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34 Years

5741, 5731 and 5721 Manotick Main Street Ottawa, Ontario

Transportation Brief

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5741, 5731 and 5721 Manotick Main Street

Ottawa, ON

Transportation Brief

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

21 July 2016

Novatech File: 115055
Ref: R-2016-077

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Engineers, Planners & Landscape Architects

21 July 2016

City of Ottawa
Planning and Growth Management Branch
110 Laurier Ave. W., 4th Floor,
Ottawa, Ontario K1P 1J1

Attention: **Amira Shehata**
Project Manager, Infrastructure Approvals

Dear Ms. Shehata:

Reference: **5741, 5731 and 5721 Manotick Main**
Transportation Brief
Our File No.: 115055

We are pleased to submit the following Transportation Impact Assessment (TIA) in support of applications for Draft Plan of Subdivision and Zoning By-law Amendment submitted on behalf of our client, Regional Group for the properties at 5741, 5731 and 5721 Manotick Main Street.

The proponent intends to construct approximately 85 residential units, which will be comprised of approximately 30 single family dwelling units and 55 townhome dwelling units. The Draft Plan provides for three road connections; one directly to Manotick Main Street and two to Kelly Marie Drive.

Based on our recent correspondence, the structure and format of this report is consistent with a *Transportation Brief (TB)* outlined in the City's 2006 *Transportation Impact Assessment Guidelines*. A checklist of the required documentation elements, as outlined in Appendix D of the TIA Guidelines is attached.

A PDF version of this report and copies of the digital Synchro software files are provided on the enclosed disk.

If you have any questions or require anything else during your review, please call.

Yours truly,

NOVATECH

Gordon R. Scobie, P.Eng.
Transportation Engineer

CC: Erin O'Connor, Regional Group

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

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Documentation and Reporting Checklist

Introduction (Section 1.0)

Description of the development (include all of the following that are known at the time of the application):

- ☐ Municipal address;
- ☐ Location relative to major elements of the existing transportation system
- ☐ Existing land uses or permitted use provisions in the Official Plan, Zoning By-law, etc.;
- ☐ Proposed land uses and relevant planning regulations to be used in the analysis;
- ☐ Proposed development size (building size, number of residential units, etc.) and location on site;
- ☐ Estimated date of occupancy;
- ☐ Planned phasing of development;
- ☐ Proposed number of parking spaces (not relevant for Registration of Plans of Subdivision); and
- ☐ Proposed access points and type of access (full turns, right-in/ right-out, turning restrictions, etc.).
- ☐ Study area;
- ☐ Time periods and phasing; and
- ☐ Horizon years (include reference to phased development).

The TB must include a key plan that shows the general location of the development in relation to the surrounding area. The TB must also provide a draft site plan or development concept of a suitable scale that shows the general location of the development and the proposed access locations. If the proposed development/ redevelopment is to be constructed in phases, a description must be provided for each phase, identifying the proposed timing of implementation.

Existing Conditions (Section 2.0)

- ☐ Existing roads and ramps in the study area, including jurisdiction, classification, number of lanes, and posted speed limit;
- ☐ Existing intersections, indicating type of control, lane configurations, turning restrictions, and any other relevant data (e.g., extraordinary lane widths, grades, etc.);
- ☐ Existing access points to adjacent developments (both sides of all roads bordering the site);
- ☐ Existing transit system, including stations and stops;
- ☐ Existing on- and off-road bicycle facilities and pedestrian sidewalks and pathway networks;
- ☐ Existing system operations (V/C, LOS); and
- ☐ Major trip generators/ attractors within the Study Area should be indicated.

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The TB report must include figures documenting the existing travel demands by mode. A photographic inventory of the transportation network elements in the vicinity of the proposed access points would be beneficial to staff in their review of the Consultant's report.

Demand Forecasting (Section 3.0)

- ☐ Trip generation forecasts

Projected Conditions (Section 4.0)

- ☐ Qualitative assessment of impacts on capacity; non-auto modes; on-site circulation; community

Mitigation Measures and Site Design Characteristics (Section 4.0-5.0)

The TB must identify all mitigation measures required to offset network impacts from the development. The TB must also identify key site design features required to implement the Official Plan and Transportation Master Plan policies regarding site development.

The TB must include all of the following, where they are required by the subject development:

- ☐ Location and timing of proposed changes to existing traffic controls at intersections (e.g., new traffic signals, Stop signs, etc.);
- ☐ Mitigation measures required to offset impacts on the surface and Rapid Transit networks;
- ☐ New or modified elements of the bicycle and pedestrian networks;
- ☐ Community impact mitigation measures; and
- ☐ Proposed TDM features or programs to support the site development.

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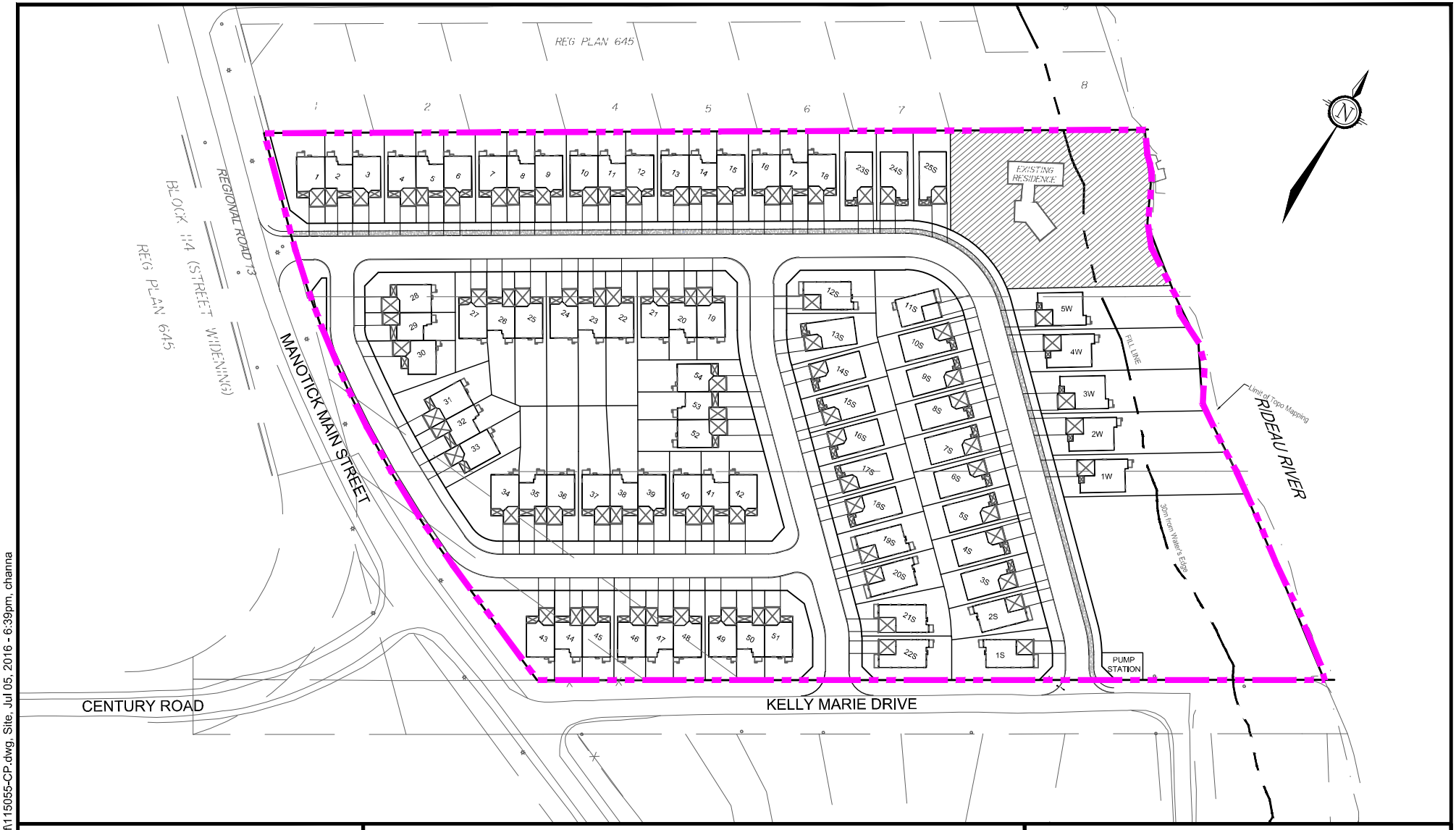
1 INTRODUCTION

An approximate 85 unit residential subdivision (approximately 30 single family homes and 54 townhome dwelling units) is being proposed on the Ottawa lands municipally known as 5741, 5731 and 5721 Manotick Main Street. The subject site is currently occupied by a single family residence in the northeast quadrant of the site (which will be maintained) and roadway connections are proposed to/from the proposed development via a single full movement connection to Manotick Main Street and two full movement connections to Kelly Marie Drive. The following **Figure 1** depicts the subject site's local context and **Figure 2** depicts the current proposed Plan of Subdivision.

Figure 1: Local Context

With respect to the City's 2006 *Transportation Impact Assessment* (TIA) Guidelines and based on recent correspondence with City staff, the appropriate level of study for the proposed development is considered to be a combined *Community Transportation Study (CTS)/Transportation Brief (TB)*. As such, the methodologies and analysis undertaken to assess the transportation impacts of the proposed development, included herein, are consistent with the requirements outlined in the City's TIA Guidelines.



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LEGEND

PROPOSED DEVELOPMENT

5721,5731,5741 MANOTICK MAIN STREET

CONCEPT PLAN

SCALE 1 : 2000 (0, 20, 40, 60, 80)

DATE	JOB	FIGURE
JUNE 2016	115055	FIGURE 2

SHT8X11.DWG - 216mmx279mm

M:\2015\115055\CAD\Design\Figures\Design Brief\115055-CP.dwg, Site, Jul 05, 2016 - 6:39pm, channa

2 EXISTING CONDITIONS

2.1 Area Road Network

Manotick Main Street, is a north-south arterial roadway with a posted speed limit of 60 km/h within the study area. Along the frontage of the proposed site, it has a two-lane rural cross-section (i.e. a single travel lane in each direction, unpaved shoulders, rural ditches, etc.), and it extends from Bankfield Road in the north to Century Road in the south. Beyond Bankfield Road and Century Road, this roadway continues as Rideau Valley Drive North.

Century Road, is an east-west collector roadway with a posted speed limit of 60 km/h within the study area. This roadway has a two-lane rural cross-section (i.e. a single travel lane in each direction, unpaved shoulders, rural ditches, etc.), and it extends from Second Line Road South in the east to Manotick Main Street in the west.

Kelly Marie Drive, is a local roadway with an unposted speed limit of 50 km/h, under the Highway Traffic Act. This roadway provides a collector loop for approximately 30 residential dwellings, with connections to Rideau Valley Drive N, approximately 60 m and 430 m south of Century Road. Its connections to Rideau Valley Drive N are STOP controlled on the minor approach only. Kelly Marie Drive has a relatively narrow two-lane cross-section (i.e. approximately 6 m of pavement width) with no sidewalks or shoulders.

Within the City's Transportation Master Plan (TMP), there are currently no plans to increase the vehicle capacity of these study area roadways.

2.2 Study Area Intersections

Following recent correspondence with City staff, the study area for analysis purposes will include the following intersections:

Manotick Main/Century
This full-movement 'T' intersection is STOP controlled on the minor approach only (Century Road). A single lane in each direction is provided for all movements and there are currently no restricted or banned movements at this location.

Rideau Valley N/Kelly Marie
This full-movement 'T' intersection is STOP controlled on the minor approach only (Kelly Marie Drive). A single lane in each direction is provided for all movements and there are currently no restricted or banned movements at this location.

2.3 Transit

Within walking distance of the subject site, OC Transpo bus service is currently provided via Route #99 at bus stops located approximately 40 m north of the Manotick Main/Century intersection. Route #99 provides limited weekday morning and afternoon peak hour service at this location (i.e. a single northbound bus during weekday morning peak hour and a single southbound bus during weekday afternoon peak hour). It should be noted that as of April 24th 2016, this route no longer serves Campus Station (the University of Ottawa) and the last northbound trip has been cancelled due to low ridership.

As the study area becomes more developed, OC Transpo can increase local transit service within the vicinity of the subject site. Currently there no plans identified within the City's TMP to extend rapid transit or transit priority within walking distance of the proposed development.

2.4 Area Pedestrian/Cycling Network

Currently, pedestrian and cycling network facilities are very limited within the vicinity of the site. Only unpaved shoulders exist along Manotick Main Street and Century Road (i.e. no sidewalks or dedicated cycling facilities are provided). Identified in the City's Official Cycling Plan, Manotick Main Street and Century Road will ultimately be classified as "Spine" and "Local" routes, respectively.

2.5 Intersection Operations

The following **Figure 3** depicts recent weekday morning and afternoon peak hour traffic counts at study area intersections (traffic volumes were collected by Novatech during the month of June 2016). It should be noted that when the June 2016 count is compared to historic traffic data, collected by Delcan (a Parsons Company) in 2007 before the opening of the Vimy Memorial Bridge, there has been an approximate 10% increase (▲) and an approximate 10% decrease (▼) in total traffic at study area intersections during the weekday morning and afternoon peak hours, respectively. The detailed traffic count data is included as **Appendix A**.

The following **Table 1** summarizes the existing performance of study area intersections based on the Synchro 8 intersection capacity analysis software. The performance of an unsignalized intersection is based on delay and the corresponding Level of Service (LOS). The detailed existing performance output from Synchro 8 for study area intersections is included as **Appendix B**.

Figure 3: Existing Peak Hour Traffic Volumes

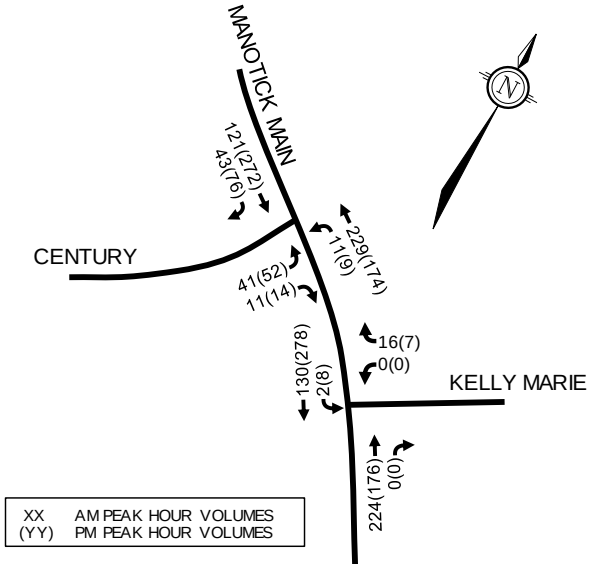


Table 1: Existing Study Area Intersection Performance

Intersection	Weekday AM Peak (PM Peak)				
	Critical Movement			Overall Intersection	
	Max. Delay (sec)	LOS	Movement	Delay (sec)	LOS
Manotick Main/ Century	11.2(12.7)	B(B)	EBL(EBL)	1.5(1.5)	A(A)
Rideau Valley N/ Kelly Marie	9.6(9.2)	A(A)	WBR(WBR)	0.5(0.3)	A(A)
Note: Synchro analysis assumes a PHF of 0.95 and a saturation flow rate of 1,800 veh/h/lane.					

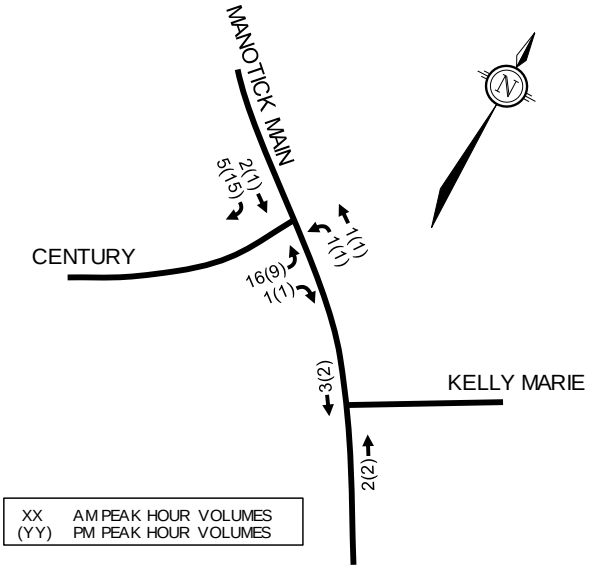
Shown in **Table 1**, study area intersections are currently operating with acceptable delays of 10 to 15 seconds on the minor approaches (i.e. LOS 'B' or better) and 95th percentile queues were observed to be 4-5 vehicles in queue, waiting to turn left on to Manotick Main Street from Century Road. On average, queues were observed to be no more than 1 vehicle.

3 DEMAND FORECASTING

3.1 Background Traffic

Based on recent correspondence with City staff and for the purpose of this assessment, the projected site-generated traffic from Phase 1 of the future Mahogany Community in Manotick was included in the subsequent analysis (the proposed Site Plan is included as **Appendix C**). The projected site-generated traffic volumes for Phase 1 of the Mahogany Community, which will consist of approximately 215 residential units, were obtained from the 2010 *Mahogany Community in Manotick: Phase 1 Traffic Impact Study*, prepared by Delcan (a Parsons company). The following **Figure 4** depicts the projected site-generated traffic at study area intersections for Phase 1 of the Mahogany Community.

Figure 4: Projected Phase 1 Mahogany Community Site-Generated Traffic



3.2 Projected Site-Generated Traffic

Obtained from the 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual, appropriate vehicle trip generation rates were used to estimate projected site-generated traffic for the proposed development, which will consist of approximately 30 single family homes and 54 townhome dwelling units. The following **Table 2** provides a summary of the vehicle trip generation rates used for analysis purposes.

Table 2: ITE Trip Generation Rates

Land Use	Source	Vehicle Trip Generation Rates	
		AM Peak	PM Peak
Single Family-Detached Housing	ITE 210	T = 0.70(du) + 9.74	Ln(T) = 0.90 Ln(du) + 0.51
Residential Condominium/Townhouse	ITE 230	Ln(T) = 0.80 Ln(du) + 0.26	Ln(T) = 0.82 Ln(du) + 0.32
Notes: T = Average Vehicle Trip Ends du = number of Dwelling Units			

Given ITE trip generation surveys only record vehicle trips and are typically conducted in highly suburban locations, and given the subject site is located outside the City's urban area with limited access to non-auto modes, adjustment factors appropriate to a more urban study area context to obtain site-generated person trips was not considered applicable. As such, the following **Table 3** summarizes the projected vehicle trip generation for the proposed development.

Table 3: Total Projected Site-Generated Traffic

Land Use	Units	AM Peak (veh/h)			PM Peak (veh/h)		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single Family-Detached Housing	30 du	7	24	31	22	14	36
Residential Condominium/Townhouse	54 du	5	27	32	24	12	36
Total Auto Trips		**12**	**51**	**63**	**46**	**26**	**72**

As shown in **Table 3**, the proposed development is projected to generate an approximate total of 65 and 75 veh/h during the weekday morning and afternoon peak hours, respectively. Given the local area context, it should be noted that this is not considered a notable amount of additional traffic (i.e. 65 to 75 veh/h equates to approximately 1 new vehicle every 60 seconds, on average).

3.3 Projected Site-Generated Traffic Distribution and Assignment

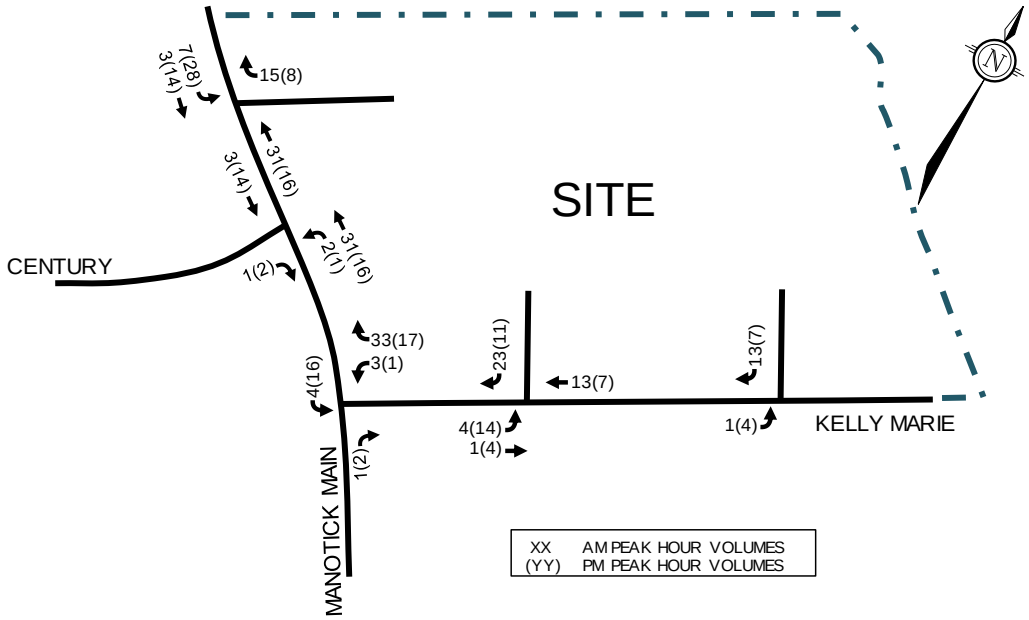
Based on observed existing weekday morning and afternoon peak hour traffic volumes and our local area knowledge, the following distribution of site-generated traffic to/from the proposed site was assumed for analysis purposes.

90%	to/from the north via Manotick Main Street;
5%	to/from the west via Century Road; and
5%	to/from the south via Manotick Main Street.
100%	

Based on the foregoing assumed distribution, the following **Figure 5** depicts projected site-generated traffic assigned to the study area network.

It was assumed that the majority of site-generated traffic (60% from the north) would access the site via the proposed connection to Manotick Main Street, given it is the first entry point for trips from the north. With regard to site-generated traffic egressing the subject site, it was assumed that the majority of trips (65% to the north) would egress the site via Kelly Marie Drive, given a westbound right-turn at this location will be easier due to less opposing northbound traffic (as opposed to egressing the site north of Century Road via the proposed connection to Manotick Main Street).

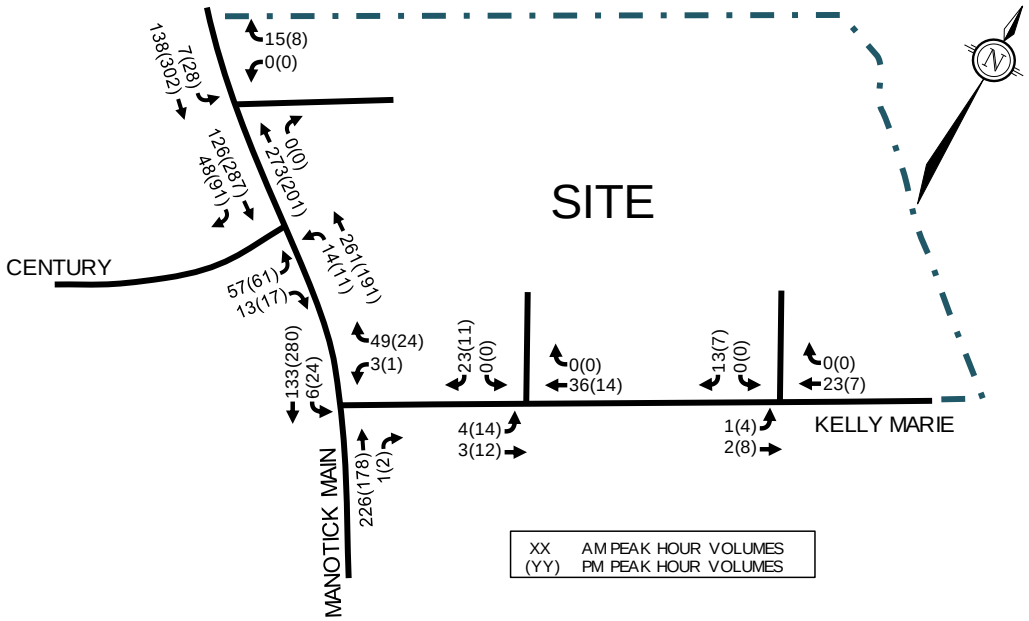
Figure 5: Projected Site-Generated Traffic



4 PROJECTED CONDITIONS

For the purpose of this assessment, total projected traffic volumes were derived by layering the projected site-generated traffic from the planned Phase 1 Mahogany Community (**Figure 4**) and the projected site-generated traffic from the proposed development (**Figure 5**) onto existing traffic volumes at study area intersections (**Figure 3**). The resultant total projected traffic volumes at study area intersections is depicted as **Figure 6**.

Figure 6: Total Projected Traffic Volumes



The following **Table 4** summarizes the projected performance of study area intersections based the total projected traffic volumes depicted in **Figure 6**. The detailed projected intersection performance output from Synchro 8 for study area intersections is included as **Appendix D**.

Table 4: Projected Study Area Intersection Performance

Intersection	Weekday AM Peak (PM Peak)				
	Critical Movement			Overall Intersection	
	Max. Delay (sec)	LOS	Movement	Delay (sec)	LOS
Manotick Main/ Site	9.9(9.4)	A(A)	WBR(WBR)	0.5(0.7)	A(A)
Manotick Main/ Century	11.9(13.4)	B(B)	EBL(EBL)	1.9(1.8)	A(A)
Rideau Valley N/ Kelly Marie	9.9(9.5)	A(A)	WBL(WBL)	1.4(0.9)	A(A)
Note: Synchro analysis assumes a PHF of 0.95 and a saturation flow rate of 1,800 veh/h/lane.					

As shown in **Table 4**, assuming no geometric modifications (e.g. no additional turn lanes, etc.) or additional intersection control (e.g. All-Way STOP control, signalization, etc.), study area intersections are projected to operate with acceptable delays of 10 to 15 seconds on the minor approaches (i.e. LOS 'B' or better) and 95th percentile queues are projected to be no greater than 5 m (i.e. no more than 1 vehicle in queue). This is similar to existing conditions, summarized in **Table 1**.

Based on total projected volumes and a Ministry of Transportation Ontario (MTO) warrant analysis, additional auxiliary turn lanes are not required at study area intersections. Additionally, total projected traffic volumes do not trigger additional intersection control at study area intersections based on the projected performance at study area intersections and based on an Ontario Traffic Manual (OTM) signal warrant analysis at the busier Manotick Main/Century intersection (i.e. STOP control on the minor approaches at study area intersections will be sufficient).

The detailed auxiliary turn lane and traffic signal control warrant analysis is included as **Appendix E**.

5 PLAN OF SUBDIVISION REVIEW

Site Circulation

Right-of-way (ROW) widths of 18 m are proposed for all internal streets, with the exception of the single loaded road adjacent to Manotick Main Street, which as a ROW width of 14 m. All internal streets will have a width of 8.5 m.

Within the proposed 18 m and 14 m Right-of-Ways (ROW) on-site, two travel lanes (i.e. one travel lane in each direction) and a single parking lane (i.e. parking on one side of the road only) can be provided. This is sufficient given the context of the proposed site (i.e. low speed residential neighbourhood, low vehicle trip generator, limited opportunities for cut-through traffic, etc.).

The proposed development is laid out effectively such that two-way traffic can easily be accommodated. The proposed intersections on-site are considered to be appropriately spaced

from each other and adjacent intersections (i.e. approximately 60 m of separation or greater), with the exception of the proposed roadway adjacent to, and parallel to Manotick Main Street (i.e. the proposed roadway with a 14 m ROW).

With regard to the proposed 14 m ROW roadway, adjacent to Manotick Main Street, its spacing is approximately 30 m (center-to-center) from Manotick Main Street. With respect to Transportation Association of Canada (TAC) Geometric Design Guide, the minimum desired distance between two 'T' intersections along a local road is 40 m (center-to-center). Given the projected volumes and queues at this location, the proposed spacing of these two intersections are expected to operate safely and acceptably, as there is sufficient spacing to store 2 vehicles in queue without blocking the first internal intersections (e.g. projected queues are less than a single car length). It should be noted that the proposed location of this 14 m ROW roadway eliminates the need for noise walls along Manotick Main Street. This is considered to be a greater benefit over providing an on-site intersection spacing of 40 m. If congestion does occur at the first internal intersection during peak hours, residents will have the opportunity to use other internal intersections to gain access to/from the development.

The new road connection to Manotick Main Street is approximately 95 m south of the Island View Drive and 140 m north of Century Road. This proposed spacing is consistent with other existing intersections to the north (e.g. Island View Drive N, Orchard Hollow Drive, Bridgeport Avenue, etc.). The new connections to Kelly Marie Drive are approximately 110 m and 195 m east of Manotick Main Street. This spacing is considered adequate for a local roadway.

Sight Distance
Figure 2.3.3.4b within the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads* suggests a sight distance of 130 m to 200 m is required for vehicles turning right onto Manotick Main Street at the new access intersection, assuming a design speed of 70 km/h. Similarly, a sight distance of 150 m to 200 m is required for vehicles turning left onto Manotick Main Street from the new access connection. With regard to stopping sight distance at this location, Table 1.2.5.3 within the TAC *Geometric Design Guide* indicates that 95 m to 110 m is required on Manotick Main Street, approaching the new access connection from either direction.

Based on the foregoing, sufficient sight distance will be available for vehicles turning onto Manotick Main Street from the new proposed connection and sufficient stopping sight distance will be available for vehicles approaching the new proposed connection to Manotick Main Street.

Parking
With respect to the City's Zoning By-Law, the proposed development will provide a sufficient amount of parking in the form of a driveway accessing a garage/carport located on the same lot for each dwelling unit. Additionally, sufficient ROW on-site will be provided for on-street parking.

Access Requirements
As mentioned previously, STOP control on the minor approaches at study area intersections will be sufficient and additional intersection control is not required to accommodate the projected traffic generated by the proposed development.

Transit
Along the frontage of the proposed development, bus stops are currently provided on Manotick Main Street, approximately 40 m north of Century Road, for Route #99. However, as mentioned

previously, bus service is currently very limited during weekday morning and afternoon peak hours (i.e. a single northbound bus during weekday morning peak hour and a single southbound bus during weekday afternoon peak hour). It should also be noted that as of April 24th 2016, Route #99 no longer serves Campus Station and the last northbound trip has been cancelled due to low ridership.

As the study area becomes more developed, it is anticipated that OC Transpo will increase local transit service within the vicinity of the subject site.

Pedestrians/Cyclists
With regard to pedestrians, a sidewalk will be provided between Manotick Main Street and Kelly Marie Drive, along the north/east side of the most northern/eastern on-site roadway (depicted on **Figure 2**). Given the context of the proposed development (i.e. low speed residential neighbourhood, low vehicle trip generator, limited opportunities for cut-through traffic, etc.), the location and amount of proposed sidewalk on-site will be sufficient to safely accommodate on-site pedestrian activity.

As mentioned previously, dedicated cycling facilities within the vicinity of the site are very limited. Identified in the City's Official Cycling Plan, Manotick Main Street and Century Road will ultimately be classified as "Spine" and "Local" routes, respectively, and there are currently no plans to provide dedicated cycling facilities within the vicinity of the proposed development.

6 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the foregoing analysis, the main findings, conclusions and recommendations of this report are as follows:

- Study area intersections are currently operating acceptably (i.e. LOS 'B' or better) during weekday morning and afternoon peak hours. Also during peak hours, 95th percentile queues were observed to be 4-5 vehicles and on average, no more than 1 vehicle;

- The projected site-generated traffic volumes for Phase 1 of the Mahogany Community, which will consist of approximately 215 residential units, is estimated to be an approximate increase of 30 veh/h at the Manotick Main/Century intersection and 5 veh/h at the Manotick Main/Kelly Marie intersection during both weekday morning and afternoon peak hours;

- The proposed subject development is projected to generate an approximate total of 65 and 75 veh/h during the weekday morning and afternoon peak hours, respectively;

- Based on total projected volumes, study area intersections are projected to operate similar to existing conditions (i.e. LOS 'B' or better) during peak hours;

- With respect to MTO and OTM auxiliary turn lane and traffic signal control warrant analysis, the additional site-generated traffic will not trigger the warrants for study area intersection modifications;

- The proposed development is laid out effectively such that two-way traffic can safely and easily be accommodated; and

- With regard to non-auto modes, transit/pedestrian/cycling facilities are currently very limited. However, as the study area becomes more developed, it is anticipated that OC Transpo will increase local transit service and the City may construct additional pedestrian/cycling facilities.

Based on the foregoing, the proposed residential subdivision on the lands municipally known as 5741, 5731 and 5721 Manotick Main Street is recommended from a transportation perspective.

NOVATECH

Prepared by:

Gordon R. Scobie, P.Eng.
Transportation Engineer

Reviewed by:

Jennifer Luong, P.Eng.
Project Manager

Appendix A

Traffic Count Data

240 Michael Cowpland Drive, Suite 200
Kanata ON, K2M 1P6

Weather: Rainy
Serial Number: T12-1614
Collected By: Matt Donald
Notes:

File Name : Century&Manotick
Site Code : 00115055
Start Date : 07/06/2016
Page No : 1

Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Manotick Main Street Southbound					Kelly Marie Drive Westbound					Manotick Main Street Northbound					Century Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	3	18	1	0	22	1	0	0	0	1	0	43	2	0	45	1	0	8	0	9	77
07:15 AM	3	26	0	0	29	1	0	0	0	1	0	57	1	0	58	2	0	17	0	19	107
07:30 AM	3	20	2	0	25	2	0	0	0	2	0	36	2	0	38	3	0	13	0	16	81
07:45 AM	12	39	0	0	51	7	0	0	0	7	0	53	3	0	56	1	0	9	0	10	124
Total	21	103	3	0	127	11	0	0	0	11	0	189	8	0	197	7	0	47	0	54	389
08:00 AM	8	28	0	0	36	5	0	0	0	5	0	56	5	0	61	3	0	8	0	11	113
08:15 AM	12	31	1	0	44	1	0	0	0	1	0	52	2	0	54	0	0	17	0	17	116
08:30 AM	11	21	1	0	33	3	0	0	0	3	0	52	1	0	53	7	0	7	0	14	103
08:45 AM	5	22	0	0	27	1	0	0	0	1	0	49	3	0	52	4	0	12	0	16	96
Total	36	102	2	0	140	10	0	0	0	10	0	209	11	0	220	14	0	44	0	58	428
09:00 AM	3	24	1	0	28	1	0	0	0	1	0	43	2	0	45	6	0	13	0	19	93
09:15 AM	10	22	0	0	32	1	0	0	0	1	0	35	2	0	37	5	0	8	0	13	83
09:30 AM	11	17	0	0	28	2	0	0	0	2	0	34	1	0	35	1	0	14	0	15	80
09:45 AM	7	40	3	0	50	1	0	0	0	1	0	39	0	0	39	2	0	8	0	10	100
Total	31	103	4	0	138	5	0	0	0	5	0	151	5	0	156	14	0	43	0	57	356
*** BREAK ***																					
11:30 AM	15	26	2	0	43	5	0	0	0	5	1	35	2	0	38	6	0	5	0	11	97
11:45 AM	8	28	2	0	38	1	0	0	0	1	0	26	2	0	28	0	0	5	0	5	72
Total	23	54	4	0	81	6	0	0	0	6	1	61	4	0	66	6	0	10	0	16	169
12:00 PM	9	30	0	0	39	0	0	0	0	0	0	35	4	0	39	2	0	8	0	10	88
12:15 PM	11	31	3	0	45	3	0	0	0	3	0	37	1	0	38	1	0	11	0	12	98
12:30 PM	14	35	1	0	50	0	0	0	0	0	1	32	0	0	33	4	0	12	0	16	99
12:45 PM	11	38	1	0	50	1	0	0	0	1	0	37	4	0	41	2	0	16	0	18	110
Total	45	134	5	0	184	4	0	0	0	4	1	141	9	0	151	9	0	47	0	56	395
01:00 PM	7	47	3	0	57	2	0	0	0	2	0	26	4	0	30	1	0	9	0	10	99
01:15 PM	8	39	2	0	49	1	0	1	0	2	1	44	3	0	48	2	0	6	0	8	107
*** BREAK ***																					
Total	15	86	5	0	106	3	0	1	0	4	1	70	7	0	78	3	0	15	0	18	206
*** BREAK ***																					
03:00 PM	14	56	2	0	72	3	1	0	0	4	0	45	3	0	48	1	0	12	0	13	137
03:15 PM	19	53	1	0	73	3	0	0	0	3	0	34	1	0	35	1	0	14	0	15	126
03:30 PM	12	54	3	0	69	1	0	0	0	1	0	30	3	0	33	5	0	11	0	16	119
03:45 PM	22	65	2	0	89	2	0	0	0	2	0	33	3	0	36	1	0	12	0	13	140
Total	67	228	8	0	303	9	1	0	0	10	0	142	10	0	152	8	0	49	0	57	522
04:00 PM	20	44	1	0	65	1	0	0	0	1	0	54	2	0	56	7	0	8	0	15	137
04:15 PM	23	63	4	0	90	1	0	0	0	1	0	28	7	0	35	4	0	5	0	9	135
04:30 PM	21	72	0	0	93	1	0	0	0	1	0	34	1	0	35	4	0	8	0	12	141
04:45 PM	16	65	1	0	82	2	0	0	0	2	0	42	1	0	43	5	0	12	0	17	144
Total	80	244	6	0	330	5	0	0	0	5	0	158	11	0	169	20	0	33	0	53	557
05:00 PM	20	74	4	0	98	2	0	0	0	2	0	44	4	0	48	3	0	18	0	21	169
05:15 PM	19	53	3	0	75	2	0	0	0	2	0	47	3	0	50	2	0	14	0	16	143
05:30 PM	11	52	5	0	68	2	0	0	0	2	0	39	0	0	39	2	0	10	0	12	121
05:45 PM	20	62	0	0	82	0	0	0	0	0	0	38	1	0	39	1	0	9	0	10	131
Total	70	241	12	0	323	6	0	0	0	6	0	168	8	0	176	8	0	51	0	59	564

240 Michael Cowpland Drive, Suite 200
Kanata ON, K2M 1P6

Weather: Rainy
Serial Number: T12-1614
Collected By: Matt Donald
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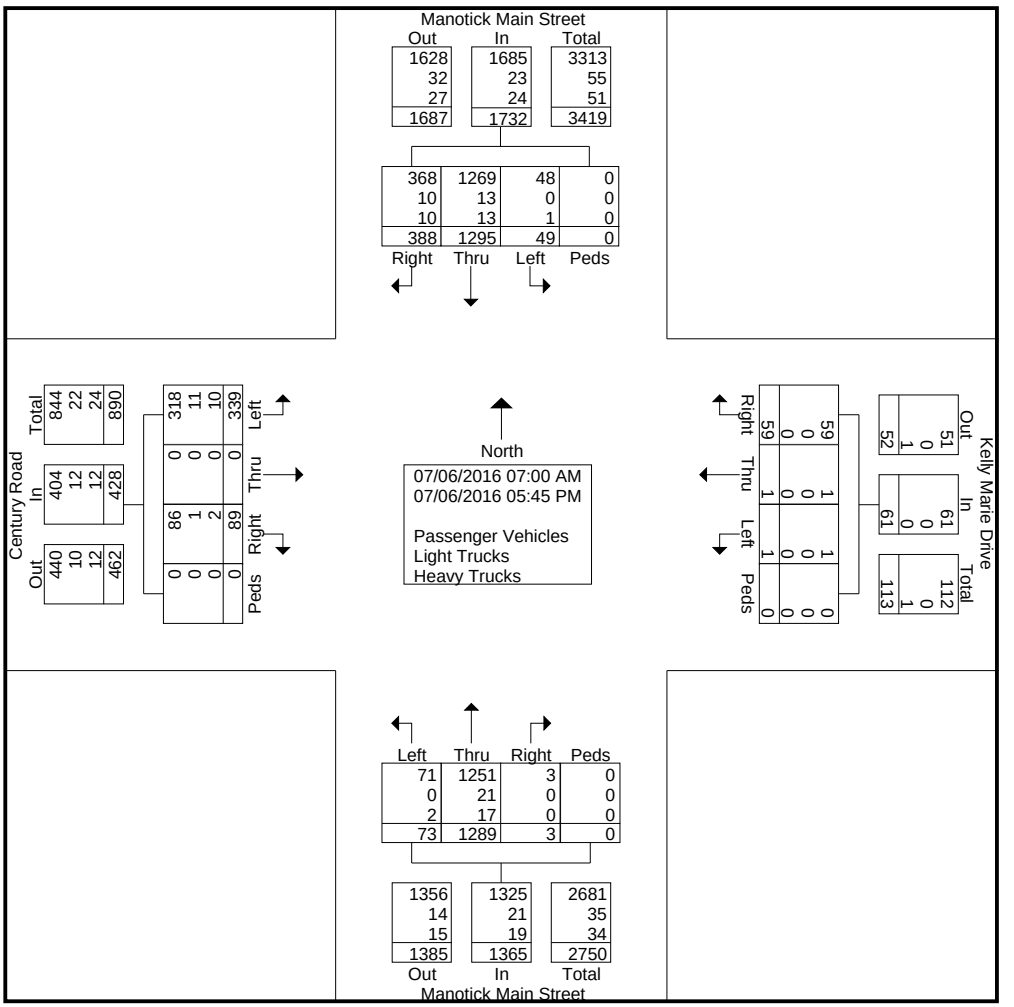
Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Manotick Main Street Southbound					Kelly Marie Drive Westbound					Manotick Main Street Northbound					Century Road Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Grand Total	388	1295	49	0	1732	59	1	1	0	61	3	1289	73	0	1365	89	0	339	0	428	3586
Apprch %	22.4	74.8	2.8	0		96.7	1.6	1.6	0		0.2	94.4	5.3	0		20.8	0	79.2	0		
Total %	10.8	36.1	1.4	0	48.3	1.6	0	0	0	1.7	0.1	35.9	2	0	38.1	2.5	0	9.5	0	11.9	
Passenger Vehicles	368	1269	48	0	1685	59	1	1	0	61	3	1251	71	0	1325	86	0	318	0	404	3475
% Passenger Vehicles	94.8	98	98	0	97.3	100	100	100	0	100	100	97.1	97.3	0	97.1	96.6	0	93.8	0	94.4	96.9
Light Trucks	10	13	0	0	23	0	0	0	0	0	0	21	0	0	21	1	0	11	0	12	56
% Light Trucks	2.6	1	0	0	1.3	0	0	0	0	0	0	1.6	0	0	1.5	1.1	0	3.2	0	2.8	1.6
Heavy Trucks	10	13	1	0	24	0	0	0	0	0	0	17	2	0	19	2	0	10	0	12	55
% Heavy Trucks	2.6	1	2	0	1.4	0	0	0	0	0	0	1.3	2.7	0	1.4	2.2	0	2.9	0	2.8	1.5



240 Michael Cowpland Drive, Suite 200
Kanata ON, K2M 1P6

Weather: Rainy
Serial Number: T12-1614
Collected By: Matt Donald
Notes:

File Name : Century&Manotick
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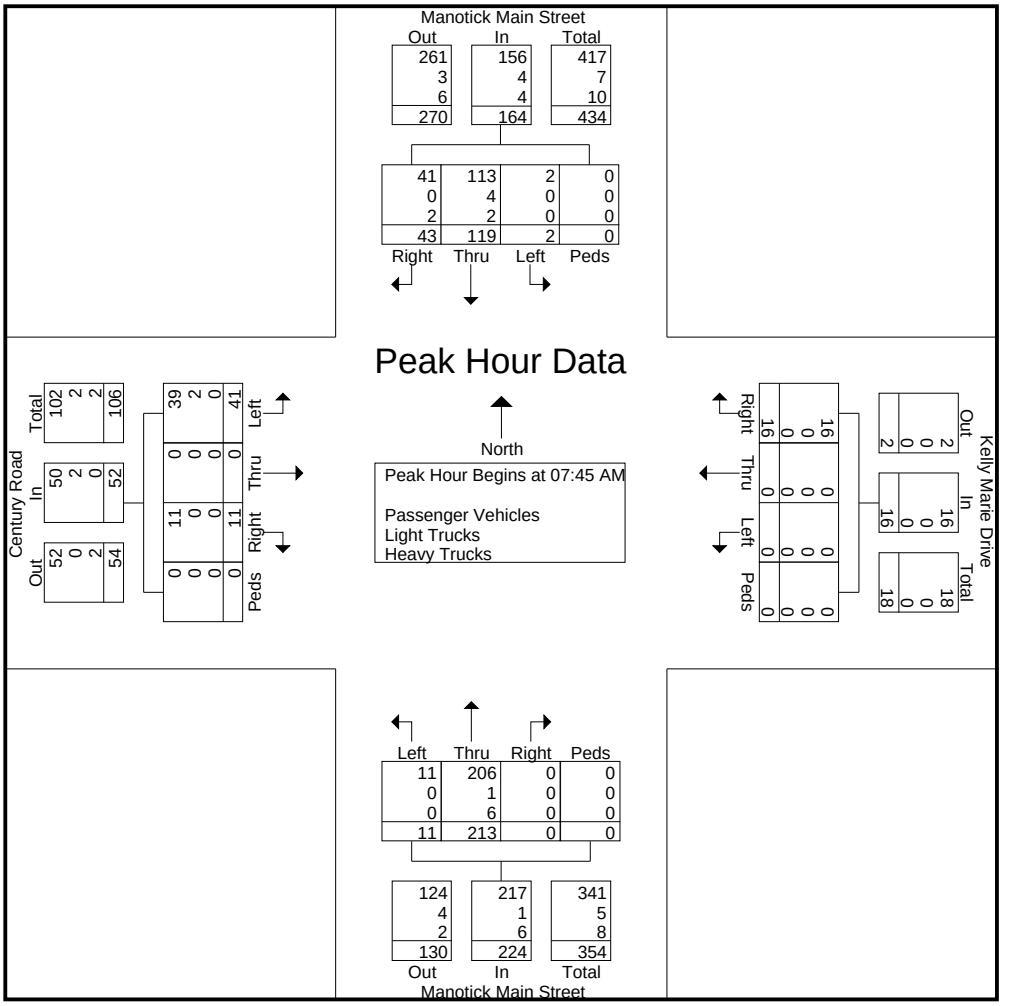
	Manotick Main Street Southbound					Kelly Marie Drive Westbound					Manotick Main Street Northbound					Century Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**12**	**39**	0	0	**51**	**7**	0	0	0	**7**	0	53	3	0	56	1	0	9	0	10	**124**
08:00 AM	8	28	0	0	36	5	0	0	0	5	0	**56**	**5**	0	**61**	3	0	8	0	11	113
08:15 AM	12	31	**1**	0	44	1	0	0	0	1	0	52	2	0	54	0	0	**17**	0	**17**	116
08:30 AM	11	21	1	0	33	3	0	0	0	3	0	52	1	0	53	**7**	0	7	0	14	103
Total Volume	43	119	2	0	164	16	0	0	0	16	0	213	11	0	224	11	0	41	0	52	456
% App. Total	26.2	72.6	1.2	0		100	0	0	0		0	95.1	4.9	0		21.2	0	78.8	0		
PHF	.896	.763	.500	.000	.804	.571	.000	.000	.000	.571	.000	.951	.550	.000	.918	.393	.000	.603	.000	.765	.919
Passenger Vehicles	41	113	2	0	156	16	0	0	0	16	0	206	11	0	217	11	0	39	0	50	439
% Passenger Vehicles																					
Light Trucks	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	2	0	2	7
% Light Trucks	0	3.4	0	0	2.4	0	0	0	0	0	0	0.5	0	0	0.4	0	0	4.9	0	3.8	1.5
Heavy Trucks	2	2	0	0	4	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	10
% Heavy Trucks	4.7	1.7	0	0	2.4	0	0	0	0	0	0	2.8	0	0	2.7	0	0	0	0	0	2.2



240 Michael Cowpland Drive, Suite 200
Kanata ON, K2M 1P6

Weather: Rainy
Serial Number: T12-1614
Collected By: Matt Donald
Notes:

File Name : Century&Manotick
Site Code : 00115055
Start Date : 07/06/2016
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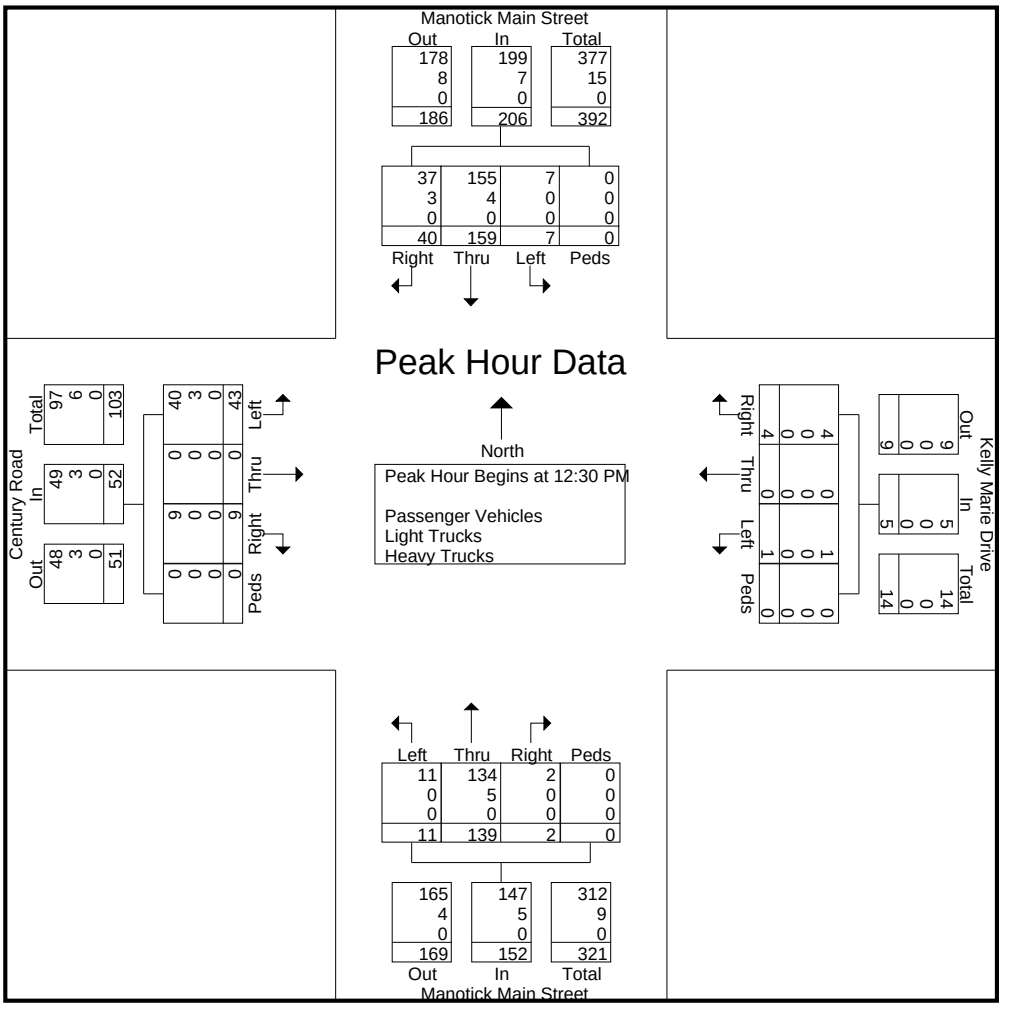
	Manotick Main Street Southbound					Kelly Marie Drive Westbound					Manotick Main Street Northbound					Century Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:30 PM																					
12:30 PM	**14**	35	1	0	50	0	0	0	0	0	**1**	32	0	0	33	**4**	0	12	0	16	99
12:45 PM	11	38	1	0	50	1	0	0	0	1	0	37	**4**	0	41	2	0	**16**	0	**18**	**110**
01:00 PM	7	**47**	**3**	0	**57**	**2**	0	0	0	**2**	0	26	4	0	30	1	0	9	0	10	99
01:15 PM	8	39	2	0	49	1	0	**1**	0	2	1	**44**	3	0	**48**	2	0	6	0	8	107
Total Volume	40	159	7	0	206	4	0	1	0	5	2	139	11	0	152	9	0	43	0	52	415
% App. Total	19.4	77.2	3.4	0		80	0	20	0		1.3	91.4	7.2	0		17.3	0	82.7	0		
PHF	.714	.846	.583	.000	.904	.500	.000	.250	.000	.625	.500	.790	.688	.000	.792	.563	.000	.672	.000	.722	.943
Passenger Vehicles	37	155	7	0	199	4	0	1	0	5	2	134	11	0	147	9	0	40	0	49	400
% Passenger Vehicles																					
Light Trucks	3	4	0	0	7	0	0	0	0	0	0	5	0	0	5	0	0	3	0	3	15
% Light Trucks	7.5	2.5	0	0	3.4	0	0	0	0	0	0	3.6	0	0	3.3	0	0	7.0	0	5.8	3.6
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



NOVATECH

240 Michael Cowpland Drive, Suite 200
Kanata ON, K2M 1P6

Weather: Rainy
Serial Number: T12-1614
Collected By: Matt Donald
Notes:

File Name : Century&Manotick
Site Code : 00115055
Start Date : 07/06/2016
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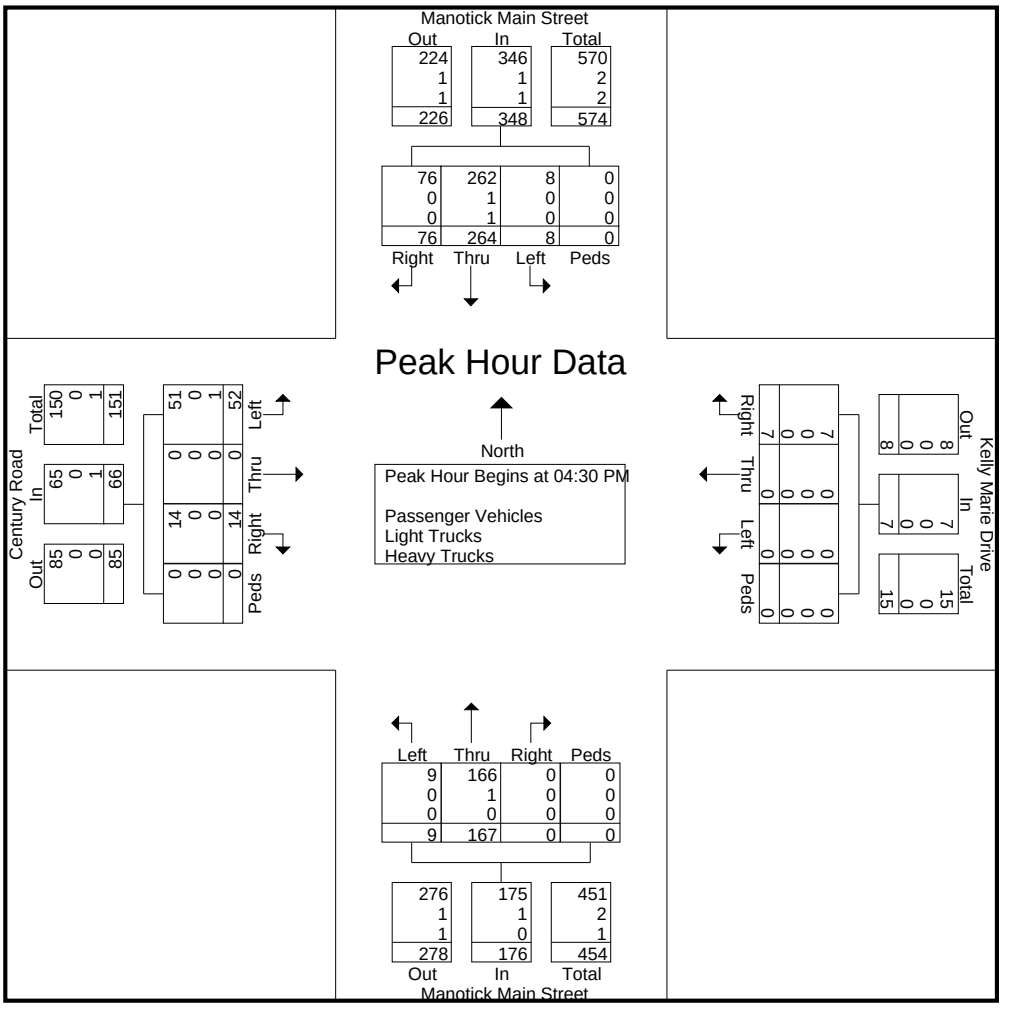
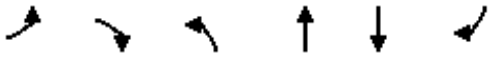
	Manotick Main Street Southbound					Kelly Marie Drive Westbound					Manotick Main Street Northbound					Century Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	**21**	72	0	0	93	1	0	0	0	1	0	34	1	0	35	4	0	8	0	12	141
04:45 PM	16	65	1	0	82	**2**	0	0	0	**2**	0	42	1	0	43	**5**	0	12	0	17	144
05:00 PM	20	**74**	**4**	0	**98**	2	0	0	0	2	0	44	**4**	0	48	3	0	**18**	0	**21**	**169**
05:15 PM	19	53	3	0	75	2	0	0	0	2	0	**47**	3	0	**50**	2	0	14	0	16	143
Total Volume	76	264	8	0	348	7	0	0	0	7	0	167	9	0	176	14	0	52	0	66	597
% App. Total	21.8	75.9	2.3	0		100	0	0	0		0	94.9	5.1	0		21.2	0	78.8	0		
PHF	.905	.892	.500	.000	.888	.875	.000	.000	.000	.875	.000	.888	.563	.000	.880	.700	.000	.722	.000	.786	.883
Passenger Vehicles	76	262	8	0	346	7	0	0	0	7	0	166	9	0	175	14	0	51	0	65	593
% Passenger Vehicles																					
Light Trucks	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
% Light Trucks	0	0.4	0	0	0.3	0	0	0	0	0	0	0.6	0	0	0.6	0	0	0	0	0	0.3
Heavy Trucks	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
% Heavy Trucks	0	0.4	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	1.9	0	1.5	0.3



Appendix B

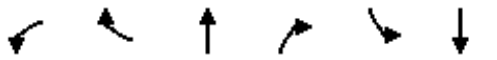
Detailed Synchro Output – Existing Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	41	11	11	229	121	43
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)	43	12	12	241	127	45
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	414	150	173			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	414	150	173			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	99	99			
cM capacity (veh/h)	590	896	1404			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	55	253	173
Volume Left	43	12	0
Volume Right	12	0	45
cSH	636	1404	1700
Volume to Capacity	0.09	0.01	0.10
Queue Length 95th (m)	2.3	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		

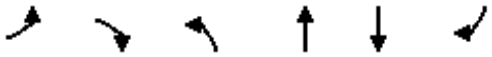
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	16	224	0	2	130
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)	0	17	236	0	2	137
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	377	236			236	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	377	236			236	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	624	803			1331	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	236	139
Volume Left	0	0	2
Volume Right	17	0	0
cSH	803	1700	1331
Volume to Capacity	0.02	0.14	0.00
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	9.6	0.0	0.1
Approach LOS	A		

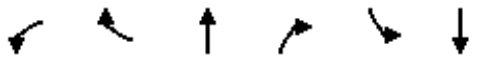
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	52	14	9	174	272	76
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)	55	15	9	183	286	80
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	528	326	366			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	528	326	366			
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)	507	715	1192			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	69	193	366
Volume Left	55	9	0
Volume Right	15	0	80
cSH	540	1192	1700
Volume to Capacity	0.13	0.01	0.22
Queue Length 95th (m)	3.5	0.2	0.0
Control Delay (s)	12.7	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	12.7	0.5	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	7	176	0	8	278
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)	0	7	185	0	8	293
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	495	185			185	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	495	185			185	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	531	857			1389	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	7	185	301
Volume Left	0	0	8
Volume Right	7	0	0
cSH	857	1700	1389
Volume to Capacity	0.01	0.11	0.01
Queue Length 95th (m)	0.2	0.0	0.1
Control Delay (s)	9.2	0.0	0.3
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	0.3
Approach LOS	A		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C

Minto Mahogany Site Plan

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: JUNE 06, 2016

TO: FILE

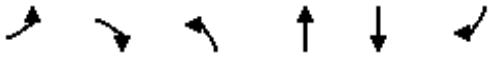
FROM: GORD SCOBIE

RE: MINTO MAHOGANY SITE PLAN

\\NOVATECH2008\NOVA2\2015\115055\DATA\CALCULATIONS\TRAFFIC\SITE PLAN\MAHONGANY SITE PLAN.DOCX

Appendix D

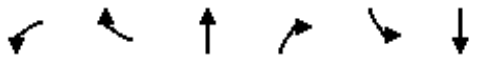
Detailed Synchro Output – Projected Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	57	13	14	261	126	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)	60	14	15	275	133	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	462	158	183			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	462	158	183			
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)	552	887	1392			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	74	289	183
Volume Left	60	15	0
Volume Right	14	0	51
cSH	594	1392	1700
Volume to Capacity	0.12	0.01	0.11
Queue Length 95th (m)	3.4	0.3	0.0
Control Delay (s)	11.9	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	11.9	0.5	0.0
Approach LOS	B		

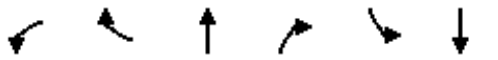
Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	3	49	226	1	6	133
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)	3	52	238	1	6	140
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	391	238			239	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	391	238			239	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	94			100	
cM capacity (veh/h)	610	801			1328	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	55	239	146
Volume Left	3	0	6
Volume Right	52	1	0
cSH	786	1700	1328
Volume to Capacity	0.07	0.14	0.00
Queue Length 95th (m)	1.8	0.0	0.1
Control Delay (s)	9.9	0.0	0.4
Lane LOS	A		A
Approach Delay (s)	9.9	0.0	0.4
Approach LOS	A		

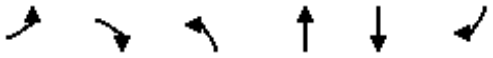
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	22.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	15	273	0	7	138
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)	0	16	287	0	7	145
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	447	287			287	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	447	287			287	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			99	
cM capacity (veh/h)	566	752			1275	

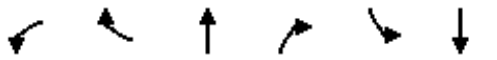
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	287	153
Volume Left	0	0	7
Volume Right	16	0	0
cSH	752	1700	1275
Volume to Capacity	0.02	0.17	0.01
Queue Length 95th (m)	0.5	0.0	0.1
Control Delay (s)	9.9	0.0	0.4
Lane LOS	A		A
Approach Delay (s)	9.9	0.0	0.4
Approach LOS	A		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	25.2%	ICU Level of Service	A
Analysis Period (min)	15		



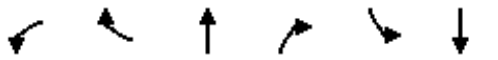
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	61	17	11	191	287	91
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.970				0.967	
Flt Protected	0.962			0.997		
Satd. Flow (prot)	1647	0	0	1759	1706	0
Flt Permitted	0.962			0.997		
Satd. Flow (perm)	1647	0	0	1759	1706	0
Link Speed (k/h)	60			60	60	
Link Distance (m)	340.0			56.0	66.2	
Travel Time (s)	20.4			3.4	4.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	64	18	12	201	302	96
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	0	0	213	398	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 33.1%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	1	24	178	2	24	280
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.870		0.999			
Flt Protected	0.998					0.996
Satd. Flow (prot)	1532	0	1763	0	0	1758
Flt Permitted	0.998					0.996
Satd. Flow (perm)	1532	0	1763	0	0	1758
Link Speed (k/h)	50		60			60
Link Distance (m)	219.7		257.2			56.0
Travel Time (s)	15.8		15.4			3.4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1	25	187	2	25	295
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	0	189	0	0	320
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	8	201	0	28	302
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Flt Protected						0.996
Satd. Flow (prot)	1526	0	1765	0	0	1758
Flt Permitted						0.996
Satd. Flow (perm)	1526	0	1765	0	0	1758
Link Speed (k/h)	50		60			60
Link Distance (m)	79.2		66.2			156.0
Travel Time (s)	5.7		4.0			9.4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	8	212	0	29	318
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	0	212	0	0	347
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

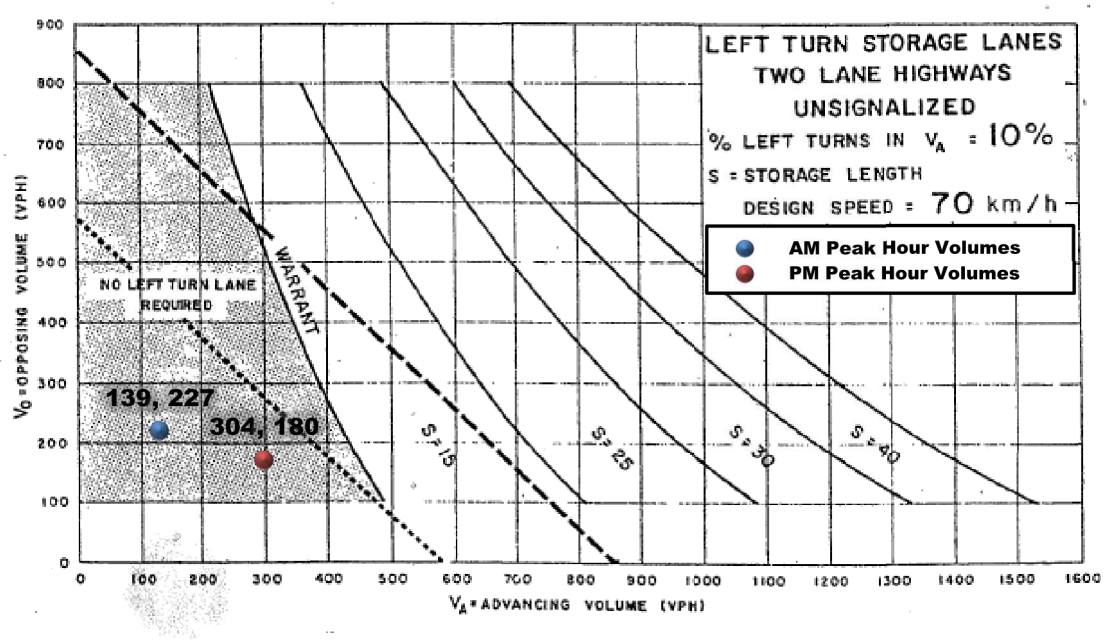
Appendix E

Detailed MTO and OTM Warrant Analysis

Novatech
200 - 240 Michael Cowpland Drive
Ottawa, ON K2M 1P6
613-254-9643

Intersection	Left-Turn Warrant	Advancing Traffic Volume (V_A)		Opposing Traffic Volume (V_O)		Left Turn Traffic Volume (V_L)		% of Left Turning Traffic		Warrant
		AM	PM	AM	PM	AM	PM	AM	PM	
Manotick Main/Kelly Marie - Projected	SBL	139	304	227	180	6	24	4%	8%	**No**

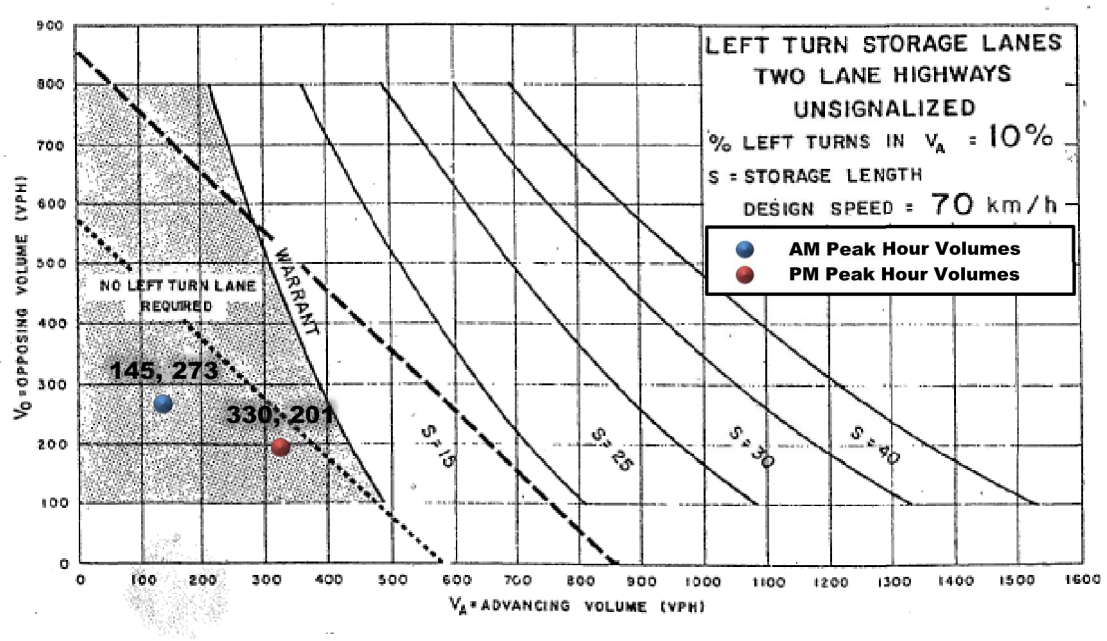
	NBL	NBT	NBR	**SBL** ▼	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM	0	226	1	**6**	133	0	0	0	0	3	0	49
PM	0	178	2	**24**	280	0	0	0	0	1	0	24



Novatech
200 - 240 Michael Cowpland Drive
Ottawa, ON K2M 1P6
613-254-9643

Intersection	Left-Turn Warrant	Advancing Traffic Volume (V_A)		Opposing Traffic Volume (V_O)		Left Turn Traffic Volume (V_L)		% of Left Turning Traffic		Warrant
		AM	PM	AM	PM	AM	PM	AM	PM	
Manotick Main/Site - Projected	SBL	145	330	273	201	7	28	5%	8%	**No**

	NBL	NBT	NBR	**SBL** ▼	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM	0	273	0	**7**	138	0	0	0	0	0	0	15
PM	0	201	0	**28**	302	0	0	0	0	0	0	8



NOVATECH
Engineers, Planners & Landscape Architects

Novatech
200 - 240 Michael Cowpland Drive
Ottawa, ON K2M 1P6
613-254-9643

Manotick Main/Century - Projected (8 hr signal warrant)

Signal Warrant			Description	Hour Ending 1	AM Peak	3	4	5	6	7	PM Peak			Sectional Total % Fulfilled/8	Entire %	Warrant
Intersection	1. Minimum Vehicular Volume	(1) A	Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of on Average Day, and	472	519	432	432	483	610	664	658	Total Across	Min Requirement for Two-Lane Roadways	74%	27%	**64% No**
			100% Fullfilled									0	720			
			80% Fullfilled						85%	92%	91%	268	580			
			Actual % if below 80% value	66%	72%	60%	60%	67%				325				
											Total % Fulfilled	593				
		(4) B	Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	67	70	69	46	71	76	82	78	Total Across	Min Requirement for Two-Lane Roadways	27%		
			100% Fullfilled									0	255			
			80% Fullfilled									0	200			
			Actual % if below 80% value	26%	27%	27%	18%	28%	30%	32%	31%	219				
											Total % Fulfilled	219				
	2. Delay to Cross Traffic	(1) A	Vehicle Volume, Along Major Street for Each of the Heaviest 8 Hours of an Average Day, and	405	449	363	386	412	534	582	580	Total Across	Min Requirement for Two-Lane Roadways	64%	64%	
			100% Fullfilled									0	720			
			80% Fullfilled							81%	81%	161	580			
			Actual % if below 80% value	56%	62%	50%	54%	57%	74%			354				
											Total % Fulfilled	515				
		(2) B	Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours	61	57	56	38	51	59	39	61	Total Across	Min Requirement for Two-Lane Roadways	70%		
			100% Fullfilled									0	75			
			80% Fullfilled	81%							81%	163	60			
			Actual % if below 80% value		76%	74%	50%	69%	78%	53%		400				
											Total % Fulfilled	563				

Notes

1 *Vehicle Volume Warrants (1A), (2A) and (5B) for Roadways Having Two or More Moving Lanes in one Direction Should Be 25% Higher Than Values Given Above* **No**

2 *For Definition of Crossing Volume Refer to Note 4 on the Signal Warrant Analysis Form B2.03.08*

3 *The Lowest Sectional Percentage Governs the Entire Warrant*

4 *For "T" Intersections the Warrant Values for Minor Street Should be Increased by 50% (Warrant 1B only)* **Yes**

5 *Restricted Flow - Operating Speed Less Than 70 km/h*