poor sightlines for vehicles accessing Deer Run Road from Mersea Road 19 (**Figure 7**).

To address the sightline issues and to simplify traffic operations in the area, the east-west section of Fox Run Road that connects Deer Run Road and Mersea Road 19 should be designated as one way eastbound. Westbound traffic would need to travel north on County Road 37 / Mersea Road 19 to the existing intersection with Deer Run Road before being able to make a left turn onto Deer Run Road.



Figure 7: Improvements to the Intersection of Mersea Road 19 at Deer Run Road

Recommendation: Designate the stretch of Fox Run Road that connects Deer Run Road and County Road 37 as one-way eastbound only.

5.3.14 Deer Run Road at Mersea Road 21

The intersections of Deer Run Road at the north and south sections of Mersea Road 21 are shown in **Figure 8**. Both sections of Mersea Road 21 at Deer Run Road have shallow intersection angles that create sightline issues for vehicles turning from either the north or south. To address this sightline issue, either land should be acquired and kept clear of obstructions to maintain sight lines or the Mersea Road 21 north and south section should be realigned to intersect Deer Run Road at more of a right angle. The sight lines from the present intersection locations were reviewed in order to determine the lane required to maintain sight lines. This was deemed as a more cost effective way to address safety concerns than realignment of the roads.

Deer Run Road has a posted speed limit of 60 km/hr which relates to a design speed of 80 km/hr. Based on the “Geometric Design for Ontario Highways” manual, for a design speed of 80 km/hr, a minimum sight distance of 135 metres is required for a vehicle to safely stop. The 135 metre sightline was placed at various points along Deer Run Road and a profile of the required clear sightline area was produced. The red shaded area on **Figure 8** represents the sightline area needed so that vehicles travelling along Deer Run Road can see and react to turning vehicles from Mersea Road 21.



Figure 8: Land Requirements to Maintain Sight Lines at the Intersection of Deer Run Road and Mersea Road 21

At a minimum, land should be acquired and maintained so that no vegetation or building is constructed to restrict sight lines at these two intersections. Once land acquisition has been completed, the need to realign the intersections to create 90 degree angles for the north and south legs of Mersea Road 21 can be revisited.

Recommendation: Acquire land and maintain free of obstructions to improve sight lines. Monitor and consider realigning the intersections to create 90 degree intersections if problems persist.

5.3.15 Fox Run Road at Lakeshore Drive

The intersection of Fox Run Road at Lakeshore Drive was studied in the 2007 report. Guide rails on the north and south sides of the bridge, a “Hidden Intersection” warning sign and an improved alignment were recommended.

Since the time of the 2007 report, curve signs, advisory speed limits and chevrons have been installed. Geometric improvements are limited because of the bridge and the proximity of the lake.

In lieu of realignment of this intersection, a possible additional measure would be to acquire land on the north side of the bridge and remove the vegetation there. During summer months when the leaves are on the trees, the vegetation blocks the sight lines of southbound traffic and blocks this traffic from the view of the northbound and eastbound traffic. Improving sight lines and alerting traffic of the hidden intersection on the southbound approach would improve the safety of this intersection.

Fox Run Road and Pulley Road have a posted speed limit of 40 km/hr, which relates to a design speed of 60 km/hr. According to the “Geometric Design for Ontario Highways” manual, the minimum sight distance required for a design speed of 60 km/hr is 85 metres. The 85 metre sightline is the minimum distance required for a vehicle travelling at 60 km/hr to react and safely brake to avoid an obstacle or a vehicle turning from Lakeshore Road. The 85 metre sightline was placed along Fox Run Road and Pulley Road to produce a sightline area profile. The area shaded in red on **Figure 9** represents the area that should be clear of obstructions to meet the required safe sightline distance.



Figure 9: Improvements to the Intersection of Fox Run Road at Lakeshore Drive

Recommendations: Acquire and maintain land to improve sight lines. Install “Hidden Intersection” sign on southbound approach. Install guard rails along both sides of the bridge.

5.3.16 Mersea Road 12 and Point Pelee Drive (County Road 33)

The Mersea Road 12 meets Point Pelee Drive at a shallow angle that creates sightline problems at the intersection. Traffic operations are further complicated by the large unpainted paved area in the intersection that does not guide drivers on a defined travel path, which can lead to driver confusion (**Figure 10**).



Figure 10: Improvements to the Intersection of Mersea Road 12 at Point Pelee Drive

The amount of pavement should be reduced and the intersection should be clearly defined to guide drivers to the appropriate travel lane. Excess pavement should be removed and/or curbed to help define the travel lanes. Access will need to remain to the residential property on the southeast corner of this intersection. The gravel driveway may need to be extended and / or realigned as part of the re-definition of the intersection.

Recommendation: Re-define intersection by removing excess pavement, curbing and painting travel lanes to guide drivers.

5.3.17 Bevel Line (County Road 33) Speed Limit

The Bevel Line (County Road 33) speed limit was reviewed as part of the 2007 report. It was noted that the current speed limit on Bevel Line from just south of Seacliff Drive to the limit of the urban area is 50 km/h. Outside the urban area the speed limit increases to 80 km/h. Bevel Line, including the section within the urban area, is a straight two-lane rural road with good sightlines. From a driver's perspective, there is no discernible difference between the section within the urban area and the section outside the core. Since drivers select their operating speed based on their perception of conditions, most drivers likely speed along the 50 km/h section of Bevel Line. There is a danger that drivers will become accustomed to disregarding inappropriate speed limit signs, such as for this section of Bevel Line, and will disregard speed limit signs in more sensitive areas where safety is a significant concern.

The 2007 report noted that the speed limits along Bevel Line should be reviewed once the Bennie South subdivision is developed between Bevel Line and Seacliff Drive East. This subdivision still has not been developed as of the writing of this update. However, since the time of the 2007 report, the County-wide Active Transportation Study has been completed and Bevel Line has been included in the Lake Erie Waterfront Trail. Increasing the speed limit in the urban area would not be conducive to this designated cycling route. The 50 km/h speed limit should be maintained. Additionally, given the cycling route designation, the likelihood of future development along Bevel Line and Bevel Line's connection to Seacliff Drive on the north and Point Pelee Drive on the south, both of which are posted at 50 km/h, the entire stretch of Bevel Line should be considered to be posted at 50 km/h.

Recommendation: The speed limit on Bevel Line for the section from Seacliff Drive to the limit of the urban area should be maintained at 50 km/h. The speed limit for remaining portion of Bevel Line to its intersection with Point Pelee Drive should be considered to be reduced to 50 km/h.

5.3.18 Bevel Line at Seacliff Drive

The existing intersection of Bevel Line at Seacliff Drive includes free flow traffic for eastbound traffic on Seacliff Drive and stop controlled traffic for westbound Seacliff Drive and northbound Bevel Line traffic (**Figure 11**). The westbound stop sign is counter-intuitive for drivers and is not necessary as there are no geometric constraints. The stop sign should be removed. Additionally the eastbound right turn from Seacliff Drive onto Bevel line has a wide turning radius, which encourages speeding through this intersection. The radius should be reduced by removing excess paving, curbing and painting travel lanes to guide drivers.

Recommendation: Remove stop sign from westbound Seacliff Drive. Reduce turning radius from eastbound right turn from Seacliff Drive to Bevel Line.

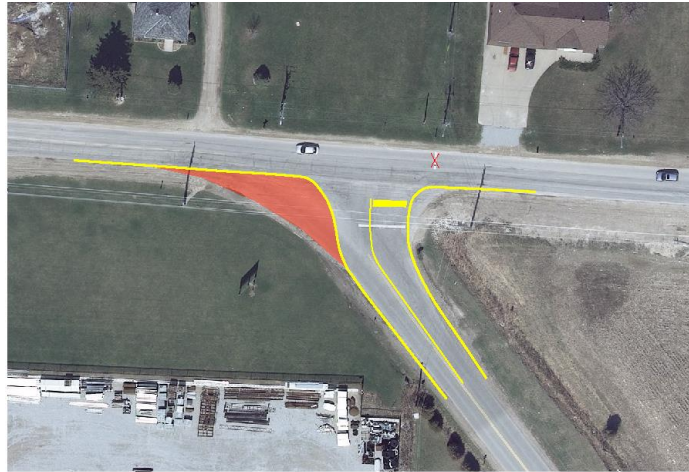


Figure 11: Improvements to the Intersection of Bevel Line at Seacliff Drive

5.3.19 Mersea Road 12 at Talbot Road

Mersea Road 12 meets Talbot Road with a skewed intersection angle that creates poor sightlines. In the 2007 report, it was identified that there was an opportunity to realign the intersection by shifting Mersea Road 12 to the west, north of Talbot, and to the east, south of Talbot. The current alignment is shown in **Figure 12**. According to the “Geometric Design for Ontario Highways” manual, a desirable horizontal alignment of intersection roads is 70° - 90° . Mersea Road 12 currently intersects Talbot Road at an angle between 70° and 90° and does not need to be realigned.

Also identified was a safety concern at this intersection associated with vehicles on Talbot Road slowing to turn either left or right to Mersea Road 12. Slowing or stopped vehicles on Talbot Road pose a risk for rear-end collisions. Left turn slip around lanes for eastbound and westbound left turns on Talbot Road at Mersea Road 12 were recommended to be considered.

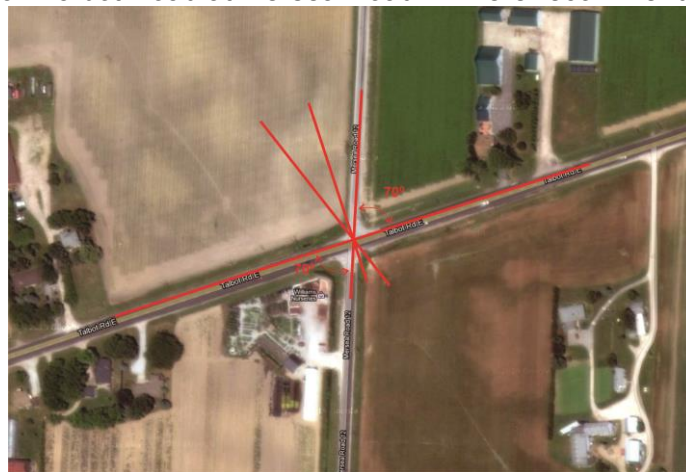


Figure 12: Improvements to the Intersection of Mersea Road 12 and Talbot Road

Since the 2007 report, the County Road 33 extension has been completed and the volume of turns has dropped at this intersection. Left turn slip around lanes are less critical due to lower vehicle volumes.

Recommendation: Monitor traffic volumes at the intersection to determine if a left turn slip would be required.

5.4 Signal Cycle Lengths

As part of the 2007 report, cycle lengths of signals during off-peak periods were reviewed. A cycle length at a signalized intersection refers to the total time for the signal to perform one complete sequence of signal indications (i.e. green, amber, red for each approach). Typical cycle lengths range from 60 seconds for less used local intersections to 120 seconds or more for large heavily used intersections.

There are three coordination areas in Leamington, on Talbot Street between Albert Street and Victoria Avenue, on Erie Street between Mill Street and Talbot Street and on Erie Street between Pulford Avenue and Seaclyff Drive. Signal timings are coordinated to maximize traffic flow during peak periods on these main roads. In order to achieve this coordination, each intersection located within the “coordinated” system must have the same cycle length. This requires some minor intersections to have longer cycle lengths than would typically be required. Implementing signal coordination throughout the day leads to increased delays for vehicles on the minor approaches when there are lower traffic volumes on the main streets.

Shorter cycle lengths during off-peak periods are preferred from a traffic operations perspective. Prolonged red times on minor approaches with little or no traffic on the major street can lead drivers to ignore the signal control. Drivers then become less likely to respect signal control signals during times when they are required.

Recommendation: Coordinate signals only during peak periods (i.e. 7 a.m. to 9 a.m., 11:30 a.m. to 1:30 p.m. and 4 p.m. to 6 p.m., from Monday to Friday). Cycle lengths should be minimized to the extent possible during all other times.

5.5 Speeding Issues

Similar to the 2007 report, the Municipality continues to receive a number of complaints and concerns from Leamington staff and area residents related to vehicle speeds. The majority of concerns related to excessive vehicle speeds; however, there have also been issues related to appropriate speed limits on specific streets and on curves. Recommendations with respect to these issues are summarized below.

5.5.1 Speeding

Most of the speeding complaints relate to north-south travel, and many are on north-south streets connecting Talbot Street to Oak Street. Motorists likely use these streets to avoid congestion on Erie Street or simply to avoid the traffic signals on Erie Street. These parallel routes provide convenient north-south connections.

Excessive speed constitutes a safety concern, as motorists are less able to stop safely if confronted with a conflict. Other safety concerns include access to driveways, as well as pedestrian and cyclist safety. Speed is also a contributor to road noise and detracts from the livability of a neighbourhood. Unacceptably high operating speeds on residential and local roads can be attributed to the perception created by sections of road with long, straight and unimpeded sections as well as excessively large turning radii. Motorists select their operating speed based on many factors including lane widths, sight distances, presence of parked vehicles, and sidewalk setbacks. These factors influence a motorist's perceived risk of a collision, which in turn influences their choice of speed.

Before any speed mitigation measures are implemented, the severity of the problem needs to be verified. If a problem exists, the magnitude of the problem will assist in establishing a priority rank for potential speed mitigation measures.

In order to determine which streets require speed mitigation measures, spot speed studies should be undertaken. The studies can be undertaken with the use of a radar gun or using a stop watch to time vehicles over a set distance. The key to a successful spot speed study is to ensure that the surveyor is as inconspicuous as possible to minimize the potential for the presence of the surveyor to bias the speed at which motorists are traveling. The vehicles measured should be free flowing and selected randomly to avoid introducing a selection bias into the study. Some common errors in sampling include:

- Always selecting the first vehicle in a platoon;
- Selecting too many trucks;
- Obtaining too large a proportion of higher speed vehicles; and
- Not being alert to other events.

A sample size of 100 vehicles per lane is reliable under most circumstances. Based on the data collected, the 85th percentile speed can be calculated; the 85th percentile speed is the speed at which 85 percent of the sample vehicles are traveling at or less. If the 85th percentile speed is significantly higher than the posted speed (i.e. 15 km/h or more), mitigation measures should be considered.

Priority should be given to relatively straight residential streets that have the highest potential to provide convenient alternate routes to busier higher order roads. Speeding on roads that provide more direct routes is more likely attributed to infiltrating vehicles, whereas speeding on less direct routes is more likely resulting from local traffic. The relative length of the street sections of concern should also be considered. Longer sections of road are more likely to be conducive for speeding than shorter sections.

Speed mitigation measures are discussed in **Section 5.6 Traffic Calming**. Speeding is typically considered as one of the key criteria for consideration of traffic calming measures.

Recommendation: Conduct speed studies to identify roads where corrective action is required.

5.5.2 Advisory Speeds on Curves

The 2007 report recommended posting speed limits on horizontal curves. This recommendation has been implemented.

5.6 Traffic Calming

The Municipality receives numerous requests for traffic calming measures to be implemented on roads throughout Leamington. The Municipality needs a way to objectively assess these requests to determine if traffic calming measures are warranted. A ranking system also is needed to prioritize the various requests that do meet warrants.

In the 2007 report, the issue of traffic calming was explored and general guidance on criteria for a warrant and the types of traffic calming measures that could be used for warranted projects was proposed. The 2007 report referenced the 2003 City of Toronto Traffic Calming Policy. In 2010, the City of Toronto issued an updated Traffic Calming Policy. This 2010 Toronto policy

was reviewed and modified to better fit local conditions in Leamington. The traffic calming warrant criteria are shown in **Table 11**.

Table 11: Traffic Calming Warrant Criteria

Warrant	Criterion	Requirement		
Warrant 1: Petition	1.1 Petition	Consideration for physical traffic calming initiated by the local Councillor following a public meeting, or upon receipt of a petition signed by at least 25% of affected households, or by a survey conducted by a Councillor. Warrants #2 and #3 will not be considered until Warrant #1 is satisfied.		
Impacts to Adjacent Streets		Should the Municipality anticipate that the proposed traffic calming will have significant traffic impacts on adjacent streets, the review of the traffic calming proposal shall be modified to include the proposed street as well as adjacent streets where traffic is expected to divert.		
Warrant 2: Safety Requirements (Both criteria must be satisfied to meet this warrant)	2.1 Sidewalks	There must be continuous sidewalks on at least one side of a local road and on both sides of a collector road. On road with no sidewalks, installation of sidewalks on at least one side of the road must have first been considered.		
	2.2 Emergency Response	Consultation must be undertaken with Fire, Ambulance and Police services to verify that impacts on these services will not be significant.		
Warrant 3: Technical Requirements (All four criteria must be satisfied to meet this warrant)	3.1 Road Classification	Only local roads and collector roads are eligible for traffic calming measures.		
	3.2 Minimum Speed	The 85 th percentile speed must be a minimum of 10 km/h over the posted speed limit. If the 85 th percentile speed is more than 15 km/h over the posted speed limit, there is no minimum volume requirement.		
	3.3 Minimum and Maximum Traffic Volume	<table><tr><td><u>Local Roads</u> Traffic volume must be between 1,000 – 8,000 vehicles per day.</td><td><u>Collector Roads</u> Traffic volumes must be between 2,500 – 8,000 vehicles per day.</td></tr></table>	<u>Local Roads</u> Traffic volume must be between 1,000 – 8,000 vehicles per day.	<u>Collector Roads</u> Traffic volumes must be between 2,500 – 8,000 vehicles per day.
	<u>Local Roads</u> Traffic volume must be between 1,000 – 8,000 vehicles per day.	<u>Collector Roads</u> Traffic volumes must be between 2,500 – 8,000 vehicles per day.		
3.4 Minimum Block Length	On streets where mid-block traffic calming measures are proposed, the block length must exceed 120 metres.			

The costs and implications associated with traffic calming measures require municipalities to objectively assess individual requests. This ensures that measures are implemented in appropriate locations, and that areas with a greater need are given priority. The City of Toronto's ranking system was reviewed and is presented in **Table 12.**

Table 12: Traffic Calming Ranking System

Ranking	Speed (0 – 25 points)	Local Road 2 points for each km/h that the 85 th percentile speed is above the minimum speed threshold used in Warrant 3.2	Collector Road 1 point for each km/h that the 85 th percentile speed is above the minimum speed threshold used in Warrant 3.2
	Volume (0 – 25 points)	Local Road 1 point for every 100 vehicles of daily traffic (0 – 2,500 vehicles per day)	Collector Road 1 point for every 220 vehicles of daily traffic over 2,500 (2,500 – 8,000 vehicles per day)
	Collisions (0 – 25 points)	<ul style="list-style-type: none"> • 5 points for 1 preventable collision recorded in the past 3 years; • 10 points for 2 or more preventable collisions recorded in the past 3 years; or • 10 points for 1 or more preventable collisions recorded resulting in personal injury in the past 3 years. 	
	Pedestrian and Bicycling Factors (0 – 25 points)	<ul style="list-style-type: none"> • 5 points for each pedestrian generator (e.g. park, school, senior centre, recreation centre, church or other public institution) • 10 points for a signed bicycle route 	

Once a traffic calming opportunity is identified, there are numerous measures that can be implemented. The Transportation Association of Canada (TAC) and the Canadian Institute of Transportation Engineers (CITE) published the Canadian Guide to Neighbourhood Traffic Calming (1998). The guide describes twenty-five different traffic calming measures and classifies them into the following four groups:

- *Vertical deflections including:*
 - Raised crosswalk
 - Raised intersection
 - Rumble strip
 - Sidewalk extension
 - Speed hump
 - Textured crosswalk
- *Horizontal deflections including:*
 - Chicane
 - Curb extension
 - Curb radius reduction
 - On-street parking
 - Raised median island
 - Traffic circle

- | | |
|--------------------------------------|--------------------------------|
| ○ <i>Obstructions including:</i> | ○ <i>Signing including:</i> |
| - Directional closure | - Maximum speed |
| - Diverter | - Right (Left) turn prohibited |
| - Full closure | - One-way |
| - Intersection channelization | - Stop |
| - Raised median through intersection | - Through traffic prohibited |
| - Right-in/right-out island | - Traffic-calmed neighbourhood |
| | - Yield |

Although not listed above as a traffic calming measure, bike lanes can also have a traffic calming effect. As a retrofit measure, a bike lane is a type of horizontal deflection that narrows the lane width available for vehicles. It is important to note that although the implementation of bike lanes can act as a traffic calming measure, bike lanes are not restricted to local and collector roads but can also be constructed on arterial roads.

A number of Leamington-specific recommendations are discussed below. Given the reality of limited funds, recommendations focus on lower cost options. It also makes sense to address traffic calming as an overall strategy so that similar treatments are used consistently throughout the Municipality. Some recommended low cost, yet effective traffic calming options include:

- Using pavement markings to artificially narrow excessively wide roads such as Danforth Avenue;
- For one-way streets that allow parking on one side of the street, the on-street parking should be alternated from one side to the other. This creates some artificial road curvature which forces drivers to check their speed;
- Artificial curvature can also be achieved using strategically placed curb extensions along long straight stretches of road;
- The use of small roundabouts should also be considered for any new intersections or intersections that are being reconstructed; and
- Vertical deflection methods such as speed humps should be used on local roads only and not on collector or arterial roads.

Recommendation: Implement the traffic calming warrant and ranking system.

5.7 On Street Parking

The regulation of on-street parking (Stopping, Standing and Parking) in an urban area is mandatory for the safe and efficient utilization of the road system. Most municipalities prescribe a uniform set of parking control by-laws designed to accommodate the bulk of the needs of the community. While engineering design factors such as safe stopping distance clearly have a role to play in the determination of the by-law requirements, the specific needs of the community also must be considered in order for the by-laws to be effective without continuous enforcement. Other considerations in the determination of appropriate corner restrictions are traffic volumes, traffic speeds, buses, prevailing land use, turning volumes, pedestrians, cyclists and intersection geometry.

On-street parking on both sides of local streets narrows the available travel area, which acts as a traffic calming feature and discourages shortcutting traffic from arterial and collector roads. A

local road should have a minimum of 8.5 metres pavement width and average annual daily traffic (AADT) volumes of 1,000 or less in order to allow two-way traffic and on-street parking on both sides of a local road. If AADT volumes are greater than 1,000 vehicles on an 8.5m street, then parking should be allowed on one side of the street only.

The parking prohibitions recommended in the 2007 report remain valid for this update. Recommended parking prohibitions include:

- No parking within 9 metres (30 feet) on the approach to any flashing beacon, stop sign, or traffic control signal located at the side of a roadway;
- No parking within 9 metres (30 feet) of a crosswalk at an intersection;
- No parking within 15 metres (50 feet) of the nearest rail of a railroad crossing; and
- No parking within 6 metres (20 feet) of the driveway entrance to any fire station.

Recommendations: Allow on-street parking on both sides of local roads provided that there is 8.5 metres of paved travel area to accommodate parked vehicles and through traffic and AADT volumes of 1,000 or less. Implement parking prohibitions.

5.8 Bike Lanes

Leamington is an ideal municipality to promote bicycle usage as a viable mode of travel for everyday trips. The municipality is relatively flat, it experiences some of the mildest weather in Ontario, traffic volumes on most roads are moderate and the urbanized area is relatively compact.

Bike lanes and signed bike routes are an effective method for providing safe options for the use of bicycles on the roads and introducing traffic calming. The addition of bike lanes along local streets also improves the character of the neighborhood through more “people friendly” transportation solutions.

Bike lanes are an effective passive traffic calming measure. They reduce the lane width available for auto use. Narrowing traffic lanes differs from other road treatments by making slower speeds seem more natural to drivers and less of an artificial imposition, as opposed to most other treatments that physically force lower speeds.

The 2007 report recommended that exclusive bike lanes be added to Chestnut Street, Fox Street, Lutsch Avenue, Ellison Street, Sherk Street and Danforth Avenue. The report also recommended that Share the Road signs be installed on Alderton Street, Cherry Lane, Forest Street, Marlborough Street, Park Street and Pulford Avenue.

Since the time of the report, exclusive bike lanes have been put in place on Chestnut Street, Fox Street and Sherk Street. Exclusive bike lanes on the other recommended roads and the Share the Road signs on the nominated roads have not been installed. In September 2012, the County of Essex released its County-wide Active Transportation Study (CWATS) Master Plan that identifies existing bike facilities and proposes additional facilities on major roads in the municipality.

At the Public Information Centre held on May 29, 2013, the most common comment heard was the need for active transportation facilities on both urban and rural roads. Facilities are needed to improve the safety of commuters, migrant workers, children, youth and recreational cyclists. Pedestrian infrastructure also should be considered, especially at key desire points such as at the pedestrian crossing of Seaciff Drive at Forest Avenue to access the Seaciff Park

The Municipality should undertake an Active Transportation Master Plan (ATMP) in order to revisit the remaining recommendations from the 2007 report that have not been implemented for exclusive bike lanes and “Share the Road” signs as well as the County’s recommendations included in the CWATS Master Plan. The ATMP should look to identify suitable east-west bicycle connections and should create an interconnected network of bicycle routes to provide access across the municipality. Additionally, the ATMP should consider pedestrian connections and identify locations with missing pedestrian links. The ATMP should include an implementation plan that prioritizes the recommended improvements to the active transportation network.

Recommendation: Prepare an Active Transportation Master Plan to identify an integrated bicycle and pedestrian network, infrastructure requirements and a priority implementation plan.

5.9 Bridge Warning Signs

The 2007 report identified that the warning signs placed on a number of the small bridge structures within Leamington were substandard based on the guidelines put forth in the Ontario Traffic Manual Book 6. The “Object Marker” signs (Wa-33) were only placed on two of the four structure edges (i.e. the structure edge to the right of the driver).

As per the OTM, the “Object Marker” warning sign must be used to mark all edges of a structure, such as a bridge pier or abutment. The warning sign must be placed on the roadway shoulder within 2m of the roadway edge if the edge of that structure is not protected by an approved safety appurtenance or guide rail system.

Since the time of the 2007 report, bridge warning signs have been installed. Pavement markings remain to be completed to finalize the work related to bridge warnings.

Recommendation: Complete pavement markings to finalize work on bridge warnings.

5.10 Rural Private Entrances

The current requirements to obtain a rural residential entrance permit in the Municipality of Leamington are shown in Figure 13. The requirements were reviewed in the 2007 report from a transportation engineering perspective in terms of safety and long-term maintenance. The recommendations from the 2007 report have been considered again in this report and have been reviewed in relation to the Ontario Provincial Standard Drawings.

Rural private entrances start outside of the “safe zone” addressed in the Ontario Roadside Safety Manual. On private property, the Ontario Provincial Standards are recommended to be followed. The Ontario Provincial Standard Drawings recommend a slope of 3 horizontal and 1 vertical or flatter. This slope allows for mowing and lessens the chance of ramping over the embankments or snagging. The Ontario Provincial Standards for rural entrances to roads in earth cut is shown in **Figure 14**.

Recommendation: Implement a design standard requiring a 3:1 end slope with earthen headwalls.

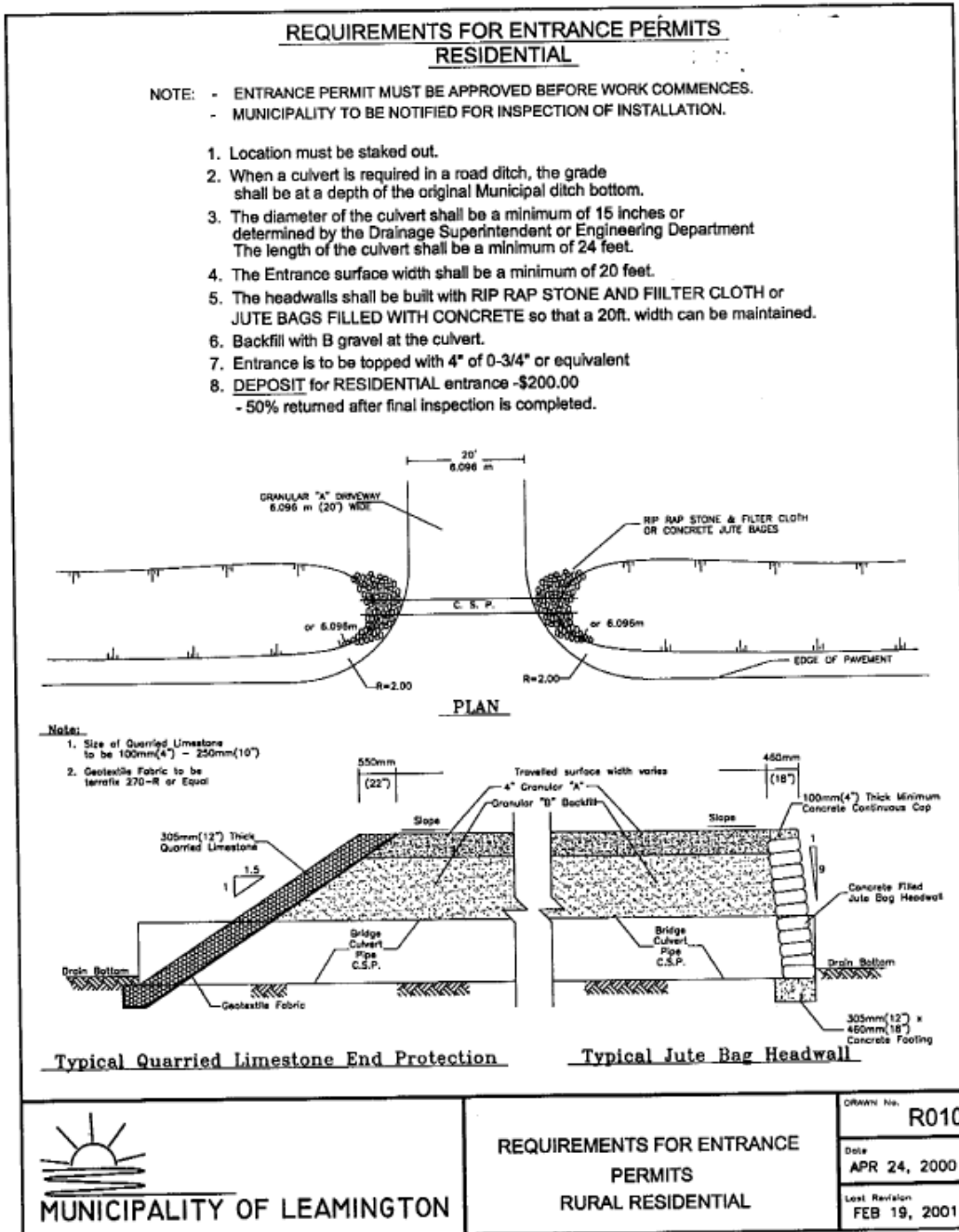


Figure 13: Requirements for Entrance Permits (Rural Residential)

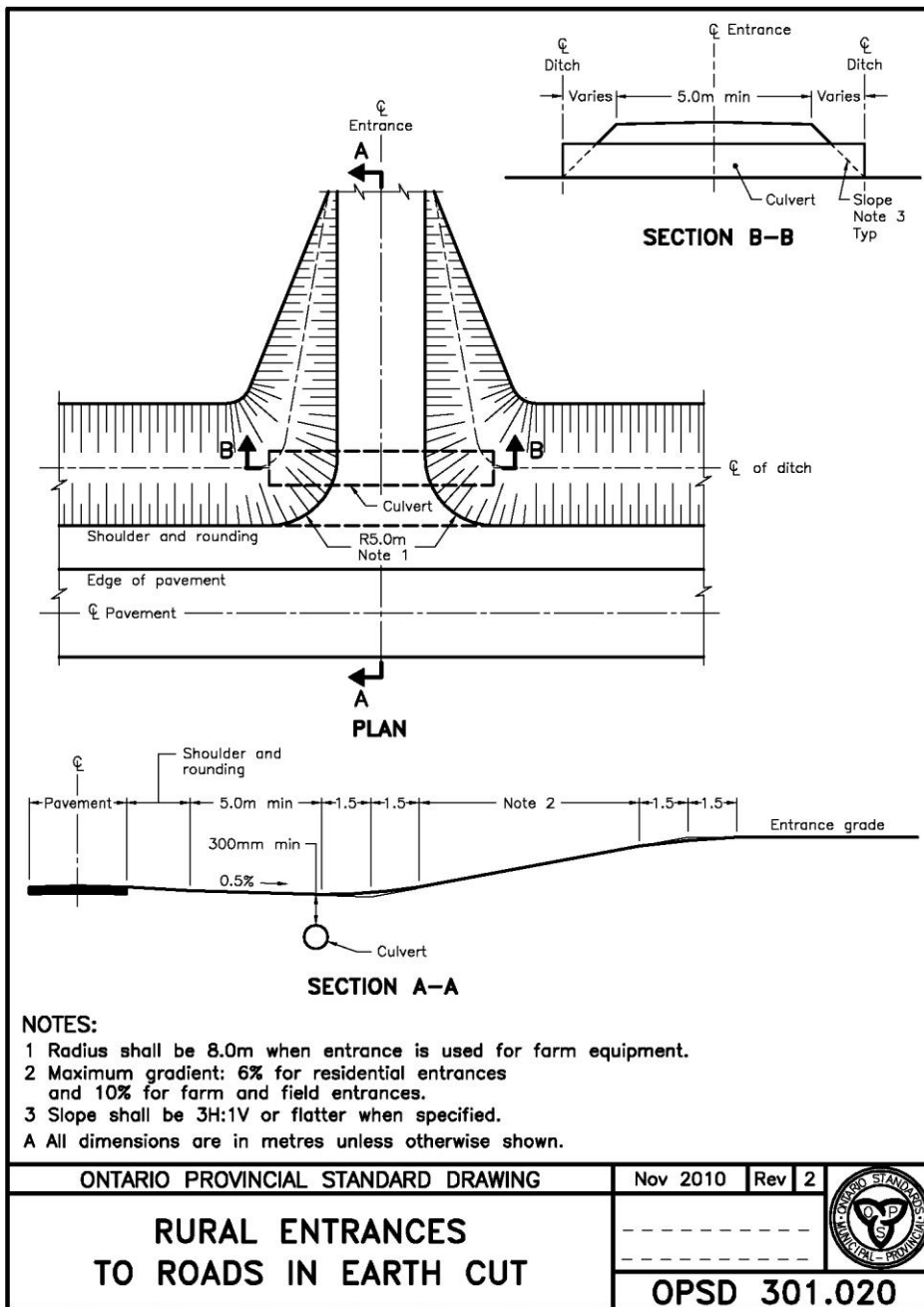


Figure 14: Provincial Standard for Rural Private Entrances

5.11 Community Safety Zones

The 2007 Long Range Transportation Action Plan recommended the creation of a Community Safety Zone policy to modify driver behavior and improve safety on sections of roads where safety is of special concern, such as around schools, recreation centres, senior centres and community playgrounds and parks.

The establishment of a Community Safety Zone is a commitment by local police to increase patrols and increase enforcement in the zone. A warrant should be established to determine where these zones should be enacted, recognizing the limits of law enforcement personnel. The zones should only be established with confirmation that the police have the personnel available to increase patrols of these zones.

The proposed traffic calming warrant could be used as the basis for the community safety zone warrant. Added to this warrant should be the following criteria:

- Presence of a special concern land use: school, recreation centres senior centre or community playground or park;
- High pedestrian location: 100 pedestrians per hour or more for any 8 hours of the day;
- Law enforcement commitment: Commitment verified by local police to increase patrols and enforcement.

Recommendation: Prepare a Community Safety Zone Policy and warrant.

5.12 Uncontrolled Pedestrian Crossing Facilities

A review has been undertaken to provide recommendations regarding 'Courtesy Crossings'. These are uncontrolled facilities, meaning that pedestrians do not have priority over general vehicle traffic. Several of these crossings are currently in operation in Leamington.

5.12.1 Provincial Guidance

Book 15 of the Ontario Traffic Manual (OTM) provides guidance on Pedestrian Crossing Facilities. It lists five alternatives for uncontrolled pedestrian crossing locations, however it indicates that the 'Courtesy Crossing' is not currently a regulated feature and their introduction by some municipalities has been on a trial basis.

The Ontario Traffic Manual discourages the use of uncontrolled crossings if the following conditions are exceeded:

- Speed limit of 60 km/h or higher;
- The roadway is more than two through lanes in each direction or has more than three through lanes if it is one-way;
- The road classification is higher than a collector road, in other words it is a major collector or arterial; or
- The pedestrian and traffic volumes exceed the warrant thresholds for controlled crossing devices.

As the Courtesy Crossing still is on a trial basis in the province, the Municipality should adhere to the prevailing signing and marking practice in Ontario for these crossings. The City of Kingston is recognized as the leader in the development of Courtesy Crossings. The City of Kingston uses the following line marking and signage at all of the Courtesy Crossings in the city:

- White ladder type crosswalk;
- Yellow Courtesy Crossing signage at the crosswalk;
- Signage for pedestrians indicating that vehicles do not stop and that pedestrians must wait for a safe gap; and
- Advanced warning signs, posted in accordance with the minimum distance provided in OTM Book 6.

Pavement Markings

Book 15 recommends that painted pavement markings should not be present at uncontrolled crossings. Section 3.3.1 states: “Marked crosswalks with painted pavement markings are not recommended at uncontrolled crossings as they create a false sense of security on the part of pedestrians, particularly children, who may enter the crossing expecting that approaching drivers will see them and stop.” This guidance is deemed appropriate for uncontrolled, unmarked pedestrian crossings. However, at a crosswalk that is specifically signed as a Courtesy Crossing, more signage and line marking is better in order to alert both drivers and pedestrians of the crossing. The standard pavement markings used at courtesy crossings in Ontario is the White ladder type crosswalk.

Signage

OTM Book 15 states that courtesy crossings should be “marked with non-standard oversized yellow fluorescent warning signs that indicate ‘COURTESY CROSSING’ along with a large black X. At the crossing, a special message sign intended for pedestrians is installed to clearly convey that pedestrians still do not have the right of-way over vehicles.” The types of courtesy crossing signs posted in Leamington are inconsistent, with some matching the above description (such as the one shown in **Figure 15**) and others are a different colour and are missing the word “crossing”.



Figure 15: Example of Courtesy Crossing Signage Consistent with the Ontario Traffic Manual

At several locations in Leamington, 'Courtesy Crossing Ahead' signs are posted upstream of the facility. While not specified in OTM Book 15, these signs provide advanced warning to drivers that pedestrians may be present. Posting these signs also is the standard practice in Ontario.

The 'Courtesy Crossing Ahead' advanced warning signs should be mounted at a suitable distance from the crossing to give drivers enough time to see the signs and react before reaching the crossing point. Table 2 of OTM Book 6 classifies similar signs as a Condition B warning sign, requiring drivers to reduce their speed in anticipation of a potential or actual stop being required. Table 4 of the same document recommends that the minimum advance placement of such signs in a 50 km/h zone be 140 metres. Consideration should also be given to side roads and parking access which may lie between the advance warning sign and the crossing. Where necessary, additional warning signs may be mounted closer to the crossing.

The higher the vehicular speed at the time of impact, the higher the probability of fatality of pedestrians. Relatively small changes in speed can have a large impact on the severity of a pedestrian crash (particularly between 40 km/h and 60 km/h). Vehicle speed limit repeater signs should therefore be posted in advance of crossings to remind drivers of the mandated speed.

5.12.2 Evaluation of Courtesy Crossings

Although this report provides general recommendations applicable to Courtesy Crossings, the safety and effectiveness of each location should be assessed on a site-specific basis. Where available, historic collision data should be evaluated to correlate the nature and frequency of collisions to the type of crossing facility that was present at the time. If data collection processes are not already in place, these should be established to monitor future collisions at the crossing points.

The physical characteristics of each crossing site should be reviewed, including:

- Sidewalk / roadway width and number of lanes;
- Intervisibility between pedestrians and drivers, particularly where driveway and obstructions are present close to the crossing;
- Distance to nearby intersections, other crossings and transit stops; and
- Proximity to destinations such as schools, hospitals, entertainment facilities and malls.

Observations should be made regarding the volume of pedestrians crossing and time it takes users to reach the other side. Particular attention should be paid to seniors, unaccompanied children and pedestrians with vision or mobility-related difficulties. Vehicle volumes, speed and composition should also be measured. The data collection methodology should be consistent with the warrants for controlled crossings as outlined in OTM Book 15; this will facilitate the identification of sites where the stated thresholds are exceeded and the facility should be upgraded to one of the controlled crossing facilities listed in section 5.12.3 below.

5.12.3 Observations

The characteristics and provisions at nine locations in Leamington were compared with the guidelines listed in Ontario Traffic Manual Book 15:

- Queens Avenue at Trail;
- Talbot Street West at Leamington High School;
- Talbot Street East at Cedar Drive;
- Princess Street at The Princess Centre (south of Mill Street East);
- Erie Street South at Heinz Plant (south of Oak Street);

- Pulford Avenue at Trail;
- Seacliff Drive East at Trail;
- Robson Road at Trail; and
- Robson Road at Erie Shores Golf Club.

In all cases the posted speed limit is 50 km/h, although no signs were seen in the vicinity of the crossings.

The scope of this study does not extend to the level of detail described in section 5.12.2 above. However, some general observations were noted at these locations with respect to the guidance outlined in OTM Book 15.

Queens Avenue at Trail

At the site of the existing uncontrolled mid-block crossing at the Trail, Queens Avenue has two through lanes. There are four commercial/industrial/institutional driveway entrances close to the uncontrolled crossing. There presently is no Courtesy Crossing signage present, however, there are ladder pavement markings.

To be consistent with other crossings of trails in town, standard Courtesy Crossing signs should be installed at the crosswalk with advance warning signs installed. Signs directing pedestrians to wait for the gap in vehicle traffic also should be installed.

Recommendation: Install Courtesy Crossing signs.

Talbot Street West at Leamington District Secondary School

There is an uncontrolled crossing on Talbot Street West outside Leamington High School. Talbot Street West is a three-lane road with a centre two-way left turn lane.

Although the facility is signed as a courtesy crossing, the existing sign is not the standard Courtesy Crossing sign and should be replaced.

This midblock pedestrian crossing on Talbot Street West provides pedestrian access between the Leamington High School on the north side of Talbot Street and the parking lot for the high school on the south side of the street.

The crossing is approximately 80 metres west of a signalized pedestrian crossing on Talbot Street at the Greenway Trail. If the uncontrolled crossing were to be removed, pedestrians would be expected to walk east to the signalized pedestrian crossing at the Greenway Trail. Those crossing to reach the parking lot on the southern side of Talbot Street may still decide to take the shorter route across the road at or near the existing uncontrolled crossing point.

This secondary school location is planned to be closed, with a new school constructed on a site on Oak Street. The scheduled opening date of the new school is September 2016. In the interest of safety due to the likelihood of jaywalkers and the short timeframe remaining for the school to be in operation, it is recommended that this unsignalized midblock pedestrian crossing be maintained, subject to the aforementioned modifications in line with OTM Book 15.

Recommendation: Maintain Courtesy Crossing. Replace existing Courtesy signage with standard Courtesy Crossing signage.

Princess Street at The Princess Centre (south of Mill Street East)

The existing uncontrolled mid-block crossing of Princess Street at Princess Centre is currently operating as a Courtesy Crossing. Princess Street has two through lanes. The existing signage is not the standard Courtesy Crossing sign and should be replaced.

Recommendation: Install standard Courtesy Crossing sign and remove existing nonstandard sign.

Erie Street South at Heinz Plant (south of Oak Street)

The existing crossing of Erie Street South at the Heinz Plant (south of Oak Street) is uncontrolled. There is no signage at, or on either approach to, the crossing, which is delineated by two fading pavement markings. Erie Street South is a four-lane arterial road.

The Heinz Plant has operations on both sides of Erie Street south of Oak Street, generating pedestrian flow across Erie Street. The traffic volumes on Erie Street are significant and queues can form from the Oak Street intersection back to the crossing area. Pedestrians have been observed to walk between queued vehicles in one lane, despite poor intervisibility with drivers of fast-moving vehicles in adjacent lanes. Municipal data indicates that 4 collisions involving pedestrians have occurred between 2005 and 2012, although none of them were fatal.

The intersection of Erie Street at Oak Street presently is being reconstructed, providing the opportunity to implement a new signalized crossing, coordinated with the new Erie / Oak traffic signal. A detailed Pedestrian Crossing Evaluation was recently undertaken at this location and concluded that such a facility was not warranted.

As the pedestrian signal was determined to be not warranted, it is recommended that the appropriate Courtesy Crossing line markings and signage be installed, both for drivers and for pedestrians. These include the white ladder crosswalk marking, the Courtesy Crossing signs at the crosswalk and in advance of the crosswalk and signage for pedestrians indicating they should wait for the gap in vehicle traffic.

Recommendation: Install Courtesy Crossing.

Pulford Avenue at Trail

The existing uncontrolled crossing of Pulford Avenue at the Trail is currently operates as a Courtesy Crossing. Pulford Avenue is a two-lane road. There are two driveway entrances in close proximity to this uncontrolled crossing. The 'Courtesy Crossing' signs for traffic at the facility are consistent with those described in OTM Book 15.

Like at several other locations, 'Courtesy Crossing Ahead' signs are posted approximately 180 metres upstream of the westbound approach to the crossing. On the eastbound approach, the sign is closer (approximately 120 metres from the crossing) which is placed in a location so that drivers turning out of the parking lots on both sides of Pulford Avenue will see the sign. While not specified in OTM Book 15, the signs warn drivers of a potential hazard ahead. As described in section 5.12.1 above, the location of the advance signs should be reviewed to ensure optimum placement.

Recommendation: Maintain Courtesy Crossing. Review location of advance warning signs to ensure optimum placement.

Seacliff Drive East at Trail

There is an uncontrolled courtesy crossing on Seacliff Drive East at the Trail. The roadway has two lanes in addition to a centre two-way left turn lane. The signage and pavement markings at the crossing point are similar to the Pulford Avenue crossing.

Again, 'Courtesy Crossing Ahead' signs are posted approximately 140 and 165 metres upstream of the crossing on the westbound and eastbound approaches, respectively. In both directions there are parking lot accesses between the signs and the crossing; drivers exiting these lots will not have advance warning that the uncontrolled crossing is ahead. As described in section 5.12.1 above, the location of the advance signs should be reviewed to ensure optimum placement.

Recommendation: Maintain Courtesy Crossing. Review location of advance warning signs to ensure optimum placement.

Robson Road at Trail

The existing uncontrolled crossing of Robson Road at the Trail is operating as a Courtesy Crossing. Robson Road has a two lane cross-section. The white ladder crosswalk and standard Courtesy Crossing sign presently are installed. Advanced warning signs should be installed both direction on Robson Road.

Recommendation: Maintain Courtesy Crossing. Install advance warning signs.

Robson Road at Erie Shores Golf Club

At this Courtesy Crossing, Robson Road also has a two lane cross-section. The standard Courtesy Crossing signs, both advanced warning signs and signs at the crossing, should be installed and the nonstandard signs presently in place should be removed.

Recommendation: Maintain Courtesy Crossing. Review location of advance signs to ensure optimum placement. Install standard Courtesy Crossing sign and remove existing nonstandard sign.

Talbot Street East at Cedar Drive

At this offset intersection, the two-lane side streets (Cedar Drive and Jones Avenue) both feature crosswalks and operate under stop control. Talbot Street East is the main road; it operates with no stop control, two through lanes and a centre two-way left turn lane. Speed limits are not posted in the vicinity of the intersection.

Across Talbot Street East there are two fading stop line pavement markings, terminating at a bus stop on the south side. There is no control over traffic approaching this crossing in either direction from Talbot Street East; neither are there warning signs to alert drivers that pedestrians may be crossing. The presence of pavement markings may mislead pedestrians into believing that drivers must yield to them.

Due to its location at an intersection, this is not a courtesy mid-block crossing. In line with OTM Book 15, the pavement markings should be removed.

Recommendation: Remove pavement markings.

5.12.4 Summary of Recommendations for Pedestrian Crossings

- Standardize signed Courtesy Crossings with appropriate signage and line marking; and
- Post repeater signs for speed limits in the vicinity of uncontrolled crossings.

5.13 Signalized Pedestrian Crossings

The Municipality presently has two signalized midblock pedestrian crossings, one at Talbot Street and the Trail and one at Oak Street and the Trail. The crossing at Talbot Street is adjacent to the existing Leamington District Secondary School. The crossing at Oak Street is adjacent to the proposed new location of the Leamington District Secondary School. At the Talbot Street and Trail pedestrian crossing, spot pedestrian counts were undertaken on May 15, 2013 and peak hour traffic hour volumes were collected on January 17, 2013. Factoring up both sets of data to cover eight-hours and comparing them based on Justification 6 in OTM Book 12 was inconclusive, with the point on the graph lying on the edge of the 'justified' zone. It is recommended that a more detailed study be undertaken in accordance with OTM Book 12 methodology, based 8-hour data and considering other justifications, prior to any decisions being made on the removal of the existing traffic signals.

Recommendation: Maintain signalized mid-block pedestrian crossings. Undertake more detailed study to determine if signalization is warranted, keeping in mind the present and future locations of the Leamington District Secondary School.

5.14 Policies for Establishing Posted Speed Limits

The current general practice for establishing posted speed limits on typical roadways was undertaken. This is based largely on the TAC Guidelines for Establishing Posted Speed Limits. This considers the following factors in determining a suitable posted speed for a roadway:

- Horizontal and vertical geometry;
- Average lane width;
- Roadside hazards;
- Pedestrian and cyclist exposure;
- Pavement surface;
- The number of intersections with public roads and private access driveways; and
- On-street parking.

Default speed limits are 50 km/h and 80 km/h for urban and rural roads respectively, unless a request to investigate for a lower speed limit is received. A review may be undertaken to identify 'hot spots' where several of these items may coincide; however, the *TAC Guidelines for Establishing Posted Speed Limits* recommends that speed zones be a minimum of 500 metres long, so there is limited scope for changes in speed limit within the downtown core.

The following items are based on the *TAC Guidelines for Establishing Posted Speed Limits*:

- Rural concessions are considered to be rural minor arterials.
- If there are vertical curves that require speed limits posted less than per TAC guideline results, they will be posted based on minimum safe stopping sight distance.
- The lowest recommended posted speed limit is 40 km/h on a public road.

Where speed limits change near intersections, it is recommended that 'Maximum Speed' (Rb-1) signs be mounted on the departure leg of the intersection, with 'Maximum Speed Begins' (Rb-2) signs at the speed limit change point. The recommended distance between Rb-1 and Rb-2

signs depends on the two speed limits on either side of the change. Ontario Traffic Manual (OTM) Book 5 provides further details on the siting of speed limit signs and example configurations.

School and Playground Areas / Zones

The *TAC School and Playground Areas and Zones: Guidelines for Application and Implementation* outlines the methodology for classifying sections of roadway adjacent to a school as a 'school area' or 'school zone'.

This document should form the technical basis for decisions regarding those facilities. The Ontario Traffic Manual (OTM) also refers to school zones, which it identifies as a "roadway section with a mandatory 40 km/h maximum speed zone" at certain times. A speed limit of 60 km/h is permissible on King's Highways but there is no stated option for a 30 km/h limit.

Neither the Ontario Traffic Manual nor the *TAC School and Playground Areas and Zones: Guidelines for Application and Implementation* specify speed limits for playground zones. However, the latter document recommends that where playground zones are adjacent to school zones, "only a single zone should be provided in order to convey a simple and unambiguous message to motorists". The speed limit of this combined zone in an urban, residential environment should therefore be 40 km/h.



Figure 16: School Speed Zone Sign

It is stated in OTM Book 15 that amendments made to Regulation 615 of the *Highway Traffic Act* stating that the requirements for school zone speed limit signs as displaying a black symbol and black border on a retro-reflective fluorescent yellow-green background are now in effect. As of January 1, 2015, all school zone speed limit signs must be displayed with the colours described and as shown in **Figure 16** to the right. For school areas, the top sign is used without the speed limit plate.

Downtown Core

Erie Street is the main north-south thoroughfare in the downtown core. Using the methodology outlined in the TAC Guidelines for Establishing Posted Speed Limits, a top level assessment of Erie Street was undertaken. This does not support the suggested reduction of the speed limit in the downtown core from the existing 50 km/h down to 40 km/h.

Recommendations:

- The minimum posted speed limit should be 40km/h on a public road.
- Where speed limits change at intersections, 'Maximum Speed' (Rb-1) signs should be mounted on the departure leg of the intersection, with 'Maximum Speed Ahead' (Rb-5) signs mounted on the reverse to alert drivers approaching the intersection to the change in speed on the other side.
- School zones and playground areas should not have posted speed limits less than 40km/h.
- The existing speed limit of 50km/h through the downtown on Erie Street should be maintained.

5.15 General Design and Application Guidelines for Curb Extensions

Curb extensions, sometimes referred to as bulb-outs, shorten pedestrian crossing distances and reduce pedestrians' exposure to motor vehicles. Curb extensions are most appropriate where on-street parking already exists or is planned to be constructed. Curb extensions offer benefits to both pedestrians and motorists. These benefits include:

- Better visibility of both pedestrians and vehicles; and
- Shorter crossing distances for pedestrians, which equates to shorter crossing times and a decreased length of the pedestrian phase at traffic signals and shorter waits for vehicles for pedestrians to cross as unsignalized intersections.

These benefits equate for a safer environment for pedestrians.

The curb extension usually is constructed to the width of the on-street parking and should not impact the delineation requirements of any existing or planned bicycle lanes. Curb radii should consider the types of vehicles that are expected to use the street and should be sufficient for trucks and transit vehicles, as appropriate, to ensure that these vehicles do mount the curb extension to complete a turn. Parking should be set back from the curb extension to ensure visibility of pedestrians on the curb extension and vehicles in the travel lane. Examples of curb extensions are provided in **Figure 17** and **Figure 18**.



Figure 17: Example of a Landscaped Curb Extension



Figure 18: Example of a Curb Extension at Mid-block Pedestrian Crossing

Appropriate locations for constructing curb extensions include:

- Locations where residential streets meet arterial streets at an obtuse angle;
- Locations on routes that are used by school children or the elderly; and
- Downtown shopping areas, such as along Erie Street.

Locations in the downtown core where curb extensions may be appropriate are indicated in **Figure 19**. These locations would need to be verified and designed in the detailed design stage. The design should consider the swept turning paths of the vehicles expected to park in the spaces adjacent to the curb extension in order to curb extensions properly.

Recommendation: Install curb extensions at appropriate locations.


















Figure 19: Possible Locations for Curb Extensions in the Downtown Core





5.16 Short Term Priority Action Plan

The recommendations of the report have been summarized in **Table 13**. Each recommendation has been ranked according to its priority, cost and level of effort required for implementation.

Table 13: Prioritization of Recommendations

Recommendation	Rank ¹	Cost ²	Effort ³	Action(s) Recommended
Operational Issues of Signalized Intersections				
Erie Street at Wilkinson Drive	1	\$		<ul style="list-style-type: none">Optimize signal timings
Erie Street at Oak Street				
Erie Street at Seaciff Drive				
Talbot Street at Oak Street / Fraser Road				
Talbot Street at Lutsch Avenue				
Operational Issues of Unsignalized Intersections				
Erie Street at Marlborough Street	--	--	--	<ul style="list-style-type: none">Based on analysis, do not install traffic signals
Danforth Avenue at Oak Street				
Sherk Street at Seaciff Drive				
Lutsch Avenue at Oak Street				
Intersections and Corridors of Specific Concern				
Oak Street at Wigle Street	2	\$\$\$		<ul style="list-style-type: none">Install Intersection Pedestrian Signal
Erie Street at Clark Street	2	\$\$\$		<ul style="list-style-type: none">Signalize intersection
Seaciff Drive at Sherk Street	2	\$\$\$		<ul style="list-style-type: none">Consider traffic calming measures such as narrowing Coronation Avenue by installing pedestrian and cycling infrastructure and lane markings
Sherk Access for Kinsmen Recreational Complex	1	\$\$		<ul style="list-style-type: none">Install centre median, explore the option of removing access at William Ave.
Erie Street South Turn Around	1	\$\$\$		<ul style="list-style-type: none">Redesign the Erie St. turnaround
Northbound Left Turn Restrictions at Erie and John Street and Eire and Russell Streets	1	\$		<ul style="list-style-type: none">Prohibit left turns during the peak hours
Aiuto Drive Extension	3	\$\$		<ul style="list-style-type: none">Consider acquisition of easement lands to construct a pedestrian linkage
Elliott Street	2	\$		<ul style="list-style-type: none">Prohibit on-street parking during peak traffic hours (i.e. Monday to Friday, from 7 a.m. to 9 a.m., 11:30 a.m. to 1:30 p.m. and 4 p.m. to 6 p.m.)
Heinz Access on Oak Street near Victoria Avenue	3	\$\$\$		<ul style="list-style-type: none">Direct trucks to use designated truck route, consider shifting access east to align with Victoria Avenue
Left Turn Slip-Around Treatment for Seaciff at Sherk and Seaciff at Fraser T-Intersection	3	\$\$\$		<ul style="list-style-type: none">Construct left turn slip around treatments
Country Road 37 at Deer Run Road	2	\$		<ul style="list-style-type: none">Designate stretch of Fox Run Rd. eastbound only
Deer Run Road at Mersea Road 21	2	\$\$\$		<ul style="list-style-type: none">Acquire land and maintain to improve sight lines
Fox Run Road at Lakeshore Drive	2	\$\$\$		<ul style="list-style-type: none">Acquire land and maintain to improve sight lines, install hidden intersection signs
Mersea Road 12 at Point Pelee Drive (County Road 33)	2	\$\$		<ul style="list-style-type: none">Re-define intersection by removing excess pavement, curbing and painting travel lanes

Recommendation	Rank ¹	Cost ²	Effort ³	Action(s) Recommended
Bevel Line (County Road 33) Speed Limit	2	\$		<ul style="list-style-type: none"> The speed limit on Bevel Line for the section from Seaclyff Drive to the limit of the urban area should be maintained at 50 km/h. The speed limit for remaining portion of Bevel Line to its intersection with Point Pelee Drive should be considered to be reduced to 50 km/h
Mersea Road 12 at Talbot Road	3	\$\$\$		<ul style="list-style-type: none"> Realign intersection by shifting Mersea Rd. 12
Signal Cycle Lengths				
Signal Coordination	1	\$		<ul style="list-style-type: none"> Coordinate signals
Speeding				
Conduct speed studies	2	\$\$		<ul style="list-style-type: none"> Conduct speed studies
Traffic Calming				
Implement traffic calming warrant	1	\$		<ul style="list-style-type: none"> Implement traffic calming warrant
On Street Parking				
Parking controls	1	\$		<ul style="list-style-type: none"> Implement parking controls
Bike Lanes				
Prepare Active Transportation Master Plan	1	\$		<ul style="list-style-type: none"> Prepare Active Transportation Master Plan
Bridge Warning Signs				
Complete pavement markings	1	\$		<ul style="list-style-type: none"> Complete pavement markings
Rural Private Entrances				
Implement Design Standard	3	\$		<ul style="list-style-type: none"> Implement a design standard requiring 4:1 end slope
Community Safety Zones				
Prepare Community Safety Zone Policy	1	\$		<ul style="list-style-type: none"> Prepare a Community Safety Zone Policy and warrant
Uncontrolled Pedestrian Crossing Facilities				
Queens Avenue at Trail	1	\$		<ul style="list-style-type: none"> Install courtesy crossing signage Post speed limit in vicinity of uncontrolled crossing
Talbot Street West at Leamington District Secondary School	1	\$		<ul style="list-style-type: none"> Maintain pedestrian crossing Replace current signage Update school speed zone signs
Talbot Street East at Cedar Drive	1	\$		<ul style="list-style-type: none"> Remove pavement markings
Princess Street at The Princess Centre (south of Mill Street East)	1	\$		<ul style="list-style-type: none"> Install courtesy crossing signage Post speed limit in vicinity of uncontrolled crossing
Erie Street South at Heinz Plant	1	\$		<ul style="list-style-type: none"> Short term: <ul style="list-style-type: none"> Install courtesy crossing signage Repaint the crossing Post speed limits in vicinity of uncontrolled crossing Long Term: <ul style="list-style-type: none"> Conduct a mid-block pedestrian crossing assessment to inform the construction of the pedestrian signal at this mid-block crossing location.
Pulford Avenue at Trail	2	\$		<ul style="list-style-type: none"> Post speed limit in vicinity of uncontrolled crossing

Recommendation	Rank ¹	Cost ²	Effort ³	Action(s) Recommended
Robson Road at Trail	2	\$		<ul style="list-style-type: none"> Post speed limit in vicinity of uncontrolled crossing
Robson Road at Erie Shores Golf Club	1	\$		<ul style="list-style-type: none"> Install courtesy crossing signage Post speed limit in vicinity of uncontrolled crossing
Policies for Establishing Posted Speed Limits				
Make Adjustments to Policy for Establishing Posted Speed Limits	1	\$		<ul style="list-style-type: none"> Changes in speed limit to be in 10km/h increments Where speed limit changes at an intersection, signage should be installed before and after intersection
General Design and Application Guidelines for Curb Extensions				
Install as Appropriate	2	\$\$		<ul style="list-style-type: none"> Install curb extensions at appropriate locations

Notes:




1. Rank

1 – Most important, begin immediately
2 – More important, make necessary plans for implementation
3 – Important, complete after more important projects are completed

2. Cost

\$ - Low financial cost of improvement/implementation is minimal (0 ≥ 25k)
\$\$ - Low to moderate financial cost of improvement/implementation (25 ≥ 50k)
\$\$\$ - High financial cost of improvement/implementation (> 50k)

3. Effort/Time to Complete

 - Implementation ready, little effort required for implementation (0-3 months)
 - Moderate effort required for implementation (3-6 months)
 - Large effort required, additional study may be required (6+ months)

Appendix A

Level of Service Definitions

LEVEL OF SERVICE DEFINITIONS AT SIGNALIZED INTERSECTIONS⁽¹⁾

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. The criteria are given in the table below. Delay may be measured in the field or estimated using software such as Highway Capacity Software. Delay is a complex measure and is dependent upon a number of variables, including quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

Level of Service	Features	Control Delay per vehicle (sec)
A	LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10
B	LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	$> 10 \text{ and } \leq 20$
C	LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	$> 20 \text{ and } \leq 35$
D	LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, of high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	$> 35 \text{ and } \leq 55$
E	LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	$> 55 \text{ and } \leq 80$
F	LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	> 80

(1) Highway Capacity Manual 2000

LEVEL OF SERVICE DEFINITIONS AT UNSIGNALIZED INTERSECTIONS⁽¹⁾

The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

Level of Service	Features	Average Total Delay (sec/veh)
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.	≤ 10
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.	> 10 and ≤ 15
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.	> 15 and ≤ 25
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.	> 25 and ≤ 35
E	Very long traffic delays occur. Operations approach the capacity of the intersection.	> 35 and ≤ 50
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.	> 50

(1) Highway Capacity Manual 2000.

Appendix B

Signalized Intersection Capacity Analysis

Lanes, Volumes, Timings

1: Erie Street & Highway 3 (Bypass)

21/03/2013

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↗	↖	↖	↗	↖	↖	↗	↖	↖	↖	↖	
Volume (vph)	30	130	101	35	172	100	76	221	7	51	272	28	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	75.0		75.0	75.0		75.0	30.0		0.0	40.0		0.0	
Storage Lanes	1		1	1		1	1		0	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850			0.850		0.996			0.986		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1658	1664	1483	1496	1648	1427	1551	1614	0	1610	1640	0	
Flt Permitted	0.563			0.628			0.422			0.511			
Satd. Flow (perm)	982	1664	1483	989	1648	1427	689	1614	0	866	1640	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)			135			133		3			9		
Link Speed (k/h)		80			80			80			80		
Link Distance (m)		254.9			283.5			785.8			150.0		
Travel Time (s)		11.5			12.8			35.4			6.8		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	2%	7%	2%	13%	8%	6%	9%	38%	5%	6%	17%		
Adj. Flow (vph)	40	173	135	47	229	133	101	295	9	68	363	37	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	40	173	135	47	229	133	101	304	0	68	400	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2			6			
Minimum Split (s)	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0		28.0	28.0		
Total Split (s)	37.0	37.0	37.0	37.0	37.0	37.0	43.0	43.0		43.0	43.0		
Total Split (%)	46.3%	46.3%	46.3%	46.3%	46.3%	46.3%	53.8%	53.8%		53.8%	53.8%		
Maximum Green (s)	31.0	31.0	31.0	31.0	31.0	31.0	37.0	37.0		37.0	37.0		
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		
Lead/Lag													
Lead-Lag Optimize?													
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		
Flash Dont Walk (s)	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0		17.0	17.0		
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0		
Act Effect Green (s)	33.0	33.0	33.0	33.0	33.0	33.0	39.0	39.0		39.0	39.0		
Actuated g/C Ratio	0.41	0.41	0.41	0.41	0.41	0.41	0.49	0.49		0.49	0.49		

Lanes, Volumes, Timings

1: Erie Street & Highway 3 (Bypass)

21/03/2013

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
v/c Ratio	0.10	0.25	0.20	0.12	0.34	0.20	0.30	0.39		0.16	0.50		
Control Delay	15.3	16.7	3.7	15.5	17.8	3.8	15.5	14.6		12.7	16.2		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0		
Total Delay	15.3	16.7	3.7	15.5	17.8	3.8	15.5	14.6		12.7	16.2		
LOS	B	B	A	B	B	A	B	B		B	B		
Approach Delay		11.5			13.0			14.8			15.7		
Approach LOS		B			B			B			B		

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 50 (63%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 13.9

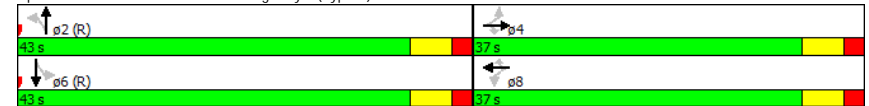
Intersection LOS: B

Intersection Capacity Utilization 53.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Erie Street & Highway 3 (Bypass)



Lanes, Volumes, Timings
2: Erie Street & Wilkinson Drive

21/03/2013

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	95	1	37	0	0	0	61	336	6	1	325	128
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00						0.98					0.94
Frt		0.853						0.997				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	1610	1382	0	1745	1745	0	1626	1675	0	1658	1664	1414
Flt Permitted	0.757						0.306			0.328		
Satd. Flow (perm)	1279	1382	0	1745	1745	0	515	1675	0	572	1664	1323
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49						1				171
Link Speed (k/h)		48			48			50			80	
Link Distance (m)		570.9			81.7			455.4			785.8	
Travel Time (s)		42.8			6.1			32.8			35.4	
Confl. Peds. (#/hr)	2					2	20					20
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	5%	2%	10%	2%	2%	2%	4%	6%	2%	2%	7%	7%
Adj. Flow (vph)	127	1	49	0	0	0	81	448	8	1	433	171
Shared Lane Traffic (%)												
Lane Group Flow (vph)	127	50	0	0	0	0	81	456	0	1	433	171
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			7.0			7.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm			pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	32.0	32.0		32.0	32.0		10.0	43.0		27.0	27.0	27.0
Total Split (s)	40.0	40.0		33.0	33.0		16.0	50.0		34.0	34.0	34.0
Total Split (%)	44.4%	44.4%		36.7%	36.7%		17.8%	55.6%		37.8%	37.8%	37.8%
Maximum Green (s)	33.0	33.0		26.0	26.0		13.0	43.0		27.0	27.0	27.0
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0		3.0	3.0		0.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		2.0	6.0		6.0	6.0	7.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0			18.0		8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	0
Act Efft Green (s)	34.0	34.0					48.0	44.0		28.0	28.0	27.0
Actuated g/C Ratio	0.38	0.38					0.53	0.49		0.31	0.31	0.30
v/c Ratio	0.26	0.09					0.18	0.56		0.01	0.84	0.33

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 3

Lanes, Volumes, Timings
2: Erie Street & Wilkinson Drive

21/03/2013

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	21.2	6.2					13.5	19.4		22.0	45.2	5.9
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	0.0
Total Delay	21.2	6.2					13.5	19.4		22.0	45.2	5.9
LOS	C	A					B	B		C	D	A
Approach Delay		17.0						18.5			34.0	
Approach LOS		B						B			C	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 43 (48%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 25.4

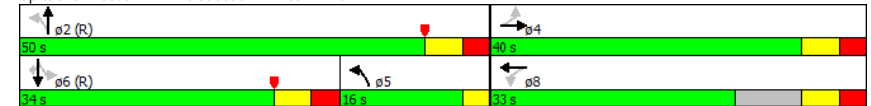
Intersection LOS: C

Intersection Capacity Utilization 74.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Erie Street & Wilkinson Drive



Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 4

Lanes, Volumes, Timings
3: Erie Street & Talbot Street

21/03/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗		
Volume (vph)	33	140	17	43	199	43	58	191	25	83	215	26	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	15.0		0.0	15.0		0.0	15.0		0.0	15.0		0.0	
Storage Lanes	1		0	1		0	1		0	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	0.99	0.99		0.98	0.99		0.99	1.00		0.99	1.00		
Frt		0.984			0.973			0.983			0.984		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1610	1659	0	1658	1686	0	1595	1637	0	1610	1606	0	
Flt Permitted	0.566			0.418			0.463			0.503			
Satd. Flow (perm)	948	1659	0	717	1686	0	772	1637	0	847	1606	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		8			15			10			9		
Link Speed (k/h)		80			80			50			50		
Link Distance (m)		622.2			977.7			162.7			276.7		
Travel Time (s)		28.0			44.0			11.7			19.9		
Confl. Peds. (#/hr)	14		15	15		14	10		8	8		10	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	6%	7%	3%	5%	9%	6%	
Adj. Flow (vph)	44	187	23	57	265	57	77	255	33	111	287	35	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	44	210	0	57	322	0	77	288	0	111	322	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right		
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA		
Protected Phases		4		3	8		5	2		1	6		
Permitted Phases	4			8			2			6			
Minimum Split (s)	27.0	27.0		8.0	35.0		8.0	37.0		8.0	37.0		
Total Split (s)	27.0	27.0		8.0	35.0		8.0	37.0		8.0	37.0		
Total Split (%)	33.8%	33.8%		10.0%	43.8%		10.0%	46.3%		10.0%	46.3%		
Maximum Green (s)	21.0	21.0		3.0	29.0		3.0	31.0		3.0	31.0		
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0		
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0		1.0	-1.0		1.0	-1.0		1.0	-1.0		
Total Lost Time (s)	5.0	5.0		6.0	5.0		6.0	5.0		6.0	5.0		
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes			
Walk Time (s)	10.0	10.0			18.0			20.0			20.0		
Flash Dont Walk (s)	11.0	11.0			11.0			11.0			11.0		
Pedestrian Calls (#/hr)	0	0			0			0			0		

Lanes, Volumes, Timings
3: Erie Street & Talbot Street

21/03/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effect Green (s)	22.0	22.0		29.0	30.0		33.0	32.0		33.0	32.0		
Actuated g/C Ratio	0.28	0.28		0.36	0.38		0.41	0.40		0.41	0.40		
v/c Ratio	0.17	0.45		0.20	0.50		0.23	0.44		0.30	0.50		
Control Delay	25.4	28.2		19.0	21.6		13.0	16.6		16.0	20.7		
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay	25.4	28.2		19.0	21.6		13.0	16.6		16.0	20.7		
LOS	C	C		B	C		B	B		B	C		
Approach Delay		27.7			21.2			15.8			19.5		
Approach LOS		C			C			B			B		

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green, Master Intersection

Natural Cycle: 80

Control Type: Pretimed

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 20.5

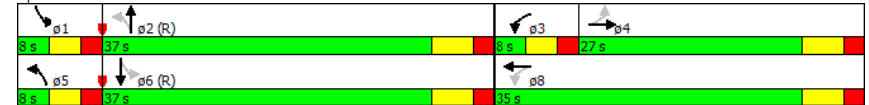
Intersection LOS: C

Intersection Capacity Utilization 76.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: Erie Street & Talbot Street















4: Erie Street & Mill Street

21/03/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	0	22	11	31	64	0	232	18	15	243	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		15.0	20.0		0.0
Storage Lanes	1		0	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.919				0.850			
Flt Protected	0.950				0.995					0.950		
Satd. Flow (prot)	1658	1483	0	0	1594	0	0	1695	1483	1658	1604	0
Flt Permitted	0.620				0.970					0.549		
Satd. Flow (perm)	1082	1483	0	0	1554	0	0	1695	1483	958	1604	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		503			85				123			
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		187.2			147.6			162.7			162.7	
Travel Time (s)		14.0			11.1			11.7			11.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%	2%	5%	2%	2%	11%	2%
Parking (#/hr)				0								
Adj. Flow (vph)	9	0	29	15	41	85	0	309	24	20	324	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	29	0	0	141	0	0	309	24	20	325	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1			1	1	1	1	
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0			10.0	10.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Detector 1 Size(m)	10.0	10.0		10.0	10.0			10.0	10.0	10.0	10.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA			NA	Perm	pm+pt	NA	

4: Erie Street & Mill Street

21/03/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	32.0	32.0		32.0	32.0			37.0	37.0	9.0	48.0	
Total Split (s)	32.0	32.0		32.0	32.0			37.0	37.0	11.0	48.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%			46.3%	46.3%	13.8%	60.0%	
Maximum Green (s)	26.0	26.0		26.0	26.0			31.0	31.0	5.0	42.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0	2.0	3.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0			-1.0			-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	5.0	5.0			5.0			5.0	5.0	5.0	5.0	
Lead/Lag								Lead	Lead		Lag	
Lead-Lag Optimize?								Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None			C-Max	C-Max	None	C-Max	
Walk Time (s)	15.0	15.0		15.0	15.0			20.0	20.0		31.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	
Act Effect Green (s)	16.0	16.0			16.0			49.6	49.6	54.0	54.0	
Actuated g/C Ratio	0.20	0.20			0.20			0.62	0.62	0.68	0.68	
v/c Ratio	0.04	0.04			0.37			0.29	0.02	0.03	0.30	
Control Delay	26.6	0.1			15.7			9.1	0.0	1.4	1.9	
Queue Delay	0.0	0.0			0.0			0.0	0.0	0.0	0.0	
Total Delay	26.6	0.1			15.7			9.1	0.0	1.4	1.9	
LOS	C	A			B			A	A	A	A	
Approach Delay		6.4			15.7			8.5			1.8	
Approach LOS		A			B			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 51 (64%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

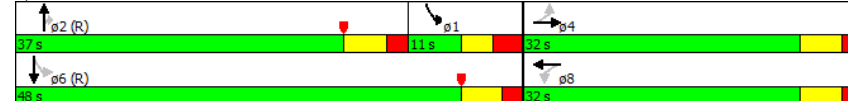
Maximum v/c Ratio: 0.37

Intersection Signal Delay: 6.9

Intersection Capacity Util

Analysis Period (min) 15

Splits and Phases: 4: Erie Street & Mill Street



Lanes, Volumes, Timings
5: Erie Street & Oak Street

21/03/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↗	↗	↖	↖	↖	↖	↗	↗	↖	↖	↖	
Volume (vph)	59	264	66	297	305	96	131	442	308	101	509	69	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	15.0		0.0	35.0			40.0	15.0		0.0	15.0		40.0
Storage Lanes	1		1	1		0	1		1	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	
Ped Bike Factor	1.00				0.99		1.00		0.98	1.00	1.00		
Frt			0.850		0.964				0.850		0.982		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1523	1695	1427	1658	3114	0	1537	1745	1483	1496	3078	0	
Flt Permitted	0.453			0.317			0.359			0.125			
Satd. Flow (perm)	726	1695	1427	553	3114	0	579	1745	1447	197	3078	0	
Right Turn on Red			Yes		Yes			Yes			Yes		
Satd. Flow (RTOR)			109		60			404			21		
Link Speed (k/h)		50			50			50			50		
Link Distance (m)		422.6			264.5			903.1			60.5		
Travel Time (s)		30.4			19.0			65.0			4.4		
Confl. Peds. (#/hr)	2					2	7		3	3		7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	11%	5%	6%	2%	2%	11%	10%	2%	2%	13%	8%	4%	
Adj. Flow (vph)	79	352	88	396	407	128	175	589	411	135	679	92	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	79	352	88	396	535	0	175	589	411	135	771	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	pm+pt	NA			
Protected Phases		4		3	8		2		1	6			
Permitted Phases	4		4	8		2		2	6				
Minimum Split (s)	35.0	35.0	35.0	10.0	45.0		35.0	35.0	35.0	10.0	45.0		
Total Split (s)	35.0	35.0	35.0	10.0	45.0		35.0	35.0	35.0	10.0	45.0		
Total Split (%)	38.9%	38.9%	38.9%	11.1%	50.0%		38.9%	38.9%	38.9%	11.1%	50.0%		
Maximum Green (s)	29.0	29.0	29.0	7.0	39.0		29.0	29.0	29.0	7.0	39.0		
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0	3.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	0.0	2.0		2.0	2.0	2.0	0.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0	0.0	1.0	-1.0		-1.0	-1.0	0.0	1.0	-1.0		
Total Lost Time (s)	5.0	5.0	6.0	4.0	5.0		5.0	5.0	6.0	4.0	5.0		
Lead/Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lag	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes				
Walk Time (s)	9.0	9.0	9.0		19.0		10.0	10.0	10.0		20.0		
Flash Dont Walk (s)	20.0	20.0	20.0		20.0		19.0	19.0	19.0		19.0		
Pedestrian Calls (#/hr)	0	0	0		0		0	0	0		0		

Lanes, Volumes, Timings
5: Erie Street & Oak Street

21/03/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effect Green (s)	30.0	30.0	29.0	41.0	40.0		30.0	30.0	29.0	41.0	40.0		
Actuated g/C Ratio	0.33	0.33	0.32	0.46	0.44		0.33	0.33	0.32	0.46	0.44		
v/c Ratio	0.33	0.62	0.17	1.22	0.38		0.91	1.01	0.56	0.77	0.56		
Control Delay	27.2	31.1	3.8	146.7	15.6		76.6	72.6	5.9	45.5	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	27.2	31.1	3.8	146.7	15.6		76.6	72.6	5.9	45.5	19.9		
LOS	C	C	A	F	B		E	E	A	D	B		
Approach Delay		25.9			71.3			49.9			23.7		
Approach LOS		C			E			D			C		

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 32 (36%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 45.3

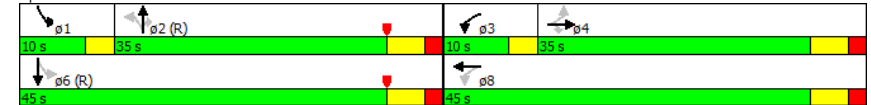
Intersection LOS: D

Intersection Capacity Utilization 98.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: Erie Street & Oak Street



Lanes, Volumes, Timings
6: Erie Street & Pulford Avenue

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘		
Volume (vph)	17	26	46	25	43	36	15	238	19	10	178	18	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	30.0		0.0	30.0		0.0	35.0		0.0	20.0		0.0	
Storage Lanes	1		0	1		0	1		0	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	
Ped Bike Factor	1.00	0.99		1.00	0.99		0.99	1.00		1.00	1.00		
Frt		0.904			0.932			0.989			0.986		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1658	1558	0	1626	1587	0	1658	3263	0	1566	3186	0	
Flt Permitted	0.700			0.705			0.615			0.428			
Satd. Flow (perm)	1219	1558	0	1204	1587	0	1063	3263	0	702	3186	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		51			40			11			20		
Link Speed (k/h)		48			48			50			50		
Link Distance (m)		169.5			399.0			597.5			903.1		
Travel Time (s)		12.7			29.9			43.0			65.0		
Confl. Peds. (#/hr)	3		3	3		3	12		5	5		12	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Heavy Vehicles (%)	2%	3%	2%	4%	2%	6%	2%	2%	6%	8%	4%	8%	
Adj. Flow (vph)	19	29	51	28	48	40	17	264	21	11	198	20	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	19	80	0	28	88	0	17	285	0	11	218	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA		
Protected Phases		4			8			2		1	6		
Permitted Phases	4			8			2			6			
Minimum Split (s)	35.0	35.0		35.0	35.0		31.0	31.0		14.0	45.0		
Total Split (s)	35.0	35.0		35.0	35.0		31.0	31.0		14.0	45.0		
Total Split (%)	43.8%	43.8%		43.8%	43.8%		38.8%	38.8%		17.5%	56.3%		
Maximum Green (s)	29.0	29.0		29.0	29.0		25.0	25.0		9.0	39.0		
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		3.0	4.0		
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	1.0	-3.0		-3.0	-3.0		-3.0	-3.0		1.0	-3.0		
Total Lost Time (s)	7.0	3.0		3.0	3.0		3.0	3.0		6.0	3.0		
Lead/Lag							Lag	Lag		Lead			
Lead-Lag Optimize?							Yes	Yes		Yes			
Walk Time (s)	11.0	11.0		11.0	11.0		10.0	10.0			24.0		
Flash Dont Walk (s)	18.0	18.0		18.0	18.0		15.0	15.0			15.0		
Pedestrian Calls (#/hr)	0	0		0	0		0	0			0		
Act Effect Green (s)	28.0	32.0		32.0	32.0		28.0	28.0		39.0	42.0		

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 11

Lanes, Volumes, Timings
6: Erie Street & Pulford Avenue

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Actuated g/C Ratio	0.35	0.40		0.40	0.40		0.35	0.35		0.49	0.52		
v/c Ratio	0.04	0.12		0.06	0.13		0.05	0.25		0.03	0.13		
Control Delay	17.7	7.8		15.3	9.9		17.3	17.3		10.8	9.0		
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay	17.7	7.8		15.3	9.9		17.3	17.3		10.8	9.0		
LOS	B	A		B	A		B	B		B	A		
Approach Delay		9.7			11.2			17.3			9.1		
Approach LOS		A			B			B			A		

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 78 (98%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 80

Control Type: Pretimed

Maximum v/c Ratio: 0.25

Intersection Signal Delay: 12.8

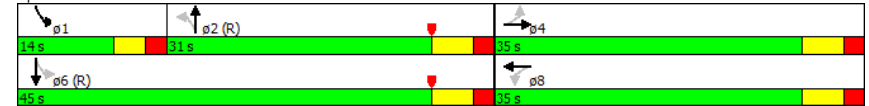
Intersection LOS: B

Intersection Capacity Utilization 63.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 6: Erie Street & Pulford Avenue



Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 12

Lanes, Volumes, Timings
7: Erie Street & Seaciff Drive

21/03/2013

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	53	146	55	9	142	114	76	66	6	77	54	42
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	15.0		0.0	15.0		30.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98	0.98					0.96
Frt		0.959				0.850		0.987				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1658	1522	0	1353	1391	1316	1523	1479	0	1433	1745	1401
Flt Permitted	0.391			0.594			0.710			0.693		
Satd. Flow (perm)	681	1522	0	846	1391	1296	1116	1479	0	1045	1745	1343
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		25			152			6			218	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		405.3			641.8			423.3			597.5	
Travel Time (s)		29.2			46.2			30.5			43.0	
Confl. Peds. (#/hr)	3					3	13					13
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	2%	16%	2%	25%	28%	15%	11%	19%	16%	18%	2%	8%
Adj. Flow (vph)	71	195	73	12	189	152	101	88	8	103	72	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	71	268	0	12	189	152	101	96	0	103	72	56
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		3	8	8	5	2		1	6	6
Switch Phase												

Lanes, Volumes, Timings
7: Erie Street & Seaciff Drive

21/03/2013

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	7.0		7.0	4.0	4.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	10.0	29.5		10.0	29.5	29.5	10.0	30.5		10.0	30.5	30.5
Total Split (s)	10.0	29.5		10.0	29.5	29.5	10.0	30.5		10.0	30.5	30.5
Total Split (%)	12.5%	36.9%		12.5%	36.9%	36.9%	12.5%	38.1%		12.5%	38.1%	38.1%
Maximum Green (s)	7.0	23.0		7.0	23.0	23.0	7.0	24.0		7.0	24.0	24.0
Yellow Time (s)	3.0	3.5		3.0	3.5	3.5	3.0	3.5		3.0	3.5	3.5
All-Red Time (s)	0.0	3.0		0.0	3.0	3.0	0.0	3.0		0.0	3.0	3.0
Lost Time Adjust (s)	1.0	-2.0		-2.0	-2.0	-2.0	2.0	-2.0		1.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.5		1.0	4.5	4.5	5.0	4.5		4.0	4.5	4.5
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)		16.0			16.0	16.0		17.0			17.0	17.0
Pedestrian Calls (#/hr)		0			0	0		0			0	0
Act Effect Green (s)	24.9	24.4		24.0	18.4	18.4	40.0	35.8		42.0	35.9	35.9
Actuated g/C Ratio	0.31	0.30		0.30	0.23	0.23	0.50	0.45		0.52	0.45	0.45
v/c Ratio	0.25	0.56		0.04	0.59	0.37	0.17	0.14		0.18	0.09	0.08
Control Delay	20.3	25.0		18.9	34.4	6.7	12.3	17.3		9.7	14.0	0.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	20.3	25.0		18.9	34.4	6.7	12.3	17.3		9.7	14.0	0.4
LOS	C	C		B	C	A	B	B		A	B	A
Approach Delay		24.0			21.9			14.7			8.8	
Approach LOS		C			C			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 24 (30%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 18.6

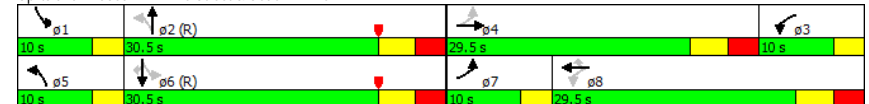
Intersection LOS: B

Intersection Capacity Utilization 50.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Erie Street & Seaciff Drive



Lanes, Volumes, Timings
8: Sherk Street & Oak Street

21/03/2013

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↖	↗	↖	↗
Volume (vph)	209	113	155	293	165	167
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)		30.0	25.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor		0.98	1.00		0.99	
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1679	1427	1545	1595	1626	1441
Flt Permitted			0.375		0.950	
Satd. Flow (perm)	1679	1395	609	1595	1607	1441
Right Turn on Red		Yes			Yes	
Satd. Flow (RTOR)		151			223	
Link Speed (k/h)	50			50	48	
Link Distance (m)	1518.3			422.6	230.7	
Travel Time (s)	109.3			30.4	17.3	
Confl. Peds. (#/hr)		1	1		8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	6%	6%	4%	6%	4%	5%
Adj. Flow (vph)	279	151	207	391	220	223
Shared Lane Traffic (%)			0%			
Lane Group Flow (vph)	279	151	207	391	220	223
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)		14	24		24	14
Turn Type	NA	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Minimum Split (s)	18.0	18.0	10.0	33.0	24.0	24.0
Total Split (s)	18.0	18.0	15.0	33.0	27.0	27.0
Total Split (%)	30.0%	30.0%	25.0%	55.0%	45.0%	45.0%
Maximum Green (s)	12.0	12.0	12.0	27.0	24.0	24.0
Yellow Time (s)	4.0	4.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	0.0	2.0	0.0	0.0
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	1.0	4.0	1.0	1.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						
Walk Time (s)	12.0	12.0		27.0	9.0	9.0
Flash Dont Walk (s)	0.0	0.0		0.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0

Lanes, Volumes, Timings
8: Sherk Street & Oak Street

21/03/2013

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Act Effect Green (s)	14.0	12.0	32.0	29.0	26.0	26.0
Actuated g/C Ratio	0.23	0.20	0.53	0.48	0.43	0.43
v/c Ratio	0.71	0.38	0.38	0.51	0.31	0.30
Control Delay	33.7	7.5	9.9	13.5	12.7	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.7	7.5	9.9	13.5	12.7	3.0
LOS	C	A	A	B	B	A
Approach Delay	24.5			12.3	7.8	
Approach LOS	C			B	A	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBL, Start of Green

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 14.5

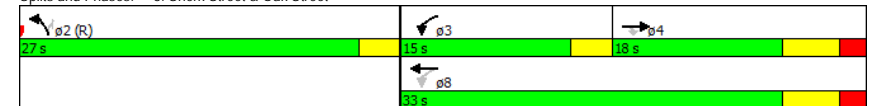
Intersection LOS: B

Intersection Capacity Utilization 58.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 8: Sherk Street & Oak Street



Lanes, Volumes, Timings
9: Talbot Street & Elliot Street

21/03/2013

	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Volume (vph)	140	245	311	1	58	169
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	30.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		1.00			0.97
Frt					0.850	
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1642	1745	1728	0	1658	1469
Flt Permitted	0.439				0.950	
Satd. Flow (perm)	756	1745	1728	0	1658	1429
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						225
Link Speed (k/h)		80	80		48	
Link Distance (m)		60.2	622.2		957.8	
Travel Time (s)		2.7	28.0		71.8	
Confl. Peds. (#/hr)	6			6		3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	3%	2%	3%	2%	2%	3%
Adj. Flow (vph)	187	327	415	1	77	225
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	327	416	0	77	225
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24			14	24	14
Number of Detectors	1	1	1		1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0		10.0	10.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	10.0		10.0	10.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Detector Phase	5	2	6		4	4
Switch Phase						

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

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Lanes, Volumes, Timings
9: Talbot Street & Elliot Street

21/03/2013

	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Initial (s)	7.0	44.0	12.0		4.0	4.0
Minimum Split (s)	10.0	50.0	32.0		24.0	24.0
Total Split (s)	18.0	50.0	32.0		30.0	30.0
Total Split (%)	22.5%	62.5%	40.0%		37.5%	37.5%
Maximum Green (s)	15.0	44.0	26.0		24.0	24.0
Yellow Time (s)	3.0	4.0	4.0		4.0	4.0
All-Red Time (s)	0.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	1.0	4.0	4.0		4.0	4.0
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		13.0	12.0		5.0	5.0
Flash Dont Walk (s)		11.0	14.0		12.0	12.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	63.7	60.7	42.7		11.3	11.3
Actuated g/C Ratio	0.80	0.76	0.53		0.14	0.14
v/c Ratio	0.24	0.25	0.45		0.33	0.57
Control Delay	3.6	3.8	10.8		33.6	10.6
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	3.6	3.8	10.8		33.6	10.6
LOS	A	A	B		C	B
Approach Delay		3.8	10.8		16.4	
Approach LOS		A	B		B	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 28 (35%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 9.2

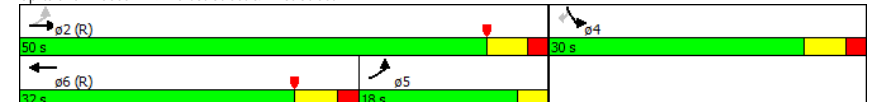
Intersection LOS: A

Intersection Capacity Utilization 48.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 9: Talbot Street & Elliot Street





















Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

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Lanes, Volumes, Timings
10: Talbot Street & Oak Street

21/03/2013














												
Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	48	239	175	11	21	138	31	4	46	10	59	35
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		30.0		0.0	50.0			0.0		0.0		0.0
Storage Lanes		2		0	1			0		0		0
Taper Length (m)		7.5			7.5				7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99					0.99				0.97		
Frt			0.991			0.970				0.915		
Flt Protected	0.950	0.950			0.950					0.985		
Satd. Flow (prot)	1658	1353	1583	0	1537	1571	0	0	0	1502	0	0
Flt Permitted	0.569	0.950			0.629					0.985		
Satd. Flow (perm)	985	1353	1583	0	1018	1571	0	0	0	1502	0	0
Right Turn on Red			Yes				Yes				Yes	
Satd. Flow (RTOR)			3			1				11		
Link Speed (k/h)			60			50				48		
Link Distance (m)			699.6			1518.3				455.7		
Travel Time (s)			42.0			109.3				34.2		
Confl. Peds. (#/hr)	3						3				3	3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	25%	12%	2%	10%	11%	2%	2%	2%	4%	2%	10%
Adj. Flow (vph)	53	266	194	12	23	153	34	4	51	11	66	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	266	206	0	23	191	0	0	0	167	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(m)			7.0			7.0				0.0		
Link Offset(m)			0.0			0.0				0.0		
Crosswalk Width(m)			4.8			4.8				4.8		
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24	24		14	24		14	14	24		14	14
Turn Type	custom	Prot	NA		Perm	NA			Split	NA		
Protected Phases		2				4			7	7		
Permitted Phases	2		2		4							
Minimum Split (s)	31.0	31.0	31.0		27.0	27.0			24.0	24.0		
Total Split (s)	31.0	31.0	31.0		27.0	27.0			24.0	24.0		
Total Split (%)	26.1%	26.1%	26.1%		22.7%	22.7%			20.2%	20.2%		
Maximum Green (s)	23.0	23.0	23.0		18.0	18.0			19.0	19.0		
Yellow Time (s)	5.0	5.0	5.0		5.0	5.0			3.0	3.0		
All-Red Time (s)	3.0	3.0	3.0		4.0	4.0			2.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0				-1.0		
Total Lost Time (s)	7.0	7.0	7.0		8.0	8.0				4.0		
Lead/Lag									Lead	Lead		
Lead-Lag Optimize?									Yes	Yes		
Walk Time (s)	5.0	5.0	5.0		5.0	5.0			5.0	5.0		
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0			11.0	11.0		
Pedestrian Calls (#/hr)	0	0	0		0	0			0	0		
Act Effect Green (s)	34.0	34.0	34.0		19.0	19.0				20.0		

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

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Lanes, Volumes, Timings
10: Talbot Street & Oak Street

21/03/2013













								
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Volume (vph)	40	20	23	83	2	40	154	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		0.0		10.0		75.0		0.0
Storage Lanes		0		1		1		0
Taper Length (m)		7.5				7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.99					0.97
Frt				0.850				0.850
Flt Protected			0.965			0.950		
Satd. Flow (prot)	0	0	1668	1483	0	1503	1361	0
Flt Permitted			0.731			0.464		
Satd. Flow (perm)	0	0	1248	1483	0	734	1319	0
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			174				138	
Link Speed (k/h)			48			80		
Link Distance (m)			66.4			1113.6		
Travel Time (s)			5.0			50.1		
Confl. Peds. (#/hr)	3	3						3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	2%	2%	2%	2%	13%	12%	2%
Adj. Flow (vph)	44	22	26	92	2	44	171	16
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	92	92	0	46	187	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(m)			0.0			3.5		
Link Offset(m)			0.0			0.0		
Crosswalk Width(m)			4.8			4.8		
Two way Left Turn Lane						Yes		
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24	24		14	24	24	14	14
Turn Type	Perm	Perm	NA	Perm	custom	NA	custom	
Protected Phases			8					
Permitted Phases	8	8		8	6	6	6	
Minimum Split (s)	27.0	27.0	27.0	27.0	31.0	31.0	31.0	
Total Split (s)	27.0	27.0	27.0	27.0	41.0	41.0	41.0	
Total Split (%)	22.7%	22.7%	22.7%	22.7%	34.5%	34.5%	34.5%	
Maximum Green (s)	23.0	23.0	23.0	23.0	33.0	33.0	33.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	5.0	5.0	5.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	3.0	3.0	3.0	
Lost Time Adjust (s)			-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)			2.0	2.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	
Act Effect Green (s)			25.0	25.0		35.0	35.0	

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings
10: Talbot Street & Oak Street

21/03/2013

												
Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Actuated g/C Ratio	0.29	0.29	0.29		0.16	0.16						0.17
v/c Ratio	0.19	0.69	0.45		0.14	0.76						0.64
Control Delay	34.4	48.5	38.2		45.6	67.7						55.3
Queue Delay	0.0	0.0	0.0		0.0	0.0						0.0
Total Delay	34.4	48.5	38.2		45.6	67.7						55.3
LOS	C	D	D		D	E						E
Approach Delay			43.0			65.4						55.3
Approach LOS			D			E						E









Intersection Summary	
Area Type:	Other
Cycle Length:	119
Actuated Cycle Length:	119
Offset:	0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle:	110
Control Type:	Pretimed
Maximum v/c Ratio:	0.76
Intersection Signal Delay:	40.8
Intersection Capacity Utilization:	88.7%
Analysis Period (min):	15
Intersection LOS:	D
ICU Level of Service:	E

Splits and Phases: 10: Talbot Street & Oak Street



Lanes, Volumes, Timings
10: Talbot Street & Oak Street

21/03/2013

								
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Actuated g/C Ratio			0.21	0.21		0.29	0.29	
v/c Ratio			0.35	0.20		0.21	0.39	
Control Delay			44.6	1.0		35.0	12.5	
Queue Delay			0.0	0.0		0.0	0.0	
Total Delay			44.6	1.0		35.0	12.5	
LOS			D	A		C	B	
Approach Delay			22.8			16.9		
Approach LOS			C			B		

Intersection Summary	
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Lanes, Volumes, Timings

11: Lutsch Avenue & Talbot Street

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘	↙	
Volume (vph)	4	127	65	43	209	15	195	6	114	1	0	1	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	75.0		0.0	75.0		0.0	15.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	1		0	0		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	0.99		1.00	1.00		0.99	0.99				0.98	
Frt		0.949			0.990			0.857				0.932	
Flt Protected	0.950			0.950			0.950					0.976	
Satd. Flow (prot)	1483	1416	0	1658	1645	0	1483	1465	0	0	1562	0	
Flt Permitted	0.520			0.535			0.757					0.927	
Satd. Flow (perm)	810	1416	0	930	1645	0	1168	1465	0	0	1481	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		42			8			152				140	
Link Speed (k/h)		80			80			50				48	
Link Distance (m)		977.7			675.2			479.6				216.3	
Travel Time (s)		44.0			30.4			34.5				16.2	
Confl. Peds. (#/hr)	4		4	4		4	8		4	4		8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	14%	23%	9%	2%	6%	20%	14%	14%	2%	2%	50%	2%	
Adj. Flow (vph)	5	169	87	57	279	20	260	8	152	1	0	1	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	5	256	0	57	299	0	260	160	0	0	2	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5				3.5	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		4.8			4.8			4.8				4.8	
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA		
Protected Phases		2		1	6			8			4		
Permitted Phases	2			6			8			4			
Minimum Split (s)	30.0	30.0		10.0	41.0		29.0	29.0		29.0	29.0		
Total Split (s)	30.0	30.0		11.0	41.0		29.0	29.0		29.0	29.0		
Total Split (%)	42.9%	42.9%		15.7%	58.6%		41.4%	41.4%		41.4%	41.4%		
Maximum Green (s)	24.0	24.0		8.0	35.0		23.0	23.0		23.0	23.0		
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		
Total Lost Time (s)	4.0	4.0		1.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lead		Lag									
Lead-Lag Optimize?	Yes	Yes		Yes									
Walk Time (s)	9.0	9.0			20.0		8.0	8.0		8.0	8.0		
Flash Dont Walk (s)	15.0	15.0			15.0		15.0	15.0		15.0	15.0		
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0		

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings

11: Lutsch Avenue & Talbot Street

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effect Green (s)	26.0	26.0		40.0	37.0		25.0	25.0				25.0	
Actuated g/C Ratio	0.37	0.37		0.57	0.53		0.36	0.36				0.36	
v/c Ratio	0.02	0.46		0.09	0.34		0.62	0.26				0.00	
Control Delay	14.2	17.1		7.4	10.6		26.5	4.7				0.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0				0.0	
Total Delay	14.2	17.1		7.4	10.6		26.5	4.7				0.0	
LOS	B	B		A	B		C	A				A	
Approach Delay		17.1			10.1			18.2				0.0	
Approach LOS		B			B			B				A	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Pretimed

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 15.1

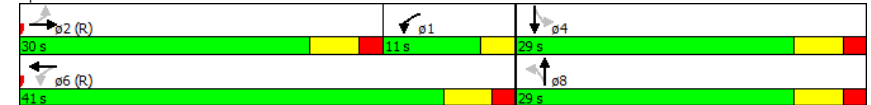
Intersection LOS: B

Intersection Capacity Utilization 67.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: Lutsch Avenue & Talbot Street



Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings

19: Talbot Street & Highway 3 (Bypass)

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘	↘	↙	↘	↘	↙	↘	↘	↙	↘	↘	
Volume (vph)	52	99	14	52	234	90	44	130	46	30	74	110	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850			0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1610	1679	1483	1658	1664	1483	1658	1745	1483	1551	1745	1469	
Flt Permitted	0.384			0.673			0.250			0.950			
Satd. Flow (perm)	651	1679	1483	1174	1664	1483	436	1745	1483	1551	1745	1469	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)			91			120			91			147	
Link Speed (k/h)		80			80			48			80		
Link Distance (m)		675.2			730.5			58.8			491.5		
Travel Time (s)		30.4			32.9			4.4			22.1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	100%	100%	120%	120%	100%	100%	100%	120%	100%	120%	
Heavy Vehicles (%)	5%	6%	2%	2%	7%	2%	2%	2%	2%	9%	2%	3%	
Adj. Flow (vph)	69	132	16	58	312	120	49	144	51	40	82	147	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	69	132	16	58	312	120	49	144	51	40	82	147	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		7.0			7.0			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Split	NA	Perm	
Protected Phases		4			8			2		6	6		
Permitted Phases	4		4	8		8	2		2			6	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	
Maximum Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag													
Lead-Lag Optimize?													
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	
Act Effect Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	
v/c Ratio	0.40	0.30	0.03	0.19	0.70	0.25	0.42	0.31	0.11	0.10	0.18	0.29	
Control Delay	26.2	19.7	0.1	18.9	30.6	5.7	31.5	19.9	2.3	17.4	18.2	5.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings

19: Talbot Street & Highway 3 (Bypass)

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Total Delay	26.2	19.7	0.1	18.9	30.6	5.7	31.5	19.9	2.3	17.4	18.2	5.5	
LOS	C	B	A	B	C	A	C	B	A	B	B	A	
Approach Delay		20.4			23.1			18.5			11.2		
Approach LOS		C			C			B			B		

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green

Natural Cycle: 60

Control Type: Pretimed

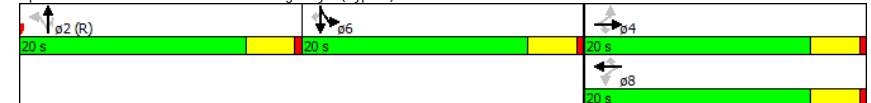
Maximum v/c Ratio: 0.70

Intersection Signal Delay: 19.1

Intersection Capacity Utilization 43.1%

Analysis Period (min) 15

Splits and Phases: 19: Talbot Street & Highway 3 (Bypass)



Lanes, Volumes, Timings

1: Erie Street & Highway 3 (Bypass)

21/03/2013

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↗	↗	↖	↖	↖	↖	↖	↖	↖	↖	↖	
Volume (vph)	12	140	92	42	222	120	108	334	28	123	352	36	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	75.0		75.0	75.0		75.0	30.0		0.0	40.0		0.0	
Storage Lanes	1		1	1		1	1		0	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850			0.850		0.988			0.986		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1658	1664	1483	1496	1648	1427	1551	1581	0	1610	1640	0	
Flt Permitted	0.487			0.612			0.321			0.351			
Satd. Flow (perm)	850	1664	1483	964	1648	1427	524	1581	0	595	1640	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)			123			160		7			9		
Link Speed (k/h)		80			80			80			80		
Link Distance (m)		254.9			283.5			785.8			150.0		
Travel Time (s)		11.5			12.8			35.4			6.8		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	2%	7%	2%	13%	8%	6%	9%	38%	5%	6%	17%		
Adj. Flow (vph)	16	187	123	56	296	160	144	445	37	164	469	48	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	16	187	123	56	296	160	144	482	0	164	517	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2			6			
Minimum Split (s)	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0		28.0	28.0		
Total Split (s)	37.0	37.0	37.0	37.0	37.0	37.0	43.0	43.0		43.0	43.0		
Total Split (%)	46.3%	46.3%	46.3%	46.3%	46.3%	46.3%	53.8%	53.8%		53.8%	53.8%		
Maximum Green (s)	31.0	31.0	31.0	31.0	31.0	31.0	37.0	37.0		37.0	37.0		
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		
Lead/Lag													
Lead-Lag Optimize?													
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		
Flash Dont Walk (s)	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0		17.0	17.0		
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0		
Act Effect Green (s)	33.0	33.0	33.0	33.0	33.0	33.0	39.0	39.0		39.0	39.0		
Actuated g/C Ratio	0.41	0.41	0.41	0.41	0.41	0.41	0.49	0.49		0.49	0.49		

Lanes, Volumes, Timings

1: Erie Street & Highway 3 (Bypass)

21/03/2013

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
v/c Ratio	0.05	0.27	0.18	0.14	0.44	0.23	0.56	0.62		0.57	0.64		
Control Delay	14.7	16.9	3.8	15.9	19.4	3.7	25.2	19.3		24.0	19.6		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0		
Total Delay	14.7	16.9	3.8	15.9	19.4	3.7	25.2	19.3		24.0	19.6		
LOS	B	B	A	B	B	A	C	B		C	B		
Approach Delay		11.9			14.1			20.6			20.7		
Approach LOS		B			B			C			C		

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Pretimed

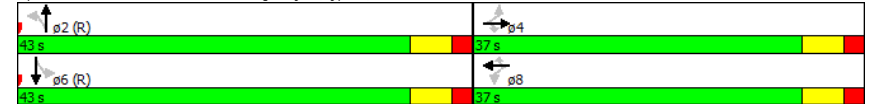
Maximum v/c Ratio: 0.64

Intersection Signal Delay: 17.7

Intersection Capacity Utilization 65.3%

Analysis Period (min) 15

Splits and Phases: 1: Erie Street & Highway 3 (Bypass)



Lanes, Volumes, Timings
2: Erie Street & Wilkinson Drive

21/03/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖	
Volume (vph)	117	2	117	9	1	4	86	381	4	4	514	101	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00						0.98	0.99				0.95	
Frt		0.853			0.875			0.999				0.850	
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1610	1382	0	1658	1497	0	1626	1678	0	1658	1664	1414	
Flt Permitted	0.754			0.656			0.111			0.474			
Satd. Flow (perm)	1274	1382	0	1145	1497	0	189	1678	0	827	1664	1343	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		156			5			1				135	
Link Speed (k/h)		48			48			50				80	
Link Distance (m)		570.9			81.7			455.4				785.8	
Travel Time (s)		42.8			6.1			32.8				35.4	
Confl. Peds. (#/hr)	2					2	20					20	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	5%	2%	10%	2%	2%	2%	4%	6%	2%	2%	7%	7%	
Adj. Flow (vph)	156	3	156	12	1	5	115	508	5	5	685	135	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	156	159	0	12	6	0	115	513	0	5	685	135	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			7.0				7.0	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		4.8			4.8			4.8				4.8	
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm	
Protected Phases		4			8		5	2			6		
Permitted Phases	4			8			2			6		6	
Minimum Split (s)	32.0	32.0		32.0	32.0		10.0	50.0		34.0	34.0	34.0	
Total Split (s)	33.0	33.0		33.0	33.0		10.0	50.0		34.0	34.0	34.0	
Total Split (%)	39.8%	39.8%		39.8%	39.8%		12.0%	60.2%		41.0%	41.0%	41.0%	
Maximum Green (s)	26.0	26.0		26.0	26.0		7.0	43.0		27.0	27.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		0.0	3.0		3.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		2.0	6.0		6.0	6.0	7.0	
Lead/Lag							Lead			Lag	Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	Yes	
Walk Time (s)	7.0	7.0		7.0	7.0			31.0		15.0	15.0	15.0	
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			12.0		12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	0	
Act Effect Green (s)	27.0	27.0		27.0	27.0		48.0	44.0		34.0	34.0	33.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.58	0.53		0.41	0.41	0.40	
v/c Ratio	0.38	0.29		0.03	0.01		0.47	0.58		0.01	1.01	0.22	

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
Page 3

Lanes, Volumes, Timings
2: Erie Street & Wilkinson Drive

21/03/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Control Delay	24.9	5.4		19.5	13.0		15.2	16.4		14.8	62.7	4.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Total Delay	24.9	5.4		19.5	13.0		15.2	16.4		14.8	62.7	4.1	
LOS	C	A		B	B		B	B		B	E	A	
Approach Delay		15.0			17.4			16.2			52.8		
Approach LOS		B			B			B			D		

Intersection Summary

Area Type: Other

Cycle Length: 83

Actuated Cycle Length: 83

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 85

Control Type: Pretimed

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 32.9

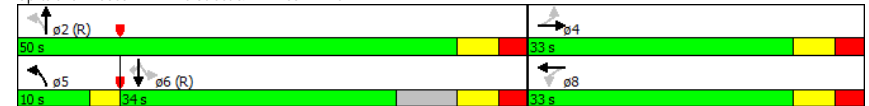
Intersection LOS: C

Intersection Capacity Utilization 74.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Erie Street & Wilkinson Drive



Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
Page 4

Lanes, Volumes, Timings
3: Erie Street & Talbot Street

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘		
Volume (vph)	42	217	26	53	167	43	90	261	59	122	352	54	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	15.0		0.0	15.0		0.0	15.0		0.0	15.0		0.0	
Storage Lanes	1		0	1		0	1		0	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	0.97	0.99		0.99	0.99		1.00	0.99		1.00	1.00		
Frt		0.984			0.969			0.972			0.980		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1610	1659	0	1658	1672	0	1595	1619	0	1610	1599	0	
Flt Permitted	0.588			0.231			0.261			0.374			
Satd. Flow (perm)	972	1659	0	397	1672	0	436	1619	0	631	1599	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		7			17			18			12		
Link Speed (k/h)		80			80			50			50		
Link Distance (m)		622.2			977.7			162.7			276.7		
Travel Time (s)		28.0			44.0			11.7			19.9		
Confl. Peds. (#/hr)	14		15	15		14	10		8	8		10	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	6%	7%	3%	5%	9%	6%	
Adj. Flow (vph)	56	289	35	71	223	57	120	348	79	163	469	72	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	56	324	0	71	280	0	120	427	0	163	541	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA		
Protected Phases		4		3	8		5	2		1	6		
Permitted Phases	4			8			2			6			
Minimum Split (s)	24.0	24.0		8.0	29.0		8.0	37.0		8.0	37.0		
Total Split (s)	24.0	24.0		8.0	32.0		8.0	40.0		8.0	40.0		
Total Split (%)	30.0%	30.0%		10.0%	40.0%		10.0%	50.0%		10.0%	50.0%		
Maximum Green (s)	18.0	18.0		5.0	26.0		5.0	34.0		5.0	34.0		
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0		
All-Red Time (s)	2.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0		1.0	-1.0		1.0	-1.0		1.0	-1.0		
Total Lost Time (s)	5.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0		
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes	Yes		
Walk Time (s)	7.0	7.0			11.0		3.0	20.0			20.0		
Flash Dont Walk (s)	11.0	11.0			4.0		0.0	11.0			11.0		
Pedestrian Calls (#/hr)	0	0			0		0	0			0		

Lanes, Volumes, Timings
3: Erie Street & Talbot Street

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effect Green (s)	19.0	19.0		28.0	27.0		40.0	35.0		40.0	35.0		
Actuated g/C Ratio	0.24	0.24		0.35	0.34		0.50	0.44		0.50	0.44		
v/c Ratio	0.24	0.81		0.35	0.49		0.44	0.59		0.45	0.77		
Control Delay	20.6	38.3		22.9	23.2		9.5	17.8		14.4	27.5		
Queue Delay	0.0	17.0		0.3	0.0		0.0	0.0		0.0	0.0		
Total Delay	20.6	55.2		23.2	23.2		9.5	17.8		14.4	27.5		
LOS	C	E		C	C		A	B		B	C		
Approach Delay		50.1			23.2			16.0			24.5		
Approach LOS		D			C			B			C		

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 80

Control Type: Pretimed

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 26.8

Intersection LOS: C

Intersection Capacity Utilization 71.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Erie Street & Talbot Street



Lanes, Volumes, Timings
4: Erie Street & Mill Street

21/03/2013

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖			↖			↖	↖	↖	↖	
Volume (vph)	25	43	89	25	0	53	0	395	24	12	491	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		15.0	20.0		0.0
Storage Lanes	1		0	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.899			0.908				0.850			
Frt Protected	0.950				0.984					0.950		
Satd. Flow (prot)	1658	1569	0	0	1554	0	0	1695	1483	1658	1604	0
Frt Permitted	0.729				0.875					0.260		
Satd. Flow (perm)	1272	1569	0	0	1382	0	0	1695	1483	454	1604	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		119			82				82			
Link Speed (k/h)		48			48				50			50
Link Distance (m)		187.2			147.6				162.7			162.7
Travel Time (s)		14.0			11.1				11.7			11.7
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%	2%	5%	2%	2%	11%	2%
Parking (#/hr)				0								
Adj. Flow (vph)	33	57	119	33	0	71	0	527	32	16	655	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	176	0	0	104	0	0	527	32	16	655	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5				3.5			3.5
Link Offset(m)		0.0			0.0				0.0			0.0
Crosswalk Width(m)		4.8			4.8				4.8			4.8
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA			NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8				2	6			
Minimum Split (s)	30.0	30.0		30.0	30.0			39.0	39.0	8.0	50.0	
Total Split (s)	30.0	30.0		30.0	30.0			39.0	39.0	11.0	50.0	
Total Split (%)	37.5%	37.5%		37.5%	37.5%			48.8%	48.8%	13.8%	62.5%	
Maximum Green (s)	24.0	24.0		24.0	24.0			33.0	33.0	8.0	44.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0	2.0	5.0	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Walk Time (s)	13.0	13.0		13.0	13.0			22.0	22.0		33.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	
Act Effect Green (s)	25.0	25.0		25.0	25.0			34.0	34.0	48.0	45.0	

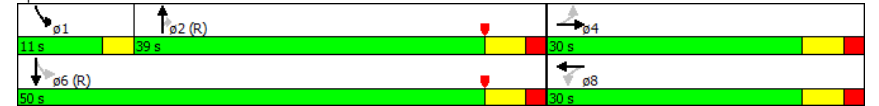
Lanes, Volumes, Timings
4: Erie Street & Mill Street

21/03/2013

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.31	0.31			0.31			0.42	0.42	0.60	0.56	
v/c Ratio	0.08	0.31			0.21			0.73	0.05	0.04	0.73	
Control Delay	20.2	9.4			8.4			26.5	0.1	8.6	24.6	
Queue Delay	0.0	0.0			0.0			0.0	0.0	0.0	0.9	
Total Delay	20.2	9.4			8.4			26.5	0.1	8.6	25.5	
LOS	C	A			A			C	A	A	C	
Approach Delay		11.2			8.4			25.0			25.1	
Approach LOS		B			A			C			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 47 (59%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow	
Natural Cycle: 80	
Control Type: Pretimed	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 22.0	Intersection LOS: C
Intersection Capacity Utilization 66.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: Erie Street & Mill Street



Lanes, Volumes, Timings
5: Erie Street & Oak Street

21/03/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↗	↗	↖	↖	↖	↖	↗	↗	↖	↖	↖	
Volume (vph)	65	275	86	266	325	83	139	464	336	109	427	56	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	15.0		0.0	35.0			40.0	15.0		0.0	15.0		40.0
Storage Lanes	1		1	1		0	1		1	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	
Ped Bike Factor	1.00				1.00		1.00		0.98		1.00		
Frt			0.850		0.969				0.850		0.983		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1523	1695	1427	1658	3142	0	1537	1745	1483	1496	3082	0	
Flt Permitted	0.449			0.274			0.407			0.125			
Satd. Flow (perm)	719	1695	1427	478	3142	0	656	1745	1447	197	3082	0	
Right Turn on Red			Yes		Yes			Yes			Yes		
Satd. Flow (RTOR)			115		45			396			21		
Link Speed (k/h)		50			50			50			50		
Link Distance (m)		422.6			264.5			903.1			61.1		
Travel Time (s)		30.4			19.0			65.0			4.4		
Confl. Peds. (#/hr)	2					2	7		3	3		7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	11%	5%	6%	2%	2%	11%	10%	2%	2%	13%	8%	4%	
Adj. Flow (vph)	87	367	115	355	433	111	185	619	448	145	569	75	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	87	367	115	355	544	0	185	619	448	145	644	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24			14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		
Protected Phases		4		3	8			2		1	6		
Permitted Phases	4		4	8			2		2	6			
Minimum Split (s)	33.0	33.0	33.0	11.0	44.0		34.0	34.0	34.0	11.0	46.0		
Total Split (s)	33.0	33.0	33.0	11.0	44.0		34.0	34.0	34.0	11.0	46.0		
Total Split (%)	36.7%	36.7%	36.7%	12.2%	48.9%		37.8%	37.8%	37.8%	12.2%	51.1%		
Maximum Green (s)	27.0	27.0	27.0	8.0	38.0		28.0	28.0	28.0	8.0	40.0		
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0	3.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	0.0	2.0		2.0	2.0	2.0	0.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0	0.0	1.0	-1.0		-1.0	-1.0	0.0	1.0	-1.0		
Total Lost Time (s)	5.0	5.0	6.0	4.0	5.0		5.0	5.0	6.0	4.0	5.0		
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes			
Walk Time (s)		7.0	7.0	7.0		18.0		9.0	9.0	9.0		21.0	
Flash Dont Walk (s)	20.0	20.0	20.0		20.0		19.0	19.0	19.0		19.0		
Pedestrian Calls (#/hr)	0	0	0		0		0	0	0		0		

Lanes, Volumes, Timings
5: Erie Street & Oak Street

21/03/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effect Green (s)	28.0	28.0	27.0	40.0	39.0		30.0	30.0	29.0	42.0	41.0		
Actuated g/C Ratio	0.31	0.31	0.30	0.44	0.43		0.33	0.33	0.32	0.47	0.46		
v/c Ratio	0.39	0.70	0.23	1.17	0.39		0.85	1.07	0.61	0.76	0.46		
Control Delay	30.7	35.5	6.0	128.8	16.9		62.7	87.1	8.2	41.3	17.5		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		
Total Delay	30.7	35.5	6.0	128.8	16.9		62.7	87.1	8.2	41.3	17.5		
LOS	C	D	A	F	B		E	F	A	D	B		
Approach Delay		28.8			61.1			55.2			21.9		
Approach LOS		C			E			E			C		

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 60 (67%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 100

Control Type: Pretimed

Maximum v/c Ratio: 1.17

Intersection Signal Delay: 44.9

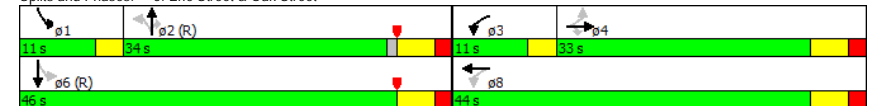
Intersection LOS: D

Intersection Capacity Utilization 97.3%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: Erie Street & Oak Street



Lanes, Volumes, Timings
6: Erie Street & Pulford Avenue

21/03/2013

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↖		↖	↖		↖	↖		↖	↖		
Volume (vph)	43	65	102	80	56	46	84	421	62	46	425	21	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	30.0		0.0	30.0		0.0	35.0		0.0	20.0		0.0	
Storage Lanes	1		0	1		0	1		0	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	
Ped Bike Factor	1.00	0.99		1.00	0.99		0.99	1.00		1.00	1.00		
Frt		0.908			0.932			0.981			0.993		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1658	1564	0	1626	1587	0	1658	3225	0	1566	3219	0	
Flt Permitted	0.679			0.591			0.471			0.270			
Satd. Flow (perm)	1182	1564	0	1009	1587	0	817	3225	0	444	3219	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		113			51			22			9		
Link Speed (k/h)		48			48			50			50		
Link Distance (m)		169.5			399.0			597.5			903.1		
Travel Time (s)		12.7			29.9			43.0			65.0		
Confl. Peds. (#/hr)	3		3	3		3	12		5	5		12	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Heavy Vehicles (%)	2%	3%	2%	4%	2%	6%	2%	2%	6%	8%	4%	8%	
Adj. Flow (vph)	48	72	113	89	62	51	93	468	69	51	472	23	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	48	185	0	89	113	0	93	537	0	51	495	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA		
Protected Phases		4			8			2			1	6	
Permitted Phases	4			8			2			6			
Minimum Split (s)	35.0	35.0		35.0	35.0		31.0	31.0		14.0	45.0		
Total Split (s)	35.0	35.0		35.0	35.0		31.0	31.0		14.0	45.0		
Total Split (%)	43.8%	43.8%		43.8%	43.8%		38.8%	38.8%		17.5%	56.3%		
Maximum Green (s)	29.0	29.0		29.0	29.0		25.0	25.0		10.0	39.0		
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		0.0	2.0		
Lost Time Adjust (s)	1.0	-3.0		-3.0	-3.0		-3.0	-3.0		1.0	-3.0		
Total Lost Time (s)	7.0	3.0		3.0	3.0		3.0	3.0		5.0	3.0		
Lead/Lag							Lag	Lag		Lead			
Lead-Lag Optimize?							Yes	Yes		Yes			
Walk Time (s)	18.0	18.0		18.0	18.0		10.0	10.0			24.0		
Flash Dont Walk (s)	4.0	4.0		4.0	4.0		15.0	15.0			15.0		
Pedestrian Calls (#/hr)	0	0		0	0		0	0			0		
Act Effect Green (s)	28.0	32.0		32.0	32.0		28.0	28.0		40.0	42.0		

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings
6: Erie Street & Pulford Avenue

21/03/2013

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Actuated g/C Ratio	0.35	0.40		0.40	0.40		0.35	0.35		0.50	0.52		
v/c Ratio	0.12	0.27		0.22	0.17		0.33	0.47		0.15	0.29		
Control Delay	18.7	7.9		17.7	9.9		23.1	21.0		11.4	11.0		
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay	18.7	7.9		17.7	9.9		23.1	21.0		11.4	11.0		
LOS	B	A		B	A		C	C		B	B		
Approach Delay		10.1			13.3			21.3			11.1		
Approach LOS		B			B			C			B		

Intersection Summary												
Area Type:	Other											
Cycle Length: 80												
Actuated Cycle Length: 80												
Offset: 2 (3%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow												
Natural Cycle: 80												
Control Type: Pretimed												
Maximum v/c Ratio: 0.47												
Intersection Signal Delay: 15.2	Intersection LOS: B											
Intersection Capacity Utilization 84.2%	ICU Level of Service E											
Analysis Period (min) 15												

Splits and Phases: 6: Erie Street & Pulford Avenue



Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings
7: Erie Street & Seaclyff Drive

21/03/2013

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	↗
Volume (vph)	97	211	70	10	220	185	64	94	19	212	119	142
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	15.0		0.0	15.0		30.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98	0.98					0.95
Frt		0.963				0.850		0.975				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1658	1523	0	1353	1391	1316	1523	1465	0	1433	1745	1401
Flt Permitted	0.266			0.511			0.500			0.662		
Satd. Flow (perm)	463	1523	0	728	1391	1295	787	1465	0	999	1745	1336
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		19			207			10			189	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		405.3			641.8			423.3			597.5	
Travel Time (s)		29.2			46.2			30.5			43.0	
Confl. Peds. (#/hr)	3					3	13					13
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	2%	16%	2%	25%	28%	15%	11%	19%	16%	18%	2%	8%
Adj. Flow (vph)	129	281	93	13	293	247	85	125	25	283	159	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	129	374	0	13	293	247	85	150	0	283	159	189
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Minimum Split (s)	21.0	29.5		10.0	29.5	29.5	19.0	30.5		10.0	30.5	30.5
Total Split (s)	21.0	29.5		10.0	29.5	29.5	19.0	30.5		10.0	30.5	30.5
Total Split (%)	21.0%	29.5%		10.0%	29.5%	29.5%	19.0%	30.5%		10.0%	30.5%	30.5%
Maximum Green (s)	18.0	23.0		7.0	23.0	23.0	16.0	24.0		7.0	24.0	24.0
Yellow Time (s)	3.0	3.5		3.0	3.5	3.5	3.0	3.5		3.0	3.5	3.5
All-Red Time (s)	0.0	3.0		0.0	3.0	3.0	0.0	3.0		0.0	3.0	3.0
Lost Time Adjust (s)	1.0	-2.0		-2.0	-2.0	-2.0	2.0	-2.0		1.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.5		1.0	4.5	4.5	5.0	4.5		4.0	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?		Yes		Yes			Yes	Yes		Yes	Yes	Yes
Walk Time (s)	7.0	7.0			7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)	10.0	16.0			16.0	16.0		17.0			17.0	17.0
Pedestrian Calls (#/hr)	0	0			0	0		0			0	0

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings
7: Erie Street & Seaclyff Drive

21/03/2013

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effect Green (s)	46.5	36.0		37.5	25.0	25.0	25.5	26.0		26.5	26.0	26.0
Actuated g/C Ratio	0.46	0.36		0.38	0.25	0.25	0.26	0.26		0.26	0.26	0.26
v/c Ratio	0.31	0.67		0.04	0.84	0.52	0.28	0.39		0.86	0.35	0.39
Control Delay	17.7	32.5		14.0	58.6	11.4	32.3	31.9		62.0	32.8	7.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	17.7	32.5		14.0	58.6	11.4	32.3	31.9		62.0	32.8	7.0
LOS	B	C		B	E	B	C	C		E	C	A
Approach Delay		28.7			36.5			32.0			38.2	
Approach LOS		C			D			C			D	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 100

Control Type: Pretimed

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 34.5

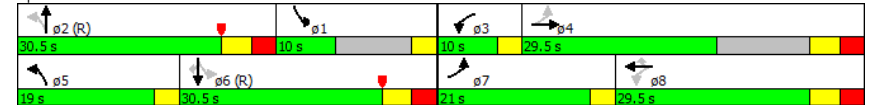
Intersection LOS: C

Intersection Capacity Utilization 66.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Erie Street & Seaclyff Drive



Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings
8: Sherk Street & Oak Street

21/03/2013

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (vph)	275	248	230	226	189	176
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0	25.0			0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor	0.98	1.00			0.99	
Frt	0.850					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1679	1427	1545	1595	1626	1441
Flt Permitted			0.273		0.950	
Satd. Flow (perm)	1679	1396	443	1595	1606	1441
Right Turn on Red		Yes			Yes	
Satd. Flow (RTOR)		331				235
Link Speed (k/h)	50			50	48	
Link Distance (m)	1505.2			422.6	230.7	
Travel Time (s)	108.4			30.4	17.3	
Confl. Peds. (#/hr)		1	1		8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	6%	6%	4%	6%	4%	5%
Adj. Flow (vph)	367	331	307	301	252	235
Shared Lane Traffic (%)			0%			
Lane Group Flow (vph)	367	331	307	301	252	235
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)		14	24		24	14
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0	10.0	10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	NA	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	3	8	2	2
Switch Phase						

Lanes, Volumes, Timings
8: Sherk Street & Oak Street

21/03/2013

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Minimum Initial (s)	13.0	13.0	7.0	28.0	8.0	8.0
Minimum Split (s)	19.0	19.0	10.0	34.0	27.0	27.0
Total Split (s)	19.0	19.0	15.0	34.0	27.0	27.0
Total Split (%)	31.1%	31.1%	24.6%	55.7%	44.3%	44.3%
Maximum Green (s)	13.0	13.0	12.0	28.0	21.0	21.0
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	0.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	1.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Max	Max
Walk Time (s)	13.0	13.0		5.0	8.0	8.0
Flash Dont Walk (s)	0.0	0.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effect Green (s)	16.1	14.1	33.0	30.0	23.0	23.0
Actuated g/C Ratio	0.26	0.23	0.54	0.49	0.38	0.38
v/c Ratio	0.83	0.57	0.65	0.38	0.41	0.34
Control Delay	41.6	7.5	15.5	11.5	16.6	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	7.5	15.5	11.5	16.6	3.7
LOS	D	A	B	B	B	A
Approach Delay	25.4			13.6	10.4	
Approach LOS	C			B	B	

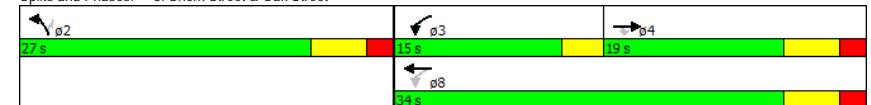
Intersection Summary

Area Type: Other
Cycle Length: 61
Actuated Cycle Length: 61
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 17.3
Intersection Capacity Utilization 64.9%
Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service C

Splits and Phases: 8: Sherk Street & Oak Street



Lanes, Volumes, Timings
9: Talbot Street & Elliot Street

21/03/2013

	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	145	351	298	23	58	176
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	30.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		1.00			0.97
Frt			0.990			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1642	1745	1709	0	1658	1469
Flt Permitted	0.292				0.950	
Satd. Flow (perm)	503	1745	1709	0	1658	1432
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			6			235
Link Speed (k/h)		80	80		48	
Link Distance (m)		60.2	622.2		957.8	
Travel Time (s)		2.7	28.0		71.8	
Confl. Peds. (#/hr)	6			6		3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	3%	2%	3%	2%	2%	3%
Adj. Flow (vph)	193	468	397	31	77	235
Shared Lane Traffic (%)						
Lane Group Flow (vph)	193	468	428	0	77	235
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24			14	24	14
Turn Type	pm+pt	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Minimum Split (s)	10.0	45.0	33.0		29.0	29.0
Total Split (s)	18.0	51.0	33.0		29.0	29.0
Total Split (%)	22.5%	63.8%	41.3%		36.3%	36.3%
Maximum Green (s)	15.0	45.0	27.0		23.0	23.0
Yellow Time (s)	3.0	4.0	4.0		4.0	4.0
All-Red Time (s)	0.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	1.0	4.0	4.0		4.0	4.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Walk Time (s)		12.0	13.0		12.0	12.0
Flash Dont Walk (s)		11.0	14.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings
9: Talbot Street & Elliot Street

21/03/2013

	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effect Green (s)	50.0	47.0	29.0		25.0	25.0
Actuated g/C Ratio	0.62	0.59	0.36		0.31	0.31
v/c Ratio	0.35	0.46	0.69		0.15	0.39
Control Delay	8.2	11.1	35.0		20.9	5.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	8.2	11.1	35.0		20.9	5.1
LOS	A	B	D		C	A
Approach Delay		10.3	35.0		9.0	
Approach LOS		B	D		A	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 17.5

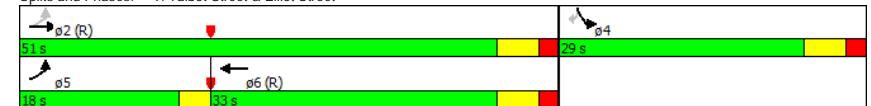
Intersection LOS: B

Intersection Capacity Utilization 61.8%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 9: Talbot Street & Elliot Street






















Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings
10: Talbot Street & Oak Street

21/03/2013













												
Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	28	213	226	17	55	184	10	3	33	2	39	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0	30.0	30.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	1			0	1		0		0		0	
Taper Length (m)	7.5				7.5				7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00				0.97			
Frt			0.989			0.990				0.909		
Flt Protected	0.950	0.950			0.950					0.985		
Satd. Flow (prot)	1658	1353	1582	0	1537	1593	0	0	0	1482	0	0
Flt Permitted	0.389	0.950			0.593					0.985		
Satd. Flow (perm)	676	1353	1582	0	960	1593	0	0	0	1482	0	0
Right Turn on Red			Yes				Yes				Yes	
Satd. Flow (RTOR)			3			1				16		
Link Speed (k/h)			60			50				48		
Link Distance (m)			699.6			1505.2				455.7		
Travel Time (s)			42.0			108.4				34.2		
Confl. Peds. (#/hr)	3						3				3	3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	25%	12%	2%	10%	11%	2%	2%	2%	4%	2%	10%
Adj. Flow (vph)	31	237	251	19	61	204	11	3	37	2	43	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	31	237	270	0	61	218	0	0	0	119	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(m)			7.0			7.0				0.0		
Link Offset(m)			0.0			0.0				0.0		
Crosswalk Width(m)			4.8			4.8				4.8		
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24	24		14	24		14	14	24		14	14
Turn Type	custom	Prot	NA		Perm	NA			Split	NA		
Protected Phases		2				4			7	7		
Permitted Phases	2		2		4							
Minimum Split (s)	31.0	31.0	31.0		27.0	27.0			24.0	24.0		
Total Split (s)	31.0	31.0	31.0		27.0	27.0			24.0	24.0		
Total Split (%)	26.1%	26.1%	26.1%		22.7%	22.7%			20.2%	20.2%		
Maximum Green (s)	23.0	23.0	23.0		18.0	18.0			19.0	19.0		
Yellow Time (s)	5.0	5.0	5.0		5.0	5.0			3.0	3.0		
All-Red Time (s)	3.0	3.0	3.0		4.0	4.0			2.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0			-1.0	-1.0		
Total Lost Time (s)	7.0	7.0	7.0		8.0	8.0			4.0	4.0		
Lead/Lag									Lag	Lag		
Lead-Lag Optimize?									Yes	Yes		
Walk Time (s)	5.0	5.0	5.0		5.0	5.0			5.0	5.0		
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0			11.0	11.0		
Pedestrian Calls (#/hr)	0	0	0		0	0			0	0		
Act Effect Green (s)	34.0	34.0	34.0		19.0	19.0			20.0	20.0		

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

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Lanes, Volumes, Timings
10: Talbot Street & Oak Street

21/03/2013













								
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Volume (vph)	29	17	7	22	2	61	272	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		0.0		10.0		75.0	0.0	
Storage Lanes		0		1		1	0	
Taper Length (m)		7.5				7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						0.97		
Frt			0.850			0.850		
Flt Protected			0.959			0.950		
Satd. Flow (prot)	0	0	1656	1483	0	1501	1355	0
Flt Permitted			0.458			0.505		
Satd. Flow (perm)	0	0	791	1483	0	798	1313	0
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			174				138	
Link Speed (k/h)			48			80		
Link Distance (m)			237.3			1094.2		
Travel Time (s)			17.8			49.2		
Confl. Peds. (#/hr)	3	3						3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	2%	2%	2%	2%	13%	12%	2%
Adj. Flow (vph)	32	19	8	24	2	68	302	10
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	59	24	0	70	312	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(m)			0.0			3.5		
Link Offset(m)			0.0			0.0		
Crosswalk Width(m)			4.8			4.8		
Two way Left Turn Lane						Yes		
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24	24		14	24	24	14	14
Turn Type	Perm	Perm	NA	Perm	custom	NA	custom	
Protected Phases			8					
Permitted Phases	8	8		8	6	6	6	
Minimum Split (s)	27.0	27.0	27.0	27.0	31.0	31.0	31.0	
Total Split (s)	27.0	27.0	27.0	27.0	41.0	41.0	41.0	
Total Split (%)	22.7%	22.7%	22.7%	22.7%	34.5%	34.5%	34.5%	
Maximum Green (s)	23.0	23.0	23.0	23.0	33.0	33.0	33.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	5.0	5.0	5.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)			3.0	3.0		7.0	7.0	
Lead/Lag	Lead	Lead	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	
Act Effect Green (s)			24.0	24.0		34.0	34.0	

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
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Lanes, Volumes, Timings
10: Talbot Street & Oak Street

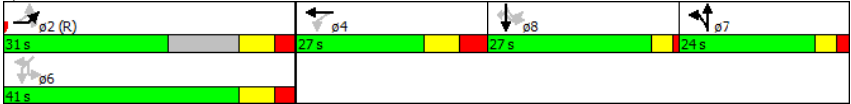
21/03/2013

												
Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Actuated g/C Ratio	0.29	0.29	0.29		0.16	0.16						0.17
v/c Ratio	0.16	0.61	0.59		0.40	0.85						0.45
Control Delay	34.6	44.9	42.5		53.7	78.0						44.7
Queue Delay	0.0	0.0	0.0		0.0	0.0						0.0
Total Delay	34.6	44.9	42.5		53.7	78.0						44.7
LOS	C	D	D		D	E				D		D
Approach Delay			43.1			72.7					44.7	
Approach LOS			D			E				D		

Intersection Summary








Area Type: Other
Cycle Length: 119
Actuated Cycle Length: 119
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 110
Control Type: Pretimed
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 45.0 Intersection LOS: D
Intersection Capacity Utilization 86.9% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 10: Talbot Street & Oak Street



Lanes, Volumes, Timings
10: Talbot Street & Oak Street

21/03/2013

								
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Actuated g/C Ratio			0.20	0.20		0.29	0.29	
v/c Ratio			0.37	0.05		0.31	0.66	
Control Delay			48.9	0.2		37.9	27.9	
Queue Delay			0.0	0.0		0.0	0.0	
Total Delay			48.9	0.2		37.9	27.9	
LOS			D	A		D	C	
Approach Delay			34.8			29.7		
Approach LOS			C			C		

Intersection Summary

Lanes, Volumes, Timings

11: Lutsch Avenue & Talbot Street

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘	↙	
Volume (vph)	2	333	105	154	321	2	74	3	134	14	2	9	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	75.0		0.0	75.0		0.0	15.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	1		0	0		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	0.99		1.00	1.00		0.99	0.98			0.99		
Frt		0.964			0.999			0.853			0.952		
Flt Protected	0.950			0.950			0.950				0.973		
Satd. Flow (prot)	1483	1425	0	1658	1676	0	1483	1462	0	0	1534	0	
Flt Permitted	0.512			0.154			0.735				0.840		
Satd. Flow (perm)	798	1425	0	268	1676	0	1134	1462	0	0	1322	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		25			1			179			12		
Link Speed (k/h)		80			80			50			48		
Link Distance (m)		977.7			675.2			479.6			216.3		
Travel Time (s)		44.0			30.4			34.5			16.2		
Confl. Peds. (#/hr)	4		4	4		4	8		4	4		8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	14%	23%	9%	2%	6%	20%	14%	14%	2%	2%	50%	2%	
Adj. Flow (vph)	3	444	140	205	428	3	99	4	179	19	3	12	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	3	584	0	205	431	0	99	183	0	0	34	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA		
Protected Phases		2		1	6			8			4		
Permitted Phases	2			6			8			4			
Minimum Split (s)	29.0	29.0		10.0	42.0		28.0	28.0		28.0	28.0		
Total Split (s)	29.0	29.0		13.0	42.0		28.0	28.0		28.0	28.0		
Total Split (%)	41.4%	41.4%		18.6%	60.0%		40.0%	40.0%		40.0%	40.0%		
Maximum Green (s)	23.0	23.0		10.0	36.0		22.0	22.0		22.0	22.0		
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		
Total Lost Time (s)	4.0	4.0		1.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lag	Lag		Lead									
Lead-Lag Optimize?	Yes	Yes		Yes									
Walk Time (s)	8.0	8.0			21.0		7.0	7.0		7.0	7.0		
Flash Dont Walk (s)	15.0	15.0			15.0		15.0	15.0		15.0	15.0		
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0		

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDTSynchro 8 Report
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Lanes, Volumes, Timings

11: Lutsch Avenue & Talbot Street

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effect Green (s)	25.0	25.0		41.0	38.0		24.0	24.0			24.0		
Actuated g/C Ratio	0.36	0.36		0.59	0.54		0.34	0.34			0.34		
v/c Ratio	0.01	1.11		0.52	0.47		0.26	0.30			0.07		
Control Delay	14.7	98.4		13.3	12.0		18.8	4.6			12.1		
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0		
Total Delay	14.7	98.4		13.3	12.0		18.8	4.6			12.1		
LOS	B	F		B	B		B	A			B		
Approach Delay		97.9			12.4			9.6			12.1		
Approach LOS		F			B			A			B		

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green, Master Intersection

Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 44.5

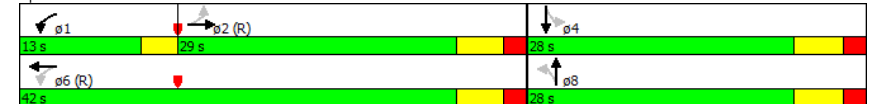
Intersection LOS: D

Intersection Capacity Utilization 69.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: Lutsch Avenue & Talbot Street

Municipality of Leamington - Traffic Study 15/11/2005 Existing Conditions - P.M. Peak Hour
BDTSynchro 8 Report
Page 24

Lanes, Volumes, Timings

19: Talbot Street & Highway 3 (Bypass)

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘	↘	↙	↘	↘	↙	↘	↘	↙	↘	↘	
Volume (vph)	100	250	84	66	156	46	51	81	73	94	155	117	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850			0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1610	1679	1483	1658	1664	1483	1658	1745	1483	1551	1745	1469	
Flt Permitted	0.559			0.350			0.250			0.950			
Satd. Flow (perm)	948	1679	1483	611	1664	1483	436	1745	1483	1551	1745	1469	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)			93			91			91			156	
Link Speed (k/h)		80			80			48				80	
Link Distance (m)		675.2			730.5			58.8				491.5	
Travel Time (s)		30.4			32.9			4.4				22.1	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	100%	100%	120%	120%	100%	100%	100%	120%	100%	120%	
Heavy Vehicles (%)	5%	6%	2%	2%	7%	2%	2%	2%	2%	9%	2%	3%	
Adj. Flow (vph)	133	333	93	73	208	61	57	90	81	125	172	156	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	133	333	93	73	208	61	57	90	81	125	172	156	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		7.0			7.0			3.5				3.5	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		4.8			4.8			4.8				4.8	
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Split	NA	Perm	
Protected Phases		4			8			2		6	6		
Permitted Phases	4		4	8		8	2		2			6	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	
Maximum Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag													
Lead-Lag Optimize?													
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	
Act Effect Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	
v/c Ratio	0.53	0.74	0.20	0.45	0.47	0.13	0.49	0.19	0.18	0.30	0.37	0.31	
Control Delay	27.7	32.9	5.9	28.8	22.6	3.2	36.5	18.4	5.2	20.0	20.7	5.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings

19: Talbot Street & Highway 3 (Bypass)

21/03/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Total Delay	27.7	32.9	5.9	28.8	22.6	3.2	36.5	18.4	5.2	20.0	20.7	5.5	
LOS	C	C	A	C	C	A	D	B	A	C	C	A	
Approach Delay		27.2			20.5			18.2			15.3		
Approach LOS		C			C			B			B		

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 21.0

Intersection Capacity Utilization 45.8%

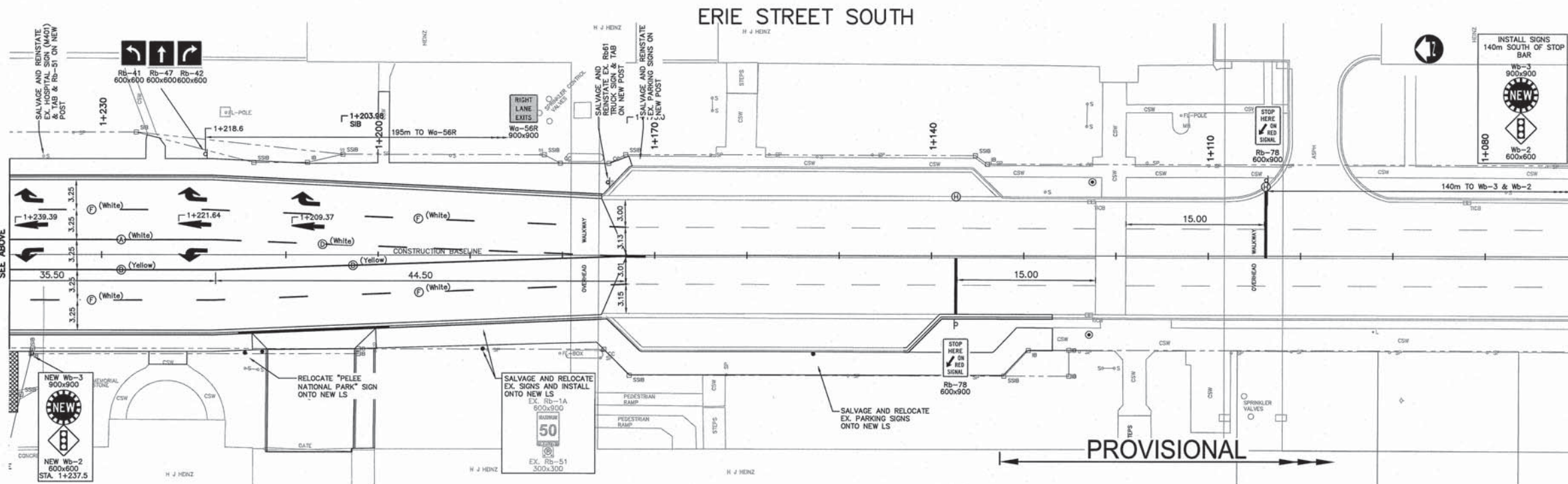
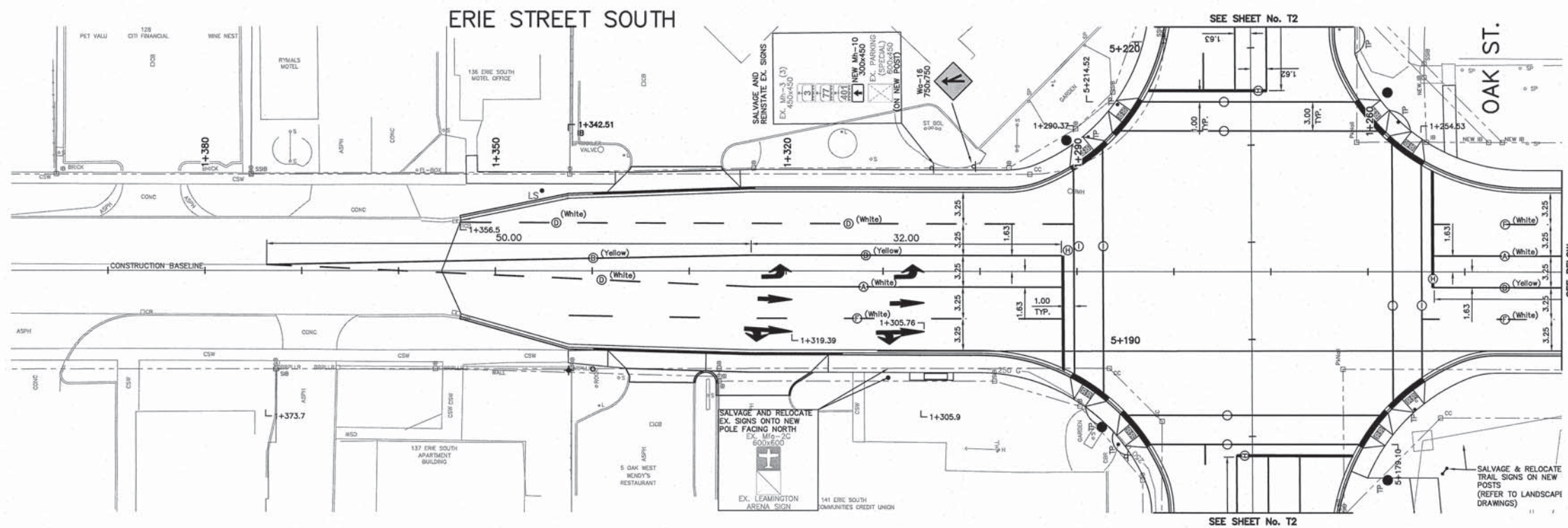
Analysis Period (min) 15

Splits and Phases: 19: Talbot Street & Highway 3 (Bypass)



Appendix C

New Layout for the Intersection of Oak Street at Erie Street



GENERAL NOTES:

1. THE OWNER AND DILLON CONSULTING LIMITED DO NOT GUARANTEE THE ACCURACY OF THE UTILITIES SHOWN ON THE DRAWINGS. OTHER UTILITIES MAY BE PRESENT OR THE UTILITIES SHOWN MAY DIFFER IN SIZE OR LOCATION FROM THOSE SHOWN. THE CONTRACTOR SHALL NOTE THAT SERVICES FROM THE MAIN LINES ARE NOT SHOWN. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY TO CONTACT THE VARIOUS UTILITY COMPANIES AND TO REPAIR ANY DAMAGE IT MAY CAUSE TO THESE UTILITIES OR TO OTHER THIRD PARTIES. THE CONTRACTOR AGREES TO INDEMNIFY THE OWNER AND DILLON CONSULTING LIMITED AGAINST ANY CLAIMS WHICH MAY ARISE FROM THE CONTRACTOR'S ACTIONS.
2. ALL DIMENSIONS AND RADII ARE TO CONSTRUCTION BASELINE OR EDGE OF PAVEMENT.
3. PAVEMENT MARKINGS SHALL BE IN ACCORDANCE WITH THE MINIMUM STANDARDS OF THE ONTARIO TRAFFIC MANUAL BOOK 11.
4. PERMANENT PAVEMENT MARKINGS WITHIN THE LIMITS OF CONSTRUCTION SHALL BE PER CONTRACT SPECIFICATIONS.
5. CONTRACTOR SHALL REMOVE AND SALVAGE ALL TRAFFIC SIGNAGE AND POSTS/POLES FROM SITE AS INDICATED ON THE CONTRACT DRAWINGS.
6. CONTRACTOR TO CONFIRM FINAL LOCATION OF SIGNS WITH MUNICIPALITY PRIOR TO INSTALLATION AND PRIOR TO CONSTRUCTION OF SIDEWALKS.
7. INSTALL NEW OVERSIZED STREET NAME SIGNS (SUPPLIED BY MUNICIPALITY) ON NEW TRAFFIC POLES AT ERIE/OAK INTERSECTION.

PAVEMENT MARKINGS LEGEND

NAME OF LINE	DIMENSIONS (m)	USE
LONGITUDINAL	(A)	EDGE LINES (WHITE OR YELLOW), DIRECTIONAL DIVIDING LINES (YELLOW), LANE LINES (WHITE), PROTECTING LANE CHANGES (WHITE)
	(B)	DIRECTIONAL DIVIDING LINES (YELLOW)
	(C)	DIRECTIONAL DIVIDING LINES (WHITE), TWO-WAY LEFT TURN LINES (YELLOW)
	(D)	CONTINUITY LINES (WHITE)
	(E)	GUIDING LINES (E.G. INTERSECTION MOVEMENTS) (WHITE)
TRANSVERSE	(F)	DIRECTIONAL DIVIDING LINES (YELLOW), URBAN LANE LINES, LOW SPEED (WHITE)
	(G)	LANE LINES (WHITE), HIGH SPEED ROAD (WHITE)
	(H)	INTERSECTION STOP LINES (WHITE)
	(I)	CROSSWALKS (WHITE)

Conditions of Use
Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.
Do not scale dimensions from drawing.
Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.



THE CORPORATION OF THE MUNICIPALITY OF LEAMINGTON



5	TENDER	FEB 12/13	RM
4	REVISED PER MUNICIPAL COMMENTS	JAN 31/13	RM
3	MUNICIPAL APPROVAL	01/2013	MLM
2	90% CLIENT REVIEW	10/2012	RM
1	CLIENT REVIEW	08/2011	RM
1	ISSUED FOR	DATE	BY

ERIE STREET / OAK STREET INTERSECTION IMPROVEMENTS
PHASE 1

TRAFFIC PAVEMENT MARKINGS

ERIE STREET SOUTH

PROJECT NO.
11-4925

SHEET NO.

T1

SCALE
1:250











Appendix D

Unsignalized Intersection Capacity Analysis

HCM Unsignalized Intersection Capacity Analysis

12: Sherk Street & Ellison Avenue










21/03/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	80	138	151	224	145	105
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	89	153	168	249	161	117
Pedestrians	2			8	5	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	0			1	0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	811	229	280			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	811	229	280			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	71	81	87			
cM capacity (veh/h)	302	803	1281			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1		
Volume Total	89	153	417	278		
Volume Left	89	0	168	0		
Volume Right	0	153	0	117		
cSH	302	803	1281	1700		
Volume to Capacity	0.29	0.19	0.13	0.16		
Queue Length 95th (m)	9.1	5.3	3.4	0.0		
Control Delay (s)	21.9	10.5	4.1	0.0		
Lane LOS	C	B	A			
Approach Delay (s)	14.7		4.1	0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			52.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis










13: Pulford Avenue & Theresa Trail

21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	1	120	187	1	2	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	133	208	1	2	2
Pedestrians		2			1	
Lane Width (m)		3.5			3.5	
Walking Speed (m/s)		1.2			1.2	
Percent Blockage		0			0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		399				
pX, platoon unblocked						
vC, conflicting volume	210				345	211
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	210				345	211
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)	1360				651	827
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	134	209	4			
Volume Left	1	0	2			
Volume Right	0	1	2			
cSH	1360	1700	728			
Volume to Capacity	0.00	0.12	0.01			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.1	0.0	10.0			
Lane LOS	A		A			
Approach Delay (s)	0.1	0.0	10.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			21.2%	ICU Level of Service	A	
Analysis Period (min)			15			











HCM Unsignalized Intersection Capacity Analysis 14: Seacliff Drive & Danforth Avenue

21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	58	195	197	26	30	55
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	64	217	219	29	33	61
Pedestrians					6	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	254				585	239
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	254				585	239
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				93	92
cM capacity (veh/h)	1305				445	796
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	281	248	94			
Volume Left	64	0	33			
Volume Right	0	29	61			
cSH	1305	1700	622			
Volume to Capacity	0.05	0.15	0.15			
Queue Length 95th (m)	1.2	0.0	4.0			
Control Delay (s)	2.2	0.0	11.8			
Lane LOS	A		B			
Approach Delay (s)	2.2	0.0	11.8			
Approach LOS			B			
Intersection Summary						
Average Delay		2.8				
Intersection Capacity Utilization		42.3%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 15: Cherry Lane & Seacliff Drive

21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	157	34	41	217	63	73
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	174	38	46	241	70	81
Pedestrians	1			5	2	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			214		529	200
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			214		529	200
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			97		85	90
cM capacity (veh/h)			1354		481	836
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	212	46	241	151		
Volume Left	0	46	0	70		
Volume Right	38	0	0	81		
cSH	1700	1354	1700	623		
Volume to Capacity	0.12	0.03	0.14	0.24		
Queue Length 95th (m)	0.0	0.8	0.0	7.2		
Control Delay (s)	0.0	7.8	0.0	12.6		
Lane LOS		A		B		
Approach Delay (s)	0.0	1.2		12.6		
Approach LOS				B		
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			33.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

16: Oak Street & Victoria Avenue

21/03/2013

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱	↰		↰	↱
Volume (veh/h)	75	348	470	72	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	100	464	627	96	0	0
Pedestrians					8	
Lane Width (m)					0.0	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		265				
pX, platoon unblocked						
vC, conflicting volume	731				1347	683
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	731				1347	683
tC, single (s)	4.2				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	88				100	100
cM capacity (veh/h)	847				147	449
Direction, Lane #	EB 1	EB 2	WB 1			
Volume Total	100	464	723			
Volume Left	100	0	0			
Volume Right	0	0	96			
cSH	847	1700	1700			
Volume to Capacity	0.12	0.27	0.43			
Queue Length 95th (m)	3.0	0.0	0.0			
Control Delay (s)	9.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	1.7		0.0			
Approach LOS						
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			48.9%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis





17: Erie Street & Clark Street

21/03/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰	↱		↰	↱
Volume (veh/h)	8	2	19	0	4	11	19	243	1	4	351	21
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	3	25	0	5	15	25	324	1	5	468	28
Pedestrians		6			3						3	
Lane Width (m)		3.5			3.5						3.5	
Walking Speed (m/s)		1.2			1.2						1.2	
Percent Blockage		0			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)								277				
pX, platoon unblocked	0.98	0.98		0.98	0.98	0.98				0.98		
vC, conflicting volume	894	878	488	898	891	331	502			328		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	881	864	488	885	878	306	502			303		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.3		
p0 queue free %	96	99	96	100	98	98	98			100		
cM capacity (veh/h)	244	276	575	240	271	702	1057			1165		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	39	20	351	501								
Volume Left	11	0	25	5								
Volume Right	25	15	1	28								
cSH	396	493	1057	1165								
Volume to Capacity	0.10	0.04	0.02	0.00								
Queue Length 95th (m)	2.4	1.0	0.6	0.1								
Control Delay (s)	15.1	12.6	0.8	0.1								
Lane LOS	C	B	A	A								
Approach Delay (s)	15.1	12.6	0.8	0.1								
Approach LOS	C	B										
Intersection Summary												
Average Delay				1.3								
Intersection Capacity Utilization			47.1%		ICU Level of Service					A		
Analysis Period (min)			15									





18: Westmoreland Avenue & Talbot Street

21/03/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	365	14	54	333	21	75
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	487	19	72	444	28	100
Pedestrians	18				2	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage (veh)	2			2		
Upstream signal (m)				356		
pX, platoon unblocked						
vC, conflicting volume			507		1104	498
vC1, stage 1 conf vol					498	
vC2, stage 2 conf vol					606	
vCu, unblocked vol			507		1104	498
tC, single (s)			4.3		6.8	6.2
tC, 2 stage (s)					5.8	
tF (s)			2.4		3.8	3.3
p0 queue free %			93		92	82
cM capacity (veh/h)			970		371	565
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	505	72	444	128		
Volume Left	0	72	0	28		
Volume Right	19	0	0	100		
cSH	1700	970	1700	507		
Volume to Capacity	0.30	0.07	0.26	0.25		
Queue Length 95th (m)	0.0	1.8	0.0	7.5		
Control Delay (s)	0.0	9.0	0.0	14.5		
Lane LOS		A		B		
Approach Delay (s)	0.0	1.3		14.5		
Approach LOS				B		
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			46.5%		ICU Level of Service	A
Analysis Period (min)			15			

20: Erie Street & Marlborough Street

















21/03/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Volume (veh/h)	2	3	6	17	14	15	14	275	9	11	286	13								
Sign Control		Stop			Stop			Free			Free									
Grade		0%			0%			0%			0%									
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90								
Hourly flow rate (vph)	3	4	8	23	19	20	19	367	12	15	381	17								
Pedestrians		2			6			3			2									
Lane Width (m)		3.5			3.5			3.5			3.5									
Walking Speed (m/s)		1.2			1.2			1.2			1.2									
Percent Blockage		0			0			0			0									
Right turn flare (veh)																				
Median type	None								None											
Median storage (veh)																				
Upstream signal (m)	163																			
pX, platoon unblocked	0.96	0.96	0.96	0.96	0.96		0.96													
vC, conflicting volume	863	843	395	848	846	381	401			385										
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	835	815	347	820	818	381	353			385										
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1										
tC, 2 stage (s)																				
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2										
p0 queue free %	99	99	99	91	94	97	98			99										
cM capacity (veh/h)	246	289	664	266	287	662	1154			1168										
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	15	61	397	413																
Volume Left	3	23	19	15																
Volume Right	8	20	12	17																
cSH	399	340	1154	1168																
Volume to Capacity	0.04	0.18	0.02	0.01																
Queue Length 95th (m)	0.9	4.9	0.4	0.3																
Control Delay (s)	14.4	17.9	0.5	0.4																
Lane LOS	B	C	A	A																
Approach Delay (s)	14.4	17.9	0.5	0.4																
Approach LOS	B	C																		
Intersection Summary																				
Average Delay				1.9																
Intersection Capacity Utilization				39.6%	ICU Level of Service				A											
Analysis Period (min)				15																

HCM Unsignalized Intersection Capacity Analysis

21: Princess Street & Robinson Street

















21/03/2013

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Sign Control		Stop			Stop			Stop			Stop									
Volume (vph)	2	11	3	2	10	1	4	59	0	6	37	1								
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90								
Hourly flow rate (vph)	3	15	4	3	13	1	5	79	0	8	49	1								
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total (vph)	21	17	84	59																
Volume Left (vph)	3	3	5	8																
Volume Right (vph)	4	1	0	1																
Hadj (s)	0.18	0.02	0.05	0.05																
Departure Headway (s)	4.4	4.2	4.1	4.1																
Degree Utilization, x	0.03	0.02	0.10	0.07																
Capacity (veh/h)	787	815	859	859																
Control Delay (s)	7.5	7.3	7.5	7.4																
Approach Delay (s)	7.5	7.3	7.5	7.4																
Approach LOS	A	A	A	A																
Intersection Summary																				
Delay	7.5																			
Level of Service	A																			
Intersection Capacity Utilization	15.9%			ICU Level of Service			A													
Analysis Period (min)	15																			

HCM Unsignalized Intersection Capacity Analysis

22: Lutsch Avenue & Mill Street

















21/03/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	7	2	2	4	8	4	157	12	7	136	22
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	9	3	3	5	11	5	209	16	9	181	29
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	15	19	231	220								
Volume Left (vph)	3	3	5	9								
Volume Right (vph)	3	11	16	29								
Hadj (s)	-0.04	-0.27	0.03	0.06								
Departure Headway (s)	4.9	4.6	4.2	4.3								
Degree Utilization, x	0.02	0.02	0.27	0.26								
Capacity (veh/h)	665	696	831	819								
Control Delay (s)	8.0	7.7	8.8	8.8								
Approach Delay (s)	8.0	7.7	8.8	8.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	8.7											
Level of Service	A											
Intersection Capacity Utilization	33.9%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

23: Worchester Avenue & Orange Street










21/03/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	44	3	1	87	0	20	2	0	0	2	8
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	59	4	1	116	0	27	3	0	0	3	11
Pedestrians												1
Lane Width (m)												3.5
Walking Speed (m/s)												1.2
Percent Blockage												0
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	117			63			197	186	61	187	188	117
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	117			63			197	186	61	187	188	117
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			96	100	100	100	100	99
cM capacity (veh/h)	1470			1540			749	706	1005	769	704	934
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	65	117	29	13								
Volume Left	3	1	27	0								
Volume Right	4	0	0	11								
cSH	1470	1540	745	877								
Volume to Capacity	0.00	0.00	0.04	0.02								
Queue Length 95th (m)	0.0	0.0	0.9	0.4								
Control Delay (s)	0.3	0.1	10.0	9.2								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.3	0.1	10.0	9.2								
Approach LOS			B	A								
Intersection Summary												
Average Delay	2.0											
Intersection Capacity Utilization	21.4%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

24: Wigle Street & Oak Street

21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	239	4	8	497	6	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	319	5	11	663	8	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			324		1005	321
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			324		1005	321
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		97	99
cM capacity (veh/h)			1236		265	720
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	324	673	19			
Volume Left	0	11	8			
Volume Right	5	0	11			
cSH	1700	1236	415			
Volume to Capacity	0.19	0.01	0.04			
Queue Length 95th (m)	0.0	0.2	1.1			
Control Delay (s)	0.0	0.2	14.1			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.2	14.1			
Approach LOS			B			
Intersection Summary						
Average Delay	0.4					
Intersection Capacity Utilization	51.2%		ICU Level of Service		A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
25: Danforth Avenue & Oak Street

21/03/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↗	↖	↗
Volume (veh/h)	242	14	57	496	53	52
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	323	19	76	661	71	69
Pedestrians	10				9	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	1				1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			350		1164	341
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			350		1164	341
tC, single (s)			4.3		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.4
p0 queue free %			93		64	90
cM capacity (veh/h)			1117		197	687
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	341	737	140			
Volume Left	0	76	71			
Volume Right	19	0	69			
cSH	1700	1117	305			
Volume to Capacity	0.20	0.07	0.46			
Queue Length 95th (m)	0.0	1.7	17.4			
Control Delay (s)	0.0	1.7	26.5			
Lane LOS		A	D			
Approach Delay (s)	0.0	1.7	26.5			
Approach LOS			D			
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization		72.1%		ICU Level of Service		C
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
26: Erie Street & Robson Road

21/03/2013

	↖	↗	↑	↘	↙	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↑	↘	↙	↓
Volume (veh/h)	2	125	25	8	62	24
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	167	33	11	83	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	231	33			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	231	33			44	
tC, single (s)	6.6	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.7	3.3			2.2	
p0 queue free %	100	84			95	
cM capacity (veh/h)	672	1040			1564	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	169	33	11	83	32	
Volume Left	3	0	0	83	0	
Volume Right	167	0	11	0	0	
cSH	1031	1700	1700	1564	1700	
Volume to Capacity	0.16	0.02	0.01	0.05	0.02	
Queue Length 95th (m)	4.5	0.0	0.0	1.3	0.0	
Control Delay (s)	9.2	0.0	0.0	7.4	0.0	
Lane LOS	A			A		
Approach Delay (s)	9.2	0.0		5.4		
Approach LOS	A					
Intersection Summary						
Average Delay			6.6			
Intersection Capacity Utilization		27.6%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

27: Erie Street & Park Street

21/03/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	1	3	2	0	8	0	143	0	6	84	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	12	1	4	2	0	9	0	191	0	7	112	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	325	316	112	321	316	191	112			191		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	325	316	112	321	316	191	112			191		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	100	100	99	100			100		
cM capacity (veh/h)	619	597	941	626	597	851	1478			1383		
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	17	2	9	191	119							
Volume Left	12	2	0	0	7							
Volume Right	4	0	9	0	0							
cSH	671	626	851	1700	1383							
Volume to Capacity	0.03	0.00	0.01	0.11	0.00							
Queue Length 95th (m)	0.6	0.1	0.2	0.0	0.1							
Control Delay (s)	10.5	10.8	9.3	0.0	0.5							
Lane LOS	B	B	A		A							
Approach Delay (s)	10.5	9.6		0.0	0.5							
Approach LOS	B	A										
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			26.2%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

28: Seacliff Drive & Sherk Street











21/03/2013

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	117	216	200	112	67	66
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	130	240	222	124	74	73
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	347				788	284
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	347				788	284
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				77	90
cM capacity (veh/h)	1212				320	755
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	370	347	74	73		
Volume Left	130	0	74	0		
Volume Right	0	124	0	73		
cSH	1212	1700	320	755		
Volume to Capacity	0.11	0.20	0.23	0.10		
Queue Length 95th (m)	2.7	0.0	6.7	2.4		
Control Delay (s)	3.6	0.0	19.6	10.3		
Lane LOS	A		C	B		
Approach Delay (s)	3.6	0.0	15.0			
Approach LOS			B			
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			51.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

29: Oak Street & Lutsch Avenue










21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	86	168	370	48	28	112
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	115	224	493	64	37	149
Pedestrians					6	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	563				985	531
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	563				985	531
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	88				84	72
cM capacity (veh/h)	984				233	530
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	339	557	187			
Volume Left	115	0	37			
Volume Right	0	64	149			
cSH	984	1700	422			
Volume to Capacity	0.12	0.33	0.44			
Queue Length 95th (m)	3.0	0.0	16.8			
Control Delay (s)	3.9	0.0	20.1			
Lane LOS	A		C			
Approach Delay (s)	3.9	0.0	20.1			
Approach LOS			C			
Intersection Summary						
Average Delay		4.7				
Intersection Capacity Utilization		66.4%		ICU Level of Service	C	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

30: MCR Drive & Talbot Street










21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	359	21	11	436	35	37
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	479	28	15	581	47	49
Pedestrians					11	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	TWLTL		None			
Median storage (veh)	2					
Upstream signal (m)			60			
pX, platoon unblocked			0.86			
vC, conflicting volume			518		1114	504
vC1, stage 1 conf vol					504	
vC2, stage 2 conf vol					611	
vCu, unblocked vol			518		1050	504
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		89	91
cM capacity (veh/h)			1039		432	559
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	507	596	96			
Volume Left	0	15	47			
Volume Right	28	0	49			
cSH	1700	1039	489			
Volume to Capacity	0.30	0.01	0.20			
Queue Length 95th (m)	0.0	0.3	5.5			
Control Delay (s)	0.0	0.4	14.2			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.4	14.2			
Approach LOS			B			
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			52.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

31: Bevel Line & Seacliff Drive

















21/03/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	85	48	81	11	128	8
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	94	53	90	12	142	9
Pedestrians					1	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1		296	217	243	1
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1		296	217	243	1
tC, single (s)	4.1		7.1	6.5	6.5	6.3
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.4
p0 queue free %	94		82	98	77	99
cM capacity (veh/h)	1620		513	641	620	1063
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	148	102	151			
Volume Left	94	90	0			
Volume Right	53	0	9			
cSH	1620	525	635			
Volume to Capacity	0.06	0.19	0.24			
Queue Length 95th (m)	1.4	5.4	7.0			
Control Delay (s)	4.9	13.5	12.4			
Lane LOS	A	B	B			
Approach Delay (s)	4.9	13.5	12.4			
Approach LOS		B	B			
Intersection Summary						
Average Delay			9.9			
Intersection Capacity Utilization	31.0%		ICU Level of Service	A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

32: Elliot Street & Wilkinson Drive

21/03/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	91	57	89	125	24	63	17	39	7	7	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	121	76	119	167	32	84	23	52	9	9	3
Pedestrians		2			4			6			2	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	201			203			629	638	169	683	660	187
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			203			629	638	169	683	660	187
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			91			76	94	94	97	97	100
cM capacity (veh/h)	1369			1344			351	353	868	297	343	853
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	215	317	159	21								
Volume Left	17	119	84	9								
Volume Right	76	32	52	3								
cSH	1369	1344	436	345								
Volume to Capacity	0.01	0.09	0.36	0.06								
Queue Length 95th (m)	0.3	2.2	12.4	1.5								
Control Delay (s)	0.7	3.5	17.9	16.1								
Lane LOS	A	A	C	C								
Approach Delay (s)	0.7	3.5	17.9	16.1								
Approach LOS			C	C								
Intersection Summary												
Average Delay		6.2										
Intersection Capacity Utilization		50.5%		ICU Level of Service					A			
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis

33: Township Road 3 & Township Road 4

21/03/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↖
Volume (veh/h)	54	18	0	45	9	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	60	20	0	50	10	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			80		120	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			80		120	70
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1518		857	993
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	80	50	10			
Volume Left	0	0	10			
Volume Right	20	0	0			
cSH	1700	1518	857			
Volume to Capacity	0.05	0.00	0.01			
Queue Length 95th (m)	0.0	0.0	0.3			
Control Delay (s)	0.0	0.0	9.3			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.3			
Approach LOS			A			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			14.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

34: Morse Road & County Road 18










21/03/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↖
Volume (veh/h)	57	10	10	73	11	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	63	11	11	81	12	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			74		172	69
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			74		172	69
tC, single (s)			4.1		6.6	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1525		779	994
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	74	92	22			
Volume Left	0	11	12			
Volume Right	11	0	10			
cSH	1700	1525	863			
Volume to Capacity	0.04	0.01	0.03			
Queue Length 95th (m)	0.0	0.2	0.6			
Control Delay (s)	0.0	0.9	9.3			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.9	9.3			
Approach LOS		A	A			
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			21.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

35: Oak Street & Mersea Road 12










21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	11	35	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	12	39	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	39				51	39
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	39				51	39
tC, single (s)	4.2				6.7	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.7	3.4
p0 queue free %	100				100	100
cM capacity (veh/h)	1546				898	1013
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	12	39	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1546	1700	1700			
Volume to Capacity	0.00	0.02	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		6.7%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

36: County Road 33 & Mersea Road 12





21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	18	20	7	8	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	20	22	8	9	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	30				51	26
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	30				51	26
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				99	100
cM capacity (veh/h)	1583				957	1050
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	22	30	10			
Volume Left	2	0	9			
Volume Right	0	8	1			
cSH	1583	1700	967			
Volume to Capacity	0.00	0.02	0.01			
Queue Length 95th (m)	0.0	0.0	0.2			
Control Delay (s)	0.7	0.0	8.8			
Lane LOS	A		A			
Approach Delay (s)	0.7	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay		1.7				
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

37: Hillman Sideroad & Township Road 3





21/03/2013

									
Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations									
Volume (veh/h)	4	2	24	9	0	10			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90			
Hourly flow rate (vph)	4	2	27	10	0	11			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type			None			None			
Median storage (veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	43	32			37				
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	43	32			37				
tC, single (s)	6.4	6.3			4.1				
tC, 2 stage (s)									
tF (s)	3.5	3.4			2.2				
p0 queue free %	100	100			100				
cM capacity (veh/h)	968	1028			1574				
Direction, Lane #	WB 1	NB 1	SB 1						
Volume Total	7	37	11						
Volume Left	4	0	0						
Volume Right	2	10	0						
cSH	987	1700	1574						
Volume to Capacity	0.01	0.02	0.00						
Queue Length 95th (m)	0.2	0.0	0.0						
Control Delay (s)	8.7	0.0	0.0						
Lane LOS	A								
Approach Delay (s)	8.7	0.0	0.0						
Approach LOS	A								
Intersection Summary									
Average Delay		1.1							
Intersection Capacity Utilization		13.3%	ICU Level of Service	A					
Analysis Period (min)		15							

HCM Unsignalized Intersection Capacity Analysis

38: Lakeshore Drive & Township Road 3










21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	1	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	0	1	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			0		0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		0	0
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)			1623		1023	1085
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	0	0	1			
Volume Left	0	0	1			
Volume Right	0	0	0			
cSH	1700	1700	1023			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	8.5			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.5			
Approach LOS			A			
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization			6.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

39: Mersea Road 21 & Township Road 4










21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	40	1	1	36	1	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	44	1	1	40	1	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			46		87	45
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			46		87	45
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1562		896	1025
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	46	41	3			
Volume Left	0	1	1			
Volume Right	1	0	2			
cSH	1700	1562	978			
Volume to Capacity	0.03	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.2	8.7			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.2	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

40: 5th Concession & Mersea Road 12

















21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	9	11	24	4	3	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	12	27	4	3	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	31				61	29
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	31				61	29
tC, single (s)	4.2				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	99				100	97
cM capacity (veh/h)	1543				939	1043
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	22	31	37			
Volume Left	10	0	3			
Volume Right	0	4	33			
cSH	1543	1700	1033			
Volume to Capacity	0.01	0.02	0.04			
Queue Length 95th (m)	0.1	0.0	0.8			
Control Delay (s)	3.3	0.0	8.6			
Lane LOS	A		A			
Approach Delay (s)	3.3	0.0	8.6			
Approach LOS			A			
Intersection Summary						
Average Delay		4.3				
Intersection Capacity Utilization		17.8%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

41: Lutsch Avenue & Marlborough Street











21/03/2013

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Volume (veh/h)	11	8	4	12	9	17	11	155	4	4	117	9								
Sign Control		Stop			Stop			Free			Free									
Grade		0%			0%			0%			0%									
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90								
Hourly flow rate (vph)	12	9	4	13	10	19	12	172	4	4	130	10								
Pedestrians																				
Lane Width (m)																				
Walking Speed (m/s)																				
Percent Blockage																				
Right turn flare (veh)																				
Median type								None			None									
Median storage (veh)																				
Upstream signal (m)																				
pX, platoon unblocked																				
vC, conflicting volume	367	345	135	352	348	174	140			177										
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	367	345	135	352	348	174	140			177										
tC, single (s)	7.1	6.5	6.5	7.3	6.6	6.3	4.3			4.1										
tC, 2 stage (s)																				
tF (s)	3.5	4.0	3.5	3.7	4.1	3.4	2.4			2.2										
p0 queue free %	98	98	99	98	98	98	99			100										
cM capacity (veh/h)	563	571	856	559	556	856	1314			1399										
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	26	42	189	144																
Volume Left	12	13	12	4																
Volume Right	4	19	4	10																
cSH	602	661	1314	1399																
Volume to Capacity	0.04	0.06	0.01	0.00																
Queue Length 95th (m)	1.0	1.6	0.2	0.1																
Control Delay (s)	11.2	10.8	0.6	0.3																
Lane LOS	B	B	A	A																
Approach Delay (s)	11.2	10.8	0.6	0.3																
Approach LOS	B	B																		
Intersection Summary																				
Average Delay		2.2																		
Intersection Capacity Utilization		24.0%		ICU Level of Service		A														
Analysis Period (min)		15																		

HCM Unsignalized Intersection Capacity Analysis

100: Oak Street & Wigle Street











21/03/2013

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Volume (veh/h)	0	246	549	0	19	53		
Sign Control		Free	Free		Stop			
Grade		0%	0%		0%			
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly flow rate (vph)	0	328	732	0	25	71		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type		None	None					
Median storage (veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	732				1060	732		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	732				1060	732		
tC, single (s)	4.2				6.4	6.2		
tC, 2 stage (s)								
tF (s)	2.3				3.5	3.3		
p0 queue free %	100				90	83		
cM capacity (veh/h)	846				248	421		
Direction, Lane #	EB 1	WB 1	SB 1	SB 2				
Volume Total	328	732	25	71				
Volume Left	0	0	25	0				
Volume Right	0	0	0	71				
cSH	1700	1700	248	421				
Volume to Capacity	0.19	0.43	0.10	0.17				
Queue Length 95th (m)	0.0	0.0	2.6	4.5				
Control Delay (s)	0.0	0.0	21.1	15.3				
Lane LOS			C	C				
Approach Delay (s)	0.0	0.0	16.8					
Approach LOS			C					
Intersection Summary								
Average Delay		1.4						
Intersection Capacity Utilization		47.4%		ICU Level of Service		A		
Analysis Period (min)		15						

HCM Unsignalized Intersection Capacity Analysis

12: Sherk Street & Ellison Avenue










21/03/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	30	85	127	271	350	47
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	33	94	141	301	389	52
Pedestrians	2			8	5	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	0			1	0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1005	425	443			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1005	425	443			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	85	87			
cM capacity (veh/h)	232	624	1115			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1		
Volume Total	33	94	442	441		
Volume Left	33	0	141	0		
Volume Right	0	94	0	52		
cSH	232	624	1115	1700		
Volume to Capacity	0.14	0.15	0.13	0.26		
Queue Length 95th (m)	3.7	4.0	3.3	0.0		
Control Delay (s)	23.1	11.8	3.7	0.0		
Lane LOS	C	B	A			
Approach Delay (s)	14.7		3.7	0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			60.6%	ICU Level of Service	B	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis










13: Pulford Avenue & Theresa Trail

21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	7	187	146	3	2	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	208	162	3	2	7
Pedestrians		2			1	
Lane Width (m)		3.5			3.5	
Walking Speed (m/s)		1.2			1.2	
Percent Blockage		0			0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		399				
pX, platoon unblocked						
vC, conflicting volume	167				388	167
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	167				388	167
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	99
cM capacity (veh/h)	1410				611	875
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	216	166	9			
Volume Left	8	0	2			
Volume Right	0	3	7			
cSH	1410	1700	790			
Volume to Capacity	0.01	0.10	0.01			
Queue Length 95th (m)	0.1	0.0	0.3			
Control Delay (s)	0.3	0.0	9.6			
Lane LOS	A		A			
Approach Delay (s)	0.3	0.0	9.6			
Approach LOS			A			
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			27.0%	ICU Level of Service	A	
Analysis Period (min)			15			











HCM Unsignalized Intersection Capacity Analysis 14: Seacliff Drive & Danforth Avenue

21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	80	229	232	25	29	109
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	89	254	258	28	32	121
Pedestrians					6	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	292				710	278
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	292				710	278
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				91	84
cM capacity (veh/h)	1264				367	757
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	343	286	153			
Volume Left	89	0	32			
Volume Right	0	28	121			
cSH	1264	1700	619			
Volume to Capacity	0.07	0.17	0.25			
Queue Length 95th (m)	1.7	0.0	7.4			
Control Delay (s)	2.6	0.0	12.7			
Lane LOS	A		B			
Approach Delay (s)	2.6	0.0	12.7			
Approach LOS			B			
Intersection Summary						
Average Delay		3.6				
Intersection Capacity Utilization		50.7%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 15: Cherry Lane & Seacliff Drive







21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	290	99	100	296	55	59
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	322	110	111	329	61	66
Pedestrians	1			5	2	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			434		931	384
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			434		931	384
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			90		76	90
cM capacity (veh/h)			1124		259	660
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	432	111	329	127		
Volume Left	0	111	0	61		
Volume Right	110	0	0	66		
cSH	1700	1124	1700	377		
Volume to Capacity	0.25	0.10	0.19	0.34		
Queue Length 95th (m)	0.0	2.5	0.0	11.0		
Control Delay (s)	0.0	8.6	0.0	19.3		
Lane LOS		A		C		
Approach Delay (s)	0.0	2.2		19.3		
Approach LOS				C		
Intersection Summary						
Average Delay		3.4				
Intersection Capacity Utilization		46.6%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

16: Oak Street & Victoria Avenue













21/03/2013

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	80	554	400	68	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	107	739	533	91	0	0
Pedestrians					8	
Lane Width (m)					0.0	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)		265				
Upstream signal (m)						
pX, platoon unblocked					0.91	
vC, conflicting volume	632				1539	587
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	632				1543	587
tC, single (s)	4.2				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	88				100	100
cM capacity (veh/h)	922				102	510
Direction, Lane #	EB 1	EB 2	WB 1			
Volume Total	107	739	624			
Volume Left	107	0	0			
Volume Right	0	0	91			
cSH	922	1700	1700			
Volume to Capacity	0.12	0.43	0.37			
Queue Length 95th (m)	3.0	0.0	0.0			
Control Delay (s)	9.4	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	1.2		0.0			
Approach LOS						
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			44.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis











17: Erie Street & Clark Street

21/03/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	21	11	26	6	7	10	26	310	11	17	458	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	28	15	35	8	9	13	35	413	15	23	611	17
Pedestrians		6			3						3	
Lane Width (m)		3.5			3.5						3.5	
Walking Speed (m/s)		1.2			1.2						1.2	
Percent Blockage		0			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)								277				
Upstream signal (m)												
pX, platoon unblocked	0.91	0.91		0.91	0.91	0.91				0.91		
vC, conflicting volume	1182	1171	625	1200	1172	427	634			431		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1151	1139	625	1170	1140	322	634			327		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.3		
p0 queue free %	80	91	93	94	95	98	96			98		
cM capacity (veh/h)	141	172	480	127	171	639	944			1062		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	77	31	463	651								
Volume Left	28	8	35	23								
Volume Right	35	13	15	17								
cSH	217	222	944	1062								
Volume to Capacity	0.36	0.14	0.04	0.02								
Queue Length 95th (m)	11.6	3.6	0.9	0.5								
Control Delay (s)	30.4	23.8	1.1	0.6								
Lane LOS	D	C	A	A								
Approach Delay (s)	30.4	23.8	1.1	0.6								
Approach LOS	D	C										
Intersection Summary												
Average Delay				3.2								
Intersection Capacity Utilization			50.2%		ICU Level of Service					A		
Analysis Period (min)			15									


















HCM Unsignalized Intersection Capacity Analysis 18: Westmoreland Avenue & Talbot Street

21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	404	19	28	378	15	31
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	539	25	37	504	20	41
Pedestrians	18				2	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type	TWLTL		TWLTL			
Median storage (veh)	2		2			
Upstream signal (m)			356			
pX, platoon unblocked					0.88	
vC, conflicting volume			566		1150	553
vC1, stage 1 conf vol					553	
vC2, stage 2 conf vol					597	
vCu, unblocked vol			566		1104	553
tC, single (s)			4.3		6.8	6.2
tC, 2 stage (s)					5.8	
tF (s)			2.4		3.8	3.3
p0 queue free %			96		95	92
cM capacity (veh/h)			921		370	526
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	564	37	504	61		
Volume Left	0	37	0	20		
Volume Right	25	0	0	41		
cSH	1700	921	1700	462		
Volume to Capacity	0.33	0.04	0.30	0.13		
Queue Length 95th (m)	0.0	1.0	0.0	3.5		
Control Delay (s)	0.0	9.1	0.0	14.0		
Lane LOS		A		B		
Approach Delay (s)	0.0	0.6		14.0		
Approach LOS				B		
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization	39.6%		ICU Level of Service		A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 20: Erie Street & Marlborough Street

















21/03/2013

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (veh/h)	13	4	9	12	3	19	10	397	19	34	553	11	
Sign Control		Stop			Stop			Free			Free		
Grade		0%			0%			0%			0%		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Hourly flow rate (vph)	17	5	12	16	4	25	13	529	25	45	737	15	
Pedestrians		2			6			3			2		
Lane Width (m)		3.5			3.5			3.5			3.5		
Walking Speed (m/s)		1.2			1.2			1.2			1.2		
Percent Blockage		0			0			0			0		
Right turn flare (veh)													
Median type	None								None				
Median storage (veh)													
Upstream signal (m)												163	
pX, platoon unblocked	0.70	0.70	0.70	0.70	0.70		0.70						
vC, conflicting volume	1435	1425	750	1428	1419	550	754			561			
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1408	1392	428	1397	1385	550	434			561			
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1			
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2			
p0 queue free %	76	94	97	78	96	95	98			95			
cM capacity (veh/h)	71	93	437	73	94	531	786			1006			
Direction, Lane #	EB 1	WB 1	NB 1	SB 1									
Volume Total	35	45	568	797									
Volume Left	17	16	13	45									
Volume Right	12	25	25	15									
cSH	105	146	786	1006									
Volume to Capacity	0.33	0.31	0.02	0.05									
Queue Length 95th (m)	9.8	9.4	0.4	1.1									
Control Delay (s)	55.1	40.4	0.5	1.2									
Lane LOS	F	E	A	A									
Approach Delay (s)	55.1	40.4	0.5	1.2									
Approach LOS	F	E											
Intersection Summary													
Average Delay			3.4										
Intersection Capacity Utilization	69.9%		ICU Level of Service		C								
Analysis Period (min)	15												

HCM Unsignalized Intersection Capacity Analysis

21: Princess Street & Robinson Street

















21/03/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	33	3	7	19	3	4	53	1	6	97	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	44	4	9	25	4	5	71	1	8	129	3
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	49	39	77	140								
Volume Left (vph)	1	9	5	8								
Volume Right (vph)	4	4	1	3								
Hadj (s)	0.29	0.02	0.04	0.03								
Departure Headway (s)	4.7	4.5	4.3	4.2								
Degree Utilization, x	0.06	0.05	0.09	0.16								
Capacity (veh/h)	724	754	808	830								
Control Delay (s)	8.1	7.7	7.7	8.1								
Approach Delay (s)	8.1	7.7	7.7	8.1								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				7.9								
Level of Service				A								
Intersection Capacity Utilization	22.0%			ICU Level of Service					A			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

22: Lutsch Avenue & Mill Street

















21/03/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	10	12	8	6	7	4	146	11	3	173	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	5	13	16	11	8	9	5	195	15	4	231	5
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	35	28	215	240								
Volume Left (vph)	5	11	5	4								
Volume Right (vph)	16	9	15	5								
Hadj (s)	-0.21	-0.06	0.03	0.13								
Departure Headway (s)	4.7	4.9	4.3	4.4								
Degree Utilization, x	0.05	0.04	0.26	0.29								
Capacity (veh/h)	681	658	806	791								
Control Delay (s)	8.0	8.1	8.9	9.2								
Approach Delay (s)	8.0	8.1	8.9	9.2								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	8.9											
Level of Service	A											
Intersection Capacity Utilization	32.4%			ICU Level of Service					A			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

23: Worchester Avenue & Orange Street










21/03/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	83	10	0	43	0	9	2	1	1	1	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	111	13	0	57	0	12	3	1	1	1	3
Pedestrians												1
Lane Width (m)												3.5
Walking Speed (m/s)												1.2
Percent Blockage												0
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	58			124			186	184	117	186	190	58
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	58			124			186	184	117	186	190	58
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	100	100	100	100
cM capacity (veh/h)	1544			1463			769	708	935	768	702	1007
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	128	57	16	5								
Volume Left	4	0	12	1								
Volume Right	13	0	1	3								
cSH	1544	1463	770	849								
Volume to Capacity	0.00	0.00	0.02	0.01								
Queue Length 95th (m)	0.1	0.0	0.5	0.1								
Control Delay (s)	0.2	0.0	9.8	9.3								
Lane LOS	A		A	A								
Approach Delay (s)	0.2	0.0	9.8	9.3								
Approach LOS			A	A								
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			19.4%		ICU Level of Service		A					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis










24: Wigle Street & Oak Street

21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	502	20	9	349	26	7
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	669	27	12	465	35	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			696		1172	683
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			696		1172	683
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		83	98
cM capacity (veh/h)			900		210	449
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	696	477	44			
Volume Left	0	12	35			
Volume Right	27	0	9			
cSH	1700	900	236			
Volume to Capacity	0.41	0.01	0.19			
Queue Length 95th (m)	0.0	0.3	5.1			
Control Delay (s)	0.0	0.4	23.7			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.4	23.7			
Approach LOS			C			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			45.0%	ICU Level of Service		A
Analysis Period (min)			15			












HCM Unsignalized Intersection Capacity Analysis 25: Danforth Avenue & Oak Street

21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	480	91	54	347	32	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	640	121	72	463	43	45
Pedestrians	10				9	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	1				1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			770		1326	710
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			770		1326	710
tC, single (s)			4.3		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.4
p0 queue free %			91		72	89
cM capacity (veh/h)			771		153	424
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	761	535	88			
Volume Left	0	72	43			
Volume Right	121	0	45			
cSH	1700	771	228			
Volume to Capacity	0.45	0.09	0.39			
Queue Length 95th (m)	0.0	2.3	13.0			
Control Delay (s)	0.0	2.5	30.3			
Lane LOS		A	D			
Approach Delay (s)	0.0	2.5	30.3			
Approach LOS			D			
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization	80.9%			ICU Level of Service	D	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 26: Erie Street & Robson Road


















21/03/2013

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	3	110	25	18	103	39
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	147	33	24	137	52
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	360	33			57	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360	33			57	
tC, single (s)	6.6	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.7	3.3			2.2	
p0 queue free %	99	86			91	
cM capacity (veh/h)	542	1040			1547	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	151	33	24	137	52	
Volume Left	4	0	0	137	0	
Volume Right	147	0	24	0	0	
cSH	1015	1700	1700	1547	1700	
Volume to Capacity	0.15	0.02	0.01	0.09	0.03	
Queue Length 95th (m)	4.0	0.0	0.0	2.2	0.0	
Control Delay (s)	9.2	0.0	0.0	7.6	0.0	
Lane LOS	A			A		
Approach Delay (s)	9.2	0.0		5.5		
Approach LOS	A					
Intersection Summary						
Average Delay		6.1				
Intersection Capacity Utilization		29.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

27: Erie Street & Park Street


21/03/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	1	10	2	0	9	0	113	2	7	154	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	5	1	13	2	0	10	0	151	2	8	205	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None								None			
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	383	374	205	387	373	152	205	153				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	383	374	205	387	373	152	205	153				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1				
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2				
p0 queue free %	99	100	98	100	100	99	100	99				
cM capacity (veh/h)	567	554	835	560	555	894	1366	1428				
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	20	2	10	153	213							
Volume Left	5	2	0	0	8							
Volume Right	13	0	10	2	0							
cSH	722	560	894	1700	1428							
Volume to Capacity	0.03	0.00	0.01	0.09	0.01							
Queue Length 95th (m)	0.6	0.1	0.3	0.0	0.1							
Control Delay (s)	10.1	11.5	9.1	0.0	0.3							
Lane LOS	B	B	A		A							
Approach Delay (s)	10.1	9.5		0.0	0.3							
Approach LOS	B	A										
Intersection Summary												
Average Delay	1.0											
Intersection Capacity Utilization	28.7%			ICU Level of Service					A			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

28: Seacliff Drive & Sherk Street










21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕		↔	↕
Volume (veh/h)	106	282	289	99	102	119
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	118	313	321	110	113	132
Pedestrians			4			
Lane Width (m)			3.5			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	431				929	376
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	431				929	376
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				57	80
cM capacity (veh/h)	1128				265	670
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	118	313	431	113	132	
Volume Left	118	0	0	113	0	
Volume Right	0	0	110	0	132	
cSH	1128	1700	1700	265	670	
Volume to Capacity	0.10	0.18	0.25	0.43	0.20	
Queue Length 95th (m)	2.6	0.0	0.0	15.4	5.5	
Control Delay (s)	8.6	0.0	0.0	28.3	11.7	
Lane LOS	A			D	B	
Approach Delay (s)	2.3		0.0	19.4		
Approach LOS				C		
Intersection Summary						
Average Delay	5.2					
Intersection Capacity Utilization	44.6%		ICU Level of Service		A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

29: Oak Street & Lutsch Avenue










21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	279	400	0	63	118
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	372	533	0	84	157
Pedestrians					6	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	539				911	539
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	539				911	539
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	100				71	70
cM capacity (veh/h)	1004				292	524
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	372	533	241			
Volume Left	0	0	84			
Volume Right	0	0	157			
cSH	1004	1700	411			
Volume to Capacity	0.00	0.31	0.59			
Queue Length 95th (m)	0.0	0.0	27.7			
Control Delay (s)	0.0	0.0	25.5			
Lane LOS			D			
Approach Delay (s)	0.0	0.0	25.5			
Approach LOS			D			
Intersection Summary						
Average Delay		5.4				
Intersection Capacity Utilization		46.9%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

30: MCR Drive & Talbot Street










21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	465	17	32	447	15	28
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	620	23	43	596	20	37
Pedestrians					11	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	TWLTL		None			
Median storage (veh)	2					
Upstream signal (m)			60			
pX, platoon unblocked			0.79			
vC, conflicting volume			654		1324	642
vC1, stage 1 conf vol					642	
vC2, stage 2 conf vol					681	
vCu, unblocked vol			654		1277	642
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			95		95	92
cM capacity (veh/h)			925		364	466
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	643	639	57			
Volume Left	0	43	20			
Volume Right	23	0	37			
cSH	1700	925	425			
Volume to Capacity	0.38	0.05	0.14			
Queue Length 95th (m)	0.0	1.1	3.5			
Control Delay (s)	0.0	1.2	14.8			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.2	14.8			
Approach LOS		B				
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			73.1%	ICU Level of Service	D	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

31: Bevel Line & Seacliff Drive

















21/03/2013

									
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations									
Volume (veh/h)	142	94	64	10	13	101			
Sign Control	Free			Stop	Stop				
Grade	0%			0%	0%				
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90			
Hourly flow rate (vph)	158	104	71	11	14	112			
Pedestrians					1				
Lane Width (m)					3.5				
Walking Speed (m/s)					1.2				
Percent Blockage					0				
Right turn flare (veh)									
Median type	None								
Median storage (veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	1		487	369	421	1			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	1		487	369	421	1			
tC, single (s)	4.1		7.1	6.5	6.5	6.3			
tC, 2 stage (s)									
tF (s)	2.2		3.5	4.0	4.0	3.4			
p0 queue free %	90		82	98	97	89			
cM capacity (veh/h)	1620		397	505	472	1063			
Direction, Lane #	EB 1	NB 1	SB 1						
Volume Total	262	82	127						
Volume Left	158	71	0						
Volume Right	104	0	112						
cSH	1620	408	930						
Volume to Capacity	0.10	0.20	0.14						
Queue Length 95th (m)	2.5	5.6	3.6						
Control Delay (s)	4.8	16.0	9.5						
Lane LOS	A	C	A						
Approach Delay (s)	4.8	16.0	9.5						
Approach LOS		C	A						
Intersection Summary									
Average Delay		8.0							
Intersection Capacity Utilization		32.0%	ICU Level of Service	A					
Analysis Period (min)		15							

HCM Unsignalized Intersection Capacity Analysis

32: Elliot Street & Wilkinson Drive

21/03/2013

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Volume (veh/h)	0	147	72	74	88	8	69	7	59	13	18	13								
Sign Control		Free			Free			Stop			Stop									
Grade		0%			0%			0%			0%									
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90								
Hourly flow rate (vph)	0	196	96	99	117	11	92	9	79	17	24	17								
Pedestrians		2			4			6			2									
Lane Width (m)		3.5			3.5			3.5			3.5									
Walking Speed (m/s)		1.2			1.2			1.2			1.2									
Percent Blockage		0			0			0			0									
Right turn flare (veh)																				
Median type		None			None															
Median storage veh																				
Upstream signal (m)																				
pX, platoon unblocked																				
vC, conflicting volume	130			298			601	577	254	653	620	127								
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	130			298			601	577	254	653	620	127								
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2								
tC, 2 stage (s)																				
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3								
p0 queue free %	100			92			74	98	90	94	94	98								
cM capacity (veh/h)	1453			1240			356	391	778	312	369	921								
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	292	227	180	59																
Volume Left	0	99	92	17																
Volume Right	96	11	79	17																
cSH	1453	1240	469	421																
Volume to Capacity	0.00	0.08	0.38	0.14																
Queue Length 95th (m)	0.0	2.0	13.5	3.7																
Control Delay (s)	0.0	3.9	17.4	14.9																
Lane LOS		A	C	B																
Approach Delay (s)	0.0	3.9	17.4	14.9																
Approach LOS			C	B																
Intersection Summary																				
Average Delay		6.5																		
Intersection Capacity Utilization		54.1%		ICU Level of Service									A							
Analysis Period (min)		15																		

HCM Unsignalized Intersection Capacity Analysis

33: Township Road 3 & Township Road 4

21/03/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↗	↘	
Volume (veh/h)	61	14	0	12	32	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	16	0	13	36	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			83		89	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			83		89	76
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		96	100
cM capacity (veh/h)			1514		893	986
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	83	13	38			
Volume Left	0	0	36			
Volume Right	16	0	2			
cSH	1700	1514	898			
Volume to Capacity	0.05	0.00	0.04			
Queue Length 95th (m)	0.0	0.0	1.0			
Control Delay (s)	0.0	0.0	9.2			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.2			
Approach LOS			A			
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			14.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

34: Morse Road & County Road 18










21/03/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↗	↘	
Volume (veh/h)	95	14	17	56	15	18
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	106	16	19	62	17	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			121		213	113
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			121		213	113
tC, single (s)			4.1		6.6	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.3
p0 queue free %			99		98	98
cM capacity (veh/h)			1466		733	939
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	121	81	37			
Volume Left	0	19	17			
Volume Right	16	0	20			
cSH	1700	1466	833			
Volume to Capacity	0.07	0.01	0.04			
Queue Length 95th (m)	0.0	0.3	1.0			
Control Delay (s)	0.0	1.8	9.5			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.8	9.5			
Approach LOS		A	A			
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			20.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

35: Oak Street & Mersea Road 12










21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	36	25	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	40	28	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	28				68	28
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	28				68	28
tC, single (s)	4.2				6.7	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.7	3.4
p0 queue free %	100				100	100
cM capacity (veh/h)	1560				879	1028
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	40	28	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1560	1700	1700			
Volume to Capacity	0.00	0.02	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		6.7%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

36: County Road 33 & Mersea Road 12





21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	28	28	3	8	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	31	31	3	9	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	34				71	33
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	34				71	33
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				99	99
cM capacity (veh/h)	1577				932	1041
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	34	34	16			
Volume Left	3	0	9			
Volume Right	0	3	7			
cSH	1577	1700	976			
Volume to Capacity	0.00	0.02	0.02			
Queue Length 95th (m)	0.0	0.0	0.4			
Control Delay (s)	0.7	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	0.7	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay		1.9				
Intersection Capacity Utilization		14.2%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

37: Hillman Sideroad & Township Road 3





21/03/2013

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	18	4	18	7	0	18
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	20	4	20	8	0	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	44	24			28	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	44	24			28	
tC, single (s)	6.4	6.3			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.4			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	967	1038			1586	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	24	28	20			
Volume Left	20	0	0			
Volume Right	4	8	0			
cSH	979	1700	1586			
Volume to Capacity	0.02	0.02	0.00			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	8.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.8	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.0				
Intersection Capacity Utilization		13.3%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

38: Lakeshore Drive & Township Road 3










21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	0	3	0	0	3	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	3	0	0	3	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			3		2	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			3		2	2
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)			1619		1021	1083
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	3	0	3			
Volume Left	0	0	3			
Volume Right	3	0	0			
cSH	1700	1700	1021			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	8.5			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.5			
Approach LOS			A			
Intersection Summary						
Average Delay		4.3				
Intersection Capacity Utilization		13.3%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

39: Mersea Road 21 & Township Road 4










21/03/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	61	0	3	40	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	0	3	44	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			68		119	68
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			68		119	68
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1534		858	996
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	68	48	0			
Volume Left	0	3	0			
Volume Right	0	0	0			
cSH	1700	1534	1700			
Volume to Capacity	0.04	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.5	0.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.5	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			8.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

40: 5th Concession & Mersea Road 12

















21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	39	45	26	2	6	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	43	50	29	2	7	22
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	31				167	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	31				167	30
tC, single (s)	4.2				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	97				99	98
cM capacity (veh/h)	1543				801	1042
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	93	31	29			
Volume Left	43	0	7			
Volume Right	0	2	22			
cSH	1543	1700	974			
Volume to Capacity	0.03	0.02	0.03			
Queue Length 95th (m)	0.7	0.0	0.7			
Control Delay (s)	3.6	0.0	8.8			
Lane LOS	A		A			
Approach Delay (s)	3.6	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay		3.8				
Intersection Capacity Utilization		21.4%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

41: Lutsch Avenue & Marlborough Street











21/03/2013

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Volume (veh/h)	7	22	9	12	17	19	14	134	25	15	173	6								
Sign Control		Stop			Stop			Free			Free									
Grade		0%			0%			0%			0%									
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90								
Hourly flow rate (vph)	8	24	10	13	19	21	16	149	28	17	192	7								
Pedestrians																				
Lane Width (m)																				
Walking Speed (m/s)																				
Percent Blockage																				
Right turn flare (veh)																				
Median type								None			None									
Median storage (veh)																				
Upstream signal (m)																				
pX, platoon unblocked																				
vC, conflicting volume	453	437	196	445	426	163	199			177										
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	453	437	196	445	426	163	199			177										
tC, single (s)	7.1	6.5	6.5	7.3	6.6	6.3	4.3			4.1										
tC, 2 stage (s)																				
tF (s)	3.5	4.0	3.5	3.7	4.1	3.4	2.4			2.2										
p0 queue free %	98	95	99	97	96	98	99			99										
cM capacity (veh/h)	481	501	790	464	496	869	1247			1399										
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	42	53	192	216																
Volume Left	8	13	16	17																
Volume Right	10	21	28	7																
cSH	544	585	1247	1399																
Volume to Capacity	0.08	0.09	0.01	0.01																
Queue Length 95th (m)	1.9	2.3	0.3	0.3																
Control Delay (s)	12.2	11.8	0.7	0.7																
Lane LOS	B	B	A	A																
Approach Delay (s)	12.2	11.8	0.7	0.7																
Approach LOS	B	B																		
Intersection Summary																				
Average Delay		2.8																		
Intersection Capacity Utilization		25.0%		ICU Level of Service		A														
Analysis Period (min)		15																		

HCM Unsignalized Intersection Capacity Analysis

100: Oak Street & Wigle Street

21/03/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	508	378	0	49	54
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	677	504	0	65	72
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	504				1181	504
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	504				1181	504
tC, single (s)	4.2				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	100				69	87
cM capacity (veh/h)	1030				210	568
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	677	504	65	72		
Volume Left	0	0	65	0		
Volume Right	0	0	0	72		
cSH	1700	1700	210	568		
Volume to Capacity	0.40	0.30	0.31	0.13		
Queue Length 95th (m)	0.0	0.0	9.6	3.3		
Control Delay (s)	0.0	0.0	29.7	12.3		
Lane LOS			D	B		
Approach Delay (s)	0.0	0.0	20.6			
Approach LOS			C			
Intersection Summary						
Average Delay		2.1				
Intersection Capacity Utilization		44.0%		ICU Level of Service	A	
Analysis Period (min)		15				

Appendix E

Optimized Signalized Intersection Capacity Analysis

Lanes, Volumes, Timings
2: Erie Street & Wilkinson Drive

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘	↙	
Volume (vph)	95	1	37	0	0	0	61	336	6	1	325	128	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00						0.98					0.94	
Frt		0.853						0.997				0.850	
Flt Protected	0.950						0.950			0.950			
Satd. Flow (prot)	1610	1382	0	1745	1745	0	1626	1675	0	1658	1664	1414	
Flt Permitted	0.757						0.306			0.328			
Satd. Flow (perm)	1279	1382	0	1745	1745	0	515	1675	0	572	1664	1323	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		49						1				171	
Link Speed (k/h)		48			48			50				80	
Link Distance (m)		570.9			81.7			455.4				785.8	
Travel Time (s)		42.8			6.1			32.8				35.4	
Confl. Peds. (#/hr)	2					2	20					20	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	5%	2%	10%	2%	2%	2%	4%	6%	2%	2%	7%	7%	
Adj. Flow (vph)	127	1	49	0	0	0	81	448	8	1	433	171	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	127	50	0	0	0	0	81	456	0	1	433	171	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			7.0			7.0		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		Perm			pm+pt	NA		Perm	NA	Perm	
Protected Phases		4			8		5	2			6		
Permitted Phases	4			8			2			6		6	
Minimum Split (s)	32.0	32.0		32.0	32.0		10.0	43.0		27.0	27.0	27.0	
Total Split (s)	40.0	40.0		33.0	33.0		16.0	50.0		34.0	34.0	34.0	
Total Split (%)	44.4%	44.4%		36.7%	36.7%		17.8%	55.6%		37.8%	37.8%	37.8%	
Maximum Green (s)	33.0	33.0		26.0	26.0		13.0	43.0		27.0	27.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		0.0	3.0		3.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		2.0	6.0		6.0	6.0	7.0	
Lead/Lag							Lag			Lead	Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	Yes	
Walk Time (s)	7.0	7.0		7.0	7.0			18.0		8.0	8.0	8.0	
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			12.0		12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	0	
Act Efft Green (s)	34.0	34.0					48.0	44.0		28.0	28.0	27.0	
Actuated g/C Ratio	0.38	0.38					0.53	0.49		0.31	0.31	0.30	
v/c Ratio	0.26	0.09					0.18	0.56		0.01	0.84	0.33	

Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 1

Lanes, Volumes, Timings
2: Erie Street & Wilkinson Drive

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Control Delay	21.2	6.2					13.5	19.4		22.0	45.2	5.9	
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	0.0	
Total Delay	21.2	6.2					13.5	19.4		22.0	45.2	5.9	
LOS	C	A					B	B		C	D	A	
Approach Delay		17.0						18.5			34.0		
Approach LOS		B						B			C		

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 43 (48%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 25.4

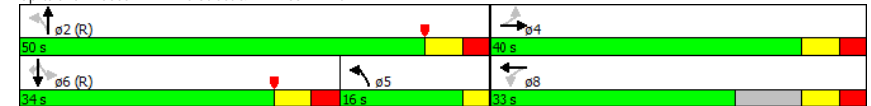
Intersection LOS: C

Intersection Capacity Utilization 74.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Erie Street & Wilkinson Drive



Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 2

Lanes, Volumes, Timings
5: Erie Street & Oak Street

6/25/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↗	↗	↖	↖	↖	↖	↗	↗	↖	↗	↖	
Volume (vph)	59	264	66	297	305	96	131	442	308	101	509	69	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	15.0		0.0	35.0			40.0	15.0		0.0	15.0		40.0
Storage Lanes	1		1	1		0	1		1	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	
Ped Bike Factor	1.00				0.99		1.00		0.98	1.00	1.00		
Frt			0.850		0.964				0.850		0.982		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1523	1695	1427	1658	3114	0	1537	1745	1483	1496	3078	0	
Flt Permitted	0.453			0.317			0.359			0.125			
Satd. Flow (perm)	726	1695	1427	553	3114	0	579	1745	1447	197	3078	0	
Right Turn on Red			Yes		Yes			Yes			Yes		
Satd. Flow (RTOR)			109		60			404			21		
Link Speed (k/h)		50			50			50			50		
Link Distance (m)		422.6			264.5			903.1			60.5		
Travel Time (s)		30.4			19.0			65.0			4.4		
Confl. Peds. (#/hr)	2					2	7		3	3		7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	11%	5%	6%	2%	2%	11%	10%	2%	2%	13%	8%	4%	
Adj. Flow (vph)	79	352	88	396	407	128	175	589	411	135	679	92	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	79	352	88	396	535	0	175	589	411	135	771	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	pm+pt	NA			
Protected Phases		4		3	8		2		1	6			
Permitted Phases	4		4	8		2		2	6				
Minimum Split (s)	35.0	35.0	35.0	10.0	45.0		35.0	35.0	35.0	10.0	45.0		
Total Split (s)	35.0	35.0	35.0	10.0	45.0		35.0	35.0	35.0	10.0	45.0		
Total Split (%)	38.9%	38.9%	38.9%	11.1%	50.0%		38.9%	38.9%	38.9%	11.1%	50.0%		
Maximum Green (s)	29.0	29.0	29.0	7.0	39.0		29.0	29.0	29.0	7.0	39.0		
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0	3.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	0.0	2.0		2.0	2.0	2.0	0.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0	0.0	1.0	-1.0		-1.0	-1.0	0.0	1.0	-1.0		
Total Lost Time (s)	5.0	5.0	6.0	4.0	5.0		5.0	5.0	6.0	4.0	5.0		
Lead/Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lag	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes				
Walk Time (s)	9.0	9.0	9.0		19.0		10.0	10.0	10.0		20.0		
Flash Dont Walk (s)	20.0	20.0	20.0		20.0		19.0	19.0	19.0		19.0		
Pedestrian Calls (#/hr)	0	0	0		0		0	0	0		0		

Lanes, Volumes, Timings
5: Erie Street & Oak Street

6/25/2013

	←	→	↖	↗	←	↖	↗	→	↖	↗	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effect Green (s)	30.0	30.0	29.0	41.0	40.0		30.0	30.0	29.0	41.0	40.0		
Actuated g/C Ratio	0.33	0.33	0.32	0.46	0.44		0.33	0.33	0.32	0.46	0.44		
v/c Ratio	0.33	0.62	0.17	1.22	0.38		0.91	1.01	0.56	0.77	0.56		
Control Delay	27.2	31.1	3.8	146.7	15.6		76.6	72.6	5.9	45.5	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	27.2	31.1	3.8	146.7	15.6		76.6	72.6	5.9	45.5	19.9		
LOS	C	C	A	F	B		E	E	A	D	B		
Approach Delay		25.9			71.3			49.9			23.7		
Approach LOS		C			E			D			C		

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 32 (36%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 45.3

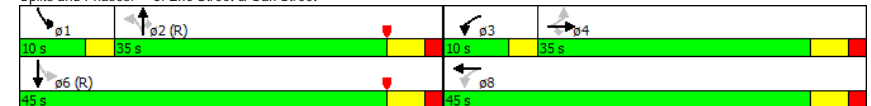
Intersection LOS: D

Intersection Capacity Utilization 98.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: Erie Street & Oak Street



Lanes, Volumes, Timings
7: Erie Street & Seaciff Drive

6/25/2013

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	53	146	55	9	142	114	76	66	6	77	54	42
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	15.0		0.0	15.0		30.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98	0.98					0.96
Frt		0.959				0.850		0.987				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1658	1522	0	1353	1391	1316	1523	1479	0	1433	1745	1401
Flt Permitted	0.391			0.594			0.710			0.693		
Satd. Flow (perm)	681	1522	0	846	1391	1296	1116	1479	0	1045	1745	1343
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		25			152			6			218	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		405.3			641.8			423.3			597.5	
Travel Time (s)		29.2			46.2			30.5			43.0	
Confl. Peds. (#/hr)	3					3	13					13
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Heavy Vehicles (%)	2%	16%	2%	25%	28%	15%	11%	19%	16%	18%	2%	8%
Adj. Flow (vph)	71	195	73	12	189	152	101	88	8	103	72	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	71	268	0	12	189	152	101	96	0	103	72	56
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	1		1	1	1	1	1		1	1	1
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		3	8	8	5	2		1	6	6
Switch Phase												

Lanes, Volumes, Timings
7: Erie Street & Seaciff Drive

6/25/2013

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	7.0		7.0	4.0	4.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	10.0	29.5		10.0	29.5	29.5	10.0	30.5		10.0	30.5	30.5
Total Split (s)	10.0	29.5		10.0	29.5	29.5	10.0	30.5		10.0	30.5	30.5
Total Split (%)	12.5%	36.9%		12.5%	36.9%	36.9%	12.5%	38.1%		12.5%	38.1%	38.1%
Maximum Green (s)	7.0	23.0		7.0	23.0	23.0	7.0	24.0		7.0	24.0	24.0
Yellow Time (s)	3.0	3.5		3.0	3.5	3.5	3.0	3.5		3.0	3.5	3.5
All-Red Time (s)	0.0	3.0		0.0	3.0	3.0	0.0	3.0		0.0	3.0	3.0
Lost Time Adjust (s)	1.0	-2.0		-2.0	-2.0	-2.0	2.0	-2.0		1.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.5		1.0	4.5	4.5	5.0	4.5		4.0	4.5	4.5
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	C-Max
Walk Time (s)		7.0			7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)		16.0			16.0	16.0		17.0			17.0	17.0
Pedestrian Calls (#/hr)		0			0	0		0			0	0
Act Effect Green (s)	24.9	24.4		24.0	18.4	18.4	40.0	35.8		42.0	35.9	35.9
Actuated g/C Ratio	0.31	0.30		0.30	0.23	0.23	0.50	0.45		0.52	0.45	0.45
v/c Ratio	0.25	0.56		0.04	0.59	0.37	0.17	0.14		0.18	0.09	0.08
Control Delay	20.3	25.0		18.9	34.4	6.7	12.3	17.3		9.7	14.0	0.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	20.3	25.0		18.9	34.4	6.7	12.3	17.3		9.7	14.0	0.4
LOS	C	C		B	C	A	B	B		A	B	A
Approach Delay		24.0			21.9			14.7			8.8	
Approach LOS		C			C			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 24 (30%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 18.6

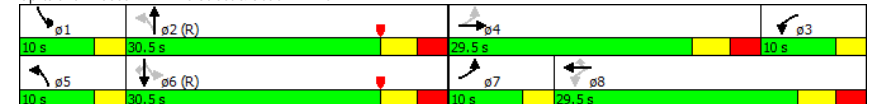
Intersection LOS: B

Intersection Capacity Utilization 50.6%

ICU Level of Service A




















Analysis Period (min) 15

Splits and Phases: 7: Erie Street & Seaciff Drive



Lanes, Volumes, Timings
10: Talbot Street & Oak Street

6/25/2013














												
Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	48	239	175	11	21	138	31	4	46	10	59	35
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		30.0		0.0	50.0			0.0		0.0		0.0
Storage Lanes		2		0	1			0		0		0
Taper Length (m)		7.5			7.5				7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99					0.99				0.97		
Frt			0.991			0.970				0.915		
Flt Protected	0.950	0.950			0.950					0.985		
Satd. Flow (prot)	1658	1353	1583	0	1537	1571	0	0	0	1502	0	0
Flt Permitted	0.569	0.950			0.629					0.985		
Satd. Flow (perm)	985	1353	1583	0	1018	1571	0	0	0	1502	0	0
Right Turn on Red			Yes				Yes				Yes	
Satd. Flow (RTOR)			3			1				11		
Link Speed (k/h)			60			50				48		
Link Distance (m)			699.6			1518.3				455.7		
Travel Time (s)			42.0			109.3				34.2		
Confl. Peds. (#/hr)	3						3				3	3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	25%	12%	2%	10%	11%	2%	2%	2%	4%	2%	10%
Adj. Flow (vph)	53	266	194	12	23	153	34	4	51	11	66	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	266	206	0	23	191	0	0	0	167	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(m)			7.0			7.0				0.0		
Link Offset(m)			0.0			0.0				0.0		
Crosswalk Width(m)			4.8			4.8				4.8		
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24	24		14	24		14	14	24		14	14
Turn Type	custom	Prot	NA		Perm	NA			Split	NA		
Protected Phases		2				4			7	7		
Permitted Phases	2		2		4							
Minimum Split (s)	31.0	31.0	31.0		27.0	27.0			24.0	24.0		
Total Split (s)	31.0	31.0	31.0		27.0	27.0			24.0	24.0		
Total Split (%)	26.1%	26.1%	26.1%		22.7%	22.7%			20.2%	20.2%		
Maximum Green (s)	23.0	23.0	23.0		18.0	18.0			19.0	19.0		
Yellow Time (s)	5.0	5.0	5.0		5.0	5.0			3.0	3.0		
All-Red Time (s)	3.0	3.0	3.0		4.0	4.0			2.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0				-1.0		
Total Lost Time (s)	7.0	7.0	7.0		8.0	8.0				4.0		
Lead/Lag									Lead	Lead		
Lead-Lag Optimize?									Yes	Yes		
Walk Time (s)	5.0	5.0	5.0		5.0	5.0			5.0	5.0		
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0			11.0	11.0		
Pedestrian Calls (#/hr)	0	0	0		0	0			0	0		
Act Effect Green (s)	34.0	34.0	34.0		19.0	19.0				20.0		

Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 7

Lanes, Volumes, Timings
10: Talbot Street & Oak Street

6/25/2013













								
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Volume (vph)	40	20	23	83	2	40	154	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)			0.0	10.0		75.0		0.0
Storage Lanes			0	1		1		0
Taper Length (m)			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.99					0.97
Frt				0.850				0.850
Flt Protected			0.965			0.950		
Satd. Flow (prot)	0	0	1668	1483	0	1503	1361	0
Flt Permitted			0.731			0.464		
Satd. Flow (perm)	0	0	1248	1483	0	734	1319	0
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)			174				138	
Link Speed (k/h)			48			80		
Link Distance (m)			66.4			1113.6		
Travel Time (s)			5.0			50.1		
Confl. Peds. (#/hr)	3	3						3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	2%	2%	2%	2%	13%	12%	2%
Adj. Flow (vph)	44	22	26	92	2	44	171	16
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	92	92	0	46	187	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(m)			0.0			3.5		
Link Offset(m)			0.0			0.0		
Crosswalk Width(m)			4.8			4.8		
Two way Left Turn Lane						Yes		
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24	24		14	24	24	14	14
Turn Type	Perm	Perm	NA	Perm	custom	NA	custom	
Protected Phases			8					
Permitted Phases	8	8		8	6	6	6	
Minimum Split (s)	27.0	27.0	27.0	27.0	31.0	31.0	31.0	
Total Split (s)	27.0	27.0	27.0	27.0	41.0	41.0	41.0	
Total Split (%)	22.7%	22.7%	22.7%	22.7%	34.5%	34.5%	34.5%	
Maximum Green (s)	23.0	23.0	23.0	23.0	33.0	33.0	33.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	5.0	5.0	5.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	3.0	3.0	3.0	
Lost Time Adjust (s)			-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)			2.0	2.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	
Act Effect Green (s)			25.0	25.0		35.0	35.0	

Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 8

Lanes, Volumes, Timings
10: Talbot Street & Oak Street

6/25/2013

												
Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Actuated g/C Ratio	0.29	0.29	0.29		0.16	0.16						0.17
v/c Ratio	0.19	0.69	0.45		0.14	0.76						0.64
Control Delay	34.4	48.5	38.2		45.6	67.7						55.3
Queue Delay	0.0	0.0	0.0		0.0	0.0						0.0
Total Delay	34.4	48.5	38.2		45.6	67.7						55.3
LOS	C	D	D		D	E						E
Approach Delay			43.0			65.4						55.3
Approach LOS			D			E						E

Intersection Summary

Area Type: Other

Cycle Length: 119

Actuated Cycle Length: 119

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 110

Control Type: Pretimed

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 40.8

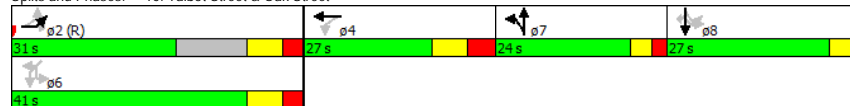
Intersection LOS: D

Intersection Capacity Utilization 88.7%

ICU Level of Service E








Analysis Period (min) 15

Splits and Phases: 10: Talbot Street & Oak Street



Lanes, Volumes, Timings
10: Talbot Street & Oak Street

6/25/2013

								
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Actuated g/C Ratio			0.21	0.21		0.29	0.29	
v/c Ratio			0.35	0.20		0.21	0.39	
Control Delay			44.6	1.0		35.0	12.5	
Queue Delay			0.0	0.0		0.0	0.0	
Total Delay			44.6	1.0		35.0	12.5	
LOS			D	A		C	B	
Approach Delay			22.8			16.9		
Approach LOS			C			B		

Intersection Summary

Lanes, Volumes, Timings

11: Lutsch Avenue & Talbot Street

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘	↙	
Volume (vph)	4	127	65	43	209	15	195	6	114	1	0	1	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	75.0		0.0	75.0		0.0	15.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	1		0	0		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	0.99		1.00	1.00		0.99	0.99				0.98	
Frt		0.949			0.990			0.857				0.932	
Flt Protected	0.950			0.950			0.950					0.976	
Satd. Flow (prot)	1483	1416	0	1658	1645	0	1483	1465	0	0	1562	0	
Flt Permitted	0.520			0.535			0.757					0.927	
Satd. Flow (perm)	810	1416	0	930	1645	0	1168	1465	0	0	1481	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		42			8			152				140	
Link Speed (k/h)		80			80			50				48	
Link Distance (m)		977.7			675.2			479.6				216.3	
Travel Time (s)		44.0			30.4			34.5				16.2	
Confl. Peds. (#/hr)	4		4	4		4	8		4	4		8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	14%	23%	9%	2%	6%	20%	14%	14%	2%	2%	50%	2%	
Adj. Flow (vph)	5	169	87	57	279	20	260	8	152	1	0	1	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	5	256	0	57	299	0	260	160	0	0	2	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5				3.5	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		4.8			4.8			4.8				4.8	
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA		
Protected Phases		2		1	6			8			4		
Permitted Phases	2			6			8			4			
Minimum Split (s)	30.0	30.0		10.0	41.0		29.0	29.0		29.0	29.0		
Total Split (s)	30.0	30.0		11.0	41.0		29.0	29.0		29.0	29.0		
Total Split (%)	42.9%	42.9%		15.7%	58.6%		41.4%	41.4%		41.4%	41.4%		
Maximum Green (s)	24.0	24.0		8.0	35.0		23.0	23.0		23.0	23.0		
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		
Total Lost Time (s)	4.0	4.0		1.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lead		Lag									
Lead-Lag Optimize?	Yes	Yes		Yes									
Walk Time (s)	9.0	9.0			20.0		8.0	8.0		8.0	8.0		
Flash Dont Walk (s)	15.0	15.0			15.0		15.0	15.0		15.0	15.0		
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0		

Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 11

Lanes, Volumes, Timings

11: Lutsch Avenue & Talbot Street

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effect Green (s)	26.0	26.0		40.0	37.0		25.0	25.0				25.0	
Actuated g/C Ratio	0.37	0.37		0.57	0.53		0.36	0.36				0.36	
v/c Ratio	0.02	0.46		0.09	0.34		0.62	0.26				0.00	
Control Delay	14.2	17.1		7.4	10.6		26.5	4.7				0.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0				0.0	
Total Delay	14.2	17.1		7.4	10.6		26.5	4.7				0.0	
LOS	B	B		A	B		C	A				A	
Approach Delay		17.1			10.1			18.2				0.0	
Approach LOS		B			B			B				A	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Pretimed

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 15.1

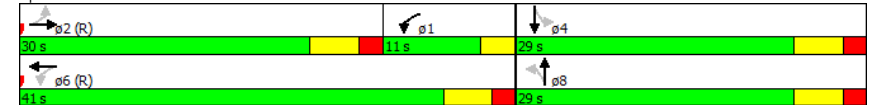
Intersection LOS: B

Intersection Capacity Utilization 67.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: Lutsch Avenue & Talbot Street



Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - A.M. Peak Hour
BDT

Synchro 8 Report
Page 12

Lanes, Volumes, Timings
2: Erie Street & Wilkinson Drive

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘	↙	
Volume (vph)	117	2	117	9	1	4	86	381	4	4	514	101	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00						0.98	0.99				0.95	
Frt		0.853			0.875			0.999				0.850	
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1610	1382	0	1658	1497	0	1626	1678	0	1658	1664	1414	
Flt Permitted	0.754			0.656			0.126			0.474			
Satd. Flow (perm)	1274	1382	0	1145	1497	0	214	1678	0	827	1664	1343	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		156			5			1				135	
Link Speed (k/h)		48			48			50				80	
Link Distance (m)		570.9			81.7			455.4				785.8	
Travel Time (s)		42.8			6.1			32.8				35.4	
Confl. Peds. (#/hr)	2					2	20					20	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	5%	2%	10%	2%	2%	2%	4%	6%	2%	2%	7%	7%	
Adj. Flow (vph)	156	3	156	12	1	5	115	508	5	5	685	135	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	156	159	0	12	6	0	115	513	0	5	685	135	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			7.0				7.0	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		4.8			4.8			4.8				4.8	
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm	
Protected Phases		4			8		5	2			6		
Permitted Phases	4			8			2			6		6	
Minimum Split (s)	32.0	32.0		32.0	32.0		10.0	50.0		34.0	34.0	34.0	
Total Split (s)	32.0	32.0		32.0	32.0		10.0	51.0		41.0	41.0	41.0	
Total Split (%)	38.6%	38.6%		38.6%	38.6%		12.0%	61.4%		49.4%	49.4%	49.4%	
Maximum Green (s)	25.0	25.0		25.0	25.0		7.0	44.0		34.0	34.0	34.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		0.0	3.0		3.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		2.0	6.0		6.0	6.0	7.0	
Lead/Lag							Lead			Lag	Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	Yes	
Walk Time (s)	7.0	7.0		7.0	7.0			31.0		15.0	15.0	15.0	
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			12.0		12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	0	
Act Effect Green (s)	26.0	26.0		26.0	26.0		49.0	45.0		35.0	35.0	34.0	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.59	0.54		0.42	0.42	0.41	
v/c Ratio	0.39	0.29		0.03	0.01		0.44	0.56		0.01	0.98	0.21	

Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
Page 1

Lanes, Volumes, Timings
2: Erie Street & Wilkinson Drive

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Control Delay	25.9	5.6		20.3	13.6		12.9	15.5		14.2	54.6	4.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Total Delay	25.9	5.6		20.3	13.6		12.9	15.5		14.2	54.6	4.0	
LOS	C	A		C	B		B	B		B	D	A	
Approach Delay		15.7			18.0			15.1			46.1		
Approach LOS		B			B			B			D		

Intersection Summary

Area Type: Other

Cycle Length: 83

Actuated Cycle Length: 83

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 85

Control Type: Pretimed

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 29.5

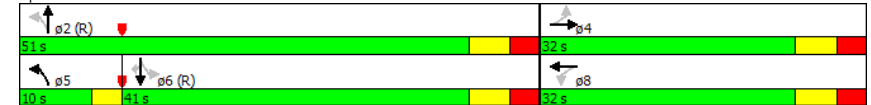
Intersection LOS: C

Intersection Capacity Utilization 74.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Erie Street & Wilkinson Drive



Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
Page 2

Lanes, Volumes, Timings
5: Erie Street & Oak Street

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	→	↘	↙	→	↘	↙	→	↘	↙	→	↘	
Volume (vph)	65	275	86	266	325	83	139	464	336	109	427	56	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	15.0		0.0	35.0		40.0	15.0		0.0	15.0		40.0	
Storage Lanes	1		1	1		0	1		1	1		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	
Ped Bike Factor	1.00				1.00		1.00		0.98		1.00		
Frt			0.850		0.969				0.850		0.983		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1523	1695	1427	1658	3142	0	1537	1745	1483	1496	3082	0	
Flt Permitted	0.449			0.274			0.407			0.125			
Satd. Flow (perm)	719	1695	1427	478	3142	0	656	1745	1447	197	3082	0	
Right Turn on Red			Yes		Yes			Yes			Yes		
Satd. Flow (RTOR)			115		45			396			21		
Link Speed (k/h)		50			50			50			50		
Link Distance (m)		422.6			264.5			903.1			61.1		
Travel Time (s)		30.4			19.0			65.0			4.4		
Confl. Peds. (#/hr)	2					2	7		3	3		7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	11%	5%	6%	2%	2%	11%	10%	2%	2%	13%	8%	4%	
Adj. Flow (vph)	87	367	115	355	433	111	185	619	448	145	569	75	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	87	367	115	355	544	0	185	619	448	145	644	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24			14	24			14	24			14	
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		
Protected Phases		4		3	8			2		1	6		
Permitted Phases	4		4	8			2		2	6			
Minimum Split (s)	33.0	33.0	33.0	11.0	44.0		34.0	34.0	34.0	11.0	46.0		
Total Split (s)	33.0	33.0	33.0	11.0	44.0		34.0	34.0	34.0	11.0	46.0		
Total Split (%)	36.7%	36.7%	36.7%	12.2%	48.9%		37.8%	37.8%	37.8%	12.2%	51.1%		
Maximum Green (s)	27.0	27.0	27.0	8.0	38.0		28.0	28.0	28.0	8.0	40.0		
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0	3.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	0.0	2.0		2.0	2.0	2.0	0.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0	0.0	1.0	-1.0		-1.0	-1.0	0.0	1.0	-1.0		
Total Lost Time (s)	5.0	5.0	6.0	4.0	5.0		5.0	5.0	6.0	4.0	5.0		
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes			
Walk Time (s)	7.0	7.0	7.0		18.0		9.0	9.0	9.0		21.0		
Flash Dont Walk (s)	20.0	20.0	20.0		20.0		19.0	19.0	19.0		19.0		
Pedestrian Calls (#/hr)	0	0	0		0		0	0	0		0		

Lanes, Volumes, Timings
5: Erie Street & Oak Street

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effct Green (s)	28.0	28.0	27.0	40.0	39.0		30.0	30.0	29.0	42.0	41.0		
Actuated g/C Ratio	0.31	0.31	0.30	0.44	0.43		0.33	0.33	0.32	0.47	0.46		
v/c Ratio	0.39	0.70	0.23	1.17	0.39		0.85	1.07	0.61	0.76	0.46		
Control Delay	30.7	35.5	6.0	128.8	16.9		62.7	87.1	8.2	41.3	17.5		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		
Total Delay	30.7	35.5	6.0	128.8	16.9		62.7	87.1	8.2	41.3	17.5		
LOS	C	D	A	F	B		E	F	A	D	B		
Approach Delay		28.8			61.1			55.2			21.9		
Approach LOS		C			E			E			C		

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 60 (67%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 100

Control Type: Pretimed

Maximum v/c Ratio: 1.17

Intersection Signal Delay: 44.9

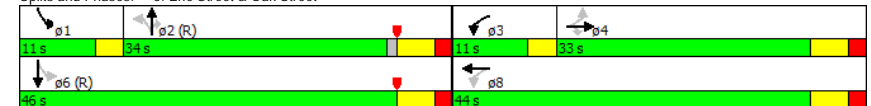
Intersection LOS: D

Intersection Capacity Utilization 97.3%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: Erie Street & Oak Street



Lanes, Volumes, Timings
7: Erie Street & Seaclyff Drive

6/25/2013

	←	→	↖	↗	←	↖	↗	↖	↗	←	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖		
Volume (vph)	97	211	70	10	220	185	64	94	19	212	119	142		
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800		
Storage Length (m)	15.0		0.0	15.0		30.0	15.0		0.0	25.0		0.0		
Storage Lanes	1		0	1		1	1		0	1		1		
Taper Length (m)	7.5			7.5			7.5			7.5				
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Ped Bike Factor	1.00					0.98	0.98					0.95		
Frt		0.963				0.850		0.975				0.850		
Flt Protected	0.950			0.950			0.950			0.950				
Satd. Flow (prot)	1658	1523	0	1353	1391	1316	1523	1465	0	1433	1745	1401		
Flt Permitted	0.266			0.511			0.577			0.598				
Satd. Flow (perm)	463	1523	0	728	1391	1295	906	1465	0	902	1745	1336		
Right Turn on Red		Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		19			200			10			189			
Link Speed (k/h)		50			50			50			50			
Link Distance (m)		405.3			641.8			423.3			597.5			
Travel Time (s)		29.2			46.2			30.5			43.0			
Confl. Peds. (#/hr)	3					3	13					13		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%		
Heavy Vehicles (%)	2%	16%	2%	25%	28%	15%	11%	19%	16%	18%	2%	8%		
Adj. Flow (vph)	129	281	93	13	293	247	85	125	25	283	159	189		
Shared Lane Traffic (%)														
Lane Group Flow (vph)	129	374	0	13	293	247	85	150	0	283	159	189		
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No		
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right		
Median Width(m)		3.5			3.5			3.5			3.5			
Link Offset(m)		0.0			0.0			0.0			0.0			
Crosswalk Width(m)		4.8			4.8			4.8			4.8			
Two way Left Turn Lane														
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09		
Turning Speed (k/h)	24		14	24		14	24		14	24		14		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm		
Protected Phases	7	4		3	8		5	2		1	6			
Permitted Phases	4			8		8	2			6		6		
Minimum Split (s)	21.0	40.5		10.0	29.5	29.5	19.0	30.5		19.0	30.5	30.5		
Total Split (s)	21.0	40.5		10.0	29.5	29.5	19.0	30.5		19.0	30.5	30.5		
Total Split (%)	21.0%	40.5%		10.0%	29.5%	29.5%	19.0%	30.5%		19.0%	30.5%	30.5%		
Maximum Green (s)	18.0	34.0		7.0	23.0	23.0	16.0	24.0		16.0	24.0	24.0		
Yellow Time (s)	3.0	3.5		3.0	3.5	3.5	3.0	3.5		3.0	3.5	3.5		
All-Red Time (s)	0.0	3.0		0.0	3.0	3.0	0.0	3.0		0.0	3.0	3.0		
Lost Time Adjust (s)	1.0	-2.0		-2.0	-2.0	-2.0	2.0	-2.0		1.0	-2.0	-2.0		
Total Lost Time (s)	4.0	4.5		1.0	4.5	4.5	5.0	4.5		4.0	4.5	4.5		
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag		
Lead-Lag Optimize?		Yes		Yes			Yes	Yes		Yes	Yes	Yes		
Walk Time (s)	7.0	7.0			7.0	7.0		7.0			7.0	7.0		
Flash Dont Walk (s)	10.0	16.0			16.0	16.0		17.0			17.0	17.0		
Pedestrian Calls (#/hr)	0	0			0	0		0			0	0		

Lanes, Volumes, Timings
7: Erie Street & Seaclyff Drive

6/25/2013

	←	→	↖	↗	←	↖	↗	↖	↗	←	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Act Effect Green (s)	46.5	36.0		37.5	25.0	25.0	39.5	26.0		41.5	26.0	26.0		
Actuated g/C Ratio	0.46	0.36		0.38	0.25	0.25	0.40	0.26		0.42	0.26	0.26		
v/c Ratio	0.31	0.67		0.04	0.84	0.52	0.19	0.39		0.62	0.35	0.39		
Control Delay	17.7	32.5		14.0	58.6	12.1	17.7	31.9		26.2	32.8	7.0		
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		
Total Delay	17.7	32.5		14.0	58.6	12.1	17.7	31.9		26.2	32.8	7.0		
LOS	B	C		B	E	B	B	C		C	C	A		
Approach Delay		28.7			36.8			26.7			22.1			
Approach LOS		C			D			C			C			

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 38 (38%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 100

Control Type: Pretimed

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 28.6

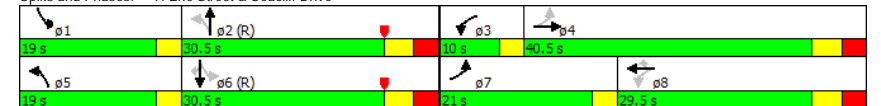
Intersection LOS: C

Intersection Capacity Utilization 66.8%

ICU Level of Service C



















Analysis Period (min) 15

Splits and Phases: 7: Erie Street & Seaclyff Drive



Lanes, Volumes, Timings
10: Talbot Street & Oak Street

6/25/2013













												
Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Volume (vph)	28	213	226	17	55	184	10	3	33	2	39	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		30.0		0.0	50.0				0.0			0.0
Storage Lanes		1		0	1			0			0	
Taper Length (m)		7.5			7.5				7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					1.00				0.97		
Frt			0.989			0.990				0.909		
Flt Protected	0.950	0.950			0.950					0.985		
Satd. Flow (prot)	1658	1353	1582	0	1537	1593	0	0	0	1482	0	0
Flt Permitted	0.370	0.950			0.593					0.985		
Satd. Flow (perm)	643	1353	1582	0	960	1593	0	0	0	1482	0	0
Right Turn on Red			Yes				Yes				Yes	
Satd. Flow (RTOR)			3			1				16		
Link Speed (k/h)			60			50				48		
Link Distance (m)			699.6			1505.2				455.7		
Travel Time (s)			42.0			108.4				34.2		
Confl. Peds. (#/hr)	3						3				3	3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	25%	12%	2%	10%	11%	2%	2%	2%	4%	2%	10%
Adj. Flow (vph)	31	237	251	19	61	204	11	3	37	2	43	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	31	237	270	0	61	218	0	0	0	119	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(m)			7.0			7.0				0.0		
Link Offset(m)			0.0			0.0				0.0		
Crosswalk Width(m)			4.8			4.8				4.8		
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24	24		14	24		14	14	24		14	14
Turn Type	custom	Prot	NA		Perm	NA			Split	NA		
Protected Phases		2				4			7	7		
Permitted Phases	2		2		4							
Minimum Split (s)	31.0	31.0	31.0		27.0	27.0			24.0	24.0		
Total Split (s)	39.0	39.0	39.0		29.0	29.0			24.0	24.0		
Total Split (%)	32.8%	32.8%	32.8%		24.4%	24.4%			20.2%	20.2%		
Maximum Green (s)	31.0	31.0	31.0		20.0	20.0			19.0	19.0		
Yellow Time (s)	5.0	5.0	5.0		5.0	5.0			3.0	3.0		
All-Red Time (s)	3.0	3.0	3.0		4.0	4.0			2.0	2.0		
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0				-1.0		
Total Lost Time (s)	7.0	7.0	7.0		8.0	8.0				4.0		
Lead/Lag									Lag	Lag		
Lead-Lag Optimize?									Yes	Yes		
Walk Time (s)	5.0	5.0	5.0		5.0	5.0			5.0	5.0		
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0			11.0	11.0		
Pedestrian Calls (#/hr)	0	0	0		0	0			0	0		
Act Effect Green (s)	32.0	32.0	32.0		21.0	21.0				20.0		

Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
Page 7

Lanes, Volumes, Timings
10: Talbot Street & Oak Street

6/25/2013













								
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Volume (vph)	29	17	7	22	2	61	272	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)			0.0	10.0		75.0		0.0
Storage Lanes			0	1		1	0	
Taper Length (m)						7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							0.97	
Frt				0.850			0.850	
Flt Protected			0.959			0.950		
Satd. Flow (prot)	0	0	1656	1483	0	1501	1355	0
Flt Permitted			0.458			0.493		
Satd. Flow (perm)	0	0	791	1483	0	779	1313	0
Right Turn on Red			Yes				Yes	
Satd. Flow (RTOR)				174			138	
Link Speed (k/h)				48		80		
Link Distance (m)			237.3			1094.2		
Travel Time (s)			17.8			49.2		
Confl. Peds. (#/hr)	3	3						3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	2%	2%	2%	2%	13%	12%	2%
Adj. Flow (vph)	32	19	8	24	2	68	302	10
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	59	24	0	70	312	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(m)			0.0			3.5		
Link Offset(m)			0.0			0.0		
Crosswalk Width(m)			4.8			4.8		
Two way Left Turn Lane						Yes		
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (k/h)	24	24		14	24	24	14	14
Turn Type	Perm	Perm	NA	Perm	custom	NA	custom	
Protected Phases			8					
Permitted Phases	8	8		8	6	6	6	
Minimum Split (s)	27.0	27.0	27.0	27.0	31.0	31.0	31.0	
Total Split (s)	27.0	27.0	27.0	27.0	39.0	39.0	39.0	
Total Split (%)	22.7%	22.7%	22.7%	22.7%	32.8%	32.8%	32.8%	
Maximum Green (s)	23.0	23.0	23.0	23.0	31.0	31.0	31.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	5.0	5.0	5.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	3.0	3.0	3.0	
Lost Time Adjust (s)			-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)			3.0	3.0		7.0	7.0	
Lead/Lag	Lead	Lead		Lead				
Lead-Lag Optimize?	Yes	Yes		Yes				
Walk Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	
Act Effect Green (s)			24.0	24.0		32.0	32.0	

Municipality of Leamington - Traffic Study 11/15/2005 Existing Conditions - P.M. Peak Hour
BDT

Synchro 8 Report
Page 8

Lanes, Volumes, Timings
10: Talbot Street & Oak Street

6/25/2013

												
Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Actuated g/C Ratio	0.27	0.27	0.27		0.18	0.18						0.17
v/c Ratio	0.18	0.65	0.63		0.36	0.78						0.45
Control Delay	36.9	48.3	45.6		50.1	66.1						44.7
Queue Delay	0.0	0.0	0.0		0.0	0.0						0.0
Total Delay	36.9	48.3	45.6		50.1	66.1						44.7
LOS	D	D	D		D	E				D		D
Approach Delay			46.3			62.6						44.7
Approach LOS			D			E						D

Intersection Summary

Area Type: Other

Cycle Length: 119

Actuated Cycle Length: 119

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 110

Control Type: Pretimed

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 44.8

Intersection LOS: D

Intersection Capacity Utilization 86.9%

ICU Level of Service E








Analysis Period (min) 15

Splits and Phases: 10: Talbot Street & Oak Street

 p2 (R)	 p4	 p8	 p7
39 s	29 s	27 s	24 s
 p6			
39 s			

Lanes, Volumes, Timings
10: Talbot Street & Oak Street

6/25/2013

								
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Actuated g/C Ratio			0.20	0.20		0.27	0.27	
v/c Ratio			0.37	0.05		0.33	0.69	
Control Delay			48.9	0.2		40.5	30.1	
Queue Delay			0.0	0.0		0.0	0.0	
Total Delay			48.9	0.2		40.5	30.1	
LOS			D	A		D	C	
Approach Delay			34.8			32.0		
Approach LOS			C			C		

Intersection Summary

Lanes, Volumes, Timings

11: Lutsch Avenue & Talbot Street

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘	↙	
Volume (vph)	2	333	105	154	321	2	74	3	134	14	2	9	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Storage Length (m)	75.0		0.0	75.0		0.0	15.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	1		0	0		0	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	0.99		1.00	1.00		0.99	0.98			0.99		
Frt		0.964			0.999			0.853			0.952		
Flt Protected	0.950			0.950			0.950				0.973		
Satd. Flow (prot)	1483	1425	0	1658	1676	0	1483	1462	0	0	1534	0	
Flt Permitted	0.512			0.181			0.735				0.840		
Satd. Flow (perm)	798	1425	0	315	1676	0	1134	1462	0	0	1322	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		27			1			179			12		
Link Speed (k/h)		80			80			50			48		
Link Distance (m)		977.7			675.2			479.6			216.3		
Travel Time (s)		44.0			30.4			34.5			16.2		
Confl. Peds. (#/hr)	4		4	4		4	8		4	4		8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	
Heavy Vehicles (%)	14%	23%	9%	2%	6%	20%	14%	14%	2%	2%	50%	2%	
Adj. Flow (vph)	3	444	140	205	428	3	99	4	179	19	3	12	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	3	584	0	205	431	0	99	183	0	0	34	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right	
Median Width(m)		3.5			3.5			3.5			3.5		
Link Offset(m)		0.0			0.0			0.0			0.0		
Crosswalk Width(m)		4.8			4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA		
Protected Phases		2		1	6			8			4		
Permitted Phases	2			6			8			4			
Minimum Split (s)	29.0	29.0		10.0	42.0		28.0	28.0		28.0	28.0		
Total Split (s)	32.0	32.0		10.0	42.0		28.0	28.0		28.0	28.0		
Total Split (%)	45.7%	45.7%		14.3%	60.0%		40.0%	40.0%		40.0%	40.0%		
Maximum Green (s)	26.0	26.0		7.0	36.0		22.0	22.0		22.0	22.0		
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		
Total Lost Time (s)	4.0	4.0		1.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lag	Lag		Lead									
Lead-Lag Optimize?	Yes	Yes		Yes									
Walk Time (s)	8.0	8.0			21.0		7.0	7.0		7.0	7.0		
Flash Dont Walk (s)	15.0	15.0			15.0		15.0	15.0		15.0	15.0		
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0		

Lanes, Volumes, Timings

11: Lutsch Avenue & Talbot Street

6/25/2013

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Act Effect Green (s)	28.0	28.0		41.0	38.0		24.0	24.0		24.0	24.0		
Actuated g/C Ratio	0.40	0.40		0.59	0.54		0.34	0.34		0.34	0.34		
v/c Ratio	0.01	1.00		0.57	0.47		0.26	0.30		0.26	0.07		
Control Delay	13.0	59.6		14.2	12.0		18.8	4.6		12.1			
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0			
Total Delay	13.0	59.6		14.2	12.0		18.8	4.6		12.1			
LOS	B	E		B	B		B	A		B			
Approach Delay		59.4			12.7			9.6			12.1		
Approach LOS		E			B			A			B		

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green, Master Intersection

Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 29.9

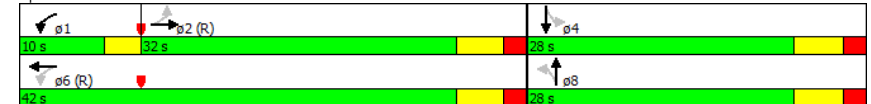
Intersection LOS: C

Intersection Capacity Utilization 69.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: Lutsch Avenue & Talbot Street



Appendix F

Signal Warrant Worksheets

PROJECTED TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

Minimum warrants for installation of traffic signal for roadways with two or more lanes per **OTM Book 12 Sec 4.10**

*NOTES: Does not consider pedestrian crossing volumes, which need to be added where appropriate and available

Only Projected Warrants can be conducted with Peak Hour counts; remaining warrants require 8 hours

Major Street: North-South Erie Street
 Minor Street: East-West Marlborough Street
 Comments: Existing

Analyst: Peter Y
 Date: 23-Apr-13
 Project No.: 16-12109.JWG

FREE FLOW OR RESTRICTED CONDITIONS (FF or RES): RES

FREE FLOW CONDITIONS (RURAL)

RESTRICTED FLOW CONDITIONS (URBAN)

Major Street Approach Lanes:
 Three or four legged intersection (3 or 4)

Future Condition (YES or NO):

New Intersection (YES or NO):

Intersection ID

Source Data Table AM

Source Data Table PM

1

4

YES

NO

20

Data AM 10

Data PM 10

Locked for Projected Signal Warrant Analysis

Locked for Projected Signal Warrant Analysis

WARRANT 1

ALL APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	666	1085							
Minimum: 864									
100% FULFILLED	0	1	0	0	0	0	0	0	1
Minimum: 690									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.77		-	-	-	-	-	-	0.77

Sectional Percentage 1.77
89%

MINOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	57	61							
Minimum: 204									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 162									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.28	0.30	-	-	-	-	-	-	0.58

Sectional Percentage 0.58

Entire Warrant 1 Percentage 29%
29%

WARRANT 2

MAJOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	608	1024							
Minimum: 864									
100% FULFILLED	0	1	0	0	0	0	0	0	1
Minimum: 690									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.70		-	-	-	-	-	-	0.70

Sectional Percentage 1.70
85%

TRAFFIC CROSSING MAJOR STREET

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	33	30							
Minimum: 90									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 72									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.37	0.33	-	-	-	-	-	-	0.70

Sectional Percentage 0.70
35%

Entire Warrant 2 Percentage 35%

ARE SIGNALS WARRANTED AT THIS INTERSECTION?: NO

PROJECTED TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

Minimum warrants for installation of traffic signal for roadways with two or more lanes per **OTM Book 12 Sec 4.10**

*NOTES: Does not consider pedestrian crossing volumes, which need to be added where appropriate and available

Only Projected Warrants can be conducted with Peak Hour counts; remaining warrants require 8 hours

Major Street: North-South Erie Street
 Minor Street: East-West Clark Street
 Comments: Existing

Analyst: Peter Y
 Date: 23-Apr-13
 Project No.: 16-12109.JWG

FREE FLOW OR RESTRICTED CONDITIONS (FF or RES): RES

FREE FLOW CONDITIONS (RURAL)

RESTRICTED FLOW CONDITIONS (URBAN)

Major Street Approach Lanes: 1
 Three or four legged intersection (3 or 4) 4

Future Condition (YES or NO): YES

Locked for Projected Signal Warrant Analysis

New Intersection (YES or NO): NO

Locked for Projected Signal Warrant Analysis

Intersection ID 17

Source Data Table AM Data AM 10

Source Data Table PM Data PM 10

WARRANT 1

ALL APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	683	915							
Minimum: 864									
100% FULFILLED	0	1	0	0	0	0	0	0	1
Minimum: 690									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.79		-	-	-	-	-	-	0.79

Sectional Percentage 1.79 90%

MINOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	44	80							
Minimum: 204									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 162									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.22	0.39	-	-	-	-	-	-	0.61

Sectional Percentage 0.61 30%

Entire Warrant 1 Percentage 30%

WARRANT 2

MAJOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	639	835							
Minimum: 864									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 690									
80% FULFILLED	0	1	0	0	0	0	0	0	0.8
Actual if Below 80% Value	0.74		-	-	-	-	-	-	0.74

Sectional Percentage 1.54 77%

TRAFFIC CROSSING MAJOR STREET

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	13	38							
Minimum: 90									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 72									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.14	0.42	-	-	-	-	-	-	0.57

Sectional Percentage 0.57 28%

Entire Warrant 2 Percentage 28%

ARE SIGNALS WARRANTED AT THIS INTERSECTION?: NO

PROJECTED TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

Minimum warrants for installation of traffic signal for roadways with two or more lanes per **OTM Book 12 Sec 4.10**

*NOTES: Does not consider pedestrian crossing volumes, which need to be added where appropriate and available

Only Projected Warrants can be conducted with Peak Hour counts; remaining warrants require 8 hours

Major Street: East-West Oak Street
 Minor Street: North-South Danforth Avenue
 Comments: Existing

Analyst: Peter Y
 Date: 23-Apr-13
 Project No.: 16-12109.JWG

FREE FLOW OR RESTRICTED CONDITIONS (FF or RES): RES

FREE FLOW CONDITIONS (RURAL)

RESTRICTED FLOW CONDITIONS (URBAN)

Major Street Approach Lanes:
 Three or four legged intersection (3 or 4)

Future Condition (YES or NO):

New Intersection (YES or NO):

Intersection ID

Source Data Table AM

Source Data Table PM

1

3

YES

NO

25

Data AM 10

Data PM 10

Locked for Projected Signal Warrant Analysis

Locked for Projected Signal Warrant Analysis

WARRANT 1

ALL APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	914	1037							
Minimum: 864									
100% FULFILLED	1	1	0	0	0	0	0	0	2
Minimum: 690									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value			-	-	-	-	-	-	-

2.00

Sectional Percentage 100%

MINOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	105	66							
Minimum: 306									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 243									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.34	0.22	-	-	-	-	-	-	0.56

0.56

Sectional Percentage 28%

Entire Warrant 1 Percentage 28%

WARRANT 2

MAJOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	810	971							
Minimum: 864									
100% FULFILLED	0	1	0	0	0	0	0	0	1
Minimum: 690									
80% FULFILLED	1	0	0	0	0	0	0	0	0.8
Actual if Below 80% Value			-	-	-	-	-	-	-

1.80

Sectional Percentage 90%

TRAFFIC CROSSING MAJOR STREET

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	53	32							
Minimum: 90									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 72									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.59	0.36	-	-	-	-	-	-	0.94

0.94

Sectional Percentage 47%

Entire Warrant 2 Percentage 47%

ARE SIGNALS WARRANTED AT THIS INTERSECTION?: NO

PROJECTED TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

Minimum warrants for installation of traffic signal for roadways with two or more lanes per **OTM Book 12 Sec 4.10**

*NOTES: Does not consider pedestrian crossing volumes, which need to be added where appropriate and available

Only Projected Warrants can be conducted with Peak Hour counts; remaining warrants require 8 hours

Major Street: East-West Seadiff Drive
 Minor Street: North-South Sherk Street
 Comments: Existing

Analyst: Peter Y
 Date: 23-Apr-13
 Project No.: 16-12109.JWG

FREE FLOW OR RESTRICTED CONDITIONS (FF or RES): RES

FREE FLOW CONDITIONS (RURAL)

RESTRICTED FLOW CONDITIONS (URBAN)

Major Street Approach Lanes:

Three or four legged intersection (3 or 4)

Future Condition (YES or NO):

New Intersection (YES or NO):

Intersection ID

Source Data Table AM

Source Data Table PM

1

3

YES

NO

28

Data AM 10

Data PM 10

Locked for Projected Signal Warrant Analysis

Locked for Projected Signal Warrant Analysis

WARRANT 1

ALL APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	778	997							
Minimum: 864									
100% FULFILLED	0	1	0	0	0	0	0	0	1
Minimum: 690									
80% FULFILLED	1	0	0	0	0	0	0	0	0.8
Actual if Below 80% Value			-	-	-	-	-	-	-

1.80

Sectional Percentage 90%

MINOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	133	221							
Minimum: 306									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 243									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.43	0.72	-	-	-	-	-	-	1.16

1.16

Sectional Percentage 58%

Entire Warrant 1 Percentage 58%

WARRANT 2

MAJOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	645	776							
Minimum: 864									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 690									
80% FULFILLED	0	1	0	0	0	0	0	0	0.8
Actual if Below 80% Value	0.75		-	-	-	-	-	-	0.75

1.55

Sectional Percentage 77%

TRAFFIC CROSSING MAJOR STREET

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	68	103							
Minimum: 90									
100% FULFILLED	0	1	0	0	0	0	0	0	1
Minimum: 72									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.76		-	-	-	-	-	-	0.76

1.76

Sectional Percentage 88%

Entire Warrant 2 Percentage 77%

ARE SIGNALS WARRANTED AT THIS INTERSECTION?: NO

PROJECTED TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

Minimum warrants for installation of traffic signal for roadways with two or more lanes per **OTM Book 12 Sec 4.10**

*NOTES: Does not consider pedestrian crossing volumes, which need to be added where appropriate and available

Only Projected Warrants can be conducted with Peak Hour counts; remaining warrants require 8 hours

Major Street: East-West Oak Street Analyst: Peter Y
 Minor Street: North-South Lutsch Avenue Date: 23-Apr-13
 Comments: Existing Project No.: 16-12109.JWG

FREE FLOW OR RESTRICTED CONDITIONS (FF or RES): RES

FREE FLOW CONDITIONS (RURAL)

RESTRICTED FLOW CONDITIONS (URBAN)

Major Street Approach Lanes: 1
 Three or four legged intersection (3 or 4) 3
 Future Condition (YES or NO): YES Locked for Projected Signal Warrant Analysis
 New Intersection (YES or NO): NO Locked for Projected Signal Warrant Analysis
 Intersection ID 29
 Source Data Table AM Data AM 10
 Source Data Table PM Data PM 10

WARRANT 1

ALL APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOUR ENDING	AM PEAK	PM PEAK							
Volumes	812	1014							
Minimum: 864									
100% FULFILLED	0	1	0	0	0	0	0	0	1
Minimum: 690									
80% FULFILLED	1	0	0	0	0	0	0	0	0.8
Actual if Below 80% Value			-	-	-	-	-	-	-

Sectional Percentage 1.80
90%

MINOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOUR ENDING	AM PEAK	PM PEAK							
Volumes	140	180							
Minimum: 306									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 243									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.46	0.59	-	-	-	-	-	-	1.05

Sectional Percentage 1.05

Entire Warrant 1 Percentage 52%

WARRANT 2

MAJOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOUR ENDING	AM PEAK	PM PEAK							
Volumes	672	834							
Minimum: 864									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 690									
80% FULFILLED	0	1	0	0	0	0	0	0	0.8
Actual if Below 80% Value	0.78		-	-	-	-	-	-	0.78

Sectional Percentage 1.58
79%

TRAFFIC CROSSING MAJOR STREET

	PERCENTAGE WARRANT								TOTAL
HOUR ENDING	AM PEAK	PM PEAK							
Volumes	28	63							
Minimum: 90									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 72									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.31	0.70	-	-	-	-	-	-	1.01

Sectional Percentage 1.01

Entire Warrant 2 Percentage 51%

ARE SIGNALS WARRANTED AT THIS INTERSECTION?: NO

PROJECTED TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

Minimum warrants for installation of traffic signal for roadways with two or more lanes per **OTM Book 12 Sec 4.10**

*NOTES: Does not consider pedestrian crossing volumes, which need to be added where appropriate and available

Only Projected Warrants can be conducted with Peak Hour counts; remaining warrants require 8 hours

Major Street: East-West Oak Street
 Minor Street: North-South Wigle Street
 Comments: Existing

Analyst: Peter Y
 Date: 23-Apr-13
 Project No.: 16-12109.JWG

FREE FLOW OR RESTRICTED CONDITIONS (FF or RES): RES

FREE FLOW CONDITIONS (RURAL)

RESTRICTED FLOW CONDITIONS (URBAN)

Major Street Approach Lanes:
 Three or four legged intersection (3 or 4)

Future Condition (YES or NO):

New Intersection (YES or NO):

Intersection ID

Source Data Table AM

Source Data Table PM

1
4
YES
NO
24
Data AM 10
Data PM 10

Locked for Projected Signal Warrant Analysis

Locked for Projected Signal Warrant Analysis

WARRANT 1

ALL APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	840	1025							
Minimum: 864									
100% FULFILLED	0	1	0	0	0	0	0	0	1
Minimum: 690									
80% FULFILLED	1	0	0	0	0	0	0	0	0.8
Actual if Below 80% Value			-	-	-	-	-	-	-

Sectional Percentage 1.80
 90%

MINOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	92	146							
Minimum: 204									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 162									
80% FULFILLED	0	0	0	0	0	0	0	0	0
Actual if Below 80% Value	0.45	0.72	-	-	-	-	-	-	1.17

Sectional Percentage 1.17
 59%
 Entire Warrant 1 Percentage 59%

WARRANT 2

MAJOR STREET BOTH APPROACHES

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	748	879							
Minimum: 864									
100% FULFILLED	0	1	0	0	0	0	0	0	1
Minimum: 690									
80% FULFILLED	1	0	0	0	0	0	0	0	0.8
Actual if Below 80% Value			-	-	-	-	-	-	-

Sectional Percentage 1.80
 90%

TRAFFIC CROSSING MAJOR STREET

	PERCENTAGE WARRANT								TOTAL
HOURLY ENDING	AM PEAK	PM PEAK							
Volumes	27	81							
Minimum: 90									
100% FULFILLED	0	0	0	0	0	0	0	0	0
Minimum: 72									
80% FULFILLED	0	1	0	0	0	0	0	0	0.8
Actual if Below 80% Value	0.30		-	-	-	-	-	-	0.30

Sectional Percentage 1.10
 55%
 Entire Warrant 2 Percentage 55%

ARE SIGNALS WARRANTED AT THIS INTERSECTION?: NO