

# Transportation Impact Study

## PROPOSED MIXED-USE DEVELOPMENT

392-412 Wilson Street East  
CITY OF HAMILTON, ONTARIO

December 2024  
Project No: NT-20-089

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**nexttrans**  
CONSULTING ENGINEERS

NextEng Consulting Group Inc.

December 19, 2024  
Wilson St. Ancaster Inc.

**Attention: Spencer McKay**

Urban Solutions  
3 Studebaker Place, Unit 1  
Hamilton, ON L8L 0C8

**Re: Transportation Impact Study  
Proposed Mixed-use Development  
392-412 Wilson Street East, City of Hamilton  
Our Project No. NT-20-089**

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Nexttrans Consulting Engineers (a Division of NextEng Consulting Group Inc.) is pleased to present the enclosed Transportation Impact Study for the above-noted site in support of the Urban Hamilton Official Plan Application for the proposed mixed-use development.

The subject site is located at 392-412 Wilson Street E, southeast corner of Wilson Street E and Academy Street, in the City of Hamilton. The development proposal consists of an 8-storey mixed-use building with a total of 118 residential units and 1,475.2 m<sup>2</sup> of retail gross floor area on the related ground floor. The proposed development is proposing full movement access via Academy Street to accommodate the proposed development. The proposed development will provide a total of 270 vehicle parking spaces and 190 bicycle parking spaces.

The transportation impact study concludes that the proposed development can adequately be accommodated by the existing transportation network, existing Hamilton Transit service, as well as the recommended Transportation Demand Management measures and incentives recommended in this report.

We trust the enclosed sufficiently addresses your needs. Should you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

**Nexttrans Consulting Engineers**

A Division of NextEng Consulting Group Inc.

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**Report Submission Record**

Identification	Date	Description of issued and/or revision
Final Report	December 19, 2024	For Project Team Submission

## EXECUTIVE SUMMARY

Nextrans Consulting Engineers (A Division of NextEng Consulting Group Inc.) was retained by Wilson St. Ancaster Inc. (the 'Client') to undertake a Transportation Impact Study in support of Urban Hamilton Official Plan Application for a proposed mixed-use residential development. The subject site is located at 392-412 Wilson Street E, southeast corner of Wilson Street E and Academy Street, in the City of Hamilton.

### Proposed Development

Currently, the subject land is occupied by a two-story building. The proposed development consists of an 8-storey mixed-use building with 118 residential dwelling units and 1,475.2 m<sup>2</sup> GFA of retail on the related ground floor.

### Proposed Development Access

The proposed development is proposing one full movement via Academy Street.

Based on the findings of this Study and Nextrans' assessment, the proposed access arrangement is reasonable and acceptable as it is optimized for the developable lands and consistent with the context of the area. The analysis indicates that the proposed access is expected to operate at acceptable levels of service with minimum queues and delays.

### Capacity Analysis

The proposed development is expected to generate 81 total two-way trips (32 inbound and 49 outbound) and 150 total two-way trips (80 inbound and 70 outbound) during the morning and afternoon peak hours, respectively.

### ***Auto Mode Assessment***

Under the existing traffic conditions, the analysis indicates that all the intersections considered are currently operating at acceptable levels of service. No improvements are required at this time.

Under the future background traffic conditions, the intersection capacity analysis indicates that all the intersections considered are expected to operate at acceptable levels of service, except the southbound through movement at the Wilson Street E and Old Dundas Road/Rousseaux Street intersection due to high traffic demand.

Under the future total conditions, similar to the existing and future background conditions, all intersections considered are expected to operate at acceptable levels of service, except the northbound through movement at the Wilson Street E and Old Dundas Road/Rousseaux Street intersection. This is due to the heavy northbound movement/demand.

To address this critical movement, Nextrans has optimized the signal timing for this intersection. Based on the analysis, it is indicated that the intersection would improve with a slightly longer cycle length (from 110 to 120) with the additional green time allocated to the northbound movement during the afternoon peak hour. It is recommended that the City monitor this intersection in the future and optimize the signal timing plan as required at that time. It is Nextrans' opinion that no physical improvements are required for this intersection under this horizon.

### ***Active Transportation Mode Assessment***

#### **Walking**

Sidewalks are currently provided along both sides of Wilson Street E along the frontage of the proposed development. Sidewalks are also available on the north side of Academy Street.

As part of this proposed development, it is recommended that the existing sidewalk on the south side of Academy Street be maintained or enhanced if appropriate. Sidewalks should also be provided along the internal private accesses to

facilitate pedestrian movements. The proposed building's main entrance should be provided directly onto Wilson Street E and Academy Street, where appropriate.

## **Cycling**

Currently, there is an un-signed bike route along Wilson Street E from Halson Street and Rousseaux Street, and designated bike lanes along Wilson Street E from Halson Street to the south and Rousseaux Street to the north. There are unsigned bicycle routes along Sulphur Springs Road/ Church Street and other collector and local streets in the area. There are also multi-use trails in the area.

It is Nexttrans' opinion that the cycling network in the area could be improved in the future, especially along Wilson Street E, to encourage more cycling trips to and from this area. These cycling facilities can be implemented as part of the future capital projects by the City of Hamilton. These facilities are beyond the scope of this Study.

## ***Transit Mode Assessment***

If a 10% transit modal split is applied to the site trip generation, the proposed development is expected to generate 8 two-way transit trips (3 inbound and 5 outbound) and 15 two-way transit trips (8 inbound and 7 outbound) during the morning and afternoon peak hours, respectively.

The proposed development is located adjacent to the existing transit stops located at the Wilson Street E and Academy Street intersection for the HSR Transit Bus Routes 16 Ancaster, and about 350m to the HSR Transit Bus Route 5 Delaware.

The analysis indicates that the transit passenger demands generated by the proposed development per transit vehicle are very low (at most 8 passengers per transit vehicle). As such, the proposed development impact on transit service is negligible and no improvements are required. In reality, some passengers could be bunched together during the peak 15 minutes, instead of spreading during the entire peak hour. Even if this is the case, our estimates indicate that the demand per vehicle is extremely low and can be accommodated without the need for additional transit vehicles or improvements during both the morning and afternoon peak periods.

## **Vehicle/Bicycle Parking Review**

Based on the City's By-Law No. 05-200, a total of 234 parking spaces (including retail, resident, and visitor parking spaces) are required for the proposed development. It is our understanding that the proposed development will provide a total of 270 parking spaces which meets the requirement.

Based on the City's By-Law No. 05-200, a total of 61 bicycle long-term spaces and 8 bicycle short-term spaces are required for the proposed development. It is our understanding that the proposed development will provide a total of 190 bicycle parking spaces which meets the requirement.

## **Transportation Demand Management Measures and Incentives**

The Report identifies and recommends appropriate Transportation Demand Management measures and incentives to support active transportation and transit, to meet the objectives and requirements in the City of Hamilton's TDM for Development Report (June, 2015).

## **Loading Requirement**

The proposed development will provide one loading space. Turning movement templates for servicing and passenger vehicles can be provide at the site plan stage.

## **Study Conclusions and Recommendations**

Based on the findings and conclusions of this study, the following recommendations are provided:

- The proposed development implements the TDM measures and incentives identified in this report to support active transportation and transit and to reduce the numbers of single-occupant-vehicle trips to and from the proposed development;
- The signal timing for Wilson Street E and Old Dundas Road/Rousseaux Street intersection should be optimized due to heavy northbound movement/demand.
- No additional physical improvements for the area at this time to accommodate the proposed development, under the future background and future total conditions.

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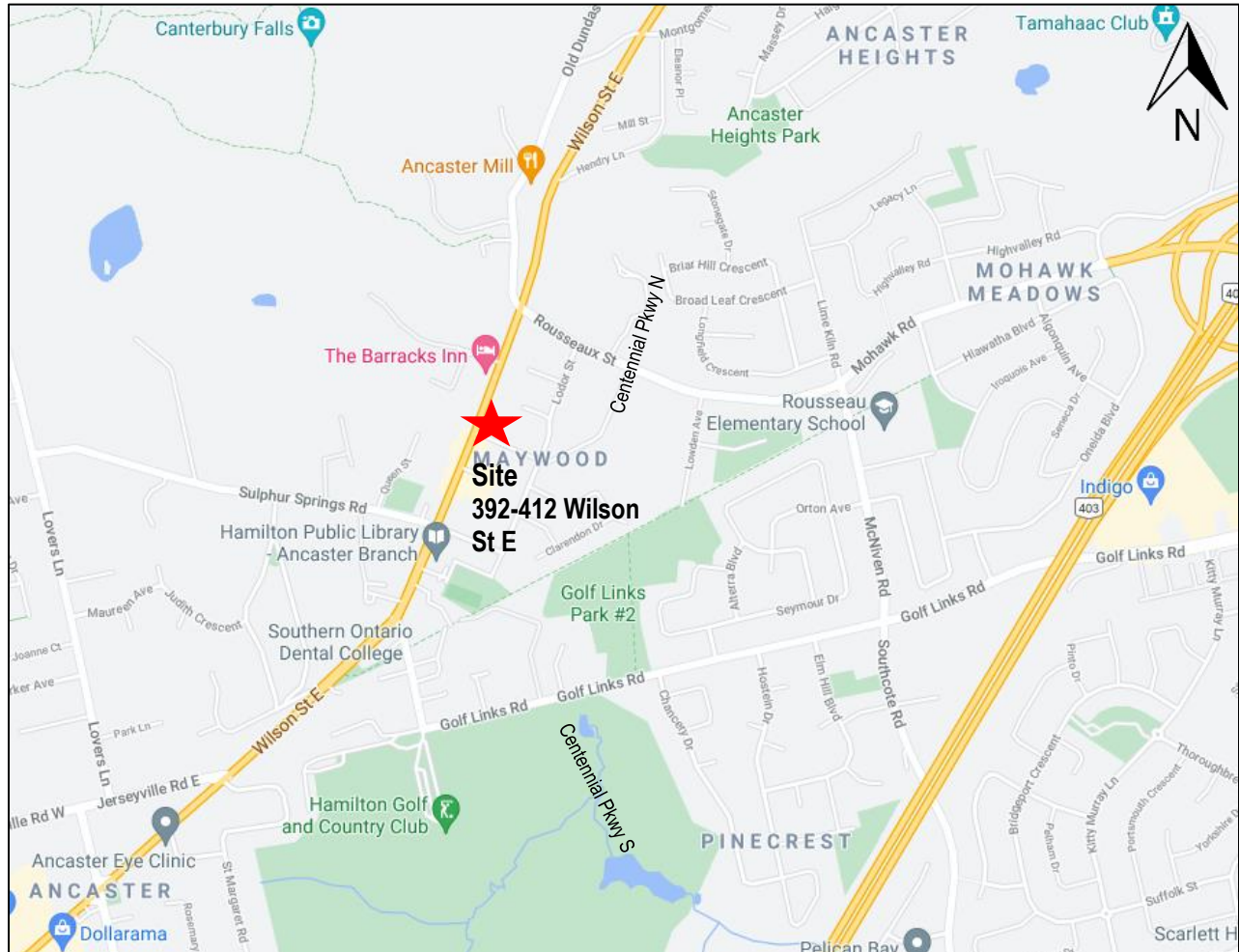
- Appendix A – Existing Traffic Data
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## 1.0 INTRODUCTION

Nextrans Consulting Engineers (A Division of NextEng Consulting Group Inc.) was retained by Wilson St. Ancaster Inc. (the 'Client') to undertake a Transportation Impact Study in support of Urban Hamilton Official Plan Amendment and Zoning By-law Amendment Applications for a proposed mixed-use residential development. The subject site is located at 392-412 Wilson Street E, southeast corner of Wilson Street E and Academy Street, in the City of Hamilton.

The location of the proposed development is illustrated in **Figure 1**.

**Figure 1 – Proposed Development Location**



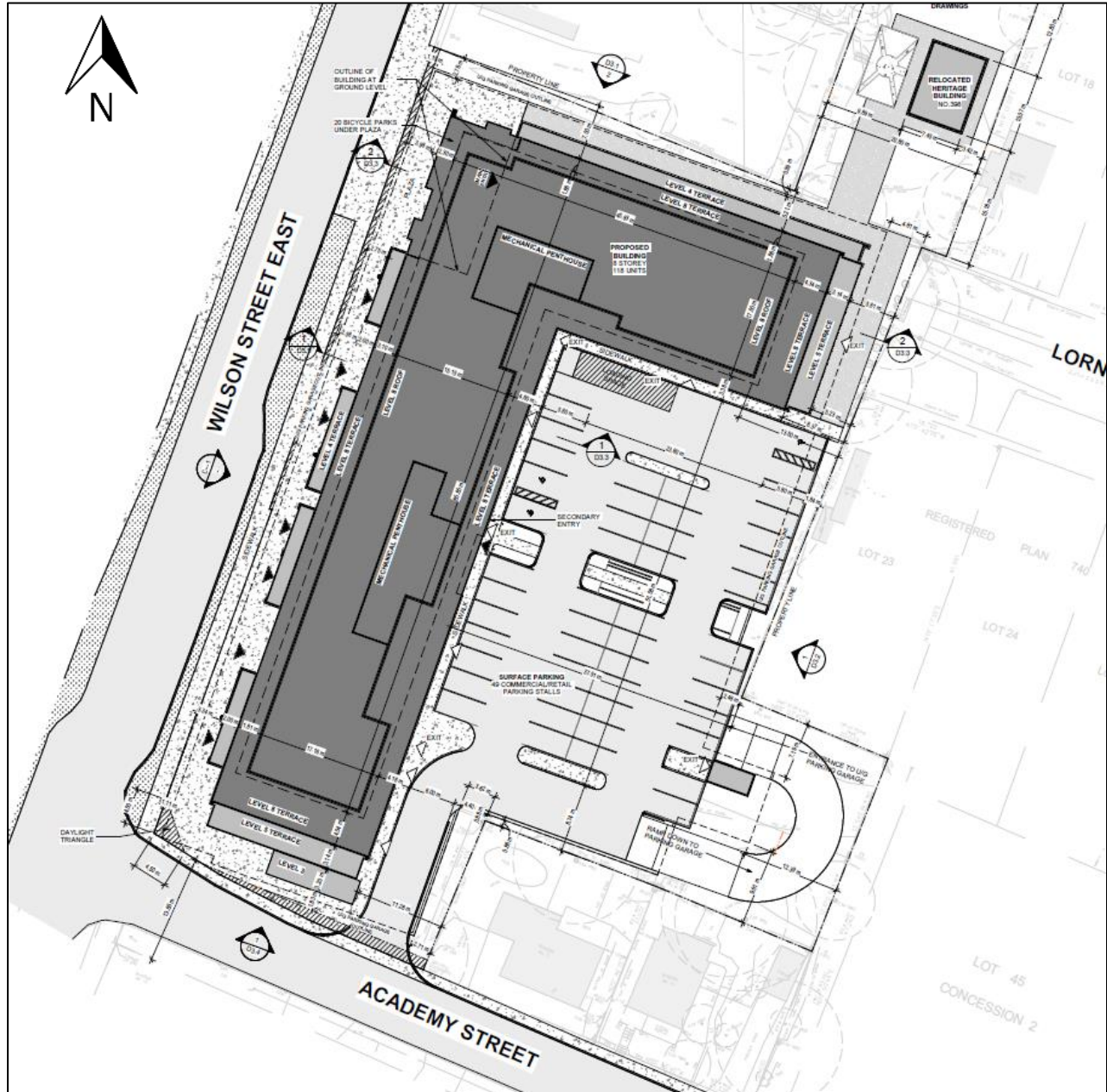
Source: Google Map

Currently, the subject land is occupied by a two-story building and a parking lot to the south and vacant to the north. The proposed development consists of 118 residential dwelling units and 1,475.2 m<sup>2</sup> of ground-related retail gross floor area.

The proposed development will provide 270 vehicle parking spaces and 190 bicycle parking spaces. The proposed site plan is illustrated in Figure 2.

The proposed development is proposing full movement access via Academy Street.

Figure 2 – Proposed Site Plan



## 2.0 EXISTING TRAFFIC CONDITIONS

### 2.1. Existing Road Network

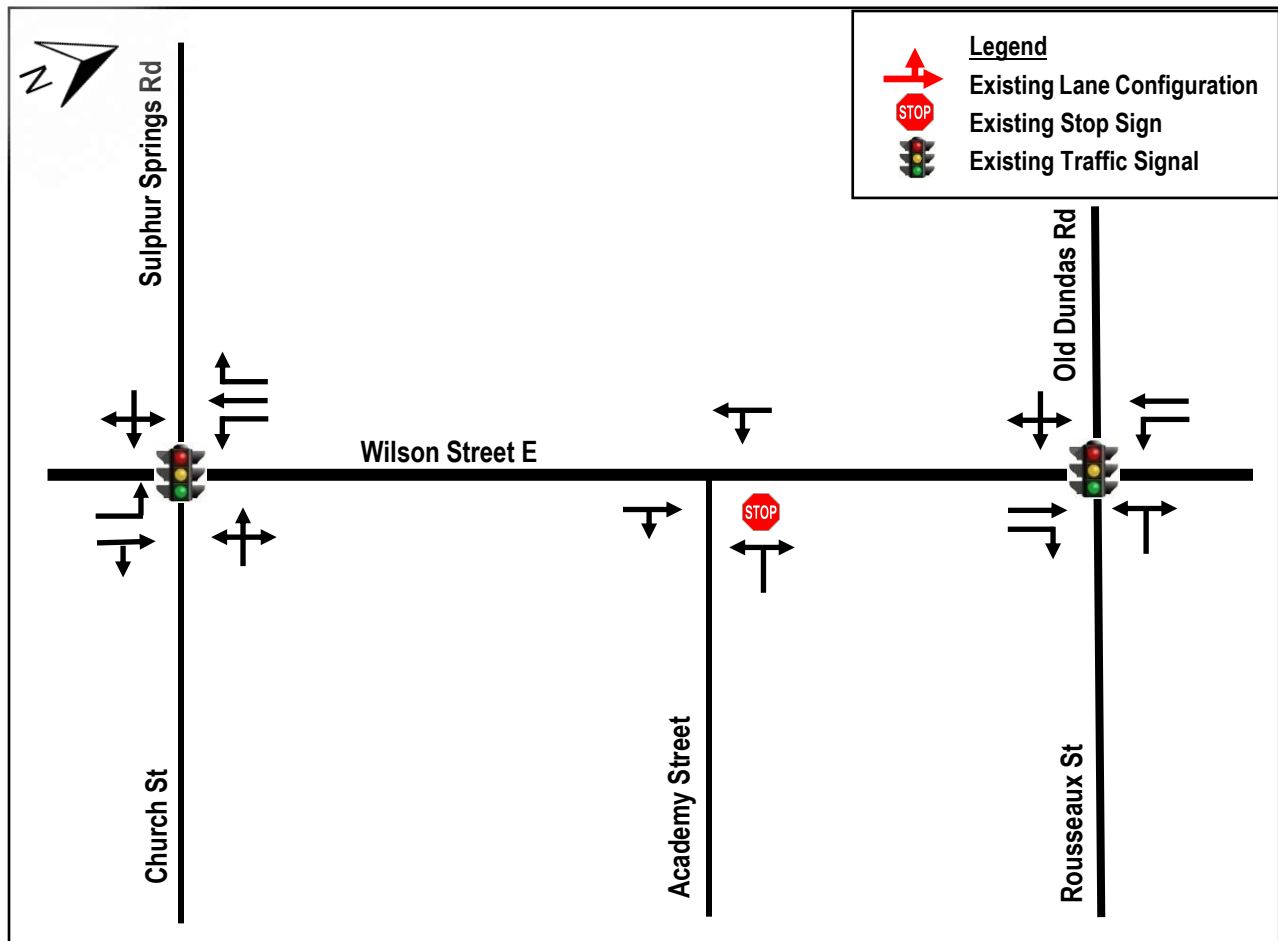
As indicated, the subject site is located at 392-412 Wilson Street E, southeast corner of Wilson Street E and Academy Street, in the City of Hamilton. The description of the existing road network in the study area is summarized in **Table 1** below.

**Table 1 – Summary of the Existing Road Network in the Study Area**

Road Name	Jurisdiction	Number of Lanes	Speed	Road Type	Sidewalk/Cycling
Wilson Street E	City of Hamilton	2	50 km/h (unposted)	Arterial	Sidewalks on both sides of Wilson Street E
Rousseau Street/ Old Dundas Road	City of Hamilton	2	50 km/h (unposted)	Rural Roadway	The sidewalk on both sides of Rousseau Street and the east side of Old Dundas Road
Sulphur Spring Road/ Church Street	City of Hamilton	2	50 km/h (unposted)	Urban Roadway	Sidewalks on both sides of Sulphur Springs Road and the east side of Church Street
Academy Street	City of Hamilton	2	40 km/h (posted)	Local	Sidewalks on the east side of Academy Street

Figure 3 illustrates the existing lane configurations and traffic control devices for the intersections considered in the analysis.

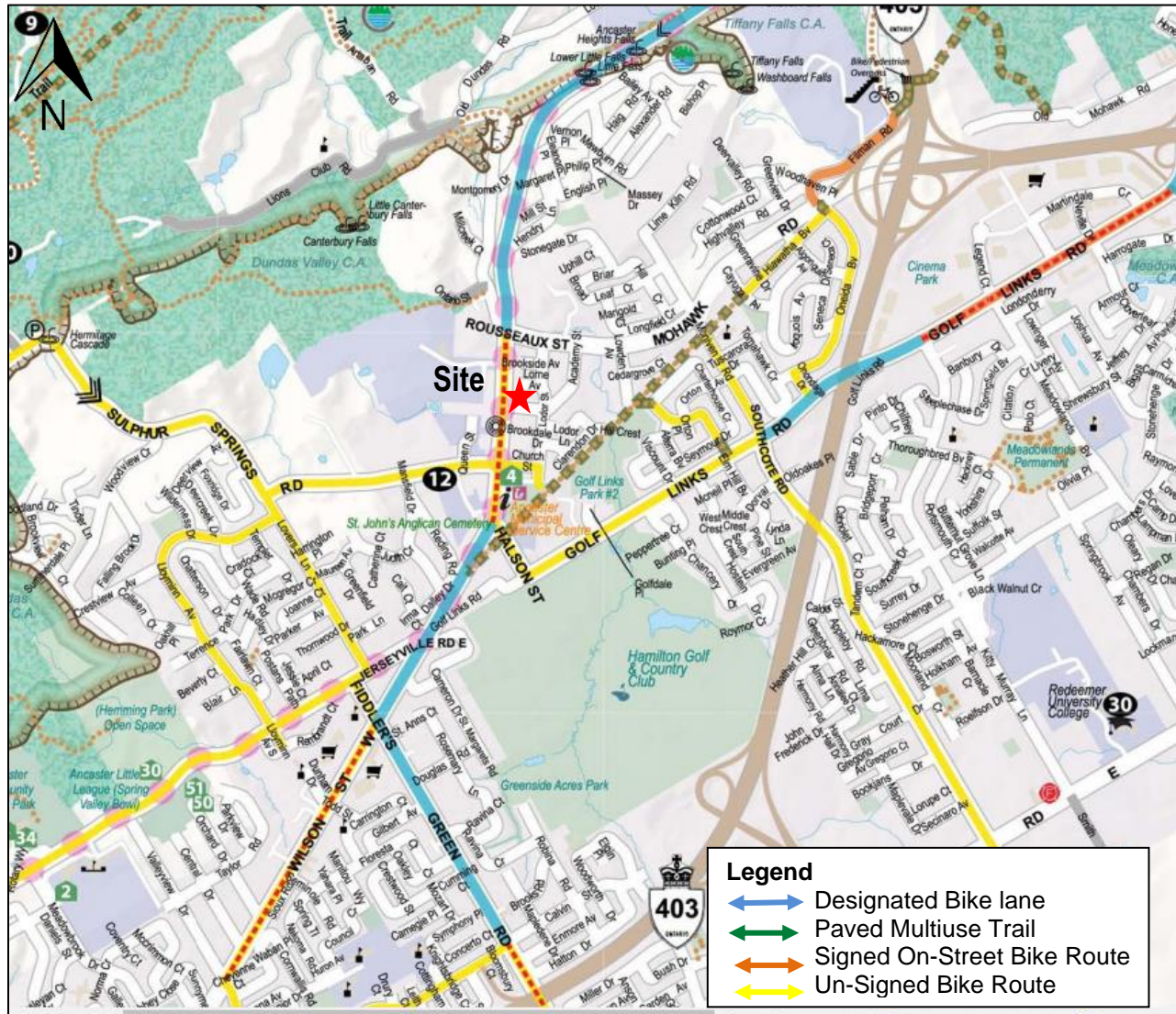
**Figure 3 – Existing Lane Configuration and Traffic Control**



## 2.2. Existing Active Transportation Network

Figure 4 illustrates the existing active transportation network in the study area.

Figure 4 – Existing Active Transportation Network in the Study Area



Source: Google Map/City of Hamilton Cycling Map

### 2.3. Existing Active Transportation Assessment

#### Walking

Sidewalks are currently provided along both sides of Wilson Street E along the frontage of the proposed development. Sidewalks are also available on the east side of Academy Street, both sides of Sulphur Springs Road, both sides of Rousseaux Street, and the east side of Old Dundas Road. In addition, sidewalks are generally in good condition, therefore, it is Nextrans’ opinion that no improvements to the sidewalk network are required at this time.

#### Cycling

Currently, there is an un-signed bike route along Wilson Street E from Halson Street and Rousseaux Street, and designated bike lanes along Wilson Street E from Halson Street to the south and Rousseaux Street to the north. There are unsigned bicycle routes along Sulphur Springs Road/ Church Street and other collector and local streets in the area. There are also multi-use trails in the area.

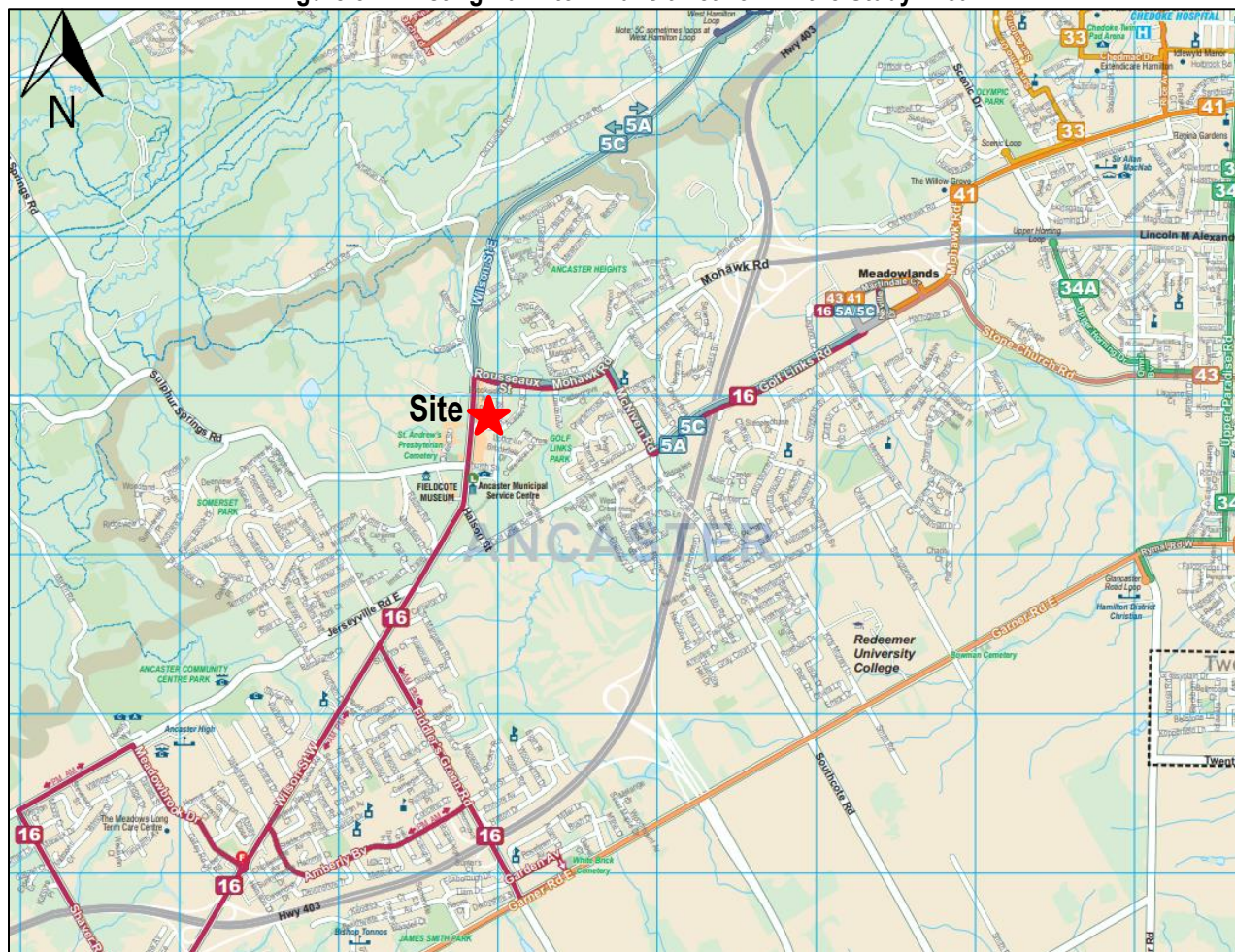
It is Nextrans’ opinion that the cycling network in the area could be improved in the future, especially along Wilson Street East, and Academy Street, to encourage more cycling trips to and from this area. These cycling facilities can be

implemented as part of the future capital projects by the City of Hamilton. These facilities are beyond the scope of this Study.

### 2.4. Existing Hamilton Transit (HSR) System

The area is currently serviced by four existing HSR Transit Bus Routes 16 Ancaster and 5 Delaware. **Figure 5** illustrates the existing HSR Transit Bus Routes in the study area.

**Figure 5 – Existing Hamilton Transit Network in the Study Area**



Source: Hamilton Transit website (as of December 2019)

The proposed development is located adjacent to the existing transit stops located at the Wilson Street East/Academy intersection for the HSR Transit Bus Route 16 Ancaster, and about 350 m to the existing transit stops located at Wilson Street East/Rousseaux Street intersection for the HSR Transit Bus Route 5 Delaware. It is Nexttrans' opinion that the proposed development will contribute to a healthy transit ridership for the existing Hamilton transit system in the area. Below are the bus route descriptions based on the information provided on the Hamilton Transit Website (<https://www.hamilton.ca/hsr-bus-schedules-fares>):

- **Route 16 Ancaster** – The Ancaster route travels generally in the east-west direction between Meadowlands Transit Terminal and the shopping complex at Wilson and Garner. This service runs 6 days a week from the early morning until after midnight. The service frequency is approximately 30 minutes during the weekday peak periods and weekend peak periods.
- **Route 5 Delaware** – The Delaware route generally runs east-west lower Hamilton including Dundas, Ancaster, and Stoney Creek. This service runs 7 days a week from the early morning until after midnight. The service frequency is approximately 15 minutes during the weekday peak periods and weekend peak periods.

### 2.3. Existing Traffic Volumes

Existing traffic volumes at the study area intersections were obtained from the City of Hamilton for the following intersections:

- Wilson Street East and Academy Street (signalized) – Count date Tuesday, March 03, 2020
- Wilson Street East and Sulphur Springs Road/Church Street (signalized) – Count date Tuesday, June 18, 2019
- Wilson Street East and Rousseaux Street/Old Dundas Road (signalized) – Count date Tuesday, November 10, 2020

Existing turning movement counts are summarized in **Appendix A**. The existing volumes are illustrated in **Figure 6**.

### 2.4. Existing Traffic Assessment

The existing volumes in **Figure 6** were analyzed using Synchro Version 11 software. It should be noted that the printouts for signalized intersections are based on Synchro so that queues and more detailed information are provided.

The signal timing plans for the signalized intersections were obtained from the City of Hamilton and incorporated into the analysis. The results are provided in **Appendix B** and summarized in **Table 2**.

Based on the intersection capacity analysis, under the existing traffic conditions, all the intersections considered are currently operating at acceptable levels of service. No improvements are required at this time.

Figure 6 – Existing Traffic Volumes

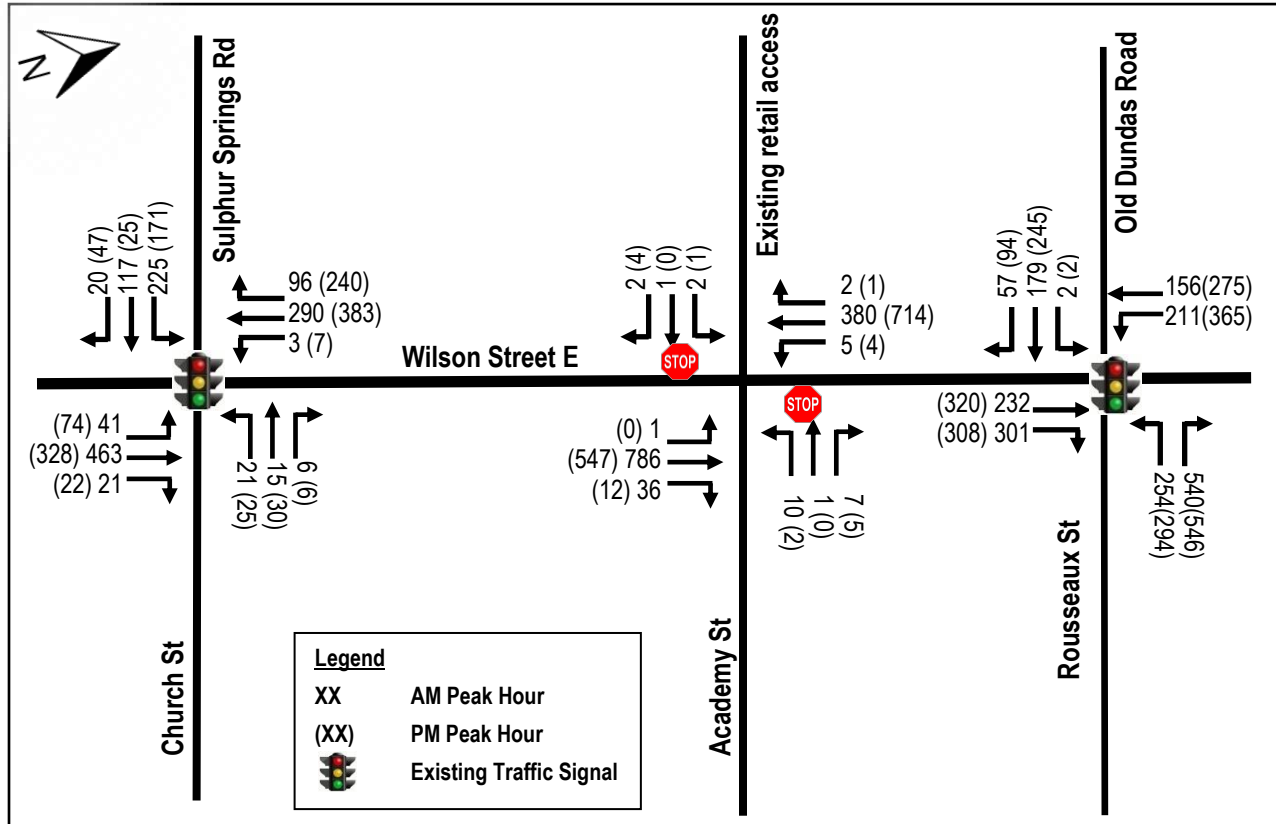


Table 2 – Existing Levels of Service

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		LOS (v/c)	Delay (s)	95 <sup>th</sup> Queue (m)	LOS (v/c)	Delay (s)	95 <sup>th</sup> Queue (m)
Wilson Street E & Rouseaux St/Old Dundas Rd (Signalized)	<b>OVERALL</b>	<b>B (0.61)</b>	18.5		<b>D (0.97)</b>	47.1	
	EB – LTR	B (0.39)	17.2	48.7	E (0.94)	72.6	133.0
	WB – L	C (0.72)	25.8	70.3	E (0.93)	73.9	120.3
	WB – R	C (0.38)	16.8	19.9	B (0.39)	19.9	19.2
	NB – T	D (0.54)	23.6	59.4	E (0.90)	64.6	122.6
	NB – R	C (0.21)	20.7	18.8	D (0.22)	35.2	23.1
	SB – L	C (0.43)	12.2	34.1	E (0.95)	57.2	118.5
	SB – T	A (0.20)	11.0	27.2	C (0.38)	20.4	62.6
Wilson Street E & Sulphur Springs Road/ Church St (Signalized)	<b>OVERALL</b>	<b>B (0.68)</b>	16.1		<b>B (0.52)</b>	11.1	
	EB – LTR	C (0.76)	24.8	86.8	C (0.69)	23.4	43.2
	WB – LTR	B (0.08)	13.6	9.4	B (0.15)	15.5	11.7
	NB – L	A (0.10)	9.8	8.0	A (0.18)	7.1	12.8
	NB – TR	B (0.62)	14.5	74.1	A (0.40)	8.3	48.2
	SB – L	A (0.01)	9.3	1.4	A (0.02)	6.4	2.4
	SB – T	B (0.37)	11.4	39.9	A (0.44)	8.5	53.9
	SB – R	A (0.07)	9.5	6.6	A (0.17)	7.0	10.2
Wilson Street E/ Academy St (unsignalized)	EB – LTR	<b>D (0.03)</b>	26.1	0.7	<b>C (0.02)</b>	17.8	0.4
	WB – LTR	D (0.12)	30.7	3.2	C (0.02)	17.9	0.6
	NB – LTR	A (0.00)	0.0	0.0	A (0.00)	0.0	0.0
	SB - LTR	A (0.01)	0.2	0.2	A (0.00)	0.1	0.1



## 3.0 TRANSPORTATION PLANNING CONTEXT IN THE AREA

### 3.1. Existing Land Use Context and Amenities

Based on Nextran's comprehensive review of the existing land uses in the area indicates that:

- Existing residential neighborhoods are located immediately east of the subject site. The majority is low-rise housing;
- The existing retail stores are located immediately to the south of the subject site,
- Hamilton Public Library, Ancaster Community Services – Ancaster Branch is located at the Wilson St/ Sulphur Springs Road intersection
- Ancaster Town Plaza (shopping mall) is located about 1.48 km to the south of the subject site, at Wilson Street West and Fiddlers Green Road intersection.

It is NexTrans' opinion that the community is complete with various amenities to support the future residents in the proposed development.

### 3.2. Transportation Planning Context

The existing area today is developed based on the traditional urban sprawl planning with low-rise residential and big box shopping centers where residents will have to drive to school, work, or shopping. It is anticipated that the majority of the mode of transportation in this area would be driving private cars.

It is Nextrans' opinion that the proposed development, a compact development that is different from traditional urban sprawl, will contribute to a healthy transit ridership for the existing Hamilton transit system in the area and provide more housing options for the residents. This type of development should be encouraged and embraced in the City of Hamilton.

As part of this study, Nextrans will provide appropriate recommendations that the proposed development can implement to continue to contribute positively to the area and community.

## 4.0 FUTURE BACKGROUND CONDITIONS

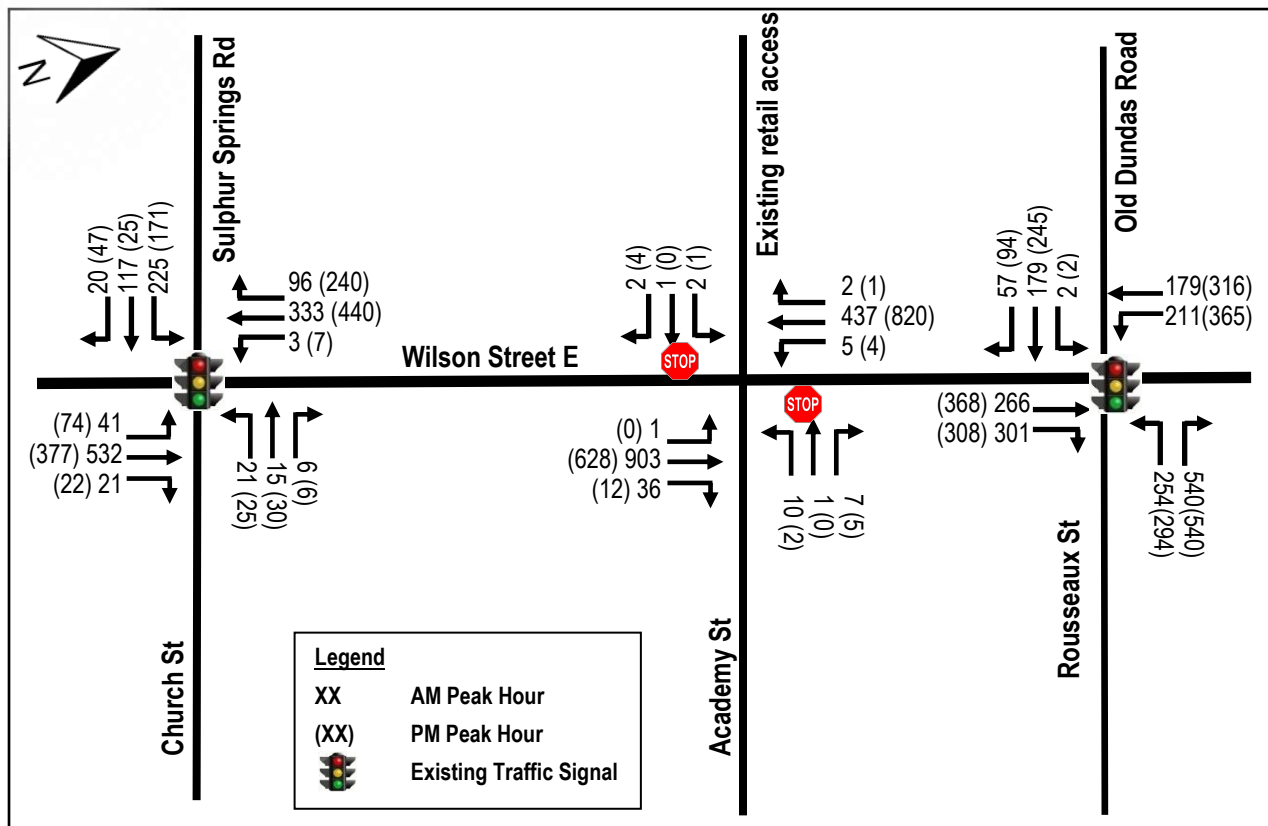
### 4.1. Analysis Horizon

For the purposes of this assessment, it is assumed that the proposed development will be completed by 2026 and therefore a five-year horizon (2030) has been carried out for the study analysis. This provision is consistent with the City of Hamilton's Traffic Impact Study Guidelines.

### 4.2. Future Background Corridor Growth

Based on the City of Hamilton's requirement, a 2% per annum compounded growth rate will be applied to all through movements as per the City's guidelines and industry standards, for the horizon year indicated above. **Figure 7** illustrates the future background traffic growth for the area intersections for the analysis.

Figure 7 – 2030 Background Corridor Growth Traffic Volumes



### 4.3. Background Development Applications

A comprehensive review of the active developments located within the study area was conducted based on the information extracted from the City of Hamilton development application portal (<https://www.hamilton.ca/development/planning-applications/development-applications-mapping>).

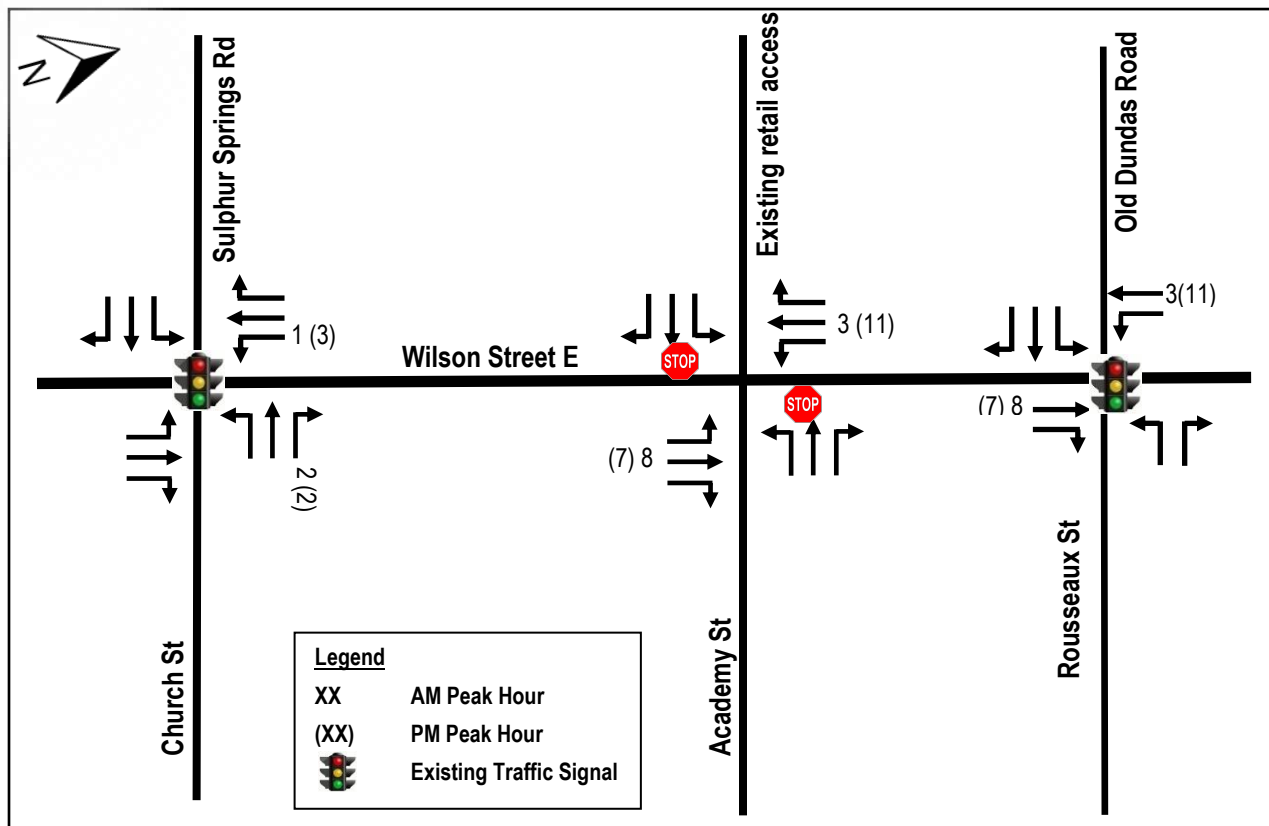
Based on this information, the majority of the active applications are very minor and are already either completed or under construction. It is Nextrans' opinion that the background corridor growth rate of 2% per annum or a total of 16% growth would cover the background development site trip generation.

There are four applications that may have some impacts on the corridor:

- DA-18-015: mixed-use building containing commercial on the ground floor and six dwelling units
- DA-14-117: a 3-storey commercial building as a proposed medical clinic
- DA-21-031: a 3-storey building with two ground commercial units and 10 dwelling units
- ZAC-20-011: 6 street townhouse units

For the purposes of this assessment, the 2016 Transportation Tomorrow Survey (TTS) and the Trip Generation Manual, 10<sup>th</sup> Edition published by the Institute of Transportation Engineers (ITE) and information were reviewed to estimate the modal split, trip distribution, and trip generation for the proposed development. The trip assignment is based on both the 2016 TTS and existing turning movement counts at the intersections considered in the Study. **Figure 8** illustrates the background development traffic volumes, with the site trip generation for these background developments included in **Appendix C**.

Figure 8 – Background Development Traffic Volumes



#### 4.4. Future Background Traffic Assessment

The estimated 2030 future background traffic volumes are illustrated in **Figure 9** and were analyzed using Synchro Version 11 software. The detailed calculations are provided in **Appendix D** and summarized in **Table 3**.

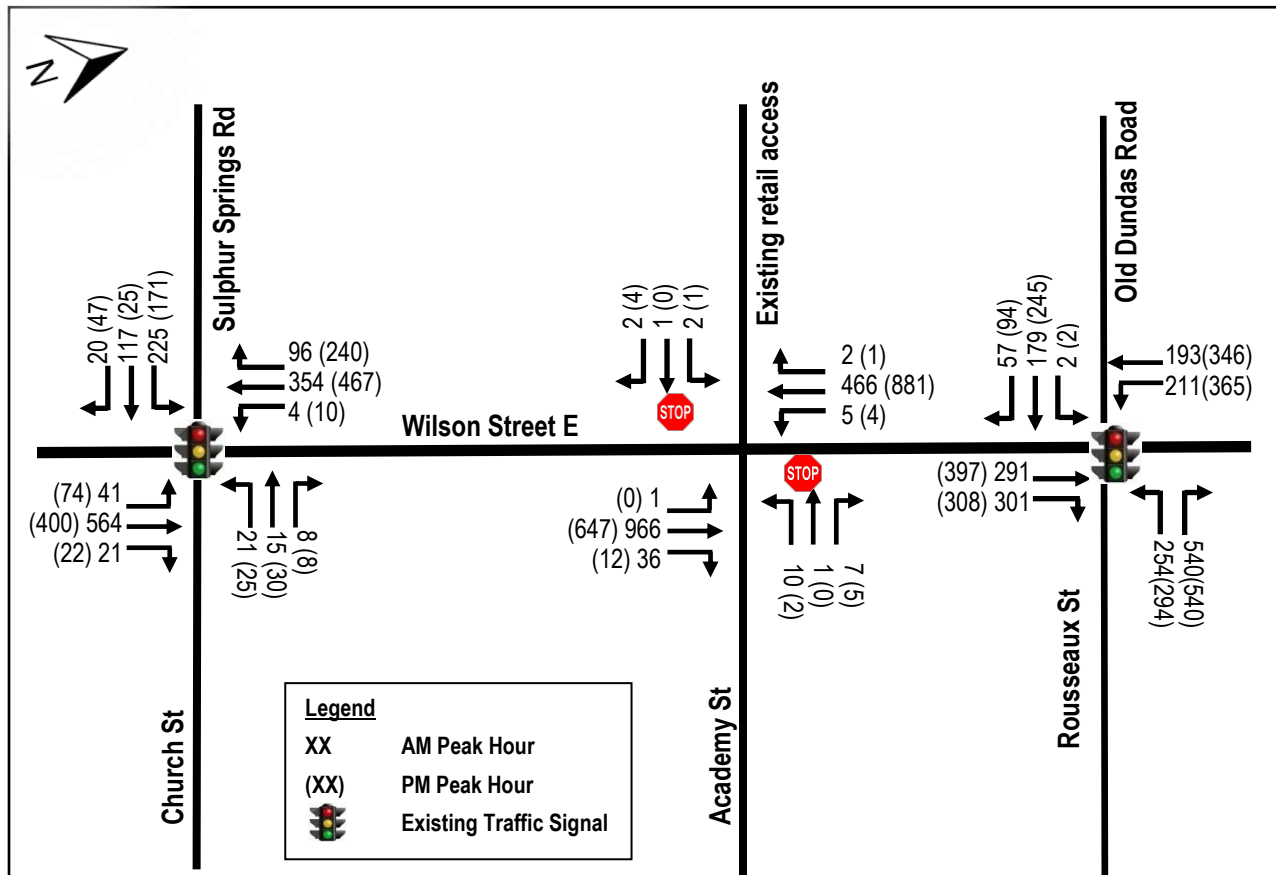
Under the future background traffic conditions, the intersection capacity analysis indicates that all the intersections considered are expected to operate at acceptable levels of service, with the exception of the northbound through movement at the Wilson Street E and Old Dundas Road/Rousseaux Street intersection due to high traffic demand.

It is anticipated that the operational issue for this movement can be mitigated by allocating more green time to this movement. Nextrans will provide potential mitigation measures for this movement under the future total conditions with the proposed development.

**Table 3 – 2030 Future Background Levels of Service**

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		LOS (v/c)	Delay (s)	95 <sup>th</sup> Queue (m)	LOS (v/c)	Delay (s)	95 <sup>th</sup> Queue (m)
Wilson Street E & Rousseaux St/Old Dundas Rd (Signalized)	<b>OVERALL</b>	<b>B (0.66)</b>	19.3		<b>E (0.99)</b>	57.4	
	EB – LTR	B (0.40)	17.8	48.7	E (0.95)	76.7	133.0
	WB – L	C (0.74)	27.3	71.8	E (0.94)	77.0	120.3
	WB – R	C (0.38)	17.4	19.9	B (0.40)	20.8	24.7
	NB – T	D (0.64)	26.0	75.4	F (1.09)	113.7	164.3
	NB – R	C (0.21)	20.6	18.8	D (0.22)	35.3	23.1
	SB – L	C (0.48)	12.7	34.1	E (0.98)	69.3	127.6
SB – T	A (0.24)	11.3	33.2	C (0.46)	21.4	80.5	
Wilson Street E & Sulphur Springs Road/ Church St (Signalized)	<b>OVERALL</b>	<b>B (0.75)</b>	17.6		<b>B (0.58)</b>	11.3	
	EB – LTR	C (0.79)	28.1	105.4	C (0.70)	24.5	48.4
	WB – LTR	B (0.08)	14.7	11.3	B (0.15)	16.0	13.1
	NB – L	A (0.11)	9.5	7.7	A (0.21)	7.3	13.5
	NB – TR	B (0.72)	16.8	94.5	A (0.47)	8.7	61.1
	SB – L	A (0.01)	9.0	1.3	A (0.03)	6.3	3.0
	SB – T	B (0.44)	11.7	48.3	A (0.52)	8.7	70.5
SB – R	A (0.07)	9.2	6.1	A (0.17)	6.8	9.9	
Wilson Street E/ Academy St (unsignalized)	EB – LTR	<b>E (0.05)</b>	41.1	1.1	<b>C (0.02)</b>	21.9	0.5
	WB – LTR	F (0.21)	53.2	5.7	C (0.03)	21.4	0.7
	NB – LTR	A (0.00)	0.0	0.0	A (0.00)	0.0	0.0
	SB – LTR	A (0.01)	0.3	0.2	A (0.00)	0.1	0.1

**Figure 9 – 2030 Future Background Traffic Volumes**



## 5.0 SITE TRAFFIC

### 5.1. Proposed Development

As indicated, currently, the subject land is occupied by a two-story building and a parking lot to the south and vacant to the north. The proposed development consists of a mixed-use 8-storey building with 118 dwelling units and 1,475.2 m<sup>2</sup> of ground-related retail gross floor area.

The 2016 Transportation Tomorrow Survey (TTS) and the *Trip Generation Manual, 11<sup>th</sup> Edition* published by the Institute of Transportation Engineers (ITE) and information was reviewed to estimate the modal split, trip distribution, and trip generation for the proposed development.

### 5.2. Site Trip Generation

The trip generation forecasts were undertaken using the information contained in the *Trip Generation Manual, 10<sup>th</sup> Edition* published by the Institute of Transportation Engineers (ITE).

For the purposes of this assessment, the ITE Land Use Codes (LUC) 221 “Multifamily Housing (Mid-Rise) General Urban/Suburban” and LUC 822 “Strip Retail Plaza (<40k) General Urban/Suburban” average rates have been utilized for the proposed development.

The site trip generation is summarized in **Table 5**.

**Table 4 – Site Traffic Trip Generation**

ITE Land Use	Magnitude (units/ft <sup>2</sup> )	Parameters	Morning Peak Hour			Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) LUC 221 General Urban/Suburban	118	Trip Rates (Average)	0.085	0.28	0.37	0.24	0.15	0.39
		<b>Total Trips</b>	<b>10</b>	<b>34</b>	<b>44</b>	<b>28</b>	<b>18</b>	<b>46</b>
Strip Retail Plaza(<40k) LUC 822 General Urban/Suburban	15,878	Trip Rates (Average)	1.42	0.94	2.36	3.295	3.295	6.59
		<b>Total Trips</b>	<b>22</b>	<b>15</b>	<b>37</b>	<b>52</b>	<b>52</b>	<b>104</b>
<b>Total Trips</b>			<b>32</b>	<b>49</b>	<b>81</b>	<b>80</b>	<b>70</b>	<b>150</b>

The proposed development is expected to generate 81 total two-way trips (32 inbound and 49 outbound) and 150 total two-way trips (80 inbound and 70 outbound) during the morning and afternoon peak hours, respectively.

### 5.3. Site Trip Distribution Based on 2016 TTS Data

The 2016 Transportation Tomorrow Survey (TTS) data was reviewed for Traffic Zones 5105 in order to estimate the general trip distribution for the proposed development.

**Table 5** summarizes the general distribution based on the 2016 TTS data for the proposed development, with **Table 6** summarizing the site traffic assignment. It should be noted that the auto-site trip distribution and assignment have taken into consideration the TTS information, existing intersection operations, and capacity constraints. The detailed 2016 TTS data extraction is included in **Appendix E**.

**Table 5 – Trip Distribution for Residential Component**

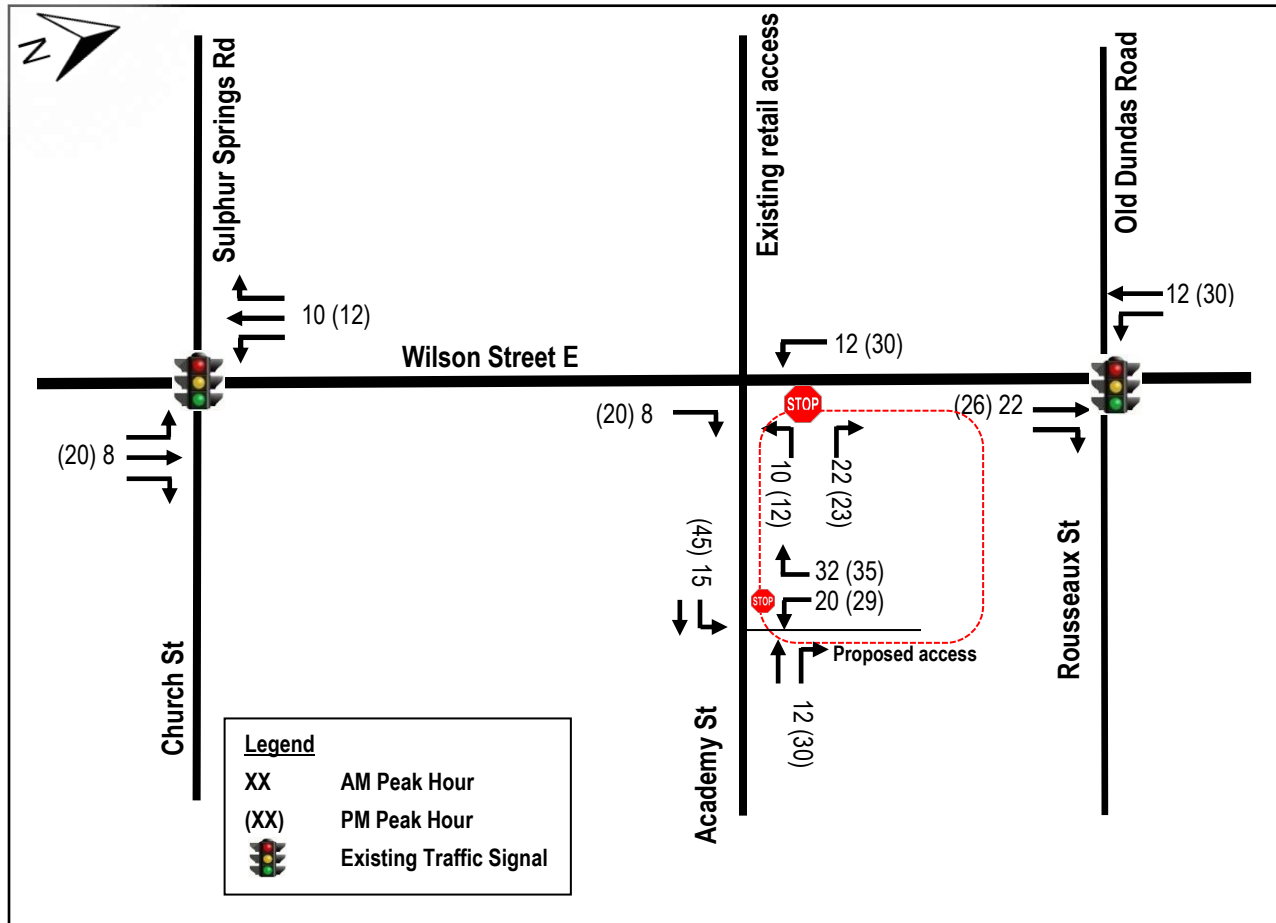
Toronto	Peel Region	Halton Region	City of Hamilton	Niagara Region
5%	3%	8%	63%	22%

**Table 6 – Site Trip Distribution for Residential Component**

General Direction (To/From)	Inbound
North (Wilson Street E, Academy St)	8%
South (Wilson Street E, Academy St)	28%
East (Wilson Street E, Academy St)	42%
West (Wilson Street E)	22%
<b>Total</b>	<b>100%</b>

Figure 10 illustrates the proposed development generated traffic volumes for the proposed development.

**Figure 10 – Site Traffic Volumes**



## 6.0 FUTURE TOTAL TRAFFIC CONDITIONS

### 6.1 Future Total Traffic Assessment for Auto Mode

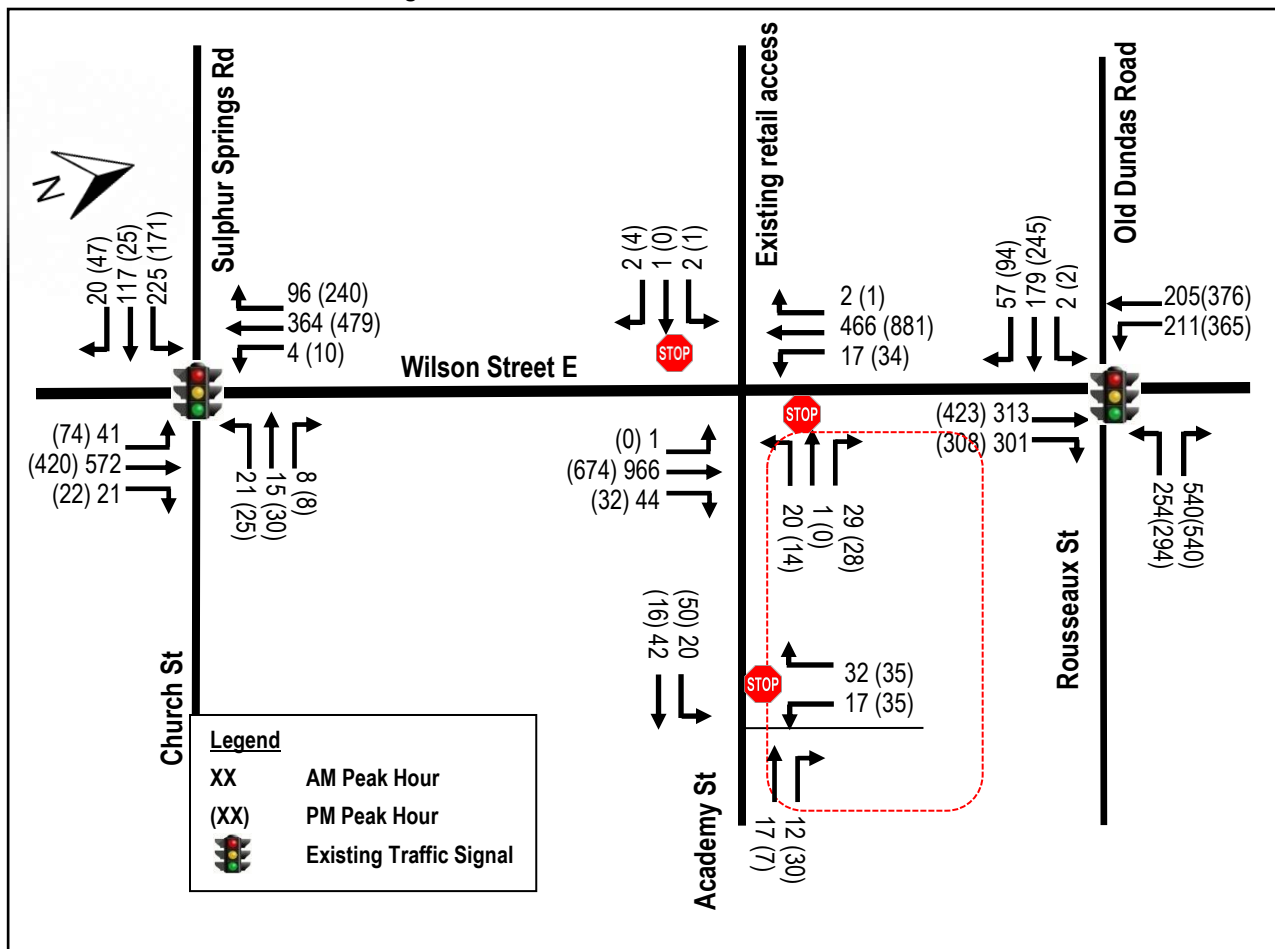
The estimated future total traffic volumes (future background traffic volumes plus site-generated traffic volumes) are illustrated in **Figure 11** and were analyzed using Synchro Version 11 software. The detailed calculations are provided in **Appendix E** and summarized in **Table 7**.

Under the future total conditions, similar to the existing and future background conditions, all intersections considered are expected to operate at acceptable levels of service, except the northbound through movement at the Wilson Street E and Old Dundas Road/Rousseaux Street intersection during the afternoon peak hour. This is due to the heavy northbound movement/demand.

To address this critical movement, Nextrans has optimized the signal timing for this intersection. Based on the analysis, it is indicated that the intersection would improve with a slightly longer cycle length (from 110 to 120) with the additional green time allocated to the northbound movement during the afternoon peak hour. It is recommended that the City monitor this intersection in the future and optimize the signal timing plan as required at that time. It is Nextrans' opinion that no physical improvements are required for this intersection under this horizon.

The analysis indicates that the proposed access is expected to operate at acceptable levels of service with minimum delays or queues.

Figure 11 – 2030 Future Total Traffic Volumes



**Table 7 – 2030 Future Total Levels of Service**

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		LOS (v/c)	Delay (s)	95 <sup>th</sup> Queue (m)	LOS (v/c)	Delay (s)	95 <sup>th</sup> Queue (m)
Wilson Street E & Rousseaux St/Old Dundas Rd (Signalized)	<b>OVERALL</b>	<b>B (0.67)</b>	<b>23.8</b>		<b>E (1.01)</b>	61.7	
	EB – LTR	D (0.70)	37.8	75.2	E (0.95)	76.7	133.0
	WB – L	C (0.61)	20.7	53.3	E (0.94)	77.0	120.3
	WB – R	B (0.38)	17.5	18.2	B (0.41)	20.8	26.4
	NB – T	C (0.73)	35.1	116.2	F (1.16)	138.8	178.7
	NB – R	C (0.21)	25.3	22.5	D (0.22)	35.3	23.1
	SB – L	B (0.55)	17.6	46.2	E (0.98)	69.3	127.6
	SB – T	B (0.28)	15.1	46.7	C (0.51)	22.0	89.0
Wilson Street E & Rousseaux St/Old Dundas Rd (Signalized) optimized	<b>OVERALL</b>				<b>D (0.99)</b>	44.6	
	EB – LTR				E (0.92)	68.8	146.2
	WB – L				D (0.89)	48.2	100.6
	WB – R				C (0.46)	26.4	47.2
	NB – T	-	-	-	D (0.90)	56.6	168.4
	NB – R				C (0.22)	34.1	21.9
	SB – L				E (0.98)	65.4	144.0
	SB – T				B (0.43)	20.2	92.0
Wilson Street E & Sulphur Springs Road/ Church St (Signalized)	<b>OVERALL</b>	<b>B (0.76)</b>	17.7		<b>B (0.59)</b>	11.4	
	EB – LTR	C (0.79)	28.3	107.0	C (0.70)	24.6	49.4
	WB – LTR	B (0.09)	14.8	11.6	B (0.15)	16.0	13.3
	NB – L	A (0.11)	9.5	7.6	A (0.21)	7.3	13.5
	NB – TR	B (0.73)	17.1	96.2	A (0.50)	8.9	64.9
	SB – L	A (0.02)	9.0	1.5	A (0.03)	6.3	3.0
	SB – T	B (0.45)	11.8	49.8	A (0.54)	9.3	72.4
	SB - R	A (0.07)	9.2	6.0	A (0.17)	6.9	9.8
Wilson Street E/ Academy St (unsignalized)	EB – LTR	E (0.05)	46.3	1.3	C (0.03)	24.3	0.6
	WB – LTR	F (0.37)	67.0	15.6	D (0.24)	30.8	7.0
	NB – LTR	A (0.00)	0.0	0.0	A (0.00)	0.0	0.0
	SB - LTR	A (0.03)	1.0	0.8	A (0.05)	1.3	1.1
Academy St/ proposed access (unsignalized)	EB – LT	A (0.01)	2.4	0.3	A (0.03)	5.7	0.8
	SB - LR	A (0.05)	8.9	1.3	A (0.08)	9.3	2.1

## 6.2. Active Transportation Mode Assessment

### Walking

Sidewalks are currently provided along both sides of Wilson Street E along the frontage of the proposed development. Sidewalks are also available on the north side of Academy Street.

As part of this proposed development, it is recommended that the existing sidewalk on the south side of Academy Street be maintained or enhanced if appropriate. Sidewalks should also be provided along the internal private accesses to facilitate pedestrian movements. The proposed building's main entrance should be provided directly onto Wilson Street E and Academy Street, where appropriate.

### Cycling

Currently, there is an un-signed bike route along Wilson Street E from Halson Street and Rousseaux Street, and designated bike lanes along Wilson Street E from Halson Street to the south and Rousseaux Street to the north. There are unsigned bicycle routes along Sulphur Springs Road/ Church Street and other collector and local streets in the area. There are also multi-use trails in the area.



It is Nextrans' opinion that the cycling network in the area could be improved in the future, especially along Wilson Street E, to encourage more cycling trips to and from this area. These cycling facilities can be implemented as part of the future capital projects by the City of Hamilton. These facilities are beyond the scope of this Study.

### 6.3. Transit Mode Assessment

If a 10% transit modal split is applied to the site trip generation, the proposed development is expected to generate 8 two-way transit trips (3 inbound and 5 outbound) and 15 two-way transit trips (8 inbound and 7 outbound) during the morning and afternoon peak hours, respectively.

The proposed development is located adjacent to the existing transit stops located at the Wilson Street E and Academy Street intersection for the HSR Transit Bus Routes 16 Ancaster, and about 350m to the HSR Transit Bus Route 5 Delaware.

For this assessment, it is assumed that the majority of the transit customers from the proposed development will take Route 16 to Meadowlands Bus Terminal. **Table 8** summarizes the anticipated ridership forecasts for Route 44.

**Table 8 – Future Transit Passenger Demand from the Proposed Development**

Transit Route	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Inbound (pass/veh)	Outbound (pass/veh)	Inbound (pass/veh)	Outbound (pass/veh)
Route 16 Northbound	0	5	0	7
Route 16 southbound	3	0	8	0

As indicated in the table above, the transit passenger demands generated by the proposed development per transit vehicle are very low (at most 8 passengers per transit vehicle per hour). As such, the proposed development impact on transit service is negligible and no improvements are required.

In reality, some passengers could be bunched together during the peak 15 minutes, instead of spreading during the entire peak hour. Even if this is the case, our estimates indicate that the demand per vehicle is extremely low and can be accommodated without the need for additional transit vehicles or improvements during both the morning and afternoon peak periods.

## 7.0 SITE PLAN REVIEW

### 7.1. Loading Requirement

As indicated, the development proposal consists of a total of 118 residential units and 1,475.2 m<sup>2</sup> of retail gross floor area. The proposed development will provide one loading space. Turning movement templates for servicing and passenger vehicles can be provided at the site plan stage.

### 7.2. Driveway Location and Configuration

The proposed development is proposing one full movement access via Academy Street.

Based on the findings of this Study and Nextrans' assessment, the proposed access arrangement is reasonable and acceptable as it is optimized for the developable lands and consistent with the context of the area.

## 8.0 SAFETY AND OTHER CONSIDERATIONS

### 8.1. Pedestrian Safety

Nextrans has conducted a site visit in the area. Crosswalk ladder/zebra markings are not currently provided at the Wilson Street E and Academy Street intersections. It is recommended the City reviews and provides the treatment at this intersection to enhance pedestrian safety.

### 8.2. Traffic Calming

Given that Wilson Street East are arterial road, traditional traffic calming measures may not be appropriate since these roads need to service buses, servicing vehicles, and emergency vehicles. If required in the future, the City can consider installing speed boards to deter drivers from speeding on Academy Street.

## 9.0 PARKING ASSESSMENT

### 9.1. Vehicle Parking Assessment

For this assessment, Zoning By-law No. 05-200 section 5 has been reviewed and applied in the analysis. **Table 9** summarizes the vehicle parking requirement, based on the City’s Zoning By-law No. 05-200.

**Table 9 – Zoning By-law No. 05-200 Vehicle Parking Requirement for Areas Outside Downtown Zones**

Type	No. Unit	Ratio	Required
Multiple Dwelling; Dwelling Units where the total number of such units is 5 or greater	118 units	1 space per unit for residents plus 0.3 visitor parking spaces per unit	118 parking spaces for residents and 35 spaces for visitors
Retail/Commercial	1,475.2 m <sup>2</sup>	5.5 for each 100 sqm	81 spaces
<b>Total</b>			<b>234 spaces</b>

Based on the City’s By-Law No. 05-200, a total of 234 parking spaces (including retail, resident, and visitor parking spaces) are required for the proposed development. It is our understanding that the proposed development will provide a total of 270 parking spaces which meets the requirement.

### 9.2. Bicycle Parking Assessment

For this assessment, Zoning By-law No. 05-200 section 5 has been reviewed and applied in the analysis. **Table 10** summarizes the vehicle parking requirement, based on the City’s Zoning By-law No. 05-200.

**Table 10 – Zoning By-law No. 05-200 Vehicle Parking Requirement for Areas Outside Downtown Zones**

Type	No. Unit	Ratio	Required
Multiple Dwelling; Dwelling Units where the total number of such units exceeds 4.	118 units	0.5 per unit for long-term 0.05 per unit for short-term	59 long-term spaces 6 short-term spaces
Retail/Commercial	1,475.2 m <sup>2</sup>	0.1 per 100sqm for long-term 0.15 per 100sqm for short-term	2 long-term spaces 2 short-term spaces
<b>Total</b>			<b>61 long-term spaces 8 short-term spaces</b>

Based on the City's By-Law No. 05-200, a total of 61 bicycle long-term spaces and 8 bicycle short-term spaces are required for the proposed development. It is our understanding that the proposed development will provide a total of 190 bicycle parking spaces which meets the requirement.

## 10.0 TRANSPORTATION DEMAND MANAGEMENT

### 10.1. City of Hamilton's TDM for Development (June 2015)

The City of Hamilton's TDM for Development Report (June 2015) has been reviewed and consulted to prepare the TDM requirement for the proposed development. In order to address the City's requirements, the following TDM recommendations are provided to support the proposed development.

Transportation Demand Management (TDM) is a coordinated series of actions aimed at maximizing the people-moving capability of the transportation system. According to the City's TDM Report, the main objectives of TDM are:

- Shifting travel modes (e.g., walking, cycling, taking transit, or carpooling instead of driving alone);
- Reducing the number of trips people must make (e.g., destinations and activities such as work and shopping, near each other); and,
- Travelling more efficiently (e.g., making trips outside of peak hours).

Potential TDM measures may include but are not limited to: TDM-supportive land use, bicycle and pedestrian programs and facilities, public transit improvements, preferential treatments for buses and high occupancy vehicles (if applicable), ridesharing, and employee incentives.

#### 10.1.1. Increase Density and Compact Site Design

As indicated in previous sections of this report, the development proposal consists of a total of 118 dwelling units and 1,475.2 m<sup>2</sup> retail/commercial on the related ground floor.

It is Nextrans' opinion that this is a very compact residential development and design that meets the City's requirements because it does not include low-rise housing units.

#### 10.1.2. Site Design Elements

It is Nextrans' understanding that the proposed development has been designed to include the following design elements:

- Provide direct pedestrian/cycling connections onto Wilson Street East;
- Provide internal pedestrian circulation;
- Reduce vehicle parking for both phases of the development to encourage future residents to take transit or other sustainable modes of transportation instead of driving private vehicles

It is Nextrans' opinion that these compact design elements will help facilitate pedestrian and cyclist movements in efficient and safe manner.

#### 10.1.3. Sidewalks and Pathways

The proposed development provides continuous sidewalks internally and direct connections to Wilson Avenue East and Academy Street, as illustrated in the proposed site plan.

#### 10.1.4. Direct Connections to Transit

As indicated, the proposed development is located adjacent to the existing transit stops located at the Wilson Street East and Academy Street intersection for the HSR Transit Bus Routes 16 Ancaster and about 350m to the Bus Route 5

Delaware. The residents will have direct access to these existing bus stops located at the Wilson Street East and Academy Street intersection. It is Nextrans’ opinion that the proposed development will contribute to a healthy transit ridership for the existing Hamilton transit system in the area.

### 10.1.5. Unbundle Parking

As parking is the best TDM incentive for residents to take alternative modes of transportation, it is recommended that the proposed development unbundle the parking sale from the unit.

### 10.1.6. On-Site Carshare Vehicle(s) and Parking Spot(s)

It is Nextrans’ opinion that this requirement is more appropriate for larger-scale development in the Downtown or Transit Oriented Corridor setting where carshare is economically viable. It is not appropriate for a small development like this without other high-rise/mid-rise buildings nearby to share the use or carrying costs. As such, it is Nextrans’ opinion that this requirement is not appropriate or necessary for the proposed development given the proposed development context and location.

### 10.1.7. On-Site Bikeshare

It is Nextrans’ opinion that bike-share is more appropriate in the downtown setting surrounded by more mid-rise and high-rise uses, as well as other office and retail uses, to share the use and carrying costs to make bikeshare more economically feasible. It is Nextrans’ opinion that bikeshare is not appropriate for this proposed development.

### 10.1.8. Travel Planning Tools and Support for the Development of a School Travel Plan

It is recommended that the proposed development contact and coordinate with the Hamilton-Wentworth District School Board for any potential school travel plan in the area.

### 10.1.9. Opportunities for Transit Passes, Carshare Memberships, or Bikeshare Memberships

It is recommended that the proposed development provides a pre-loaded PRESTO CARD with a value of \$25 (inclusive of registration fees) for each residential unit on a demand basis. This incentive will encourage residents to try the existing transit services in the area.

### 10.1.10. Proposed Monitoring Evaluation of TDM Measures

Based on our previous experience, monitoring, and evaluation of TDM measures are important but very onerous for the Applicant. When the project is completed and the Applicant transfers the ownership to the Condominium Board, the Board will have full control of the proposed development and there are certain conditions and requirements the Condominium Board may not agree with. It is Nextrans’ opinion that TDM measures and incentives provided in this report are sufficient and appropriate, as such, monitoring for the proposed development is not required.

## 10.2. Recommended TDM Measures and Incentives for the Proposed Development

Based on the review of the context of the proposed development about the TDM requirements by the City of Hamilton, several TDM measures and incentives are identified for the proposed development to consider, given the limited transit service and active transportation network in the area. **Table 11** summarizes the recommended TDM measures and incentives.

**Table 11 – Recommended TDM Measures for the Proposed Development**

Category	TDM Initiative required by the City or suggested by Nextrans	Recommended Actions	Responsibility
Walking	<ul style="list-style-type: none"> <li>Safe, attractive, and direct walkways for pedestrians linking building entrances</li> </ul>	<ul style="list-style-type: none"> <li>Provide direct shared pedestrian and cycling connections from the proposed development to Wilson Street E</li> </ul>	Applicant

	with public sidewalks and with key destinations such as schools • Enhanced pedestrian amenities on-site (benches, landscaping, lighting)		
Transit	• Enhance walking routes between main building entrance(s) and transit stops/stations • Bicycle parking located at or near transit stops • Implement transit priority measures (queue jump lanes, traffic signal priority, bus-only lanes)	• The proposed development provides a shared pedestrian/cycling connection directly to Wilson Street E	Applicant
Parking	• Reduced minimum parking requirements based on proximity to transit • Shared parking with nearby developments or on-street spaces • Unbundle parking costs from unit costs	• Consider unbundling parking sale with the unit;	Applicant
Information Brochure/ Letter	• Provide an information brochure/letter for each residential unit that includes HSR Transit System schedules, GO Transit schedules, cycling maps, and community maps.	• Provide a brochure (or a letter) to new residents that includes all website links to Hamilton Transit System schedules, community maps, and cycling maps. The information package can be distributed at the sales office.	Applicant
Transit Incentive	• Provide transit incentives	• Provide pre-loaded PRESTO CARD with a value of \$50 (inclusive of registration fees) for each residential unit on-demand basis	Applicant

## 11.0 CONCLUSIONS / FINDINGS

### 11.1. Study Conclusions

The findings and conclusions of the analysis are as follows:

- The proposed development is expected to generate 81 total two-way trips (32 inbound and 49 outbound) and 150 total two-way trips (80 inbound and 70 outbound) during the morning and afternoon peak hours, respectively.
- Under the existing traffic conditions, the analysis indicates that all the intersections considered are currently operating at acceptable levels of service. No improvements are required at this time.
- Under the future background traffic conditions, the intersection capacity analysis indicates that all the intersections considered are expected to operate at acceptable levels of service, except the southbound through movement at the Wilson Street E and Old Dundas Road/Rousseaux Street intersection due to high traffic demand.
- Under the future total conditions, similar to the existing and future background conditions, all intersections considered are expected to operate at acceptable levels of service, except the northbound through movement at the Wilson Street E and Old Dundas Road/Rousseaux Street intersection. This is due to the heavy northbound movement/demand.

To address this critical movement, Nextrans has optimized the signal timing for this intersection. Based on the analysis, it is indicated that the intersection would improve with a slightly longer cycle length (from 110 to 120) with the additional green time allocated to the northbound movement. It is recommended that the City monitor

this intersection in the future and optimize the signal timing plan as required at that time. It is Nextrans' opinion that no physical improvements are required for this intersection under this horizon.

- The analysis indicates that the transit passenger demands generated by the proposed development per transit vehicle are very low (at most 8 passengers per transit vehicle). As such, the proposed development impact on transit service is negligible and no improvements are required. In reality, some passengers could be bunched together during the peak 15 minutes, instead of spreading during the entire peak hour. Even if this is the case, our estimates indicate that the demand per vehicle is extremely low and can be accommodated without the need for additional transit vehicles or improvements during both the morning and afternoon peak periods.
- Based on the City's By-Law No. 05-200, a total of 234 parking spaces (including retail, resident, and visitor parking spaces) are required for the proposed development. It is our understanding that the proposed development will provide a total of 270 parking spaces which meets the requirement.
- Based on the City's By-Law No. 05-200, a total of 61 bicycle long-term spaces and 8 bicycle short-term spaces are required for the proposed development. It is our understanding that the proposed development will provide a total of 190 bicycle parking spaces which meets the requirement.

## 11.2. Study Recommendations

Based on the findings and conclusions of this study, the following recommendations are provided:

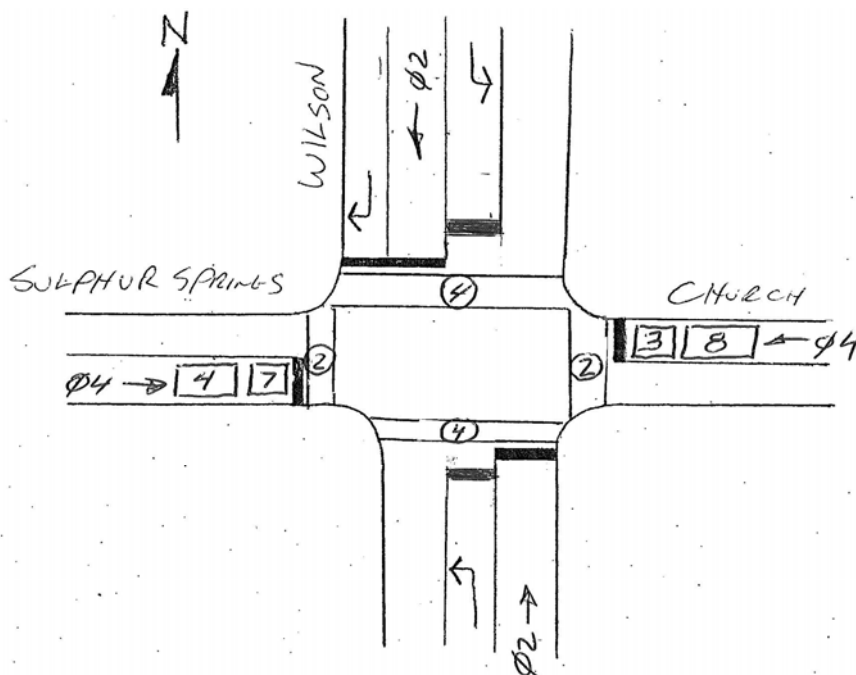
- The proposed development implements the TDM measures and incentives identified in this report to support active transportation and transit and to reduce the numbers of single-occupant-vehicle trips to and from the proposed development;
- The signal timing for Wilson Street E and Old Dundas Road/Rousseaux Street intersection should be optimized due to heavy northbound movement/demand.
- No additional physical improvements for the area at this time to accommodate the proposed development, under the future background and future total conditions.

# **APPENDIX A**

## **TRAFFIC DATA**

## City of Hamilton - Traffic Traffic Signal Controller Timing Data

Intersection: **Church & Sulphur Springs & Wilson**  
 Controller Type: **3000E** Page 1 of 15  
 Programmed By: **RD** Installed By: **RD**  
 Date: **04-Jun-14** Date: **23-Jun-14**



- φ1:
- φ2: **Wilson - NB/SB, East & West Xwalks**
- φ3:
- φ4: **Church / Sulphur Springs - EB/WB, North & South Xwalks**
- φ5:
- φ6:
- φ7:
- φ8:

**Flash Operation:**                      **Amber: Wilson**  
**Red: Church / Sulphur Springs**



**SEQUENCE/START-UP (MM-3-1-1)**

**START-UP PHASES/INTERVAL/SEQUENCE**

(X = Enable for start-up phases. Must be compatible if more than one)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
START-UP	Phases		X														
	Interval	0	(0=Red, 1=Yel, 2= Grn, determines color of selected phases above on start-up)														
	Flash	10	(0-255 seconds start-up flash time)														
	Red	5.0	(0-25.5 secs = length of first red after start-up if start-up in yellow or red)														
	Sequence	2	(2=single ring, 3=dual ring, 4=123/567+48, 5=12/56+3478, 6=1234/56+78, 7=1234/5678, 8=dual quad, 9=12ph)														

**PHASE RING ASSIGNMENTS**

X = Phase assigned to ring (if used). Phases in different rings but same co-phase group can time together.

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

**CO-PHASE GRP 1-4 ASSIGNMENTS**

X = phase assigned to co-phase group. All ph's assigned to rings must be assigned to co-phase group.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CO-PHASE	CO PH 1		X														
	CO PH 2				X												
	CO PH 3																
	CO PH 4																

		(X = ENABLE)															
		TP1 PHASE RECALLS															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK				X												
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

		(X = ENABLE)															
		TP2 PHASE RECALLS															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK				X												
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

(X = ENABLE)

**TP3 PHASE RECALLS**

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK				X												
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

**PHASE RECALLS/MODES; CNA, INH MAX, PED OPTIONS, etc. (MM-3-1-2-2) ONLY 1 PLAN PER UNIT**

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	CNA 1		X														
	CNA 2																
	CNA 3																
	CNA 4																
	WRM		X														
	INH MAX																
	PED RECY																
	FL WALK																
	FDW->YEL																
	FDW->RED																
	COND PED																

		TP1															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial		30		10												
	Passage				3.0												
	Yellow		3.3		3.3												
	Red		2.1		2.0												
	Walk		7		7												
	Ped Clr		8		10												
	Max 1		55		30												
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	AI/Act																
Max In																	

		TP2															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial		<b>30</b>		<b>10</b>												
	Passage				<b>3.0</b>												
	Yellow		<b>3.3</b>		<b>3.3</b>												
	Red		<b>2.1</b>		<b>2.0</b>												
	Walk		<b>7</b>		<b>7</b>												
	Ped Clr		<b>8</b>		<b>10</b>												
	Max 1		<b>55</b>		<b>30</b>												
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	AI/Act																
Max In																	

		TP3															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial		<b>30</b>		<b>10</b>												
	Passage				<b>3.0</b>												
	Yellow		<b>3.3</b>		<b>3.3</b>												
	Red		<b>2.1</b>		<b>2.0</b>												
	Walk		<b>7</b>		<b>7</b>												
	Ped Clr		<b>8</b>		<b>10</b>												
	Max 1		<b>55</b>		<b>30</b>												
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	AI/Act																
Max In																	

Church / Sulphur Springs / Wilson  
**VEHICLE DETECTOR ASSIGNMENTS (MM-3-1-4-1, PGDN etc.)**

**CONTROLLER DATA**

4/09/21

(X = ASSIGN VEH DETECTOR TO THAT PHASE)

	DET/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VEH DET ASSIGN- MENTS	1																
	2																
	3				X												
	4				X												
	5																
	6																
	7				X												
	8				X												

**PED DETECTOR ASSIGNMENTS (MM-3-1-4-2)**

(X = ASSIGN PED DETECTOR TO THAT PHASE)

	DET/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PED DET ASSIGN- MENTS	1																
	2																
	3																
	4				X												
	5																
	6																
	7																
	8																

**DETECTOR MODES (MM-3-1-4-3)**

	DET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VEH DET	Mode			2	2			2	2								
MODES																	

**DETECTOR TIMES (MM-3-1-4-4)**

**USE 1 TO ALL 3 DETECTOR TIMING PLANS**

		TP1															
	DET	1	2	3	4	5	6	7	8								
DET TIMES	Delay			1	1					1	1						
	Str/Stp																
	DET	9	10	11	12	13	14	15	16								
DET TIMES	Delay																
	Str/Stp																

**SELECTION SOURCE (MM-3-2-2)**

Entries determine how parameters get selected

Cycle Source:	<b>0</b>	0=TOD, 1=CL, 2=INT
Split Source:	<b>0</b>	0=TOD, 1=CL, 2=INT
Offset Source:	<b>0</b>	0=TOD, 1=CL, 2=INT

Free Source:	<b>0</b>	0=TOD, 1=CL, 2=INT
Flash Source:	<b>0</b>	0=TOD, 1=CL, 2=INT
Inter-TOD Revert:	<b>255</b>	0-255 SECS

TOD = Time of day control by internal clock, CL = Closed loop (comm), INT = Interconnect. Inter-TOD Revert is time allowed after failed interconnect before unit reverts to TOD (Time Base) control.

**COORD BASIC OPTIONS (MM-3-2-3)**

Reference to End (vs. begin) of Main St.:	<b>N</b>	Y/N: Y = Offset references to end of main st. green. N = Beginning of Main st. green.
Use % (vs. secs) for Phase Allocation:	<b>N</b>	Y/N: Y = Phase allocations loaded as percent of 100. N = Allocations in seconds.
Use % (vs. secs) for Offset Entry:	<b>N</b>	Y/N: Y = Offset loaded as percent of 100. N = Offset loaded in seconds.
Use Fixed (vs. floating) Force Offs:	<b>Y</b>	Y/N: Y = Force offs are fixed to cycle. N=Force offs like max times, begin with green.
Permissive Type:	<b>0</b>	0-2: 0=Yield, 1= Single, 2= Multiple. See Permissives note below



**C/S TO TIMING PLAN (MM-3-2-9-6)**

**USE THIS CHART WHEN 4 SPLITS/CYCLE = Y**

SPLIT TO TIME PLAN	CYCLE	1	2	3	4	5	6
	SPLIT 1	<b>1</b>	<b>2</b>	<b>3</b>			
	SPLIT 2						
	SPLIT 3						
	SPLIT 4						

(0-4 = TIME PLAN IMPLEMENTED  
WHEN SPLIT IN EFFECT)

**CYCLES & OFFSETS (MM-3-2-4)**

**NOTE:** FIRST SPECIFY OFSET SEEKING MODE AND 4 SPLITS CYCLE MODE (ENHANCED OPTIONS, OPERATING MODES)

CYCLE & OFFSETS	Cycle #	1/1	2/1	3/1	4/1		
	Length	<b>70</b>	<b>90</b>	<b>90</b>			
	Offset 1	<b>24</b>	<b>10</b>	<b>53</b>			
	Offset 2						
	Offset 3						
	Offset 4						
	Offset 5						
	Max Dwell	<b>32</b>	<b>32</b>	<b>32</b>			

**COORD PHASES (MM-3-2-5)**

COORD PHASES	CYCLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	<b>1-1</b>		<b>X</b>															
	<b>2-1</b>		<b>X</b>															
	<b>3-1</b>		<b>X</b>															

Church / Sulphur Springs / Wilson  
**OFFSET SEEKING MODE (MM-3-2-7)**

Offset Seeking Mode:	<b>0</b>
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**CONTROLLER DATA**

4/09/21

**Mode**

- 0 Add only, cycle times 20% slow only to get in sync
- 1 Dwell, cycle timer stops at cycle 0 up to max dwell time to get in step
- 2 Short Route, cycle times 20% fast or slow--whichever gets in step fastest

**ENHANCED OPTIONS**

**OPERATING OPTIONS (MM-3-2-9-1)**

Enhanced Perm:	<b>Y</b>	Y/N: See note	Invert Free In:	<b>N</b>	Y/N: See note
Central Override:	<b>N</b>	Y/N: See note	Split Matrix:	<b>N</b>	Y/N: See note
No PCL Offset Adjust:	<b>N</b>	Y/N: See note	4 Splits/Cycle:	<b>Y</b>	Y/N: See note
			No Early Coord Ped:	<b>N</b>	Y/N: See note

Yeild Percent	<b>1</b>	0-10%: See note
EGB%	<b>0</b>	0-100%: See note
RGB%	<b>10</b>	0-100%: See note
# Cycles to out of step:	<b>0</b>	0-255: 0=Disable

**CYCLE SYNC OPTIONS (MM-3-2-9-2)**

Sync Source:	<b>0</b>	0-2, 0=TOD/CL/Interconnect, 1= City Zero, 2= Absolute
--------------	----------	---

Charts below only For City Zero offsets or Absolute (0's). These are not daily reference times for Sync Source Option 0 (see TOD).

Cycle 1:	<b>0</b>
Cycle 4:	<b>0</b>

Cycle 2:	<b>0</b>
Cycle 5:	<b>0</b>

Cycle 3:	<b>0</b>
Cycle 6:	<b>0</b>

**SET MANUAL MODE (MM-3-2-9-3-1)**

Auto Perm and FO:	<b>Y</b>	Y/N: Y = Perms & Force offs auto-calculated from phase allocations. N = Manually entered
Ped Perm:	<b>0</b>	0-255: 0 = Auto calculated. 1-255 = secs each ped perm, starting with vehicle permissives

**PHASE ALLOCATION (MM-3-2-6)**

PHASE ALLO-CATION	ENTRY IN:	Secs	% or Secs: Not a controller entry--for reference only. Controller entry is under basic options.														
	PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	C1 S1		40		30												
	C1 S2																
	C1 S3																
	C1 S4																
	C2 S1		55		35												
	C2 S2																
	C2 S3																
	C2 S4																
	C3 S1		55		35												
	C3 S2																
	C3 S3																
	C3 S4																
	C4 S1																
	C4 S2																
	C4 S3																
	C4 S4																

	HH	MM	CIRCUIT PLAN	C	O	S	CKT	ON/OFF
<b>1</b>	<b>00</b>	<b>00</b>					<b>11(FRE)</b>	<b>ON</b>
	<b>06</b>	<b>30</b>					<b>11(FRE)</b>	<b>OFF</b>
	<b>06</b>	<b>30</b>		<b>1</b>	<b>1</b>	<b>1</b>		
	<b>23</b>	<b>00</b>					<b>11(FRE)</b>	<b>ON</b>
<b>2</b>	<b>00</b>	<b>00</b>					<b>11(FRE)</b>	<b>ON</b>
	<b>06</b>	<b>30</b>					<b>11(FRE)</b>	<b>OFF</b>
	<b>06</b>	<b>30</b>		<b>2</b>	<b>1</b>	<b>1</b>		
	<b>09</b>	<b>30</b>		<b>1</b>	<b>1</b>	<b>1</b>		
	<b>15</b>	<b>30</b>		<b>3</b>	<b>1</b>	<b>1</b>		
	<b>18</b>	<b>00</b>		<b>1</b>	<b>1</b>	<b>1</b>		
	<b>23</b>	<b>00</b>					<b>11(FRE)</b>	<b>ON</b>

**WEEK PLANS (MM-3-3-3)**

Plan	SUN	MON	TUE	WED	THU	FRI	SAT
1	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
2							
3							
4							
5							

**CIRCUIT OVERRIDES (MM-3-3-6)**

For each circuit specify TOD (time of day controlled), or manually ON or OFF. Default = TOD

CIRCUIT OVER-RIDES	Circuit	65	66	67	68	69	70	71	72
	Function	LL1	LL2	LL3	LL4	LL5	LL6	LL7	LL8
	State								
	Circuit	<b>73</b>	74	75	76	<b>77</b>	78	79	80
	Function	<b>CN1</b>	CN2	CN3	CN4	<b>WRM</b>	MIN	DIM	CVS
	State	<b>ON</b>				<b>ON</b>			
CIRCUIT OVER-RIDES	Circuit	113	114	115	116	117	118	119	120
	Function	UD1	UD2	UD3	UD4	UD5	UD6	UD7	UD8
	State								
	Circuit	121	122	123	124	<b>125</b>	<b>126</b>	127	128
	Function	PH2	DP2	DP3	3CD	<b>EVL</b>	<b>EML</b>	ASC	DCP
	State					<b>ON</b>	<b>ON</b>		

**DAYLIGHT SAVINGS (MM-3-3-7)**

DAY LIGHT SAVINGS	Spring		Fall	
	(0-12)	(0-5)	(0-12)	(0-5)
	Month	WOM	Month	WOM
	<b>3</b>	<b>2</b>	<b>11</b>	<b>1</b>

Enter Month and Week of Month for Spring Forward and Fall Back days (typical 4 - 1 and 10 - 5). Unit will adjust at 2AM on Sunday of week specified. Enter zero (or leave blank) if Daylight Savings not used.

**SYNC REFERENCE MODE (MM-3-3-8)**

Mode:	<b>0</b>	0 = Time dependent, 1 = C/O/S Event
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	HH	MM	
Time Clock Reset:	<b>00</b>	<b>00</b>	TOD clock reset to by TBC input
Interrupter:	<b>N</b>		Y/N; Y = Interrupter pulses provided
Pulses:	<b>0</b>		0-6 = Number of interrupter pulses

TIME DEPENDENT CYCLE REFERENCES		HH	MM		HH	MM		HH	MM
	CYC 1:	<b>00</b>	<b>00</b>	CYC 2:	<b>00</b>	<b>00</b>	CYC 3:	<b>00</b>	<b>00</b>
	CYC 4:	<b>00</b>	<b>00</b>	CYC 5:	<b>00</b>	<b>00</b>	CYC 6:	<b>00</b>	<b>00</b>

When mode = Time dependent, enter reference times of day for each cycle. Default = 00:00 = midnight = most commonly used reference. When mode = C/O/S Event, cycle restarts on each COS change. Only use this mode for specific reasons. Time dependent most common used mode.

CLOSED LOOP ID	Master Type:	<b>1</b>	0 = None, 1 = 3000 Series Master, 2 = 3800 EL master
	Intersection ID		0-255
	Master Identification		0-255
	Allow Comm Xfer Between Ports 2 & 3		Y/N: Y = Incoming signal on Master port (2 or 3), gets echo'd on other port

**COMM SET-UP (MM-3-5-2)**

PG1 PORT ASSIGN	Master (CL) Port:		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used to receive Master Comm)
	Monitor Port		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used for Monitor Data Upload)
	Central Port:		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used for Direct Dial-up Modem)

PG2 PORT 2 SETUP	Data Rate:	<b>9600</b>	1200, 2400, 4800, 9600, 14400, 19200
	Parity	<b>0</b>	0 = None, 1 = Odd, 2=Even
	Data bits	<b>1</b>	0 = 7 bits, 1 = 8 bits

PG3 PORT 3 SETUP	Data Rate:	<b>1200</b>	1200, 2400, 4800, 9600, 14400, 19200
	Parity	<b>0</b>	0 = None, 1 = Odd, 2=Even
	Data bits	<b>1</b>	0 = 7 bits, 1 = 8 bits

PG4	Modem Set-up String:		Up to 40 charaters; A-Z, or # @ = , ! ; % \ &
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**PHONE NUMBERS (MM-3-5-3)**

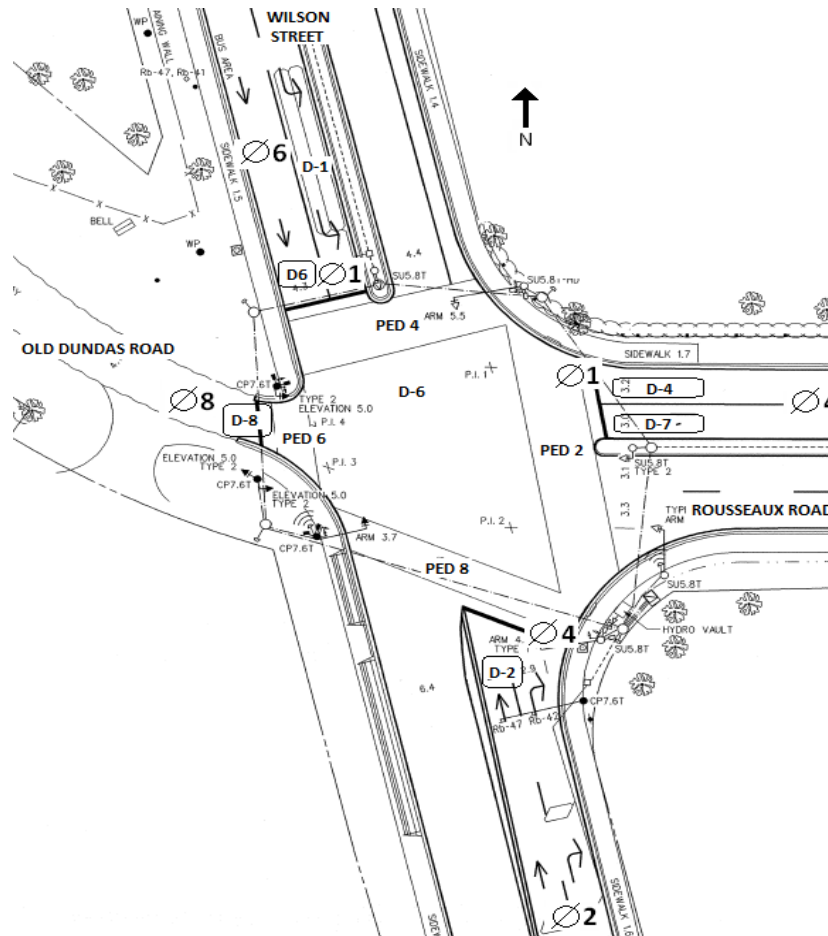
PHONE NUMBERS	Tone:		Y/N
	Phone 1:		Number & control characters (W , ; # ' / T P) if used
	Phone 2:		Number & control characters (W , ; # ' / T P) if used

**LOG DATA (MM-3-5-5)**

PG1 SAMPLE	Volume Log Sample period:	<b>60</b>	0, 6, 10, 15, 20, 30, 60 minutes, Enabled by TOD Ckt. 125 (EVL)
	MOE Log Sample period:	<b>60</b>	0, 6, 10, 15, 20, 30, 60 minutes, Enabled by TOD Ckt. 126 (EML)

# City of Hamilton - Traffic Traffic Signal Controller Timing Data

Intersection: **Old Dundas & Rousseaux & Wilson**  
 Controller Type: **3000E** Page 1 of 14  
 Programmed By: **JC** Installed By: \_\_\_\_\_  
 Date: **Feb 22/17** Date: \_\_\_\_\_



- φ1: Wilson - SBLT & WBRT
- φ2: Wilson - NB, East Xwalk
- φ3:
- φ4: Rousseaux - WB, North Xwalk & NBRT
- φ5:
- φ6: Wilson - SB, West Xwalk
- φ7:
- φ8: Old Ancaster/Dundas - EB, South Xwalk

**Flash Operation: Red: All Phases**

**SEQUENCE/START-UP (MM-3-1-1)**

**START-UP PHASES/INTERVAL/SEQUENCE**

(X = Enable for start-up phases. Must be compatible if more than one)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
START-UP	Phases		X			X											
	Interval	0	(0=Red, 1=Yel, 2= Grn, determines color of selected phases above on start-up)														
	Flash	10	(0-255 seconds start-up flash time)														
	Red	5.0	(0-25.5 secs = length of first red after start-up if start-up in yellow or red)														
	Sequence	5	(2=single ring, 3=dual ring, 4=123/567+48, 5=12/56+3478, 6=1234/56+78, 7=1234/5678, 8=dual quad, 9=12ph)														

**PHASE RING ASSIGNMENTS**

X = Phase assigned to ring (if used). Phases in different rings but same co-phase group can time together.

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

**CO-PHASE GRP 1-4 ASSIGNMENTS**

X = phase assigned to co-phase group. All ph's assigned to rings must be assigned to co-phase group.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CO-PHASE	CO PH 1	X	X			X										
	CO PH 2				X			X								
	CO PH 3															
	CO PH 4															



PHASE RECALLS/MODES; MIN, MAX, etc. (MM-3-1-2-1-PGDN, etc.)

USE 1 TO ALL 4 TIMING PLANS

		(X = ENABLE)															
		TP1 PHASE RECALLS															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL		X				X										
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK	X	X		X		X		X								
	VEH OMIT																
	PED OMIT	X															
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

		(X = ENABLE)															
		TP2 PHASE RECALLS															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL		X				X										
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK	X	X		X		X		X								
	VEH OMIT																
	PED OMIT	X															
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

**CONTROLLER DATA**

(X = ENABLE)

**TP3 PHASE RECALLS**

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL		X				X										
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK	X	X		X		X		X								
	VEH OMIT																
	PED OMIT	X															
	WLK REST																
	MAX II																
	RED REST																
NO SKIP																	

**PHASE RECALLS/MODES; CNA, INH MAX, PED OPTIONS, etc. (MM-3-1-2-2) ONLY 1 PLAN PER UNIT**

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	CNA 1																
	CNA 2																
	CNA 3																
	CNA 4																
	WRM																
	INH MAX																
	PED RECY																
	FL WALK																
	FDW->YEL																
	FDW->RED																
	COND PED																

		TP1															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial	<b>5</b>	<b>15</b>		<b>15</b>		<b>15</b>		<b>5</b>								
	Passage	<b>1.5</b>	<b>1.5</b>		<b>0.5</b>		<b>1.5</b>		<b>3.0</b>								
	Yellow	<b>3.0</b>	<b>3.3</b>		<b>3.3</b>		<b>3.3</b>		<b>3.0</b>								
	Red	<b>0.0</b>	<b>2.5</b>		<b>2.3</b>		<b>2.5</b>		<b>3.2</b>								
	Walk		<b>7</b>		<b>7</b>		<b>7</b>		<b>7</b>								
	Ped Clr		<b>19</b>		<b>12</b>		<b>5</b>		<b>17</b>								
	Max 1	<b>15</b>	<b>20</b>		<b>30</b>		<b>30</b>		<b>15</b>								
	Max 2																
	Mx 3 Lim	<b>25</b>	<b>30</b>		<b>40</b>		<b>50</b>		<b>25</b>								
	Mx 3 Adh	<b>3</b>	<b>3</b>		<b>3</b>		<b>3</b>		<b>3</b>								
	TBR																
	TTR																
	Min Gap																
	AI/Act																
Max In																	

**CONTROLLER DATA**

		TP2															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial	5	15		20		15		5								
	Passage	1.5	1.5		0.5		1.5		1.5								
	Yellow	3.0	3.3		3.3		3.3		3.0								
	Red	0.0	2.5		2.3		2.5		3.2								
	Walk		7		7		7		7								
	Ped Clr		19		12		5		17								
	Max 1	15	30		30		30		15								
	Max 2																
	Mx 3 Lim	30	40		30		40		30								
	Mx 3 Adh	5	5		5		5		5								
	TBR																
	TTR																
	Min Gap																
	AI/Act																
Max In																	

		TP3															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial	5	15		20		15		5								
	Passage	1.5	1.5		0.5		1.5		1.5								
	Yellow	3.0	3.3		3.3		3.3		3.0								
	Red	0.0	2.5		2.3		2.5		3.2								
	Walk		7		7		7		7								
	Ped Clr		19		12		5		17								
	Max 1	15	20		30		30		15								
	Max 2																
	Mx 3 Lim	30	30		40		40		30								
	Mx 3 Adh	5	5		5		5		5								
	TBR																
	TTR																
	Min Gap																
	AI/Act																
Max In																	

**VEHICLE DETECTOR ASSIGNMENTS (MM-3-1-4-1, PGDN etc.)**

(X = ASSIGN VEH DETECTOR TO THAT PHASE)

	DET/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VEH DET ASSIGN- MENTS	1	X															
	2		X														
	3								X								
	4				X												
	5		X														
	6						X										
	7				X												
	8								X								

**PED DETECTOR ASSIGNMENTS (MM-3-1-4-2)**

(X = ASSIGN PED DETECTOR TO THAT PHASE)

	DET/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PED DET ASSIGN- MENTS	1																
	2		X														
	3																
	4				X												
	5																
	6						X										
	7																
	8								X								

**DETECTOR MODES (MM-3-1-4-3)**

	DET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VEH DET MODES	Mode	0	0	0	1	0	0	2	0								

	DET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VEH DET LOCKS	Lock																

**DETECTOR TIMES (MM-3-1-4-4)**

	DET	1	2	3	4	5	6	7	8
DET TIMES	Delay	0	0	0	2	0	0	0	0
	Str/Stp							2	

	DET	9	10	11	12	13	14	15	16
DET TIMES	Delay								
	Str/Stp								

**DUAL ENTRY (MM-3-1-6)**

DUAL ENTRY ENABLE:	<b>Y</b>	Y/N: Y=Enable Dual Entry. Note this is only one setting even though it appears on each controller screen.
--------------------	----------	---

<b>PG1</b>	PH/CALLS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DUAL ENTRY ASSIGN- MENTS	1						X										
	2						X										
	3																
	4																
	5																
	6		X														
	7																
	8																

**ENHANCED OPTIONS**

**DYNAMIC OMITTS (MM-3-1-9-1-1)**

DYNAM OMITTS GP1 ENABLE:	<b>Y</b>	Y/N: Y=Enable. Note: This is one setting but appears on each screen. No input required for GP1.
--------------------------	----------	---

(X = ENABLE)

<b>GRP1-1</b>	FUNC/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DYNAM. OMITTS	OMIT PHS	<b>X</b>															
	IF PH ON		<b>X</b>				<b>X</b>										
ASSIGN-MENTS	OR O/L	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	GRN																

Select phases to be dynamically omitted from OMIT PHS row. Select the PH-ONs and/or O/L GRNs that will cause those omits. Phases are omitted when controller state matches IF PH ON row or O/L GRN row. Note that there are 2 groups of dynamic omits, each with 8 patterns. Group 1 is the default group and group 2 can be selected by input or TOD ckt 96. When a group is active, any one or all of the patterns within that group may be true depending on the controller state.

**DYNAMIC RECALLS (MM-3-1-9-1-2)**

DYN. RECALL GP1 ENABLE:	<b>Y</b>	Y/N: Y=Enable. Note: This is one setting but appears on each screen. No input required for GP1.
-------------------------	----------	---

(X = ENABLE)

	FUNC/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DYNAM. RECALLS	RCL PHS		<b>X</b>				<b>X</b>										
	IF PH ON	<b>X</b>															
ASSIGN-MENTS	OR O/L	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	GRN																

**SIMULTANEOUS GAP-OUT ENABLES (MM-3-1-9-4)**

Simultaneous Gap-Out Enable:	<b>Y</b>	Y/N; Y= Unit-Wide Enable for all enabled phases
------------------------------	----------	---

(X = ENABLE)

	FUNC/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SGO	Sim Gap		<b>X</b>				<b>X</b>										

**DETECTOR SWITCH AND COPY (MM-3-1-4-6-PGDN, etc.)**

Detector Switching	Enable	<b>Y</b>	Y/N; Y= Enable, detector switching per plans 1-16 is enabled
Detector Copy Group 1	Enable		Y/N; Y = Enable, detector copy per plans 1-16 is enabled
Detector Copy Group 2 Input	Eneble		Y/N; Y = Enable, the goupr 2 input is enabled. GP2 will then become selected copy group if input is active

	DET/PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DET SWITCH & COPY 1 of 16	Ph Grns																
	Switch (TS1)																
	G1 Copy																
	G2 Copy																

Notes: 1. Phase greens on "Switch" row apply to TS1 only, do not use for TS2  
 TS2 Det Switching requires "From" and "To" phases only -->

	Switch	G1C	G2C
From Ph:	<b>1</b>		
To Ph:	<b>2</b>		

**MAX 3 SET-UP (MM-3-1-9-5)**

**MAX-OUTS TO ADJUST MX3 (How many max-outs in a row will add one adjustment time to max)**

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

Shift Righth -->

**GAP OUTS TO ADJUST MX3 (How many gap-outs in a row will subtract one adjustment time from max)**

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

Shift Righth -->

Max 3 allows MAX timer to self-adjust based on Max-outs in a row or Gap-outs in a row. Starts with normal selected max time. If phase max's out X times in a row, one Max Adj time is added to max. This can continue up to Max Lim time. Once Max is extended by Max-outs, it can reduce back down by X gap-outs in row. Cannot reduce below normal selected Max setting. Max Lim and Max Adj times found under Phase Times.



**SELECTION SOURCE (MM-3-2-2)**

Entries determine how parameters get selected

Cycle Source:	<b>0</b>	0=TOD, 1=CL, 2=INT
Split Source:	<b>0</b>	0=TOD, 1=CL, 2=INT
Offset Source:	<b>0</b>	0=TOD, 1=CL, 2=INT

Free Source:	<b>0</b>	0=TOD, 1=CL, 2=INT
Flash Source:	<b>0</b>	0=TOD, 1=CL, 2=INT
Inter-TOD Revert:	<b>255</b>	0-255 SECS

TOD = Time of day control by internal clock, CL = Closed loop (comm), INT = Interconnect. Inter-TOD Revert is time allowed after failed interconnect before unit reverts to TOD (Time Base) control.

DAY PLANS (MM-3-3-1-#)

	HH	MM	CIRCUIT PLAN	C	O	S	CKT	ON/OFF
<b>1</b>	<b>00</b>	<b>00</b>					<b>11(FRE)</b>	<b>ON</b>
	<b>00</b>	<b>00</b>					<b>95(DM3)</b>	<b>ON</b>
	<b>06</b>	<b>00</b>					<b>95(DM3)</b>	<b>OFF</b>
	<b>22</b>	<b>00</b>					<b>95(DM3)</b>	<b>ON</b>
<b>2</b>	<b>00</b>	<b>00</b>					<b>11(FRE)</b>	<b>ON</b>
	<b>00</b>	<b>00</b>					<b>95(DM3)</b>	<b>ON</b>
	<b>06</b>	<b>00</b>					<b>95(DM3)</b>	<b>OFF</b>
	<b>06</b>	<b>00</b>					<b>14(TP2)</b>	<b>ON</b>
	<b>10</b>	<b>00</b>					<b>14(TP2)</b>	<b>OFF</b>
	<b>14</b>	<b>30</b>					<b>15(TP3)</b>	<b>ON</b>
	<b>18</b>	<b>30</b>					<b>15(TP3)</b>	<b>OFF</b>
	<b>22</b>	<b>00</b>					<b>95(DM3)</b>	<b>ON</b>

WEEK PLANS (MM-3-3-3)

Plan	SUN	MON	TUE	WED	THU	FRI	SAT
<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
2							
3							
4							
5							

**CIRCUIT OVERRIDES (MM-3-3-6)**

For each circuit specify TOD (time of day controlled), or manually ON or OFF. Default = TOD

CIRCUIT OVER- RIDES	Circuit	81	82	83	84	85	86	87	88
	Function	TIA	TIB	TIC	N/U	N/U	N/U	PR1	PR2
	State								
	Circuit	89	90	91	92	93	94	95	96
	Function	OR1	OR2	RR1	RR2	M21	M22	DM3	GR2
	State								
CIRCUIT OVER- RIDES	Circuit	113	114	115	116	117	118	119	120
	Function	UD1	UD2	UD3	UD4	UD5	UD6	UD7	UD8
	State								
	Circuit	121	122	123	124	<b>125</b>	<b>126</b>	127	128
	Function	PH2	DP2	DP3	3CD	<b>EVL</b>	<b>EML</b>	ASC	DCP
	State					<b>ON</b>	<b>ON</b>		

**DAYLIGHT SAVINGS (MM-3-3-7)**

DAY LIGHT SAVINGS	Spring		Fall	
	(0-12)	(0-5)	(0-12)	(0-5)
	Month	WOM	Month	WOM
	<b>3</b>	<b>2</b>	<b>11</b>	<b>1</b>

Enter Month and Week of Month for Spring Forward and Fall Back days (typical 4 - 1 and 10 - 5). Unit will adjust at 2AM on Sunday of week specified. Enter zero (or leave blank) if Daylight Savings not used.

**SYNC REFERENCE MODE (MM-3-3-8)**

Mode:	<b>0</b>	0 = Time dependent, 1 = C/O/S Event
-------	----------	-------------------------------------

Time Clock Reset:	HH: <b>00</b>	MM: <b>00</b>	TOD clock reset to by TBC input
Interrupter:	<b>N</b> Y/N; Y = Interrupter pulses provided		
Pulses:	<b>0</b> 0-6 = Number of interrupter pulses		

TIME DEPENDENT CYCLE REFERENCES	CYC 1:	HH: <b>00</b>	MM: <b>00</b>	CYC 2:	HH: <b>00</b>	MM: <b>00</b>	CYC 3:	HH: <b>00</b>	MM: <b>00</b>
	CYC 4:	HH: <b>00</b>	MM: <b>00</b>	CYC 5:	HH: <b>00</b>	MM: <b>00</b>	CYC 6:	HH: <b>00</b>	MM: <b>00</b>

When mode = Time dependent, enter reference times of day for each cycle. Default = 00:00 = midnight = most commonly used reference. When mode = C/O/S Event, cycle restarts on each COS change. Only use this mode for specific reasons. Time dependent most common used mode.

**CLOSED LOOP ID (MM-3-5-1)**

CLOSED LOOP ID	Master Type:	<b>1</b>	0 = None, 1 = 3000 Series Master, 2 = 3800 EL master
	Intersection ID		0-255
	Master Identification		0-255
	Allow Comm Xfer Between Ports 2 & 3		Y/N: Y = Incoming signal on Master port (2 or 3), gets echo'd on other port

**COMM SET-UP (MM-3-5-2)**

PG1 PORT ASSIGN	Master (CL) Port:		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used to receive Master Comm)
	Monitor Port		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used for Monitor Data Upload)
	Central Port:		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used for Direct Dial-up Modem)

PG2 PORT 2 SETUP	Data Rate:		1200, 2400, 4800, 9600, 14400, 19200
	Parity		0 = None, 1 = Odd, 2=Even
	Data bits		0 = 7 bits, 1 = 8 bits

PG3 PORT 3 SETUP	Data Rate:		1200, 2400, 4800, 9600, 14400, 19200
	Parity		0 = None, 1 = Odd, 2=Even
	Data bits		0 = 7 bits, 1 = 8 bits

PG4	Modem Set-up String:		Up to 40 charaters; A-Z, or # @ = , ! ; % \ &
-----	----------------------	--	---

**PHONE NUMBERS (MM-3-5-3)**

PHONE NUMBERS	Tone:		Y/N
	Phone 1:		Number & control characters (W , ; # ' / T P) if used
	Phone 2:		Number & control characters (W , ; # ' / T P) if used

**LOG DATA (MM-3-5-5)**

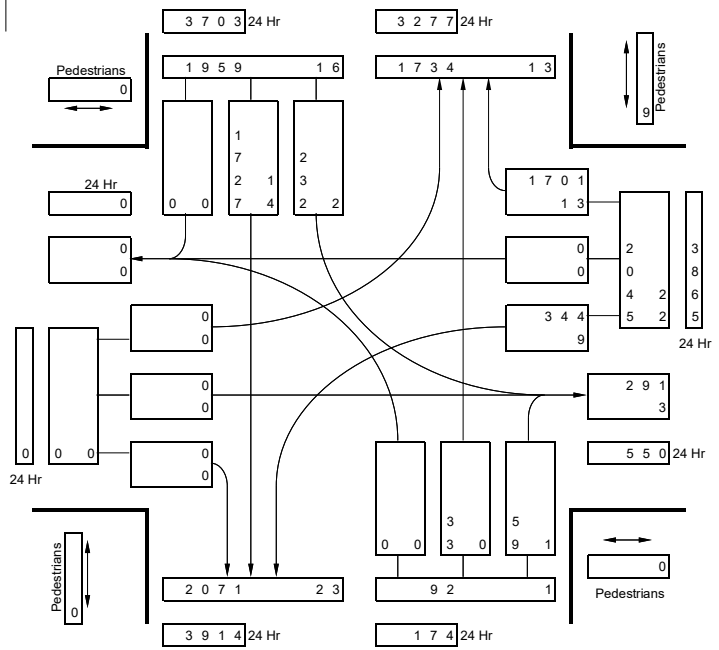
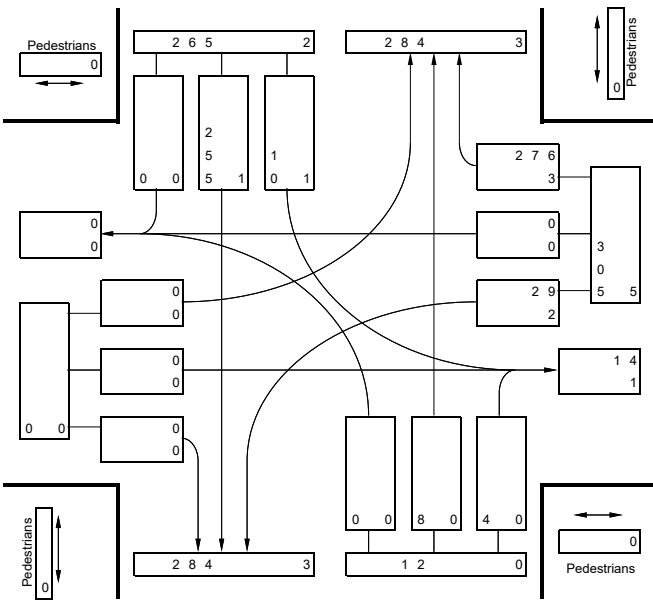
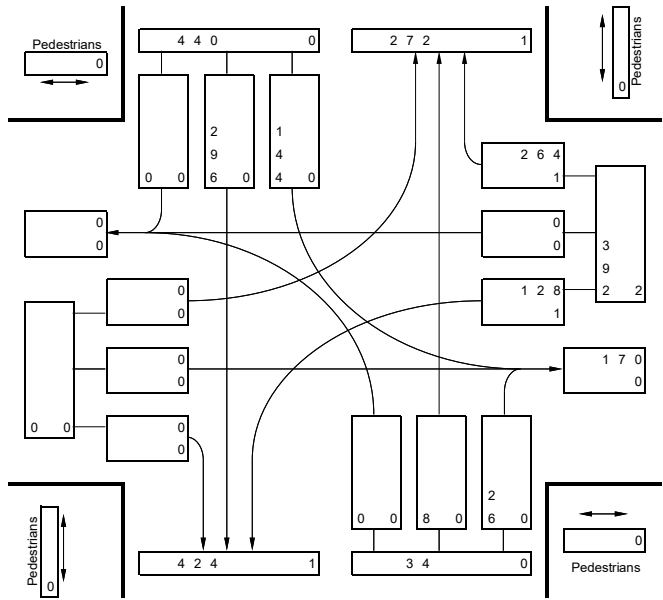
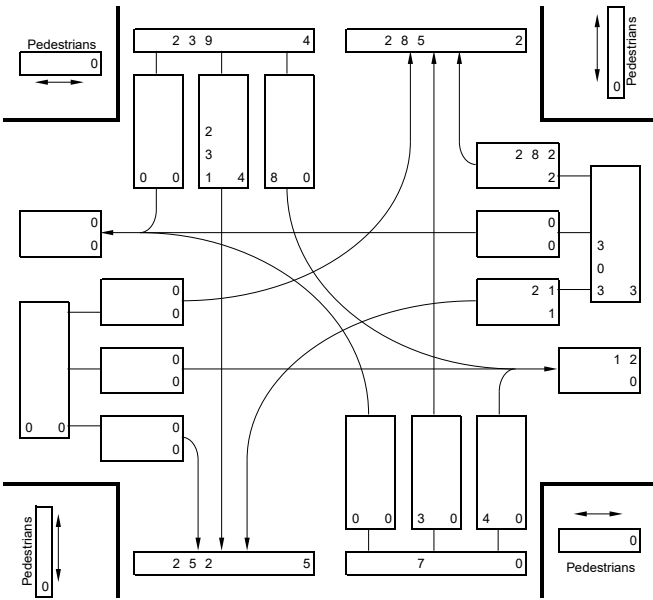
PG1 SAMPLE	Volume Log Sample period:	<b>60</b>	0, 6, 10, 15, 20, 30, 60 minutes, Enabled by TOD Ckt. 125 (EVL)
	MOE Log Sample period:	<b>60</b>	0, 6, 10, 15, 20, 30, 60 minutes, Enabled by TOD Ckt. 126 (EML)

Intersection: **Montgomery Dr**  
Direction: (East/West)  
Road Condition: Dry  
Comments:

at **Old Dundas Rd**  
(North/South)  
Weather: Clear

Total Vehicles: 4,096  
M.V.E./Year: 2.632  
AWDT Factor: 1.89

Date: Thursday  
Jun 21, 2018  
Period: 7 hours



7 Hr & 24 Hr TOTAL VOLUMES





Intersection: Church St/Sulphur Springs Rd at

Wilson St E (North/South)

Total Vehicles: 8,159 M.V.E./Year: 5.493 AWDT Factor: 1.98

Date: Tuesday Jun 18, 2019 Period: 7 hours

Direction: (East/West) Weather: Clear

Road Condition: Dry

Comments:

Table with 16 columns: 15 mins. Ending (Pk.Hr.\*), North Bd. on N/S (L, S, R), East Bd. on E/W (L, S, R), South Bd. on N/S (L, S, R), West Bd. on E/W (L, S, R), Total Veh's, Pedestrians (N side, E side, S side, W side). Rows include hourly intervals from 7:15 to 18:00 and a TOTAL row.

Summary row for APPR. with values: 2,917, 1,654, 3,236, 352, 8,159, 165.

Table titled 'TRUCKS & BUSES' with the same column structure as the total vehicles table. Rows include hourly intervals from 7:15 to 18:00 and a TOTAL row.

Summary row for APPR. with values: 89, 35, 101, 7, 232.

Table titled 'TRUCKS' with the same column structure as the total vehicles table. Rows include hourly intervals from 7:15 to 18:00 and a TOTAL row.

Summary row for APPR. with values: 56, 24, 72, 4, 156.



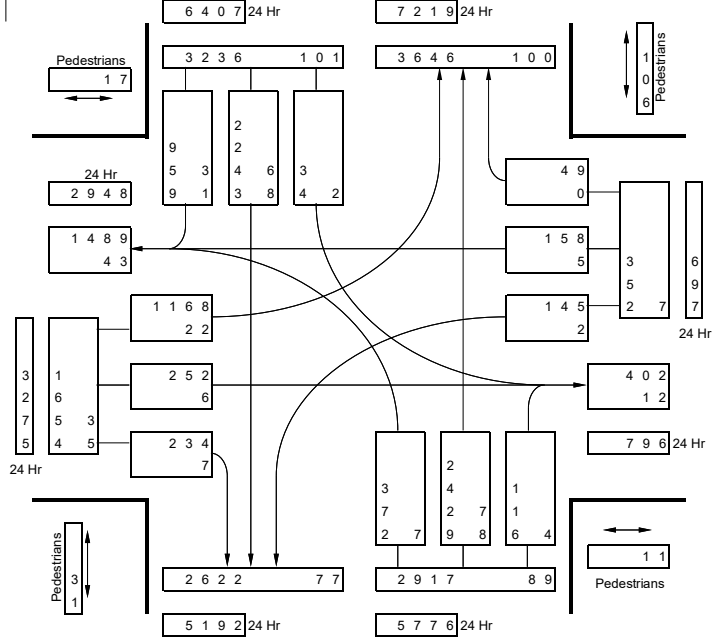
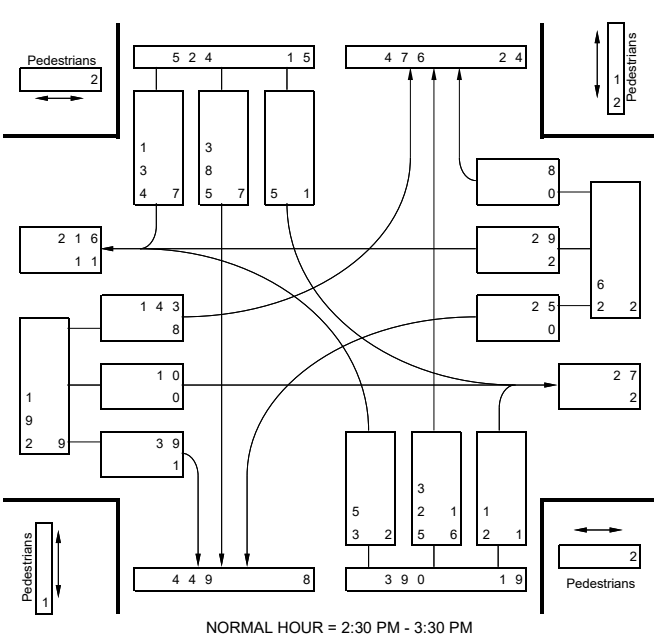
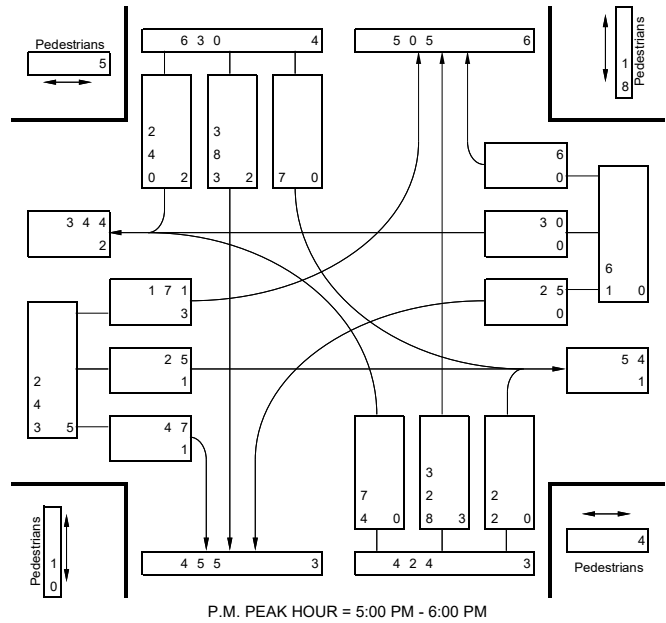
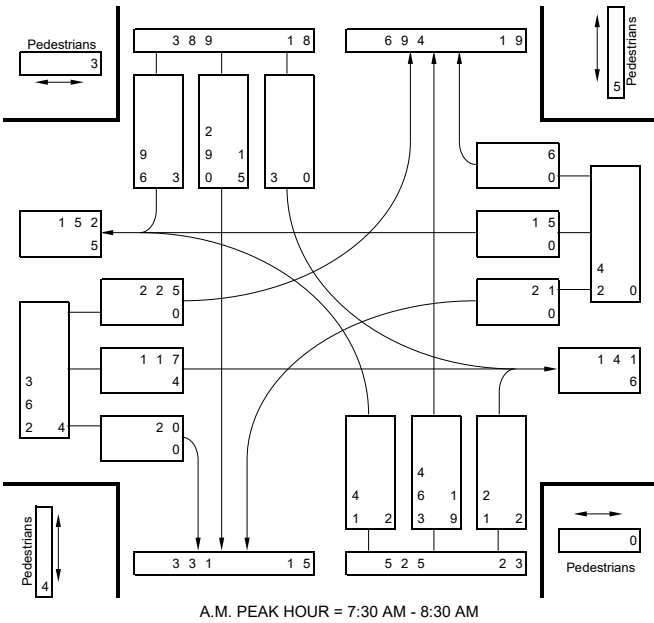
Intersection: **Church St/Sulphur Springs Rd** at  
 Direction: (East/West)  
 Road Condition: Dry  
 Comments:

**Wilson St E**  
 (North/South)

Weather: Clear

Total Vehicles: 8,159  
 M.V.E./Year: 5,493  
 AWDT Factor: 1.98

Date: Tuesday  
 Jun 18, 2019  
 Period: 7 hours



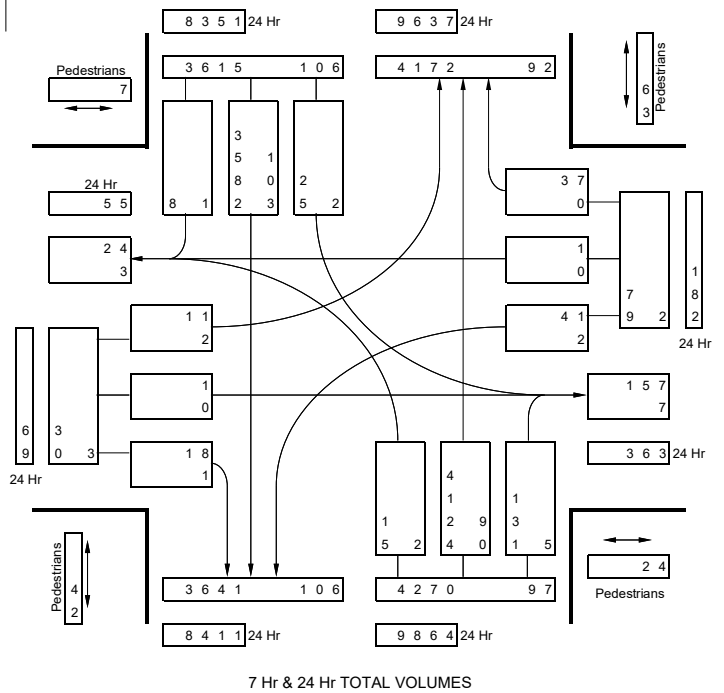
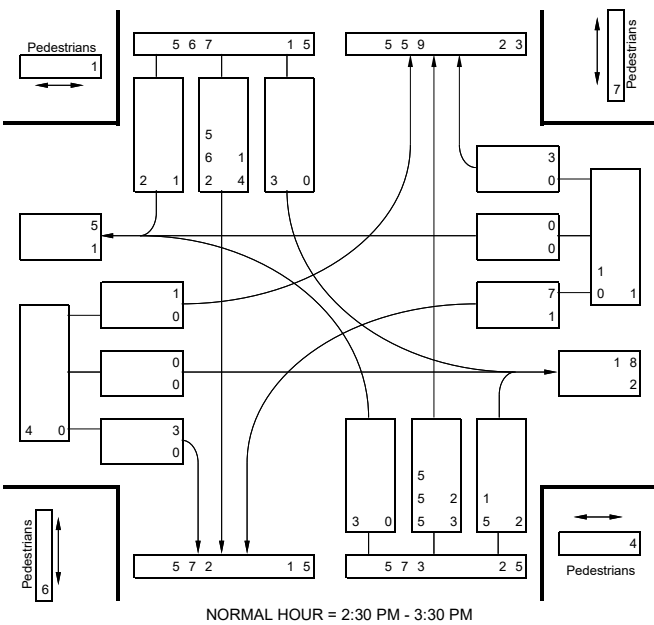
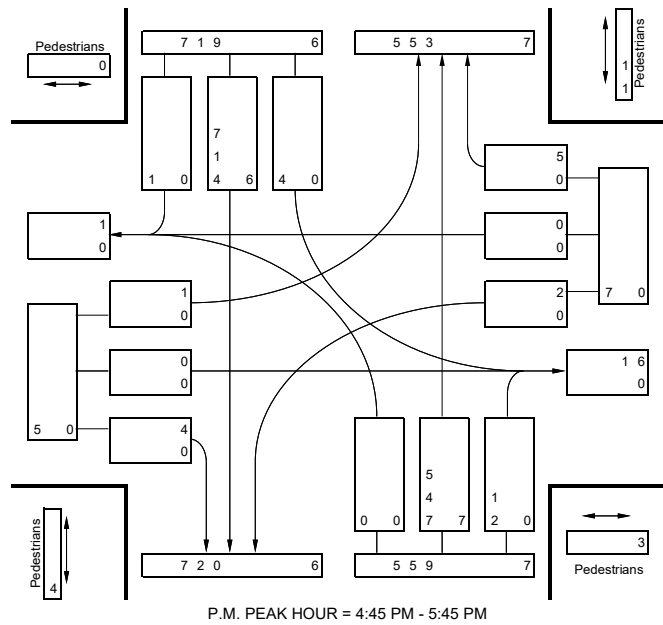
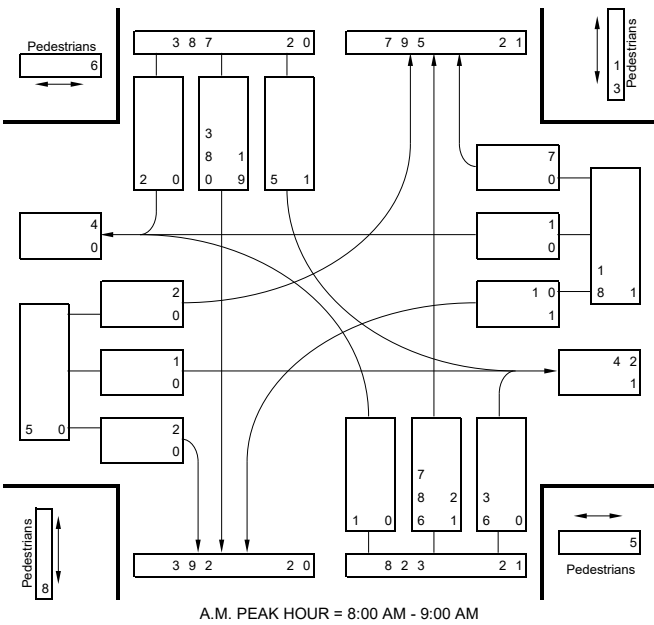


Intersection: **Academy St**  
 Direction: (East/West)  
 Road Condition: Wet  
 Comments:

at **Wilson St E**  
 (North/South)  
 Weather: Overcast

Total Vehicles: 7,994  
 M.V.E./Year: 6.278  
 AWDT Factor: 2.31

Date: Tuesday  
 Mar 3, 2020  
 Period: 7 hours





Intersection: Academy St at Wilson St E  
Direction: (East/West)  
Road Condition: Wet  
Comments:

Weather: Overcast

Total Vehicles: 8,920

Date: Tuesday  
Mar 3, 2020  
Period: 8 hours

Table with columns: 15 mins. Ending, North Bd. on N/S, East Bd. on E/W, South Bd. on N/S, West Bd. on E/W, Total Veh's, Pedestrians (N side, E side, S side, W side). Rows include time intervals from 7:15 to 19:00 and a TOTAL row.

TRUCKS & BUSES summary row with totals and APPR. values.

Table with columns: 15 mins. Ending, North Bd. on N/S, East Bd. on E/W, South Bd. on N/S, West Bd. on E/W, Total. Rows include time intervals from 7:15 to 19:00 and a TOTAL row.

TRUCKS summary row with totals and APPR. values.

Table with columns: 15 mins. Ending, North Bd. on N/S, East Bd. on E/W, South Bd. on N/S, West Bd. on E/W, Total. Rows include time intervals from 7:15 to 19:00 and a TOTAL row.

TRUCKS summary row with totals and APPR. values.

Intersection: Old Dundas Rd/Rousseau St at

Wilson St E

Total Vehicles: 13,861

Date: Tuesday

Direction: (East/West)

(North/South)

M.V.E./Year: 9.897

Nov 10, 2020

Road Condition: Dry

Weather: Clear

AWDT Factor: 2.1

Period: 7 hours

Comments:

Table with columns: 15 mins. Ending (Pk.Hr.), North Bd. on N/S, East Bd. on E/W, South Bd. on N/S, West Bd. on E/W, Total Veh's, Pedestrians (N side, E side, S side, W side). Rows include time intervals from 7:15 to 18:00 and a TOTAL/APPR. row.

TRUCKS & BUSES

Table with columns: 15 mins. Ending (Pk.Hr.), North Bd. on N/S, East Bd. on E/W, South Bd. on N/S, West Bd. on E/W, Total. Rows include time intervals from 7:15 to 18:00 and a TOTAL/APPR. row.

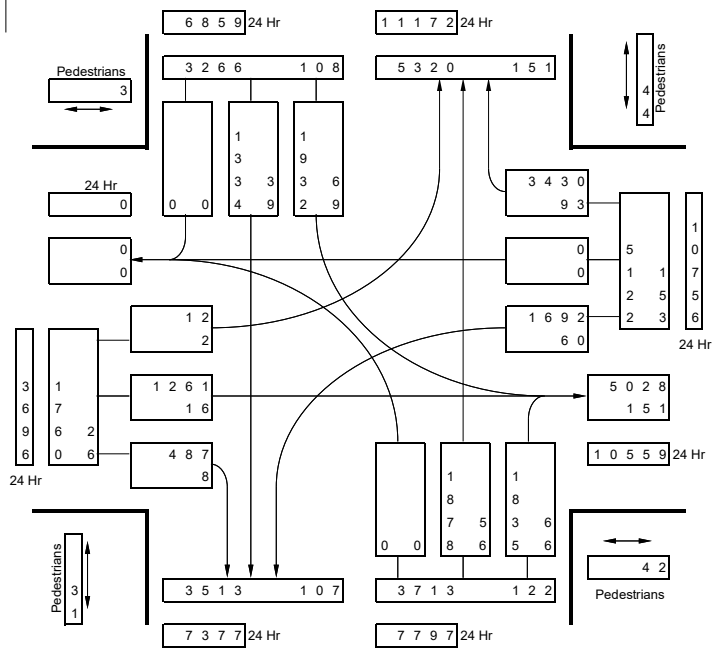
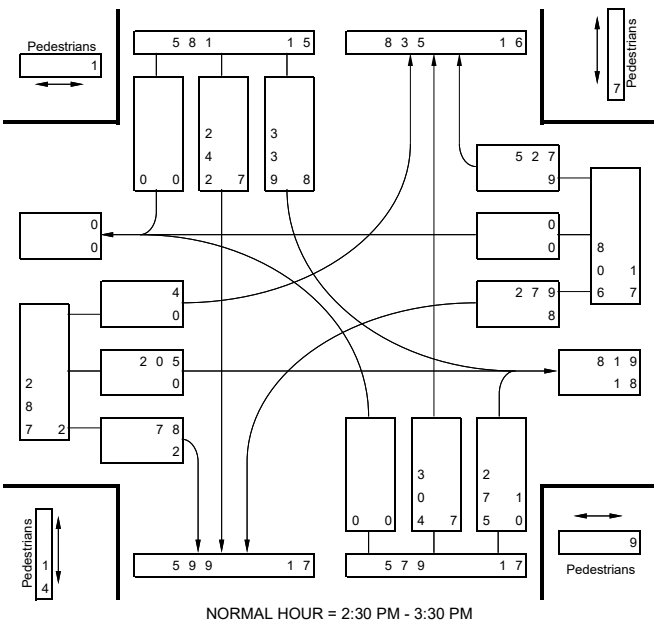
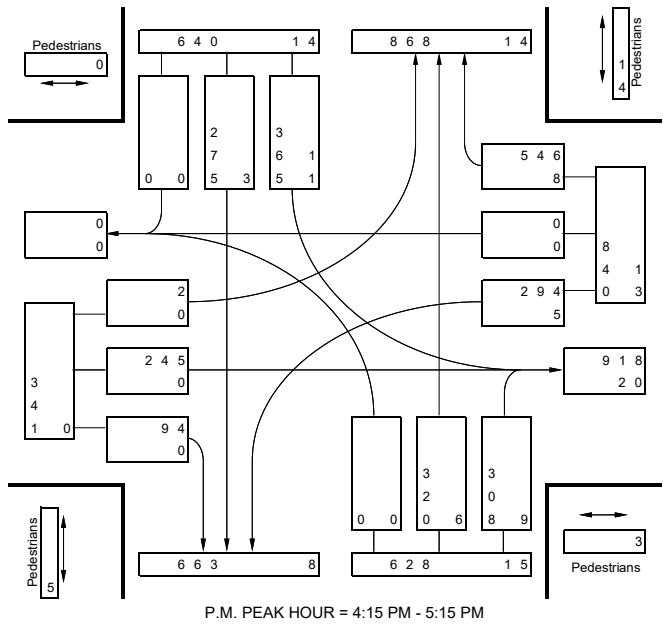
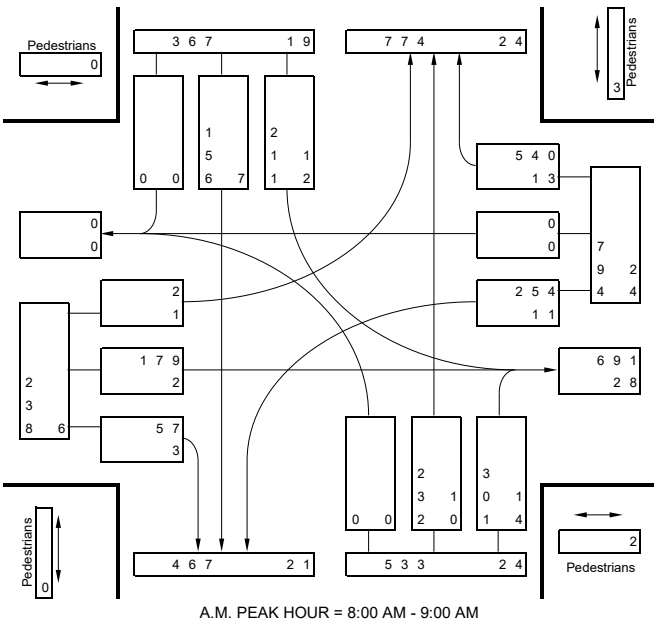
TRUCKS

Table with columns: 15 mins. Ending (Pk.Hr.), North Bd. on N/S, East Bd. on E/W, South Bd. on N/S, West Bd. on E/W, Total. Rows include time intervals from 7:15 to 18:00 and a TOTAL/APPR. row.

Intersection: Old Dundas Rd/Rousseau St at Wilson St E
Direction: (East/West) (North/South)
Road Condition: Dry Weather: Clear
Comments: COUNT CONDUCTED DURING COVID-19 PANDEMIC

Total Vehicles: 13,861
M.V.E./Year: 9.897
AWDT Factor: 2.1

Date: Tuesday
Nov 10, 2020
Period: 7 hours



7 Hr & 24 Hr TOTAL VOLUMES





# **APPENDIX B**

## **Existing Traffic Level of Service Calculations**

Queues

3: wilson st e & old dundas rd/rousseau st

4/28/2021



Lane Group	EBT	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	259	276	587	252	327	229	170
Act Effct Green (s)	25.4	26.1	26.1	18.4	18.4	36.1	33.4
Actuated g/C Ratio	0.36	0.37	0.37	0.26	0.26	0.51	0.47
v/c Ratio	0.41	0.73	0.63	0.54	0.51	0.41	0.20
Control Delay	18.5	33.1	5.2	30.0	6.4	13.7	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.5	33.1	5.2	30.0	6.4	13.7	13.1
LOS	B	C	A	C	A	B	B
Approach Delay	18.5			16.7			13.4
Approach LOS	B			B			B
Queue Length 50th (m)	22.2	29.5	0.0	29.8	0.0	17.0	13.1
Queue Length 95th (m)	48.7	#70.3	19.9	59.4	18.8	34.1	27.2
Internal Link Dist (m)	62.8			336.7			214.5
Turn Bay Length (m)		48.0			112.0		
Base Capacity (vph)	872	521	1062	638	753	699	1303
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.53	0.55	0.39	0.43	0.33	0.13

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 71.1

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 15.2

Intersection LOS: B

Intersection Capacity Utilization 73.6%

ICU Level of Service D

Analysis Period (min) 15





















# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

















## 3: wilson st e & old dundas rd/rousseau st

4/28/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	2	179	57	254	0	540	0	232	301	211	156	0	
Future Volume (vph)	2	179	57	254	0	540	0	232	301	211	156	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		6.2		5.6		5.6		5.8	5.8	3.0	5.6		
Lane Util. Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00		
Frt		0.97		1.00		0.85		1.00	0.85	1.00	1.00		
Flt Protected		1.00		0.95		1.00		1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1742		1711		1531		1801	1531	1711	1801		
Flt Permitted		1.00		0.57		1.00		1.00	1.00	0.44	1.00		
Satd. Flow (perm)		1742		1035		1531		1801	1531	801	1801		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	2	195	62	276	0	587	0	252	327	229	170	0	
RTOR Reduction (vph)	0	12	0	0	0	370	0	0	241	0	0	0	
Lane Group Flow (vph)	0	247	0	276	0	217	0	252	86	229	170	0	
Turn Type	Perm	NA		Perm		Perm		NA	Perm	pm+pt	NA		
Protected Phases		4						2		1	6		
Permitted Phases	4			8		8			2	6			
Actuated Green, G (s)		25.5		26.1		26.1		18.5	18.5	33.4	33.4		
Effective Green, g (s)		25.5		26.1		26.1		18.5	18.5	33.4	33.4		
Actuated g/C Ratio		0.36		0.37		0.37		0.26	0.26	0.47	0.47		
Clearance Time (s)		6.2		5.6		5.6		5.8	5.8	3.0	5.6		
Vehicle Extension (s)		3.0		3.0		3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)		628		382		565		471	400	529	850		
v/s Ratio Prot								c0.14		c0.07	0.09		
v/s Ratio Perm		0.14		c0.27		0.14			0.06	0.13			
v/c Ratio		0.39		0.72		0.38		0.54	0.21	0.43	0.20		
Uniform Delay, d1		16.8		19.2		16.4		22.4	20.4	11.7	10.9		
Progression Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2		0.4		6.6		0.4		1.2	0.3	0.6	0.1		
Delay (s)		17.2		25.8		16.8		23.6	20.7	12.2	11.0		
Level of Service		B		C		B		C	C	B	B		
Approach Delay (s)		17.2			19.7			21.9			11.7		
Approach LOS		B			B			C			B		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			18.5									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.61										
Actuated Cycle Length (s)			70.7									Sum of lost time (s)	15.0
Intersection Capacity Utilization			73.6%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis  
6: wilson st e & existing retail access /academy st

4/28/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	2	10	1	7	1	786	36	5	380	2
Future Volume (Veh/h)	2	1	2	10	1	7	1	786	36	5	380	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	1	2	11	1	8	1	854	39	5	413	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)												
								280			361	
pX, platoon unblocked	0.79	0.79		0.79	0.79	0.79				0.79		
vC, conflicting volume	1308	1319	414	1302	1300	874	415			893		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1258	1272	414	1250	1248	709	415			734		
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	99	100	91	99	98	100			99		
cM capacity (veh/h)	113	132	638	117	136	344	1144			690		
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	5	20	894	420								
Volume Left	2	11	1	5								
Volume Right	2	8	39	2								
cSH	176	160	1144	690								
Volume to Capacity	0.03	0.12	0.00	0.01								
Queue Length 95th (m)	0.7	3.2	0.0	0.2								
Control Delay (s)	26.1	30.7	0.0	0.2								
Lane LOS	D	D	A	A								
Approach Delay (s)	26.1	30.7	0.0	0.2								
Approach LOS	D	D										
Intersection Summary												
Average Delay			0.6									
Intersection Capacity Utilization			54.1%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues

8: wilson st e & sulphur springs rd/church st

4/28/2021



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	394	46	45	526	3	315	104
Act Effct Green (s)	24.0	24.0	30.7	30.7	30.7	30.7	30.7
Actuated g/C Ratio	0.37	0.37	0.47	0.47	0.47	0.47	0.47
v/c Ratio	0.77	0.09	0.10	0.63	0.01	0.37	0.13
Control Delay	30.4	12.9	10.6	17.1	9.7	12.9	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.4	12.9	10.6	17.1	9.7	12.9	2.9
LOS	C	B	B	B	A	B	A
Approach Delay	30.4	12.9		16.6		10.4	
Approach LOS	C	B		B		B	
Queue Length 50th (m)	39.7	2.9	2.9	45.8	0.2	23.7	0.0
Queue Length 95th (m)	#86.8	9.4	8.0	74.1	1.4	39.9	6.6
Internal Link Dist (m)	250.6	192.9		295.0		255.6	
Turn Bay Length (m)			40.0		52.0		70.0
Base Capacity (vph)	530	528	728	1357	453	1365	1186
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.09	0.06	0.39	0.01	0.23	0.09

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 65.5

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 18.5

Intersection LOS: B

Intersection Capacity Utilization 71.7%

ICU Level of Service C

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 8: wilson st e & sulphur springs rd/church st

4/28/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	225	117	20	21	15	6	41	463	21	3	290	96
Future Volume (vph)	225	117	20	21	15	6	41	463	21	3	290	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.99			0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1733			1721		1711	1789		1711	1801	1531
Flt Permitted		0.78			0.79		0.53	1.00		0.33	1.00	1.00
Satd. Flow (perm)		1400			1388		959	1789		599	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	127	22	23	16	7	45	503	23	3	315	104
RTOR Reduction (vph)	0	3	0	0	4	0	0	3	0	0	0	55
Lane Group Flow (vph)	0	391	0	0	42	0	45	523	0	3	315	49
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		24.0			24.0		30.7	30.7		30.7	30.7	30.7
Effective Green, g (s)		24.0			24.0		30.7	30.7		30.7	30.7	30.7
Actuated g/C Ratio		0.37			0.37		0.47	0.47		0.47	0.47	0.47
Clearance Time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		513			509		450	839		281	845	718
v/s Ratio Prot								c0.29			0.17	
v/s Ratio Perm		c0.28			0.03		0.05			0.01		0.03
v/c Ratio		0.76			0.08		0.10	0.62		0.01	0.37	0.07
Uniform Delay, d1		18.2			13.5		9.7	13.0		9.3	11.2	9.5
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		6.6			0.1		0.1	1.5		0.0	0.3	0.0
Delay (s)		24.8			13.6		9.8	14.5		9.3	11.4	9.5
Level of Service		C			B		A	B		A	B	A
Approach Delay (s)		24.8			13.6			14.1			11.0	
Approach LOS		C			B			B			B	

### Intersection Summary

HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	65.4	Sum of lost time (s)	10.7
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# Queues

## 3: wilson st e & old dundas rd/rousseau st

4/28/2021



Lane Group	EBT	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	370	320	593	348	335	397	299
Act Effct Green (s)	23.6	21.6	48.8	23.1	23.1	50.2	47.6
Actuated g/C Ratio	0.22	0.20	0.45	0.21	0.21	0.47	0.44
v/c Ratio	0.94	0.93	0.58	0.90	0.57	0.93	0.38
Control Delay	74.3	78.0	4.2	69.1	8.1	54.7	21.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.3	78.0	4.2	69.1	8.1	54.7	21.8
LOS	E	E	A	E	A	D	C
Approach Delay	74.3			39.2			40.6
Approach LOS	E			D			D
Queue Length 50th (m)	75.9	68.3	0.4	72.9	0.0	62.1	41.5
Queue Length 95th (m)	#133.0	#120.3	19.2	#122.6	23.1	#118.5	62.6
Internal Link Dist (m)	62.8			336.7			214.5
Turn Bay Length (m)		48.0			112.0		
Base Capacity (vph)	400	350	1024	406	604	438	829
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.91	0.58	0.86	0.55	0.91	0.36

### Intersection Summary

Cycle Length: 110.2

Actuated Cycle Length: 107.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 41.3

Intersection LOS: D

Intersection Capacity Utilization 88.7%

ICU Level of Service E

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 3: wilson st e & old dundas rd/rousseau st

4/28/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↖		↗		↑	↗	↖	↑	
Traffic Volume (vph)	2	245	94	294	0	546	0	320	308	365	275	0
Future Volume (vph)	2	245	94	294	0	546	0	320	308	365	275	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6	
Lane Util. Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00	
Frt		0.96		1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1733		1711		1531		1801	1531	1711	1801	
Flt Permitted		1.00		0.95		1.00		1.00	1.00	0.19	1.00	
Satd. Flow (perm)		1733		1711		1531		1801	1531	335	1801	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	266	102	320	0	593	0	348	335	397	299	0
RTOR Reduction (vph)	0	12	0	0	0	322	0	0	263	0	0	0
Lane Group Flow (vph)	0	358	0	320	0	271	0	348	72	397	299	0
Turn Type	Perm	NA		Prot		Perm		NA	Perm	pm+pt	NA	
Protected Phases		4		3				2		1	6	
Permitted Phases	4					8			2	6		
Actuated Green, G (s)		23.6		21.6		48.8		23.1	23.1	47.6	47.6	
Effective Green, g (s)		23.6		21.6		48.8		23.1	23.1	47.6	47.6	
Actuated g/C Ratio		0.22		0.20		0.45		0.21	0.21	0.44	0.44	
Clearance Time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6	
Vehicle Extension (s)		3.0		3.0		3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		380		343		694		386	328	420	796	
v/s Ratio Prot				c0.19				0.19		c0.19	0.17	
v/s Ratio Perm		0.21				0.18			0.05	c0.23		
v/c Ratio		0.94		0.93		0.39		0.90	0.22	0.95	0.38	
Uniform Delay, d1		41.3		42.3		19.5		41.1	34.8	27.1	20.1	
Progression Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		31.3		31.6		0.4		23.5	0.3	30.1	0.3	
Delay (s)		72.6		73.9		19.9		64.6	35.2	57.2	20.4	
Level of Service		E		E		B		E	D	E	C	
Approach Delay (s)		72.6			38.8			50.2			41.4	
Approach LOS		E			D			D			D	

### Intersection Summary

















HCM 2000 Control Delay	47.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	107.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



HCM Unsignalized Intersection Capacity Analysis  
 6: wilson st e & exsting retail access /academy st

4/28/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	4	2	0	5	0	547	12	4	714	1
Future Volume (Veh/h)	1	0	4	2	0	5	0	547	12	4	714	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	4	2	0	5	0	595	13	4	776	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)								280			361	
pX, platoon unblocked	0.94	0.94	0.92	0.94	0.94	0.95	0.92			0.95		
vC, conflicting volume	1391	1392	776	1390	1386	602	777			608		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1262	1263	709	1261	1257	553	710			560		
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	99	99	100	99	100			100		
cM capacity (veh/h)	136	159	397	137	160	505	814			959		
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	5	7	608	781								
Volume Left	1	2	0	4								
Volume Right	4	5	13	1								
cSH	287	285	814	959								
Volume to Capacity	0.02	0.02	0.00	0.00								
Queue Length 95th (m)	0.4	0.6	0.0	0.1								
Control Delay (s)	17.8	17.9	0.0	0.1								
Lane LOS	C	C		A								
Approach Delay (s)	17.8	17.9	0.0	0.1								
Approach LOS	C	C										
<b>Intersection Summary</b>												
Average Delay			0.2									
Intersection Capacity Utilization			50.8%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues

8: wilson st e & sulphur springs rd/church st

4/28/2021



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	264	67	80	381	8	416	261
Act Effct Green (s)	16.1	16.1	30.2	30.2	30.2	30.2	30.2
Actuated g/C Ratio	0.28	0.28	0.53	0.53	0.53	0.53	0.53
v/c Ratio	0.70	0.16	0.18	0.40	0.02	0.44	0.28
Control Delay	27.4	14.3	9.9	10.6	8.6	11.2	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	14.3	9.9	10.6	8.6	11.2	2.4
LOS	C	B	A	B	A	B	A
Approach Delay	27.4	14.3		10.5		7.8	
Approach LOS	C	B		B		A	
Queue Length 50th (m)	22.7	4.6	3.9	20.6	0.4	23.5	0.0
Queue Length 95th (m)	43.2	11.7	12.8	48.2	2.4	53.9	10.2
Internal Link Dist (m)	250.6	192.9		295.0		255.6	
Turn Bay Length (m)			40.0		52.0		70.0
Base Capacity (vph)	579	654	745	1562	794	1576	1372
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.10	0.11	0.24	0.01	0.26	0.19

Intersection Summary

Cycle Length: 85	
Actuated Cycle Length: 57.1	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 83.7%	ICU Level of Service E
Analysis Period (min) 15	

# HCM Signalized Intersection Capacity Analysis

## 8: wilson st e & sulphur springs rd/church st

4/28/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	171	25	47	25	30	6	74	328	22	7	383	240
Future Volume (vph)	171	25	47	25	30	6	74	328	22	7	383	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97			0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1694			1740		1711	1784		1711	1801	1531
Flt Permitted		0.75			0.84		0.47	1.00		0.50	1.00	1.00
Satd. Flow (perm)		1312			1494		852	1784		907	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	186	27	51	27	33	7	80	357	24	8	416	261
RTOR Reduction (vph)	0	10	0	0	5	0	0	3	0	0	0	123
Lane Group Flow (vph)	0	254	0	0	62	0	80	378	0	8	416	138
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		16.1			16.1		30.2	30.2		30.2	30.2	30.2
Effective Green, g (s)		16.1			16.1		30.2	30.2		30.2	30.2	30.2
Actuated g/C Ratio		0.28			0.28		0.53	0.53		0.53	0.53	0.53
Clearance Time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		370			421		451	945		480	954	811
v/s Ratio Prot								0.21			c0.23	
v/s Ratio Perm		c0.19			0.04		0.09			0.01		0.09
v/c Ratio		0.69			0.15		0.18	0.40		0.02	0.44	0.17
Uniform Delay, d1		18.2			15.3		7.0	8.0		6.4	8.2	6.9
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		5.2			0.2		0.2	0.3		0.0	0.3	0.1
Delay (s)		23.4			15.5		7.1	8.3		6.4	8.5	7.0
Level of Service		C			B		A	A		A	A	A
Approach Delay (s)		23.4			15.5			8.1			7.9	
Approach LOS		C			B			A			A	

### Intersection Summary

HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	10.7
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

# **APPENDIX C**

## **Future background 2030 Traffic Level of Service Calculations**

Queues

3: wilson st e & old dundas rd/rousseau st

12-19-2024



Lane Group	EBT	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	259	276	587	316	327	229	210
Act Effct Green (s)	26.0	26.6	26.6	19.8	19.8	37.5	34.8
Actuated g/C Ratio	0.36	0.36	0.36	0.27	0.27	0.51	0.48
v/c Ratio	0.41	0.74	0.63	0.65	0.50	0.46	0.24
Control Delay	19.2	34.9	5.2	32.8	6.2	14.3	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	34.9	5.2	32.8	6.2	14.3	13.4
LOS	B	C	A	C	A	B	B
Approach Delay	19.2			19.2			13.9
Approach LOS	B			B			B
Queue Length 50th (m)	24.1	32.2	0.0	40.1	0.0	17.8	17.3
Queue Length 95th (m)	48.7	#71.8	19.9	75.4	18.8	34.1	33.2
Internal Link Dist (m)	62.8			336.7			214.5
Turn Bay Length (m)		48.0			112.0		
Base Capacity (vph)	850	503	1050	622	742	666	1269
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.55	0.56	0.51	0.44	0.34	0.17

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 73.1

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 16.4

Intersection LOS: B

Intersection Capacity Utilization 76.4%

ICU Level of Service D

Analysis Period (min) 15





















# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

















3: wilson st e & old dundas rd/rousseau st

12-19-2024

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	2	179	57	254	0	540	0	291	301	211	193	0	
Future Volume (vph)	2	179	57	254	0	540	0	291	301	211	193	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		6.2		5.6		5.6		5.8	5.8	3.0	5.6		
Lane Util. Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00		
Frt		0.97		1.00		0.85		1.00	0.85	1.00	1.00		
Flt Protected		1.00		0.95		1.00		1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1742		1711		1531		1801	1531	1711	1801		
Flt Permitted		1.00		0.57		1.00		1.00	1.00	0.36	1.00		
Satd. Flow (perm)		1742		1025		1531		1801	1531	651	1801		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	2	195	62	276	0	587	0	316	327	229	210	0	
RTOR Reduction (vph)	0	12	0	0	0	372	0	0	237	0	0	0	
Lane Group Flow (vph)	0	247	0	276	0	215	0	316	90	229	210	0	
Turn Type	Perm	NA		Perm		Perm		NA	Perm	pm+pt	NA		
Protected Phases		4						2		1	6		
Permitted Phases	4			8		8			2	6			
Actuated Green, G (s)		26.0		26.6		26.6		19.9	19.9	34.8	34.8		
Effective Green, g (s)		26.0		26.6		26.6		19.9	19.9	34.8	34.8		
Actuated g/C Ratio		0.36		0.37		0.37		0.27	0.27	0.48	0.48		
Clearance Time (s)		6.2		5.6		5.6		5.8	5.8	3.0	5.6		
Vehicle Extension (s)		3.0		3.0		3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)		623		375		560		493	419	482	863		
v/s Ratio Prot								c0.18		c0.08	0.12		
v/s Ratio Perm		0.14		c0.27		0.14			0.06	0.15			
v/c Ratio		0.40		0.74		0.38		0.64	0.21	0.48	0.24		
Uniform Delay, d1		17.4		20.0		17.0		23.2	20.3	12.0	11.1		
Progression Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2		0.4		7.3		0.4		2.8	0.3	0.7	0.1		
Delay (s)		17.8		27.3		17.4		26.0	20.6	12.7	11.3		
Level of Service		B		C		B		C	C	B	B		
Approach Delay (s)		17.8			20.6			23.3			12.0		
Approach LOS		B			C			C			B		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			19.3									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66										
Actuated Cycle Length (s)			72.6									Sum of lost time (s)	15.0
Intersection Capacity Utilization			76.4%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis  
 6: wilson st e & exsting retail access /academy st

12-19-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	2	10	1	7	1	966	36	5	466	2
Future Volume (Veh/h)	2	1	2	10	1	7	1	966	36	5	466	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	1	2	11	1	8	1	1050	39	5	507	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)												
								280			361	
pX, platoon unblocked	0.72	0.72	0.97	0.72	0.72	0.71	0.97			0.71		
vC, conflicting volume	1598	1609	508	1592	1590	1070	509			1089		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1553	1568	481	1545	1543	892	482			920		
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 %	97	99	100	83	99	97	100			99		
cM capacity (veh/h)	63	79	570	66	82	241	1052			526		
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	5	20	1090	514								
Volume Left	2	11	1	5								
Volume Right	2	8	39	2								
cSH	105	94	1052	526								
Volume to Capacity	0.05	0.21	0.00	0.01								
Queue Length 95th (m)	1.1	5.7	0.0	0.2								
Control Delay (s)	41.1	53.2	0.0	0.3								
Lane LOS	E	F	A	A								
Approach Delay (s)	41.1	53.2	0.0	0.3								
Approach LOS	E	F										
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			63.6%		ICU Level of Service					B		
Analysis Period (min)			15									

Queues

8: wilson st e & sulphur springs rd/church st

12-19-2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	394	46	45	636	3	385	104
Act Effct Green (s)	24.2	24.2	33.3	33.3	33.3	33.3	33.3
Actuated g/C Ratio	0.35	0.35	0.49	0.49	0.49	0.49	0.49
v/c Ratio	0.79	0.09	0.11	0.73	0.01	0.44	0.13
Control Delay	34.9	15.2	10.1	19.4	8.7	13.2	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	15.2	10.1	19.4	8.7	13.2	2.5
LOS	C	B	B	B	A	B	A
Approach Delay	34.9	15.2		18.8		10.9	
Approach LOS	C	B		B		B	
Queue Length 50th (m)	39.7	2.9	3.0	60.7	0.2	30.5	0.0
Queue Length 95th (m)#	105.4	11.3	7.7	94.5	1.3	48.3	6.1
Internal Link Dist (m)	250.6	192.9		295.0		255.6	
Turn Bay Length (m)			40.0		52.0		70.0
Base Capacity (vph)	512	508	618	1313	329	1319	1149
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.09	0.07	0.48	0.01	0.29	0.09

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 68.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 20.2

Intersection LOS: C

Intersection Capacity Utilization 71.7%

ICU Level of Service C

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.



# HCM Signalized Intersection Capacity Analysis

8: wilson st e & sulphur springs rd/church st

12-19-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	↕
Traffic Volume (vph)	225	117	20	21	15	6	41	564	21	3	354	96
Future Volume (vph)	225	117	20	21	15	6	41	564	21	3	354	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.99			0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1733			1721		1711	1791		1711	1801	1531
Flt Permitted		0.78			0.78		0.47	1.00		0.25	1.00	1.00
Satd. Flow (perm)		1400			1383		844	1791		451	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	127	22	23	16	7	45	613	23	3	385	104
RTOR Reduction (vph)	0	3	0	0	5	0	0	2	0	0	0	53
Lane Group Flow (vph)	0	391	0	0	41	0	45	634	0	3	385	51
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		24.1			24.1		33.3	33.3		33.3	33.3	33.3
Effective Green, g (s)		24.1			24.1		33.3	33.3		33.3	33.3	33.3
Actuated g/C Ratio		0.35			0.35		0.49	0.49		0.49	0.49	0.49
Clearance Time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		495			489		412	875		220	880	748
v/s Ratio Prot							c0.35				0.21	
v/s Ratio Perm		c0.28			0.03		0.05			0.01		0.03
v/c Ratio		0.79			0.08		0.11	0.72		0.01	0.44	0.07
Uniform Delay, d1		19.7			14.7		9.4	13.8		9.0	11.3	9.2
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		8.4			0.1		0.1	3.0		0.0	0.3	0.0
Delay (s)		28.1			14.7		9.5	16.8		9.0	11.7	9.2
Level of Service		C			B		A	B		A	B	A
Approach Delay (s)		28.1			14.7			16.3			11.1	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	68.1	Sum of lost time (s)	10.7
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: wilson st e & old dundas rd/rousseau st

12-19-2024



Lane Group	EBT	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	370	320	587	432	335	397	376
Act Effct Green (s)	23.8	21.8	49.2	24.2	24.2	51.8	49.2
Actuated g/C Ratio	0.22	0.20	0.45	0.22	0.22	0.47	0.45
v/c Ratio	0.95	0.94	0.59	1.09	0.56	0.96	0.46
Control Delay	76.7	80.5	4.8	112.1	7.9	65.2	23.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.7	80.5	4.8	112.1	7.9	65.2	23.5
LOS	E	F	A	F	A	E	C
Approach Delay	76.7			66.6			44.9
Approach LOS	E			E			D
Queue Length 50th (m)	75.9	68.3	3.0	~105.1	0.0	68.0	55.0
Queue Length 95th (m)#	133.0	#120.3	24.7	#164.3	23.1	#127.6	80.5
Internal Link Dist (m)	62.8			336.7			214.5
Turn Bay Length (m)		48.0			112.0		
Base Capacity (vph)	392	343	999	397	598	415	811
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.93	0.59	1.09	0.56	0.96	0.46

Intersection Summary

Cycle Length: 110.2

Actuated Cycle Length: 109.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 50.7

Intersection LOS: D

Intersection Capacity Utilization 92.8%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.




















# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

















3: wilson st e & old dundas rd/rousseau st

12-19-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	245	94	294	0	540	0	397	308	365	346	0
Future Volume (vph)	2	245	94	294	0	540	0	397	308	365	346	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6	
Lane Util. Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00	
Fr <sub>t</sub>		0.96		1.00		0.85		1.00	0.85	1.00	1.00	
Fl <sub>t</sub> Protected		1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1733		1711		1531		1801	1531	1711	1801	
Fl <sub>t</sub> Permitted		1.00		0.95		1.00		1.00	1.00	0.15	1.00	
Satd. Flow (perm)		1733		1711		1531		1801	1531	263	1801	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	266	102	320	0	587	0	432	335	397	376	0
RTOR Reduction (vph)	0	13	0	0	0	309	0	0	261	0	0	0
Lane Group Flow (vph)	0	357	0	320	0	278	0	432	74	397	376	0
Turn Type	Perm	NA		Prot		Perm		NA	Perm	pm+pt	NA	
Protected Phases		4		3				2		1	6	
Permitted Phases	4					8			2	6		
Actuated Green, G (s)		23.8		21.8		49.2		24.2	24.2	49.3	49.3	
Effective Green, g (s)		23.8		21.8		49.2		24.2	24.2	49.3	49.3	
Actuated g/C Ratio		0.22		0.20		0.45		0.22	0.22	0.45	0.45	
Clearance Time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6	
Vehicle Extension (s)		3.0		3.0		3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		375		340		686		397	337	407	809	
v/s Ratio Prot				c0.19				c0.24		c0.19	0.21	
v/s Ratio Perm		0.21				0.18			0.05	0.24		
v/c Ratio		0.95		0.94		0.40		1.09	0.22	0.98	0.46	
Uniform Delay, d <sub>1</sub>		42.4		43.3		20.4		42.8	35.0	31.5	21.0	
Progression Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d <sub>2</sub>		34.3		33.7		0.4		71.0	0.3	37.8	0.4	
Delay (s)		76.7		77.0		20.8		113.7	35.3	69.3	21.4	
Level of Service		E		E		C		F	D	E	C	
Approach Delay (s)		76.7			40.6			79.5			46.0	
Approach LOS		E			D			E			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			57.4				HCM 2000 Level of Service		E			
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			109.7				Sum of lost time (s)		18.0			
Intersection Capacity Utilization			92.8%				ICU Level of Service		F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis  
 6: wilson st e & exsting retail access /academy st

12-19-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	4	2	0	5	0	647	12	4	881	1
Future Volume (Veh/h)	1	0	4	2	0	5	0	647	12	4	881	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	4	2	0	5	0	703	13	4	958	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)												
								280			361	
pX, platoon unblocked	0.92	0.92	0.87	0.92	0.92	0.89	0.87			0.89		
vC, conflicting volume	1681	1682	958	1680	1676	710	959			716		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1425	1426	875	1424	1420	610	876			618		
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	99	98	100	99	100			100		
cM capacity (veh/h)	103	124	302	103	125	439	668			855		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	5	7	716	963								
Volume Left	1	2	0	4								
Volume Right	4	5	13	1								
cSH	218	227	668	855								
Volume to Capacity	0.02	0.03	0.00	0.00								
Queue Length 95th (m)	0.5	0.7	0.0	0.1								
Control Delay (s)	21.9	21.4	0.0	0.1								
Lane LOS	C	C		A								
Approach Delay (s)	21.9	21.4	0.0	0.1								
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.2									
Intersection Capacity Utilization			59.6%	ICU Level of Service							B	
Analysis Period (min)			15									

Queues

8: wilson st e & sulphur springs rd/church st

12-19-2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	264	67	80	459	11	508	261
Act Effct Green (s)	16.2	16.2	31.3	31.3	31.3	31.3	31.3
Actuated g/C Ratio	0.28	0.28	0.54	0.54	0.54	0.54	0.54
v/c Ratio	0.70	0.16	0.21	0.48	0.03	0.53	0.28
Control Delay	28.8	15.2	10.4	11.5	8.5	12.3	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.8	15.2	10.4	11.5	8.5	12.3	2.3
LOS	C	B	B	B	A	B	A
Approach Delay	28.8	15.2		11.3		8.9	
Approach LOS	C	B		B		A	
Queue Length 50th (m)	22.7	4.6	3.9	26.5	0.5	30.8	0.0
Queue Length 95th (m)	48.4	13.1	13.5	61.1	3.0	70.5	9.9
Internal Link Dist (m)	250.6	192.9		295.0		255.6	
Turn Bay Length (m)			40.0		52.0		70.0
Base Capacity (vph)	570	646	617	1539	679	1551	1354
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.10	0.13	0.30	0.02	0.33	0.19

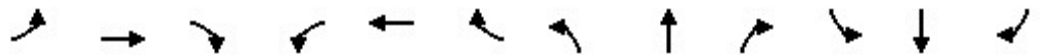
Intersection Summary

Cycle Length: 85	
Actuated Cycle Length: 58.3	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 13.1	Intersection LOS: B
Intersection Capacity Utilization 83.7%	ICU Level of Service E
Analysis Period (min) 15	

# HCM Signalized Intersection Capacity Analysis

8: wilson st e & sulphur springs rd/church st

12-19-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↖		↗	↖	↗
Traffic Volume (vph)	171	25	47	25	30	6	74	400	22	10	467	240
Future Volume (vph)	171	25	47	25	30	6	74	400	22	10	467	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97			0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1694			1740		1711	1787		1711	1801	1531
Flt Permitted		0.75			0.84		0.40	1.00		0.44	1.00	1.00
Satd. Flow (perm)		1312			1499		716	1787		789	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	186	27	51	27	33	7	80	435	24	11	508	261
RTOR Reduction (vph)	0	10	0	0	5	0	0	3	0	0	0	121
Lane Group Flow (vph)	0	254	0	0	62	0	80	456	0	11	508	140
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		16.2			16.2		31.3	31.3		31.3	31.3	31.3
Effective Green, g (s)		16.2			16.2		31.3	31.3		31.3	31.3	31.3
Actuated g/C Ratio		0.28			0.28		0.54	0.54		0.54	0.54	0.54
Clearance Time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		365			417		385	961		424	968	823
v/s Ratio Prot								0.26				c0.28
v/s Ratio Perm		c0.19			0.04		0.11			0.01		0.09
v/c Ratio		0.70			0.15		0.21	0.47		0.03	0.52	0.17
Uniform Delay, d1		18.8			15.8		7.0	8.3		6.3	8.7	6.8
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		5.7			0.2		0.3	0.4		0.0	0.5	0.1
Delay (s)		24.5			16.0		7.3	8.7		6.3	9.2	6.9
Level of Service		C			B		A	A		A	A	A
Approach Delay (s)		24.5			16.0			8.5			8.4	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	10.7
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

# **APPENDIX D**

## **2016 TTS DATA EXTRACTION**

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06\_orig

Column: Planning district of destination - pd\_dest

Filters:

2006 GTA zone of origin - gta06\_orig In 5105

and

Primary travel mode m p t u

and

Start time of trip - start\_time In 600-900

Trip 2016

Table:

	PD 1 of Tor	PD 8 of Tor	Brampton	Mississauga	Burlington	Dundas	Ancaster	Glanbrook	Hamilton	St. Catharir	Cambridge	Brantford	
5105	26	35	19	18	94	13	99	29	640	85	97	93	1248
	2%	3%	2%	1%	8%	1%	8%	2%	51%	7%	8%	7%	
				toronto		5%							
north		8%		halton regi		8%							
south		28%		peel region		3%							
east		42%		hamilton		63%							
west		22%		Niagara Rej		22%							
		100%				100%							




Thu Apr 22 2021 16:21:12 GMT-0400 (Eastern Daylight Time) - Run Time: 2512ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06\_orig

Column: Primary travel mode of trip - mode\_prime

Filters:

2006 GTA zone of origin - gta06\_orig In 5105

and

Primary travel mode of trip - mode\_prime In d g j m p t u w

and

Start time of trip - start\_time In 600-900

Trip 2016

Table:

	Cycle	Auto driver	GO rail only	Joint GO ra	Auto passe	Walk	
5105	16	1150	15	11	98	25	1315
	1%	87%	1%	1%	7%	2%	

Thu Apr 22 2021 16:21:51 GMT-0400 (Eastern Daylight Time) - Run Time: 2527ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06\_orig

Column: Primary travel mode of trip - mode\_prime

Filters:

2006 GTA zone of origin - gta06\_orig In 5105

and

Primary travel mode of trip - mode\_prime In d g j m p t u w

and

Start time of trip - start\_time In 1500-1800

Trip 2016

Table:

	Transit excl	Auto driver	GO rail only	Auto passe	Walk	
5105	22	751	13	89	25	900
	2%	83%	1%	10%	3%	

# **APPENDIX E**

## **Future Total 2030 Traffic Level of Service Calculations**

Queues

3: wilson st e & old dundas rd/rousseau st

12-19-2024



Lane Group	EBT	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	259	276	587	340	327	229	223
Act Effct Green (s)	17.5	38.8	36.1	22.0	22.0	41.2	38.5
Actuated g/C Ratio	0.20	0.45	0.42	0.25	0.25	0.48	0.45
v/c Ratio	0.72	0.59	0.60	0.74	0.52	0.53	0.28
Control Delay	44.3	21.8	4.3	43.6	7.2	19.9	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.3	21.8	4.3	43.6	7.2	19.9	17.7
LOS	D	C	A	D	A	B	B
Approach Delay	44.3			25.7			18.8
Approach LOS	D			C			B
Queue Length 50th (m)	39.1	29.9	0.0	51.2	0.0	21.8	22.4
Queue Length 95th (m)	75.2	53.3	18.2	#116.2	22.5	46.2	46.7
Internal Link Dist (m)	62.8			336.7			214.5
Turn Bay Length (m)		48.0			112.0		
Base Capacity (vph)	512	637	1208	525	678	565	1072
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.43	0.49	0.65	0.48	0.41	0.21

Intersection Summary

Cycle Length: 115.2

Actuated Cycle Length: 86.3

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 20.4

Intersection LOS: C

Intersection Capacity Utilization 77.6%

ICU Level of Service D

Analysis Period (min) 15






















# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

3: wilson st e & old dundas rd/rousseau st

12-19-2024

















													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	2	179	57	254	0	540	0	313	301	211	205	0	
Future Volume (vph)	2	179	57	254	0	540	0	313	301	211	205	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6		
Lane Util. Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00		
Frt		0.97		1.00		0.85		1.00	0.85	1.00	1.00		
Flt Protected		1.00		0.95		1.00		1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1742		1711		1531		1801	1531	1711	1801		
Flt Permitted		1.00		0.35		1.00		1.00	1.00	0.29	1.00		
Satd. Flow (perm)		1740		626		1531		1801	1531	525	1801		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	2	195	62	276	0	587	0	340	327	229	223	0	
RTOR Reduction (vph)	0	10	0	0	0	340	0	0	243	0	0	0	
Lane Group Flow (vph)	0	249	0	276	0	247	0	340	84	229	223	0	
Turn Type	Perm	NA		pm+pt		Perm		NA	Perm	pm+pt	NA		
Protected Phases		4		3		8		2		1		6	
Permitted Phases	4			8		8			2		6		
Actuated Green, G (s)		17.6		36.1		36.1		22.1	22.1	38.5	38.5		
Effective Green, g (s)		17.6		36.1		36.1		22.1	22.1	38.5	38.5		
Actuated g/C Ratio		0.21		0.42		0.42		0.26	0.26	0.45	0.45		
Clearance Time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6		
Vehicle Extension (s)		3.0		3.0		3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)		356		451		644		463	394	418	808		
v/s Ratio Prot				c0.11				c0.19		c0.08	0.12		
v/s Ratio Perm		0.14		c0.15		0.16			0.06	0.16			
v/c Ratio		0.70		0.61		0.38		0.73	0.21	0.55	0.28		
Uniform Delay, d1		31.7		18.2		17.2		29.2	25.0	16.1	14.9		
Progression Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2		6.1		2.5		0.4		6.0	0.3	1.5	0.2		
Delay (s)		37.8		20.7		17.5		35.1	25.3	17.6	15.1		
Level of Service		D		C		B		D	C	B	B		
Approach Delay (s)		37.8			18.6			30.3			16.4		
Approach LOS		D			B			C			B		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			23.8									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.67										
Actuated Cycle Length (s)			85.8									Sum of lost time (s)	18.0
Intersection Capacity Utilization			77.6%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

6: wilson st e & exsting retail access /academy st

12-19-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	2	20	1	24	1	966	44	17	466	2
Future Volume (Veh/h)	2	1	2	20	1	24	1	966	44	17	466	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	1	2	22	1	26	1	1050	48	18	507	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)												
								280			361	
pX, platoon unblocked	0.72	0.72	0.96	0.72	0.72	0.70	0.96			0.70		
vC, conflicting volume	1646	1644	508	1622	1621	1074	509			1098		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1591	1587	471	1557	1555	892	472			926		
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 %	96	99	100	65	99	89	100			97		
cM capacity (veh/h)	54	75	571	63	78	239	1051			517		
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	5	49	1099	527								
Volume Left	2	22	1	18								
Volume Right	2	26	48	2								
cSH	92	104	1051	517								
Volume to Capacity	0.05	0.47	0.00	0.03								
Queue Length 95th (m)	1.3	15.6	0.0	0.8								
Control Delay (s)	46.3	67.0	0.0	1.0								
Lane LOS	E	F	A	A								
Approach Delay (s)	46.3	67.0	0.0	1.0								
Approach LOS	E	F										
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			64.1%		ICU Level of Service					C		
Analysis Period (min)			15									

Queues

8: wilson st e & sulphur springs rd/church st

12-19-2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	394	48	45	645	4	396	104
Act Effct Green (s)	24.2	24.2	33.5	33.5	33.5	33.5	33.5
Actuated g/C Ratio	0.35	0.35	0.49	0.49	0.49	0.49	0.49
v/c Ratio	0.79	0.10	0.11	0.73	0.02	0.45	0.13
Control Delay	35.3	15.0	10.1	19.7	9.0	13.3	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.3	15.0	10.1	19.7	9.0	13.3	2.5
LOS	D	B	B	B	A	B	A
Approach Delay	35.3	15.0		19.1		11.0	
Approach LOS	D	B		B		B	
Queue Length 50th (m)	39.8	3.0	3.0	62.1	0.3	31.5	0.0
Queue Length 95th (m)#	107.0	11.6	7.6	96.2	1.5	49.8	6.0
Internal Link Dist (m)	250.6	192.9		295.0		255.6	
Turn Bay Length (m)			40.0		52.0		70.0
Base Capacity (vph)	510	509	601	1307	319	1313	1144
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.09	0.07	0.49	0.01	0.30	0.09

Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 68.5

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 20.4

Intersection LOS: C

Intersection Capacity Utilization 71.7%

ICU Level of Service C

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

8: wilson st e & sulphur springs rd/church st

12-19-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	↕
Traffic Volume (vph)	225	117	20	21	15	8	41	572	21	4	364	96
Future Volume (vph)	225	117	20	21	15	8	41	572	21	4	364	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.99			0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1733			1714		1711	1791		1711	1801	1531
Flt Permitted		0.78			0.79		0.46	1.00		0.24	1.00	1.00
Satd. Flow (perm)		1398			1387		825	1791		438	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	127	22	23	16	9	45	622	23	4	396	104
RTOR Reduction (vph)	0	3	0	0	6	0	0	2	0	0	0	53
Lane Group Flow (vph)	0	391	0	0	42	0	45	643	0	4	396	51
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		24.2			24.2		33.5	33.5		33.5	33.5	33.5
Effective Green, g (s)		24.2			24.2		33.5	33.5		33.5	33.5	33.5
Actuated g/C Ratio		0.35			0.35		0.49	0.49		0.49	0.49	0.49
Clearance Time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		494			490		404	877		214	882	749
v/s Ratio Prot							c0.36				0.22	
v/s Ratio Perm		c0.28			0.03		0.05			0.01		0.03
v/c Ratio		0.79			0.09		0.11	0.73		0.02	0.45	0.07
Uniform Delay, d1		19.8			14.7		9.4	13.9		9.0	11.4	9.2
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		8.5			0.1		0.1	3.2		0.0	0.4	0.0
Delay (s)		28.3			14.8		9.5	17.1		9.0	11.8	9.2
Level of Service		C			B		A	B		A	B	A
Approach Delay (s)		28.3			14.8			16.6			11.2	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	68.4	Sum of lost time (s)	10.7
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis  
 12: academy st & proposed access

12-19-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	20	42	17	12	17	32
Future Volume (Veh/h)	20	42	17	12	17	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	46	18	13	18	35
<b>Pedestrians</b>						
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				114	24
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	31				114	24
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				98	97
cM capacity (veh/h)	1582				870	1052
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	68	31	53			
Volume Left	22	0	18			
Volume Right	0	13	35			
cSH	1582	1700	982			
Volume to Capacity	0.01	0.02	0.05			
Queue Length 95th (m)	0.3	0.0	1.3			
Control Delay (s)	2.4	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	2.4	0.0	8.9			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			4.2			
Intersection Capacity Utilization			20.0%	ICU Level of Service	A	
Analysis Period (min)			15			



Queues

3: wilson st e & old dundas rd/rousseau st

12-19-2024



Lane Group	EBT	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	370	320	587	460	335	397	409
Act Effct Green (s)	23.8	21.8	49.2	24.2	24.2	51.8	49.2
Actuated g/C Ratio	0.22	0.20	0.45	0.22	0.22	0.47	0.45
v/c Ratio	0.95	0.94	0.59	1.16	0.56	0.96	0.51
Control Delay	76.7	80.5	5.0	135.3	7.9	65.2	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.7	80.5	5.0	135.3	7.9	65.2	24.3
LOS	E	F	A	F	A	E	C
Approach Delay	76.7			81.6			44.5
Approach LOS	E			F			D
Queue Length 50th (m)	75.9	68.3	3.9	~117.7	0.0	68.0	61.3
Queue Length 95th (m)#	133.0	#120.3	26.4	#178.7	23.1	#127.6	89.0
Internal Link Dist (m)	62.8			336.7			214.5
Turn Bay Length (m)		48.0			112.0		
Base Capacity (vph)	392	343	995	397	598	415	811
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.93	0.59	1.16	0.56	0.96	0.50

Intersection Summary

Cycle Length: 110.2

Actuated Cycle Length: 109.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.16

Intersection Signal Delay: 54.8

Intersection LOS: D

Intersection Capacity Utilization 94.2%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.




















# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

















3: wilson st e & old dundas rd/rousseau st

12-19-2024

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	2	245	94	294	0	540	0	423	308	365	376	0		
Future Volume (vph)	2	245	94	294	0	540	0	423	308	365	376	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6			
Lane Util. Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00			
Frt		0.96		1.00		0.85		1.00	0.85	1.00	1.00			
Flt Protected		1.00		0.95		1.00		1.00	1.00	0.95	1.00			
Satd. Flow (prot)		1733		1711		1531		1801	1531	1711	1801			
Flt Permitted		1.00		0.95		1.00		1.00	1.00	0.15	1.00			
Satd. Flow (perm)		1733		1711		1531		1801	1531	263	1801			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	2	266	102	320	0	587	0	460	335	397	409	0		
RTOR Reduction (vph)	0	13	0	0	0	306	0	0	261	0	0	0		
Lane Group Flow (vph)	0	357	0	320	0	281	0	460	74	397	409	0		
Turn Type	Perm	NA		Prot		Perm		NA	Perm	pm+pt	NA			
Protected Phases		4		3				2		1	6			
Permitted Phases	4					8			2	6				
Actuated Green, G (s)		23.8		21.8		49.2		24.2	24.2	49.3	49.3			
Effective Green, g (s)		23.8		21.8		49.2		24.2	24.2	49.3	49.3			
Actuated g/C Ratio		0.22		0.20		0.45		0.22	0.22	0.45	0.45			
Clearance Time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6			
Vehicle Extension (s)		3.0		3.0		3.0		3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)		375		340		686		397	337	407	809			
v/s Ratio Prot				c0.19				c0.26		c0.19	0.23			
v/s Ratio Perm		0.21				0.18			0.05	0.24				
v/c Ratio		0.95		0.94		0.41		1.16	0.22	0.98	0.51			
Uniform Delay, d1		42.4		43.3		20.4		42.8	35.0	31.5	21.5			
Progression Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00			
Incremental Delay, d2		34.3		33.7		0.4		96.0	0.3	37.8	0.5			
Delay (s)		76.7		77.0		20.8		138.8	35.3	69.3	22.0			
Level of Service		E		E		C		F	D	E	C			
Approach Delay (s)		76.7			40.7			95.2			45.3			
Approach LOS		E			D			F			D			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			61.7									HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio			1.01											
Actuated Cycle Length (s)			109.7								18.0			
Intersection Capacity Utilization			94.2%										ICU Level of Service	F
Analysis Period (min)			15											
c Critical Lane Group														

HCM Unsignalized Intersection Capacity Analysis  
 6: wilson st e & exsting retail access /academy st

12-19-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	4	14	0	28	0	674	32	34	881	1
Future Volume (Veh/h)	1	0	4	14	0	28	0	674	32	34	881	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	4	15	0	30	0	733	35	37	958	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)												
								280			361	
pX, platoon unblocked	0.91	0.91	0.85	0.91	0.91	0.87	0.85			0.87		
vC, conflicting volume	1813	1800	958	1787	1784	750	959			768		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1527	1513	860	1498	1494	640	860			660		
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	99	83	100	93	100			95		
cM capacity (veh/h)	78	104	301	87	107	414	661			809		
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	5	45	768	996								
Volume Left	1	15	0	37								
Volume Right	4	30	35	1								
cSH	192	184	661	809								
Volume to Capacity	0.03	0.24	0.00	0.05								
Queue Length 95th (m)	0.6	7.0	0.0	1.1								
Control Delay (s)	24.3	30.8	0.0	1.3								
Lane LOS	C	D		A								
Approach Delay (s)	24.3	30.8	0.0	1.3								
Approach LOS	C	D										
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization			84.8%		ICU Level of Service					E		
Analysis Period (min)			15									

## Queues

8: wilson st e &amp; sulphur springs rd/church st

12-19-2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	264	69	80	481	11	521	261
Act Effct Green (s)	16.2	16.2	31.4	31.4	31.4	31.4	31.4
Actuated g/C Ratio	0.28	0.28	0.54	0.54	0.54	0.54	0.54
v/c Ratio	0.71	0.16	0.21	0.50	0.03	0.54	0.28
Control Delay	29.1	15.0	10.5	11.8	8.4	12.5	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	15.0	10.5	11.8	8.4	12.5	2.3
LOS	C	B	B	B	A	B	A
Approach Delay	29.1	15.0		11.6		9.1	
Approach LOS	C	B		B		A	
Queue Length 50th (m)	22.7	4.6	3.9	28.4	0.5	32.1	0.0
Queue Length 95th (m)	49.4	13.3	13.5	64.9	3.0	72.4	9.8
Internal Link Dist (m)	250.6	192.9		295.0		255.6	
Turn Bay Length (m)			40.0		52.0		70.0
Base Capacity (vph)	568	646	600	1537	649	1547	1352
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.11	0.13	0.31	0.02	0.34	0.19

## Intersection Summary

Cycle Length: 85

Actuated Cycle Length: 58.5

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 13.3

Intersection LOS: B

Intersection Capacity Utilization 83.9%

ICU Level of Service E

Analysis Period (min) 15

# HCM Signalized Intersection Capacity Analysis

8: wilson st e & sulphur springs rd/church st

12-19-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	↕
Traffic Volume (vph)	171	25	47	25	30	8	74	420	22	10	479	240
Future Volume (vph)	171	25	47	25	30	8	74	420	22	10	479	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97			0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1694			1735		1711	1787		1711	1801	1531
Flt Permitted		0.75			0.85		0.39	1.00		0.42	1.00	1.00
Satd. Flow (perm)		1310			1500		698	1787		756	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	186	27	51	27	33	9	80	457	24	11	521	261
RTOR Reduction (vph)	0	10	0	0	6	0	0	2	0	0	0	120
Lane Group Flow (vph)	0	254	0	0	63	0	80	479	0	11	521	141
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		16.2			16.2		31.4	31.4		31.4	31.4	31.4
Effective Green, g (s)		16.2			16.2		31.4	31.4		31.4	31.4	31.4
Actuated g/C Ratio		0.28			0.28		0.54	0.54		0.54	0.54	0.54
Clearance Time (s)		5.3			5.3		5.4	5.4		5.4	5.4	5.4
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		364			416		375	962		407	970	824
v/s Ratio Prot								0.27				c0.29
v/s Ratio Perm		c0.19			0.04		0.11			0.01		0.09
v/c Ratio		0.70			0.15		0.21	0.50		0.03	0.54	0.17
Uniform Delay, d1		18.9			15.9		7.0	8.5		6.3	8.7	6.8
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		5.7			0.2		0.3	0.4		0.0	0.6	0.1
Delay (s)		24.6			16.0		7.3	8.9		6.3	9.3	6.9
Level of Service		C			B		A	A		A	A	A
Approach Delay (s)		24.6			16.0			8.7			8.5	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	10.7
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis  
 12: academy st & proposed access

12-19-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Traffic Volume (veh/h)	50	16	7	30	35	35
Future Volume (Veh/h)	50	16	7	30	35	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	17	8	33	38	38
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	41				150	24
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	41				150	24
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				95	96
cM capacity (veh/h)	1568				813	1052

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	71	41	76
Volume Left	54	0	38
Volume Right	0	33	38
cSH	1568	1700	917
Volume to Capacity	0.03	0.02	0.08
Queue Length 95th (m)	0.8	0.0	2.1
Control Delay (s)	5.7	0.0	9.3
Lane LOS	A		A
Approach Delay (s)	5.7	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay		5.9	
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		

Queues

3: wilson st e & old dundas rd/rousseau st

12-19-2024



Lane Group	EBT	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	370	320	587	460	335	397	409
Act Effct Green (s)	28.2	53.5	50.9	35.3	35.3	65.1	62.4
Actuated g/C Ratio	0.23	0.43	0.41	0.28	0.28	0.52	0.50
v/c Ratio	0.92	0.87	0.64	0.90	0.50	0.97	0.45
Control Delay	74.9	50.5	7.9	65.4	6.3	69.8	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.9	50.5	7.9	65.4	6.3	69.8	22.4
LOS	E	D	A	E	A	E	C
Approach Delay	74.9			40.5			45.7
Approach LOS	E			D			D
Queue Length 50th (m)	89.8	56.5	12.7	111.8	0.0	79.2	65.5
Queue Length 95th (m)#	146.2	#100.6	47.2	#168.4	21.9	#144.0	92.0
Internal Link Dist (m)	62.8			336.7			214.5
Turn Bay Length (m)		48.0			112.0		
Base Capacity (vph)	427	379	948	556	704	413	953
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	0.84	0.62	0.83	0.48	0.96	0.43

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 124.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 40.9

Intersection LOS: D

Intersection Capacity Utilization 95.5%

ICU Level of Service F

Analysis Period (min) 15






















# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

3: wilson st e & old dundas rd/rousseau st

12-19-2024

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	2	245	94	294	0	540	0	423	308	365	376	0	
Future Volume (vph)	2	245	94	294	0	540	0	423	308	365	376	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6		
Lane Util. Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00		
Frt		0.96		1.00		0.85		1.00	0.85	1.00	1.00		
Flt Protected		1.00		0.95		1.00		1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1733		1711		1531		1801	1531	1711	1801		
Flt Permitted		1.00		0.21		1.00		1.00	1.00	0.14	1.00		
Satd. Flow (perm)		1732		384		1531		1801	1531	249	1801		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	2	266	102	320	0	587	0	460	335	397	409	0	
RTOR Reduction (vph)	0	11	0	0	0	299	0	0	240	0	0	0	
Lane Group Flow (vph)	0	359	0	320	0	288	0	460	95	397	409	0	
Turn Type	Perm	NA		pm+pt		Perm		NA	Perm	pm+pt	NA		
Protected Phases		4		3		8		2		1		6	
Permitted Phases	4			8		8			2		6		
Actuated Green, G (s)		28.2		50.9		50.9		35.3	35.3	62.4	62.4		
Effective Green, g (s)		28.2		50.9		50.9		35.3	35.3	62.4	62.4		
Actuated g/C Ratio		0.23		0.41		0.41		0.28	0.28	0.50	0.50		
Clearance Time (s)		6.2		3.0		5.6		5.8	5.8	3.0	5.6		
Vehicle Extension (s)		3.0		3.0		3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)		392		360		625		510	434	405	902		
v/s Ratio Prot				c0.14				0.26		c0.19	0.23		
v/s Ratio Perm		0.21		c0.23		0.19			0.06	c0.30			
v/c Ratio		0.92		0.89		0.46		0.90	0.22	0.98	0.45		
Uniform Delay, d1		47.0		29.5		26.8		42.9	34.1	34.7	20.0		
Progression Factor		1.00		1.00		1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2		25.6		22.3		0.5		19.0	0.3	39.3	0.4		
Delay (s)		72.6		51.9		27.3		62.0	34.3	74.0	20.4		
Level of Service		E		D		C		E	C	E	C		
Approach Delay (s)		72.6			36.0			50.3			46.8		
Approach LOS		E			D			D			D		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			47.7									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.99										
Actuated Cycle Length (s)			124.5									Sum of lost time (s)	18.0
Intersection Capacity Utilization			95.5%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													