Appendix G

Eighth Line EA, Town of Halton Hill 2024 Budget: Capital Budget and Forecast, and Halton Region Budget and Business Plan Capital Report 2025 Relevant Excerpts

BURNSIDE

Eighth Line Environmental Assessment

Environmental Study Report

Town of Halton Hills

1.0 Introduction

The Town of Halton Hills ('Town') has undertaken a Municipal Class Environmental Assessment (MCEA) to determine the needs of transportation corridor improvement along Eighth Line from Steeles Avenue to Maple Avenue to support future growth. R.J. Burnside & Associates ('Burnside') facilitated the MCEA on behalf of the Town.

The MCEA study follows a comprehensive planning and design process to ensure protection of the environment, facilitate a proactive and meaningful consultation with a broad range of stakeholders, determine a solution that provides the required road corridor improvements to meet future needs while minimizing disruption to the existing residents and business and produces a comprehensive documentation that meets all the requirements of the MCEA process.

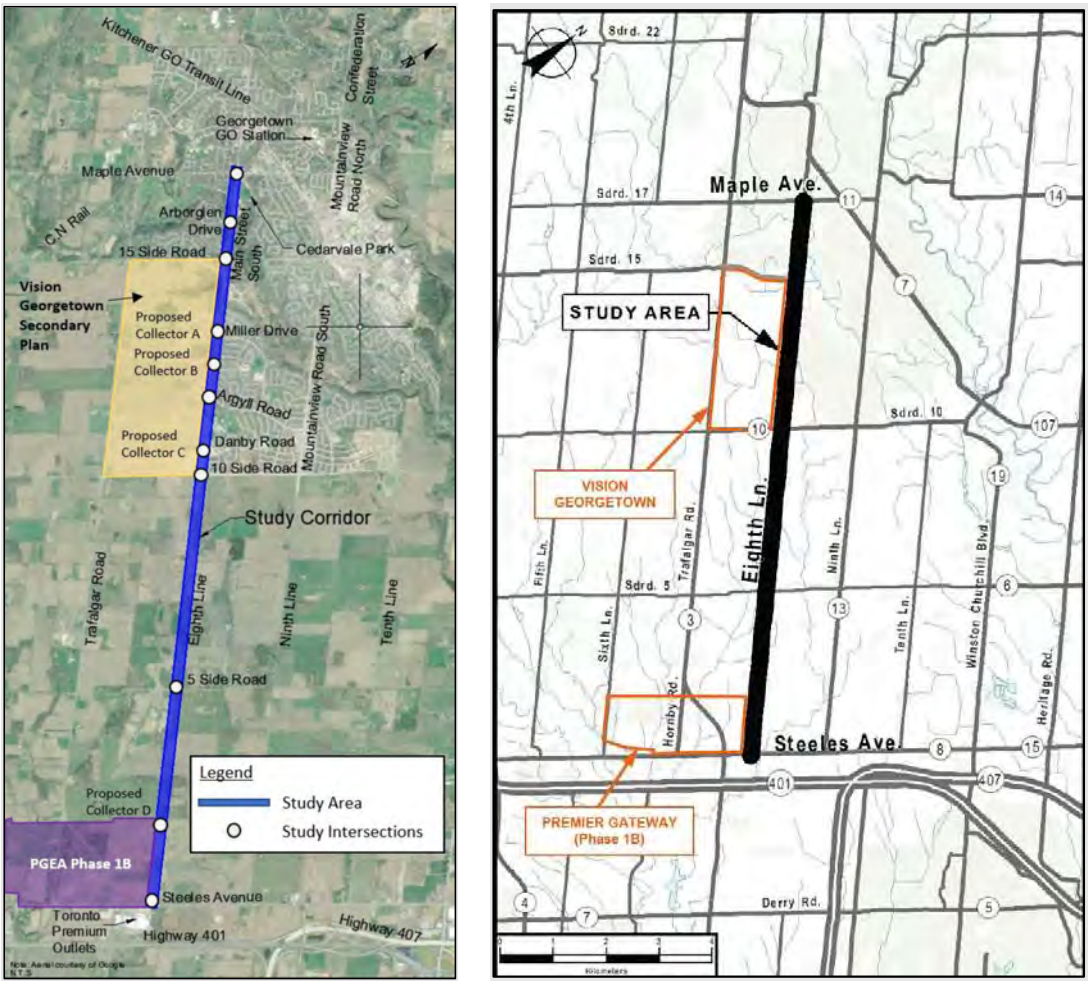
1.1 Description of Study Area

Eighth Line is a two-lane minor arterial road roadway south of the Georgetown urban core. From Steeles Avenue to 15 Side Road, the road is known as "Eighth Line" and north of 15 Side Road, the road is referred to as "Main Street South". The project limits for this study extend from Steeles Avenue to Maple Avenue as shown in Figure 1.1 for a length of approximately 10.5 km and generally encompasses the lands within 50 m of the existing right-of-way (ROW).

The Study Area includes the following intersections along Eighth Line:

- Steeles Avenue
- 5 Side Road
- 10 Side Road
- Danby Road
- Argyll Road
- Miller Drive
- West Branch Drive
- 15 Side Road
- Cromar Court
- Arborglen Drive
- Cindebarke Terrace
- Maple Avenue
- All potential future collector roads as a result of proposed developments in the area:
  - Proposed Collector A (opposite Miller Drive)
  - Proposed Collector B (between Argyll Road and Miller Drive)
  - Proposed Collector C (opposite Danby Road)
  - Proposed Collector D (between Steeles and 5 Side Road)

Figure 1.1: Study Area



The surrounding area consists of primarily rural residential properties and farmlands from Steeles Avenue to 10 Side Road and urban and developed sections from 10 Side Road to Maple Avenue.

Other notable existing land uses within the Study Area include:

- Toronto Premium Outlets located south of Steeles Avenue.
- Hornby Cemeteries on the northeast and northwest quadrants of the Steeles Avenue intersection.
- Heritage Properties including McCallum Farmhouse, Hunter Farmhouse, Reid Farmstead / Allison Farm and Chestnut Tree (former Reed Farmhouse).
- Living Hope Church located south of Arborglen Drive.
- Cedarvale Park located southeast of the Maple Avenue intersection.

9.2 Cross-Sections

Typical cross-sections have been prepared for five major segments of the Eighth Line Study Area including:

- Steeles Avenue to Proposed Collector Road D.
- Proposed Collector Road D to 5 Side Road.
- 5 Side Road to 10 Side Road.
- 10 Side Road to 15 Side Road.
- 15 Side Road to Maple Avenue.

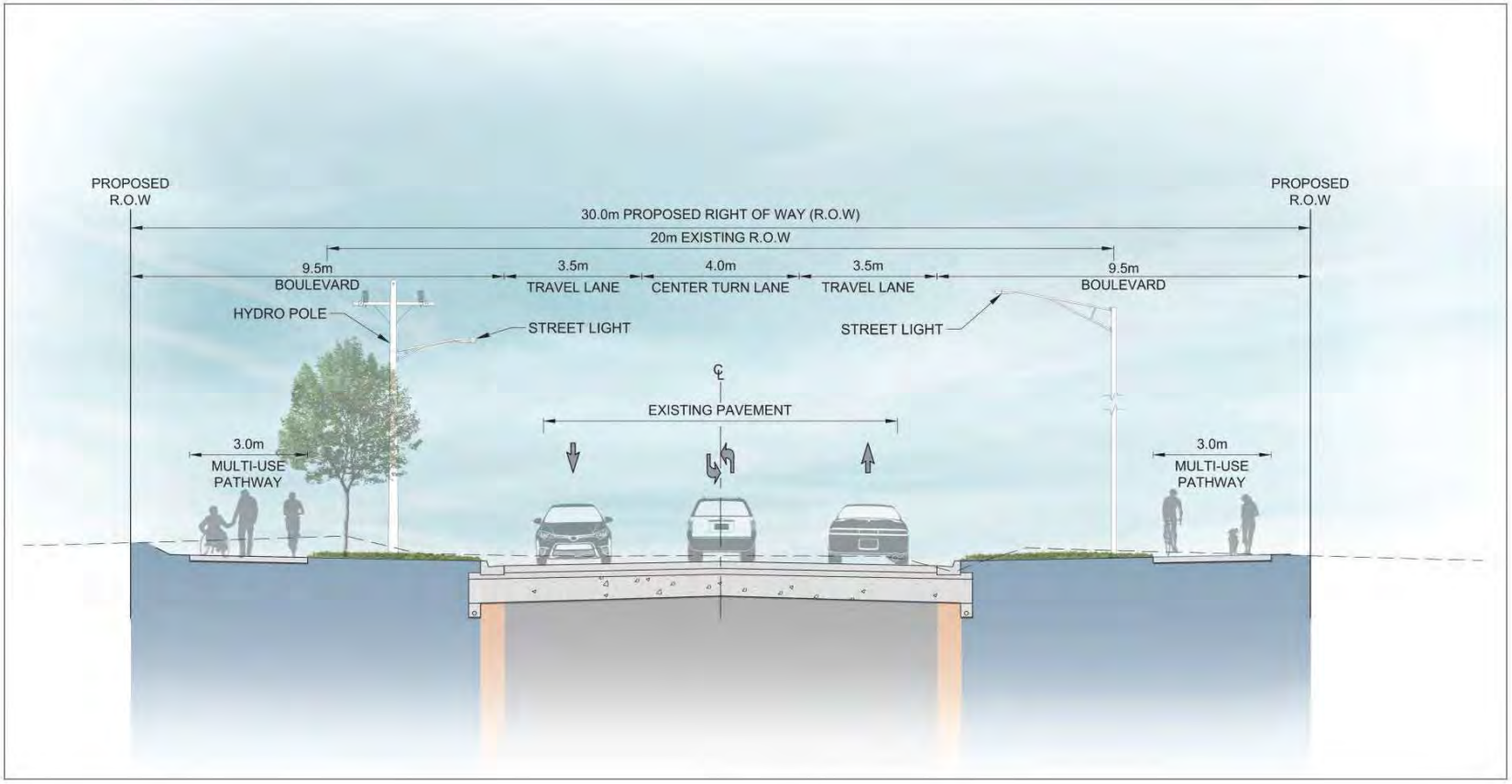
Preliminary preferred cross-sections were presented at the second Public Information Centre (PIC), which maintained a rural cross-section from Steeles Avenue to 10 Side Road and urban cross-section from 10 Side Road to Maple Avenue. Based on feedback from the second PIC, the Study Team modified the cross-section from Steeles Avenue to 5 Side Road to include a segment of urbanized roadway between Steeles Avenue to Proposed Collector Road D to reduce property impacts to adjacent landowners. The preferred cross-sections for each of the five major segments are illustrated on the preferred design concept plans provided in Appendix K1.

9.2.1 Steeles Avenue to Proposed Collector Road D

The preferred cross-section for Steeles Avenue to Proposed Collector Road D as illustrated in Figure 9.1 includes the following elements:

- 30 m proposed ROW.
- One 3.5 m travel lane per direction.
- One 4.0 m bi-directional centre left turn lane.
- Urban cross-section with curbs and catch basins.
- 3.0 m MUP on both sides within 9.5 m boulevards.
- Streetlighting within boulevards.
- Opportunity for street trees plantings within west side boulevard.
- Opportunities for Low Impact Development (LID) features in boulevard.

Figure 9.1: Typical Cross-Section for Steeles Avenue to Proposed Collector Road D



EIGHTH LINE ENVIRONMENTAL ASSESSMENT

CROSS SECTION | STEELES AVENUE TO COLLECTOR D

BURNSIDE

9.2.2 Proposed Collector Road D to 5 Side Road

The preferred cross-section for Proposed Collector Road D to 5 Side Road as illustrated in Figure 9.2 includes the following elements:

- 35 m proposed ROW.
- ROW widens where SWM quality and storage required.
- ROW shifted in areas to limit impact to existing buildings.
- One 3.5 m travel lane per direction.
- One 4.0 m bi-directional centre left turn lane.
- Rural cross-section with roadside ditches.
- Semi-urban cross-section across some properties to limit property impacts.
- 1.2 m buffer between travel lanes and MUPs.
- 3.0 m MUP between 1.2 m buffer and roadside ditch.

Some sections of the roadway will have no streetlighting. Lighting requirements may be reevaluated at a later date and added when warranted.

9.2.3 5 Side Road to 10 Side Road

The preferred cross-section for 5 Side Road to 10 Side Road as illustrated in Figure 9.3 includes the same elements as the cross-section for Proposed Collector Road D to 5 Side Road.

9.2.4 10 Side Road to 15 Side Road

The preferred cross-section for 10 Side Road to 15 Side Road as illustrated in Figure 9.4 include the following elements:

- 35 m proposed ROW.
- Two 3.5 m travel lanes per direction.
- One 5.0 m bi-directional centre left turn lane.
- Urban cross-section with curbs and catch basins.
- 3.0 m MUP on both sides within 8.0 m boulevards.
- Streetlighting within boulevards.

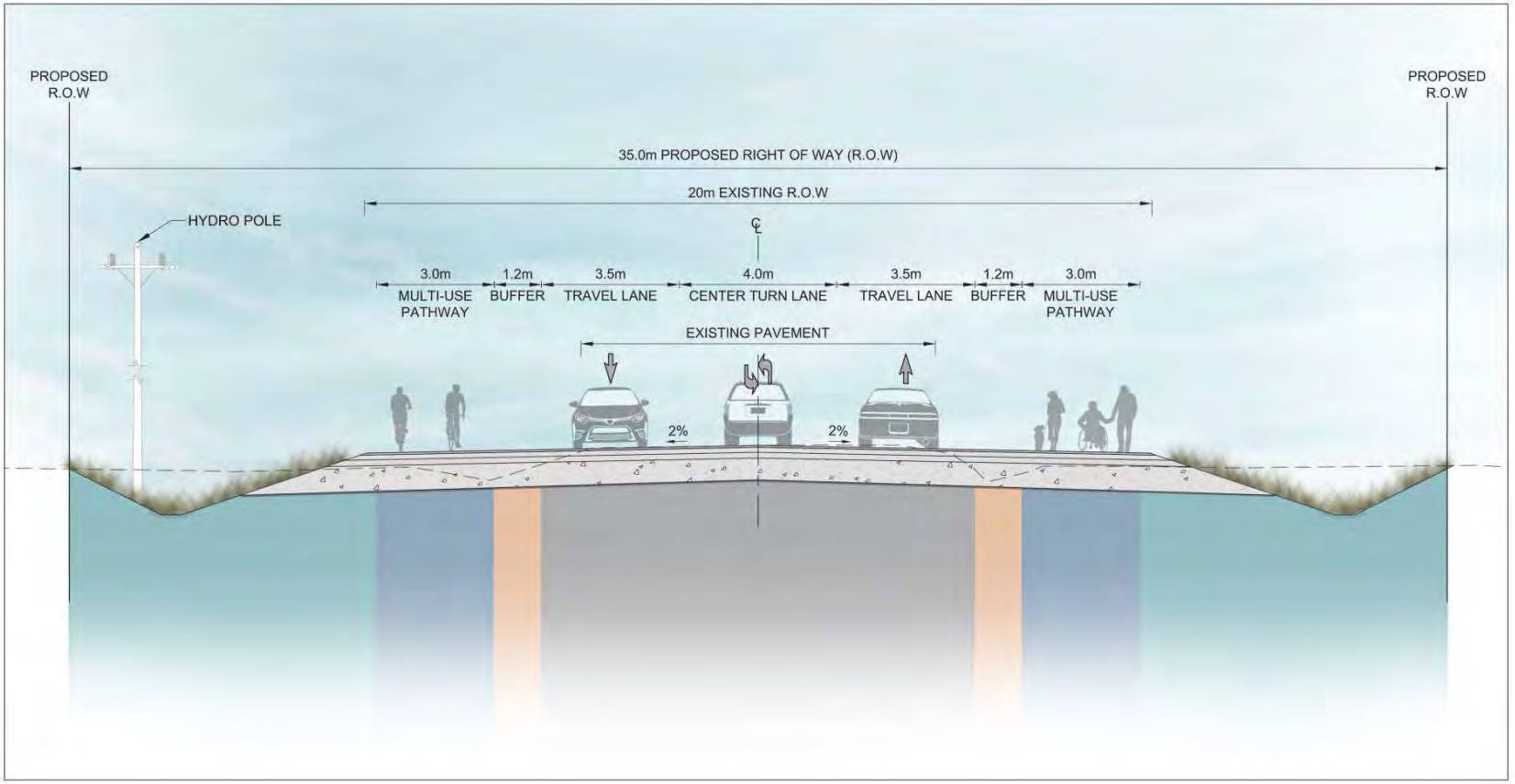
9.2.5 15 Side Road to Maple Avenue

The preferred cross-section for 15 Side Road to Maple Avenue as illustrated in Figure 9.5 include the following elements:

- Proposed ROW varies from 22 m to 31 m.
- Widening varies along corridor to limit impact on properties and environment.
- One 3.5 m travel lane per direction.

- One 4.0 m bi-directional centre left turn lane.
- Urban cross-section with curbs and catch basins.
- 3.0 m MUP on east side.
- Existing sidewalk on west side maintained.

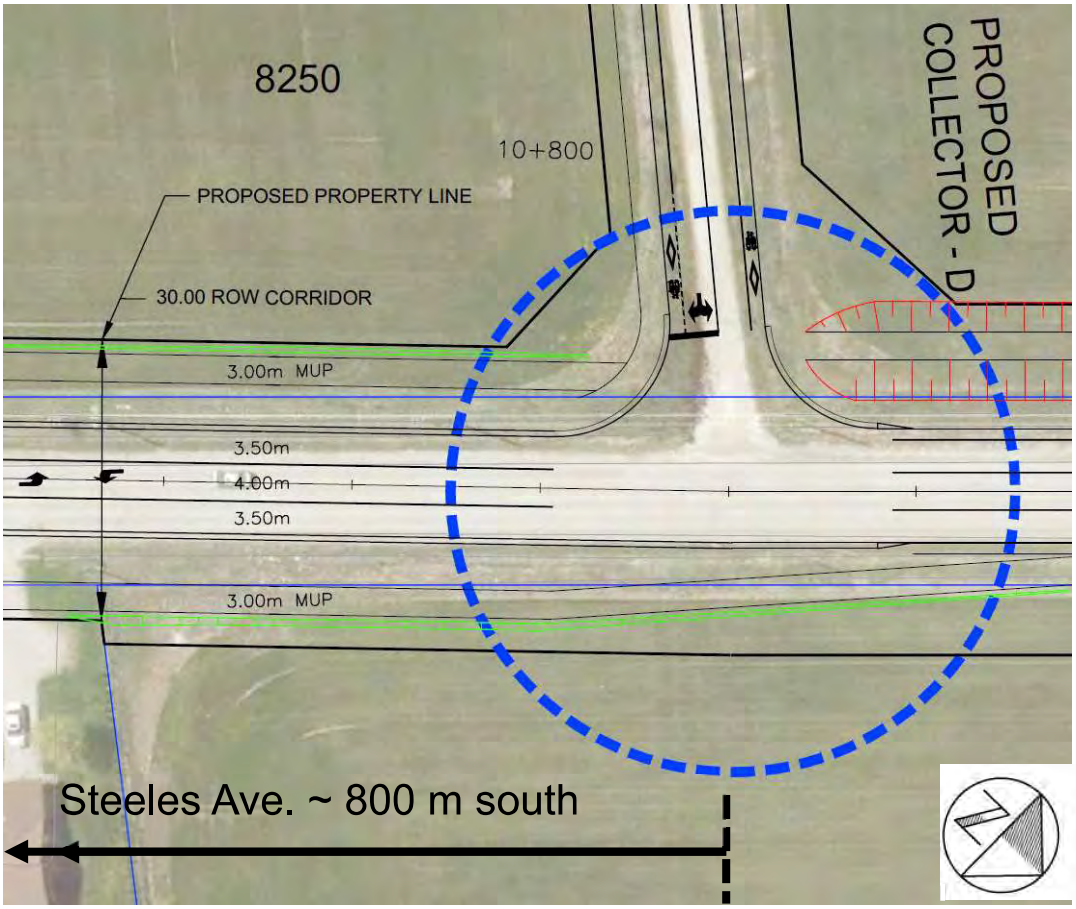
Figure 9.2: Typical Cross-Section for Proposed Collector Road D to 5 Side Road



9.5.2 Eighth Line and Proposed Collector Road D

As illustrated in Figure 9.8, Proposed Collector Road D is proposed to be stop controlled for eastbound traffic. A roundabout configuration for this intersection could be considered at the next phase of the project. North of the intersection, Eighth Line transitions from an urban to rural cross-section.

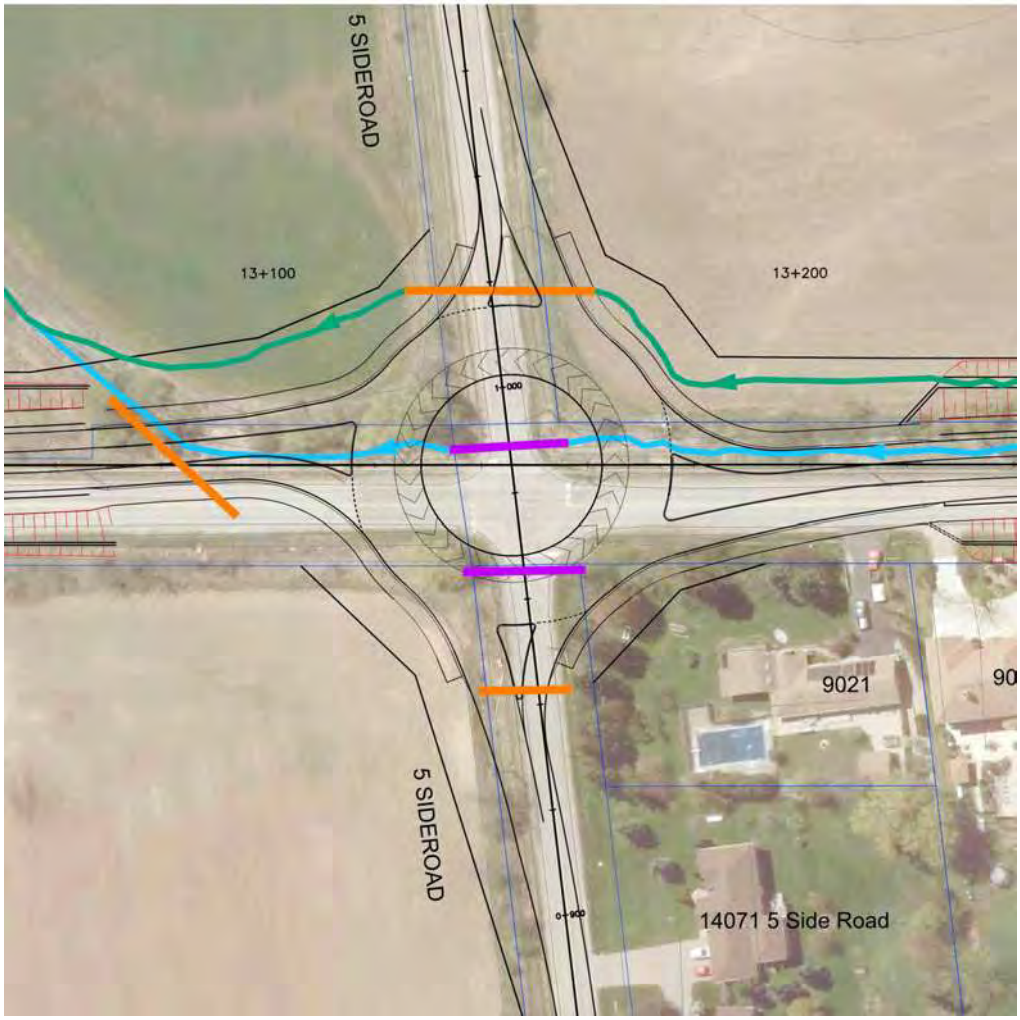
Figure 9.8: Eighth Line and Proposed Collector Road D Intersection



9.5.3 Eighth Line and 5 Side Road

As illustrated on Figure 9.9, the intersection at 5 Side Road is proposed to be a roundabout. Eighth Line is shifted west to limit the impacts on the residential property in the northeast corner of the intersection. The existing watercourse that runs parallel to Eighth Line of the west side of Eighth Line will be realigned to the west to accommodate this shift.

Figure 9.9: Eighth Line and 5 Side Road Intersection



Eighth Line Environmental Assessment

Environmental Study Report

Appendix A – Transportation Study Report

2031 Future Operations – Do Nothing

Under future conditions, with the projected increase in traffic, the majority of the segments will exceed the planning capacity for one lane arterial road and intersections will have movements over capacity. Given the projected volumes on Eighth Line, drivers turning left from driveways or side roads will experience longer delays and it will become more challenging for them to turn onto Eighth Line. A do nothing option does not address the future transportation needs along the corridor.

Alternative Solutions

The alternatives to alleviate the deficiencies in the road network are summarized in Table A to Table C. Due to the characteristics of the road through the Study Area, the roadway is divided into three segments:

- Maple Avenue to 15 Side Road;
- 15 Side Road to 10 Side Road; and
- 10 Side Road to Steeles Avenue.

Evaluation of Alternative Solutions

The overall objective of the evaluation was to identify a preferred alternative that will allow for the safe and efficient movement of traffic and meet the travel demands anticipated by the Town in year 2031.

Preferred Alternative

The preferred alternative is highlighted in the Table A for Maple Avenue to 15 Side Road, Table B for 15 Side Road to 10 Side Road and Table C for 10 Side Road to Steeles Avenue.

Table A: Maple Avenue to 15 Side Road Alternatives

Segment	Intersections	Alternative 1	Alternative 2
Maple Avenue to 15 Side Road		**Three Lane Cross Section**: • Additional centre two-way left turn lane. • The multi-use path on the east side is to be maintained and a sidewalk or multiuse path is proposed on the west side. • Alternative 3 moves bike lanes on-road, which does not affect traffic operations.	**Four Lane Cross Section:** • Additional northbound and southbound through lane. • The multi-use path on the east side is to be maintained and a sidewalk is proposed on the west side.
	Maple Avenue	• Additional eastbound right turn lane	
	Aborglen Drive	**Option A:** • Single Lane Roundabout • NB will approach capacity (v/c 0.87) • Substantial property impacts • Bridge widening not necessary	• Signalization with NBTR + SBTR • Will operate with excess capacity • Impacts the bridge due to widening and environmental area to the north
		Option B: • Signalization • Will operate with excess capacity	
	15 Side Road	• Exclusive SBR • Will operate with excess capacity	• Signalization with NBT + SBTR • Will operate with excess capacity

Note: Preferred Alternative highlighted in blue.

Table B: 15 Side Road to 10 Side Road Alternatives

Segment	Intersections	Alternative 1	Alternative 2
15 Side Road to 10 Side Road		**Four to Five Lane Cross Section**: • Additional northbound and southbound through lanes and a centre two-way left turn lane. • The second northbound through lane, north of Miller Drive will become an exclusive right turn lane as it approaches West Branch Drive. • The multi-use path on the east side is to be maintained and a sidewalk or multi-use path is proposed on the west side.	**Five Lane Cross Section:** • Additional northbound and southbound through lanes and a centre two-way left turn lane. • The multi-use path on the east side is to be maintained and a sidewalk or multi-use path is proposed on the west side.
	Proposed Collector A / Miller Drive	• Signalization • Signal warranted and justified • Will operate with excess capacity	
	Proposed Collector B	• Dual Lane Roundabout • Will operate with excess capacity • Signalized intersection alternative would be acceptable	• Stop controlled. • Will operate with excess capacity, but the left turn movement will experience a delay resulting in a level of service E. • Note that signalization would be required.
	Argyll Road	• Signalization with additional NBT + SBT • Signal warranted under Justification 2 • Will operate with excess capacity	
	Proposed Collector C / Danby Road	• Dual Lane Roundabout. • Will operate with excess capacity. • Due to the residential property to the southeast and church property to the northeast, the roundabout will have to be shifted towards the west.	
	10 Side Road	• Single SBL • Will operate with excess capacity	• Dual SBL. • Will operate with excess capacity. • Additional widening will be needed for the dual southbound left turn lanes.

Note: Preferred Alternative highlighted in blue.

Table C: 10 Side Road to Steeles Avenue Alternatives

Segment	Intersections	Alternative 1	Alternative 2	Alternative 3
10 Side Road to 5 Side Road		**10 Side Road to 5 Side Road Five Lane Cross Section:** • Additional northbound and southbound through lanes and a centre two-way left turn lane. • Paved shoulders on both sides.	**10 Side Road to 5 Side Road Four Lane Cross Section:** • Additional northbound and southbound through lanes. • Paved shoulders on both sides.	**10 Side Road to 5 Side Road Three Lane Cross Section**: • Three lane cross section, which consists of a centre two-way left turn lane. • Proposed multi-use path on the east and west side.
	5 Side Road	• Single Lane Roundabout. • Will operate with excess capacity. • With the residential property to the northeast, it is expected that the roundabout will shift towards the west or southeast.	• Signalization with NBTR + SBTR. • Will operate with excess capacity. • Signal warranted and justified.	• Signalization. • Will operate with excess capacity. • Signal warranted and justified.
5 Side Road to Steeles Avenue			• 5 Side Road to Steeles Four to Three Lane Cross Section. • additional northbound and southbound through lanes. However, the second southbound through lane will be dropped, south of Proposed Collector D. • Paved shoulders on both sides.	• 5 Side Road to Steeles Three Lane Cross Section. • Three lane cross section, which consists of a centre two-way left turn lane. • Paved shoulders on both sides.
	Proposed Collector D		• Stop Controlled. • Experience delays resulting in level of service F for the eastbound left turn movement during both peak hours.	• Single Lane Roundabout • Will operate with excess capacity
	Steeles Avenue		• Signalization with additional WBT, EBT, exclusive WBR. • During PM peak hour, the overall intersection is projected to be at capacity with the eastbound left turn and westbound through movements projected to approach capacity.	

Note: Preferred Alternative highlighted in blue.

Steeles & Eighth Line N.

Pattern 1

Time:	6:00-9:30			
Cycle Leng	130			
Offset (%):	65%			
Direction				
Phase	***1***	***2***	***3***	***4***
%	10	45	30	15
Direction				
Phase	***5***	***6***	***7***	***8***
%	13	42	0	45

Pattern 2

Time:	9:30-15:00			
Cycle Leng	120			
Offset (%):	69%			
Direction				
Phase	***1***	***2***	***3***	***4***
%	12	43	30	15
Direction				
Phase	***5***	***6***	***7***	***8***
%	12	43	0	45

Pattern 3

Time:	15:00-19:00			
Cycle Leng	130			
Offset (%):	26%			
Direction				
Phase	***1***	***2***	***3***	***4***
%	13	42	30	15
Direction	16.9	54.6	39	19.5
Phase	***5***	***6***	***7***	***8***
%	13	42	0	45
	16.9	54.6	0	58.5

Pattern 4

Time:	19:00-21:30			
Cycle Leng	120			
Offset (%):	69%			
Direction				
Phase	***1***	***2***	***3***	***4***
%	12	43	30	15
Direction				
Phase	***5***	***6***	***7***	***8***
%	12	43	0	45

Pattern 5 (weekend)

Time:	7:00 - 21:30			
Cycle Leng	120			
Offset (%):	70%			
Direction				
Phase	***1***	***2***	***3***	***4***
%	13	42	30	15
Direction				
Phase	***5***	***6***	***7***	***8***
%	13	42	0	45

Pattern 6

Time:	0:00			
Cycle Leng	local			
Offset (%):	0%			
Direction				
Phase	***1***	***2***	***3***	***4***
%	0	0	0	0
Direction				
Phase	***5***	***6***	***7***	***8***
%	0	0	0	0

southbound left turn volume is projected to be in the order of 565 vehicles during the AM peak hour.

The intersection will function similarly between Alternative 1 and Alternative 2 with slightly better operations for Alternative 2. Both options are projected to operate with an individual movement of 0.93 volume to capacity ratio or better and will experience a delay resulting in a level of service D or better during the weekday AM and PM peak hours.

As a single southbound left turn lane, 135 m of storage would be required, which would result in the taper extending of Danby Road. For a dual left turn lane, the individual lane storage is reduced to 73 m per lane.

Either Alternative 1 or 2 can accommodate the traffic demand. The impact on the environment or land requirements needs to be considered to determine the appropriate design.

Summary

Along this corridor between 15 Side Road and 10 Side Road, majority of the lands in the east are developed. As a result, most of the widening will need to be accommodated for on the west side. There is not much difference between the two options operationally and either option can accommodate the 2031 traffic volumes.

A sidewalk should be provided on the west side of Eighth Line, while maintaining the multi-use path along the east side.

5.3 10 Side Road to Steeles Avenue Alternatives

There are several alternatives considered for this segment including:

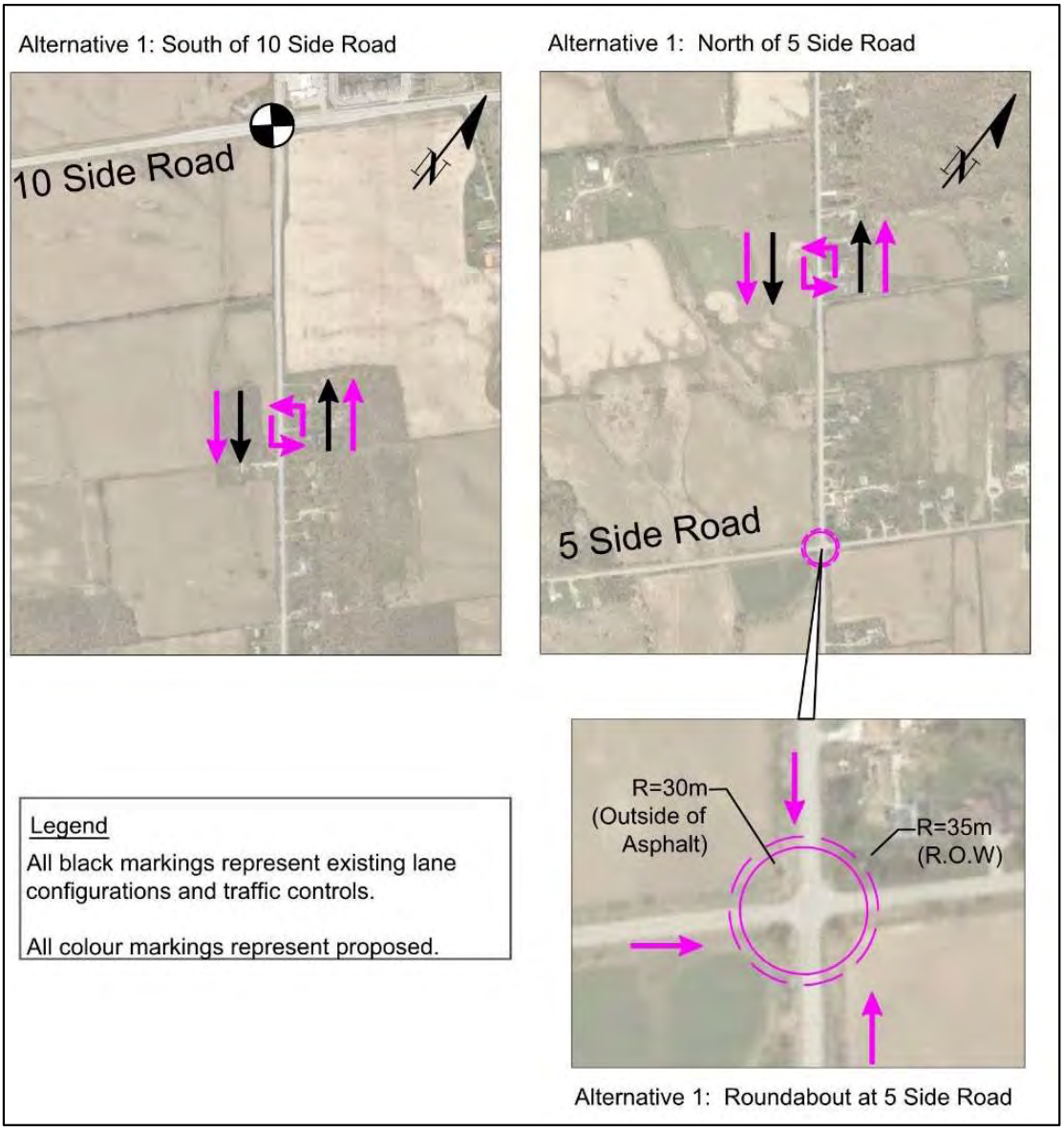
- 10 Side Road to 5 Side Road
  - Alternative 1: Five Lane Cross Section
  - Alternative 2: Four Lane Cross Section
  - Alternative 3: Three Lane Cross Section
- 5 Side Road to Steeles Avenue
  - Alternative 2: Four to Three Lane Cross Section
  - Alternative 3: Three Lane Cross Section

The provision of active transportation facilities along the corridor will affect the right-of-way width. It is desirable to provide a better condition over today where there are no shoulders. At a minimum, partially paved shoulders up to sidewalks, bike lanes or multi-use trail should be provided. As the active transportation facilities will not affect the traffic operations, please refer to the ESR document for the assessment.

5.3.1 Alternative 1: 10 Side Road to 5 Side Road Five Lane Cross Section

This segment will be a five lane cross section, which consists of an additional northbound and southbound through lanes and a centre two-way left turn lane. This is illustrated in Figure 11. A roundabout is proposed at 5 Side Road in this alternative.

Figure 11: Alternative 1 – 10 Side Road to 5 Side Road Five Lane Cross Section



4.0 Future Traffic Projections

In reviewing future traffic conditions, a study horizon year of 2031 was chosen to be consistent with the Town's Official Plan. To project future traffic, historical traffic growth on study roads, background traffic from planned future developments and any planned road network connections and improvements need to be considered.

4.1 Future Road Network

There are two major planned roadway improvement within year 2031 on the study corridor and intersections, including:

- An exclusive northbound right turn lane at Maple Avenue.
  - This was implemented in September 2019 after the existing traffic counts were conducted; as a result, it is included under future conditions.
- According to the Region's 2020 Capital Budget, Steeles Avenue will be widening from four to six lanes (with a reserved bus lane) from Trafalgar Road to Winston Churchill Boulevard by 2028. It has been assumed that with this widening, the Region would incorporate planned active transportation facilities at the same time.

The above were considered under the future conditions. In addition, there are also proposed road network connections associated with the development applications and this is detailed in the proceeding sections.

4.2 Traffic Growth Rate

Based on a discussion with the Town, a growth rate of 1.0% compounded annually up to horizon year 2031 was applied to all movements with some exceptions. The movements associated with roadways that have built-up development or will have built-up development, no growth was assumed. This includes the following:

- Arborglen Drive;
- 15 Side Road;
- Miller Drive;
- Argyll Road;
- Danby Road; and
- Premium Outlets Driveway.

4.3 Background Developments

There are two major development applications identified to be within the vicinity of the Study Area and are an anticipated to be built within the study horizon year. Details are provided below.

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[THE DIFFERENCE IS OUR PEOPLE]

Appendix L

10 Side Road to Steeles Future Operations

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	23	296	88	181	3	131	83	772
Future Volume (vph)	23	296	88	181	3	131	83	772
Lane Group Flow (vph)	24	338	92	191	3	164	86	974
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	69.0	69.0	69.0	69.0	31.0	31.0	31.0	31.0
Total Split (%)	69.0%	69.0%	69.0%	69.0%	31.0%	31.0%	31.0%	31.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.10	0.72	0.65	0.41	0.01	0.08	0.11	0.44
Control Delay	26.2	41.5	53.2	32.3	10.0	7.6	4.8	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	41.5	53.2	32.3	10.0	7.6	4.8	4.9
Queue Length 50th (m)	3.6	58.8	16.0	30.9	0.2	5.0	3.3	19.3
Queue Length 95th (m)	8.7	76.5	29.8	43.4	1.6	11.7	m8.5	40.2
Internal Link Dist (m)		171.8		223.6		1516.5		2849.8
Turn Bay Length (m)	30.0		30.0		30.0		30.0	
Base Capacity (vph)	621	1157	355	1162	305	2038	782	2226
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.29	0.26	0.16	0.01	0.08	0.11	0.44

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Eighth Line & 5 Sideroad

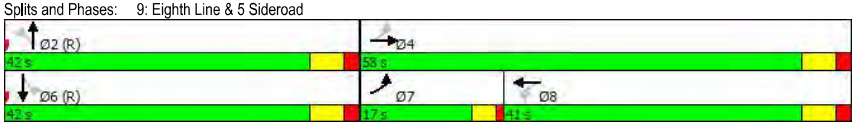
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	296	29	88	181	2	3	131	27	83	772	163
Future Volume (vph)	23	296	29	88	181	2	3	131	27	83	772	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1659	1831		1738	1845		1825	3232		1825	3530	
Flt Permitted	0.56	1.00		0.31	1.00		0.25	1.00		0.65	1.00	
Satd. Flow (perm)	986	1831		563	1845		486	3232		1245	3530	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	24	308	30	92	189	2	3	136	28	86	804	170
RTOR Reduction (vph)	0	7	0	0	1	0	0	9	0	0	9	0
Lane Group Flow (vph)	24	331	0	92	190	0	3	155	0	86	965	0
Heavy Vehicles (%)	10%	2%	19%	5%	4%	0%	0%	8%	20%	0%	0%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.2	25.2		25.2	25.2		62.8	62.8		62.8	62.8	
Effective Green, g (s)	25.2	25.2		25.2	25.2		62.8	62.8		62.8	62.8	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.63	0.63		0.63	0.63	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	248	461		141	464		305	2029		781	2216	
v/s Ratio Prot		c0.18			0.10			0.05			c0.27	
v/s Ratio Perm	0.02			0.16			0.01			0.07		
v/c Ratio	0.10	0.72		0.65	0.41		0.01	0.08		0.11	0.44	
Uniform Delay, d1	28.7	34.2		33.5	31.2		7.0	7.3		7.4	9.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.49	0.42	
Incremental Delay, d2	0.2	5.3		10.3	0.6		0.1	0.1		0.2	0.5	
Delay (s)	28.8	39.5		43.8	31.8		7.0	7.3		3.9	4.5	
Level of Service	C	D		D	C		A	A		A	A	
Approach Delay (s)		38.8			35.7			7.3			4.4	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.52				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	72.9%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	199	281	42	323	20	673	6	242
Future Volume (vph)	199	281	42	323	20	673	6	242
Lane Group Flow (vph)	209	298	44	422	21	820	6	303
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	17.0	58.0	41.0	41.0	42.0	42.0	42.0	42.0
Total Split (%)	17.0%	58.0%	41.0%	41.0%	42.0%	42.0%	42.0%	42.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.63	0.36	0.14	0.82	0.04	0.52	0.03	0.19
Control Delay	24.4	18.7	25.9	45.3	19.7	22.7	14.2	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	18.7	25.9	45.3	19.7	22.7	14.2	12.2
Queue Length 50th (m)	23.7	36.5	6.4	73.9	2.3	58.5	0.5	13.4
Queue Length 95th (m)	32.8	47.8	13.4	98.6	7.7	86.5	m2.2	20.4
Internal Link Dist (m)		118.1		121.2		922.2		2714.5
Turn Bay Length (m)	30.0		30.0		30.0		30.0	
Base Capacity (vph)	337	985	388	651	477	1577	211	1561
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.30	0.11	0.65	0.04	0.52	0.03	0.19

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Eighth Line & 5 Sideroad



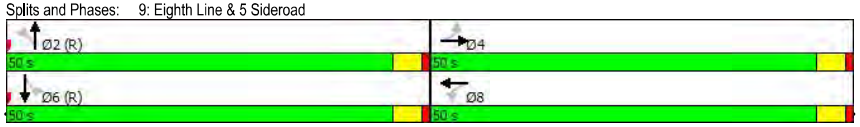
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	281	2	42	323	78	20	673	106	6	242	46
Future Volume (vph)	199	281	2	42	323	78	20	673	106	6	242	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.97		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1722	1894		1825	1836		1825	3575		1825	3534	
Flt Permitted	0.19	1.00		0.58	1.00		0.57	1.00		0.25	1.00	
Satd. Flow (perm)	341	1894		1111	1836		1089	3575		482	3534	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	209	296	2	44	340	82	21	708	112	6	255	48
RTOR Reduction (vph)	0	1	0	0	9	0	0	11	0	0	13	0
Lane Group Flow (vph)	209	297	0	44	413	0	21	809	0	6	290	0
Heavy Vehicles (%)	6%	1%	50%	0%	1%	4%	0%	0%	0%	0%	1%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	44.2	44.2		27.7	27.7		43.8	43.8		43.8	43.8	
Effective Green, g (s)	44.2	44.2		27.7	27.7		43.8	43.8		43.8	43.8	
Actuated g/C Ratio	0.44	0.44		0.28	0.28		0.44	0.44		0.44	0.44	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	323	837		307	508		476	1565		211	1547	
v/s Ratio Prot	c0.08	0.16			c0.22			c0.23			0.08	
v/s Ratio Perm	0.20			0.04			0.02			0.01		
v/c Ratio	0.65	0.36		0.14	0.81		0.04	0.52		0.03	0.19	
Uniform Delay, d1	20.3	18.5		27.2	33.7		16.1	20.4		16.0	17.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.69	0.69	
Incremental Delay, d2	4.4	0.3		0.2	9.6		0.2	1.2		0.2	0.3	
Delay (s)	24.7	18.7		27.4	43.3		16.3	21.6		11.3	12.1	
Level of Service	C	B		C	D		B	C		B	B	
Approach Delay (s)		21.2			41.8			21.5			12.1	
Approach LOS		C			D			C			B	

Intersection Summary				
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	68.1%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	23	296	88	181	3	131	83	772
Future Volume (vph)	23	296	88	181	3	131	83	772
Lane Group Flow (vph)	24	338	92	191	3	164	86	974
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.11	0.75	0.80	0.43	0.02	0.14	0.10	0.78
Control Delay	27.5	44.5	78.4	33.4	8.3	7.1	5.2	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.5	44.5	78.4	33.4	8.3	7.1	5.2	16.3
Queue Length 50th (m)	3.6	59.9	16.8	31.3	0.2	9.5	3.9	63.0
Queue Length 95th (m)	9.0	79.5	#36.3	44.8	1.5	22.1	m8.6	#254.3
Internal Link Dist (m)		171.8		223.6		1516.5		2849.8
Turn Bay Length (m)	30.0		30.0		30.0		30.0	
Base Capacity (vph)	413	836	215	839	189	1137	836	1243
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.40	0.43	0.23	0.02	0.14	0.10	0.78

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Eighth Line & 5 Sideroad



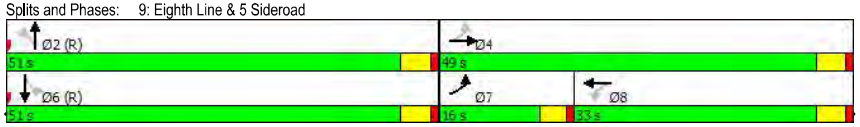
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	296	29	88	181	2	3	131	27	83	772	163
Future Volume (vph)	23	296	29	88	181	2	3	131	27	83	772	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1659	1831		1738	1845		1825	1701		1825	1858	
Flt Permitted	0.52	1.00		0.26	1.00		0.15	1.00		0.65	1.00	
Satd. Flow (perm)	908	1831		474	1845		284	1701		1255	1858	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	24	308	30	92	189	2	3	136	28	86	804	170
RTOR Reduction (vph)	0	5	0	0	1	0	0	5	0	0	5	0
Lane Group Flow (vph)	24	333	0	92	190	0	3	159	0	86	969	0
Heavy Vehicles (%)	10%	2%	19%	5%	4%	0%	0%	8%	20%	0%	0%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.3	24.3		24.3	24.3		66.7	66.7		66.7	66.7	
Effective Green, g (s)	24.3	24.3		24.3	24.3		66.7	66.7		66.7	66.7	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.67	0.67		0.67	0.67	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	220	444		115	448		189	1134		837	1239	
v/s Ratio Prot		0.18			0.10			0.09			c0.52	
v/s Ratio Perm	0.03			c0.19			0.01			0.07		
v/c Ratio	0.11	0.75		0.80	0.42		0.02	0.14		0.10	0.78	
Uniform Delay, d1	29.4	35.0		35.6	31.9		5.6	6.1		6.0	11.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.66	0.83	
Incremental Delay, d2	0.2	7.0		31.5	0.7		0.2	0.3		0.2	4.3	
Delay (s)	29.7	42.1		67.1	32.6		5.8	6.4		4.1	13.9	
Level of Service	C	D		E	C		A	A		A	B	
Approach Delay (s)		41.2			43.8			6.4			13.1	
Approach LOS		D			D			A			B	

Intersection Summary				
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0	
Intersection Capacity Utilization	91.9%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	199	281	42	323	20	673	6	242
Future Volume (vph)	199	281	42	323	20	673	6	242
Lane Group Flow (vph)	209	298	44	422	21	820	6	303
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	16.0	49.0	33.0	33.0	51.0	51.0	51.0	51.0
Total Split (%)	16.0%	49.0%	33.0%	33.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.76	0.38	0.15	0.87	0.04	0.88	0.08	0.33
Control Delay	38.8	21.2	28.7	53.7	14.9	36.0	16.3	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	21.2	28.7	53.7	14.9	36.0	16.3	15.2
Queue Length 50th (m)	24.9	37.3	6.4	73.9	2.1	142.0	0.5	29.4
Queue Length 95th (m)	#53.7	56.6	14.9	#118.9	6.3	#223.7	m2.2	41.3
Internal Link Dist (m)		118.1		121.2		922.2		2714.5
Turn Bay Length (m)	30.0		30.0		30.0		30.0	
Base Capacity (vph)	279	842	316	531	481	934	77	923
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.35	0.14	0.79	0.04	0.88	0.08	0.33

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Eighth Line & 5 Sideroad



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	281	2	42	323	78	20	673	106	6	242	46
Future Volume (vph)	199	281	2	42	323	78	20	673	106	6	242	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.97		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1722	1894		1825	1836		1825	1882		1825	1860	
Flt Permitted	0.13	1.00		0.58	1.00		0.51	1.00		0.08	1.00	
Satd. Flow (perm)	242	1894		1111	1836		976	1882		158	1860	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	209	296	2	44	340	82	21	708	112	6	255	48
RTOR Reduction (vph)	0	0	0	0	9	0	0	6	0	0	7	0
Lane Group Flow (vph)	209	298	0	44	413	0	21	814	0	6	296	0
Heavy Vehicles (%)	6%	1%	50%	0%	1%	4%	0%	0%	0%	0%	1%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.7	41.7		25.9	25.9		49.3	49.3		49.3	49.3	
Effective Green, g (s)	41.7	41.7		25.9	25.9		49.3	49.3		49.3	49.3	
Actuated g/C Ratio	0.42	0.42		0.26	0.26		0.49	0.49		0.49	0.49	
Clearance Time (s)	4.0	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	275	789		287	475		481	927		77	916	
v/s Ratio Prot	c0.09	0.16			c0.22			c0.43			0.16	
v/s Ratio Perm	0.23			0.04			0.02			0.04		
v/c Ratio	0.76	0.38		0.15	0.87		0.04	0.88		0.08	0.32	
Uniform Delay, d1	22.5	20.2		28.6	35.4		13.1	22.7		13.4	15.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.88	0.91	
Incremental Delay, d2	11.7	0.3		0.2	15.5		0.2	11.6		1.9	0.9	
Delay (s)	34.2	20.5		28.8	51.0		13.3	34.3		13.7	14.9	
Level of Service	C	C		C	D		B	C		B	B	
Approach Delay (s)		26.1			48.9			33.7			14.8	
Approach LOS		C			D			C			B	

Intersection Summary					
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.86				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0		
Intersection Capacity Utilization	85.5%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	49	64	262	122	664	202
Future Volume (Veh/h)	49	64	262	122	664	202
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	70	285	133	722	220
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	1468	471	942			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1468	471	942			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	26	87	61			
cM capacity (veh/h)	72	539	724			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	53	70	329	89	481	461
Volume Left	53	0	285	0	0	0
Volume Right	0	70	0	0	0	220
cSH	72	539	724	1700	1700	1700
Volume to Capacity	0.74	0.13	0.39	0.05	0.28	0.27
Queue Length 95th (m)	26.1	3.4	14.3	0.0	0.0	0.0
Control Delay (s)	138.3	12.7	12.1	0.0	0.0	0.0
Lane LOS	F	B	B			
Approach Delay (s)	66.8		9.5		0.0	
Approach LOS	F					

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	243	314	136	550	161	105
Future Volume (Veh/h)	243	314	136	550	161	105
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	264	341	148	598	175	114
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	TWLTL	
Median storage veh)					2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	827	144	289			
vC1, stage 1 conf vol	232					
vC2, stage 2 conf vol	595					
vCu, unblocked vol	827	144	289			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	38	61	88			
cM capacity (veh/h)	428	877	1270			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	264	341	347	399	117	172
Volume Left	264	0	148	0	0	0
Volume Right	0	341	0	0	0	114
cSH	428	877	1270	1700	1700	1700
Volume to Capacity	0.62	0.39	0.12	0.23	0.07	0.10
Queue Length 95th (m)	30.6	14.1	3.0	0.0	0.0	0.0
Control Delay (s)	26.0	11.7	4.1	0.0	0.0	0.0
Lane LOS	D	B	A			
Approach Delay (s)	17.9		1.9		0.0	
Approach LOS	C					

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	101	1302	3	28	796	283	4	0	335	7
Future Volume (vph)	101	1302	3	28	796	283	4	0	335	7
Lane Group Flow (vph)	112	1447	3	31	884	314	4	12	372	437
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		2	6		6			4	
Detector Phase	5	2	2	1	6	6	3	8	7	4
Switch Phase										
Minimum Initial (s)	7.0	20.0	20.0	5.0	20.0	20.0	10.0	10.0	5.0	10.0
Minimum Split (s)	11.0	30.0	30.0	9.5	30.0	30.0	17.0	35.0	9.5	17.0
Total Split (s)	13.0	53.2	53.2	9.8	50.0	50.0	17.0	41.8	25.2	50.0
Total Split (%)	10.0%	40.9%	40.9%	7.5%	38.5%	38.5%	13.1%	32.2%	19.4%	38.5%
Yellow Time (s)	3.0	4.0	4.0	3.5	4.0	4.0	4.0	4.0	3.5	4.0
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	4.5	6.0	6.0	7.0	7.0	4.5	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	Max	Max
v/c Ratio	0.47	0.74	0.00	0.22	0.54	0.47	0.02	0.02	0.53	0.50
Control Delay	27.7	37.4	0.0	24.2	36.2	6.2	55.8	0.1	25.4	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.7	37.4	0.0	24.2	36.2	6.2	55.8	0.1	25.4	11.1
Queue Length 50th (m)	16.4	121.4	0.0	4.4	67.1	1.2	0.5	0.0	60.8	21.5
Queue Length 95th (m)	28.3	140.1	0.0	10.3	81.0	22.0	2.3	0.0	86.1	62.6
Internal Link Dist (m)		404.2			434.4			90.9		675.2
Turn Bay Length (m)	120.0		70.0	133.0		50.0			100.0	
Base Capacity (vph)	240	1945	743	138	1626	670	217	514	699	876
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.74	0.00	0.22	0.54	0.47	0.02	0.02	0.53	0.50

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 11: Premium Outlet Driveway/Eighth Line & Steeles Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	1302	3	28	796	283	4	0	11	335	7	386
Future Volume (vph)	101	1302	3	28	796	283	4	0	11	335	7	386
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.5	6.0	6.0	7.0	7.0		4.5	7.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1706	4948	1633	1755	4768	1372	2832	1476		1804	1633	
Flt Permitted	0.18	1.00	1.00	0.10	1.00	1.00	0.95	1.00		0.67	1.00	
Satd. Flow (perm)	322	4948	1633	190	4768	1372	2832	1476		1281	1633	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	112	1447	3	31	884	314	4	0	12	372	8	429
RTOR Reduction (vph)	0	0	2	0	0	215	0	8	0	0	165	0
Lane Group Flow (vph)	112	1447	1	31	884	99	4	4	0	372	272	0
Confl. Peds. (#/hr)									2	2		
Heavy Vehicles (%)	7%	6%	0%	4%	10%	19%	25%	0%	9%	1%	17%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6				4		
Actuated Green, G (s)	51.4	43.7	43.7	42.0	38.8	38.8	2.0	40.4		65.6	56.6	
Effective Green, g (s)	51.4	43.7	43.7	42.0	38.8	38.8	2.0	40.4		65.6	56.6	
Actuated g/C Ratio	0.40	0.34	0.34	0.32	0.30	0.30	0.02	0.31		0.50	0.44	
Clearance Time (s)	4.0	6.0	6.0	4.5	6.0	6.0	7.0	7.0		4.5	7.0	
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	4.0	4.0		3.0	3.0	
Lane Grp Cap (vph)	218	1663	548	99	1423	409	43	458		729	710	
v/s Ratio Prot	c0.03	c0.29		0.01	0.19		0.00	0.00		c0.08	0.17	
v/s Ratio Perm	0.17		0.00	0.09		0.07				c0.18		
v/c Ratio	0.51	0.87	0.00	0.31	0.62	0.24	0.09	0.01		0.51	0.38	
Uniform Delay, d1	27.0	40.5	28.7	32.9	39.3	34.5	63.1	31.0		20.2	24.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	6.5	0.0	1.8	2.0	1.4	1.3	0.0		2.5	1.6	
Delay (s)	29.0	47.0	28.7	34.7	41.3	35.9	64.4	31.0		22.7	26.4	
Level of Service	C	D	C	C	D	D	E	C		C	C	
Approach Delay (s)		45.7			39.8			39.3			24.7	
Approach LOS		D			D			D			C	

Intersection Summary

HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	367	1180	19	137	1358	254	96	65	350	45
Future Volume (vph)	367	1180	19	137	1358	254	96	65	350	45
Lane Group Flow (vph)	386	1242	20	144	1429	267	101	242	368	131
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		2	6		6			4	
Detector Phase	5	2	2	1	6	6	3	8	7	4
Switch Phase										
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0	5.0	10.0
Minimum Split (s)	11.0	30.0	30.0	11.0	30.0	30.0	17.0	35.0	9.5	17.0
Total Split (s)	27.0	53.0	53.0	15.0	41.0	41.0	17.0	35.0	17.0	35.0
Total Split (%)	22.5%	44.2%	44.2%	12.5%	34.2%	34.2%	14.2%	29.2%	14.2%	29.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	7.0	7.0	4.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	Max
v/c Ratio	0.96	0.62	0.03	0.56	0.97	0.44	0.35	0.52	0.88	0.29
Control Delay	68.5	30.5	0.1	25.5	58.6	14.7	55.5	27.5	52.9	20.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.5	30.5	0.1	25.5	58.6	14.7	55.5	27.5	52.9	20.3
Queue Length 50th (m)	73.2	84.8	0.0	16.5	122.2	16.7	11.7	28.7	64.3	11.5
Queue Length 95th (m)	#131.7	101.6	0.0	27.4	#155.1	40.4	20.6	54.3	#113.6	28.3
Internal Link Dist (m)		390.8			428.7			90.9		682.8
Turn Bay Length (m)	120.0		70.0	133.0		50.0			25.0	
Base Capacity (vph)	411	1990	697	275	1479	605	292	466	420	447
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.62	0.03	0.52	0.97	0.44	0.35	0.52	0.88	0.29

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Premium Outlet Driveway/Eighth Line & Steeles Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	367	1180	19	137	1358	254	96	65	165	350	45	80
Future Volume (vph)	367	1180	19	137	1358	254	96	65	165	350	45	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0	7.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	4948	1532	1825	4995	1633	3506	1672		1824	1688	
Flt Permitted	0.10	1.00	1.00	0.18	1.00	1.00	0.95	1.00		0.45	1.00	
Satd. Flow (perm)	193	4948	1532	346	4995	1633	3506	1672		864	1688	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	386	1242	20	144	1429	267	101	68	174	368	47	84
RTOR Reduction (vph)	0	0	12	0	0	122	0	77	0	0	54	0
Lane Group Flow (vph)	386	1242	8	144	1429	145	101	165	0	368	77	0
Confl. Peds. (#/hr)			2	2					2	2		
Heavy Vehicles (%)	1%	6%	5%	0%	5%	0%	1%	0%	2%	0%	8%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6				4		
Actuated Green, G (s)	62.0	48.3	48.3	45.2	35.5	35.5	10.0	28.0		41.0	28.0	
Effective Green, g (s)	62.0	48.3	48.3	45.2	35.5	35.5	10.0	28.0		41.0	28.0	
Actuated g/C Ratio	0.52	0.40	0.40	0.38	0.30	0.30	0.08	0.23		0.34	0.23	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	4.0	4.0		3.0	3.0	
Lane Grp Cap (vph)	402	1991	616	249	1477	483	292	390		399	393	
v/s Ratio Prot	c0.18	0.25		0.05	0.29		0.03	0.10		c0.10	0.05	
v/s Ratio Perm	c0.32		0.01	0.17		0.09				c0.22		
v/c Ratio	0.96	0.62	0.01	0.58	0.97	0.30	0.35	0.42		0.92	0.20	
Uniform Delay, d1	36.4	28.6	21.5	25.5	41.7	32.7	51.9	39.1		36.0	37.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	34.5	1.5	0.0	3.2	16.9	1.6	1.0	3.4		26.5	1.1	
Delay (s)	70.9	30.1	21.6	28.7	58.5	34.2	52.9	42.5		62.5	38.1	
Level of Service	E	C	C	C	E	C	D	D		E	D	
Approach Delay (s)		39.5			52.7			45.6			56.1	
Approach LOS		D			D			D			E	

Intersection Summary

HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	106.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.0.0.4211 []

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Filename: 043880_Tot31_Alt 1_5SR Rndabt.j9
Path: C:\Users\cchung\RJB\300043880 Eighth EA - Documents\General\02_Technical\Traffic\Analysis\ARCADY\10 to 5
Report generation date: 3/10/2020 11:16:53 AM

Summary of intersection performance

	AM				PM			
	Queue (PCE)	Delay (s)	V/C Ratio	LOS	Queue (PCE)	Delay (s)	V/C Ratio	LOS
	Single Lane Roundabout - 2031							
1 - 5 Side Road - E	0.4	4.37	0.27	A	2.8	21.38	0.75	C
2 - Eighth Line - N	1.3	4.21	0.57	A	0.2	2.30	0.17	A
3 - 5 Side Road - W	1.6	15.11	0.62	C	1.0	7.11	0.51	A
4 - Eighth Line - S	0.2	4.40	0.15	A	4.8	23.53	0.84	C

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	1/10/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	RJBURNSIDE"cchung
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	V/C Ratio Threshold	Average Delay threshold (s)	Queue threshold (PCE)
5.75	✓			0.85	36.00	20.00

Analysis Set Details

ID	Name	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)

A1	Single Lane Roundabout	✓	100.000	100.000

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓

Single Lane Roundabout - 2031, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg order	Intersection Delay (s)	Intersection LOS
1 - 5 Side Road and Eighth Line	5 Side Road and Eighth Line	Standard Roundabout	1,2,3,4	6.36	A

Intersection Network Options

Driving side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Name	Description
1	5 Side Road - E	East Leg
2	Eighth Line - N	North Leg
3	5 Side Road - W	West Leg
4	Eighth Line - S	South Leg

Capacity Options

Leg	Minimum capacity (PCE/hr)	Maximum capacity (PCE/hr)	Assume flat start profile	Initial queue (PCE)
1 - 5 Side Road - E	0.00	99999.00		0.00
2 - Eighth Line - N	0.00	99999.00		0.00
3 - 5 Side Road - W	0.00	99999.00		0.00
4 - Eighth Line - S	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - 5 Side Road - E	3.50	4.50	30.0	20.0	40.0	25.0	
2 - Eighth Line - N	7.00	8.00	30.0	20.0	55.0	25.0	
3 - 5 Side Road - W	3.50	4.50	30.0	20.0	40.0	25.0	
4 - Eighth	3.50	4.50	30.0	20.0	40.0	25.0	

Line - S							

Bypass

Leg	Leg has bypass	Bypass utilisation (%)
1 - 5 Side Road - E		
2 - Eighth Line - N		
3 - 5 Side Road - W		
4 - Eighth Line - S	✓	100

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - 5 Side Road - E	Percentage	MTO guideline	90.00
2 - Eighth Line - N	Percentage	MTO Guideline	90.00
3 - 5 Side Road - W	Percentage	MTO Guideline	90.00
4 - Eighth Line - S	Percentage	MTO Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - 5 Side Road - E	0.579	1221.701
2 - Eighth Line - N	0.723	2192.710
3 - 5 Side Road - W	0.579	1221.701
4 - Eighth Line - S	0.579	1221.701

The slope and intercept shown above include any corrections and adjustments.

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - 5 Side Road - E	0.27	4.37	0.4	1.1	A	248.67	373.01
2 - Eighth Line - N	0.57	4.21	1.3	1.7	A	934.13	1401.20
3 - 5 Side Road - W	0.62	15.11	1.6	5.6	C	319.33	479.00
4 - Eighth Line - S	0.15	4.40	0.2	0.5	A	147.74	184.44

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 043880_Tot31_Alt 1 PropD Rndabt.j9
Path: C:\Users\cchung\RJB\300043880 Eighth EA - Documents\General\02_Technical\Traffic\Analysis\ARCADY\5 to Steeles
Report generation date: 3/10/2020 11:19:35 AM

Summary of intersection performance

	AM				PM			
	Queue (PCE)	Delay (s)	V/C Ratio	LOS	Queue (PCE)	Delay (s)	V/C Ratio	LOS
	Single Lane Roundabout - 2031							
1 - Eighth Line - N	2.2	11.10	0.69	B	0.2	3.76	0.16	A
2 - Proposed Collector D - E	0.2	5.34	0.16	A	1.2	7.12	0.55	A
3 - Eighth Line - S	0.5	4.69	0.36	A	2.4	11.53	0.71	B

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	1/10/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	RJBURNSIDE"cchung
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	V/C Ratio Threshold	Average Delay threshold (s)	Queue threshold (PCE)
5.75	✓			0.85	36.00	20.00

Analysis Set Details

ID	Name	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Single Lane Roundabout	✓	100.000	100.000

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2031	PM	ONE HOUR	17:00	18:30	15	✓

Single Lane Roundabout - 2031, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg order	Intersection Delay (s)	Intersection LOS
1 - Proposed Collector D and Eighth Line	Proposed Collector D and Eighth Line	Standard Roundabout	1,2,3	8.53	A

Intersection Network Options

Driving side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Name	Description
1	Eighth Line - N	North Leg
2	Proposed Collector D - E	East Leg
3	Eighth Line - S	South Leg

Capacity Options

Leg	Minimum capacity (PCE/hr)	Maximum capacity (PCE/hr)	Assume flat start profile	Initial queue (PCE)
1 - Eighth Line - N	0.00	99999.00		0.00
2 - Proposed Collector D - E	0.00	99999.00		0.00
3 - Eighth Line - S	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Eighth Line - N	3.50	4.50	30.0	20.0	40.0	25.0	
2 - Proposed Collector D - E	3.50	4.50	30.0	20.0	40.0	25.0	
3 - Eighth Line - S	3.50	4.50	30.0	20.0	40.0	25.0	

Bypass

Leg	Leg has bypass	Bypass utilisation (%)
1 - Eighth Line - N	✓	100
2 - Proposed Collector D - E		
3 - Eighth Line - S		

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Eighth Line - N	Percentage	MTO Guideline	90.00
2 - Proposed Collector D - E	Percentage	MTO Guideline	90.00
3 - Eighth Line - S	Percentage	MTO Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Eighth Line - N	0.579	1221.701
2 - Proposed Collector D - E	0.579	1221.701
3 - Eighth Line - S	0.579	1221.701

The slope and intercept shown above include any corrections and adjustments.

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Eighth Line - N	0.16	3.76	0.2	0.5	A	244.09	221.60
2 - Proposed Collector D - E	0.55	7.12	1.2	1.5	A	511.11	766.67
3 - Eighth Line - S	0.71	11.53	2.4	8.0	B	629.49	944.23

BURNSIDE

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Appendix M

10 Side Road to Steeles Future Signal Warrant Analysis

Input Sheet

Main Road	Eighth Line
Minor Road	5 Side Road
Direction of Main Road	North / South
Date:	Future 2031 Total
No. of Lanes on Main	1
T-Intersection	No
Operating Environment	Rural
Scenario	Forecasted Traffic Volumes (Existing Intersection)

Analysis Sheet

Justification 1: Minimum Vehicle Volumes

Justification	Guidance Approach Lanes				Total	Section Percent
	1 Lanes		2 or More Lanes			
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW		
1A (All Approach Lanes)	480	720	600	900		
	x					
	COMPLIANCE %				954	199%
1B (Minor Street Both Approaches)	120	170	120	170		
	x					
	COMPLIANCE %				386	322%
Signal Justification 1:						

Justification 2: Delay to Cross Traffic

Justification	Guidance Approach Lanes				Total	Section Percent
	1 lanes		2 or More lanes			
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW		
2A (Major Street Both Approaches)	480	720	600	900		
	x					
	COMPLIANCE %				568	118%
2B (Traffic Crossing Major Street)	50	75	50	75		
	x					
	COMPLIANCE %				243	486%
Signal Justification 2:						

Justification 3: Combination (Justification 1 and 2)

Justification Satisfied 80% or More	
Justification 1	Minimun Vehicular Volume
Justification 2	Delay Cross Traffic

Results Sheet

Justification		Compliance	Minimum Target	Signal Justified?	
				YES	NO
1. Minimum Vehicular Volume	A. Total Volume	199%	120%	YES	
	B. Crossing Volume	322%			
2. Delay to Cross Traffic	A. Main Road	118%	120%		NO
	B. Crossing Road	486%			
3. Combination	A. Justificaton 1	199%	120%		NO
	B. Justification 2	118%			

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R.J. Burnside & Associates Limited



Halton Region
Budget and Business Plan

CAPITAL REPORT 2025

Halton REGION

2025 - 2034 TRANSPORTATION FORECAST
PROJECT FORECAST LISTING 2025 (000 DOLLARS)

PR NO	UNIQ ID#	PROJECT DESCRIPTION	Gross Cost	GROSS EXPENDITURE BY YEAR									
				2025	2026	2027	2028	2029	2030	2031	2032*	2033*	2034*
PR-3381	6821	Steeles Avenue - Widening from 4 to 6 lanes from Regional Road 25 to Trafalgar Road (MIL) (Regional Road 8)	80,610	0	0	80,610	0	0	0	0	0	0	0
		EA	0	0	0	0	0	0	0	0	0	0	0
		Study	0	0	0	0	0	0	0	0	0	0	0
		Design	0	0	0	0	0	0	0	0	0	0	0
		Property	0	0	0	0	0	0	0	0	0	0	0
		Utility Relocate	0	0	0	0	0	0	0	0	0	0	0
		Construction	80,610	0	0	80,610	0	0	0	0	0	0	0
	6822	Steeles Avenue - Widening from 4 to 6 lanes (with RBL) from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 8)	51,551	0	0	786	50,765	0	0	0	0	0	0
		EA	0	0	0	0	0	0	0	0	0	0	0
		Study	0	0	0	0	0	0	0	0	0	0	0
		Design	0	0	0	0	0	0	0	0	0	0	0
		Property	0	0	0	0	0	0	0	0	0	0	0
		Utility Relocate	786	0	0	786	0	0	0	0	0	0	0
		Construction	50,765	0	0	0	50,765	0	0	0	0	0	0
	6758	10 Side Road - Widening from 2 to 4 lanes from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 10)	79,843	0	0	6,334	0	27,212	811	45,486	0	0	0
		EA	0	0	0	0	0	0	0	0	0	0	0
		Study	0	0	0	0	0	0	0	0	0	0	0
		Design	6,334	0	0	6,334	0	0	0	0	0	0	0
		Property	27,212	0	0	0	0	27,212	0	0	0	0	0
		Utility Relocate	811	0	0	0	0	0	811	0	0	0	0
		Construction	45,486	0	0	0	0	0	0	45,486	0	0	0

* The Transportation Capital report identifies Development-related infrastructure requirements up to 2031. An updated Council approved master plan is required to support the growth planning period post 2031.

Note: Schedule may not add due to rounding.

TOWN OF
HALTON HILLS

CAPITAL BUDGET & FORECAST

2024 Capital Budget & 2025 - 2033 Capital Forecast Summary

Line	Project No.	Project Name	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
158	6100-22-2601	Growth Related Transp Studies	-	-	200,000	-	-	-	-	200,000	-	-	400,000
159	6100-23-1602	Active Transportation Promotion & Education	-	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	270,000
160	6100-23-2401	Active Transportation Improvements	-	428,000	678,000	2,050,000	40,000	45,000	1,520,000	2,900,000	-	-	7,661,000
161	6100-28-0101	Opticom Installation/Replacement Program	50,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	725,000
162	6100-28-0107	LED Traffic Signal Replacement	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	300,000
163	6100-28-1516	Neighbourhood Traffic Calming	177,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	1,257,000
164	6100-28-1703	Pedestrian Crossovers	234,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000	1,719,000
165	6100-28-1807	Mill St Neighbourhood Imprvmts	-	100,000	125,000	125,000	125,000	125,000	-	-	-	-	600,000
166	6100-28-1808	Mandated AODA Accessible Traffic Signals	68,000	105,000	105,000	105,000	-	-	-	-	-	-	383,000
167	6100-28-2401	Main Street North (Hwy 7) & Ewing Street/Carruthers Road	-	350,000	-	-	-	-	-	-	-	-	350,000
168	6100-28-2701	15 Sd Rd & Belmont Blvd Traffic Signal	-	-	-	325,000	-	-	-	-	-	-	325,000
169	6100-28-2702	Main St N & Wallace St Traffic Signal	-	-	-	325,000	-	-	-	-	-	-	325,000
170	6100-28-2801	Argyll Rd & Miller Dr Traffic Signal	-	-	-	-	325,000	-	-	-	-	-	325,000
171	6100-28-2901	Argyll Rd & Barber Dr Traffic Signal	-	-	-	-	-	325,000	-	-	-	-	325,000
172	6100-28-3001	Miller Dr & Eaton St Traffic Signal	-	-	-	-	-	-	325,000	-	-	-	325,000
173	6100-28-3101	Eaton St & Barber Dr Traffic Signal	-	-	-	-	-	-	-	325,000	-	-	325,000
174	6200-10-1902	#29 Papermill Dam Rehabilitation	-	-	-	-	-	150,000	-	400,000	-	-	550,000
175	6200-10-2301	Maple Avenue at McClure Court Acoustic Fence Replacement	400,000	-	-	-	-	-	-	-	-	-	400,000
176	6200-10-2302	Fairy Lake Retaining Walls	200,000	-	1,175,000	-	-	-	-	-	-	-	1,375,000
177	6200-16-0104	Pavement Management	1,956,000	1,956,000	1,956,000	2,250,000	2,250,000	2,250,000	2,250,000	2,250,000	2,250,000	2,250,000	21,618,000
178	6200-16-0105	Right-of-Way Rehabilitation	250,000	250,000	250,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	3,200,000
179	6200-16-1004	Main St Glen Williams Eng	-	8,750,000	-	-	-	-	-	-	-	-	8,750,000
180	6200-16-1501	22nd SdRd Conc 11 Realignment	-	350,000	-	1,000,000	-	-	-	-	-	-	1,350,000
181	6200-16-1702	Collector/Arterial Asphalt Res	-	2,450,000	-	2,825,000	-	2,825,000	-	2,825,000	-	2,825,000	13,750,000
182	6200-16-1803	Prince St (All Phases)	-	-	4,250,000	-	-	-	-	-	-	-	4,250,000
183	6200-16-1901	McNabb St - King to CNR Improvements	52,000	-	650,000	-	-	-	-	-	-	-	702,000
184	6200-16-1904	Eighth Line - Steeles to Maple Ave Reconstruction	-	1,500,000	2,250,000	35,000,000	30,000,000	14,250,000	-	-	-	-	83,000,000
185	6200-16-2004	Guelph St & Mountainview - NB/SB Turn Lane Improvements	-	-	500,000	-	1,500,000	-	-	-	-	-	2,000,000
186	6200-16-2007	5 SdRd Fourth Line to Trafalgar Reconstruction	-	-	950,000	-	1,430,000	-	4,400,000	-	-	-	6,780,000
187	6200-16-2101	Eighth Line Steeles South Improvements	-	-	-	150,000	-	-	1,000,000	-	-	-	1,150,000
188	6200-16-2103	10 SdRd from RR 25 to Trafalgar Rd Reconstruction	-	3,150,000	-	5,000,000	4,350,000	-	-	-	-	-	12,500,000
189	6200-16-2104	5 SdRd Trafalgar to Winston Churchill Reconstruction	-	-	-	-	-	-	1,850,000	-	6,050,000	-	7,900,000
190	6200-16-2105	Ontario & Ann Street	78,000	4,450,000	-	-	-	-	-	-	-	-	4,528,000
191	6200-16-2201	Confederation St. Main to Urban Boundary	-	600,000	-	3,500,000	-	-	-	-	-	-	4,100,000
192	6200-16-2302	Hornby Road Reconstruction	-	400,000	400,000	2,000,000	3,000,000	-	-	-	-	-	5,800,000
193	6200-16-2303	10th Ln Reconst South of 22sdrd	-	75,000	-	1,500,000	-	-	-	-	-	-	1,575,000
194	6200-16-2304	22 Side Road Resurfacing - Engineering Services	520,000	-	2,600,000	-	-	-	-	-	-	-	3,120,000
195	6200-16-2401	15 SdRd - Town Line to Trafalgar Rd Reconstruction	-	500,000	2,000,000	-	6,000,000	6,000,000	-	-	-	-	14,500,000
196	6200-16-2402	17 SdRd/River Dr 10th Line Realignment	-	-	350,000	-	1,050,000	2,200,000	-	-	-	-	3,600,000
197	6200-16-2501	Fourth Line Resurfacing 17 sdrd to Hwy 7	1,040,000	100,000	-	1,800,000	-	-	-	-	-	-	2,940,000
198	6200-16-2502	Tenth Line north of 17 Side Road	-	150,000	-	750,000	-	-	-	-	-	-	900,000
199	6200-16-2601	17 Side Road/Tenth Line from Winston Churchill Blvd to River	-	1,500,000	-	-	-	-	-	-	-	-	1,500,000
200	6200-16-2801	Back Street Reconstruction	-	-	-	-	250,000	-	1,000,000	-	-	-	1,250,000
201	6200-16-3101	Mountainview & Sinclair Southbound Left Turn Lane	-	-	-	-	-	300,000	-	1,200,000	-	-	1,500,000
202	6200-17-1802	Mill St (All Phases)	-	-	1,000,000	-	-	-	-	-	-	-	1,000,000
203	6200-17-2301	Wallace Street Reconstruction	-	175,000	-	2,000,000	-	-	-	-	-	-	2,175,000
204	6200-17-2302	Wallace Street MUP	-	-	-	240,000	-	-	-	-	-	-	240,000
205	6200-20-1701	StrmWtr Fac. Rehab Assmnt Prgm	-	-	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	2,000,000
206	6200-20-1901	Harold Street Reconstruction	750,000	-	-	-	-	-	-	-	-	-	750,000
207	6200-20-2201	Limehouse Stormwater Outlet	-	350,000	-	-	-	-	-	-	-	-	350,000
208	6200-22-0020	Traffic Signal Legal Drawings Update	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	300,000
209	6200-22-0107	Bridge Rehabilitation Study Update	90,000	-	90,000	-	100,000	-	100,000	-	100,000	-	480,000
210	6200-22-1702	Pavement Management Study - 5 YR Cycle	-	75,000	-	-	75,000	-	-	85,000	-	-	235,000
211	6200-22-2201	Weather & Flow Monitoring Stations	-	-	30,000	30,000	-	-	-	-	-	-	60,000
212	6200-22-2801	Stormwater Master Plan Update (Future)	-	-	-	-	300,000	-	-	-	-	-	300,000
213	6200-26-2201	#4 Bridge Fifth Line north of Steeles Rehabilitation	-	1,750,000	-	-	-	-	-	-	-	-	1,750,000