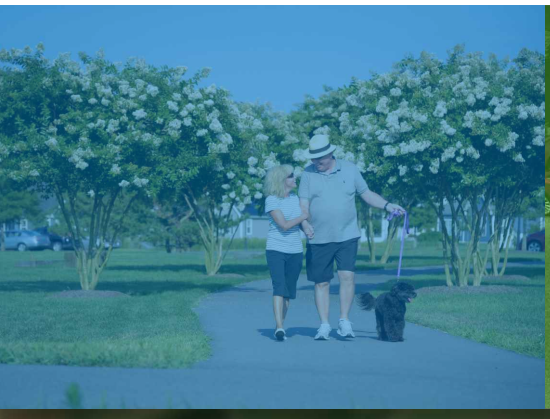
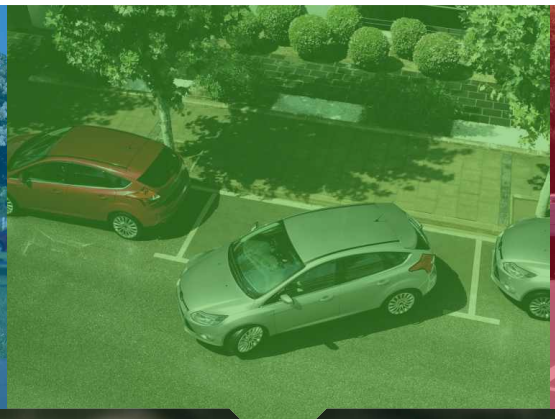
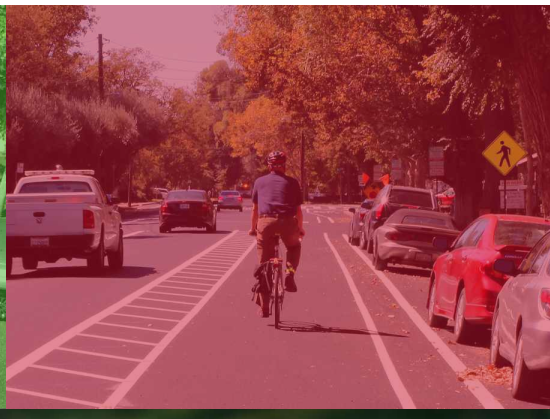
June 2017

Minto Mahogany Stage 2

Transportation Impact Study







PARSONS

Minto Mahogany Stage 2

Transportation Impact Study

prepared for:
Minto Developments Inc
200-180 Kent Street
Ottawa, ON K1P 0B6

prepared by:
PARSONS
1223 Michael Street
Suite 100
Ottawa, ON K1J 7T2

June 27, 2017

476169 - 01000

PARSONS

envision more

Table of Contents

List of Figures

List of Tables

List of Appendices

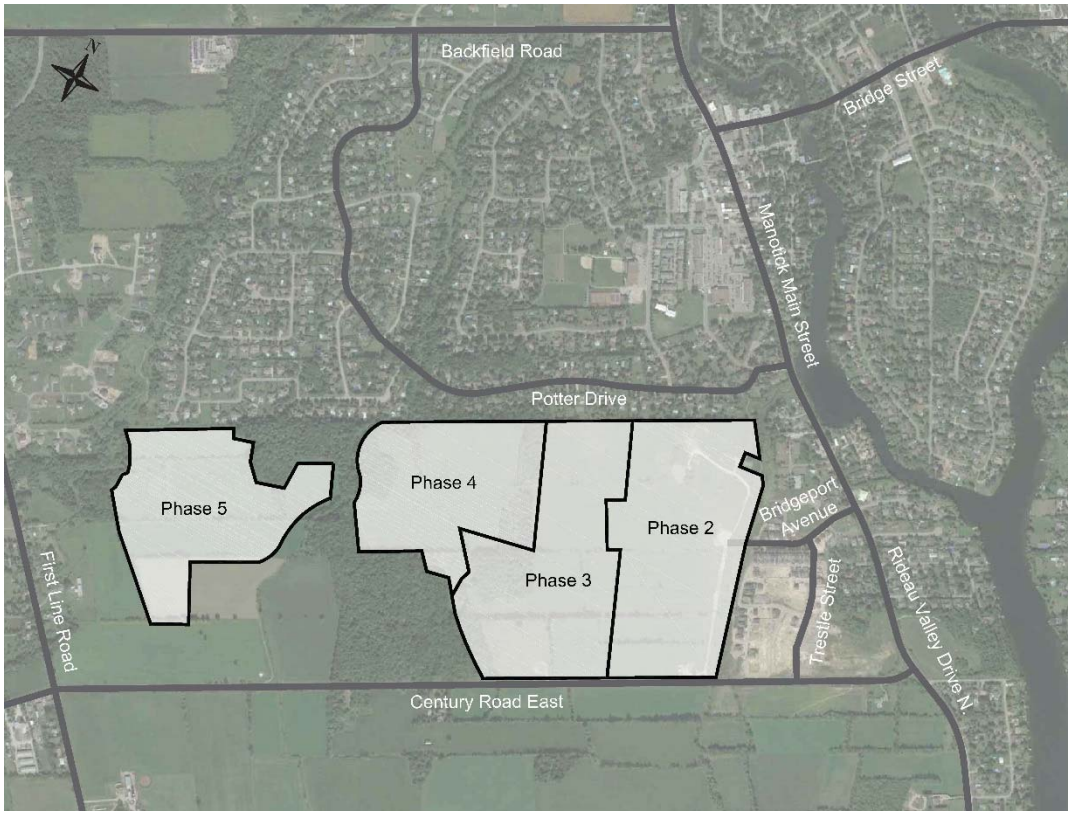
Transportation Impact Study

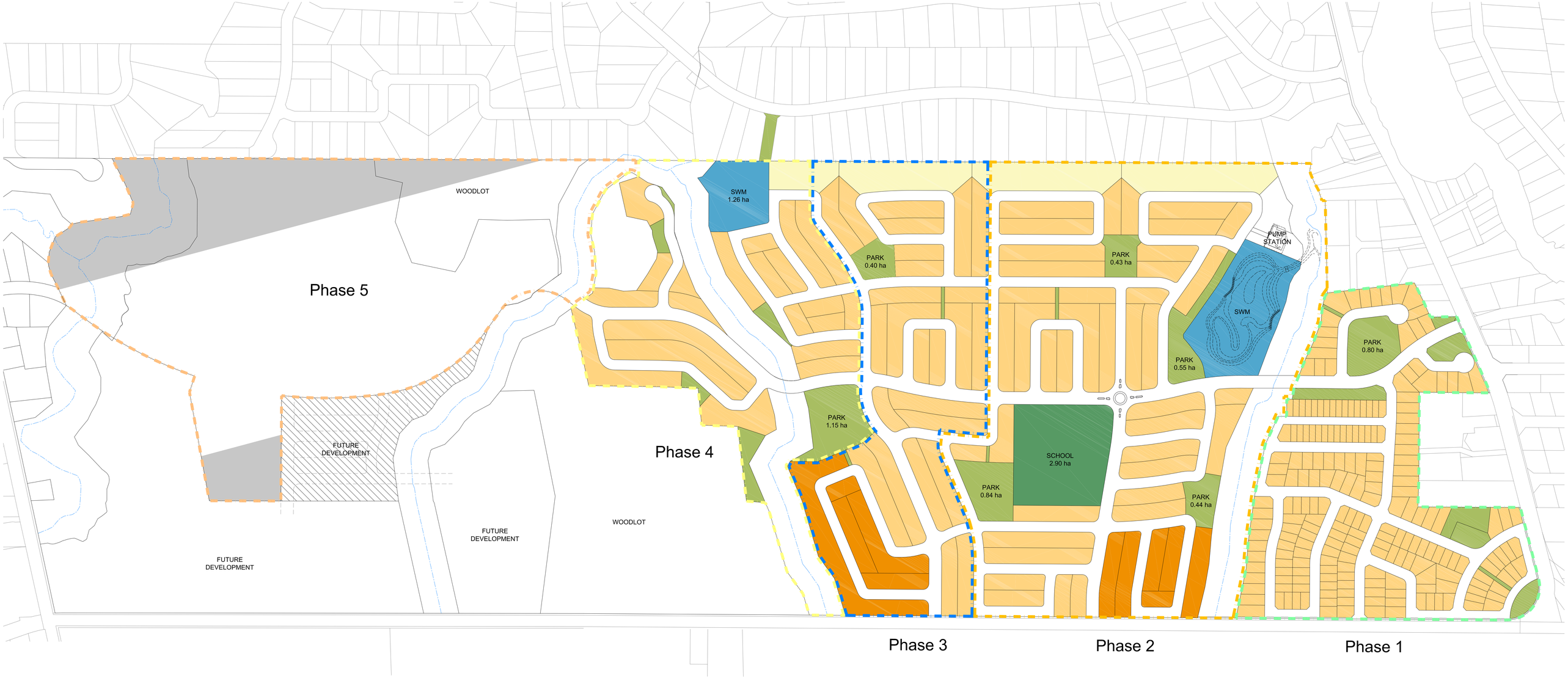
1. INTRODUCTION

This study has been prepared in support of a Draft Plan of Subdivision application for Stage 2 of the Mahogany Subdivision by Minto Developments Inc. A Transportation Impact Study is required to satisfy the site plan application. The Stage 2 residential development will consist of 4 Phases: Phase 2 with 99 townhomes and 347 single family homes, Phase 3 with 93 townhomes and 224 single family homes, Phase 4 with 167 single family homes, and Phase 5 with 54 townhomes and 205 single family homes. In total, Stage 2 will include 246 townhomes and 943 single family homes. Phase 1 was previously approved and nearing completion. The proposed site is located north of Century Road, between First Line Road and Rideau Valley Drive North. It is acknowledged that the projected unit numbers may vary slightly as each phase comes online, the total unit count for the Mahogany Community is capped at 1,400 units and will not increase beyond this limit.

Figure 1 illustrates the local context of the site and Figure 2 illustrates the proposed Site Plan.

Figure 1: Local Context





legend

- Single Family (Low Density)
- Single Family (Moderate Density)
- Mixed Residential (3-Storey Townhomes & Bungalow Townhome)
- Park
- School
- SWM
- Phase 1 Boundary
- Phase 2 Boundary
- Phase 3 Boundary
- Phase 4 Boundary
- Phase 5 Boundary

All Phases Unit Summary

Phase 1	211
Phase 2	446
Phase 3	317
Phase 4	167
Phase 5	259
Total	1400

Density
Phases 1 - 5 (u/ha)

Single Family Low Density	7.40 u/ha
Single Family Moderate Density	13.98 u/ha
Mixed Residential	27.33 u/ha

Product Distribution
Phases 1- 5 (%)

Single Family Low Density	3.29%
Single Family Moderate Density	79.14%
Mixed Residential	17.57%

NORTH

scale | 1:3000

NAK design strategies
421 Roncesvalles Avenue | Toronto, Ontario | M6R 2N1
tel: 416.340.8700 | fax: 416.340.7100 | info@nak-design.com

MINTO | MAHOGANY

Concept Plan

Phase 2+

date | 19 may 2017

2. EXISTING CONDITIONS

2.1. STUDY AREA ROAD NETWORK

Manotick Main Street (Rideau Valley Drive) is a north-south arterial roadway with a two-lane cross-section within the study area. It extends from the south at Roger Stevens Dr through to Prince of Wales Dr where it continues as Jockvale Road. Manotick Main St is urbanized through Manotick to approximately 85m north of Eastman Ave where it transitions into a rural cross-section. The shoulders are generally paved along the rural section, with gravel shoulders generally being provided south of Bridgeport Ave. The posted speed limit is 40 km/h within Manotick and 60 km/h south of Eastman Ave.

Bridgeport Avenue is a two-lane, east-west urban collector with an unposted speed of 50 km/h. The road extends from Manotick Main St to Mahogany Creek.

Century Road is a two-lane, east-west rural collector with a posted speed of 60 km/h east of Trestle St and 80 km/h to the west. The road extends from Rideau Valley Dr/Manotick Main St to Second Line Rd. Gravel shoulders are provided on either side of the road.

Trestle Street is a north-south urban collector roadway with a two-lane cross-section within the study area. It extends from Century Rd northward to Bridgeport Ave. The unposted speed is 50 km/h.

Bridge Street is an east-west arterial roadway with a two-lane urban cross-section within the study area. It extends from Manotick Main St to River Rd where it continues as Mitch Owens Road. The posted speed is 40 km/h.

First Line Road is a two-lane, north-south rural collector with a posted speed limit of 80 km/h. The road extends from Roger Stevens Road through to Backfield Road and gravel shoulders are provided in both sides of the road.

2.2. PEDESTRIAN/CYCLING NETWORK

Sidewalk facilities are provided along both sides of Manotick Main St between Bridge St and Currier St, and a sidewalk on the eastside continues south to approximately 40m north of Eastman Ave. Bridgeport Ave has sidewalks on both sides of the roadway, except for a small link on the south side between Moretto Crt and Trestle St. Bicycle facilities are currently provided in the form of a multi-use pathway (MUP) along Mahogany Creek between Potter Dr and Century Rd and bicycle lanes along Bridge St.

Per the City's Cycling Plan, Manotick Main St is classified as a "Spine Route" and Potter Dr and Century Rd are classified as "Local Routes".

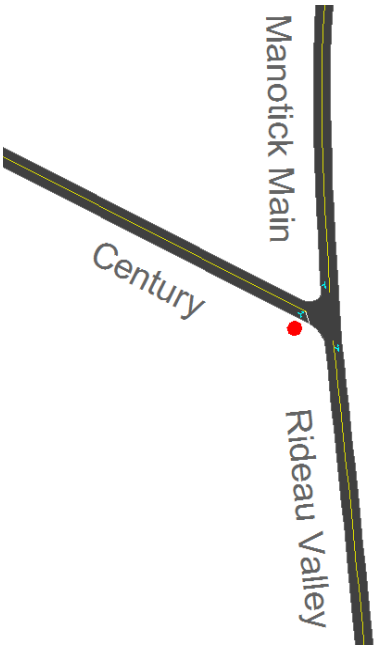
2.3. TRANSIT NETWORK

Transit service within the vicinity of the site is currently provided by OC Transpo Peak Route #99 which provides peak hour service in the morning and afternoon. Bus stops for Route #99 closest to the development are located along Manotick Main St at Century Rd, approximately 1 kilometer east from the proposed development access on Century Rd.

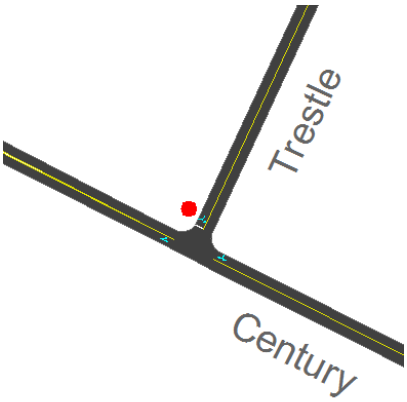
Peak Route #186 and Local Route #305 are located approximately 2 kilometers north of the development which provides access to multiple along the Transitway.

2.4. EXISTING STUDY AREA INTERSECTIONS

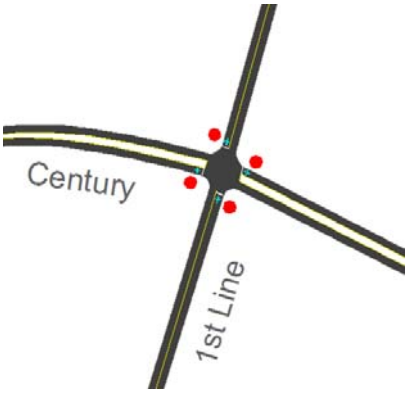
Century Road/Manotick Main Street/Rideau Valley Drive
The Century Rd/Manotick Main St/Rideau Valley Dr intersection is an unsignalized 'T' intersection with a minor STOP-control on the Century Rd. A single lane approach is provided for each leg of this intersection with all movements permitted.



Century Road/Trestle Street
The Century Rd/Trestle St intersection is an unsignalized 'T' intersection with STOP-control on the minor approach only. A single lane approach is provided for each leg of this intersection with all movements permitted.



Century Road/First Line Road
The Century Rd/First Line Rd intersection is an unsignalized four-legged intersection with all-way STOP-control. A single lane approach is provided for each leg of this intersection with all movements permitted. Exponential stop bars are provided along both approaches of Century Rd.



Manotick Main Street/Bridgeport Avenue/Antochi Lane

The Manotick Main St/Bridgeport Ave/Antochi Ln intersection is an unsignalized four-legged intersection with STOP-control on both minor approaches. A single lane approach is provided for each leg of this intersection with all movements permitted. Perpendicular parking stalls are provided for Ottawa Fire Station 94 on the northeast quadrant of the intersection, outside of the paved shoulder.

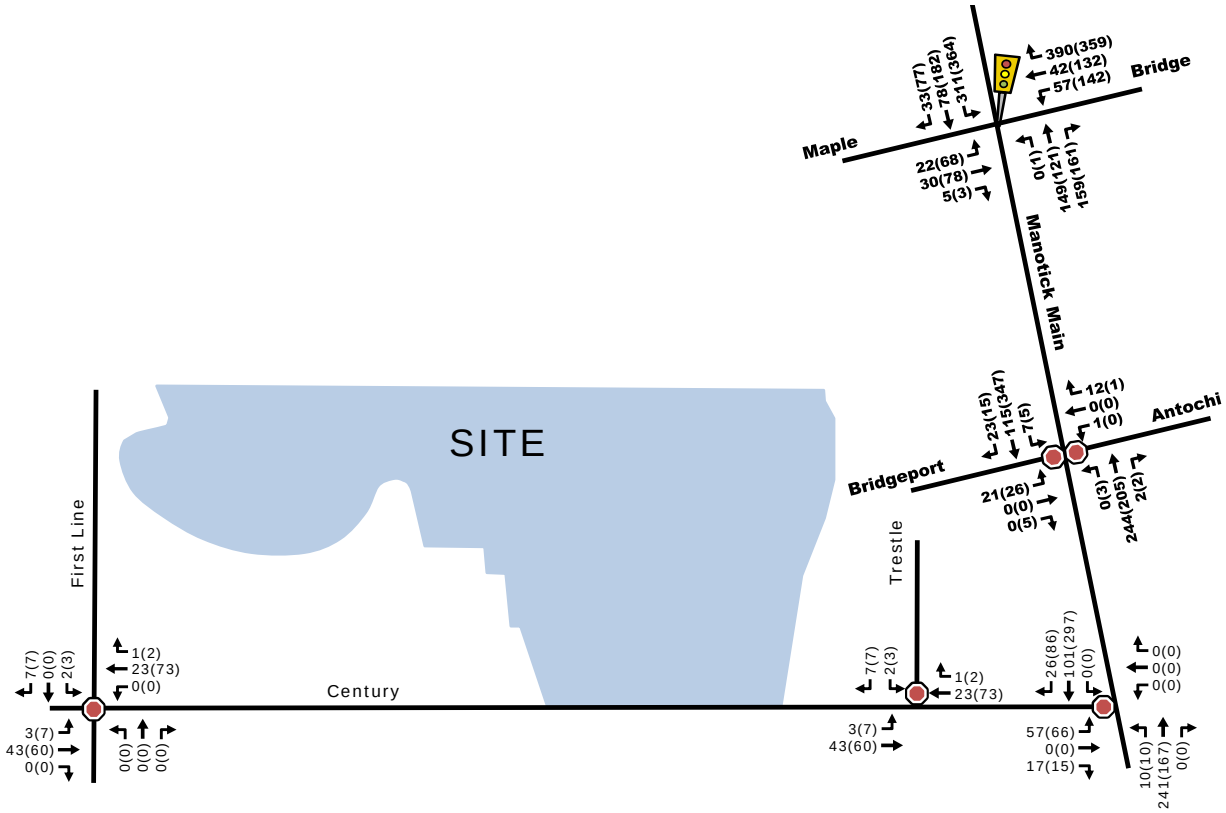
Manotick Main Street/Bridge Street/Maple Avenue

The Manotick Main St/Bridge St/Maple Ave is a signalized four-legged intersection. The northbound approach consists of a through lane and a right-turn lane. The northbound left turn is restricted, except for buses. The southbound approach consists of a left-turn lane and a shared through/right-turn lane. The eastbound approach consists of a shared through/right-turn lane and a left-turn lane. The westbound approach consists of a right-turn lane, a through lane and a left-turn lane.

2.5. EXISTING INTERSECTION OPERATIONS

Illustrated as Figure 3, are the most recent weekday morning and afternoon peak hour traffic volumes obtained from the City of Ottawa. Peak hour traffic volumes are included as Appendix A.

Figure 3: Existing Peak Hour Traffic Volumes



The following Table 1 provides a summary of existing traffic operations at study area intersections based on the SYNCHRO (V9) traffic analysis software. The subject intersection was assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The subject intersections 'as a whole' were assessed based on a weighted v/c ratio. The SYNCHRO model output of existing conditions is provided within Appendix B.

Table 1: Existing Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Manotick Main/Century (unsignalized)	B(B)	11.2(13.4)	EBL(EBL)	2.0(1.8)	-	-
Century/Trestle (unsignalized)	A(A)	8.7(9.1)	SBR(SBR)	1.3(0.9)	-	-
First Line/Century (unsignalized)	A(A)	7.2(7.4)	EBT(WBT)	7.1(7.4)	-	-
Manotick Main/Bridgeport (unsignalized)	B(B)	12.4(14.5)	EBL(EBL)	1.1(0.9)	-	-
Manotick Main /Bridge	A(A)	0.50(0.54)	WBR(SBL)	13.7(20.3)	A(A)	0.45(0.46)
Notes: • Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 1, the signalized Manotick Main/Bridge study area intersection 'as a whole' is currently operating at an excellent LoS 'A' during both peak hours, with respect to the City of Ottawa operating standards of LoS 'D' or better (*v/c ≤ 0.90*).

Regarding 'critical movements' at study area intersections, they are currently operating at an acceptable LoS 'B' or better during peak hours.

2.6. EXISTING ROAD SAFETY CONDITIONS

Collision history for study area roads (2013 to 2015, inclusive) was obtained from the City of Ottawa and most collisions (87%) involved only property damage, indicating low impact speeds, and the remaining 13% involved personal injuries. No incidents were identified as "non-reportable", indicating the total damage to a vehicle was less than $1,000.

The primary causes of collisions cited by police include; rear end (26%), turning movement (26%), angle (24%), single vehicle (Other) (13%), sideswipe (5%), and approaching and single vehicle (unattended) (3%) type collisions.

A standard unit of measure for assessing collisions at an intersection is based on the number collisions per million entering vehicles (MEV). At intersections and road segments within the study area, reported collisions have historically take place at a rate of:

- 0.95/MEV at the Manotick Main St and Bridge St intersection.
- 0.25/MEV along Manotick Main St between Bridge and Johnston Clapp Ln.
- 0.25/MEV along Manotick Main St between Johnston Clapp Ln and Mill St.
- 0.24/MEV at the Manotick Main St and Tighe St intersection.
- 0.27/MEV along Manotick Main St between Tighe St and O'Grady St.
- 0.13/MEV at the Manotick Main St and O'Grady St intersection.
- 0.14/MEV along Manotick Main St between Beaverwood Rd and Currier St.
- 0.14/MEV at the Manotick Main St and Currier St intersection.
- 0.45/MEV along Manotick Main St between Currier St and Eastman Ave.
- 0.16/MEV at the Manotick Main St and Island View Dr intersection.
- 0.16/MEV at the Manotick Main St and Century Rd intersection.

Based on the available data, there does not appear to be any prevailing safety issues. The roadways within the study area are noted as being suburban in nature through Manotick (Manotick Main St) or relatively straight and level rural roads (Century Rd), resulting in good sight-lines/visibility and vehicle traction. The source collision data as provided by the City of Ottawa and related analysis is provided as Appendix C.

3. DEMAND FORECASTING

3.1. PLANNED STUDY AREA TRANSPORTATION NETWORK CHANGES

3.1.1. MANOTICK SECONDARY PLAN

Approved in 2016, the Manotick Secondary Plan outlines the vision for Manotick, to maintain the village atmosphere, historic beginnings, and integration of residential and pedestrian-oriented nature of the area. The planning for the Mahogany development was included in the Secondary Plan, including recommendations for the land use and transportation network.

While the land use is in concert with the Secondary Plan, the transportation recommendations to be considered for the Mahogany development include:

- A pathway along Mahogany Creek, connecting to Potter Dr (existing).
- Potential cycling route along Manotick Main St and Century Rd.
- Proposed sidewalk/path along both sides of Bridgeport Ave and connections to Century Rd.
  - Potential combination with cycling connectivity.
- Proposed sidewalk along the north side of Century Rd.

- Proposed sidewalk connection to Potter Dr (adjacent to Wilson Cowan Drain) and Carrison Dr (adjacent to Mud Creek).
- Consideration of a roundabout at Manotick Main St/Bridgeport Ave, including a gateway feature for Manotick.

3.1.2. MANOTICK MAIN PEDESTRIAN CROSSOVER

In August 2016, a pedestrian crossover was installed on Manotick Main Street at Tighe Street. Pedestrians can safely cross the street at the push of the button, which activates flashing beacons ensuring cars yield to pedestrians. There are currently no other planned crossovers for this area.

3.2. OTHER AREA DEVELOPMENT

3.2.1. MAHOGANY PHASE 1 (MINTO)

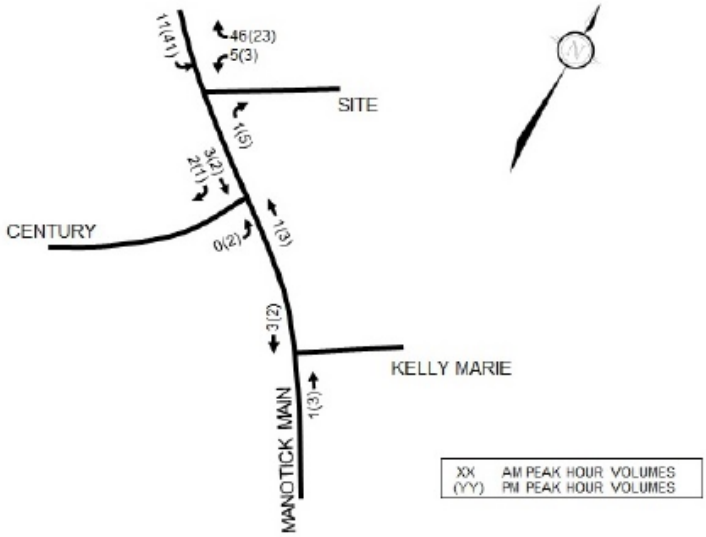
Phase 1 of the Mahogany subdivision is currently undergoing of the final phase of construction, with Phase 1C, located between Manotick Main St and Trestle St, north of Century Rd. Phase 1C will include 57 units, for a total of 221 residential units in all of Phase 1. As part of Phase 1C, a sidewalk will be extended along Century Rd from Manotick Main St to Trestle Rd. The build-out of this Phase will be completed in 2019.

3.2.2. 5741, 5731, AND 5721 MANOTICK MAIN STREET (REGIONAL)

Regional has submitted a Draft Plan of Subdivision and Zoning By-law Amendment for an 82-unit development within the lands encompassing 5741, 5731, and 5721 Manotick Main St. The development site access will be located north of the Century Rd intersection to Manotick Main St and provide a multi-use pathway connection to Kelly Marie Dr. No auxiliary lanes are proposed for the development and the site access will be a minor stop-control.

The trip generation from this site, illustrated in Figure 4, will be explicitly included in the background traffic growth, as referenced from the *Revised Access Memorandum*, dated February 15, 2017.

Figure 4: 5741, 5731, and 5721 Projected Site-Generated Traffic



3.3. BACKGROUND TRAFFIC GROWTH

The background traffic along Manotick Main Street is expected to increase at a constant rate. The anticipated development of the Manotick community will be captured by subsequent transportation impact assessments to determine when various improvements are triggered. Due to the opening of the Vimy Memorial Bridge, a 1% traffic growth rate per annum was assumed for the 2027 and 2032 Horizon years. First Line Road and Century Road were assumed to have 0% growth and any future traffic growth along the road corridor will be generated by the development of the adjacent community.

The projected background traffic volumes for the horizon years is illustrated as Figure 5 for 2027 and Figure 6 for 2032.

Figure 5: Projected 2027 Baseline Traffic Volumes

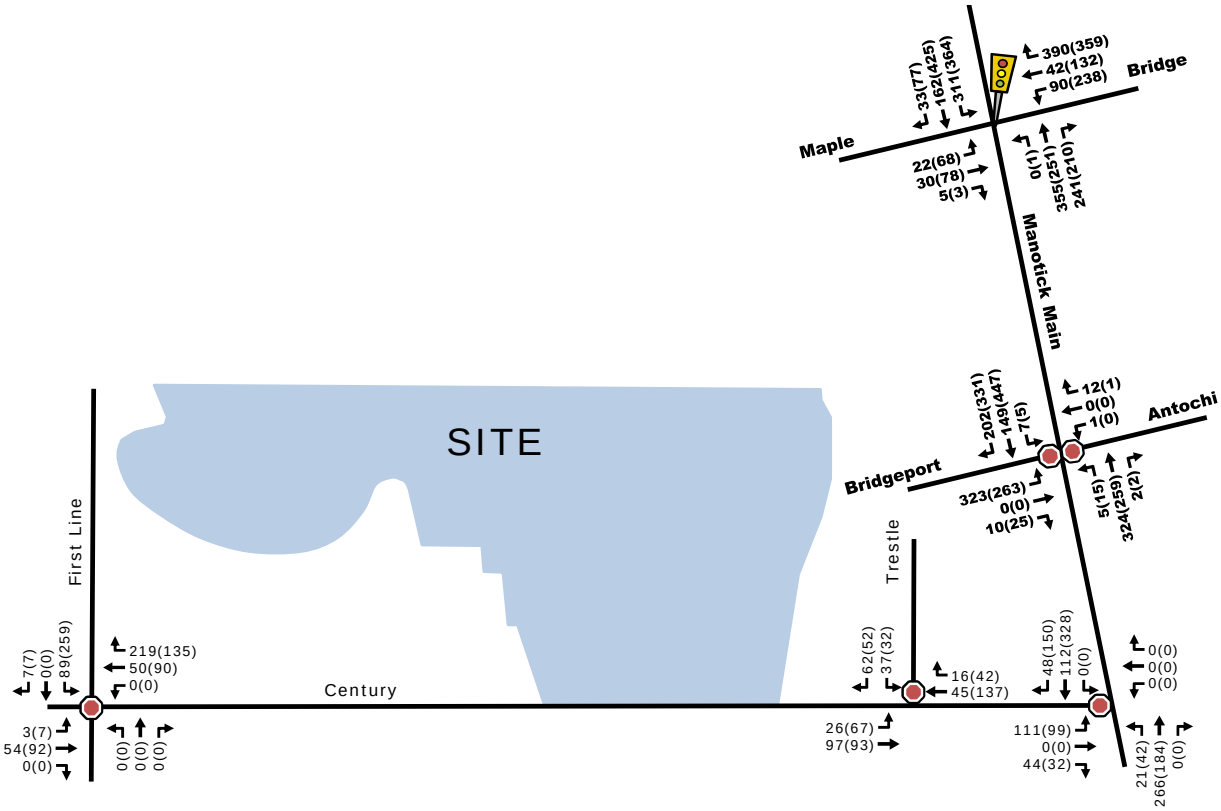
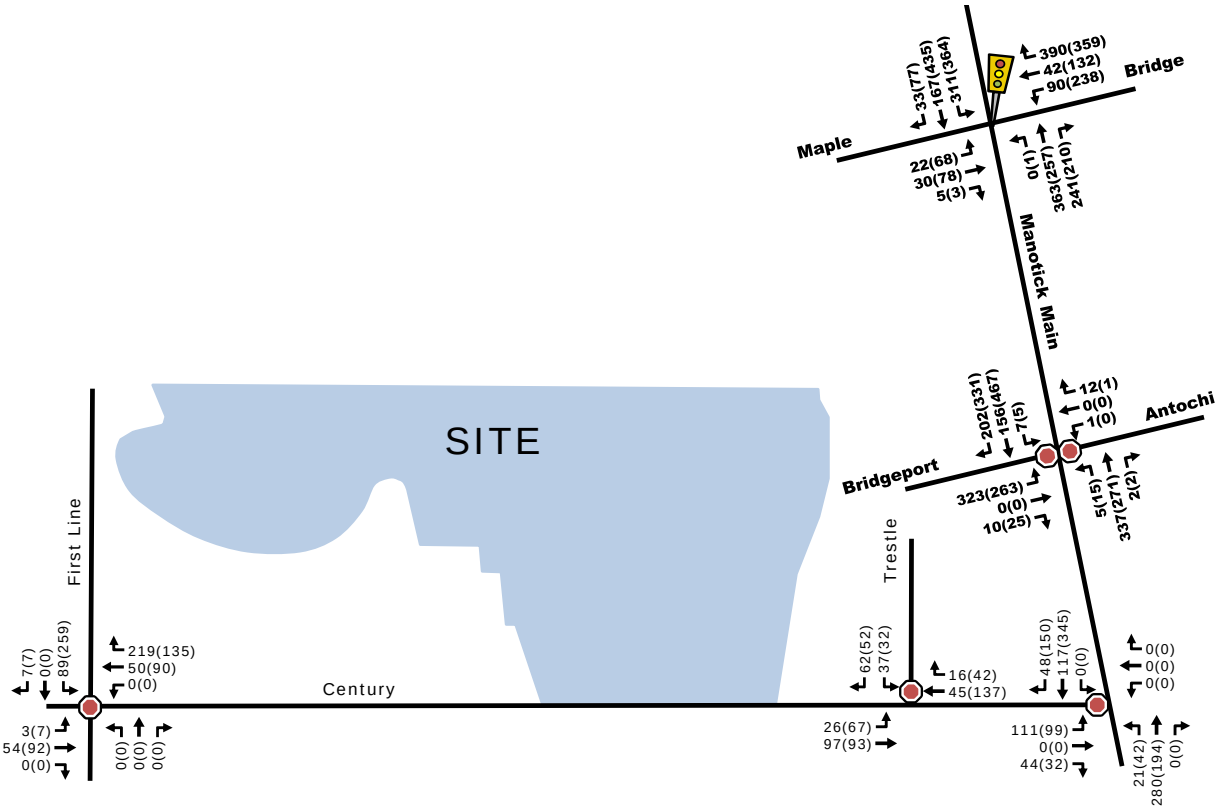


Figure 6: Projected 2032 Baseline Traffic Volumes



The following Table 2 and Table 3 provide a summary of the projected background traffic operations for both the 2027 and 2032 horizon years at study area intersections based on the SYNCHRO (V9) traffic analysis software. The subject intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The subject intersections 'as a whole' were assessed based on a weighted v/c ratio. The SYNCHRO model output of background conditions is provided within Appendix D.

Table 2: Projected Background 2027 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Manotick Main/Century (unsignalized)	B(B)	11.5(14.0)	EBL(EBL)	0.9(1.9)	-	-
Century/Trestle (unsignalized)	A(A)	8.9(9.3)	SBR(SBR)	0.9(3.7)	-	-
First Line/Century (unsignalized)	A(A)	7.2(7.4)	EBT(WBT)	7.1(7.4)	-	-
Manotick Main/Bridgeport (unsignalized)	C(C)	15.9(25.0)	EBL(EBL)	2.9(4.8)	-	-
Manotick Main /Bridge	A(A)	0.50(0.55)	WBR(SBL)	14.0(20.4)	A(A)	0.45(0.47)
Notes: • Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

Table 3: Projected Background 2032 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Manotick Main/Century (unsignalized)	B(B)	11.7(14.4)	EBL(EBL)	1.9(1.8)	-	-
Century/Trestle (unsignalized)	A(A)	8.9(9.3)	SBR(SBR)	3.7(2.7)	-	-
First Line/Century (unsignalized)	A(A)	7.2(7.4)	EBT(WBT)	7.1(7.4)	-	-
Manotick Main/Bridgeport (unsignalized)	C(D)	16.3(27.0)	EBL(EBL)	2.9(5.0)	-	-
Manotick Main /Bridge	A(A)	0.50(0.55)	WBR(SBL)	14.1(20.4)	A(A)	0.45(0.47)
Notes: • Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

The background volumes for both the 2027 and 2032 horizons are projected to operate acceptably in both the AM and PM peak hours. It is noted that the build out of Mahogany Phase1 will have over 60 veh/h making the southbound right-turn movement at Manotick Main St/Bridgeport Ave. While not recommended for the background conditions, additional volume will likely trigger the need for a right-turn lane and this will be carried forward into the future horizons analysis.

3.4. SITE TRIP GENERATION

Appropriate trip generation rates for the proposed development of approximate 943 single family homes and 246 residential townhome units were obtained from the 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual, which are summarized in Table 4.

As ITE trip generation surveys only record vehicle trips and typically reflect highly suburban locations (with little to no access by travel modes other than private automobiles), adjustment factors appropriate to the more connected suburban study area context were applied to attain estimates of person trips for the proposed development. This approach is considered appropriate within the industry for more urban developments.

Table 4: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Single Family Homes	ITE 210	T=0.75(du) T=0.70(du)+9.74	T=1.00(du) Ln(T)=0.90Ln(du)+0.51
Townhomes	ITE 230	T=0.44(du) Ln(T)=0.80ln(du)+0.26	T=0.52(du) Ln(T)=0.82Ln(du)+0.32
Notes: T = Average Vehicle Trip Ends du = dwelling units			

To convert ITE vehicle trip rates to person trips, an auto occupancy factor and a non-auto trip factor were applied to the ITE vehicle trip rates. Our review of available literature suggests that a combined factor of approximately 1.3 is considered reasonable to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%. As such, the person trip generation for the proposed site is summarized by phase in Table 5.

Table 5: Modified Person Trip Generation

Land Use	Units	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Single Family Homes (Phase 2)	347	101	227	328	276	143	419
Townhomes (Phase 2)	99	11	56	67	52	26	78
Single Family Homes (Phase 3)	224	67	150	217	186	96	282
Townhomes (Phase 3)	93	10	53	63	49	25	74
Single Family Homes (Phase 4)	167	51	114	165	143	74	217
Single Family Homes (Phase 5)	205	61	138	199	172	89	261
Townhomes (Phase 5)	54	6	35	41	31	16	47
Total Person Trips		**307**	**773**	**1,080**	**909**	**469**	**1,378**

Note: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%

The person trips for each phase shown in Table 5 for the proposed site were then reduced by modal share values (Table 6, Table 7, Table 8, and Table 9), with the total site-generated vehicle traffic summarized in Table 10.

Table 6: Phase 2 Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	70%	79	199	278	231	120	351
Auto Passenger	15%	17	44	61	50	25	75
Transit	5%	5	13	18	15	8	23
Non-motorized	10%	11	27	38	32	16	48
Total Person Trips	100%	112	283	395	328	169	497
Total 'New' Auto Trips		**79**	**199**	**278**	**231**	**120**	**351**

Table 7: Phase 3 Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	70%	54	143	197	166	86	252
Auto Passenger	15%	13	31	44	36	19	55
Transit	5%	3	9	12	11	5	16
Non-motorized	10%	7	20	27	22	11	33
Total Person Trips	100%	77	203	280	235	121	356
Total 'New' Auto Trips		**54**	**143**	**197**	**166**	**86**	**252**

Table 8: Phase 4 Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	70%	36	80	116	101	52	153
Auto Passenger	15%	8	18	26	21	12	33
Transit	5%	2	5	7	7	3	10
Non-motorized	10%	5	11	16	14	7	21
Total Person Trips	100%	51	114	165	143	74	217
Total 'New' Auto Trips		**36**	**80**	**116**	**101**	**52**	**153**

Table 9: Phase 5 Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	70%	48	122	170	143	75	218
Auto Passenger	15%	10	27	37	31	17	48
Transit	5%	3	8	11	9	4	13
Non-motorized	10%	6	16	22	20	9	29
Total Person Trips	100%	67	173	240	203	105	308
Total 'New' Auto Trips		**48**	**122**	**170**	**143**	**75**	**218**

Table 10: Total Site Vehicle Trip Generation

Phase	AM Peak (veh/h)			PM Peak (veh/h)		
	In	Out	Total	In	Out	Total
Phase 2	79	199	278	231	120	351
Phase 3	54	143	197	166	86	252
Phase 4	36	80	116	101	52	153
Phase 5	48	122	170	143	75	218
Total 'New' Auto Trips	**217**	**544**	**761**	**641**	**333**	**974**

As shown in Table 10, the resulting number of potential 'new' two-way vehicle trips for the proposed development is approximately 761 and 974 veh/h during the weekday morning and afternoon peak hours, respectively.

3.5. VEHICLE TRAFFIC DISTRIBUTION AND ASSIGNMENT

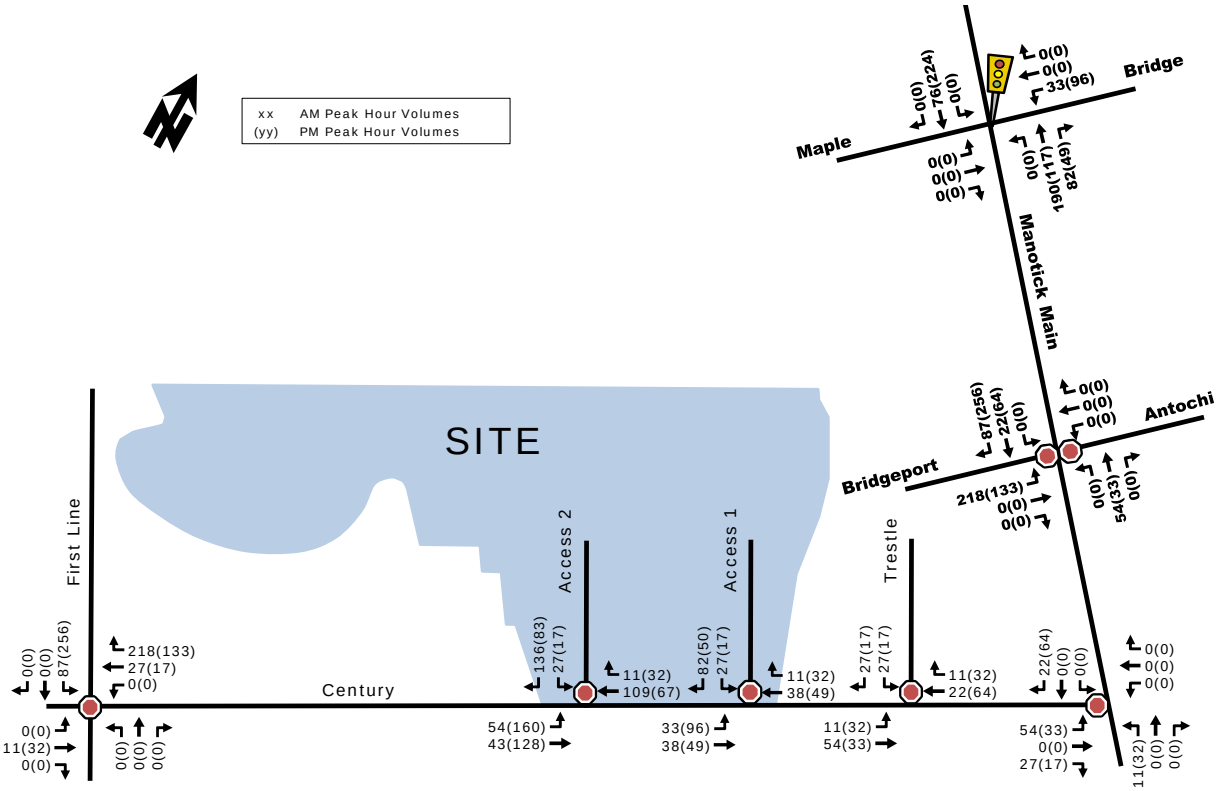
Traffic distribution was based on the different types of land uses, existing volume splits at study area intersections and our knowledge of the surrounding area. The resultant distribution is outlined as follows.

- 5% to/from the south via Rideau Valley Dr
- 35% to/from the north via Manotick Main St
- 15% to/from the east via Manotick Main St and Bridge St
- 45% to/from the west via Century Rd and First Line Rd

100%

Based on these distributions, 'new' site-generated trips were assigned to study area intersections, which are illustrated as Figure 7.

Figure 7: 'New' Site Generated Traffic Volumes



4. FUTURE TRAFFIC OPERATIONS

4.1. PROJECTED 2027 CONDITIONS AT FULL SITE DEVELOPMENT

The total projected 2027 volumes associated with the proposed development were derived by superimposing 'new' site-generated traffic volumes (Figure 7) onto projected 2027 background traffic volumes (Figure 5). The resulting total projected 2027 volumes are illustrated as Figure 8.

The following Table 11 provides a projected performance summary for study area intersections, based on total projected 2032 traffic volumes. The detailed SYNCHRO model output of projected conditions is provided within Appendix E.

Figure 8: Total Projected 2027 Peak Hour Traffic Volumes

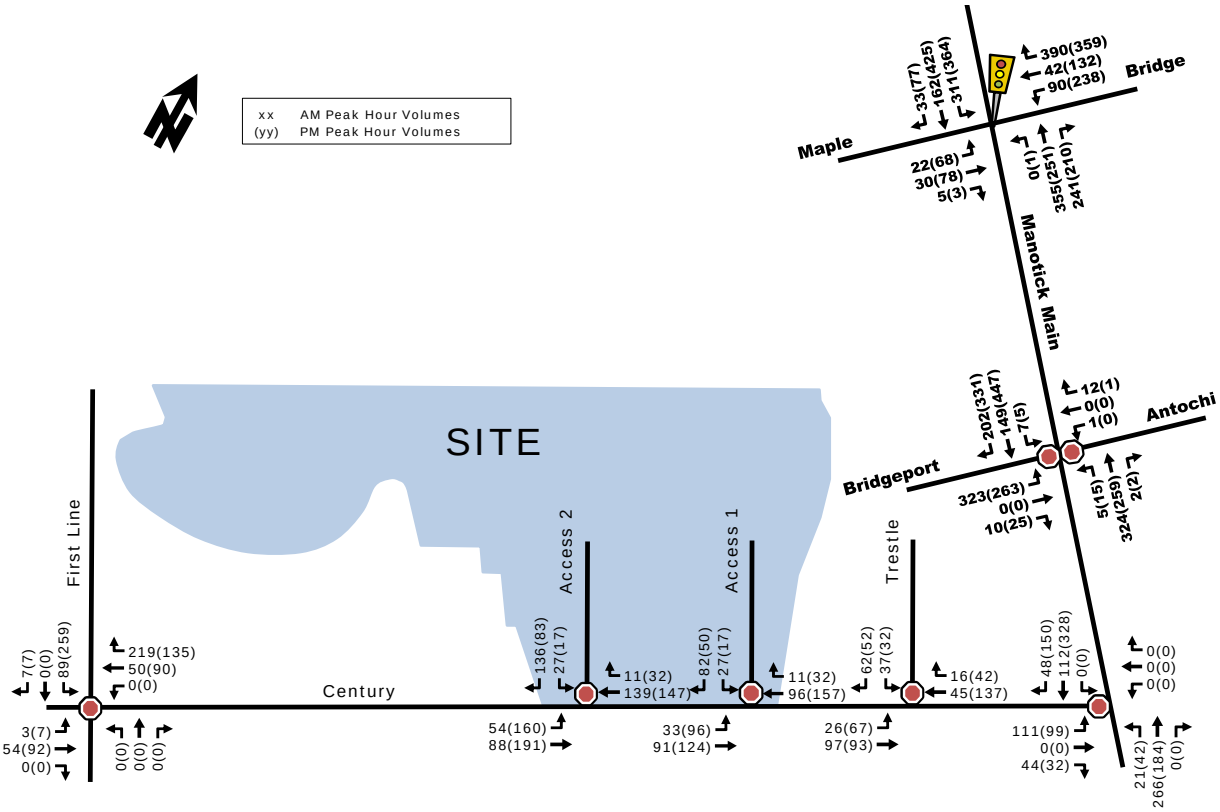


Table 11: Projected 2027 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Manotick Main/Century (unsignalized)	B(C)	13.0(17.4)	EB(EB)	3.7(3.3)	-	-
Century/Trestle (unsignalized)	A(B)	9.8(11.0)	SB(SB)	4.2(3.7)	-	-
First Line/Century (unsignalized)	A(B)	8.5(10.9)	SB(SB)	8.3(10.0)	-	-
Manotick Main/Bridgeport (unsignalized)	F(F)	75.0(225.6)	EB(EB)	24.4(48.5)	-	-
Manotick Main /Bridge	B(B)	0.65(0.69)	NBT(WBL)	20.7(25.5)	A(B)	0.52(0.66)
Century Rd/Access 1 (unsignalized)	A(B)	9.8(10.6)	SB(SB)	3.8(3.1)	-	-
Century Rd/Access 2 (unsignalized)	B(B)	10.4(11.1)	SB(SB)	4.7(4.1)	-	-

Notes: • Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.

As shown in Table 11, with the full build-out of Stage 2+, the Manotick Main/Bridgeport intersection is projected to operate above capacity (LoS 'F') during the morning and afternoon peak hour. All other study area intersections 'as a whole' are projected to operate at an acceptable LoS 'C' or better during peak hours.

Regarding the 'critical movements' at study area intersections, the eastbound movement (left) at the Manotick Main St/Bridgeport Ave intersection is projected to operate above capacity (LoS 'F') during the morning and afternoon peak hour. All other critical movements are projected to operate at an acceptable LoS 'C' or better during the morning and afternoon peak hours with respect to the City of Ottawa operating standards of LoS 'D' or better ($v/c \leq 0.90$).

The projected traffic volumes at the Manotick Main St/Bridgeport Ave intersection do not trigger a signal warrant, however, operationally, the eastbound approach would benefit from a higher order control at the intersection. A signal is recommended and Table 12 summarizes the projected operations of the Manotick Main St/Bridgeport Ave intersection. The intersection is anticipated to operate 'as a whole' with a LoS 'B' or better during both peak hours and the eastbound approach with a LoS 'C' or better.

Table 12: Projected 2027 Performance (Mitigated) at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Manotick Main/Bridgeport	C(B)	0.73(0.62)	EB(EB)	13.6(10.8)	A(B)	0.57(0.61)
Notes: • Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

The roundabout screening tool identifies a 44m requirement for a typical single lane urban roundabout, and the diagonal distances between the property quadrants are approximately 41m (Mahogany park to Fire Station No. 94) and 47m (private residential, northwest to southeast quadrants). The additional space requirements between the park and Fire Station No. 94 would impact the Station on-street parking, landscaping, street lighting, hydro poles, and the existing park space. Therefore, a roundabout intersection was not considered as an option for the high order control intersection control at Manotick Main St/Bridgeport Ave.

4.2. PROJECTED 2032 CONDITIONS AT FIVE YEARS BEYOND SITE BUILD-OUT

The total projected 2032 volumes associated with the proposed development were derived by superimposing 'new' site-generated traffic volumes (Figure 7) onto projected 2032 background traffic volumes (Figure 6). The resulting total projected 2032 volumes are illustrated as Figure 9.

The following Table 13 provides a projected performance summary for study area intersections, based on total projected 2032 traffic volumes (5-years beyond full site build-out). The detailed SYNCHRO model output of projected conditions is provided within Appendix E.

The Manotick Main St/Bridgeport Ave intersection signalization has been carried forward from the 2027 horizon, including the southbound right-turn lane. No other study area improvements are included in this horizon.

Figure 9: Total Projected 2032 Peak Hour Traffic Volumes

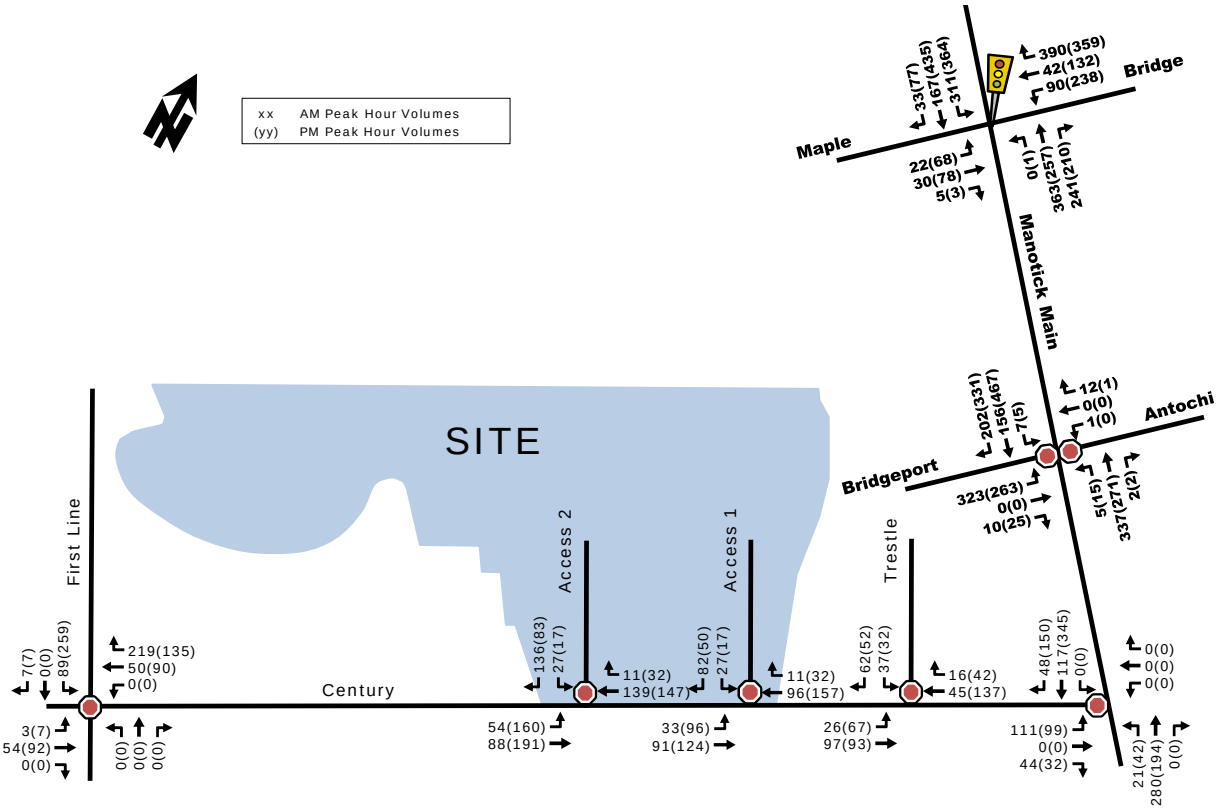


Table 13: Projected 2032 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Manotick Main/Century (unsignalized)	A(C)	13.2(18.1)	EB(EB)	3.6(3.3)	-	-
Century/Trestle (unsignalized)	A(B)	9.8(11.0)	SB(SB)	4.2(3.7)	-	-
First Line/Century (unsignalized)	A(B)	8.5(10.9)	SB(SB)	8.3(10.0)	-	-
Manotick Main/Bridgeport	B(B)	0.66(0.63)	EB(EB)	11.3(10.9)	A(B)	0.60(0.62)
Manotick Main /Bridge	B(B)	0.66(0.70)	NBT(WBL)	20.8(25.6)	A(B)	0.52(0.66)
Century Rd/Access 1 (unsignalized)	A(B)	9.8(10.6)	SB(SB)	3.8(3.1)	-	-
Century Rd/Access 2 (unsignalized)	B(B)	10.4(11.1)	SB(SB)	4.7(4.1)	-	-
Notes: • Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 13, with the continued 1% traffic growth along Manotick Main Street, the study area intersections 'as a whole' are projected to operate at an acceptable LoS 'C' or better during peak hours. The 'critical movements' are projected to operate at an acceptable LoS 'C' or better during the morning and afternoon peak hours with respect to the City of Ottawa operating standards of LoS 'D' or better ($v/c \leq 0.90$).

4.3. NEIGHBOURHOOD/MANOTICK IMPACTS

Based on the location of the proposed development, connections to the adjacent road network, and origin-destination demands of the area, it is anticipated that the majority of the site-generated traffic will utilize Century Rd and First Line

Rd. Inevitably, travel demand will utilize the Bridge St crossing to travel north and east. The opening of the Vimy Memorial Crossing has reduced the demand on Bridge St (approximately 25% from 2010 to 2015), and subsequently the Manotick Main St/Bridge St intersection, providing additional capacity for the Mahogany development to gradually build out.

Within the Mahogany development, additional traffic will utilize Bridgeport Ave and Trestle St to access the site. While the two-way volume will be approximately 10 cars a minute, the community perception may be that it is becoming unsafe. During construction, a monitoring program is recommended for community concerns along the existing portion of Bridgeport Ave to implement remedial passive traffic calming measures, similar to the recommendations for Stage 2+.

With respect to construction traffic for the development, truck routing should be directed to First Line Rd and Century Rd to access the site, avoiding the commercial core and residential areas of Manotick.

5. TRANSPORTATION DEMAND MANAGEMENT

Depending on the nature of a development, Transportation Demand Management (TDM) strategies have the potential to be an integral part of a planned development to address and support the City's policies regarding TDM. Several other TDM measures could also be considered, including:

- Improving the quality and safety of pedestrian facilities, such as enhanced sidewalks/lighting.
- Promote transit passes and park & ride options within Manotick and to the Riverview Station.
- Promote appropriate car sharing programs/facilities to reduce auto ownership and attract residents who do not own a vehicle.

TDM strategies are important in encouraging active modes of transportation to/from the site, further lessening the reliance on the private automobile.

6. SITE PLAN REVIEW

This section provides an overview of site access, parking requirements, pedestrian circulation and transit accessibility. The proposed Site Plan was previously illustrated as Figure 2.

Site Access

Access to the Mahogany Stage 2+ will be provided through two new site accesses along Century Rd and the existing Bridgeport Ave intersection on Manotick Main St. The intersections along Century Rd will be stop-controlled along the side streets. No auxiliary lanes are recommended for these additional access locations.

To accommodate the full build-out of Stage 2+, the Manotick Main St/Bridgeport Ave intersection is recommended to be signalized and a southbound right-turn lane provided. The unconstrained storage length for the southbound right-turn lane is approximately 58m, but consideration will need to be given to the adjacent residential driveways along Manotick Main St as the first driveway is approximately 20m north of Bridgeport Ave. No other auxiliary lanes are recommended for the intersection.

Internal Road Network

The internal road network for Mahogany is developed upon a frame work of 22.0m collector roads and 18.0m local roadways.

The collector roads include Bridgeport Ave, and Access 1 and Access 2, south of Bridgeport Ave. The right-of-way should be able to include 3.3m travel lanes to facilitate transit vehicles, sidewalks on both sides or combination of multi-use pathway and sidewalk, dedicated bike lanes or on-street parking, and the utility/boulevard spacing for lighting and trees. The intersection of Bridgeport Ave/Access 1 is proposed to be a roundabout, facilitating efficient access, calming traffic adjacent to the school site, and providing protected crossing locations for pedestrians and cyclists.

Given the City's recently approved 18.0m cross-section standard, these roadways will match the City typical with on-street parking and a single sidewalk, with the potential combination of a multi-use pathway on adjacent park, stormwater management pond or school lands.

Transit

While not currently provided, the opportunity for transit service along Bridgeport Ave can be facilitated with the 22.0m cross-section. Stops should be located on the far side of the intersections and the loop may be facilitated on along Access #1 during Phase 2, and ultimately along Access #2 on Phase 3 proceeds.

Pedestrian

The pedestrian network will likely include a sidewalk on the local roads and sidewalks on both sides of the collector roads within the development. External connections are planned to Potter Dr, Carrison Dr, and Century Rd. The use of multi-use pathways within the development may also consolidate the active mode facilities and allow for greater connectivity.

Cycling

The cycling network within Mahogany will be facilitated along the collector road network, and multi-use-pathways at the stormwater management ponds and Mahogany Creek. Should a multi-use pathway be provided along the north side of Bridgeport Ave, between Mahogany Creek and Access 2, a potential cycling loop is feasible with connections to Potter Dr.

Parking

On-street parking is accommodated along the propose local street network and the potential to be included along the collector roads. If dedicated bike lanes are required, the on-street parking will have to be removed from these roadways. In addition, and transit service provided to the development will limit the areas where parking can be accommodated along the collector roads.

Traffic Calming

The implementation of passive traffic calming measures are currently being incorporated into new subdivisions with the goal of reducing potential reconstruction costs soon after a new development roads are completed. The nature of these calming measures should primarily be limited to horizontal features. Within the subject lands, curb narrowings should be provided at the local road intersections with Bridgeport Ave, Access #1 and Access #2. The intersection of Bridgeport Ave/Access #2 is recommended to include a full intersection narrowing to compliment the roundabout proposed at Bridgeport Ave/Access #1. On-street parking planned for the development (as discussed above) will also provide additional side friction along the local roads to calm traffic.

7. FINDINGS AND RECOMMENDATIONS

Minto Mahogany, located north of Century Rd, between First Line Rd and Manotick Main St, is a residential development that will consist of 943 single family homes and 246 townhomes, for a total of 1,189 units. It was determined that the proposed development will generate 757 new vehicle trips in the morning peak hour and 966 vehicle trips in the afternoon peak hour.

Based on the foregoing analysis of the proposed development, the following transportation related conclusions are offered.

Existing Conditions

- The signalized study area intersection adjacent to the site is currently operating 'as a whole' with an overall LoS 'A' or better during the weekday morning and afternoon peak hours.
- Regarding 'critical movements' at the study area intersection, they are noted as operating at an acceptable LoS 'C' or better during the peak hours.

- Based on the available data, there does not appear to be any safety issues at the signalized study area intersections adjacent to the proposed site.

Projected Conditions

- The background growth rate along Manotick Main St was assumed to be 1% per annum for the 2027 and 2032 horizon years. No background growth was assumed for Century Rd and First Line Rd.
- The proposed development is projected to generate 'new' two-way vehicle volumes of approximately 757 and 966 veh/h during the weekday morning and afternoon peak hours, respectively.
- At full occupancy (year 2027), the Manotick Main St/Bridgeport Ave intersection eastbound approached is projected to operate at a LoS 'F' during both peak hours. It is recommended that the intersection be signalized upon full build-out and a southbound right-turn lane be provided with a maximum storage length of 58m.
- The remaining study area intersections 'as a whole' are projected to operate at an acceptable LoS 'C' or better and the 'critical movements' are projected to operate at acceptable levels of service during both peak hours.
- At 5-years beyond site build-out, study area intersections 'as a whole' are projected to operate at an acceptable LoS 'C' or better.

Site Plan

- The internal road network provides a high level of connectivity within the development and to the adjacent road network.
- The local roads are sufficiently wide (18.0m) to permit the construction of sidewalks on one side of the roadway. The internal collector roads are sufficiently wide to permit the construction of sidewalks along both sides of the road, or potentially the combination of a sidewalk and multi-use pathway.
- A multi-use pathway is recommended along the north side of Bridgeport Ave, between Mahogany Creek and Access 2, to facilitate a cycling loop including Potter Dr, Mahogany Creek, Bridgeport Ave and Access 2/Wilson Cowen Drain.
- Curb narrowings are recommended on the local road approaches to the internal collectors (Bridgeport Ave, Access 1 and Access 2, south of Bridgeport Ave) and a full intersection narrowing is recommended for the intersection of Bridgeport Ave/Access 2.

Based on the foregoing, the proposed Minto Mahogany Stage 2+ residential development is recommended from a transportation perspective.

Prepared By:

Andrew Harte, P.Eng.
Transportation Engineer

Reviewed By:

Christopher Gordon, P.Eng.
Senior Project Manager

Appendix A

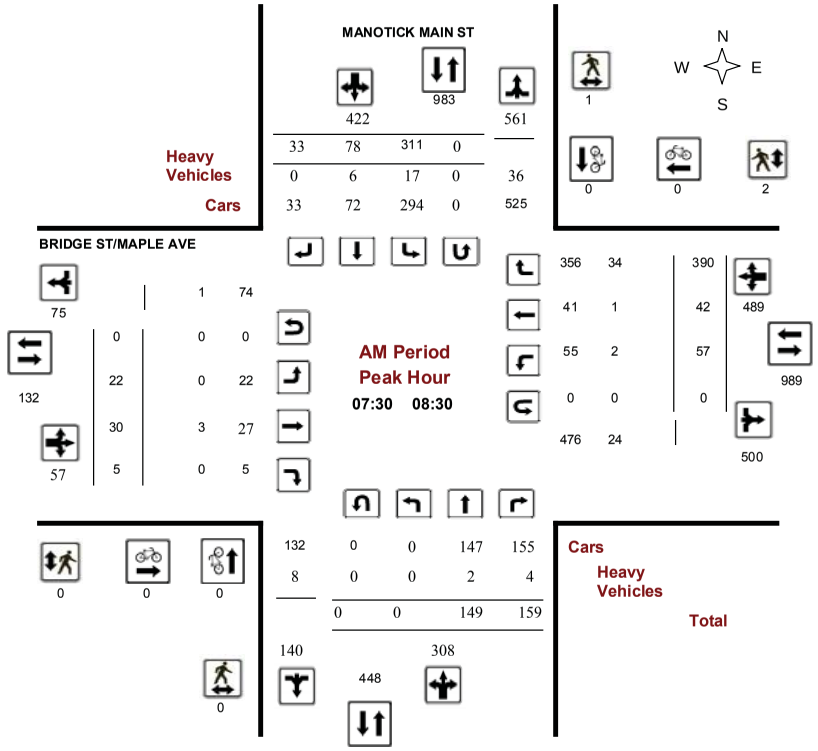
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

BRIDGE ST/MAPLE AVE @ MANOTICK MAIN ST

Survey Date: Tuesday, March 08, 2016 **WO No:** 35737

Start Time: 07:00 **Device:** Miovision



Comments

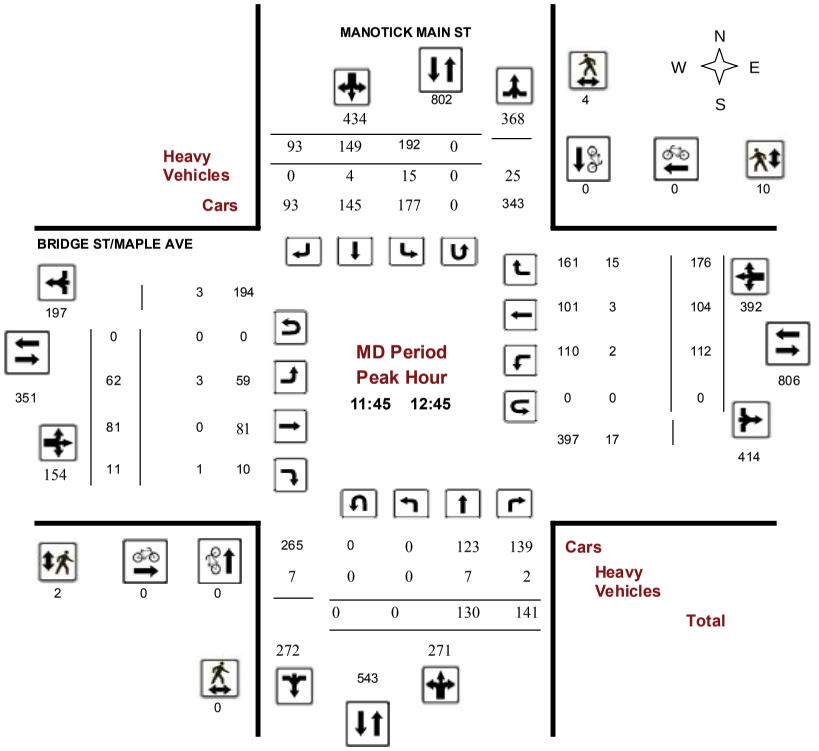
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

BRIDGE ST/MAPLE AVE @ MANOTICK MAIN ST

Survey Date: Tuesday, March 08, 2016 **WO No:** 35737

Start Time: 07:00 **Device:** Miovision



Comments

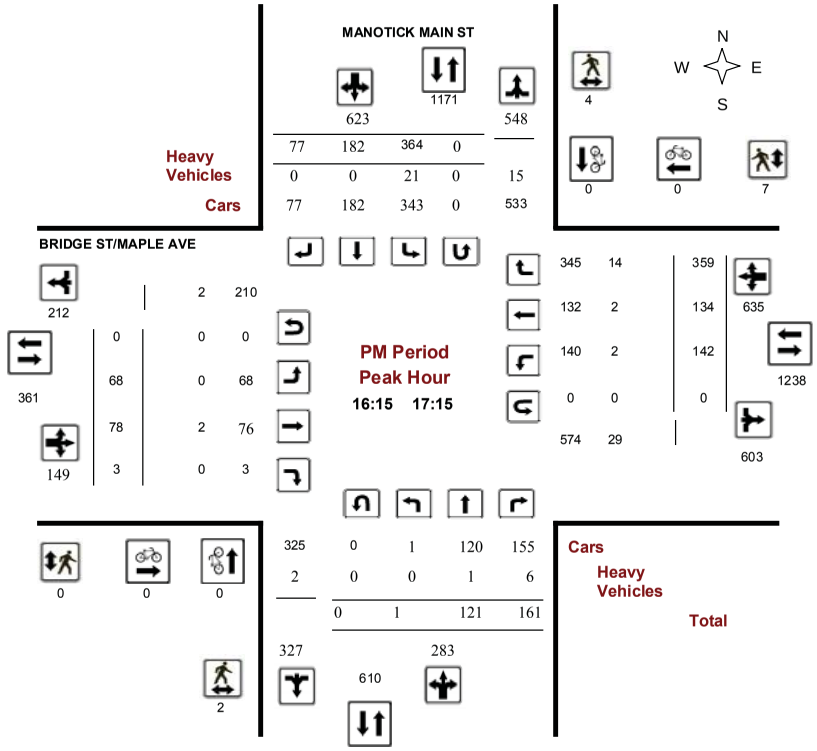
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

BRIDGE ST/MAPLE AVE @ MANOTICK MAIN ST

Survey Date: Tuesday, March 08, 2016 **WO No:** 35737

Start Time: 07:00 **Device:** Miovision



Comments

Public Works - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 35737

BRIDGE ST/MAPLE AVE @ MANOTICK MAIN ST

Count Date: Tuesday, March 08, 2016 **Start Time:** 07:00

	MANOTICK MAIN ST			BRIDGE ST/MAPLE AVE			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	2	**2**	0	0	**0**	**2**
08:00 09:00	0	0	**0**	0	0	**0**	**0**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	1	**1**	0	0	**0**	**1**
16:00 17:00	0	0	**0**	0	0	**0**	**0**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	0	3	**3**	0	0	**0**	**3**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Public Works - Traffic Services

W.O. 35737

Turning Movement Count - Heavy Vehicle Report

BRIDGE ST/MAPLE AVE @ MANOTICK MAIN ST

Survey Date: Tuesday, March 08, 2016

		MANOTICK MAIN ST									BRIDGE ST/MAPLE AVE									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	08:00	1	1	3	**5**	17	0	2	**19**	**24**	1	7	0	**8**	4	1	33	**38**	**46**	**70**
08:00	09:00	0	6	5	**11**	22	7	2	**31**	**42**	0	3	0	**3**	4	1	37	**42**	**45**	**87**
09:00	10:00	0	4	3	**7**	21	3	4	**28**	**35**	4	4	0	**8**	4	3	25	**32**	**40**	**75**
11:30	12:30	0	7	2	**9**	14	4	2	**20**	**29**	4	0	1	**5**	2	4	15	**21**	**26**	**55**
12:30	13:30	0	6	3	**9**	19	10	3	**32**	**41**	0	0	0	**0**	4	1	9	**14**	**14**	**55**
15:00	16:00	0	2	4	**6**	29	0	3	**32**	**38**	1	1	0	**2**	4	2	22	**28**	**30**	**68**
16:00	17:00	0	1	6	**7**	28	1	1	**30**	**37**	0	1	0	**1**	1	3	18	**22**	**23**	**60**
17:00	18:00	0	0	1	**1**	8	1	1	**10**	**11**	1	2	1	**4**	1	2	8	**11**	**15**	**26**
Sub Total		1	27	27	**55**	158	26	18	**202**	**257**	11	18	2	**31**	24	17	167	**208**	**239**	**496**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		1	27	27	**0**	158	26	18	**202**	**257**	11	18	2	**31**	24	17	167	**208**	**239**	**496**

Heavy Vehicles are vehicles having one rear axle with four or more wheels, or having two or more rear axles. These vehicles include most O.C. Transpo, school and inter-city buses. Further, they ARE included in the Turning Movement Count Summary.

Public Works - Traffic Services

Work Order 35737

Turning Movement Count - Pedestrian Volume Report

BRIDGE ST/MAPLE AVE @ MANOTICK MAIN ST

Count Date: Tuesday, March 08, 2016 **Start Time:** 07:00

Time Period		NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00	07:15	0	0	**0**	0	0	**0**	**0**
07:15	07:30	0	0	**0**	0	0	**0**	**0**
07:30	07:45	0	0	**0**	0	0	**0**	**0**
07:45	08:00	0	0	**0**	0	0	**0**	**0**
07:00	08:00	0	0	**0**	0	0	**0**	**0**
08:00	08:15	0	1	**1**	0	1	**1**	**2**
08:15	08:30	0	0	**0**	0	1	**1**	**1**
08:30	08:45	1	0	**1**	0	0	**0**	**1**
08:45	09:00	0	1	**1**	1	0	**1**	**2**
08:00	09:00	1	2	**3**	1	2	**3**	**6**
09:00	09:15	0	0	**0**	0	0	**0**	**0**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	1	**1**	1	0	**1**	**2**
09:45	10:00	0	0	**0**	0	0	**0**	**0**
09:00	10:00	0	1	**1**	1	0	**1**	**2**
11:30	11:45	0	0	**0**	0	1	**1**	**1**
11:45	12:00	0	1	**1**	0	4	**4**	**5**
12:00	12:15	0	0	**0**	0	5	**5**	**5**
12:15	12:30	0	0	**0**	0	1	**1**	**1**
11:30	12:30	0	1	**1**	0	11	**11**	**12**
12:30	12:45	0	3	**3**	2	0	**2**	**5**
12:45	13:00	0	2	**2**	0	0	**0**	**2**
13:00	13:15	1	0	**1**	0	1	**1**	**2**
13:15	13:30	0	1	**1**	1	0	**1**	**2**
12:30	13:30	1	6	**7**	3	1	**4**	**11**
15:00	15:15	0	2	**2**	2	1	**3**	**5**
15:15	15:30	0	0	**0**	0	1	**1**	**1**
15:30	15:45	1	0	**1**	0	0	**0**	**1**
15:45	16:00	0	3	**3**	0	0	**0**	**3**
15:00	16:00	1	5	**6**	2	2	**4**	**10**
16:00	16:15	0	3	**3**	0	0	**0**	**3**
16:15	16:30	1	3	**4**	0	3	**3**	**7**
16:30	16:45	0	1	**1**	0	3	**3**	**4**
16:45	17:00	1	0	**1**	0	0	**0**	**1**
16:00	17:00	2	7	**9**	0	6	**6**	**15**
17:00	17:15	0	0	**0**	0	1	**1**	**1**
17:15	17:30	1	0	**1**	0	0	**0**	**1**
17:30	17:45	0	0	**0**	0	0	**0**	**0**
17:45	18:00	1	0	**1**	0	0	**0**	**1**
17:00	18:00	2	0	**2**	0	1	**1**	**3**
Total	.....	7	22	**29**	7	23	**30**	**59**

Comment:

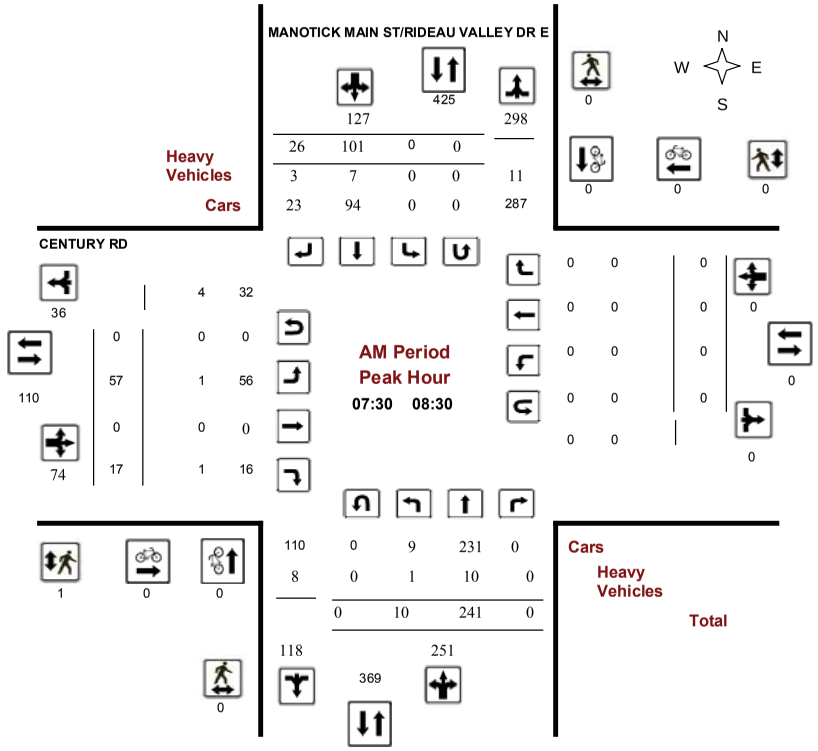
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

MANOTICK MAIN ST/RIDEAU VALLEY DR E @ CENTURY

Survey Date: Thursday, May 09, 2013 **WO No:** 31209

Start Time: 07:00 **Device:**



Comments

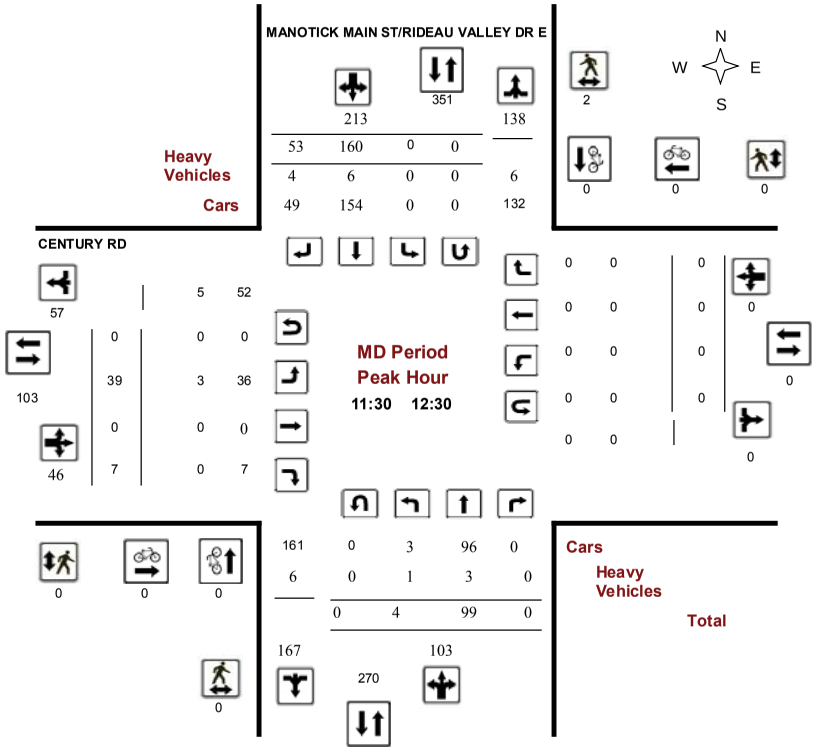
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

MANOTICK MAIN ST/RIDEAU VALLEY DR E @ CENTURY

Survey Date: Thursday, May 09, 2013 **WO No:** 31209

Start Time: 07:00 **Device:**



Comments

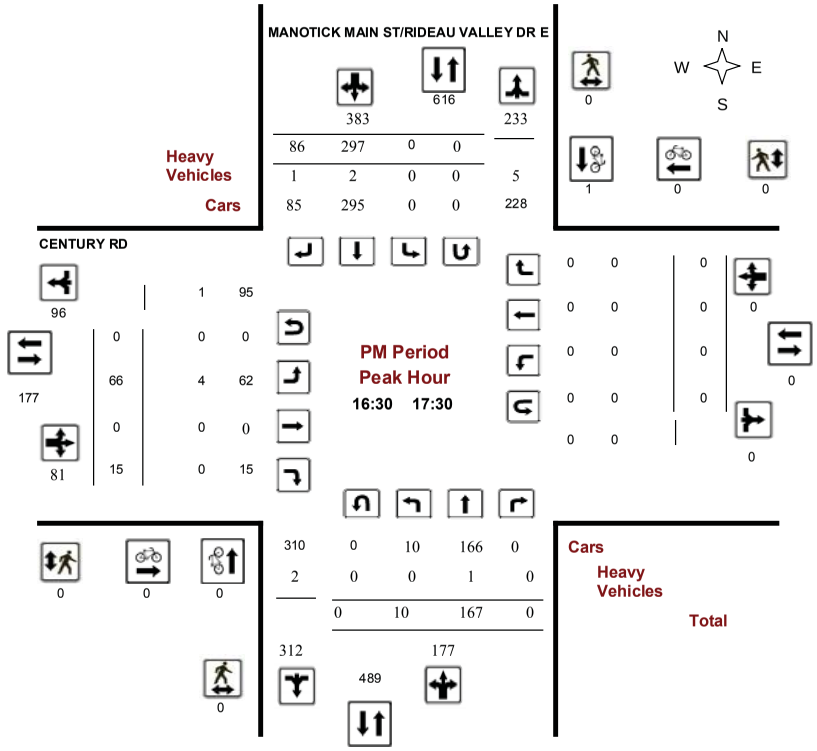
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

MANOTICK MAIN ST/RIDEAU VALLEY DR E @ CENTURY

Survey Date: Thursday, May 09, 2013 **WO No:** 31209

Start Time: 07:00 **Device:**



Comments

Public Works - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 31209

MANOTICK MAIN ST/RIDEAU VALLEY DR E @ CENTURY

Count Date: Thursday, May 09, 2013 **Start Time:** 07:00

	MANOTICK MAIN ST/RIDEAU VALLEY DR E			CENTURY RD			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	0	**0**	0	0	**0**	**0**
08:00 09:00	0	0	**0**	1	0	**1**	**1**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	2	**2**	0	0	**0**	**2**
16:00 17:00	0	1	**1**	0	0	**0**	**1**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	0	3	**3**	1	0	**1**	**4**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Public Works - Traffic Services

W.O. 31209

Turning Movement Count - Heavy Vehicle Report

MANOTICK MAIN ST/RIDEAU VALLEY DR E @ CENTURY

Survey Date: Thursday, May 09, 2013

		MANOTICK MAIN ST/RIDEAU VALLEY DR E									CENTURY RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	08:00	1	7	0	**8**	0	7	3	**10**	**18**	2	0	1	**3**	0	0	0	**0**	**3**	**21**
08:00	09:00	2	9	0	**11**	0	8	3	**11**	**22**	2	0	2	**4**	0	0	0	**0**	**4**	**26**
09:00	10:00	0	2	0	**2**	0	8	1	**9**	**11**	1	0	0	**1**	0	0	0	**0**	**1**	**12**
11:30	12:30	1	3	0	**4**	0	6	4	**10**	**14**	3	0	0	**3**	0	0	0	**0**	**3**	**17**
12:30	13:30	0	2	0	**2**	0	8	1	**9**	**11**	3	0	1	**4**	0	0	0	**0**	**4**	**15**
15:00	16:00	0	1	0	**1**	0	2	5	**7**	**8**	6	0	1	**7**	0	0	0	**0**	**7**	**15**
16:00	17:00	0	4	0	**4**	0	2	2	**4**	**8**	4	0	0	**4**	0	0	0	**0**	**4**	**12**
17:00	18:00	0	0	0	**0**	0	2	4	**6**	**6**	1	0	0	**1**	0	0	0	**0**	**1**	**7**
Sub Total		4	28	0	**32**	0	43	23	**66**	**98**	22	0	5	**27**	0	0	0	**0**	**27**	**125**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		4	28	0	**0**	0	43	23	**66**	**98**	22	0	5	**27**	0	0	0	**0**	**27**	**125**

Heavy Vehicles are vehicles having one rear axle with four or more wheels, or having two or more rear axles. These vehicles include most O.C. Transpo, school and inter-city buses. Further, they ARE included in the Turning Movement Count Summary.

Public Works - Traffic Services

Work Order 31209

Turning Movement Count - Pedestrian Volume Report

MANOTICK MAIN ST/RIDEAU VALLEY DR E @ CENTURY

Count Date: Thursday, May 09, 2013 **Start Time:** 07:00

Time Period		NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00	07:15	1	0	**1**	0	1	**1**	**2**
07:15	07:30	0	0	**0**	0	0	**0**	**0**
07:30	07:45	0	0	**0**	1	0	**1**	**1**
07:45	08:00	0	0	**0**	0	0	**0**	**0**
07:00	08:00	1	0	**1**	1	1	**2**	**3**
08:00	08:15	0	0	**0**	0	0	**0**	**0**
08:15	08:30	0	0	**0**	0	0	**0**	**0**
08:30	08:45	0	0	**0**	0	0	**0**	**0**
08:45	09:00	0	0	**0**	1	0	**1**	**1**
08:00	09:00	0	0	**0**	1	0	**1**	**1**
09:00	09:15	0	0	**0**	0	0	**0**	**0**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	0	**0**	0	0	**0**	**0**
09:45	10:00	0	0	**0**	0	0	**0**	**0**
09:00	10:00	0	0	**0**	0	0	**0**	**0**
11:30	11:45	0	1	**1**	0	0	**0**	**1**
11:45	12:00	0	0	**0**	0	0	**0**	**0**
12:00	12:15	0	1	**1**	0	0	**0**	**1**
12:15	12:30	0	0	**0**	0	0	**0**	**0**
11:30	12:30	0	2	**2**	0	0	**0**	**2**
12:30	12:45	0	0	**0**	0	0	**0**	**0**
12:45	13:00	0	1	**1**	0	0	**0**	**1**
13:00	13:15	0	1	**1**	0	0	**0**	**1**
13:15	13:30	0	0	**0**	2	0	**2**	**2**
12:30	13:30	0	2	**2**	2	0	**2**	**4**
15:00	15:15	0	1	**1**	0	1	**1**	**2**
15:15	15:30	0	0	**0**	1	0	**1**	**1**
15:30	15:45	0	1	**1**	0	0	**0**	**1**
15:45	16:00	0	1	**1**	0	0	**0**	**1**
15:00	16:00	0	3	**3**	1	1	**2**	**5**
16:00	16:15	0	0	**0**	0	0	**0**	**0**
16:15	16:30	0	0	**0**	0	0	**0**	**0**
16:30	16:45	0	0	**0**	0	0	**0**	**0**
16:45	17:00	0	0	**0**	0	0	**0**	**0**
16:00	17:00	0	0	**0**	0	0	**0**	**0**
17:00	17:15	0	0	**0**	0	0	**0**	**0**
17:15	17:30	0	0	**0**	0	0	**0**	**0**
17:30	17:45	0	1	**1**	0	0	**0**	**1**
17:45	18:00	0	0	**0**	0	0	**0**	**0**
17:00	18:00	0	1	**1**	0	0	**0**	**1**
Total	.....	1	8	**9**	5	2	**7**	**16**

Comment:

Intersection: Manotick Main & Bridgeport

Date: Thursday, Jul 14, 2016

Time: 7:00AM to 9:00AM

North Leg: Trestle
West and East Leg: Century

AM

Start Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Peak Hour	0	0	0	2	0	7	3	43	0	0	23	1

Peak hour: 7:30 - 8:30

PM

Start Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Peak Hour	0	0	0	3	0	7	7	60	0	0	73	2

Peak hour: 15:45 - 16:45

Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	15-Minute Total
7:00AM - 7:15AM						9	4						13
7:15AM - 7:30AM	1					7	4						12
7:30AM - 7:45AM						3	1		1				5
7:45AM - 8:00AM						2	6						8
8:00AM - 8:15AM						2	10						12
8:15AM - 8:30AM						4	4						8
8:30AM - 8:45AM						6	2						8
8:45AM - 9:00AM						10	3						13
2 Hour Total	1	0	0	0	0	43	34	0	1	0	0	0	79

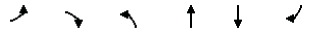
Intersection: Manotick Main & Bridgeport

Date: Thursday, Jul 14, 2016

Time: 4:00PM to 6:00PM

Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	15-Minute Total
4:00PM - 4:15PM						1	3						4
4:15PM - 4:30PM						2	8						10
4:30PM - 4:45PM	1					3	12		2				18
4:45PM - 5:00PM	0					7			3				10
5:00PM - 5:15PM						3	6						9
5:15PM - 5:30PM	2					3							5
5:30PM - 5:45PM						4							4
5:45PM - 6:00PM						4	2						6
2 Hour Total	3	0	0	0	0	27	31	0	5	0	0	0	63

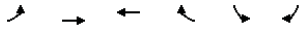
Appendix B



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	17	10	241	101	26
Future Volume (Veh/h)	57	17	10	241	101	26
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	60	18	11	254	106	27
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	396	120	133			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	396	120	133			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	98	99			
cM capacity (veh/h)	605	932	1452			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	78	265	133
Volume Left	60	11	0
Volume Right	18	0	27
cSH	658	1452	1700
Volume to Capacity	0.12	0.01	0.08
Queue Length 95th (m)	3.0	0.2	0.0
Control Delay (s)	11.2	0.4	0.0
Lane LOS	B	A	
Approach Delay (s)	11.2	0.4	0.0
Approach LOS	B		

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	33.0%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	43	23	1	2	7
Future Volume (Veh/h)	3	43	23	1	2	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	3	45	24	1	2	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	25				76	24
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	25				76	24
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	100				100	99
cM capacity (veh/h)	1223				887	1007

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	48	25	9
Volume Left	3	0	2
Volume Right	0	1	7
cSH	1223	1700	978
Volume to Capacity	0.00	0.01	0.01
Queue Length 95th (m)	0.1	0.0	0.2
Control Delay (s)	0.5	0.0	8.7
Lane LOS	A		A
Approach Delay (s)	0.5	0.0	8.7
Approach LOS			A

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	15.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	43	0	0	23	1	0	0	0	2	0	7
Future Volume (vph)	3	43	0	0	23	1	0	0	0	2	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	3	45	0	0	24	1	0	0	0	2	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	48	25	0	9
Volume Left (vph)	3	0	0	2
Volume Right (vph)	0	1	0	7
Hadj (s)	0.05	0.01	0.00	-0.39
Departure Headway (s)	4.0	4.0	4.1	3.7
Degree Utilization, x	0.05	0.03	0.00	0.01
Capacity (veh/h)	893	897	877	958
Control Delay (s)	7.2	7.1	7.1	6.7
Approach Delay (s)	7.2	7.1	0.0	6.7
Approach LOS	A	A	A	A

Intersection Summary												
Delay			7.1									
Level of Service			A									
Intersection Capacity Utilization			15.0%		ICU Level of Service				A			
Analysis Period (min)			15									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	0	0	1	0	12	0	244	2	7	115	23
Future Volume (Veh/h)	21	0	0	1	0	12	0	244	2	7	115	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	22	0	0	1	0	13	0	257	2	7	121	24
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	418	406	133	405	417	258	145			259		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	418	406	133	405	417	258	145			259		
tC, single (s)	7.3	6.5	6.4	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.5	3.5	4.0	3.3	2.9			2.2		
p0 queue free %	96	100	100	100	100	98	100			99		
cM capacity (veh/h)	508	531	875	554	524	781	1091			1306		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	14	259	152
Volume Left	22	1	0	7
Volume Right	0	13	2	24
cSH	508	758	1091	1306
Volume to Capacity	0.04	0.02	0.00	0.01
Queue Length 95th (m)	1.0	0.4	0.0	0.1
Control Delay (s)	12.4	9.8	0.0	0.4
Lane LOS	B	A		A
Approach Delay (s)	12.4	9.8	0.0	0.4
Approach LOS	B	A		

Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			28.6%		ICU Level of Service				A			
Analysis Period (min)			15									

AM Existing
5: Manotick Main & Maple/Bridge 06/27/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	30	5	57	42	390	0	149	159	311	78	33
Future Volume (vph)	22	30	5	57	42	390	0	149	159	311	78	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	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	
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1748		1695	1784	1508		1784	1492	1693	1704	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.54	1.00	
Satd. Flow (perm)	1695	1748		1695	1784	1508		1784	1492	970	1704	
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)	23	32	5	60	44	411	0	157	167	327	82	35
RTOR Reduction (vph)	0	4	0	0	0	260	0	0	86	0	10	0
Lane Group Flow (vph)	23	33	0	60	44	151	0	157	81	327	107	0
Confl. Peds. (#/hr)	1					1			2	2		
Turn Type	Split	NA		Split	NA	pm+ov		NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8			2	6		
Actuated Green, G (s)	9.4	9.4		12.2	12.2	28.5		27.4	39.6	50.0	50.0	
Effective Green, g (s)	11.6	11.6		14.4	14.4	33.1		29.7	44.0	52.3	52.3	
Actuated g/C Ratio	0.13	0.13		0.16	0.16	0.37		0.33	0.49	0.58	0.58	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	217	224		270	284	552		586	726	710	986	
v/s Ratio Prot	0.01	c0.02		0.04	0.02	c0.06		0.09	0.02	c0.09	0.06	
v/s Ratio Perm						0.04			0.04	c0.17		
v/c Ratio	0.11	0.15		0.22	0.15	0.27		0.27	0.11	0.46	0.11	
Uniform Delay, d1	34.8	34.9		33.1	32.7	20.1		22.3	12.6	10.2	8.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.4	0.3	0.3		0.2	0.1	0.5	0.0	
Delay (s)	35.0	35.3		33.5	33.0	20.4		22.5	12.6	10.6	8.6	
Level of Service	C	D		C	C	C		C	B	B	A	
Approach Delay (s)		35.1			23.0			17.4			10.1	
Approach LOS		D			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.41			
Actuated Cycle Length (s)	90.3	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	65.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

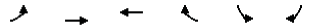
PM Existing
1: Rideau Valley/Manotick Main & Century 06/27/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	15	10	167	297	86
Future Volume (Veh/h)	66	15	10	167	297	86
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	69	16	11	176	313	91
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	556	358	404			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	556	358	404			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	98	99			
cM capacity (veh/h)	487	686	1155			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	85	187	404
Volume Left	69	11	0
Volume Right	16	0	91
cSH	515	1155	1700
Volume to Capacity	0.16	0.01	0.24
Queue Length 95th (m)	4.5	0.2	0.0
Control Delay (s)	13.4	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	13.4	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

PM Existing
2: Century & Trestle 06/27/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	60	73	2	3	7
Future Volume (Veh/h)	7	60	73	2	3	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	63	77	2	3	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	79				155	78
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	79				155	78
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	99				100	99
cM capacity (veh/h)	1162				796	940

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	70	79	10
Volume Left	7	0	3
Volume Right	0	2	7
cSH	1162	1700	891
Volume to Capacity	0.01	0.05	0.01
Queue Length 95th (m)	0.1	0.0	0.3
Control Delay (s)	0.9	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.9	0.0	9.1
Approach LOS			A

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	19.5%	ICU Level of Service		A
Analysis Period (min)	15			

PM Existing
3: 1st Line & Century 06/27/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	60	0	0	73	2	0	0	0	3	0	7
Future Volume (vph)	7	60	0	0	73	2	0	0	0	3	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	63	0	0	77	2	0	0	0	3	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	70	79	0	10
Volume Left (vph)	7	0	0	3
Volume Right (vph)	0	2	0	7
Hadj (s)	0.05	0.02	0.00	-0.33
Departure Headway (s)	4.0	4.0	4.2	3.9
Degree Utilization, x	0.08	0.09	0.00	0.01
Capacity (veh/h)	878	889	826	888
Control Delay (s)	7.4	7.4	7.2	6.9
Approach Delay (s)	7.4	7.4	0.0	6.9
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.4			
Level of Service	A			
Intersection Capacity Utilization	19.5%	ICU Level of Service		A
Analysis Period (min)	15			

PM Existing
4: Manotick Main & Bridgeport/Antochi 06/27/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	0	5	0	0	1	3	205	2	5	347	15
Future Volume (Veh/h)	26	0	5	0	0	1	3	205	2	5	347	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	27	0	5	0	0	1	3	216	2	5	365	16
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	607	607	373	611	614	217	381			218		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	607	607	373	611	614	217	381			218		
tC, single (s)	7.3	6.5	6.4	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.5	3.5	4.0	3.3	2.9			2.2		
p0 queue free %	93	100	99	100	100	100	100			100		
cM capacity (veh/h)	384	408	639	401	404	823	869			1352		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	32	1	221	386
Volume Left	27	0	3	5
Volume Right	5	1	2	16
cSH	409	823	869	1352
Volume to Capacity	0.08	0.00	0.00	0.00
Queue Length 95th (m)	1.9	0.0	0.1	0.1
Control Delay (s)	14.5	9.4	0.2	0.1
Lane LOS	B	A	A	A
Approach Delay (s)	14.5	9.4	0.2	0.1
Approach LOS	B	A		

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	38.4%	ICU Level of Service	A	
Analysis Period (min)	15			

PM Existing
5: Manotick Main & Maple/Bridge 06/27/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	78	3	142	132	359	1	121	161	364	182	77
Future Volume (vph)	68	78	3	142	132	359	1	121	161	364	182	77
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	0.99	1.00	
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1773		1695	1784	1505		1784	1483	1686	1705	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.56	1.00	
Satd. Flow (perm)	1695	1773		1695	1784	1505		1781	1483	1001	1705	
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)	72	82	3	149	139	378	1	127	169	383	192	81
RTOR Reduction (vph)	0	1	0	0	0	226	0	0	91	0	10	0
Lane Group Flow (vph)	72	84	0	149	139	152	0	128	78	383	263	0
Confl. Peds. (#/hr)	4		2	2		4			7	7		
Turn Type	Split	NA		Split	NA	pm+ov	Perm	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8	2		2	6		
Actuated Green, G (s)	12.6	12.6		15.1	15.1	35.6		26.7	41.8	53.5	53.5	
Effective Green, g (s)	14.8	14.8		17.3	17.3	40.2		29.0	46.2	55.8	55.8	
Actuated g/C Ratio	0.15	0.15		0.17	0.17	0.40		0.29	0.46	0.56	0.56	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	251	262		293	308	605		517	685	715	952	
v/s Ratio Prot	0.04	c0.05		c0.09	0.08	0.06			0.02	c0.12	0.15	
v/s Ratio Perm						0.04		0.07	0.03	c0.18		
v/c Ratio	0.29	0.32		0.51	0.45	0.25		0.25	0.11	0.54	0.28	
Uniform Delay, d1	37.9	38.1		37.4	37.0	19.8		27.1	15.2	12.8	11.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.7		1.4	1.1	0.2		0.3	0.1	0.8	0.2	
Delay (s)	38.5	38.8		38.8	38.1	20.1		27.4	15.3	13.6	11.7	
Level of Service	D	D		D	D	C		C	B	B	B	
Approach Delay (s)		38.6			28.0			20.5			12.8	
Approach LOS		D			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.53			
Actuated Cycle Length (s)	99.9	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	74.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Appendix C

Total Area

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	10	8	2	9	0	3	1	0	33
Non-fatal injury	0	2	0	0	1	2	0	0	5
Non reportable	0	0	0	0	0	0	0	0	0
Total	**10**	**10**	**2**	**9**	**1**	**5**	**1**	**0**	**38**
	#1 or 26%	#1 or 26%	#5 or 5%	#3 or 24%	#6 or 3%	#4 or 13%	#6 or 3%	#8 or 0%	

BRIDGE ST / MANOTICK MAIN ST

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	20	19,135	1095	**0.95**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	7	7	2	2	0	1	0	0	19
Non-fatal injury	0	0	0	0	0	1	0	0	1
Non reportable	0	0	0	0	0	0	0	0	0
Total	**7**	**7**	**2**	**2**	**0**	**2**	**0**	**0**	**20**
	35%	35%	10%	10%	0%	10%	0%	0%	

CENTURY RD / MANOTICK MAIN ST

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	1	5,767	1095	**0.16**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	0	0	0	0	1	0	0	1
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
	0%	0%	0%	0%	0%	100%	0%	0%	

MANOTICK MAIN ST, BRIDGE ST to CLAPP LANE

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	2	7,454	1095	**0.25**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	0	0	1	0	1	0	0	2
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**2**
	0%	0%	0%	50%	0%	50%	0%	0%	

MANOTICK MAIN ST, O'GRADY ST to TIGHE ST

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	2	6,800	1095	**0.27**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	0	0	1	0	0	0	0	1
Non-fatal injury	0	0	0	0	0	1	0	0	1
Non reportable	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**2**
	0%	0%	0%	50%	0%	50%	0%	0%	

MANOTICK MAIN ST / TIGHE ST

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	2	7,600	1095	**0.24**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	1	0	0	0	0	0	0	0	1
Non-fatal injury	0	1	0	0	0	0	0	0	1
Non reportable	0	0	0	0	0	0	0	0	0
Total	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
	50%	50%	0%	0%	0%	0%	0%	0%	

MANOTICK MAIN ST / O'GRADY ST

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	1	7,200	1095	**0.13**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	0	0	1	0	0	0	0	1
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**
	0%	0%	0%	100%	0%	0%	0%	0%	

MANOTICK MAIN ST, CLAPP LANE to MILL ST

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	2	7,300	1095	**0.25**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	1	1	0	0	0	0	0	0	2
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
	50%	50%	0%	0%	0%	0%	0%	0%	

MANOTICK MAIN ST, BEAVERWOOD RD to CURRIER ST

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	1	6,300	1095	**0.14**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	0	0	1	0	0	0	0	1
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**
	0%	0%	0%	100%	0%	0%	0%	0%	

MANOTICK MAIN ST, CURRIER ST to EASTMAN AVE

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	3	6,100	1095	**0.45**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	0	0	0	0	0	1	0	1
Non-fatal injury	0	1	0	0	1	0	0	0	2
Non reportable	0	0	0	0	0	0	0	0	0
Total	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**3**
	0%	33%	0%	0%	33%	0%	33%	0%	

CURRIER ST / MANOTICK MAIN ST

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	1	6,500	1095	**0.14**

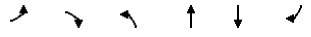
Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	0	0	1	0	0	0	0	1
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**
	0%	0%	0%	100%	0%	0%	0%	0%	

ISLAND VIEW DR N/MANOTICK MAIN ST

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	1	5,700	1095	**0.16**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	1	0	0	0	0	0	0	0	1
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
	100%	0%	0%	0%	0%	0%	0%	0%	

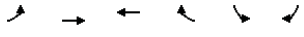
Appendix D



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	17	10	266	112	26
Future Volume (Veh/h)	57	17	10	266	112	26
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	60	18	11	280	118	27
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	434	132	145			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	434	132	145			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	98	99			
cM capacity (veh/h)	575	918	1437			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	78	291	145
Volume Left	60	11	0
Volume Right	18	0	27
cSH	629	1437	1700
Volume to Capacity	0.12	0.01	0.09
Queue Length 95th (m)	3.2	0.2	0.0
Control Delay (s)	11.5	0.4	0.0
Lane LOS	B	A	
Approach Delay (s)	11.5	0.4	0.0
Approach LOS	B		

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	34.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	43	23	5	10	35
Future Volume (Veh/h)	15	43	23	5	10	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	45	24	5	11	37
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	29				104	26
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	29				104	26
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	99				99	96
cM capacity (veh/h)	1218				846	1005

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	61	29	48
Volume Left	16	0	11
Volume Right	0	5	37
cSH	1218	1700	963
Volume to Capacity	0.01	0.02	0.05
Queue Length 95th (m)	0.3	0.0	1.2
Control Delay (s)	2.2	0.0	8.9
Lane LOS	A		A
Approach Delay (s)	2.2	0.0	8.9
Approach LOS			A

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	19.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	43	0	0	23	1	0	0	0	2	0	7
Future Volume (vph)	3	43	0	0	23	1	0	0	0	2	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	3	45	0	0	24	1	0	0	0	2	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	48	25	0	9
Volume Left (vph)	3	0	0	2
Volume Right (vph)	0	1	0	7
Hadj (s)	0.05	0.01	0.00	-0.39
Departure Headway (s)	4.0	4.0	4.1	3.7
Degree Utilization, x	0.05	0.03	0.00	0.01
Capacity (veh/h)	893	897	877	958
Control Delay (s)	7.2	7.1	7.1	6.7
Approach Delay (s)	7.2	7.1	0.0	6.7
Approach LOS	A	A	A	A

Intersection Summary												
Delay			7.1									
Level of Service			A									
Intersection Capacity Utilization			15.0%		ICU Level of Service				A			
Analysis Period (min)			15									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	0	10	1	0	12	5	270	2	7	127	115
Future Volume (Veh/h)	105	0	10	1	0	12	5	270	2	7	127	115
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	111	0	11	1	0	13	5	284	2	7	134	121
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	516	504	194	514	564	285	255			286		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	516	504	194	514	564	285	255			286		
tC, single (s)	7.3	6.5	6.4	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.5	3.5	4.0	3.3	2.9			2.2		
p0 queue free %	74	100	99	100	100	98	99			99		
cM capacity (veh/h)	434	465	808	461	430	754	982			1276		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	122	14	291	262
Volume Left	111	1	5	7
Volume Right	11	13	2	121
cSH	452	721	982	1276
Volume to Capacity	0.27	0.02	0.01	0.01
Queue Length 95th (m)	8.2	0.5	0.1	0.1
Control Delay (s)	15.9	10.1	0.2	0.3
Lane LOS	C	B	A	A
Approach Delay (s)	15.9	10.1	0.2	0.3
Approach LOS	C	B		

Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			38.8%		ICU Level of Service				A			
Analysis Period (min)			15									

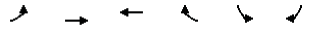
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	30	5	57	42	390	0	165	159	311	86	33
Future Volume (vph)	22	30	5	57	42	390	0	165	159	311	86	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	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	
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1748		1695	1784	1508		1784	1492	1693	1710	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.52	1.00	
Satd. Flow (perm)	1695	1748		1695	1784	1508		1784	1492	932	1710	
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)	23	32	5	60	44	411	0	174	167	327	91	35
RTOR Reduction (vph)	0	4	0	0	0	260	0	0	86	0	9	0
Lane Group Flow (vph)	23	33	0	60	44	151	0	174	81	327	117	0
Confl. Peds. (#/hr)	1					1			2	2		
Turn Type	Split	NA		Split	NA	pm+ov		NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8			2	6		
Actuated Green, G (s)	9.4	9.4		12.2	12.2	28.5		27.4	39.6	50.0	50.0	
Effective Green, g (s)	11.6	11.6		14.4	14.4	33.1		29.7	44.0	52.3	52.3	
Actuated g/C Ratio	0.13	0.13		0.16	0.16	0.37		0.33	0.49	0.58	0.58	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	217	224		270	284	552		586	726	696	990	
v/s Ratio Prot	0.01	c0.02		0.04	0.02	c0.06		0.10	0.02	c0.10	0.07	
v/s Ratio Perm						0.04			0.04	c0.18		
v/c Ratio	0.11	0.15		0.22	0.15	0.27		0.30	0.11	0.47	0.12	
Uniform Delay, d1	34.8	34.9		33.1	32.7	20.1		22.5	12.6	10.2	8.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.4	0.3	0.3		0.3	0.1	0.5	0.1	
Delay (s)	35.0	35.3		33.5	33.0	20.4		22.8	12.6	10.7	8.6	
Level of Service	C	D		C	C	C		C	B	B	A	
Approach Delay (s)		35.1			23.0			17.8			10.2	
Approach LOS		D			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.41			
Actuated Cycle Length (s)	90.3	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	65.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	15	10	184	328	86
Future Volume (Veh/h)	66	15	10	184	328	86
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	69	16	11	194	345	91
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	606	390	436			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	606	390	436			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	85	98	99			
cM capacity (veh/h)	455	658	1124			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	85	205	436
Volume Left	69	11	0
Volume Right	16	0	91
cSH	483	1124	1700
Volume to Capacity	0.18	0.01	0.26
Queue Length 95th (m)	4.8	0.2	0.0
Control Delay (s)	14.0	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	14.0	0.5	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	60	73	10	15	35
Future Volume (Veh/h)	35	60	73	10	15	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	63	77	11	16	37
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	88				220	82
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	88				220	82
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	97				98	96
cM capacity (veh/h)	1152				711	935

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	100	88	53
Volume Left	37	0	16
Volume Right	0	11	37
cSH	1152	1700	853
Volume to Capacity	0.03	0.05	0.06
Queue Length 95th (m)	0.8	0.0	1.5
Control Delay (s)	3.2	0.0	9.5
Lane LOS	A		A
Approach Delay (s)	3.2	0.0	9.5
Approach LOS			A

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	22.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	60	0	0	73	2	0	0	0	3	0	7
Future Volume (vph)	7	60	0	0	73	2	0	0	0	3	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	63	0	0	77	2	0	0	0	3	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	70	79	0	10
Volume Left (vph)	7	0	0	3
Volume Right (vph)	0	2	0	7
Hadj (s)	0.05	0.02	0.00	-0.33
Departure Headway (s)	4.0	4.0	4.2	3.9
Degree Utilization, x	0.08	0.09	0.00	0.01
Capacity (veh/h)	878	889	826	888
Control Delay (s)	7.4	7.4	7.2	6.9
Approach Delay (s)	7.4	7.4	0.0	6.9
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.4			
Level of Service	A			
Intersection Capacity Utilization	19.5%	ICU Level of Service		A
Analysis Period (min)	15			

Background 2027 PM
4: Manotick Main & Bridgeport/Antochi 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	0	25	0	0	1	15	226	2	5	383	75
Future Volume (Veh/h)	130	0	25	0	0	1	15	226	2	5	383	75
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	137	0	26	0	0	1	16	238	2	5	403	79
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	724	724	442	750	763	239	482			240		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	724	724	442	750	763	239	482			240		
tC, single (s)	7.3	6.5	6.4	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.5	3.5	4.0	3.3	2.9			2.2		
p0 queue free %	56	100	96	100	100	100	98			100		
cM capacity (veh/h)	315	343	583	307	326	800	788			1327		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	163	1	256	487
Volume Left	137	0	16	5
Volume Right	26	1	2	79
cSH	340	800	788	1327
Volume to Capacity	0.48	0.00	0.02	0.00
Queue Length 95th (m)	18.9	0.0	0.5	0.1
Control Delay (s)	25.0	9.5	0.8	0.1
Lane LOS	C	A	A	A
Approach Delay (s)	25.0	9.5	0.8	0.1
Approach LOS	C	A		

Intersection Summary				
Average Delay	4.8			
Intersection Capacity Utilization	50.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Background 2027 PM
5: Manotick Main & Maple/Bridge 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	78	3	142	132	359	1	134	161	364	201	77
Future Volume (vph)	68	78	3	142	132	359	1	134	161	364	201	77
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	0.99	1.00	
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1773		1695	1784	1505		1784	1483	1687	1710	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.54	1.00	
Satd. Flow (perm)	1695	1773		1695	1784	1505		1781	1483	965	1710	
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)	72	82	3	149	139	378	1	141	169	383	212	81
RTOR Reduction (vph)	0	1	0	0	0	226	0	0	91	0	9	0
Lane Group Flow (vph)	72	84	0	149	139	152	0	142	78	383	284	0
Confl. Peds. (#/hr)	4		2	2		4			7	7		
Turn Type	Split	NA		Split	NA	pm+ov	Perm	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8	2		2	6		
Actuated Green, G (s)	12.6	12.6		15.1	15.1	35.6		26.7	41.8	53.5	53.5	
Effective Green, g (s)	14.8	14.8		17.3	17.3	40.2		29.0	46.2	55.8	55.8	
Actuated g/C Ratio	0.15	0.15		0.17	0.17	0.40		0.29	0.46	0.56	0.56	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	251	262		293	308	605		517	685	703	955	
v/s Ratio Prot	0.04	c0.05		c0.09	0.08	0.06			0.02	c0.12	0.17	
v/s Ratio Perm						0.04		0.08	0.03	c0.18		
v/c Ratio	0.29	0.32		0.51	0.45	0.25		0.27	0.11	0.54	0.30	
Uniform Delay, d1	37.9	38.1		37.4	37.0	19.8		27.3	15.2	12.9	11.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.7		1.4	1.1	0.2		0.3	0.1	0.9	0.2	
Delay (s)	38.5	38.8		38.8	38.1	20.1		27.6	15.3	13.7	11.8	
Level of Service	D	D		D	D	C		C	B	B	B	
Approach Delay (s)		38.6			28.0			20.9			12.9	
Approach LOS		D			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.53			
Actuated Cycle Length (s)	99.9	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	74.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

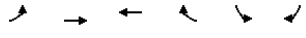
Background 2032 AM
1: Rideau Valley/Manotick Main & Century 06/21/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	17	10	280	117	26
Future Volume (Veh/h)	57	17	10	280	117	26
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	60	18	11	295	123	27
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	454	136	150			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	454	136	150			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	98	99			
cM capacity (veh/h)	560	912	1431			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	78	306	150
Volume Left	60	11	0
Volume Right	18	0	27
cSH	615	1431	1700
Volume to Capacity	0.13	0.01	0.09
Queue Length 95th (m)	3.3	0.2	0.0
Control Delay (s)	11.7	0.3	0.0
Lane LOS	B	A	
Approach Delay (s)	11.7	0.3	0.0
Approach LOS	B		

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	35.2%	ICU Level of Service		A
Analysis Period (min)	15			

Background 2032 AM
2: Century & Trestle 06/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	43	23	5	10	35
Future Volume (Veh/h)	15	43	23	5	10	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	45	24	5	11	37
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	29				104	26
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	29				104	26
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	99				99	96
cM capacity (veh/h)	1218				846	1005

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	61	29	48
Volume Left	16	0	11
Volume Right	0	5	37
cSH	1218	1700	963
Volume to Capacity	0.01	0.02	0.05
Queue Length 95th (m)	0.3	0.0	1.2
Control Delay (s)	2.2	0.0	8.9
Lane LOS	A		A
Approach Delay (s)	2.2	0.0	8.9
Approach LOS			A

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	19.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	43	0	0	23	1	0	0	0	2	0	7
Future Volume (vph)	3	43	0	0	23	1	0	0	0	2	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	3	45	0	0	24	1	0	0	0	2	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	48	25	0	9
Volume Left (vph)	3	0	0	2
Volume Right (vph)	0	1	0	7
Hadj (s)	0.05	0.01	0.00	-0.39
Departure Headway (s)	4.0	4.0	4.1	3.7
Degree Utilization, x	0.05	0.03	0.00	0.01
Capacity (veh/h)	893	897	877	958
Control Delay (s)	7.2	7.1	7.1	6.7
Approach Delay (s)	7.2	7.1	0.0	6.7
Approach LOS	A	A	A	A

Intersection Summary												
Delay			7.1									
Level of Service			A									
Intersection Capacity Utilization			15.0%		ICU Level of Service				A			
Analysis Period (min)			15									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	0	10	1	0	12	5	283	2	7	134	115
Future Volume (Veh/h)	105	0	10	1	0	12	5	283	2	7	134	115
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	111	0	11	1	0	13	5	298	2	7	141	121
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	538	526	202	536	585	299	262			300		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	538	526	202	536	585	299	262			300		
tC, single (s)	7.3	6.5	6.4	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.5	3.5	4.0	3.3	2.9			2.2		
p0 queue free %	74	100	99	100	100	98	99			99		
cM capacity (veh/h)	419	452	800	446	418	741	975			1261		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	122	14	305	269
Volume Left	111	1	5	7
Volume Right	11	13	2	121
cSH	438	707	975	1261
Volume to Capacity	0.28	0.02	0.01	0.01
Queue Length 95th (m)	8.6	0.5	0.1	0.1
Control Delay (s)	16.4	10.2	0.2	0.3
Lane LOS	C	B	A	A
Approach Delay (s)	16.4	10.2	0.2	0.3
Approach LOS	C	B		

Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			39.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Background 2032 AM
5: Manotick Main & Maple/Bridge 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	30	5	57	42	390	0	173	159	311	91	33
Future Volume (vph)	22	30	5	57	42	390	0	173	159	311	91	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	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	
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1748		1695	1784	1508		1784	1492	1693	1713	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.51	1.00	
Satd. Flow (perm)	1695	1748		1695	1784	1508		1784	1492	914	1713	
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)	23	32	5	60	44	411	0	182	167	327	96	35
RTOR Reduction (vph)	0	4	0	0	0	260	0	0	86	0	8	0
Lane Group Flow (vph)	23	33	0	60	44	151	0	182	81	327	123	0
Confl. Peds. (#/hr)	1					1			2	2		
Turn Type	Split	NA		Split	NA	pm+ov		NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8			2	6		
Actuated Green, G (s)	9.4	9.4		12.2	12.2	28.5		27.4	39.6	50.0	50.0	
Effective Green, g (s)	11.6	11.6		14.4	14.4	33.1		29.7	44.0	52.3	52.3	
Actuated g/C Ratio	0.13	0.13		0.16	0.16	0.37		0.33	0.49	0.58	0.58	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	217	224		270	284	552		586	726	689	992	
v/s Ratio Prot	0.01	c0.02		0.04	0.02	c0.06		0.10	0.02	c0.10	0.07	
v/s Ratio Perm						0.04			0.04	c0.18		
v/c Ratio	0.11	0.15		0.22	0.15	0.27		0.31	0.11	0.47	0.12	
Uniform Delay, d1	34.8	34.9		33.1	32.7	20.1		22.6	12.6	10.3	8.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.4	0.3	0.3		0.3	0.1	0.5	0.1	
Delay (s)	35.0	35.3		33.5	33.0	20.4		23.0	12.6	10.8	8.7	
Level of Service	C	D		C	C	C		C	B	B	A	
Approach Delay (s)		35.1			23.0			18.0			10.2	
Approach LOS		D			C			B			B	

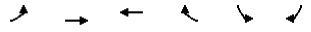
Intersection Summary				
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.42			
Actuated Cycle Length (s)	90.3	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	65.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Background 2032 PM
1: Rideau Valley/Manotick Main & Century 06/21/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	15	10	194	345	86
Future Volume (Veh/h)	66	15	10	194	345	86
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	69	16	11	204	363	91
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	634	408	454			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	634	408	454			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	84	98	99			
cM capacity (veh/h)	438	643	1107			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	85	215	454
Volume Left	69	11	0
Volume Right	16	0	91
cSH	466	1107	1700
Volume to Capacity	0.18	0.01	0.27
Queue Length 95th (m)	5.0	0.2	0.0
Control Delay (s)	14.4	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	14.4	0.5	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	60	73	10	15	35
Future Volume (Veh/h)	35	60	73	10	15	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	63	77	11	16	37
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	88				220	82
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	88				220	82
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	97				98	96
cM capacity (veh/h)	1152				711	935

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	100	88	53
Volume Left	37	0	16
Volume Right	0	11	37
cSH	1152	1700	853
Volume to Capacity	0.03	0.05	0.06
Queue Length 95th (m)	0.8	0.0	1.5
Control Delay (s)	3.2	0.0	9.5
Lane LOS	A		A
Approach Delay (s)	3.2	0.0	9.5
Approach LOS			A

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	22.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	60	0	0	73	2	0	0	0	3	0	7
Future Volume (vph)	7	60	0	0	73	2	0	0	0	3	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	63	0	0	77	2	0	0	0	3	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	70	79	0	10
Volume Left (vph)	7	0	0	3
Volume Right (vph)	0	2	0	7
Hadj (s)	0.05	0.02	0.00	-0.33
Departure Headway (s)	4.0	4.0	4.2	3.9
Degree Utilization, x	0.08	0.09	0.00	0.01
Capacity (veh/h)	878	889	826	888
Control Delay (s)	7.4	7.4	7.2	6.9
Approach Delay (s)	7.4	7.4	0.0	6.9
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.4			
Level of Service	A			
Intersection Capacity Utilization	19.5%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	130	0	25	0	0	1	15	238	2	5	403	75
Future Volume (Veh/h)	130	0	25	0	0	1	15	238	2	5	403	75
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	137	0	26	0	0	1	16	251	2	5	424	79
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	758	758	464	784	797	252	503			253		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	758	758	464	784	797	252	503			253		
tC, single (s)	7.3	6.5	6.4	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.5	3.5	4.0	3.3	2.9			2.2		
p0 queue free %	54	100	95	100	100	100	98			100		
cM capacity (veh/h)	298	328	567	291	312	787	772			1312		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	163	1	269	508
Volume Left	137	0	16	5
Volume Right	26	1	2	79
cSH	323	787	772	1312
Volume to Capacity	0.51	0.00	0.02	0.00
Queue Length 95th (m)	20.5	0.0	0.5	0.1
Control Delay (s)	27.0	9.6	0.8	0.1
Lane LOS	D	A	A	A
Approach Delay (s)	27.0	9.6	0.8	0.1
Approach LOS	D	A		

Intersection Summary				
Average Delay			5.0	
Intersection Capacity Utilization			51.3%	ICU Level of Service
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	78	3	142	132	359	1	140	161	364	211	77
Future Volume (vph)	68	78	3	142	132	359	1	140	161	364	211	77
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	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	
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1773		1695	1784	1505		1784	1483	1687	1713	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.54	1.00	
Satd. Flow (perm)	1695	1773		1695	1784	1505		1781	1483	950	1713	
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)	72	82	3	149	139	378	1	147	169	383	222	81
RTOR Reduction (vph)	0	1	0	0	0	226	0	0	91	0	9	0
Lane Group Flow (vph)	72	84	0	149	139	152	0	148	78	383	294	0
Confl. Peds. (#/hr)	4		2	2		4			7	7		
Turn Type	Split	NA		Split	NA	pm+ov	Perm	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8	2		2	6		
Actuated Green, G (s)	12.6	12.6		15.1	15.1	35.6		26.7	41.8	53.5	53.5	
Effective Green, g (s)	14.8	14.8		17.3	17.3	40.2		29.0	46.2	55.8	55.8	
Actuated g/C Ratio	0.15	0.15		0.17	0.17	0.40		0.29	0.46	0.56	0.56	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	251	262		293	308	605		517	685	698	956	
v/s Ratio Prot	0.04	c0.05		c0.09	0.08	0.06			0.02	c0.13	0.17	
v/s Ratio Perm						0.04		0.08	0.03	c0.18		
v/c Ratio	0.29	0.32		0.51	0.45	0.25		0.29	0.11	0.55	0.31	
Uniform Delay, d1	37.9	38.1		37.4	37.0	19.8		27.4	15.2	12.9	11.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.7		1.4	1.1	0.2		0.3	0.1	0.9	0.2	
Delay (s)	38.5	38.8		38.8	38.1	20.1		27.7	15.3	13.8	11.9	
Level of Service	D	D		D	D	C		C	B	B	B	
Approach Delay (s)		38.6			28.0			21.1			13.0	
Approach LOS		D			C			C			B	

Intersection Summary				
HCM 2000 Control Delay		22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio		0.53		
Actuated Cycle Length (s)		99.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization		74.2%	ICU Level of Service	D
Analysis Period (min)		15		
c Critical Lane Group				

Appendix E

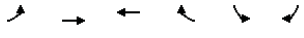
Total 2027 AM
1: Rideau Valley/Manotick Main & Century 06/21/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	111	44	21	266	112	48
Future Volume (Veh/h)	111	44	21	266	112	48
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	117	46	22	280	118	51
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	468	144	169			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	468	144	169			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	95	98			
cM capacity (veh/h)	545	904	1409			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	163	302	169
Volume Left	117	22	0
Volume Right	46	0	51
cSH	614	1409	1700
Volume to Capacity	0.27	0.02	0.10
Queue Length 95th (m)	8.1	0.4	0.0
Control Delay (s)	13.0	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	13.0	0.7	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		3.7		
Intersection Capacity Utilization		44.6%	ICU Level of Service	A
Analysis Period (min)		15		

Total 2027 AM
2: Century & Trestle 06/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	26	97	45	16	37	62
Future Volume (Veh/h)	26	97	45	16	37	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	27	102	47	17	39	65
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	64				212	56
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	64				212	56
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	98				95	93
cM capacity (veh/h)	1178				725	968

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	129	64	104
Volume Left	27	0	39
Volume Right	0	17	65
cSH	1178	1700	860
Volume to Capacity	0.02	0.04	0.12
Queue Length 95th (m)	0.5	0.0	3.1
Control Delay (s)	1.9	0.0	9.8
Lane LOS	A		A
Approach Delay (s)	1.9	0.0	9.8
Approach LOS			A

Intersection Summary				
Average Delay		4.2		
Intersection Capacity Utilization		26.4%	ICU Level of Service	A
Analysis Period (min)		15		

Total 2027 AM
3: 1st Line & Century 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	54	0	0	50	219	0	0	0	89	0	7
Future Volume (vph)	3	54	0	0	50	219	0	0	0	89	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	3	57	0	0	53	231	0	0	0	94	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	60	284	0	101
Volume Left (vph)	3	0	0	94
Volume Right (vph)	0	231	0	7
Hadj (s)	0.04	-0.45	0.00	0.18
Departure Headway (s)	4.5	3.8	4.7	4.8
Degree Utilization, x	0.07	0.30	0.00	0.13
Capacity (veh/h)	773	931	702	698
Control Delay (s)	7.8	8.4	7.7	8.5
Approach Delay (s)	7.8	8.4	0.0	8.5
Approach LOS	A	A	A	A

Intersection Summary												
Delay			8.3									
Level of Service			A									
Intersection Capacity Utilization			29.3%		ICU Level of Service				A			
Analysis Period (min)			15									

Total 2027 AM
4: Manotick Main & Bridgeport/Antochi 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	323	0	10	1	0	12	5	324	2	7	149	202
Future Volume (Veh/h)	323	0	10	1	0	12	5	324	2	7	149	202
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	340	0	11	1	0	13	5	341	2	7	157	213
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	642	630	264	640	736	342	370			343		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	642	630	264	640	736	342	370			343		
tC, single (s)	7.3	6.5	6.4	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.5	3.5	4.0	3.3	2.9			2.2		
p0 queue free %	4	100	99	100	100	98	99			99		
cM capacity (veh/h)	355	394	738	379	342	701	879			1216		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	351	14	348	377
Volume Left	340	1	5	7
Volume Right	11	13	2	213
cSH	361	660	879	1216
Volume to Capacity	0.97	0.02	0.01	0.01
Queue Length 95th (m)	82.5	0.5	0.1	0.1
Control Delay (s)	75.0	10.6	0.2	0.2
Lane LOS	F	B	A	A
Approach Delay (s)	75.0	10.6	0.2	0.2
Approach LOS	F	B		

Intersection Summary												
Average Delay			24.4									
Intersection Capacity Utilization			58.7%		ICU Level of Service				B			
Analysis Period (min)			15									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	30	5	90	42	390	0	355	241	311	162	33
Future Volume (vph)	22	30	5	90	42	390	0	355	241	311	162	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	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	
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1748		1695	1784	1508		1784	1492	1694	1739	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.28	1.00	
Satd. Flow (perm)	1695	1748		1695	1784	1508		1784	1492	496	1739	
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)	23	32	5	95	44	411	0	374	254	327	171	35
RTOR Reduction (vph)	0	4	0	0	0	251	0	0	131	0	4	0
Lane Group Flow (vph)	23	33	0	95	44	160	0	374	123	327	202	0
Confl. Peds. (#/hr)	1					1			2	2		
Turn Type	Split	NA		Split	NA	pm+ov		NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8			2	6		
Actuated Green, G (s)	9.3	9.3		13.1	13.1	32.4		28.6	41.7	54.2	54.2	
Effective Green, g (s)	11.5	11.5		15.3	15.3	37.0		30.9	46.1	56.5	56.5	
Actuated g/C Ratio	0.12	0.12		0.16	0.16	0.39		0.32	0.48	0.59	0.59	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	204	210		272	286	585		578	721	565	1030	
v/s Ratio Prot	0.01	c0.02		c0.06	0.02	0.06		c0.21	0.03	c0.13	0.12	
v/s Ratio Perm						0.04			0.06	0.21		
v/c Ratio	0.11	0.16		0.35	0.15	0.27		0.65	0.17	0.58	0.20	
Uniform Delay, d1	37.4	37.5		35.6	34.4	19.9		27.5	13.8	12.1	8.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.8	0.3	0.3		2.5	0.1	1.4	0.1	
Delay (s)	37.6	37.9		36.4	34.7	20.2		30.0	14.0	13.5	9.0	
Level of Service	D	D		D	C	C		C	B	B	A	
Approach Delay (s)		37.8			24.1			23.5			11.8	
Approach LOS		D			C			C			B	

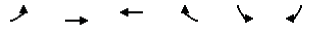
Intersection Summary				
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.52			
Actuated Cycle Length (s)	95.3	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	65.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	91	96	11	27	82
Future Volume (Veh/h)	33	91	96	11	27	82
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	35	96	101	12	28	86
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	113				273	107
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	113				273	107
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				96	91
cM capacity (veh/h)	1476				700	947

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	35	96	113	114
Volume Left	35	0	0	28
Volume Right	0	0	12	86
cSH	1476	1700	1700	871
Volume to Capacity	0.02	0.06	0.07	0.13
Queue Length 95th (m)	0.6	0.0	0.0	3.4
Control Delay (s)	7.5	0.0	0.0	9.8
Lane LOS	A			A
Approach Delay (s)	2.0		0.0	9.8
Approach LOS				A

Intersection Summary				
Average Delay	3.8			
Intersection Capacity Utilization	22.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Total 2027 AM
7: Century & Access 2 06/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	54	88	139	11	27	136
Future Volume (Veh/h)	54	88	139	11	27	136
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	57	93	146	12	28	143
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	158				359	152
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	158				359	152
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				95	84
cM capacity (veh/h)	1422				614	894

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	150	158	171
Volume Left	57	0	28
Volume Right	0	12	143
cSH	1422	1700	832
Volume to Capacity	0.04	0.09	0.21
Queue Length 95th (m)	1.0	0.0	5.8
Control Delay (s)	3.1	0.0	10.4
Lane LOS	A		B
Approach Delay (s)	3.1	0.0	10.4
Approach LOS			B

Intersection Summary				
Average Delay		4.7		
Intersection Capacity Utilization		36.9%	ICU Level of Service	A
Analysis Period (min)		15		

Total 2027 PM
1: Rideau Valley/Manotick Main & Century 06/21/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	99	32	42	184	328	150
Future Volume (Veh/h)	99	32	42	184	328	150
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	104	34	44	194	345	158
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	706	424	503			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	706	424	503			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	73	95	96			
cM capacity (veh/h)	386	630	1061			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	138	238	503
Volume Left	104	44	0
Volume Right	34	0	158
cSH	426	1061	1700
Volume to Capacity	0.32	0.04	0.30
Queue Length 95th (m)	10.5	1.0	0.0
Control Delay (s)	17.4	1.9	0.0
Lane LOS	C	A	
Approach Delay (s)	17.4	1.9	0.0
Approach LOS	C		

Intersection Summary				
Average Delay		3.3		
Intersection Capacity Utilization		58.4%	ICU Level of Service	B
Analysis Period (min)		15		

Total 2027 PM
2: Century & Trestle 06/21/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	67	93	137	42	32	52
Future Volume (Veh/h)	67	93	137	42	32	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	71	98	144	44	34	55
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	188				406	166
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188				406	166
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	93				94	93
cM capacity (veh/h)	1047				533	838

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	169	188	89
Volume Left	71	0	34
Volume Right	0	44	55
cSH	1047	1700	688
Volume to Capacity	0.07	0.11	0.13
Queue Length 95th (m)	1.7	0.0	3.4
Control Delay (s)	4.0	0.0	11.0
Lane LOS	A		B
Approach Delay (s)	4.0	0.0	11.0
Approach LOS			B

Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	34.6%	ICU Level of Service		A
Analysis Period (min)	15			

Total 2027 PM
3: 1st Line & Century 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	92	0	0	90	135	0	0	0	259	0	7
Future Volume (vph)	7	92	0	0	90	135	0	0	0	259	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	97	0	0	95	142	0	0	0	273	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	104	237	0	280
Volume Left (vph)	7	0	0	273
Volume Right (vph)	0	142	0	7
Hadj (s)	0.05	-0.33	0.00	0.21
Departure Headway (s)	5.0	4.5	5.1	4.9
Degree Utilization, x	0.14	0.29	0.00	0.38
Capacity (veh/h)	668	758	640	692
Control Delay (s)	8.8	9.3	8.1	10.9
Approach Delay (s)	8.8	9.3	0.0	10.9
Approach LOS	A	A	A	B

Intersection Summary				
Delay	10.0			
Level of Service	A			
Intersection Capacity Utilization	36.0%	ICU Level of Service		A
Analysis Period (min)	15			

Total 2027 PM
4: Manotick Main & Bridgeport/Antochi 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	263	0	25	0	0	1	15	259	2	5	447	331
Future Volume (Veh/h)	263	0	25	0	0	1	15	259	2	5	447	331
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	277	0	26	0	0	1	16	273	2	5	471	348
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	962	962	645	987	1135	274	819			275		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	962	962	645	987	1135	274	819			275		
tC, single (s)	7.3	6.5	6.4	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.5	3.5	4.0	3.3	2.9			2.2		
p0 queue free %	0	100	94	100	100	100	97			100		
cM capacity (veh/h)	215	248	445	208	196	765	566			1288		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	303	1	291	824
Volume Left	277	0	16	5
Volume Right	26	1	2	348
cSH	225	765	566	1288
Volume to Capacity	1.35	0.00	0.03	0.00
Queue Length 95th (m)	126.4	0.0	0.7	0.1
Control Delay (s)	225.6	9.7	1.0	0.1
Lane LOS	F	A	A	A
Approach Delay (s)	225.6	9.7	1.0	0.1
Approach LOS	F	A		

Intersection Summary				
Average Delay	48.5			
Intersection Capacity Utilization	78.2%	ICU Level of Service	D	
Analysis Period (min)	15			

Total 2027 PM
5: Manotick Main & Maple/Bridge 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	78	3	238	132	359	1	251	210	364	425	77
Future Volume (vph)	68	78	3	238	132	359	1	251	210	364	425	77
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	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	
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1773		1695	1784	1504		1784	1486	1691	1743	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.35	1.00	
Satd. Flow (perm)	1695	1773		1695	1784	1504		1782	1486	630	1743	
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)	72	82	3	251	139	378	1	264	221	383	447	81
RTOR Reduction (vph)	0	1	0	0	0	212	0	0	114	0	5	0
Lane Group Flow (vph)	72	84	0	251	139	166	0	265	107	383	523	0
Confl. Peds. (#/hr)	4		2	2		4			7	7		
Turn Type	Split	NA		Split	NA	pm+ov	Perm	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8	2		2	6		
Actuated Green, G (s)	12.7	12.7		20.7	20.7	42.5		26.8	47.5	54.9	54.9	
Effective Green, g (s)	14.9	14.9		22.9	22.9	47.1		29.1	51.9	57.2	57.2	
Actuated g/C Ratio	0.14	0.14		0.21	0.21	0.44		0.27	0.49	0.53	0.53	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	236	246		362	381	662		484	720	575	931	
v/s Ratio Prot	0.04	c0.05		c0.15	0.08	0.06			0.03	c0.15	0.30	
v/s Ratio Perm						0.05		0.15	0.04	c0.21		
v/c Ratio	0.31	0.34		0.69	0.36	0.25		0.55	0.15	0.67	0.56	
Uniform Delay, d1	41.4	41.6		38.8	35.8	18.9		33.3	15.3	16.3	16.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.8		5.7	0.6	0.2		1.3	0.1	2.9	0.8	
Delay (s)	42.1	42.5		44.5	36.4	19.1		34.6	15.4	19.2	17.3	
Level of Service	D	D		D	D	B		C	B	B	B	
Approach Delay (s)		42.3			30.5			25.9			18.1	
Approach LOS		D			C			C			B	

Intersection Summary					
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.66				
Actuated Cycle Length (s)	107.0	Sum of lost time (s)		18.0	
Intersection Capacity Utilization	86.4%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Total 2027 PM
6: Century & Access 1 06/21/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	96	124	157	32	17	50
Future Volume (Veh/h)	96	124	157	32	17	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	101	131	165	34	18	53
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	199				515	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	199				515	182
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				96	94
cM capacity (veh/h)	1373				482	861

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	101	131	199	71
Volume Left	101	0	0	18
Volume Right	0	0	34	53
cSH	1373	1700	1700	717
Volume to Capacity	0.07	0.08	0.12	0.10
Queue Length 95th (m)	1.8	0.0	0.0	2.5
Control Delay (s)	7.8	0.0	0.0	10.6
Lane LOS	A			B
Approach Delay (s)	3.4		0.0	10.6
Approach LOS				B

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	30.6%	ICU Level of Service		A
Analysis Period (min)	15			

Total 2027 PM
7: Century & Access 2 06/21/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	160	191	147	32	17	83
Future Volume (Veh/h)	160	191	147	32	17	83
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	168	201	155	34	18	87
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	189				709	172
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	189				709	172
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				95	90
cM capacity (veh/h)	1385				352	872

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	369	189	105
Volume Left	168	0	18
Volume Right	0	34	87
cSH	1385	1700	696
Volume to Capacity	0.12	0.11	0.15
Queue Length 95th (m)	3.1	0.0	4.0
Control Delay (s)	4.2	0.0	11.1
Lane LOS	A		B
Approach Delay (s)	4.2	0.0	11.1
Approach LOS			B

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	46.6%	ICU Level of Service		A
Analysis Period (min)	15			

Total 2027 AM - Mitigation
4: Manotick Main & Bridgeport/Antochi 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	0	10	1	0	12	5	324	2	7	149	202
Future Volume (vph)	323	0	10	1	0	12	5	324	2	7	149	202
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frt		1.00			0.87			1.00			1.00	0.85
Flt Protected		0.95			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1465			1555			1764			1781	884
Flt Permitted		0.72			0.98			1.00			0.98	1.00
Satd. Flow (perm)		1110			1526			1759			1755	884
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)	340	0	11	1	0	13	5	341	2	7	157	213
RTOR Reduction (vph)	0	34	0	0	9	0	0	1	0	0	0	115
Lane Group Flow (vph)	0	317	0	0	5	0	0	347	0	0	164	98
Heavy Vehicles (%)	18%	2%	18%	2%	2%	2%	75%	2%	2%	2%	2%	75%
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)		18.8			18.8			22.6			22.6	22.6
Effective Green, g (s)		20.8			20.8			24.6			24.6	24.6
Actuated g/C Ratio		0.39			0.39			0.46			0.46	0.46
Clearance Time (s)		6.0			6.0			6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)		432			594			810			808	407
v/s Ratio Prot												
v/s Ratio Perm		c0.29			0.00			c0.20			0.09	0.11
v/c Ratio		0.73			0.01			0.43			0.20	0.24
Uniform Delay, d1		13.9			10.0			9.7			8.6	8.7
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		6.4			0.0			1.7			0.6	1.4
Delay (s)		20.3			10.0			11.3			9.1	10.1
Level of Service		C			A			B			A	B
Approach Delay (s)		20.3			10.0			11.3			9.7	
Approach LOS		C			A			B			A	

Intersection Summary				
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	55.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Total 2027 PM - Mitigation
4: Manotick Main & Bridgeport/Antochi 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	263	0	25	0	0	1	15	259	2	5	447	331
Future Volume (vph)	263	0	25	0	0	1	15	259	2	5	447	331
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frt		0.99			0.86			1.00			1.00	0.85
Flt Protected		0.96			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1458			1543			1710			1783	884
Flt Permitted		0.74			1.00			0.97			1.00	1.00
Satd. Flow (perm)		1134			1543			1656			1778	884
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)	277	0	26	0	0	1	16	273	2	5	471	348
RTOR Reduction (vph)	0	34	0	0	1	0	0	1	0	0	0	194
Lane Group Flow (vph)	0	269	0	0	0	0	0	290	0	0	476	154
Heavy Vehicles (%)	18%	2%	18%	2%	2%	2%	75%	2%	2%	2%	2%	75%
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)		15.5			15.5			18.3			18.3	18.3
Effective Green, g (s)		17.5			17.5			20.3			20.3	20.3
Actuated g/C Ratio		0.38			0.38			0.44			0.44	0.44
Clearance Time (s)		6.0			6.0			6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)		433			589			733			788	391
v/s Ratio Prot					0.00							
v/s Ratio Perm		c0.24						0.18			c0.27	0.17
v/c Ratio		0.62			0.00			0.40			0.60	0.39
Uniform Delay, d1		11.5			8.7			8.6			9.7	8.6
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		2.8			0.0			0.4			1.3	0.7
Delay (s)		14.2			8.7			9.0			11.0	9.3
Level of Service		B			A			A			B	A
Approach Delay (s)		14.2			8.7			9.0			10.3	
Approach LOS		B			A			A			B	

Intersection Summary				
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	45.8	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	57.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Appendix F

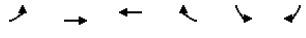
Total 2032 AM
1: Rideau Valley/Manotick Main & Century 06/21/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	111	44	21	280	117	48
Future Volume (Veh/h)	111	44	21	280	117	48
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	117	46	22	295	123	51
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	488	148	174			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	488	148	174			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	95	98			
cM capacity (veh/h)	531	898	1403			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	163	317	174
Volume Left	117	22	0
Volume Right	46	0	51
cSH	600	1403	1700
Volume to Capacity	0.27	0.02	0.10
Queue Length 95th (m)	8.3	0.4	0.0
Control Delay (s)	13.2	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	13.2	0.7	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		3.6		
Intersection Capacity Utilization	45.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Total 2032 AM
2: Century & Trestle 06/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	26	97	45	16	37	62
Future Volume (Veh/h)	26	97	45	16	37	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	27	102	47	17	39	65
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	64				212	56
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	64				212	56
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	98				95	93
cM capacity (veh/h)	1178				725	968

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	129	64	104
Volume Left	27	0	39
Volume Right	0	17	65
cSH	1178	1700	860
Volume to Capacity	0.02	0.04	0.12
Queue Length 95th (m)	0.5	0.0	3.1
Control Delay (s)	1.9	0.0	9.8
Lane LOS	A		A
Approach Delay (s)	1.9	0.0	9.8
Approach LOS			A

Intersection Summary				
Average Delay		4.2		
Intersection Capacity Utilization	26.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Total 2032 AM
3: 1st Line & Century 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	54	0	0	50	219	0	0	0	89	0	7
Future Volume (vph)	3	54	0	0	50	219	0	0	0	89	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	3	57	0	0	53	231	0	0	0	94	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	60	284	0	101
Volume Left (vph)	3	0	0	94
Volume Right (vph)	0	231	0	7
Hadj (s)	0.04	-0.45	0.00	0.18
Departure Headway (s)	4.5	3.8	4.7	4.8
Degree Utilization, x	0.07	0.30	0.00	0.13
Capacity (veh/h)	773	931	702	698
Control Delay (s)	7.8	8.4	7.7	8.5
Approach Delay (s)	7.8	8.4	0.0	8.5
Approach LOS	A	A	A	A

Intersection Summary				
Delay			8.3	
Level of Service			A	
Intersection Capacity Utilization			29.3%	ICU Level of Service
Analysis Period (min)			15	

Total 2032 AM
4: Manotick Main & Bridgeport/Antochi 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	0	10	1	0	12	5	337	2	7	156	202
Future Volume (vph)	323	0	10	1	0	12	5	337	2	7	156	202
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frt		1.00			0.87			1.00			1.00	0.85
Flt Protected		0.95			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1465			1555			1764			1781	884
Flt Permitted		0.72			0.98			1.00			0.98	1.00
Satd. Flow (perm)		1110			1524			1758			1749	884
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)	340	0	11	1	0	13	5	355	2	7	164	213
RTOR Reduction (vph)	0	31	0	0	8	0	0	1	0	0	0	132
Lane Group Flow (vph)	0	320	0	0	6	0	0	361	0	0	171	81
Heavy Vehicles (%)	18%	2%	18%	2%	2%	2%	75%	2%	2%	2%	2%	75%
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)		17.5			17.5			15.0			15.0	15.0
Effective Green, g (s)		19.5			19.5			17.0			17.0	17.0
Actuated g/C Ratio		0.44			0.44			0.38			0.38	0.38
Clearance Time (s)		6.0			6.0			6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)		486			667			671			668	337
v/s Ratio Prot												
v/s Ratio Perm		c0.29			0.00			c0.21			0.10	0.09
v/c Ratio		0.66			0.01			0.54			0.26	0.24
Uniform Delay, d1		9.9			7.1			10.7			9.4	9.4
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		3.2			0.0			0.8			0.2	0.4
Delay (s)		13.1			7.1			11.5			9.6	9.7
Level of Service		B			A			B			A	A
Approach Delay (s)		13.1			7.1			11.5			9.7	
Approach LOS		B			A			B			A	

Intersection Summary				
HCM 2000 Control Delay		11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio		0.60		
Actuated Cycle Length (s)		44.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization		55.9%	ICU Level of Service	B
Analysis Period (min)		15		
c Critical Lane Group				

Total 2032 AM
5: Manotick Main & Maple/Bridge 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	30	5	90	42	390	0	363	241	311	167	33
Future Volume (vph)	22	30	5	90	42	390	0	363	241	311	167	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	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	
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1748		1695	1784	1508		1784	1492	1695	1740	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.27	1.00	
Satd. Flow (perm)	1695	1748		1695	1784	1508		1784	1492	483	1740	
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)	23	32	5	95	44	411	0	382	254	327	176	35
RTOR Reduction (vph)	0	4	0	0	0	252	0	0	131	0	4	0
Lane Group Flow (vph)	23	33	0	95	44	159	0	382	123	327	207	0
Confl. Peds. (#/hr)	1					1			2	2		
Turn Type	Split	NA		Split	NA	pm+ov		NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8			2	6		
Actuated Green, G (s)	9.3	9.3		13.2	13.2	32.5		28.9	42.1	54.5	54.5	
Effective Green, g (s)	11.5	11.5		15.4	15.4	37.1		31.2	46.5	56.8	56.8	
Actuated g/C Ratio	0.12	0.12		0.16	0.16	0.39		0.33	0.49	0.59	0.59	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	203	210		272	287	584		581	724	560	1032	
v/s Ratio Prot	0.01	c0.02		c0.06	0.02	0.06		c0.21	0.03	c0.13	0.12	
v/s Ratio Perm						0.04			0.06	0.21		
v/c Ratio	0.11	0.16		0.35	0.15	0.27		0.66	0.17	0.58	0.20	
Uniform Delay, d1	37.6	37.7		35.7	34.5	20.1		27.7	13.8	12.2	9.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.8	0.2	0.3		2.7	0.1	1.6	0.1	
Delay (s)	37.8	38.1		36.5	34.8	20.3		30.4	13.9	13.8	9.1	
Level of Service	D	D		D	C	C		C	B	B	A	
Approach Delay (s)		38.0			24.3			23.8			11.9	
Approach LOS		D			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.52			
Actuated Cycle Length (s)	95.7	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	65.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

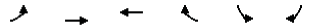
Total 2032 AM
6: Century & Access 1 06/21/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	91	96	11	27	82
Future Volume (Veh/h)	33	91	96	11	27	82
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	35	96	101	12	28	86
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	113				273	107
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	113				273	107
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				96	91
cM capacity (veh/h)	1476				700	947

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	35	96	113	114
Volume Left	35	0	0	28
Volume Right	0	0	12	86
cSH	1476	1700	1700	871
Volume to Capacity	0.02	0.06	0.07	0.13
Queue Length 95th (m)	0.6	0.0	0.0	3.4
Control Delay (s)	7.5	0.0	0.0	9.8
Lane LOS	A			A
Approach Delay (s)	2.0		0.0	9.8
Approach LOS				A

Intersection Summary				
Average Delay	3.8			
Intersection Capacity Utilization	22.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Total 2032 AM
7: Century & Access 2 06/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	54	88	139	11	27	136
Future Volume (Veh/h)	54	88	139	11	27	136
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	57	93	146	12	28	143
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	158				359	152
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	158				359	152
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				95	84
cM capacity (veh/h)	1422				614	894

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	150	158	171
Volume Left	57	0	28
Volume Right	0	12	143
cSH	1422	1700	832
Volume to Capacity	0.04	0.09	0.21
Queue Length 95th (m)	1.0	0.0	5.8
Control Delay (s)	3.1	0.0	10.4
Lane LOS	A		B
Approach Delay (s)	3.1	0.0	10.4
Approach LOS			B

Intersection Summary				
Average Delay	4.7			
Intersection Capacity Utilization	36.9%	ICU Level of Service		A
Analysis Period (min)	15			

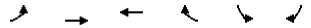
Total 2032 PM
1: Rideau Valley/Manotick Main & Century 06/21/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	99	32	42	194	345	150
Future Volume (Veh/h)	99	32	42	194	345	150
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	104	34	44	204	363	158
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	734	442	521			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	734	442	521			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	94	96			
cM capacity (veh/h)	371	615	1045			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	138	248	521
Volume Left	104	44	0
Volume Right	34	0	158
cSH	411	1045	1700
Volume to Capacity	0.34	0.04	0.31
Queue Length 95th (m)	11.0	1.0	0.0
Control Delay (s)	18.1	1.9	0.0
Lane LOS	C	A	
Approach Delay (s)	18.1	1.9	0.0
Approach LOS	C		

Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	59.9%	ICU Level of Service		B
Analysis Period (min)	15			

Total 2032 PM
2: Century & Trestle 06/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	67	93	137	42	32	52
Future Volume (Veh/h)	67	93	137	42	32	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	71	98	144	44	34	55
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	188				406	166
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188				406	166
tC, single (s)	4.8				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.9				3.7	3.5
p0 queue free %	93				94	93
cM capacity (veh/h)	1047				533	838

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	169	188	89
Volume Left	71	0	34
Volume Right	0	44	55
cSH	1047	1700	688
Volume to Capacity	0.07	0.11	0.13
Queue Length 95th (m)	1.7	0.0	3.4
Control Delay (s)	4.0	0.0	11.0
Lane LOS	A		B
Approach Delay (s)	4.0	0.0	11.0
Approach LOS			B

Intersection Summary				
Average Delay		3.7		
Intersection Capacity Utilization		34.6%	ICU Level of Service	A
Analysis Period (min)		15		

Total 2032 PM
3: 1st Line & Century 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	92	0	0	90	135	0	0	0	259	0	7
Future Volume (vph)	7	92	0	0	90	135	0	0	0	259	0	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	97	0	0	95	142	0	0	0	273	0	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	104	237	0	280
Volume Left (vph)	7	0	0	273
Volume Right (vph)	0	142	0	7
Hadj (s)	0.05	-0.33	0.00	0.21
Departure Headway (s)	5.0	4.5	5.1	4.9
Degree Utilization, x	0.14	0.29	0.00	0.38
Capacity (veh/h)	668	758	640	692
Control Delay (s)	8.8	9.3	8.1	10.9
Approach Delay (s)	8.8	9.3	0.0	10.9
Approach LOS	A	A	A	B

Intersection Summary				
Delay		10.0		
Level of Service		A		
Intersection Capacity Utilization		36.0%	ICU Level of Service	A
Analysis Period (min)		15		

Total 2032 PM
4: Manotick Main & Bridgeport/Antochi 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	263	0	25	0	0	1	15	271	2	5	467	331
Future Volume (vph)	263	0	25	0	0	1	15	271	2	5	467	331
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frt		0.99			0.86			1.00			1.00	0.85
Flt Protected		0.96			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1458			1543			1713			1783	884
Flt Permitted		0.74			1.00			0.97			1.00	1.00
Satd. Flow (perm)		1134			1543			1659			1778	884
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)	277	0	26	0	0	1	16	285	2	5	492	348
RTOR Reduction (vph)	0	34	0	0	1	0	0	1	0	0	0	191
Lane Group Flow (vph)	0	269	0	0	0	0	0	302	0	0	497	158
Heavy Vehicles (%)	18%	2%	18%	2%	2%	2%	75%	2%	2%	2%	2%	75%
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		15.4			15.4			19.0			19.0	19.0
Effective Green, g (s)		17.4			17.4			21.0			21.0	21.0
Actuated g/C Ratio		0.37			0.37			0.45			0.45	0.45
Clearance Time (s)		6.0			6.0			6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)		425			578			750			804	400
v/s Ratio Prot					0.00							
v/s Ratio Perm		c0.24						0.18			c0.28	0.18
v/c Ratio		0.63			0.00			0.40			0.62	0.39
Uniform Delay, d1		11.9			9.1			8.5			9.7	8.5
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		3.1			0.0			0.4			1.4	0.6
Delay (s)		14.9			9.1			8.9			11.1	9.1
Level of Service		B			A			A			B	A
Approach Delay (s)		14.9			9.1			8.9			10.3	
Approach LOS		B			A			A			B	

Intersection Summary				
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	46.4	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	58.4%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Total 2032 PM
5: Manotick Main & Maple/Bridge 06/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	78	3	238	132	359	1	257	210	364	435	77
Future Volume (vph)	68	78	3	238	132	359	1	257	210	364	435	77
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	0.98	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	
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1695	1773		1695	1784	1504		1784	1486	1691	1744	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.34	1.00	
Satd. Flow (perm)	1695	1773		1695	1784	1504		1782	1486	611	1744	
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)	72	82	3	251	139	378	1	271	221	383	458	81
RTOR Reduction (vph)	0	1	0	0	0	211	0	0	114	0	5	0
Lane Group Flow (vph)	72	84	0	251	139	167	0	272	107	383	534	0
Confl. Peds. (#/hr)	4		2	2		4			7	7		
Turn Type	Split	NA		Split	NA	pm+ov	Perm	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8	1		2	8	1	6	
Permitted Phases						8	2		2	6		
Actuated Green, G (s)	12.7	12.7		20.7	20.7	42.8		26.8	47.5	55.2	55.2	
Effective Green, g (s)	14.9	14.9		22.9	22.9	47.4		29.1	51.9	57.5	57.5	
Actuated g/C Ratio	0.14	0.14		0.21	0.21	0.44		0.27	0.48	0.54	0.54	
Clearance Time (s)	6.2	6.2		6.2	6.2	6.3		6.3	6.2	6.3	6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	235	246		361	380	664		483	718	573	934	
v/s Ratio Prot	0.04	c0.05		c0.15	0.08	0.06			0.03	c0.15	0.31	
v/s Ratio Perm						0.05		0.15	0.04	c0.21		
v/c Ratio	0.31	0.34		0.70	0.37	0.25		0.56	0.15	0.67	0.57	
Uniform Delay, d1	41.6	41.8		39.0	36.0	18.8		33.6	15.4	16.4	16.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.8		5.7	0.6	0.2		1.5	0.1	3.0	0.9	
Delay (s)	42.3	42.6		44.7	36.6	19.0		35.1	15.5	19.3	17.5	
Level of Service	D	D		D	D	B		D	B	B	B	
Approach Delay (s)		42.5			30.6			26.3			18.3	
Approach LOS		D			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	107.3	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	87.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Total 2032 PM
6: Century & Access 1 06/21/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	96	124	157	32	17	50
Future Volume (Veh/h)	96	124	157	32	17	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	101	131	165	34	18	53
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	199				515	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	199				515	182
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				96	94
cM capacity (veh/h)	1373				482	861

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	101	131	199	71
Volume Left	101	0	0	18
Volume Right	0	0	34	53
cSH	1373	1700	1700	717
Volume to Capacity	0.07	0.08	0.12	0.10
Queue Length 95th (m)	1.8	0.0	0.0	2.5
Control Delay (s)	7.8	0.0	0.0	10.6
Lane LOS	A			B
Approach Delay (s)	3.4		0.0	10.6
Approach LOS				B

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	30.6%	ICU Level of Service		A
Analysis Period (min)	15			

Total 2032 PM
7: Century & Access 2 06/21/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	160	191	147	32	17	83
Future Volume (Veh/h)	160	191	147	32	17	83
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	168	201	155	34	18	87
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	189				709	172
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	189				709	172
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				95	90
cM capacity (veh/h)	1385				352	872

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	369	189	105
Volume Left	168	0	18
Volume Right	0	34	87
cSH	1385	1700	696
Volume to Capacity	0.12	0.11	0.15
Queue Length 95th (m)	3.1	0.0	4.0
Control Delay (s)	4.2	0.0	11.1
Lane LOS	A		B
Approach Delay (s)	4.2	0.0	11.1
Approach LOS			B

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	46.6%	ICU Level of Service		A
Analysis Period (min)	15			