IBI GROUP
400–333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868

Memorandum

To/Attention	Mike Giampa - City of Ottawa Transportation Project Manager	**Date**	February 16, 2021
From	David Hook	**Project No**	127391
cc	Mike Boucher – DCR Phoenix		
Subject	1154-1208 Old Montreal Road - Transportation Impact Assessment Update		

1.0 Introduction

IBI Group was retained by DCR Phoenix Development Corporation Ltd. to prepare a Transportation Impact Assessment (TIA) Update to address outstanding transportation-related comments regarding the proposed residential development to be located at 1154-1208 Old Montreal Road. A TIA report was previously prepared by WSP Global Inc. in March 2018 and submitted to the City of Ottawa for circulation and review. Circulation comments have since been received and the proposed Plan of Subdivision has been revised in response to these comments. The purpose of this Update is to summarize the changes to the Plan of Subdivision since the previous submission and provide the results of a revised technical analysis based on the latest development plan.

The following items will be discussed as part of this TIA Update:

1. Summarize the revised Plan of Subdivision;
2. Identify the proposed on-site pedestrian and cycling facilities;
3. Review historical collision data;
4. Summarize the expected number of new site-generated trips during the weekday morning and afternoon peak hours based on the revised land use statistics;
5. Summarize the projected future background and total traffic conditions;
6. Discuss the projected site-generated transit demand and identify any potential capacity issues;
7. Review traffic signal and roundabout warrants;
8. Complete intersection capacity analyses under future background and total traffic conditions;
9. Calculate Multi-Modal Level of Service (MMLOS) for all signalized study area intersections and the segment of Old Montreal Road adjacent to the site;
10. Complete auxiliary lane warrant analyses at all study area intersections; and

11. Review the proposed private approaches to confirm their compliance with applicable by-laws and guidelines (e.g. Private Approach By-law, Geometric Design Guide for Canadian Roads, etc.)

2.0 Proposed Development

Since the submission of the TIA by WSP Global Inc. in March 2018, the Plan of Subdivision for the proposed development has undergone significant revisions. The previous plan was primarily composed of mid-rise apartment buildings with a small number of semi-detached and townhome units. Four private approaches were previously proposed on Old Montreal Road, two of which were to be restricted to right-in/right-out.

In response to the circulation comments, the Plan of Subdivision has been revised to include just two access intersections on Old Montreal Road - one of which will be restricted to inbound traffic only. The revision also includes a reduction in apartment units and an increase in lower-density residential units. **Table 1** provides a summary of the current dwelling unit breakdown as compared with the previous submission.

Table 1 - Land Use Statistics

<table>
<tr><th rowspan="2">Plan of Subdivision</th><th rowspan="2">Apartment Units</th><th colspan="4">Low-Density Units</th><th rowspan="2">Total Units</th></tr>
<tr><th>Townhome</th><th>Semi-Detached</th><th>Urban Townhome</th><th>Back-to-back Terrace</th></tr>
<tr><td rowspan="2">Previous</td><td rowspan="2">432</td><td>5</td><td>16</td><td>30</td><td>0</td><td rowspan="2">483</td></tr>
<tr><td colspan="4">51</td></tr>
<tr><td rowspan="2">Current</td><td rowspan="2">380</td><td>37</td><td>0</td><td>43</td><td>32</td><td rowspan="2">492</td></tr>
<tr><td colspan="4">112</td></tr>
</table>

As illustrated above, the overall number of units has increased only marginally, however there have been notable changes in the unit mix.

On-site circulation within the proposed development will be accommodated via two new roads each accessed from Montreal Road:

- **Street One** is a private road and will intersect with Old Montreal Road at the Old Montreal/Famille Laporte intersection. The road will provide 4.25m pavement width at the approach to the intersection and be restricted to inbound traffic only. The basis for this access configuration is that the addition of outbound traffic would trigger the need for traffic signals but would not meet the technical warrants. The remainder of the road will be 6m wide and allow two-way traffic flow throughout the site. On-street parallel parking stalls will be provided along the 6m wide portion.
- **Street Two** is a local public road with an 18m ROW and 8.5m pavement width, intersecting Old Montreal Road approximately 200m east of the Famille Laporte/Street One intersection. Beyond the turning circle near the southeast corner of the site, Street Two becomes a private road with 7m of pavement width, providing access to the planned townhouse units in Blocks 12 through 18.

The current Plan of Subdivision has been provided in **Appendix A**.

3.0 Proposed Pedestrian and Cycling Facilities

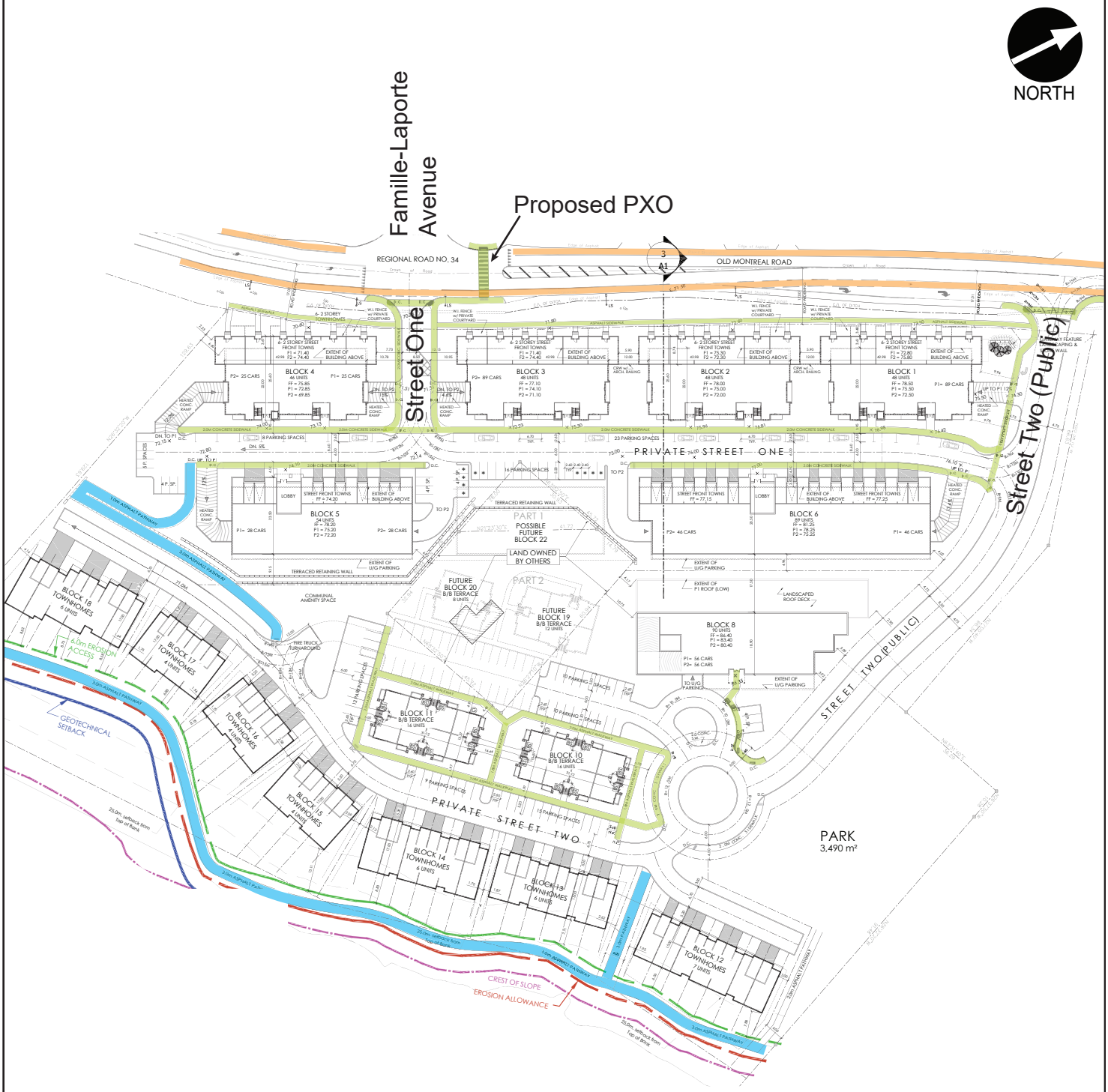
Based on the current Plan of Subdivision, the following pedestrian and cycling facilities will be provided within the limits of the subject site:

- Concrete sidewalks on both sides of Street One and the Street One private approach;
- A concrete sidewalk on the west side of Street Two between Old Montreal Road and Street One;
- Concrete sidewalks around the two back-to-back terrace home buildings (Blocks 10 & 11);
- A 3.0m wide pedestrian pathway connecting Street One to Street Two; and
- A 3.0m wide multi-use path along the southern boundary of the property with a connection to Street Two forming part of the City's Major Pathway network.

In addition to the above, the following pedestrian and cycling facilities are proposed with the Old Montreal Road right of way:

- A pedestrian crossover (PXO) on the east leg of the Old Montreal Road & Famille-Laporte Avenue / Street One intersection;
- Continuous on-road bicycle lane/paved shoulder (eastbound only) along the site frontage;
- A 1.5m wide temporary asphalt sidewalk on the south side of Old Montreal Road along the site frontage with connections to the urban townhomes fronting onto the street;

The above pedestrian and cycling facilities are illustrated in **Exhibit 1**. These facilities will provide pedestrian and cyclist connectivity to the adjacent transportation network and throughout the site. It should be noted that, given the significant grade on Street Two, a sidewalk is not possible on the planned public segment of this road. Although there are no pathways directly connecting the proposed park with Old Montreal Road, a pedestrian route is provided from the primary site access (Famille Laporte intersection) along the western edge of the site and along Street Two Private.



Legend

- Cycling Facility
- Pedestrian Facility
- Multi-Use Path

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Exhibit 1:
Pedestrian and
Cycling Plan

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4.0 Collision Data

The summary of collision trends described in the March 2018 TIA was reviewed for accuracy. Based on a review of the data provided by the City of Ottawa, the interpretation of results of the collision analysis is reasonable. Historical collision data for the period of January 2012 to December 2016 is provided in **Appendix B**.

5.0 Trip Generation

Person-trips generated by the proposed development were calculated using the residential trip generation rates, mode shares and directional splits described in the 2009 TRANS Trip Generation Study and followed the same methodology described in the March 2018 TIA. The revised number of trips generated by the apartment units were estimated using the 'mid-rise apartment' rate while the trips generated by the lower-density units were estimated using the 'townhome' rate. **Table 2** illustrates the estimated number of development-generated person-trips comparing the previous and current Plans of Subdivision.

Table 2 - Development-Generated Person-Trips

Plan of Subdivision	AM			PM		
	In	Out	Total	In	Out	Total
Previous	169	292	457	256	227	483
Current	98	263	361	264	186	450

Under the current Plan of Subdivision, the overall number of development-generated person-trips is expected to be reduced despite the small increase in the total number of units. This is a result of the specific trip generation rates for each unit type and has been calculated to a finer degree of accuracy based on the 2009 TRANS Trip Generation Study. Relevant extracts from this study are provided in **Appendix C**.

Revised development-generated person-trips were subdivided by mode in accordance with the mode share targets described in the March 2018 TIA:

- Auto Driver: 60%
- Auto Passenger: 15%
- Transit: 20%
- Bicycle: 5%
- Walk: 0%

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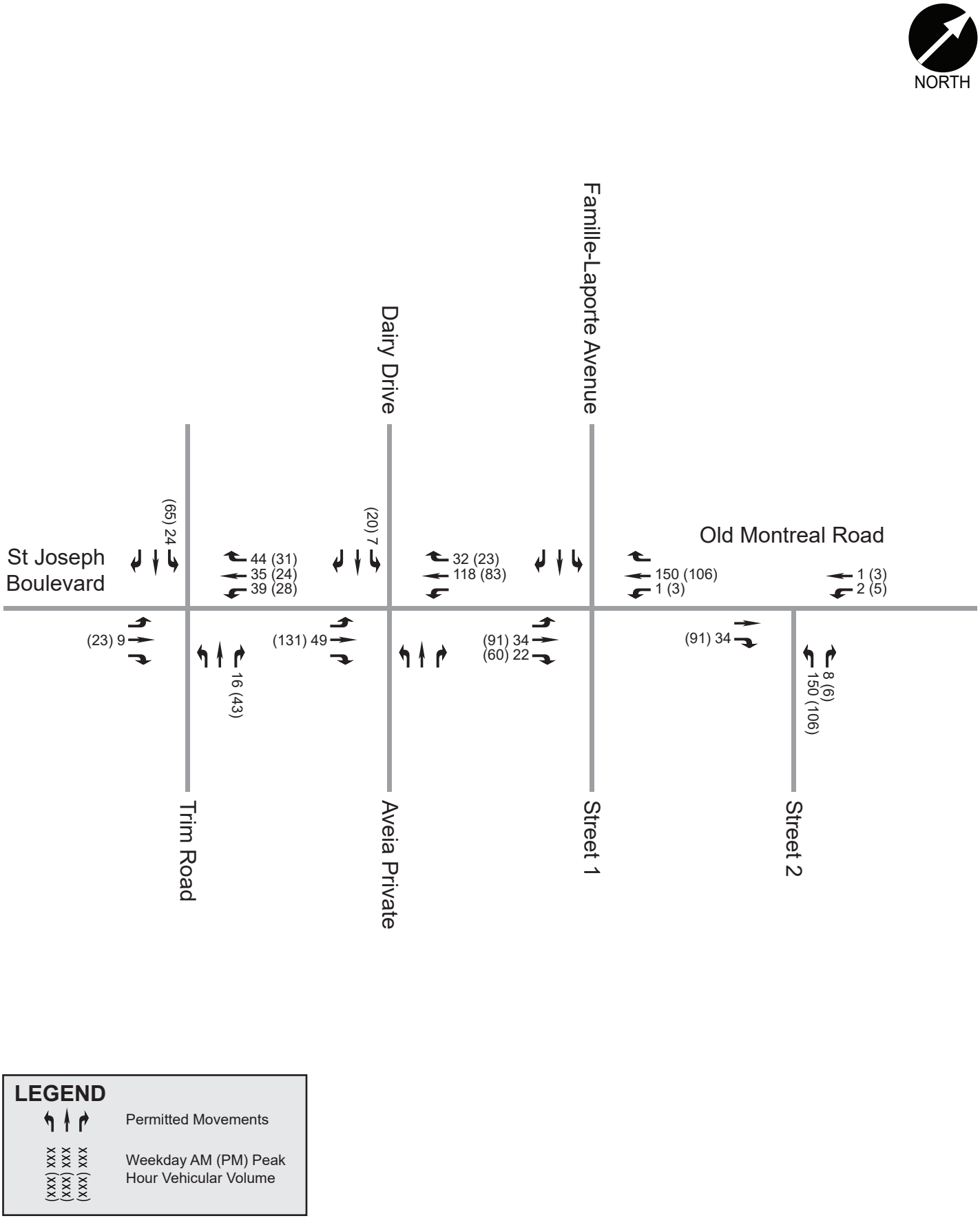
Table 3 summarizes the projected number of development-generated trips by mode of transportation.

Table 3 – Development-Generated Trips by Mode

Mode	AM			PM		
	In	Out	Total	In	Out	Total
Auto Driver	59	158	217	158	112	270
Auto Passenger	15	39	54	40	28	68
Transit	19	53	72	53	37	90
Bike	5	13	18	13	9	22
Walk	0	0	0	0	0	0

The March 2018 TIA projected a total of 305 and 323 two-way vehicle-trips and a total of 102 and 108 two-way transit-trips during the weekday morning and afternoon peak hours, respectively. As such, under the current Plan of Subdivision, the overall trip generation of the proposed development is expected to be reduced and is directly attributable to the trip generation characteristics of the revised unit mix.

Exhibit 2 illustrates the distribution and assignment of site-generated vehicle-trips to the study area intersections in accordance with the methodology described in the March 2018 TIA.



1154-1208 Old Montreal Road
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Exhibit 2:
Site-Generated Traffic

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6.0 Transit Demand and Capacity Review

Table 4 summarizes the projected transit demand generated by the full build-out of the proposed development and the adjacent Cardinal Creek (Phases 1 to 7).

Table 4 – Transit Demand per Development (Ultimate)

Development	AM			PM		
	In	Out	Total	In	Out	Total
Cardinal Creek Village[1]	136	292	628	524	144	812
1154-1208 Old Montreal Road	19	53	72	53	37	90
Total	**155**	**345**	**700**	**577**	**181**	**902**

Notes:

[1] – Transit trips were calculated based on the trip generation assumptions described in the Cardinal Creek Village Phase 1-7 Transportation Impact Study (IBI Group, October 2013)

As illustrated above, the combined transit demand of these two developments is expected to be in the order of 700 to 900 passengers during the weekday morning and afternoon peak hours upon full build-out of each. It should be noted that the proposed development transit demand represents only 10% of the adjacent Cardinal Creek demand at full build-out.

Route #221 is a weekday peak period transit route that operates between the Village of Cumberland and Blair Station with four westbound trips in the morning and four eastbound trips in the afternoon and is currently the only transit route within close proximity of the proposed development. Based on pre-pandemic information provided by OC Transpo, Route #221 was found to be operating at 36% and 27% of its available passenger capacity during the weekday morning and afternoon peak hours, respectively. While there are no formal plans to add trips on Route #221 at this time, OC Transpo continually tracks the status of developments and ridership trends and will be reviewing these in the near future in conjunction with the introduction of light rail transit (LRT) service to Trim Station. Service adjustments are made as needed to accommodate growing ridership. The current route capacity, however, will be sufficient to accommodate the projected transit demand of the proposed development.

Should an increased number of residents choose to use the Trim Park and Ride, OC Transpo has indicated that the facility was found to have a peak utilization of only 57-59% in January/February 2020, with a total parking supply of 1,065 spaces. As part of the Stage 2 LRT project, this facility will see a slight increase in parking supply to 1,111 spaces as a result of the station reconfiguration.

Based on the existing transit route capacity and utilization of the Trim Station Park and Ride facility described above, the transit demands of the proposed development will be easily accommodated.

To accommodate the projected transit demand of the proposed development, consideration has given on how transit users will be able to access transit services. Transit users coming from the west will be able to disembark on the south side of Old Montreal Road and access the site without crossing the road. Transit users heading towards the west, however, will be required to cross Old Montreal Road to access one of the westbound bus stops. As there is no existing controlled pedestrian crossing at the Famille-Laporte intersection, analysis has been conducted to determine

whether a pedestrian crossover (PXO) is warranted at this location. As noted in subsequent sections of this report, full traffic signalization at the Old Montreal/Street One/Famille Laporte intersection is not warranted.

Based on OTM Book 15, there are four criteria that are used to determine whether a PXO is warranted:

- Are traffic signals not warranted for pedestrians?
- Do the vehicular and pedestrian volumes exceed the thresholds outlines in the guideline?
- Is there a requirement for system connectivity or is the location on a pedestrian desire line?
- Is the site less than 200m from another traffic control device?

Based on the results of the analysis, a PXO was found to be appropriate at this location as traffic signals are not warranted, there is a requirement for system connectivity, and it is over 200m to the nearest traffic control device. Additionally, the future eight-hour vehicular and pedestrian volumes are also likely to meet the volume threshold.

OTM Book 15 also provides a selection matrix for determining which PXO configuration is appropriate for any given context. At the Famille-Laporte intersection, Old Montreal Road experiences eight-hour traffic volumes between 4,500 and 6,000 vehicles/8-hours, has a 60 km/h posted speed limit and has a width of three lanes (two through lanes and an auxiliary left-turn lane). Based on these parameters, a Level 2, Type 'B' PXO is appropriate for this location.

It should be noted that corridor-wide pedestrian and cycling facility improvements on Old Montreal Road (by others) would also provide future residents an opportunity to walk or bike to the Trim Park & Ride rather than use a private vehicle. Given the distance, however, walking is not expected to represent a significant proportion of the mode share while the cyclist mode share may only increase slightly following any potential upgrade from the existing paved shoulders to an exclusive facility (by others). Direct access to transit therefore represents the most effective measure for reducing the automobile dependence of the site. With the suitability of a PXO, it is recommended that OC Transpo give consideration towards the implementation of an additional (eastbound) bus stop on the east side of Famille Laporte Avenue to further-increase the convenience of transit for residents of the proposed development.

7.0 Future Background and Total Traffic Volumes

Based on the 2013 Transportation Master Plan (TMP), there are currently no planned road network or transit network improvements within the timeframe of this study that are expected to have an impact on local traffic patterns or the mode share distribution. The O-Train Confederation Line extension to Trim Road is expected to be open for full revenue service by the end of 2024, however, given the distance between the future Trim Station and the proposed development it has been conservatively assumed that this extension will not have a significant impact on local mode shares. Furthermore, the proposed development is outside the future Trim Station Transit-Oriented Development (TOD) zone.

The TMP indicates that Old Montreal Road and Ottawa Road 174 east of Trim Road may both be widened to four lanes, while west of Trim Road, Ottawa Road 174 may be widened to six lanes. The Rapid Transit & Transit Priority 2031 Network Concept from also indicates that the O-Train Confederation Line may be extended further east along Old Montreal Road. As these network modifications are not likely to occur within the 2027 horizon year of this study, they have not been considered in the analysis.

The most significant network change expected within the timeframe of this study is the planned connection of Cardinal Creek Village to Ottawa Road 174. Although the specific timing is unknown,

this connection is required for upcoming phases of the subdivision development and will result in a reduction of volumes on Old Montreal Road along the frontage of the proposed development.

The latest intersection traffic counts were obtained at the following intersections to ensure that traffic volumes were as up to date as possible:

- Trim Road & St Joseph Boulevard / Old Montreal Road (April 2017, City of Ottawa)
- Old Montreal Road & Dairy Drive / Aveia Private (December 2019, City of Ottawa)

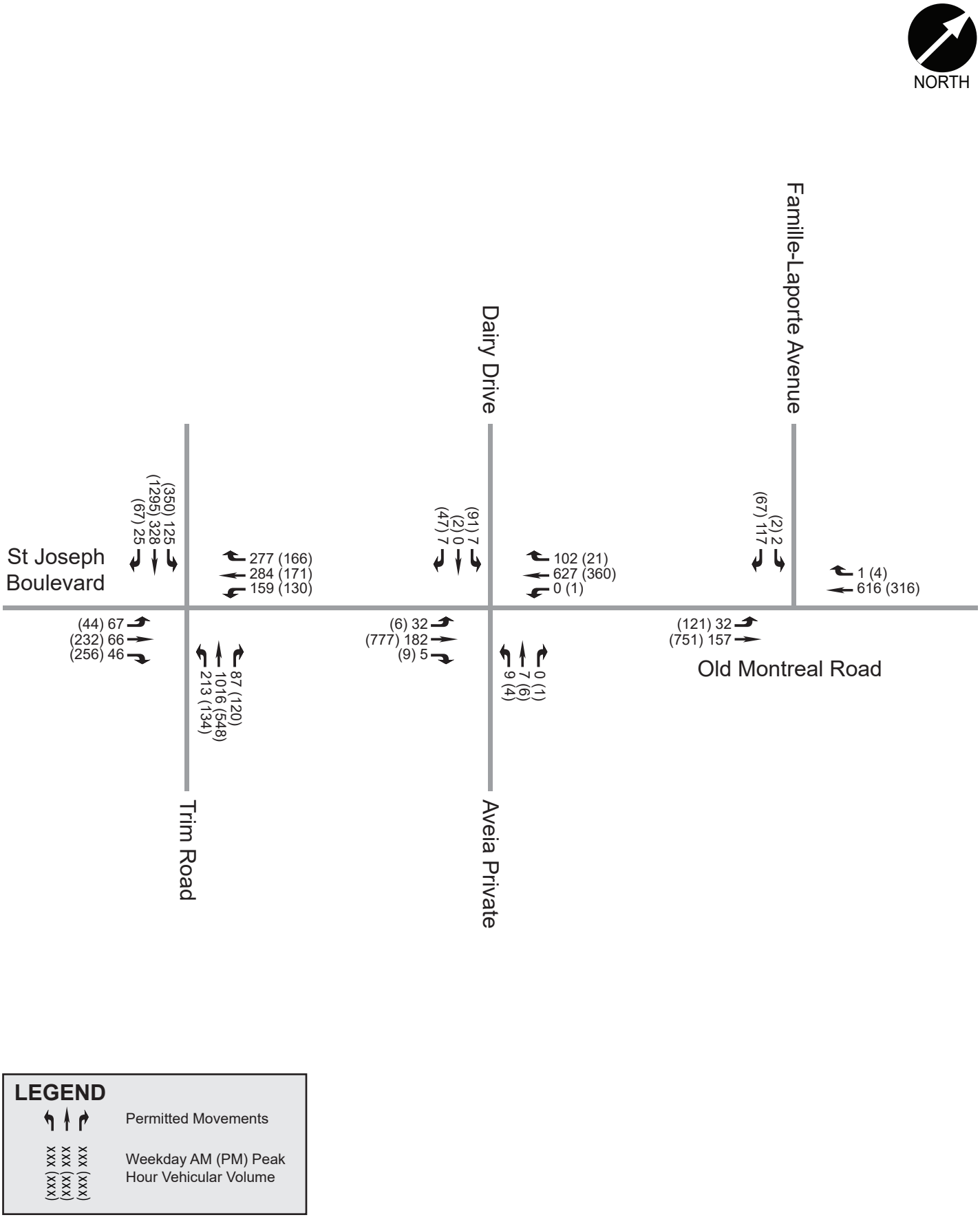
Given the ongoing COVID-19 pandemic, new intersection traffic counts could not be collected due to the impact it has on commuter traffic volumes during the weekday peak hours. Reliable traffic data at the primary site access (Montreal Road / Famille Laporte / Street One intersection) could not be obtained, and therefore the revised analysis has been based on the Cardinal Creek Village Phase 1-7 Transportation Impact Study (IBI Group, October 2013) and the approximated status of the development at the time the counts were undertaken.

A historical traffic count was also obtained for the Old Montreal Road & Dairy Drive / Aveia Private (December 2014, City of Ottawa) intersection to verify the background growth rate used in the March 2018 TIA. Based on this review, the 1.8% background traffic growth rate is confirmed to be appropriate for estimating background traffic growth from outside the study area.

The intersection traffic counts are provided in **Appendix D**.

Traffic generated by all known adjacent developments within the study area was accounted for explicitly in the analysis. There have been no new development applications within the study area since the submission of the March 2018 TIA.

Exhibits 3 to 6 illustrate the Future (2022 & 2027) Background & Total Traffic volumes at each study area intersection.



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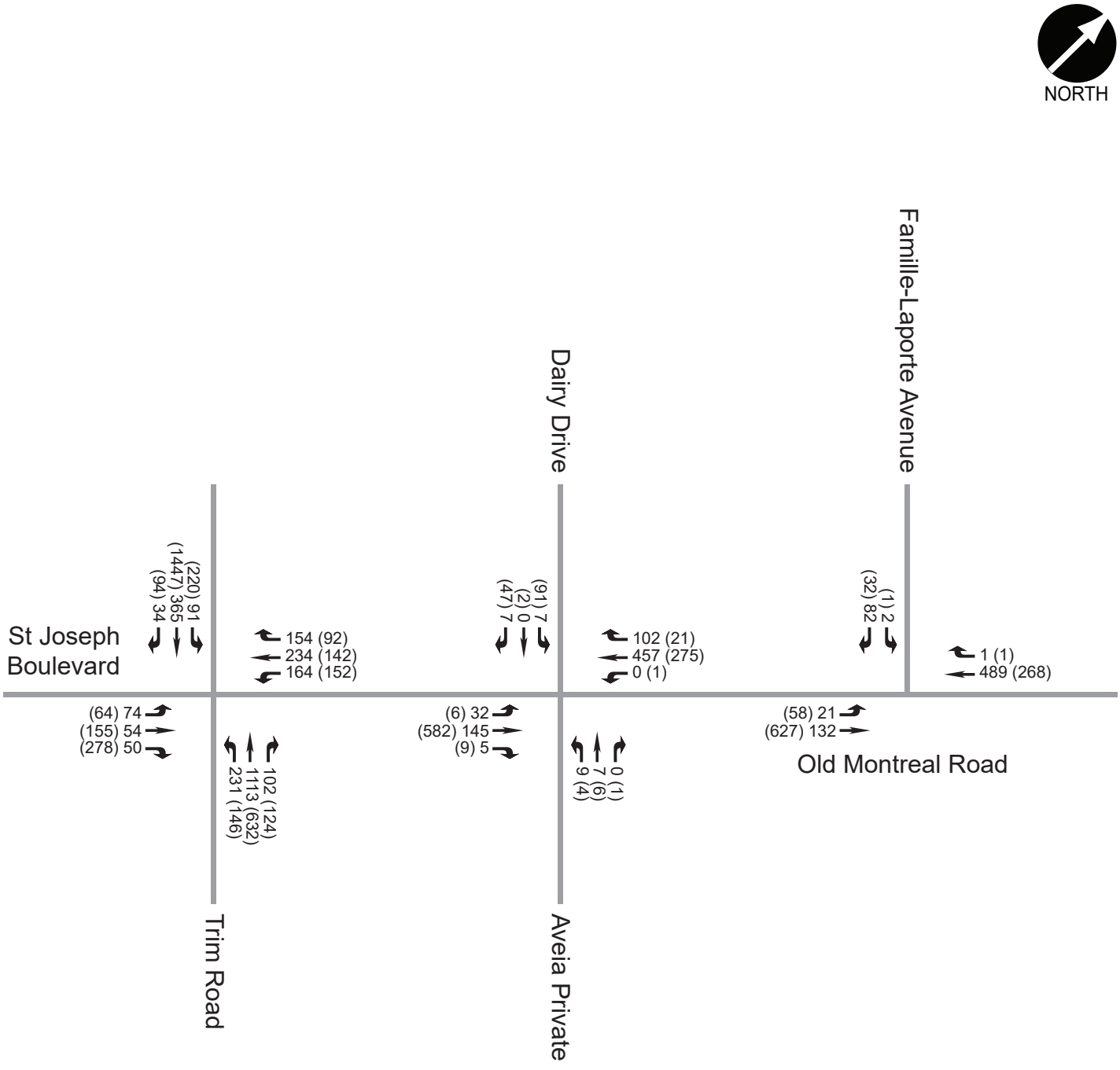
Addendum

Exhibit 3:
Future (2022)
Background Traffic

PROJECT No. 127391
DATE: February 2021
SCALE: N.T.S.



LEGEND

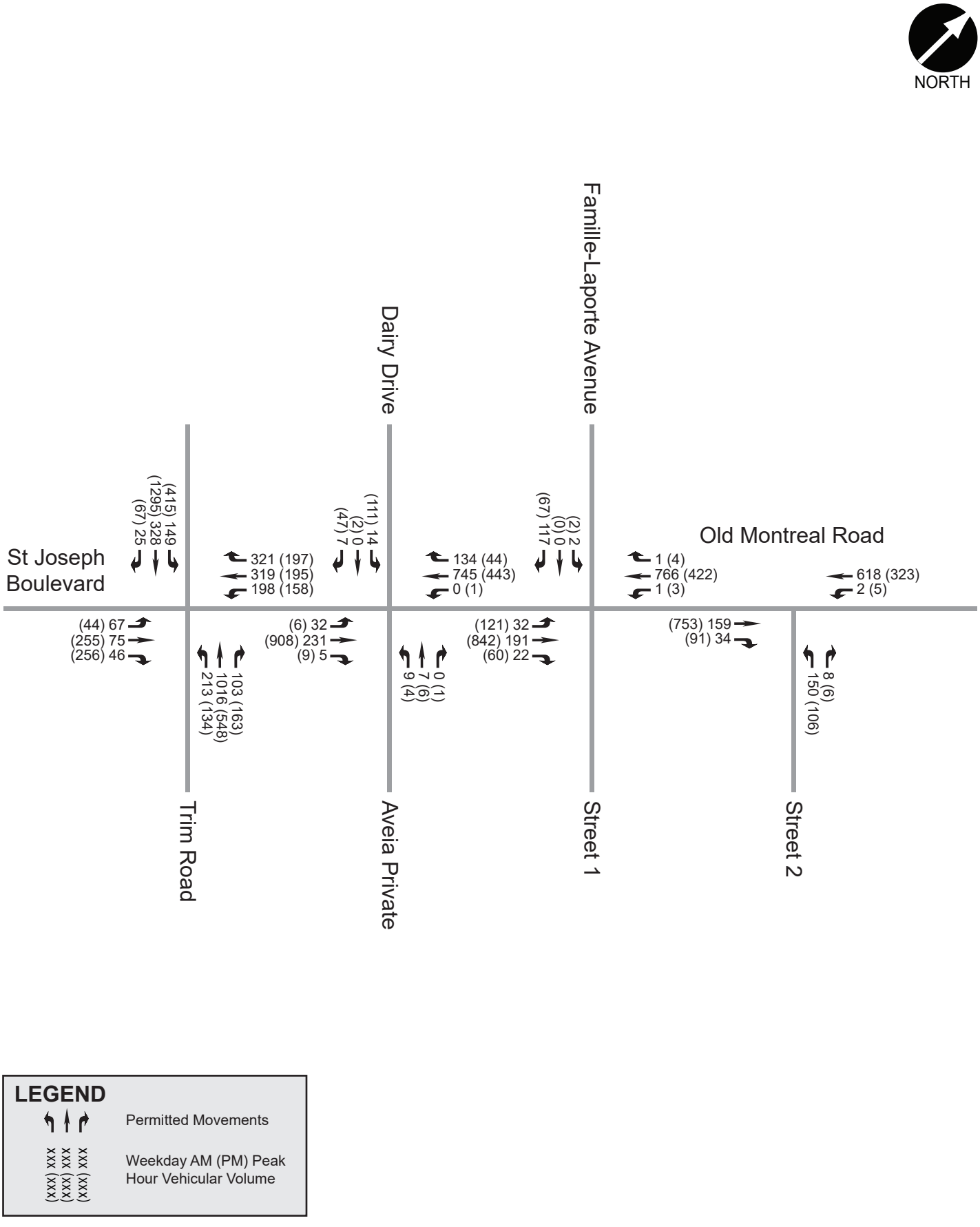
Permitted Movements

xxx (xxx)
xxx (xxx)
xxx (xxx)

Weekday AM (PM) Peak Hour Vehicular Volume

Note: Per the assumptions of the Cardinal Creek Village (Phase 1-7) TIA, a reduction in volumes is attributable to the planned connection to Ottawa Road 174.

1154-1208 Old Montreal Road Transportation Impact Assessment Addendum	Exhibit 4: Future (2027) Background Traffic	PROJECT No. DATE: SCALE:	127391 February 2021 N.T.S.



1154-1208 Old Montreal Road
Transportation Impact Assessment

Exhibit 5:
Future (2022)
Total Traffic

PROJECT No. 127391
DATE: February 2021
SCALE: N.T.S.

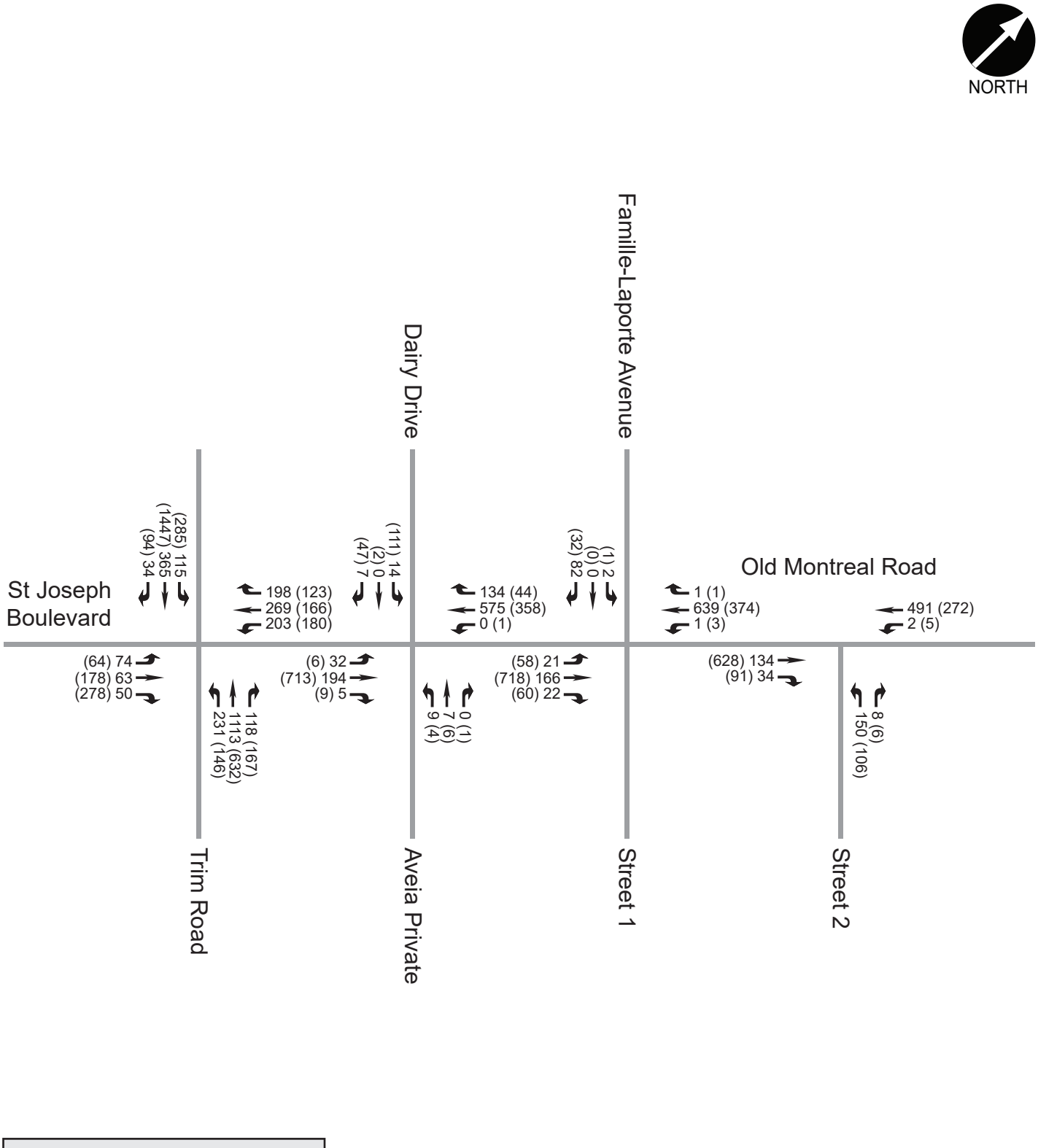


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Exhibit 6:
Future (2027)
Total Traffic

PROJECT No. 127391
DATE: February 2021
SCALE: N.T.S.

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

8.0 Intersection Control

Traffic Signal Warrants

A traffic signal warrant analysis was completed for all stop-controlled study area intersections. The results of the analysis indicate that none of the intersections warrant traffic signals under Future (2022 & 2027) Background or Total Traffic conditions, including the Old Montreal/Dairy intersection and the Old Montreal/Famille Laporte/Street One intersection. It should be noted that the results of this analysis differ from the March 2018 TIA as they have been based on more recent (2019) data at the Old Montreal/Dairy intersection. The results of the traffic signal warrant analysis are provided in **Appendix E**.

Roundabout Analysis

The City's Roundabout Implementation Policy indicates that intersections that satisfy any of the following criteria should be screened utilizing the Roundabout Initial Feasibility Screening Tool:

- At any new City intersection;
- Where traffic signals are warranted; and
- At intersections where capacity or safety problems are being experienced.

As noted in subsequent sections of this report, the Old Montreal Road & Dairy Drive / Aveia Private intersection is expected to experience capacity issues under future traffic conditions. Based on a review of the feasibility of a roundabout at this location, it has been determined that a roundabout would be appropriate at this location and will therefore be considered as a potential means of addressing the capacity issues.

The results of the roundabout feasibility analysis are provided in **Appendix F**.

9.0 Intersection Capacity Analysis

Based on the revised background and total traffic projections, intersection capacity analysis was completed at all study area intersections under Future (2022 & 2027) Background & Total Traffic conditions. All signalized and stop-controlled intersection were analysed using Synchro v11 while roundabouts were analysed using SIDRA Intersections v6.1. The results of the intersection capacity analysis are provided in **Appendix G**.

Analysis Criteria

Signalized Intersections

In qualitative terms, Level of Service (LOS) describes a user's perceived operational conditions of a transportation facility. For vehicular LOS, these conditions are generally defined in terms of delay, speed and travel time, freedom to manoeuvre, traffic interruptions, safety, comfort and convenience. LOS can also be related to the ratio of the volume to capacity (v/c) which is simply the relationship of the traffic volume (either measured or forecast) to the capability of the intersection or road section to accommodate a given traffic volume. This capability varies depending on the factors described above. LOS is given letter designation from A to F. LOS 'A' represents the best operating conditions and LOS 'E' represents the level at which the intersection or an approach to the intersection is carrying the maximum traffic volume that can, practicably, be accommodated. LOS 'F' indicates that the facility is operating beyond its theoretical capacity.

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Table 5 - LOS Thresholds (Signalized)

LEVEL OF SERVICE	VOLUME TO CAPACITY (V/C) RATIO
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.90 to 1.00
F	> 1.00

The City of Ottawa has developed a set of thresholds as part of the Transportation Impact Assessment Guidelines which directly relate the volume to capacity (v/c) ratio of a signalized intersection to a LOS designation, as indicated in **Table 5**.

The intersection capacity analysis technique provides an indication of the LOS for each movement at the intersection under consideration and for the intersection as a whole. The overall v/c ratio for an intersection is defined as the sum of equivalent volumes for all critical movements at the intersection divided by the sum of capacities for all critical movements.

The Level of Service calculation is based on locally-specific parameters as described in the TIA Guidelines and incorporates existing signal timing plans obtained from the City of Ottawa. The analysis of future conditions considers optimized signal timing plans and the use of a Peak Hour Factor (PHF) of 1.0 to recognize peak spreading beyond a 15-minute period in congested conditions.

Unsignalized Intersections

The capacity of an unsignalized intersection can also be expressed in terms of the Level of Service it provides. For an unsignalized intersection, the LOS is described in terms of the average movement delays at the intersection. Delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position. The average delay for any particular minor movement at an unsignalized intersection is a function of the capacity of the approach and the degree of saturation. The overall intersection LOS is representative of the approach with the highest degree of delay.

The Highway Capacity Manual 2010 (HCM), prepared by the Transportation Research Board, includes the following Levels of Service criteria for unsignalized intersections, related to average movement delays at the intersection, as indicated in **Table 6**.

Table 6 - LOS Thresholds (Unsignalized)

LEVEL OF SERVICE	DELAY (SECONDS / VEHICLE)
A	<10
B	>10 and <15
C	>15 and <25
D	>25 and <35
E	>35 and <50
F	>50

The unsignalized intersection capacity analysis technique included in the HCM and used in the current study provides an indication of the Level of Service for each movement of the intersection under consideration. By this technique, the performance of the unsignalized intersection can be compared under varying traffic conditions, using the Level of Service concept in a qualitative sense. One unsignalized intersection can be compared with another unsignalized intersection using this concept. Level of Service 'E' represents the capacity of the movement under consideration and generally, in large urban areas, Level of Service 'D' is considered to represent an acceptable operating condition (Level of Service 'E' is considered an acceptable operating condition for planning purposes for intersections located within Ottawa's Urban Core, Transit-

Oriented Development Zones or Traditional Mainstreet/Design Priority Areas). Level of Service 'F' indicates that the movement is operating beyond its design capacity.

Future (2022) Background Traffic

An intersection capacity analysis has been undertaken using the Future (2022) Background Traffic volumes presented in **Exhibit 3**, yielding the following results:

Table 7 - Intersection Capacity Analysis: Future (2022) Background Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Trim Road & St Joseph Boulevard / Old Montreal Road	Roundabout	D (28.7s)	WBTL (28.7s)	**F (112.9s)**	**SBTL (112.9s)**
Old Montreal Road & Dairy Drive / Aveia Private	Unsignalized	C (21.7s)	SBL (21.7s)	**F (50.8s)**	**SBL (50.8s)**
	Signalized [1]	A (0.46)	WBTR (0.49)	A (0.54)	SBL (0.60)
	Roundabout	B (14.3s)	WBTRL (14.3s)	C (19.3s)	EBTRL (19.3s)
Old Montreal Road & Famille-Laporte Avenue	Unsignalized	B (14.7s)	SBRL (14.7s)	B (11.3s)	SBRL (11.3s)

Notes:

[1] – Includes fully protected eastbound and westbound left-turn phase.

The results of the analysis indicate that the southbound approach of the Trim Road & St Joseph Boulevard / Old Montreal Road roundabout is expected to exceed its theoretical capacity during the weekday afternoon peak hour. As the roundabout was constructed within the past 5 years, it is anticipated that it will remain in its current configuration within the timeframe of this study. As such, subsequent intersection capacity analyses have assumed that no intersection modifications will be implemented at this location.

The Old Montreal Road & Dairy Drive / Aveia Private intersection is also expected to exceed its theoretical capacity during the weekday afternoon peak hour. The implementation of both traffic signals and a roundabout was considered at this intersection, although it should be noted that only a roundabout satisfies the technical warrants at this location. Based on the results of this analysis, the intersection would operate at an acceptable Level of Service (i.e. LOS 'D' or better) under either configuration. Given that there is a bi-directional cycling facility on the northbound leg of the Old Montreal Road & Dairy Drive / Aveia Private intersection, it is recommended that the eastbound and westbound left-turn movements be fully protected in order to minimize vehicle-bicycle conflicts if the intersection were to be signalized.

The intersection of Old Montreal Road & Famille-Laporte Avenue is expected to operate at an acceptable Level of Service (LOS 'D' or better) under Future (2022) Background Traffic conditions as a 3-legged intersection.

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Future (2027) Background Traffic

An intersection capacity analysis has been undertaken using the Future (2027) Background Traffic volumes presented in **Exhibit 4**, yielding the following results:

Table 8 - Intersection Capacity Analysis: Future (2027) Background Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Trim Road & St Joseph Boulevard / Old Montreal Road	Roundabout	D (31.3s)	WBTL (31.3s)	**F (127.7s)**	**SBTL (127.7s)**
Old Montreal Road & Dairy Drive / Aveia Private	Unsignalized	C (16.9s)	SBL (16.9s)	D (26.5s)	SBL (26.5s)
	Signalized [1]	A (0.36)	WBTR (0.38)	A (0.42)	SBL (0.60)
	Roundabout	A (9.9s)	WBTRL (9.9s)	B (11.6s)	EBTRL (11.6s)
Old Montreal Road & Famille-Laporte Avenue	Unsignalized	B (12.3s)	SBTRL (12.3s)	B (10.3s)	SBTRL (10.3s)

Notes:

[1] – Includes fully protected eastbound and westbound left-turn phase.

By 2027, it is expected that a new major collector road will connect Old Montreal Road to Ottawa Road 174 through the Cardinal Creek Village subdivision. Based on the Cardinal Creek Village Phase 1-7 TIS (IBI Group, October 2013), this will result in a redistribution in traffic generated by the Cardinal Creek development which will reduce overall demand on Old Montreal Road. As such, traffic operations at both the Dairy Drive / Aveia Private intersection and the Famille-Laporte Avenue intersection are expected to improve relative to Future (2022) Background Traffic conditions. Intersection Level of Service at the Trim Road & St Joseph Boulevard / Old Montreal Road is expected to deteriorate relative to Future (2022) Background Traffic conditions, however, due to growth on Trim Road which will be less impacted by the new connection to Ottawa Road 174.

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Future (2022) Total Traffic

An intersection capacity analysis has been undertaken using the Future (2022) Total Traffic volumes presented in **Exhibit 5**, yielding the following results:

Table 9 - Intersection Capacity Analysis: Future (2022) Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Trim Road & St Joseph Boulevard / Old Montreal Road	Roundabout	**E (37.1s)**	**WBTL (37.1s)**	**F (152.1s)**	**SBTL (152.1s)**
Old Montreal Road & Dairy Drive / Aveia Private	Unsignalized	D (29.0s)	SBL (29.0s)	**F (148.4s)**	**SBL (148.4s)**
	Signalized [1]	A (0.56)	WBTR (0.60)	B (0.64)	EBTR (0.68)
	Roundabout	C (22.3s)	WBTRL (22.3s)	**E (35.4s)**	**EBTRL (35.4s)**
Old Montreal Road & Famille-Laporte Avenue / Street One	Unsignalized	C (17.7s)	SBTRL (17.7s)	B (12.3s)	SBTRL (12.3s)
Old Montreal Road & Street Two	Unsignalized	C (21.9s)	NBRL (21.9s)	D (34.7s)	NBRL (34.7s)

Notes:

[1] – Assumes fully protected eastbound and westbound left-turn phase will be provided.

Under Future (2022) Total Traffic conditions, the addition of site generated traffic to the Trim Road & St Joseph Boulevard / Old Montreal Road roundabout is expected to exacerbate the weekday peak hour capacity issues observed under background traffic conditions.

As observed under Future (2022) Background Traffic conditions, the Old Montreal Road & Dairy Drive / Aveia Private intersection is expected to experience capacity issues as a stop-controlled intersection. Signalization of the intersection is shown to improve Level of Service to LOS 'D' or better. Replacing the intersection with a roundabout is also shown to improve overall traffic operations, however, the eastbound approach during the afternoon peak hour will begin approaching its theoretical capacity. The overall delay on that approach is just above the threshold for LOS 'E' therefore it is expected that small reductions in traffic volumes would be sufficient to achieve a LOS of 'D'. As such, both traffic signals or a roundabout are considered effective means of addressing the capacity issues anticipated at this intersection.

Both site access intersections are anticipated to operate at an acceptable Level of Service (LOS 'D' or better) under Future (2022) Total Traffic conditions.

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Future (2027) Total Traffic

An intersection capacity analysis has been undertaken using the Future (2027) Total Traffic volumes presented in **Exhibit 6**, yielding the following results:

Table 10 - Intersection Capacity Analysis: Future (2027) Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Trim Road & St Joseph Boulevard / Old Montreal Road	Roundabout	**E (41.3s)**	**WBTL (41.3s)**	**F (168.5s)**	**SBTL (168.5s)**
Old Montreal Road & Dairy Drive / Aveia Private	Unsignalized	C (21.7s)	SBL (21.7s)	**F (52.7s)**	**SBL (52.7s)**
	Signalized [1]	A (0.45)	WBTR (0.48)	A (0.52)	SBL (0.65)
	Roundabout	B (13.6s)	WBTRL (13.6s)	C (16.8s)	EBTRL (16.8s)
Old Montreal Road & Famille-Laporte Avenue / Street One	Unsignalized	B (14.2s)	SBTRL (14.2s)	B (11.1s)	SBTRL (11.1s)
Old Montreal Road & Street Two	Unsignalized	C (17.3s)	NBRL (17.3s)	C (24.7s)	NBRL (24.7s)

Notes:

[1] – Assumes fully protected eastbound and westbound left-turn phase will be provided.

As discussed previously, by 2027 it is anticipated that Cardinal Creek Drive will provide a connection between Old Montreal Road and Ottawa Road 174 through the Cardinal Creek Village subdivision. This is expected to result in a redistribution of traffic from this subdivision, resulting in an overall reduction in traffic volumes on Old Montreal Road. As such, traffic operations at the Dairy Drive / Aveia Private intersection and both site access intersections is expected to improve relative to Future (2022) Total Traffic conditions. Traffic operations at the Trim Road & St Joseph Boulevard / Old Montreal Road intersection is anticipated to deteriorate, however, due to traffic growth on Trim Road.

As illustrated above, as a stop-controlled intersection the Old Montreal Road & Dairy Drive / Aveia Private is expected to exceed its theoretical capacity during the afternoon peak hour. Signalization of the intersection or implementing a roundabout is expected to address these capacity issues.

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Summary of Results

Trim Road & St Joseph Boulevard / Old Montreal Road:

This intersection is currently configured as a two-lane roundabout with auxiliary right-turn slip-lanes on the eastbound and westbound approaches. The intersection capacity analysis indicates that the roundabout is expected to exceed its theoretical capacity under Future (2022 & 2027) Background & Total Traffic conditions. As the roundabout was constructed relatively recently, it is not expected that it will be modified within the timeframe of this study and any improvements can be considered beyond the scope of this study.

Old Montreal Road & Dairy Drive / Aveia Private:

The intersection is currently configured as a two-way stop-controlled intersection with auxiliary left-turn lanes on the eastbound and westbound approaches. Under both Future (2022) Background & Total Traffic conditions, the intersection is expected to exceed its theoretical capacity during the afternoon peak hour. Either signalization of the intersection or the implementation of a roundabout is expected to bring the intersection to an acceptable Level of Service.

By 2027, the planned extension of Cardinal Creek Drive from Old Montreal Road to Ottawa Road 174 is anticipated to be complete resulting in a redistribution of traffic from the Cardinal Creek Village subdivision that will reduce overall traffic volumes on Old Montreal Road. As such, under Future (2027) Background Traffic conditions the intersection will operate at an acceptable Level of Service (i.e. LOS ‘D’ or better). The addition of site-generated traffic will negate some of the reductions expected from the new connection resulting in a similar Level of Service as observed under Future (2022) Background Traffic conditions. Traffic signals or a roundabout are again shown to address the capacity issues.

Given that the intersection meets the suitability criteria for a roundabout and does not meet the traffic signal warrants, it is recommended that consideration be given to implementing a roundabout at this location despite its slightly diminished overall performance as compared to traffic signals. It is important to note that the capacity issues at this location are an existing condition primarily the result of background traffic volumes associated with the Trim Park and Ride as well as extensive development in the broader area.

Old Montreal Road & Famille-Laporte Avenue / Street One:

Under Future (2022 & 2027) Background Traffic conditions, this intersection is anticipated to operate at an acceptable Level of Service (i.e. LOS ‘D’ or better) as an unsignalized intersection. Under Future (2022 & 2027) Total Traffic conditions, the addition of site-generated traffic is expected to slightly increase delays at the intersection, however the intersection is anticipated to continue operating at an acceptable Level of Service (i.e. LOS ‘D’ or better) as an unsignalized intersection.

Old Montreal Road & Street Two:

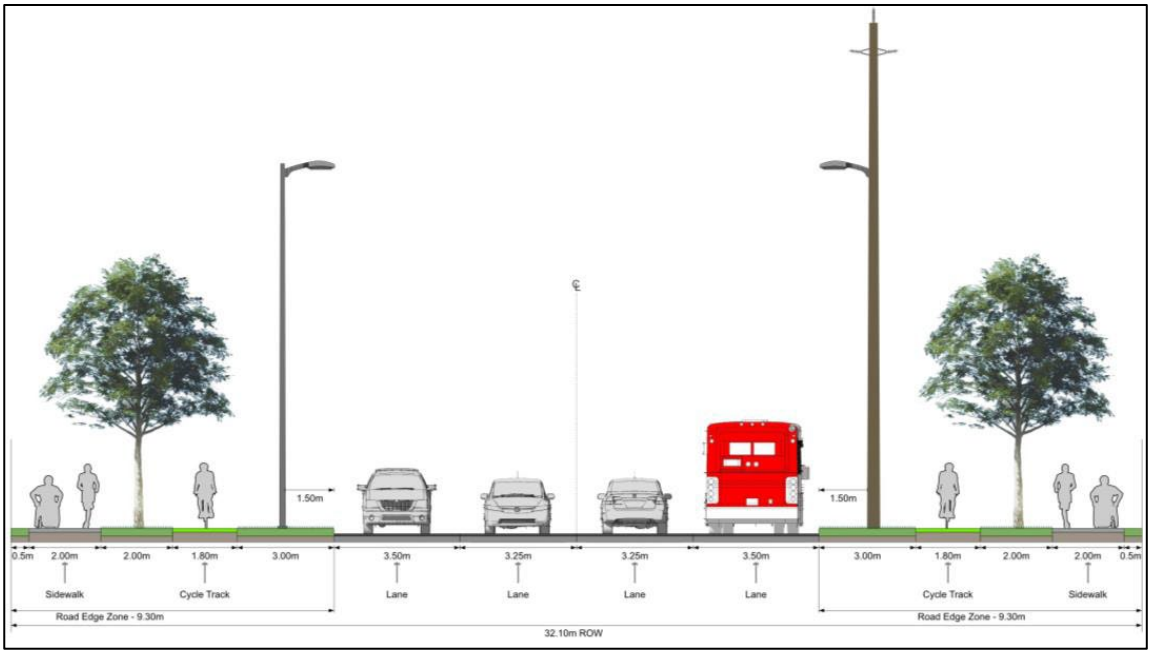
The intersection capacity analysis indicates that this intersection is expected to operate at an acceptable Level of Service (i.e. LOS ‘D’ or better) as an unsignalized intersection under all future scenarios.

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

10.0 Multi-Modal Level of Service

Segment-based Multi-Modal Level of Service (MMLOS) analysis was completed for the segment of Old Montreal Road adjacent to the site under Existing (2020), Future (2027) and Ultimate (Beyond 2031) conditions. Under Future (2027) conditions, a 1.5m wide (site frontage only) asphalt sidewalk and continuous on-road cycling facility will be provided along the south side of Old Montreal Road, while the roadway cross-section illustrated in **Figure 1** will be implemented on Old Montreal Road beyond the City's 2031 ultimate planning horizon year.

Figure 1 - City of Ottawa Arterial Road Concept



The results of the segment-based MMLOS analysis are summarized in **Table 11**. Details of the MMLOS analysis are provided in **Appendix H**.

Table 11 - Segment-Based MMLOS Results

SCENARIO	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS) TARGET: C	BICYCLE (BLOS) TARGET: C	TRANSIT (TLOS) TARGET: N/A[1]	TRUCK (TkLOS) TARGET: D
Existing (2020)	F	E	D	C
Future (2027)	E	E	D	C
Ultimate (Beyond 2031)	D	A	D	A

Notes:

[1] – Old Montreal Road is not identified as a transit priority corridor in the TMP therefore there is no TLOS target.

As indicated above, both the PLOS and BLOS targets are not met under Existing (2020) conditions as a result of limited active transportation facilities. Under Future (2027) conditions, the addition

of a sidewalk and a continuous on-road bicycle facility on the south side of Old Montreal Road along the site frontage is anticipated to improve the PLOS, however, further improvements would be required to reach the PLOS target, in particular system connectivity along the extent of Old Montreal Road corridor. Following the four-lane widening of Old Montreal Road, it is anticipated that all MMLOS targets will be met with the exception of the PLOS target. Based on the analysis, a reduction in operating speeds on Old Montreal Road to 60 km/h or less would result in a PLOS of 'C'.

11.0 Auxiliary Lane Warrant Analysis

Auxiliary left-turn lane warrant analysis was completed for both the Street One access intersection and the Street Two access intersection. As westbound left-turn volumes at both intersections represent less than 1% to 2% of approach volumes, an auxiliary left-turn lane is not warranted at either location.

The Transportation Association of Canada (TAC) suggests that auxiliary right-turn lanes should be considered "when the volume of decelerating or accelerating vehicles compared with through vehicles causes undue hazard." Consideration for auxiliary right-turn lanes is typically given when the right-turning traffic exceeds 10% of the through volume and is at least 60 vehicles per hour. Based on projected Future (2027) Traffic volumes, an auxiliary right-turn lane on the eastbound approach of the Old Montreal & Street Two intersection will be required as the volume of right-turning traffic is expected to be in the order of 90 vehicles during the weekday afternoon peak hour. Based on a design speed of 70 km/h (posted speed limit plus 10 km/h) and 3.5m lane widths, the auxiliary right-turn lane would require a taper length of 60m and a parallel lane of 20m. This has been shown in the attached functional design drawings in **Appendix I**.

12.0 Site Access Review

The proposed development will provide one (1) one-way private approach on Old Montreal Road (Street One) as well as a two-way local road (Street Two). Street Two will become a public roadway and, as such, the requirements of the City of Ottawa Private Approach By-law are not applicable. The proposed Street One access, however, is a private roadway and has been designed in conformance with the City of Ottawa Private Approach By-law 2003-447, with particular confirmation of the following items:

- Width: A private approach shall have a minimum width of 2.4m and a maximum width of 9.0m.
    - The Street One private approach at the Old Montreal/Famille Laporte intersection will be 4.25m wide, appropriate for one-way flow. ✓
- Quantity and Spacing of Private Approaches: For sites with frontage between 46 and 150 metres, one (1) two-way private approach and two (2) one-way private approaches, or two (2) two-way private approaches are permitted. For each additional 90m of frontage in excess of 150m, an additional two-way approach or two (2) additional one-way approaches are permitted. Any two private approaches must be separated by at least 9.0m and can be reduced to 2.0m in the case of two one-way driveways. On lots that abut more than one roadway, these provisions apply to each frontage separately.
    - The frontage on Old Montreal Road is approximately 264m, therefore the one (1) one-way private approach is compliant with the by-law. ✓
- Distance from Property Line: Private approaches must be at least 3.0m from the abutting property line, however this requirement can be reduced to 0.3m provided that the access

is a safe distance from the access serving the adjacent property, sight lines are adequate and that it does not create a traffic hazard.

  - The proposed Street One private approach will be more than 3.0m from the abutting property line. ✓

- Distance from Nearest Intersecting Street Line: For apartment buildings with more than 300 parking spaces located on a parcel adjacent to or within 46m of an arterial or major collector, all private approaches must be a minimum of 60m from the nearest intersecting street line.

  - The Street One private approach is directly opposite of Famille-Laporte Avenue and therefore the distance to this roadway can be disregarded. The next nearest intersecting street line is more than 60m away. ✓

- Distance from Any Other Private Approach: For apartment buildings with more than 300 parking spaces located on a parcel adjacent to or within 46m of an arterial or major collector, all two-way private approaches must be a minimum of 60m from the any other private approach.

  - There are several other private approaches within 60m of the proposed private approach, however, as they are all associated with single-family homes it is anticipated that this will not result in any safety or operational issues. ✓

The Geometric Design Guide for Canadian Road indicates the clear throat length required for apartment complexes based on the number of apartment units. The two parking garage entrances on the Street One approach provide access to half of the parking spaces of the four apartment blocks adjacent to Old Montreal Road, and as such provide parking for approximately 95 apartment units. For less than 100 apartment units, a minimum clear throat length of 15m is recommended which is less than the 22m provided on Street One.

As both site access intersections require modifications to public roadways, draft Roadway Modification Approval (RMA) drawings have been prepared and presented in **Appendix I**.

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

13.0 Conclusion

A Transportation Impact Assessment (TIA) was previously prepared by WSP Global Inc. in March 2018 in support of the proposed residential development at 1154-1208 Old Montreal Road. Based on the circulation comments from the City of Ottawa, the Plan of Subdivision has been since revised. IBI Group was retained by DCR Phoenix Development Corporation Ltd. to prepare a TIA Update to address the outstanding transportation-related comments to support the approval of this development application.

The revised Plan of Subdivision now includes only two access intersections on Old Montreal Road, one of which is restricted to inbound traffic only, and has reduced the number of apartment units while doubling the number of low-density residential units. Pedestrian and cycling facilities have been provided throughout the development in the form of concrete and asphalt sidewalks, pedestrian pathways and a 3.0m wide multi-use pathway along the southern boundary of the property. In addition to this, cycling and pedestrian facilities have been proposed along the Old Montreal Road frontage, including a continuous on-road bicycle facility and a pedestrian crossover (PXO) to facilitate access to public transportation.

Based on the current Plan of Subdivision, the number of person-trips generated by the proposed development is anticipated to be in the order of 360 and 450 two-way person-trips during the weekday morning and afternoon peak hour. This represents a decrease of approximately 30 to 100 person-trips relative to the previous submission. Approximately 220 to 270 two-way vehicle-trips and 70 to 90 two-way transit-trips are expected to be generated by the proposed development during the weekday morning and afternoon peak hours.

Future (2022 & 2027) Background & Total Traffic volumes were developed using the latest intersection traffic counts available from the City of Ottawa. Based on these revised traffic projections, none of the study area intersections were found to meet the technical warrants for signalization, however, the Old Montreal Road & Dairy Drive / Aveia Private intersection was found to meet the criteria for the implementation of a roundabout.

Significant capacity issues were observed under Future (2022) Background & Total Traffic conditions at the Old Montreal Road & Dairy Drive / Aveia Private intersection which were shown to be addressed by the implementation of a roundabout at this location. By 2027, Cardinal Creek Drive is expected to be extended from Old Montreal Road to Ottawa Road 174 resulting in a redistribution of traffic from the Cardinal Creek Village subdivision. This will reduce overall traffic volumes on Old Montreal Road; however, the addition of site-generated traffic will negate any operational benefits that this will provide. Although traffic signals are shown to provide better operational performance, they do not meet the minimum warrants. It is therefore recommended that a roundabout be considered by the City as an alternate mitigation measure to address the existing capacity issues and future traffic demand at the Old Montreal Road & Dairy Drive / Aveia Private intersection.

The Trim Road & St Joseph Boulevard / Old Montreal Road intersection was also shown to exceed its theoretical capacity under all traffic conditions. Given that the roundabout was only constructed within the past 5 years, it is not expected that it will be modified within the timeframe of this study.

Both site access intersections were found to operate at an acceptable Level of Service (i.e. LOS ‘D’ or better) under Future (2022 & 2027) Total Traffic conditions. In order to facilitate access to nearby transit stops and provide a safe crossing for developments on both sides of Old Montreal Road, it is recommended that a PXO be provided at the intersection of Old Montreal Road & Famille-Laporte Avenue / Street One and that an additional bus stop be located on Famille Laporte Avenue in the northbound direction.

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

A review of pre-pandemic transit ridership and park-and-ride capacity confirmed that the projected demand generated by the proposed development can be accommodated. Multi-Modal Level of Service (MMLOS) analysis was completed for the segment of Old Montreal Road adjacent to the site and at all intersections where traffic signals are operationally required. The results of the segment-based MMLOS analysis largely mirrors the MMLOS results reported in the March 2018 TIA. Potential measures to address MMLOS deficiencies were identified. It should be noted that these deficiencies are not expected to be exacerbated by the addition of site-generated traffic.

Auxiliary lane analysis indicated that the following new auxiliary lanes will be required to accommodate future (2027) total traffic conditions:

- An eastbound right-turn lane with a 60m taper and 20m of parallel lane is warranted at the Old Montreal Road & Street Two intersection.

The Street One private approach was assessed to determine its conformance with applicable by-laws and design guidelines. Based on this review, no adjustments to the private approach are required to conform to by-laws or design guidelines.

Based on the findings of this study, it is the overall opinion of IBI Group that the proposed development will integrate well with and can be safely accommodated by the adjacent transportation network with the recommended actions and modifications in place.

Prepared By:

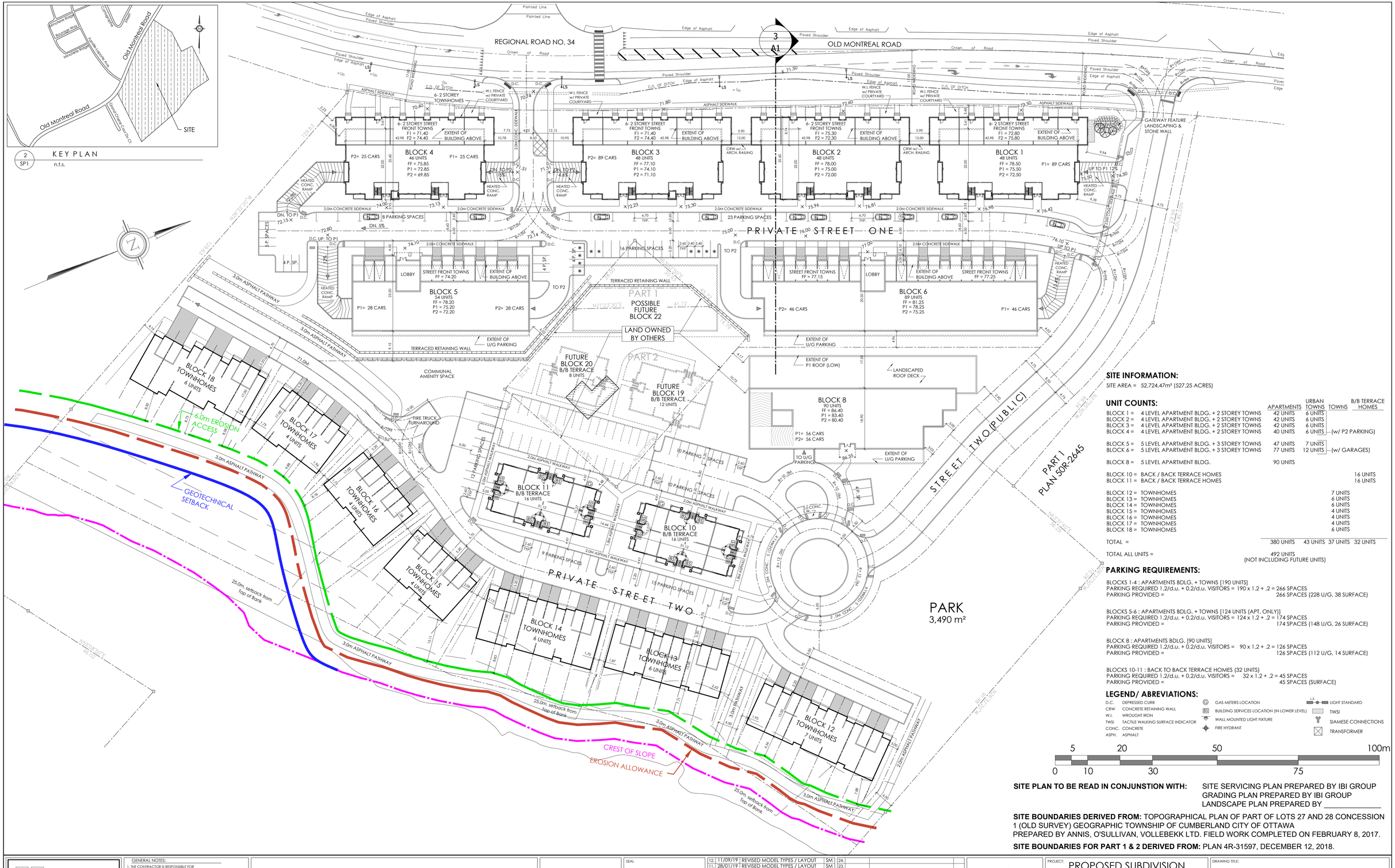
Eric McLaren, EIT

Reviewed By:

David Hook, P.Eng.

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Appendix A – Plan of Subdivision



SITE INFORMATION:

SITE AREA = 52,724.47m² (527.25 ACRES)

UNIT COUNTS:

		APARTMENTS	URBAN TOWNS	TOWNS	B/B TERRACE HOMES
BLOCK 1 =	4 LEVEL APARTMENT BLDG. + 2 STOREY TOWNS	42 UNITS	6 UNITS		
BLOCK 2 =	4 LEVEL APARTMENT BLDG. + 2 STOREY TOWNS	42 UNITS	6 UNITS		
BLOCK 3 =	4 LEVEL APARTMENT BLDG. + 2 STOREY TOWNS	42 UNITS	6 UNITS		
BLOCK 4 =	4 LEVEL APARTMENT BLDG. + 2 STOREY TOWNS	40 UNITS	6 UNITS — (w/ P2 PARKING)		
BLOCK 5 =	5 LEVEL APARTMENT BLDG. + 3 STOREY TOWNS	47 UNITS	7 UNITS		
BLOCK 6 =	5 LEVEL APARTMENT BLDG. + 3 STOREY TOWNS	77 UNITS	12 UNITS — (w/ GARAGES)		
BLOCK 8 =	5 LEVEL APARTMENT BLDG.	90 UNITS			
BLOCK 10 =	BACK / BACK TERRACE HOMES				16 UNITS
BLOCK 11 =	BACK / BACK TERRACE HOMES				16 UNITS
BLOCK 12 =	TOWNHOMES			7 UNITS	
BLOCK 13 =	TOWNHOMES			6 UNITS	
BLOCK 14 =	TOWNHOMES			6 UNITS	
BLOCK 15 =	TOWNHOMES			4 UNITS	
BLOCK 16 =	TOWNHOMES			4 UNITS	
BLOCK 17 =	TOWNHOMES			4 UNITS	
BLOCK 18 =	TOWNHOMES			6 UNITS	
TOTAL =		380 UNITS	43 UNITS	37 UNITS	32 UNITS
TOTAL ALL UNITS =		492 UNITS (NOT INCLUDING FUTURE UNITS)			

PARKING REQUIREMENTS:

BLOCKS 1-4 : APARTMENTS BDLG. + TOWNS [190 UNITS]
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 190 x 1.2 + .2 = 266 SPACES
PARKING PROVIDED = 266 SPACES (228 U/G, 38 SURFACE)

BLOCKS 5-6 : APARTMENTS BDLG. + TOWNS [124 UNITS (APT. ONLY)]
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 124 x 1.2 + .2 = 174 SPACES
PARKING PROVIDED = 174 SPACES (148 U/G, 26 SURFACE)

BLOCK 8 : APARTMENTS BDLG. [90 UNITS]
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 90 x 1.2 + .2 = 126 SPACES
PARKING PROVIDED = 126 SPACES (112 U/G, 14 SURFACE)

BLOCKS 10-11 : BACK TO BACK TERRACE HOMES (32 UNITS)
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 32 x 1.2 + .2 = 45 SPACES
PARKING PROVIDED = 45 SPACES (SURFACE)

LEGEND/ ABREVIATIONS:

D.C.	DEPRESSED CURB
CRW	CONCRETE RETAINING WALL
W.I.	WROUGHT IRON
TWSI	TACTILE WALKING SURFACE INDICATOR
CONC.	CONCRETE
ASPH.	ASPHALT
G	GAS METERS LOCATION
BS	BUILDING SERVICES LOCATION (IN LOWER LEVEL)
	WALL MOUNTED LIGHT FIXTURE
	FIRE HYDRANT
L.S.	LIGHT STANDARD
▨	TWSI
Y	SIAMESE CONNECTIONS
☒	TRANSFORMER

SITE PLAN TO BE READ IN CONJUNSTION WITH: SITE SERVICING PLAN PREPARED BY IBI GROUP
GRADING PLAN PREPARED BY IBI GROUP
LANDSCAPE PLAN PREPARED BY ____________

SITE BOUNDARIES DERIVED FROM: TOPOGRAPHICAL PLAN OF PART OF LOTS 27 AND 28 CONCESSION 1 (OLD SURVEY) GEOGRAPHIC TOWNSHIP OF CUMBERLAND CITY OF OTTAWA PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. FIELD WORK COMPLETED ON FEBRUARY 8, 2017.

SITE BOUNDARIES FOR PART 1 & 2 DERIVED FROM: PLAN 4R-31597, DECEMBER 12, 2018.

M. David Blakely
Architect Inc.
2200 Prince of Wales Dr. Suite 101 Ottawa, Ontario
Phone (613) 226-8811 Fax (613) 226-7942 k2E 6Z9

GENERAL NOTES:
1. THE CONTRACTOR IS RESPONSIBLE FOR CHECKING AND VERIFYING ALL DIMENSIONS, ANY DISCREPANCY MUST BE REPORTED TO M. DAVID BLAKELY ARCHITECT INC.
2. ALL WORK AND MATERIALS TO BE IN COMPLAINCE WITH ALL CODES, REGULATIONS, & BY-LAWS
3. ADDITIONAL DRAWINGS MAY BE ISSUED FOR CLARIFICATION TO ASSIST THE PROPER EXECUTION OF WORK. SUCH DRAWINGS WILL HAVE THE SAME MEANING AND INTENT AS IF THEY WERE INCLUDED WITH THE PLANS IN CONTRACT DOCUMENTS
4. DO NOT SCALE DRAWINGS.
5. THIS DRAWING SHALL NOT BE USED OR COPIED WITHOUT THE AUTHORIZATION OF THE ARCHITECT
6. THIS DRAWING SHALL NOT BE USED FOR PERMIT OR CONSTRUCTION UNLESS THE DRAWING BEARS THE ARCHITECT'S SEAL AND SIGNATURE

CONSTRUCTION NORTH

SEAL

REVISIONS

No.	DATE	DESCRIPTION	INIT.
24.			
23.			
22.			
21.			
20.			
19.			
18.	10/02/21	SIDEWALK @ PVT. STREET 2 DELETED	MB
17.	05/02/21	OLD. MTL. RD. GEOMETRY UPDATED	MB
16.	29/01/21	BOUNDARIES UPDATED/ PARTS 1&2	MB
15.	03/11/20	GEOTECHNICAL ADDED	MB
14.	13/07/20	BLKS. 5,6,& 8 REVISED/ GRADES REVISED	MB
13.	04/12/19	REVISED BLDG. FOOTPRINTS / LAYOUT	MB
12.	11/09/19	REVISED MODEL TYPES / LAYOUT	SM
11.	28/01/19	REVISED MODEL TYPES / LAYOUT	SM
10.	08/01/19	CONTOUR LINES ADDED	SM
9.	13/06/18	REVISED BLOCKS 1-4	SM
8.	05/04/18	ADDED SCALE TO SECTION	SM
7.	04/01/18	REVISED BLOCK LOCATIONS	SM
6.	28/09/17	REVISED SITE BOUNDARIES	SM
5.	20/09/17	REVISED SITE LAYOUT	SM
4.	05/07/17	REVISED UNIT TYPES	SM
3.	13/04/17	REVISED SITE LAYOUT	SM
2.	21/12/16	REVISED 36 UNIT BLOCK LAYOUT	SM
1.	30/11/16	FOR REVIEW	SM

A
B C
A - DETAIL NUMBER
B - SHEET NUMBER (DETAIL REQUIRED)
C - SHEET NUMBER (DETAIL LOCATION)

PROJECT:
PROPOSED SUBDIVISION
OLD MONTREAL ROAD
OTTAWA, ONTARIO.

CLIENT:
PHOENIX HOMES
18A Bentley Ave Ottawa, ON K2E 6T8

DRAWING TITLE:
SITE PLAN

DATE: NOV., 2016
SCALE: 1:500
DRAWN BY: SBM
CHECKED: MDB
SHEET No. REV No.: SP-1

IBI GROUP MEMORANDUM

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Appendix B – Collision Data

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2012 **To:** December 31, 2016

Location: AVEIA PRIV/DAIRY DR @ OLD MONTREAL RD

Traffic Control: Stop sign **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Jul-11, Sat,12:11	Clear	SMV other	Non-fatal injury	Dry	East	Going ahead	Motorcycle	Skidding/sliding	0

Location: FRANK KENNY RD/TED KELLY LANE @ OLD MONTREAL R

Traffic Control: Stop sign **Total Collisions:** 5

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2013-Feb-02, Sat,17:50	Snow	Rear end	P.D. only	Ice	North	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2013-May-30, Thu,17:33	Clear	Angle	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2014-Feb-06, Thu,11:38	Clear	Angle	Non-fatal injury	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2014-Jun-22, Sun,18:40	Clear	Angle	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Sep-20, Sat,16:40	Rain	SMV other	Non-fatal injury	Wet	West	Going ahead	Automobile, station wagon	Skidding/sliding	0

Location: OLD MONTREAL RD @ GRAND-CHENE, COUR DU CRT

Traffic Control: Stop sign **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2012-Apr-18, Wed,11:21	Clear	SMV other	P.D. only	Dry	West	Turning left	Automobile, station wagon	Skidding/sliding	0

Location: OLD MONTREAL RD btwn GRAND-CH-NE, COUR DU CRT & TED KELLY LANE

Traffic Control: No control **Total Collisions:** 16

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2012-Jan-06, Fri,09:28	Snow	SMV other	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Ran off road	0

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2012 **To:** December 31, 2016

Location: OLD MONTREAL RD btwn GRAND-CH-NE, COUR DU CRT & TED KELLY LANE

Traffic Control: No control **Total Collisions:** 16

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2012-Jul-05, Thu,15:23	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Pulling onto shoulder or toward curb	Pick-up truck	Other motor vehicle	
2012-Nov-28, Wed,06:14	Freezing Rain	SMV other	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Skidding/sliding	0
2012-Dec-02, Sun,22:14	Rain	SMV other	Non-fatal injury	Wet	West	Going ahead	Automobile, station wagon	Skidding/sliding	0
2012-Dec-20, Thu,22:10	Drifting Snow	SMV other	P.D. only	Loose snow	East	Going ahead	Passenger van	Skidding/sliding	0
2013-Feb-19, Tue,22:00	Clear	Approaching	P.D. only	Loose snow	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Apr-28, Sun,14:10	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2013-Jun-21, Fri,07:30	Clear	SMV other	P.D. only	Dry	West	Going ahead	Delivery van	Animal - wild	0
2014-Jan-14, Tue,20:11	Clear	SMV other	Non-fatal injury	Ice	East	Going ahead	Automobile, station wagon	Skidding/sliding	0
2014-Jan-16, Thu,10:58	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Ran off road	0
2014-Feb-26, Wed,07:51	Clear	SMV other	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Skidding/sliding	0
2014-Feb-27, Thu,07:01	Snow	SMV other	Non-fatal injury	Loose snow	West	Going ahead	Automobile, station wagon	Skidding/sliding	0
2014-Apr-18, Fri,19:51	Rain	SMV other	P.D. only	Wet	West	Going ahead	Automobile, station wagon	Ran off road	0
2014-Sep-29, Mon,16:07	Clear	SMV other	Non-fatal injury	Dry	West	Going ahead	Pick-up truck	Ran off road	0
2015-Jan-15, Thu,22:52	Snow	SMV other	P.D. only	Packed snow	East	Going ahead	Automobile, station wagon	Other	0
2015-Aug-12, Wed,18:27	Clear	SMV other	P.D. only	Dry	South	Turning right	Truck and trailer	Pole (utility, power)	0

Location: ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Traffic Control: Traffic signal **Total Collisions:** 83

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2012 **To:** December 31, 2016

Location: ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Traffic Control: Traffic signal **Total Collisions:** 83

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2012-Jan-06, Fri,09:30	Clear	Rear end	Non-fatal injury	Wet	South	Going ahead	Delivery van	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2012-Jan-21, Sat,10:00	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2012-Jan-22, Sun,09:30	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Passenger van	Skidding/sliding	0
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2012-Feb-29, Wed,11:30	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	0
					South	Stopped	Passenger van	Other motor vehicle	
2012-May-24, Thu,16:35	Clear	Turning movement	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2012-Jun-02, Sat,13:13	Rain	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Skidding/sliding	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2012-Aug-06, Mon,17:06	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2012-Sep-04, Tue,15:06	Rain	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2012-Sep-04, Tue,15:15	Rain	Rear end	Non-fatal injury	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2012-Sep-13, Thu,17:55	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					South	Stopped	Pick-up truck	Other motor vehicle	
2012-Oct-13, Sat,15:48	Clear	Rear end	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Pick-up truck	Other motor vehicle	

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From: January 1, 2012 **To:** December 31, 2016

Location: ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Traffic Control: Traffic signal **Total Collisions:** 83

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2012-Oct-22, Mon,07:46	Clear	Rear end	P.D. only	Dry	South	Going ahead	Municipal transit bus	Other motor vehicle	0
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2012-Oct-31, Wed,10:40	Rain	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Stopped	Pick-up truck	Other motor vehicle	
2013-Jan-01, Tue,20:20	Clear	Rear end	P.D. only	Other	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2013-Feb-04, Mon,06:50	Clear	Rear end	Non-fatal injury	Wet	North	Slowing or stopping	Passenger van	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2013-Feb-07, Thu,14:35	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Passenger van	Other motor vehicle	
2013-Apr-02, Tue,11:33	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Pick-up truck	Other motor vehicle	
2013-Jun-07, Fri,16:35	Rain	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Slowing or stopping	Pick-up truck	Other motor vehicle	
2013-Jul-04, Thu,19:56	Clear	SMV other	Non-fatal injury	Wet	North	Slowing or stopping	Motorcycle	Skidding/sliding	0
2013-Aug-14, Wed,18:32	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Skidding/sliding	0
					South	Stopped	Pick-up truck	Other motor vehicle	
2013-Oct-15, Tue,14:45	Clear	Rear end	Non-fatal injury	Dry	South	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2013-Oct-24, Thu,20:00	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2013-Nov-14, Thu,16:01	Clear	Rear end	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Slowing or stopping	Pick-up truck	Other motor vehicle	

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Collision Details Report - Public Version

From: January 1, 2012 **To:** December 31, 2016

Location: ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Traffic Control: Traffic signal **Total Collisions:** 83

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2013-Nov-15, Fri,09:18	Rain	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Skidding/sliding	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2013-Dec-13, Fri,09:27	Clear	Rear end	P.D. only	Ice	South	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2013-Dec-19, Thu,17:45	Clear	Angle	P.D. only	Wet	East	Turning right	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Passenger van	Other motor vehicle	
2013-Dec-23, Mon,14:20	Clear	Sideswipe	P.D. only	Wet	North	Turning left	Unknown	Other motor vehicle	0
					North	Stopped	Passenger van	Other motor vehicle	
2014-Feb-03, Mon,16:44	Clear	Rear end	Non-fatal injury	Packed snow	North	Slowing or stopping	Passenger van	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Feb-05, Wed,10:46	Clear	Rear end	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2014-Mar-04, Tue,08:13	Clear	Rear end	Non-fatal injury	Packed snow	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Passenger van	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Apr-05, Sat,11:30	Rain	Rear end	P.D. only	Wet	North	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2014-Apr-10, Thu,13:05	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Passenger van	Other motor vehicle	
2014-Jun-03, Tue,16:01	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Truck - dump	Other motor vehicle	0
					North	Stopped	Passenger van	Other motor vehicle	
2014-Jun-12, Thu,13:25	Rain	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	

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Collision Details Report - Public Version

From: January 1, 2012 **To:** December 31, 2016

Location: ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Traffic Control: Traffic signal **Total Collisions:** 83

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Oct-16, Thu,18:00	Rain	Rear end	P.D. only	Wet	West	Going ahead	Pick-up truck	Other motor vehicle	0
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2014-Oct-27, Mon,15:56	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Nov-05, Wed,06:57	Clear	Turning movement	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Turning left	Pick-up truck	Other motor vehicle	
2014-Dec-13, Sat,12:53	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Dec-17, Wed,15:59	Rain	Angle	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Dec-22, Mon,15:15	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Pick-up truck	Other motor vehicle	
2015-Jan-31, Sat,10:17	Clear	Angle	P.D. only	Dry	South	Merging	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2015-Feb-01, Sun,13:33	Clear	Angle	P.D. only	Ice	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Feb-20, Fri,17:42	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2015-Apr-19, Sun,13:35	Clear	Angle	P.D. only	Dry	South	Merging	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2015-May-29, Fri,12:07	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Curb	0
2015-Jun-12, Fri,14:39	Rain	SMV other	Non-fatal injury	Wet	West	Turning right	Passenger van	Pedestrian	1
2015-Jun-25, Thu,11:41	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Pick-up truck	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2012 **To:** December 31, 2016

Location: ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Traffic Control: Roundabout **Total Collisions:** 83

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Aug-18, Tue,09:10	Clear	Angle	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Oct-01, Thu,12:55	Clear	Angle	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Oct-29, Thu,17:06	Clear	Sideswipe	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Oct-30, Fri,13:45	Clear	Sideswipe	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Pick-up truck	Other motor vehicle	
2015-Nov-08, Sun,11:58	Clear	Sideswipe	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	0
					South	Going ahead	Pick-up truck	Other motor vehicle	
2015-Nov-12, Thu,23:28	Rain	Sideswipe	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Nov-26, Thu,07:51	Clear	Angle	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Going ahead	Passenger van	Other motor vehicle	
2015-Dec-04, Fri,07:06	Snow	Sideswipe	P.D. only	Wet	North	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Dec-10, Thu,14:24	Clear	Sideswipe	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Pick-up truck	Other motor vehicle	
2015-Dec-11, Fri,13:26	Clear	Angle	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Going ahead	Pick-up truck	Other motor vehicle	
2015-Dec-28, Mon,14:33	Clear	Sideswipe	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2016-Feb-16, Tue,11:49	Snow	SMV other	P.D. only	Loose snow	North	Going ahead	Automobile, station wagon	Pole (sign, parking meter)	0

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2012 **To:** December 31, 2016

Location: ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Traffic Control: Roundabout **Total Collisions:** 83

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Mar-17, Thu,16:35	Clear	Rear end	Non-fatal injury	Wet	East	Going ahead	Municipal transit bus	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Apr-06, Wed,19:26	Snow	SMV other	P.D. only	Loose snow	North	Going ahead	Pick-up truck	Curb	0
2016-Apr-13, Wed,13:26	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	0
					South	Going ahead	Pick-up truck	Other motor vehicle	
2016-May-01, Sun,12:10	Rain	SMV other	P.D. only	Wet	East	Turning right	Automobile, station wagon	Skidding/sliding	0
2016-May-10, Tue,12:01	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-May-23, Mon,14:21	Clear	Angle	P.D. only	Dry	West	Going ahead	Passenger van	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Jun-02, Thu,16:55	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2016-Jun-04, Sat,13:19	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Jun-16, Thu,06:52	Clear	Angle	P.D. only	Dry	South	Going ahead	Truck and trailer	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2016-Jun-17, Fri,15:50	Clear	Angle	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Jun-24, Fri,15:55	Clear	Sideswipe	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Jun-29, Wed,20:15	Clear	Angle	Non-fatal injury	Dry	East	Going ahead	Motorcycle	Other motor vehicle	0
					South	Going ahead	Pick-up truck	Other motor vehicle	
2016-Jul-05, Tue,14:49	Clear	Sideswipe	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Pick-up truck	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2012 **To:** December 31, 2016

Location: ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Traffic Control: Roundabout **Total Collisions:** 83

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Jul-11, Mon,14:55	Clear	Angle	P.D. only	Dry	South	Merging	Passenger van	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Aug-02, Tue,15:01	Clear	Angle	P.D. only	Dry	South	Merging	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Aug-08, Mon,12:38	Clear	Angle	P.D. only	Dry	East	Merging	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Pick-up truck	Other motor vehicle	
2016-Aug-11, Thu,10:30	Clear	Sideswipe	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Going ahead	Pick-up truck	Other motor vehicle	
2016-Aug-12, Fri,22:40	Clear	Sideswipe	P.D. only	Dry	West	Going ahead	Unknown	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2016-Aug-22, Mon,07:33	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Pick-up truck	Other motor vehicle	
2016-Sep-03, Sat,13:08	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Slowing or stopping	Pick-up truck	Other motor vehicle	
2016-Sep-12, Mon,08:48	Clear	Angle	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Sep-25, Sun,12:50	Clear	Angle	P.D. only	Dry	South	Merging	Pick-up truck	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2016-Oct-25, Tue,10:44	Clear	Angle	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Nov-14, Mon,14:08	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Pick-up truck	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	

IBI GROUP MEMORANDUM

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Appendix C – Trip Generation Data

Table 3.12: Person Trip Generation Rates – (all households with residents not older than 55 years of age)

Person Trip Generation Rates
All Households with persons 55 years of age or less
AM and PM Peak Hours

Dwelling Unit Types \ Geographic Areas		Core Area Person Trip Rate	Core Area %▽	Urban Area (Inside the greenbelt) Person Trip Rate	Urban Area %▽	Suburban (Outside the greenbelt) Person Trip Rate	Suburban %▽	Rural Person Trip Rate	Rural %▽	All Areas Person Trip Rate
Single detached:	AM	0.85	- 7%	0.99	+ 9%	0.94	+ 3%	0.78	- 14%	0.91
	PM	0.74	- 3%	0.75	- 1%	0.79	+ 4%	0.71	- 7%	0.76
Semi-detached:	AM	0.79	- 10%	0.97	10%	0.89	+ 1%	0.64	- 27%	0.88
	PM	0.74	- 1%	0.68	- 9%	0.82	+ 9%	0.60	- 20%	0.75
Row Townhouse:	AM	0.71	- 3%	0.78	+ 7%	0.67	- 8%	0.74	+ 1%	0.73
	PM	0.62	- 3%	0.60	- 6%	0.69	+ 8%	0.56	- 13%	0.64
Apartment:	AM	0.48	- 4%	0.51	+ 2%	0.53	+ 6%	0.36	- 28%	0.50
	PM	0.45	0%	0.42	- 7%	0.52	+ 16%	0.52	+ 16%	0.45
All Types:	AM	0.62	- 23%	0.82	+ 2%	0.86	+ 8%	0.76	- 5%	0.80
	PM	0.57	- 16%	0.63	- 7%	0.75	+ 10%	0.69	+ 1%	0.68

Note: 5 % (+ or -) represents the percentage delta change in trip rate when compared against the average trip rate across all geographic areas

Table 3.13: Mode Shares - (all households with residents not older than 55 years of age)

Reported Mode Shares
All Households with persons 55 years of age or less
AM and PM Peak Hours

Dwelling Unit Types \ Geographic Areas		Core Area Vehicle Trips	Core Area Transit Share	Core Area Non-Motorised	Urban Area (Inside the greenbelt) Vehicle Trips	Urban Area Transit Share	Urban Area Non-Motorised	Suburban (Outside the greenbelt) Vehicle Trips	Suburban Transit Share	Suburban Non-Motorised	Rural * Vehicle Trips	Rural * Transit Share	Rural * Non-Motorised	All Areas Vehicle Trips	All Areas Transit Share	All Areas Non-Motorised
Single - Detached:	AM	35%	20%	33%	51%	26%	11%	55%	25%	9%	60%	27%	4%	54%	25%	10%
	PM	45%	11%	32%	58%	19%	13%	64%	19%	6%	73%	13%	2%	63%	17%	8%
Semi-Detached:	AM	38%	30%	26%	44%	35%	10%	52%	24%	12%	64%	27%	5%	49%	28%	12%
	PM	36%	20%	34%	51%	27%	13%	62%	17%	7%	77%	12%	1%	58%	20%	10%
Row / Townhouse:	AM	33%	22%	40%	45%	34%	10%	55%	27%	8%	73%	15%	3%	49%	30%	11%
	PM	39%	15%	42%	53%	28%	8%	61%	22%	6%	74%	15%	1%	57%	24%	9%
Apartment:	AM	27%	27%	43%	37%	41%	14%	44%	34%	13%	76%	8%	16%	36%	35%	23%
	PM	23%	29%	42%	40%	37%	14%	44%	33%	9%	48%	4%	17%	35%	33%	23%
All Types:	AM	32%	24%	38%	47%	31%	11%	54%	26%	9%	61%	26%	4%	51%	27%	11%
	PM	34%	21%	38%	53%	24%	12%	62%	20%	6%	73%	13%	2%	59%	20%	10%

Note: Percentages do not necessarily sum to 100% as the proportion of automobile passengers have not been tabulated. Vehicle trips reflect the percentage of vehicle drivers.
* - Rural area sample size is extremely low and mode shares are highly influenced by school types where public transportation levels are high during the AM versus the PM peaks.

Table 6.1: Vehicle Trip Generation Rates

Vehicle Trip Generation Rates AM and PM Peak Hours						
ITE Land Use Code	Dwelling Unit Type / Data Source		Vehicle Trip Generation Rate			
			2008 Count Data	ITE	OD Survey	Blended Rate
210	Single-detached dwellings	AM	0.66	0.75	0.56	0.66
		PM	0.89	1.01	0.53	0.81
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.40	0.70	0.46	0.52
		PM	0.64	0.72	0.46	0.61
231	Low-rise condominiums (1 or 2 floors)	AM	0.53	0.67	0.21	0.47
		PM	0.41	0.78	0.18	0.46
232	High-rise condominiums (3+ floors)	AM	0.53	0.34	0.21	0.36
		PM	0.41	0.38	0.18	0.32
233	Luxury condominiums	AM	0.53	0.56	0.21	0.43
		PM	0.41	0.55	0.18	0.38
221	Low-rise apartments (2 floors)	AM	0.19	0.46	0.21	0.29
		PM	0.21	0.58	0.18	0.32
223	Mid-rise apartments (3-10 floors)	AM	0.19	0.30	0.21	0.23
		PM	0.21	0.39	0.18	0.26
222	High-rise apartments (10+ floors)	AM	0.19	0.30	0.21	0.23
		PM	0.21	0.35	0.18	0.25

Table 6.2: Recommended Vehicle Trip Directional Splits

Comparison of Directional Splits (Inbound/Outbound) AM and PM Peak Hours								
ITE Land Use Code	Area Dwelling Unit Type / Data Source		2008 Count Data		ITE		Blended Rate	
			Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
210	Single-detached dwellings	AM	33%	67%	25%	75%	29%	71%
		PM	60%	40%	63%	37%	62%	39%
224	Semi-detached dwellings, townhouses, rowhouses	AM	40%	60%	33%	67%	37%	64%
		PM	55%	45%	51%	49%	53%	47%
231	Low-rise condominiums (1 or 2 floors)	AM	36%	64%	25%	75%	31%	70%
		PM	54%	46%	58%	42%	56%	44%
232	High-rise condominiums (3+ floors)	AM	36%	64%	19%	81%	28%	73%
		PM	54%	46%	62%	38%	58%	42%
233	Luxury condominiums	AM	36%	64%	23%	77%	30%	71%
		PM	54%	46%	63%	37%	59%	42%
221	Low-rise apartments (2 floors)	AM	22%	78%	21%	79%	22%	79%
		PM	62%	38%	65%	35%	64%	37%
223	Mid-rise apartments (3-10 floors)	AM	22%	78%	25%	75%	24%	77%
		PM	62%	38%	61%	39%	62%	39%
222	High-rise apartments (10+ floors)	AM	22%	78%	25%	75%	24%	77%
		PM	62%	38%	61%	39%	62%	39%

Table 6.3: Recommended Vehicle Trip Generation Rates for Residential Land Uses with Transit Bonus

Recommended Vehicle Trip Generation Rates with Transit Bonus AM and PM Peak Hours									
ITE Land Use Code	Dwelling Unit Type / Geographic Area		Vehicle Trip Rate						
			Core		Urban (Inside the Greenbelt)		Suburban (Outside the Greenbelt)		Rural
			Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate
210	Single-detached dwellings	AM	0.40	0.31	0.67	0.50	0.70	0.49	0.62
		PM	0.60	0.33	0.76	0.57	0.90	0.63	0.92
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.34	0.34	0.51	0.50	0.54	0.39	0.62
		PM	0.39	0.38	0.51	0.51	0.71	0.51	0.67
231	Low-rise condominiums (1 or 2 floors)	AM	0.34	0.34	0.50	0.50	0.60	0.60	0.71
		PM	0.29	0.29	0.49	0.49	0.66	0.66	0.72
232	High-rise condominiums (3+ floors)	AM	0.26	0.26	0.38	0.38	0.46	0.46	0.54
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
233	Luxury condominiums	AM	0.31	0.31	0.45	0.45	0.55	0.55	0.65
		PM	0.24	0.24	0.40	0.40	0.55	0.55	0.59
221	Low-rise apartments (2 floors)	AM	0.21	0.21	0.31	0.31	0.37	0.37	0.44
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
223	Mid-rise apartments (3-10 floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.28	0.28	0.37	0.37	0.41
222	High-rise apartments (10+ floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.27	0.27	0.36	0.36	0.39

Note: The transit bonus was only applied to geographic areas and dwelling unit types where the reported transit mode shares were less than the transit mode share reported for residential development located within the 600m proximity to a rapid transit station. It is noted that condominium and apartment housing categories reported similar levels of transit mode shares independent of location to rapid transit stations.

6.5 Future Data Collection

While the rates presented in were prepared by blending the vehicle trip rates from ITE, the OD Survey and the 2008 local trip generation studies, it is important to stress the importance and need for ongoing local trip generation surveys to monitor changes in travel behaviour. The 2008 trip generation studies undertaken to support this study provide insight into local travel patterns and a well organized ongoing annual data collection program aimed at trip generation surveys of key land uses or requirement for data collection by local developers will continue to provide recent and accurate local trip generation rates. For example the high-rise apartment category of dwelling units reported the lowest peak hour vehicle trip rates.

IBI GROUP MEMORANDUM

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Appendix D – Intersection Traffic Counts

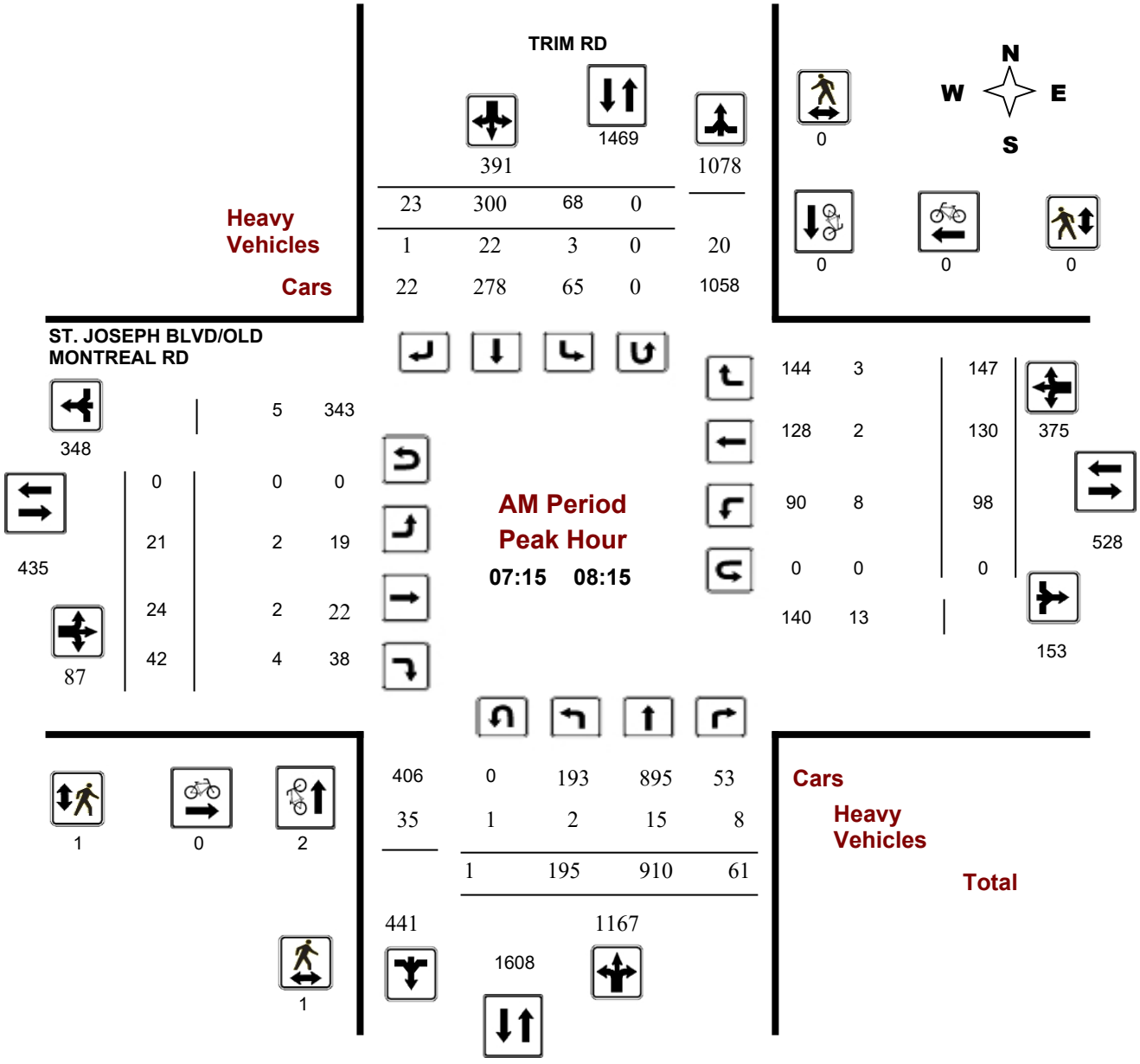
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Survey Date: Wednesday, April 26, 2017 **WO No:** 36103

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



Comments

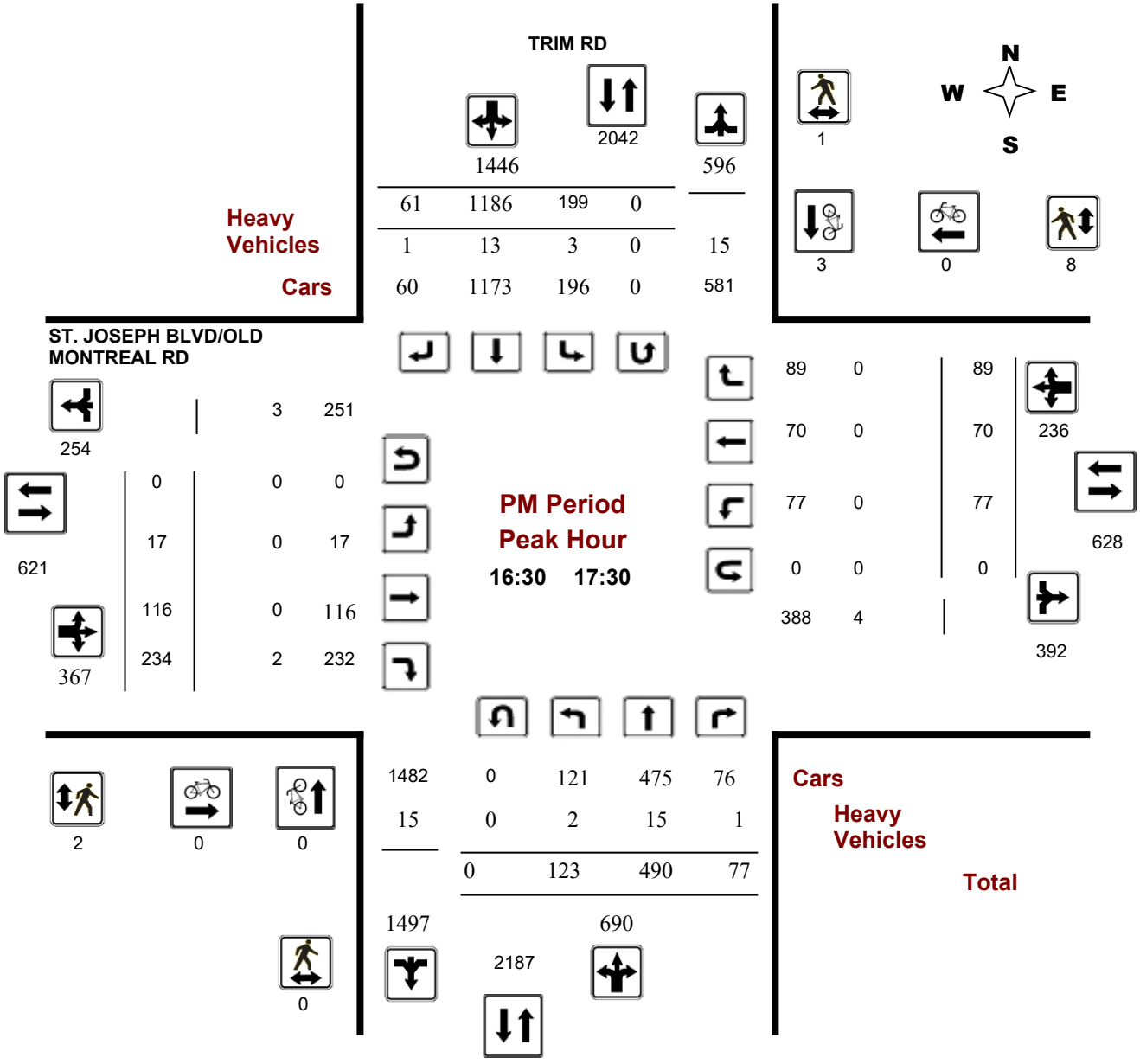
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ST. JOSEPH BLVD/OLD MONTREAL RD @ TRIM RD

Survey Date: Wednesday, April 26, 2017 **WO No:** 36103

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



Comments

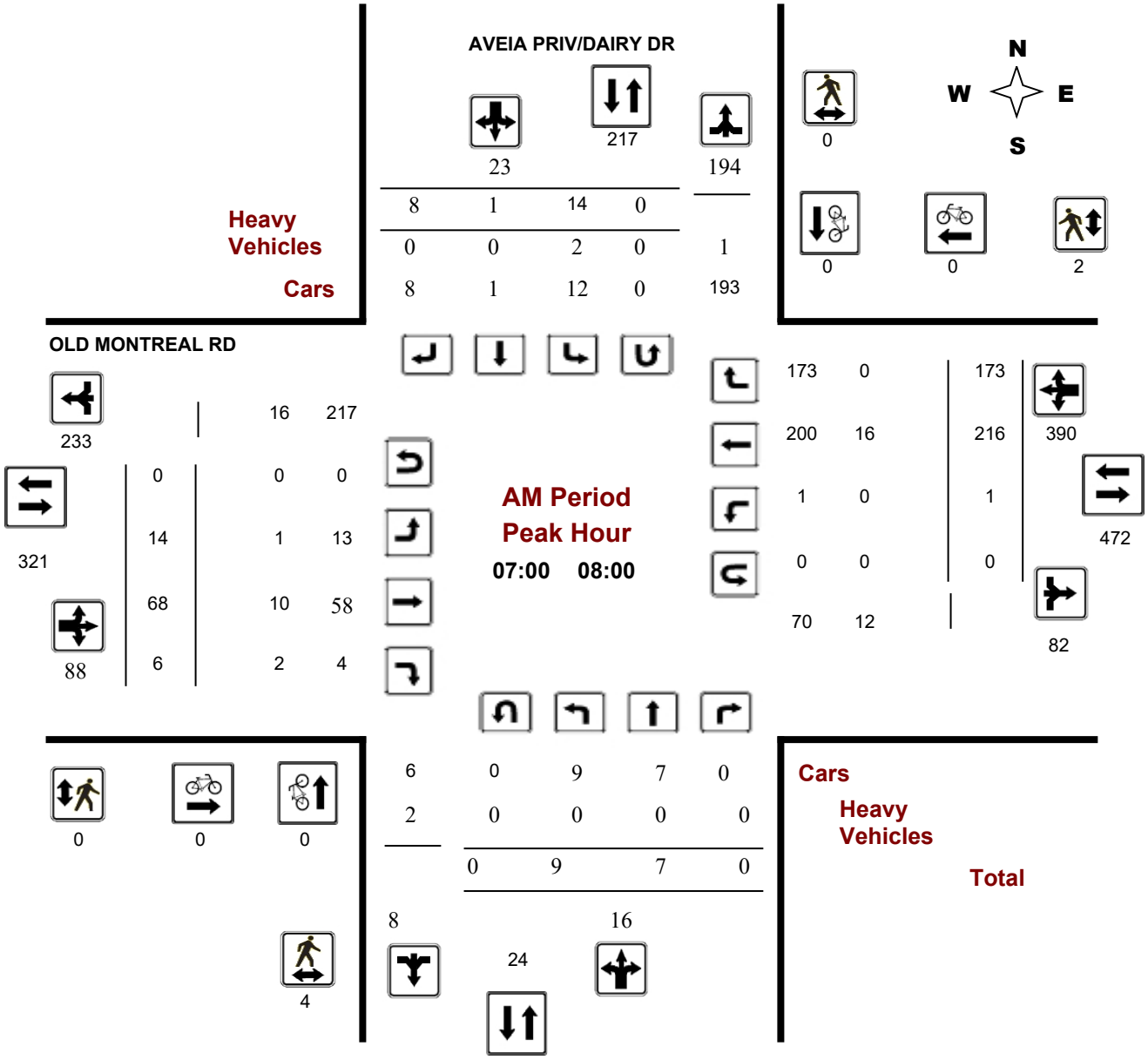
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

AVEIA PRIV/DAIRY DR @ OLD MONTREAL RD

Survey Date: Tuesday, December 09, 2014 **WO No:** 35144

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



Comments

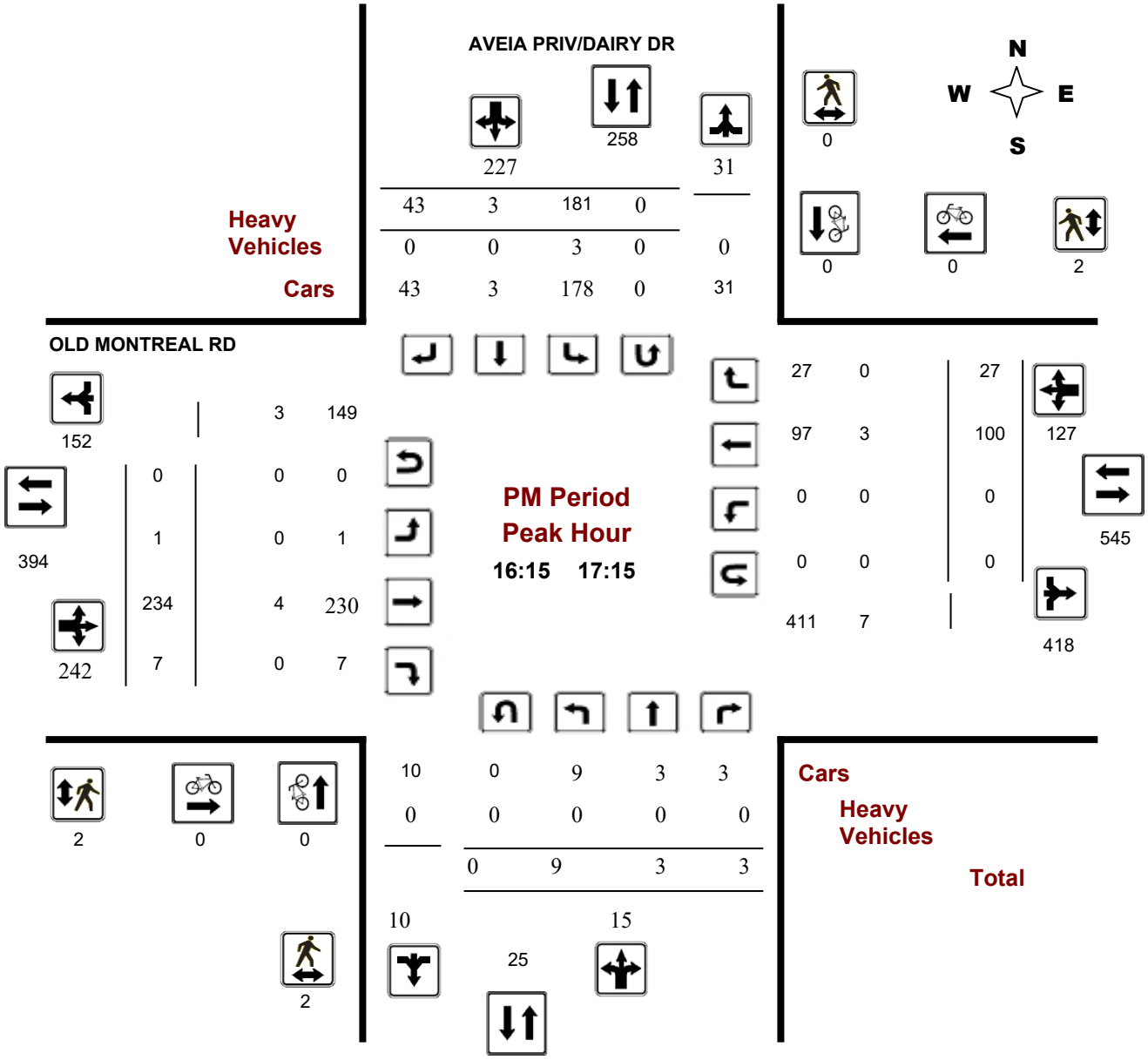
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

AVEIA PRIV/DAIRY DR @ OLD MONTREAL RD

Survey Date: Tuesday, December 09, 2014 **WO No:** 35144

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



Comments

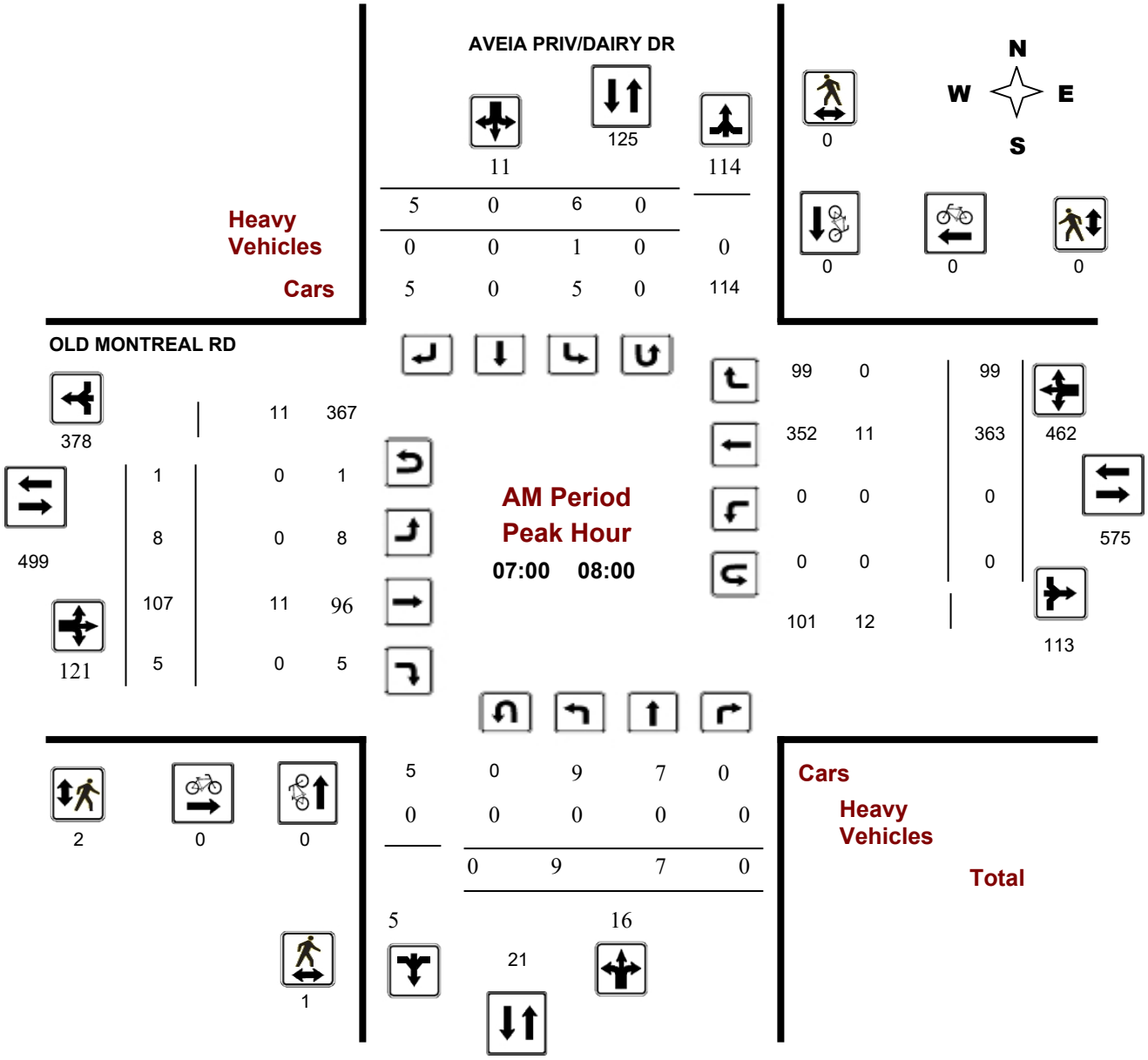
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

AVEIA PRIV/DAIRY DR @ OLD MONTREAL RD

Survey Date: Wednesday, December 04, 2019 **WO No:** 39171

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



Comments

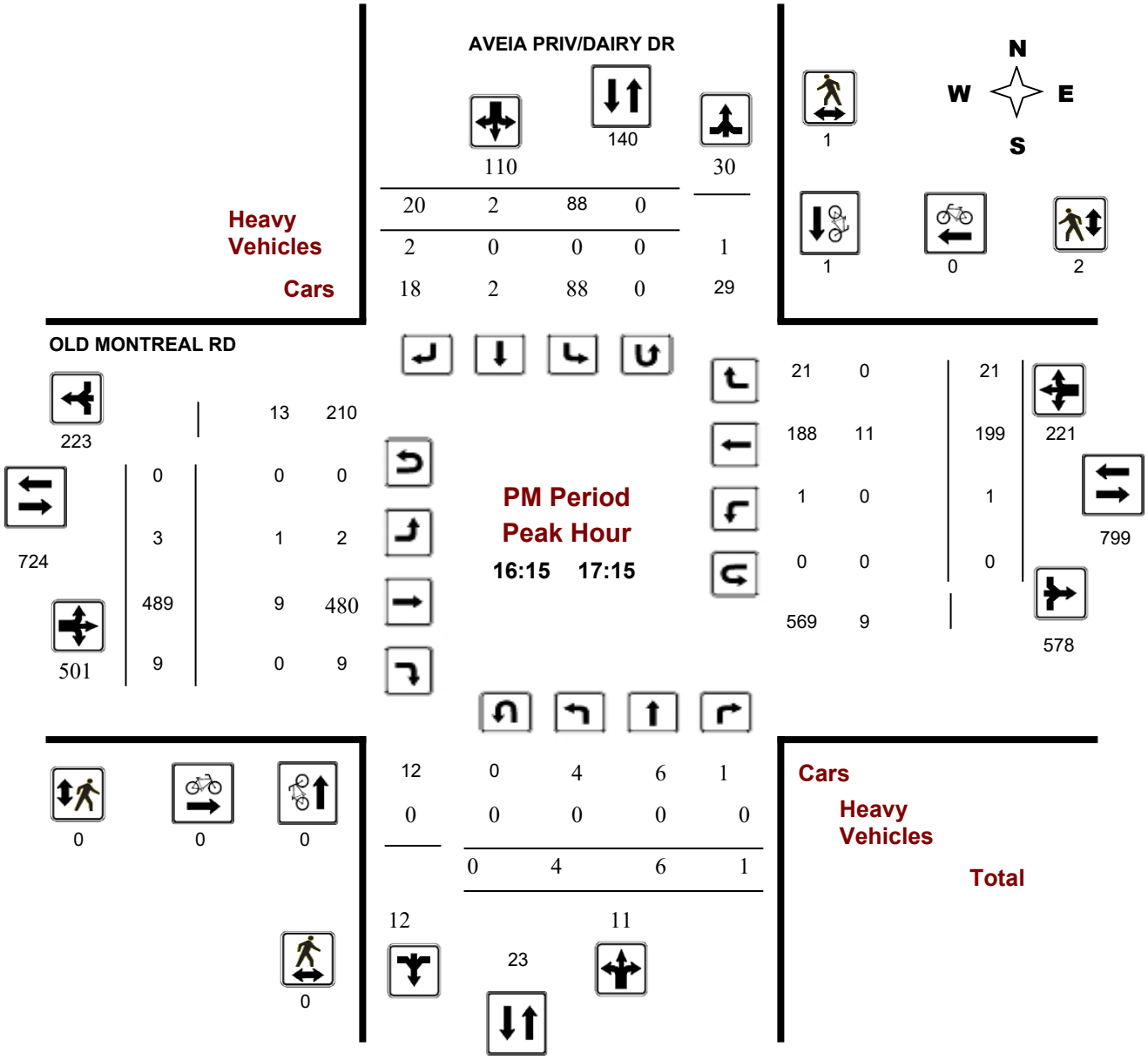
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

AVEIA PRIV/DAIRY DR @ OLD MONTREAL RD

Survey Date: Wednesday, December 04, 2019 **WO No:** 39171

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



Comments

IBI GROUP MEMORANDUM

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Appendix E – Traffic Signal Warrants

IBI

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road (Major Roadway) at Dairy Drive / Aveia Private (Minor Roadway)

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2022) Background Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	480	720	978 100%	489 100%	489 100%	489 100%	1325 100%	663 100%	663 100%	663 100%	100%
B. Vehicle volume along minor roads	120	170	120	170	30 25%	15 13%	15 13%	15 13%	151 100%	76 63%	76 63%	76 63%	44%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	480	720	948 100%	474 99%	474 99%	474 99%	1174 100%	587 100%	587 100%	587 100%	100%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	50	70	25 50%	13 25%	13 25%	13 25%	103 100%	52 100%	52 100%	52 100%	66%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	NO	NO
Justification 2 - Delay to Cross Traffic	NO	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	576	864	577	100%	32%
	B. Vehicle volume along minor roads (Average Hour)	120	170	144	204	46	32%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	576	864	531	92%	53%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	60	90	32	53%	

Projected Traffic Volumes: **Average Hourly Volume (AHV) Equation:** AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	↑	102
7	0	7	←		627
↙	↓	↘	↙		0
	32	↗	↖	↑	↗
	182	→	9	7	0
	5	↘			

PM Peak Hour Volumes

			↖	↑	21
47	2	91	←		360
↙	↓	↘	↙		1
	6	↗	↖	↑	↗
	777	→	4	6	1
	9	↘			

Average Hourly Volumes (AHV)

			↖	↑	31
14	1	25	←		247
↙	↓	↘	↙		0
	10	↗	↖	↑	↗
	240	→	3	3	0
	4	↘			

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	32	182	5	0	627	102	9	7	0	7	0	7	2
8:00 AM	16	91	3	0	314	51	5	4	0	4	0	4	1
9:00 AM	16	91	3	0	314	51	5	4	0	4	0	4	1
10:00 AM	16	91	3	0	314	51	5	4	0	4	0	4	1
3:00 PM	6	777	9	1	360	21	4	6	1	91	2	47	2
4:00 PM	3	389	5	1	180	11	2	3	1	46	1	24	1
5:00 PM	3	389	5	1	180	11	2	3	1	46	1	24	1
6:00 PM	3	389	5	1	180	11	2	3	1	46	1	24	1

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

4-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

Existing Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: The intersection does NOT meet the minimum warrants for traffic control signals.

* "Ontario Traffic Manual, Book 12 (March 2012)", Ontario Ministry of Transportation.

IBI

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road (Major Roadway) at Famille-Laporte Avenue / Street 1 (Minor Roadway)

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2022) Background Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	480	720	925 100%	463 96%	463 96%	463 96%	1261 100%	631 100%	631 100%	631 100%	99%
B. Vehicle volume along minor roads	120	170	180	255	119 66%	60 33%	60 33%	60 33%	69 38%	35 19%	35 19%	35 19%	33%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	480	720	806 100%	403 84%	403 84%	403 84%	1192 100%	596 100%	596 100%	596 100%	94%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	50	70	2 4%	1 2%	1 2%	1 2%	2 4%	1 2%	1 2%	1 2%	3%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	NO	NO
Justification 2 - Delay to Cross Traffic	NO	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		ENTIRE %
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	576	864	546	95%	22%
	B. Vehicle volume along minor roads (Average Hour)	120	170	216	306	47	22%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	576	864	499	87%	2%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	60	90	1	2%	

Projected Traffic Volumes: **Average Hourly Volume (AHV) Equation:** AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	↑	1
117	0	2	←		616
↙	↓	↘	↙		0
	32	↗	↖	↑	↗
	157	→	0	0	0
	0	↘			

PM Peak Hour Volumes

			↖	↑	4
67	0	2	←		316
↙	↓	↘	↙		0
	121	↗	↖	↑	↗
	751	→	0	0	0
	0	↘			

Average Hourly Volumes (AHV)

			↖	↑	1
46	0	1	←		233
↙	↓	↘	↙		0
	38	↗	↖	↑	↗
	227	→	0	0	0
	0	↘			

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	32	157	0	0	616	1	0	0	0	2	0	117	0
8:00 AM	16	79	0	0	308	1	0	0	0	1	0	59	0
9:00 AM	16	79	0	0	308	1	0	0	0	1	0	59	0
10:00 AM	16	79	0	0	308	1	0	0	0	1	0	59	0
3:00 PM	121	751	0	0	316	4	0	0	0	2	0	67	0
4:00 PM	61	376	0	0	158	2	0	0	0	1	0	34	0
5:00 PM	61	376	0	0	158	2	0	0	0	1	0	34	0
6:00 PM	61	376	0	0	158	2	0	0	0	1	0	34	0

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

3-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

Existing Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: The intersection does NOT meet the minimum warrants for traffic control signals.

* "Ontario Traffic Manual, Book 12 (March 2012)", Ontario Ministry of Transportation.

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road *(Major Roadway)* at Dairy Drive / Aveia Private *(Minor Roadway)*

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2027) Background Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	480	720	771 100%	386 80%	386 80%	386 80%	1045 100%	523 100%	523 100%	523 100%	93%
B. Vehicle volume along minor roads	120	170	120	170	30 25%	15 13%	15 13%	15 13%	151 100%	76 63%	76 63%	76 63%	44%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	480	720	741 100%	371 77%	371 77%	371 77%	894 100%	447 93%	447 93%	447 93%	89%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	50	70	25 50%	13 25%	13 25%	13 25%	103 100%	52 100%	52 100%	52 100%	66%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	NO	NO
Justification 2 - Delay to Cross Traffic	NO	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	576	864	455	79%	32%
	B. Vehicle volume along minor roads (Average Hour)	120	170	144	204	46	32%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	576	864	409	71%	53%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	60	90	32	53%	

Projected Traffic Volumes: **Average Hourly Volume (AHV) Equation:** AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	102	
7	0	7	←	457	
↙	↓	↘	↙	0	
	32	↗	↖	↑	↗
	145	→	9	7	0
	5	↘			

PM Peak Hour Volumes

			↖	21	
47	2	91	←	275	
↙	↓	↘	↙	1	
	6	↗	↖	↑	↗
	582	→	4	6	1
	9	↘			

Average Hourly Volumes (AHV)

			↖	31	
14	1	25	←	183	
↙	↓	↘	↙	0	
	10	↗	↖	↑	↗
	182	→	3	3	0
	4	↘			

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	32	145	5	0	457	102	9	7	0	7	0	7	2
8:00 AM	16	73	3	0	229	51	5	4	0	4	0	4	1
9:00 AM	16	73	3	0	229	51	5	4	0	4	0	4	1
10:00 AM	16	73	3	0	229	51	5	4	0	4	0	4	1
3:00 PM	6	582	9	1	275	21	4	6	1	91	2	47	2
4:00 PM	3	291	5	1	138	11	2	3	1	46	1	24	1
5:00 PM	3	291	5	1	138	11	2	3	1	46	1	24	1
6:00 PM	3	291	5	1	138	11	2	3	1	46	1	24	1

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

4-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

Existing Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: The intersection does NOT meet the minimum warrants for traffic control signals.

* "Ontario Traffic Manual, Book 12 (March 2012)", Ontario Ministry of Transportation.

IBI

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road (Major Roadway) at Famille-Laporte Avenue / Street 1 (Minor Roadway)

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2027) Background Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	480	720	727 100%	364 76%	364 76%	364 76%	987 100%	494 100%	494 100%	494 100%	91%
B. Vehicle volume along minor roads	120	170	180	255	84 47%	42 23%	42 23%	42 23%	33 18%	17 9%	17 9%	17 9%	20%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	480	720	643 100%	322 67%	322 67%	322 67%	954 100%	477 99%	477 99%	477 99%	87%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	50	70	2 4%	1 2%	1 2%	1 2%	1 2%	1 1%	1 1%	1 1%	2%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	NO	NO
Justification 2 - Delay to Cross Traffic	NO	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	576	864	429	74%	13%
	B. Vehicle volume along minor roads (Average Hour)	120	170	216	306	29	13%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	576	864	400	69%	2%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	60	90	1	2%	

Projected Traffic Volumes: **Average Hourly Volume (AHV) Equation:** AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	1				
82	0	2	←	489				
↙	↓	↘	↙	0				
	21	↗	↖	↑	↗			
	132	→	0	0	0			
	0	↘						

PM Peak Hour Volumes

			↖	1				
32	0	1	←	268				
↙	↓	↘	↙	0				
	58	↗	↖	↑	↗			
	627	→	0	0	0			
	0	↘						

Average Hourly Volumes (AHV)

			↖	1				
29	0	1	←	189				
↙	↓	↘	↙	0				
	20	↗	↖	↑	↗			
	190	→	0	0	0			
	0	↘						

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	21	132	0	0	489	1	0	0	0	2	0	82	0
8:00 AM	11	66	0	0	245	1	0	0	0	1	0	41	0
9:00 AM	11	66	0	0	245	1	0	0	0	1	0	41	0
10:00 AM	11	66	0	0	245	1	0	0	0	1	0	41	0
3:00 PM	58	627	0	0	268	1	0	0	0	1	0	32	0
4:00 PM	29	314	0	0	134	1	0	0	0	1	0	16	0
5:00 PM	29	314	0	0	134	1	0	0	0	1	0	16	0
6:00 PM	29	314	0	0	134	1	0	0	0	1	0	16	0

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

3-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

Existing Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: **The intersection does NOT meet the minimum warrants for traffic control signals.**

* "Ontario Traffic Manual, Book 12 (March 2012)", Ontario Ministry of Transportation.

IBI

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road (Major Roadway) at Dairy Drive / Aveia Private (Minor Roadway)

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2022) Total Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	480	720	1184 100%	592 100%	592 100%	592 100%	1582 100%	791 100%	791 100%	791 100%	100%
B. Vehicle volume along minor roads	120	170	120	170	37 31%	19 15%	19 15%	19 15%	171 100%	86 71%	86 71%	86 71%	49%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	480	720	1147 100%	574 100%	574 100%	574 100%	1411 100%	706 100%	706 100%	706 100%	100%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	50	70	32 64%	16 32%	16 32%	16 32%	123 100%	62 100%	62 100%	62 100%	70%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	NO	NO
Justification 2 - Delay to Cross Traffic	NO	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	576	864	692	100%	36%
	B. Vehicle volume along minor roads (Average Hour)	120	170	144	204	52	36%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	576	864	640	100%	63%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	60	90	38	63%	

Projected Traffic Volumes:

Average Hourly Volume (AHV) Equation: AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	←	134			
7	0	14	←	←	745			
↙	↓	↘	↙	←	0			
	32	↗	↖	↑	↗			
	231	→	9	7	0			
	5	↘						

PM Peak Hour Volumes

			↖	←	44			
47	2	111	←	←	443			
↙	↓	↘	↙	←	1			
	6	↗	↖	↑	↗			
	908	→	4	6	1			
	9	↘						

Average Hourly Volumes (AHV)

			↖	←	45			
14	1	31	←	←	297			
↙	↓	↘	↙	←	0			
	10	↗	↖	↑	↗			
	285	→	3	3	0			
	4	↘						

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	32	231	5	0	745	134	9	7	0	14	0	7	2
8:00 AM	16	116	3	0	373	67	5	4	0	7	0	4	1
9:00 AM	16	116	3	0	373	67	5	4	0	7	0	4	1
10:00 AM	16	116	3	0	373	67	5	4	0	7	0	4	1
3:00 PM	6	908	9	1	443	44	4	6	1	111	2	47	2
4:00 PM	3	454	5	1	222	22	2	3	1	56	1	24	1
5:00 PM	3	454	5	1	222	22	2	3	1	56	1	24	1
6:00 PM	3	454	5	1	222	22	2	3	1	56	1	24	1

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

4-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

Existing Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: The intersection does NOT meet the minimum warrants for traffic control signals.

* "Ontario Traffic Manual, Book 12 (March 2012)", Ontario Ministry of Transportation.

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road (Major Roadway) at Famille-Laporte Avenue / Street 1 (Minor Roadway)

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2022) Total Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	576	864	1132 100%	566 98%	566 98%	566 98%	1521 100%	761 100%	761 100%	761 100%	99%
B. Vehicle volume along minor roads	120	170	144	204	119 83%	60 41%	60 41%	60 41%	69 48%	35 24%	35 24%	35 24%	41%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	576	864	1013 100%	507 88%	507 88%	507 88%	1452 100%	726 100%	726 100%	726 100%	95%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	60	84	2 3%	1 2%	1 2%	1 2%	2 3%	1 2%	1 2%	1 2%	2%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	N/A	N/A
Justification 2 - Delay to Cross Traffic	N/A	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	720	1080	663	92%	26%
	B. Vehicle volume along minor roads (Average Hour)	120	170	180	255	47	26%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	720	1080	616	86%	1%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	75	113	1	1%	

Projected Traffic Volumes: **Average Hourly Volume (AHV) Equation:** AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	↑	1			
117	0	2	←		766			
↙	↓	↘	↙		1			
	32	↗	↖	↑	↗			
	191	→	0	0	0			
	22	↘						

PM Peak Hour Volumes

			↖	↑	4			
67	0	2	←		422			
↙	↓	↘	↙		3			
	121	↗	↖	↑	↗			
	842	→	0	0	0			
	60	↘						

Average Hourly Volumes (AHV)

			↖	↑	1			
46	0	1	←		297			
↙	↓	↘	↙		1			
	38	↗	↖	↑	↗			
	258	→	0	0	0			
	21	↘						

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	32	191	22	1	766	1	0	0	0	2	0	117	0
8:00 AM	16	96	11	1	383	1	0	0	0	1	0	59	0
9:00 AM	16	96	11	1	383	1	0	0	0	1	0	59	0
10:00 AM	16	96	11	1	383	1	0	0	0	1	0	59	0
3:00 PM	121	842	60	3	422	4	0	0	0	2	0	67	0
4:00 PM	61	421	30	2	211	2	0	0	0	1	0	34	0
5:00 PM	61	421	30	2	211	2	0	0	0	1	0	34	0
6:00 PM	61	421	30	2	211	2	0	0	0	1	0	34	0

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

4-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

New Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: The intersection does NOT meet the minimum warrants for traffic control signals.

* "Ontario Traffic Manual, Book 12 (March 2012)", Ontario Ministry of Transportation.

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road (Major Roadway) at Street 2 (Minor Roadway)

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2022) Total Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	576	864	971 100%	486 84%	486 84%	486 84%	1284 100%	642 100%	642 100%	642 100%	94%
B. Vehicle volume along minor roads	120	170	216	306	158 73%	79 37%	79 37%	79 37%	112 52%	56 26%	56 26%	56 26%	39%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	576	864	813 100%	407 71%	407 71%	407 71%	1172 100%	586 100%	586 100%	586 100%	89%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	60	84	150 100%	75 100%	75 100%	75 100%	106 100%	53 88%	53 88%	53 88%	96%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	N/A	N/A
Justification 2 - Delay to Cross Traffic	N/A	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	720	1080	564	78%	25%
	B. Vehicle volume along minor roads (Average Hour)	120	170	270	383	68	25%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	720	1080	496	69%	69%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	75	113	64	85%	

Projected Traffic Volumes: **Average Hourly Volume (AHV) Equation:** AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	0				
0	0	0	←	618				
↙	↓	↘	↙	2				
	0	↗	↖	↑	↗			
	159	→	150	0	8			
	34	↘						

PM Peak Hour Volumes

			↖	0				
0	0	0	←	323				
↙	↓	↘	↙	5				
	0	↗	↖	↑	↗			
	753	→	106	0	6			
	91	↘						

Average Hourly Volumes (AHV)

			↖	0				
0	0	0	←	235				
↙	↓	↘	↙	2				
	0	↗	↖	↑	↗			
	228	→	64	0	4			
	31	↘						

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	0	159	34	2	618	0	150	0	8	0	0	0	0
8:00 AM	0	80	17	1	309	0	75	0	4	0	0	0	0
9:00 AM	0	80	17	1	309	0	75	0	4	0	0	0	0
10:00 AM	0	80	17	1	309	0	75	0	4	0	0	0	0
3:00 PM	0	753	91	5	323	0	106	0	6	0	0	0	0
4:00 PM	0	377	46	3	162	0	53	0	3	0	0	0	0
5:00 PM	0	377	46	3	162	0	53	0	3	0	0	0	0
6:00 PM	0	377	46	3	162	0	53	0	3	0	0	0	0

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

3-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

New Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: The intersection does NOT meet the minimum warrants for traffic control signals.

* "Ontario Traffic Manual, Book 12 (March 2012)", Ontario Ministry of Transportation.

IBI

OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road (Major Roadway) at Dairy Drive / Aveia Private (Minor Roadway)

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2027) Total Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	480	720	977 100%	489 100%	489 100%	489 100%	1302 100%	651 100%	651 100%	651 100%	100%
B. Vehicle volume along minor roads	120	170	120	170	37 31%	19 15%	19 15%	19 15%	171 100%	86 71%	86 71%	86 71%	49%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	480	720	940 100%	470 98%	470 98%	470 98%	1131 100%	566 100%	566 100%	566 100%	99%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	50	70	32 64%	16 32%	16 32%	16 32%	123 100%	62 100%	62 100%	62 100%	70%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	NO	NO
Justification 2 - Delay to Cross Traffic	NO	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	576	864	570	99%	36%
	B. Vehicle volume along minor roads (Average Hour)	120	170	144	204	52	36%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	576	864	518	90%	63%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	60	90	38	63%	

Projected Traffic Volumes:

Average Hourly Volume (AHV) Equation: AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	↑	↗	↖	134	
7	0	14	←		→	←	575	
↙	↓	↘	↙	↓	↘	↙	0	
	32	↗	↖	↑	↗			
	194	→	9	7	0			
	5	↘						

PM Peak Hour Volumes

			↖	↑	↗	↖	44	
47	2	111	←		→	←	358	
↙	↓	↘	↙	↓	↘	↙	1	
	6	↗	↖	↑	↗			
	713	→	4	6	1			
	9	↘						

Average Hourly Volumes (AHV)

			↖	↑	↗	↖	45	
14	1	31	←		→	←	233	
↙	↓	↘	↙	↓	↘	↙	0	
	10	↗	↖	↑	↗			
	227	→	3	3	0			
	4	↘						

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	32	194	5	0	575	134	9	7	0	14	0	7	2
8:00 AM	16	97	3	0	288	67	5	4	0	7	0	4	1
9:00 AM	16	97	3	0	288	67	5	4	0	7	0	4	1
10:00 AM	16	97	3	0	288	67	5	4	0	7	0	4	1
3:00 PM	6	713	9	1	358	44	4	6	1	111	2	47	2
4:00 PM	3	357	5	1	179	22	2	3	1	56	1	24	1
5:00 PM	3	357	5	1	179	22	2	3	1	56	1	24	1
6:00 PM	3	357	5	1	179	22	2	3	1	56	1	24	1

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

4-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

Existing Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: The intersection does NOT meet the minimum warrants for traffic control signals.

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OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road (Major Roadway) at Famille-Laporte Avenue / Street 1 (Minor Roadway)

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2027) Total Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	576	864	934 100%	467 81%	467 81%	467 81%	1247 100%	624 100%	624 100%	624 100%	93%
B. Vehicle volume along minor roads	120	170	144	204	84 58%	42 29%	42 29%	42 29%	33 23%	17 11%	17 11%	17 11%	25%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	576	864	850 100%	425 74%	425 74%	425 74%	1214 100%	607 100%	607 100%	607 100%	90%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	60	84	2 3%	1 2%	1 2%	1 2%	1 2%	1 1%	1 1%	1 1%	2%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	N/A	N/A
Justification 2 - Delay to Cross Traffic	N/A	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	720	1080	545	76%	16%
	B. Vehicle volume along minor roads (Average Hour)	120	170	180	255	29	16%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	720	1080	516	72%	1%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	75	113	1	1%	

Projected Traffic Volumes:

Average Hourly Volume (AHV) Equation: AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	1				
82	0	2	←	639				
↙	↓	↘	↙	1				
	21	↗	↖	↑	↗			
	166	→	0	0	0			
	22	↘						

PM Peak Hour Volumes

			↖	1				
32	0	1	←	374				
↙	↓	↘	↙	3				
	58	↗	↖	↑	↗			
	718	→	0	0	0			
	60	↘						

Average Hourly Volumes (AHV)

			↖	1				
29	0	1	←	253				
↙	↓	↘	↙	1				
	20	↗	↖	↑	↗			
	221	→	0	0	0			
	21	↘						

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	21	166	22	1	639	1	0	0	0	2	0	82	0
8:00 AM	11	83	11	1	320	1	0	0	0	1	0	41	0
9:00 AM	11	83	11	1	320	1	0	0	0	1	0	41	0
10:00 AM	11	83	11	1	320	1	0	0	0	1	0	41	0
3:00 PM	58	718	60	3	374	1	0	0	0	1	0	32	0
4:00 PM	29	359	30	2	187	1	0	0	0	1	0	16	0
5:00 PM	29	359	30	2	187	1	0	0	0	1	0	16	0
6:00 PM	29	359	30	2	187	1	0	0	0	1	0	16	0

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

4-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

New Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: The intersection does NOT meet the minimum warrants for traffic control signals.

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OTM BOOK 12* - TRAFFIC SIGNAL WARRANT

Project: 1154-1208 Old Montreal Road TIA Addendum **Date:** February 3, 2021

Project #: 127391

Location: Old Montreal Road (Major Roadway) at Street 2 (Minor Roadway)

Orientation: East/West North/South

Municipality: City of Ottawa **Scenario:** Future (2027) Total Traffic

Justification 1 - Minimum Vehicle Volume

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, all approaches	480	720	576	864	819 100%	410 71%	410 71%	410 71%	1108 100%	554 96%	554 96%	554 96%	88%
B. Vehicle volume along minor roads	120	170	216	306	158 73%	79 37%	79 37%	79 37%	112 52%	56 26%	56 26%	56 26%	39%

Justification 2 - Delay to Cross Traffic

WARRANT	MINIMUM REQUIREMENT				COMPLIANCE								SECTIONAL PERCENT
	FREE FLOW	RESTR. FLOW	ADJUST. FREE FLOW	ADJUST. RESTR. FLOW	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	
A. Vehicle volumes, along artery	480	720	576	864	661 100%	331 57%	331 57%	331 57%	996 100%	498 86%	498 86%	498 86%	79%
B. Combined vehicle and pedestrian volume crossing artery from minor roads	50	70	60	84	150 100%	75 100%	75 100%	75 100%	106 100%	53 88%	53 88%	53 88%	96%

Justification 3 - Volume/Delay Combination

JUSTIFICATION	SATISFIED TO 80% OR MORE?	BOTH SATISFIED TO 80% OR MORE?
Justification 1 - Minimum Vehicular Volume	N/A	N/A
Justification 2 - Delay to Cross Traffic	N/A	

Justification 7 - Projected Volumes

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT				COMPLIANCE		
		FREE FLOW	RESTRICTED FLOW	ADJUSTED FREE FLOW	ADJUSTED RESTRICTED FLOW	SECTIONAL AHV	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	A. Vehicle volumes, all approaches (Average Hour)	480	720	720	1080	483	67%	25%
	B. Vehicle volume along minor roads (Average Hour)	120	170	270	383	68	25%	
2. DELAY TO CROSS TRAFFIC	A. Vehicle volumes, along artery (Average Hour)	480	720	720	1080	415	58%	58%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads (Average Hour)	50	75	75	113	64	85%	

Projected Traffic Volumes:

Average Hourly Volume (AHV) Equation: AHV = (amPHV + pmPHV)/4

AM Peak Hour Volumes

			↖	↑	0
0	0	0	←		491
↙	↓	↘	↙		2
	0	↗	↖	↑	↗
	134	→	150	0	8
	34	↘			

PM Peak Hour Volumes

			↖	↑	0
0	0	0	←		272
↙	↓	↘	↙		5
	0	↗	↖	↑	↗
	628	→	106	0	6
	91	↘			

Average Hourly Volumes (AHV)

			↖	↑	0
0	0	0	←		191
↙	↓	↘	↙		2
	0	↗	↖	↑	↗
	191	→	64	0	4
	31	↘			

Eight Hour Traffic Volumes:

Hour	Major Road						Minor Road						Ped*
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	0	134	34	2	491	0	150	0	8	0	0	0	0
8:00 AM	0	67	17	1	246	0	75	0	4	0	0	0	0
9:00 AM	0	67	17	1	246	0	75	0	4	0	0	0	0
10:00 AM	0	67	17	1	246	0	75	0	4	0	0	0	0
3:00 PM	0	628	91	5	272	0	106	0	6	0	0	0	0
4:00 PM	0	314	46	3	136	0	53	0	3	0	0	0	0
5:00 PM	0	314	46	3	136	0	53	0	3	0	0	0	0
6:00 PM	0	314	46	3	136	0	53	0	3	0	0	0	0

** Number of pedestrians crossing the major road*

Notes:

1. Vehicle volume warrant (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction should be 25% higher than the values given above.

1 Lane per Direction

2. Warrant values for free flow apply when the 85th percentile speed of artery traffic equals or exceeds 70 km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. Warrant values for restricted flow apply to large urban communities when the 85th percentile speed of artery traffic does not exceed 70 km/h.

Free Flow

3. The lowest sectional percentage governs the entire warrant.

4. For "T" intersections the warrant values for the minor road should be increased by 50% (Warrant 1B only).

3-legged Intersection

5. All flow values for Justification 1 and 2 are to be increased by 20% in the case of new intersections, Justification 3 is to only be used for existing intersections and all flow values for Warrant 1 and Warrant 2 of Justification 7 are to be increased by 20% for existing intersections and by 50% in the case of new intersections.

New Intersection

6. The crossing volumes are defined as the sum of:
   - (a) Left-turns from both minor road approaches.
   - (b) The heaviest through volume from the minor road.
   - (c) 50% of the heavier left turn movement from major road when both of the following are met:
     - (i) the left-turn volume >120 vph
     - (ii) the left-turn volume plus the opposing volume >720 vph
   - (d) Pedestrians crossing the main road.

CONCLUSION: The intersection does NOT meet the minimum warrants for traffic control signals.

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IBI GROUP MEMORANDUM

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Appendix F – Roundabout Feasibility

City of Ottawa
Roundabout Initial Feasability Screening Tool

The intent of this screening tool is to provide a relatively quick assessment of the feasibility of a roundabout at a particular intersection in comparison to other appropriate forms of traffic control or road modifications including all-way stop control, traffic signals, auxiliary lanes, etc. The intended outcome of this tool is to provide enough information to assist staff in deciding whether or not to proceed with an Intersection Control Study to investigate the feasibility of a roundabout in more

1	Project Name:	1154-1208 Old Montreal Road
2	Intersection:	Old Montreal Road & Dairy Drive / Aveia Private
3	Location and Description of Intersection: Lane Configuration, total or approach AADT, distance to nearby intersection(s), etc. Attach or sketch a diagram and include existing and/or horizon-year turning movements. If an existing intersection then indicate type of control	The intersectio is currently configured as a two-way stop-controlled intersection with a left-turn lane on the eastbound, westbound and southbound approaches.
4	What traditional modifications are proposed? All-way stop control, traffic signals, auxiliary lanes, etc. Attach or sketch a diagram if necessary.	Traffic signals
5	What size of roundabout is being considered? Describe, and attach a Roundabout Traffic Flow Worksheet	Single lane roundabout
6	Why is a roundabout being considered?	To address capacity issues

7 Are there contra-indications for

If "Yes" is indicated for one or more of the contra-indications then a roundabout may be problematic at the subject intersection. That is not to say that a roundabout is not possible, just that there may be difficulties or high

No.	Contra-Indication	Outcome
1	Is there insufficient property at the intersection (i.e. less than 44 metres diameter if considering a single-lane roundabout, and less than 60 metres if considering a two-lane roundabout) or property constraints that would require demolition of adjacent	Yes ☐ No ☒
2	Are there any instances where stopping sight distance (SSD) of a roundabout yield line may not be attainable (i.e. the intersection is on a crest vertical curve)?	Yes ☐ No ☒
3	Is there an existing uncontrolled approach with a grade in excess of 4 percent?	Yes ☐ No ☒
4	Is the intersection located within a coordinated signal system?	Yes ☐ No ☒
5	Is there a closely-spaced traffic signal or railway crossing that could not be controlled with a nearby roundabout?	Yes ☐ No ☒
6	Are significant differences in directional flows or any situations of sudden high demand expected?	Yes ☒ No ☐
7	Are there known visually-impaired pedestrians that cross this intersection?	Yes ☐ No ☒

8 Are there suitability factors for a roundabout?

If "Yes" is indicated for two or more of the suitability factors then a roundabout should be technically feasible at the subject intersection..

No.	Suitability Factor	Outcome
1	Does the intersection currently experience an average collision frequency of more than 1.5 injury crashes per year, or a collision rate in excess of 1 injury crash per 1 million vehicles entering (MVE)?	Yes ☐ No ☒
2	Has there been a fatal crash at the intersection in the last 10 years?	Yes ☐ No ☒
3	Are capacity problems currently being experienced, or expected in the future?	Yes ☒ No ☐
4	Are traffic signals warranted, or expected to be warranted in the future?	Yes ☐ No ☒
5	Does the intersection have more than 4 legs, or unusual geometry?	Yes ☐ No ☒
6	Will Planned modifications to the intersection require that nearby structures be widened (i.e. to accommodate left-turn lanes)?	Yes ☐ No ☒
7	Is the intersection located at a transition between rural and urban environments (i.e. an urban boundary) such that a roundabout could act as a means of speed transition?	Yes ☒ No ☐

9	Conclusions/recommendation whether to proceed with an Intersection Control Study:	Although there may be significant directional flows, capacity issues are anticipated at this intersection and a roundabout could act as a means of speed transition and therefore should be considered as a potential means of traffic control for this intersection.

City of Ottawa
Mini-Roundabout Screening Criteria

Mini roundabouts are best suited and most effective when they meet the following conditions;

No.	Criteria	Outcome
1	Located at minor collector road intersecting a minor collector road or a local residential road	Yes [ ] No [X]
2	ADT lesser than 15,000 (estimated ADT in case of new development area)	Yes [X] No [ ]
3	At least 10% of the total traffic has generated from minor road (estimated in case of new development area)	Yes [X] No [ ]
4	Operating speed <55km/hr or posted speed ≤ 50km/hr in a new development area	Yes [ ] No [X]
5	A right of way wide enough to accommodate a 13 m to 27 m Inscribed Circle Diameter roundabout and adjacent sidewalks	Yes [X] No [ ]
6	Situated on a non truck route or roads without heavy truck movements	Yes [ ] No [X]
7	Intersections with no more than four legs	Yes [X] No [ ]

Conclusion

This location does not meet several of the screening criteria, therefore, a mini-roundabout is not recommended for this location.

IBI GROUP MEMORANDUM

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Appendix G – Intersection Capacity Analysis

LANE SUMMARY

Site: BG2022AM

Trim Road & St Joseph Boulevard / Old Montreal Road
Future (2022) Background Traffic
AM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Trim Road													
Lane 1[d]	727	1.7	902	0.806	100	22.3	LOS C	7.3	56.3	Full	500	0.0	0.0
Lane 2	704	3.5	873	0.806	100	22.8	LOS C	7.4	57.6	Full	500	0.0	0.0
Approach	1430	2.6		0.806		22.6	LOS C	7.4	57.6				
East: Old Montreal Road													
Lane 1	227	6.6	360	0.630	100	28.7	LOS D	2.3	18.5	Full	500	0.0	0.0
Lane 2[d]	255	2.0	404	0.630	100	26.1	LOS D	2.4	18.5	Full	500	0.0	0.0
Lane 3	301	2.0	476	0.632	100	22.8	LOS C	2.6	19.9	Short	95	0.0	NA
Approach	783	3.3		0.632		25.6	LOS D	2.6	19.9				
North: Trim Road													
Lane 1	257	5.4	618	0.415	100	12.0	LOS B	1.4	11.4	Full	500	0.0	0.0
Lane 2[d]	263	6.7	633	0.415	100	11.7	LOS B	1.4	10.9	Full	500	0.0	0.0
Approach	520	6.1		0.415		11.9	LOS B	1.4	11.4				
West: St Joseph Boulevard													
Lane 1[d]	73	10.0	625	0.117	100	7.1	LOS A	0.3	2.3	Full	500	0.0	0.0
Lane 2	72	8.0	615	0.117	100	7.2	LOS A	0.3	2.4	Full	500	0.0	0.0
Lane 3	50	10.0	690	0.072	100	6.0	LOS A	0.2	1.4	Short	135	0.0	NA
Approach	195	9.3		0.117		6.9	LOS A	0.3	2.4				
Intersection	2927	3.8		0.806		20.4	LOS C	7.4	57.6				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

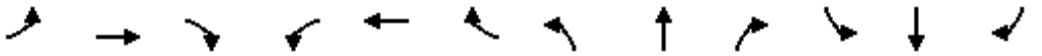
Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	182	5	0	627	102	9	7	0	7	0	7
Future Vol, veh/h	32	182	5	0	627	102	9	7	0	7	0	7
Conflicting Peds, #/hr	0	0	1	1	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	10	0	0	3	0	0	0	0	17	0	0
Mvmt Flow	32	182	5	0	627	102	9	7	0	7	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	729	0	0	188	0	0	934	979	186	930	930	680
Stage 1	-	-	-	-	-	-	250	250	-	678	678	-
Stage 2	-	-	-	-	-	-	684	729	-	252	252	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.27	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.27	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.27	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.653	4	3.3
Pot Cap-1 Maneuver	884	-	-	1398	-	-	248	252	861	233	269	454
Stage 1	-	-	-	-	-	-	759	704	-	418	455	-
Stage 2	-	-	-	-	-	-	442	431	-	720	702	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	884	-	-	1397	-	-	237	243	860	222	259	453
Mov Cap-2 Maneuver	-	-	-	-	-	-	237	243	-	222	259	-
Stage 1	-	-	-	-	-	-	731	678	-	403	455	-
Stage 2	-	-	-	-	-	-	434	431	-	687	676	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0	21.1	17.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	240	884	-	-	1397	-	-	222	453
HCM Lane V/C Ratio	0.067	0.036	-	-	-	-	-	0.032	0.015
HCM Control Delay (s)	21.1	9.2	-	-	0	-	-	21.7	13.1
HCM Lane LOS	C	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.1	0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	182	5	0	627	102	9	7	0	7	0	7
Future Volume (vph)	32	182	5	0	627	102	9	7	0	7	0	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.6			7.6			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00						1.00			0.98	
Frt		0.996			0.979						0.850	
Flt Protected	0.950							0.973		0.950		
Satd. Flow (prot)	1729	1651	0	1820	1737	0	0	1771	0	1478	1509	0
Flt Permitted	0.950							0.977				
Satd. Flow (perm)	1729	1651	0	1820	1737	0	0	1774	0	1556	1509	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			11						315	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		225.2			532.9			285.3			278.3	
Travel Time (s)		13.5			32.0			20.5			20.0	
Confl. Peds. (#/hr)			1	1			2					2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	10%	0%	0%	3%	0%	0%	0%	0%	17%	0%	0%
Adj. Flow (vph)	32	182	5	0	627	102	9	7	0	7	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	187	0	0	729	0	0	16	0	7	7	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	34.1		11.1	34.1		32.7	32.7		32.7	32.7	
Total Split (s)	13.0	76.1		11.1	74.2		32.8	32.8		32.8	32.8	
Total Split (%)	10.8%	63.4%		9.3%	61.8%		27.3%	27.3%		27.3%	27.3%	
Maximum Green (s)	6.9	70.0		5.0	68.1		27.1	27.1		27.1	27.1	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			5.7		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0			21.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	7.7	112.1			101.9			6.8		6.7	6.7	
Actuated g/C Ratio	0.06	0.93			0.85			0.06		0.06	0.06	
v/c Ratio	0.29	0.12			0.49			0.16		0.08	0.02	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	59.4	1.2			6.7			56.8		54.9	0.1	
Queue Delay	0.0	0.0			0.0			0.0		0.0	0.0	
Total Delay	59.4	1.2			6.7			56.8		54.9	0.1	
LOS	E	A			A			E		D	A	
Approach Delay		9.7			6.7			56.8			27.5	
Approach LOS		A			A			E			C	
Queue Length 50th (m)	7.3	0.0			35.9			3.7		1.6	0.0	
Queue Length 95th (m)	17.2	10.2			113.0			10.8		6.4	0.0	
Internal Link Dist (m)		201.2			508.9			261.3			254.3	
Turn Bay Length (m)	50.0									25.0		
Base Capacity (vph)	116	1542			1476			400		351	584	
Starvation Cap Reductn	0	0			0			0		0	0	
Spillback Cap Reductn	0	0			0			0		0	0	
Storage Cap Reductn	0	0			0			0		0	0	
Reduced v/c Ratio	0.28	0.12			0.49			0.04		0.02	0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.49			
Intersection Signal Delay: 8.5		Intersection LOS: A	
Intersection Capacity Utilization 58.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Aveia Private/Dairy Drive & Old Montreal Road

MOVEMENT SUMMARY

Site: Old Montreal / Dairy FB2022AM

Old Montreal Road & Dairy Drive / Aveia Private
Future (2022) Background Traffic
AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Aveia Private											
3	L2	9	0.0	0.019	4.2	LOS A	0.1	0.5	0.33	0.20	54.4
8	T1	7	0.0	0.019	4.2	LOS A	0.1	0.5	0.33	0.20	54.5
18	R2	1	0.0	0.019	4.2	LOS A	0.1	0.5	0.33	0.20	53.3
Approach		17	0.0	0.019	4.2	LOS A	0.1	0.5	0.33	0.20	54.4
East: Old Montreal Road											
1	L2	1	0.0	0.695	14.3	LOS B	6.4	50.0	0.37	0.17	48.9
6	T1	627	3.0	0.695	14.3	LOS B	6.4	50.0	0.37	0.17	48.9
16	R2	102	0.0	0.695	14.3	LOS B	6.4	50.0	0.37	0.17	48.0
Approach		730	2.6	0.695	14.3	LOS B	6.4	50.0	0.37	0.17	48.7
North: Dairy Drive											
7	L2	7	17.0	0.028	7.0	LOS A	0.1	0.7	0.52	0.46	51.8
4	T1	1	0.0	0.028	7.0	LOS A	0.1	0.7	0.52	0.46	52.8
14	R2	7	0.0	0.028	7.0	LOS A	0.1	0.7	0.52	0.46	51.7
Approach		15	7.9	0.028	7.0	LOS A	0.1	0.7	0.52	0.46	51.8
West: Old Montreal Road											
5	L2	32	0.0	0.212	5.5	LOS A	0.8	6.7	0.06	0.01	54.7
2	T1	182	10.0	0.212	5.5	LOS A	0.8	6.7	0.06	0.01	54.5
12	R2	5	0.0	0.212	5.5	LOS A	0.8	6.7	0.06	0.01	53.6
Approach		219	8.3	0.212	5.5	LOS A	0.8	6.7	0.06	0.01	54.5
All Vehicles		981	3.9	0.695	12.1	LOS B	6.4	50.0	0.30	0.14	50.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	157	0	0	616	1	0	0	0	2	0	117
Future Vol, veh/h	32	157	0	0	616	1	0	0	0	2	0	117
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1450	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	11	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	32	157	0	0	616	1	0	0	0	2	0	117

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	617	0	0	157	0	0	838	838	617
Stage 1	-	-	-	-	-	-	617	617	-
Stage 2	-	-	-	-	-	-	221	221	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	973	-	-	1435	-	-	339	305	494
Stage 1	-	-	-	-	-	-	542	484	-
Stage 2	-	-	-	-	-	-	821	724	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	973	-	-	1435	-	-	328	0	494
Mov Cap-2 Maneuver	-	-	-	-	-	-	328	0	-
Stage 1	-	-	-	-	-	-	524	0	-
Stage 2	-	-	-	-	-	-	821	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	14.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	973	-	-	1435	-	-	490
HCM Lane V/C Ratio	0.033	-	-	-	-	-	0.243
HCM Control Delay (s)	8.8	-	-	0	-	-	14.7
HCM Lane LOS	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	0.9

LANE SUMMARY

Site: BG2022PM

Trim Road & St Joseph Boulevard / Old Montreal Road
Future (2022) Background Traffic
PM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Trim Road													
Lane 1	428	2.7	686	0.624	100	16.7	LOS C	3.1	24.3	Full	500	0.0	0.0
Lane 2[d]	443	2.4	710	0.624	100	16.2	LOS C	3.0	23.4	Full	500	0.0	0.0
Approach	872	2.5		0.624		16.4	LOS C	3.1	24.3				
East: Old Montreal Road													
Lane 1	160	0.0	616	0.260	100	9.2	LOS A	0.8	5.9	Full	500	0.0	0.0
Lane 2[d]	167	0.0	641	0.260	100	8.9	LOS A	0.7	5.7	Full	500	0.0	0.0
Lane 3	180	0.0	711	0.254	100	8.0	LOS A	0.7	5.6	Short	95	0.0	NA
Approach	508	0.0		0.260		8.7	LOS A	0.8	5.9				
North: Trim Road													
Lane 1	918	1.4	780	1.177	100	112.9	LOS F	57.4	441.2	Full	500	0.0	1.4
Lane 2[d]	943	1.1	801	1.177	100	112.2	LOS F	58.3	447.1	Full	500	0.0	1.8
Approach	1861	1.2		1.177		112.6	LOS F	58.3	447.1				
West: St Joseph Boulevard													
Lane 1	144	0.0	321	0.448	100	22.3	LOS C	1.4	10.9	Full	500	0.0	0.0
Lane 2[d]	156	0.0	349	0.448	100	20.7	LOS C	1.4	10.7	Full	500	0.0	0.0
Lane 3	278	1.0	435	0.640	100	25.0	LOS D	2.6	19.5	Short	135	0.0	NA
Approach	578	0.5		0.640		23.2	LOS C	2.6	19.5				
Intersection	3818	1.3		1.177		63.3	LOS F	58.3	447.1				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	777	9	1	360	21	4	6	1	91	2	47
Future Vol, veh/h	6	777	9	1	360	21	4	6	1	91	2	47
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	33	2	0	0	6	0	0	0	0	0	0	10
Mvmt Flow	6	777	9	1	360	21	4	6	1	91	2	47

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	382	0	0	786	0	0	1191	1178	784	1173	1172	372
Stage 1	-	-	-	-	-	-	794	794	-	374	374	-
Stage 2	-	-	-	-	-	-	397	384	-	799	798	-
Critical Hdwy	4.43	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.497	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.39
Pot Cap-1 Maneuver	1026	-	-	842	-	-	166	192	396	171	194	656
Stage 1	-	-	-	-	-	-	384	403	-	651	621	-
Stage 2	-	-	-	-	-	-	633	615	-	382	401	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1025	-	-	842	-	-	152	190	395	165	192	655
Mov Cap-2 Maneuver	-	-	-	-	-	-	152	190	-	165	192	-
Stage 1	-	-	-	-	-	-	382	401	-	646	620	-
Stage 2	-	-	-	-	-	-	585	614	-	372	399	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	26	37.1
HCM LOS			D	E

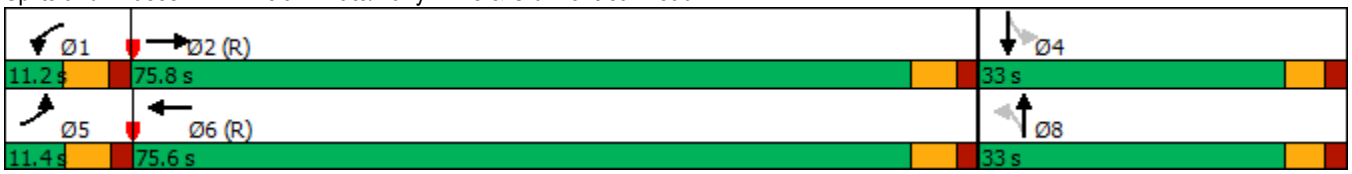
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	182	1025	-	-	842	-	-	165	596
HCM Lane V/C Ratio	0.06	0.006	-	-	0.001	-	-	0.552	0.082
HCM Control Delay (s)	26	8.5	-	-	9.3	-	-	50.8	11.6
HCM Lane LOS	D	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	2.8	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	777	9	1	360	21	4	6	1	91	2	47
Future Volume (vph)	6	777	9	1	360	21	4	6	1	91	2	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.6			7.6			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			1.00		1.00	0.98	
Frt		0.998			0.992			0.988			0.856	
Flt Protected	0.950			0.950				0.982		0.950		
Satd. Flow (prot)	1300	1781	0	1729	1706	0	0	1762	0	1729	1392	0
Flt Permitted	0.950			0.950				0.910		0.750		
Satd. Flow (perm)	1298	1781	0	1729	1706	0	0	1633	0	1359	1392	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			4			1			47	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		225.2			532.9			285.3			278.3	
Travel Time (s)		13.5			32.0			20.5			20.0	
Confl. Peds. (#/hr)	1					1			2	2		
Confl. Bikes (#/hr)												1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	33%	2%	0%	0%	6%	0%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	6	777	9	1	360	21	4	6	1	91	2	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	786	0	1	381	0	0	11	0	91	49	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	34.1		11.1	34.1		32.7	32.7		32.7	32.7	
Total Split (s)	11.4	75.8		11.2	75.6		33.0	33.0		33.0	33.0	
Total Split (%)	9.5%	63.2%		9.3%	63.0%		27.5%	27.5%		27.5%	27.5%	
Maximum Green (s)	5.3	69.7		5.1	69.5		27.3	27.3		27.3	27.3	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			5.7		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0			21.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	6.2	92.4		5.6	92.1			13.4		13.4	13.4	
Actuated g/C Ratio	0.05	0.77		0.05	0.77			0.11		0.11	0.11	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.09	0.57		0.01	0.29			0.06		0.60	0.25	
Control Delay	56.5	9.3		55.0	6.1			42.7		66.5	16.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	56.5	9.3		55.0	6.1			42.7		66.5	16.7	
LOS	E	A		D	A			D		E	B	
Approach Delay		9.7			6.2			42.7			49.0	
Approach LOS		A			A			D			D	
Queue Length 50th (m)	1.4	57.1		0.2	19.6			2.2		20.7	0.4	
Queue Length 95th (m)	5.7	154.2		2.1	57.2			7.4		36.0	11.2	
Internal Link Dist (m)		201.2			508.9			261.3			254.3	
Turn Bay Length (m)	50.0			60.0						25.0		
Base Capacity (vph)	67	1371		81	1310			372		309	352	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.09	0.57		0.01	0.29			0.03		0.29	0.14	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 13.1		Intersection LOS: B	
Intersection Capacity Utilization 65.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Aveia Private/Dairy Drive & Old Montreal Road



MOVEMENT SUMMARY

Site: Old Montreal / Dairy FB2022PM

Old Montreal Road & Dairy Drive / Aveia Private
Future (2022) Background Traffic
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Aveia Private											
3	L2	4	0.0	0.024	8.1	LOS A	0.1	0.6	0.60	0.56	52.0
8	T1	6	0.0	0.024	8.1	LOS A	0.1	0.6	0.60	0.56	52.2
18	R2	1	0.0	0.024	8.1	LOS A	0.1	0.6	0.60	0.56	51.0
Approach		11	0.0	0.024	8.1	LOS A	0.1	0.6	0.60	0.56	52.0
East: Old Montreal Road											
1	L2	1	0.0	0.364	7.2	LOS A	1.8	13.9	0.11	0.03	53.9
6	T1	360	6.0	0.364	7.2	LOS A	1.8	13.9	0.11	0.03	53.8
16	R2	21	0.0	0.364	7.2	LOS A	1.8	13.9	0.11	0.03	52.8
Approach		382	5.7	0.364	7.2	LOS A	1.8	13.9	0.11	0.03	53.8
North: Dairy Drive											
7	L2	91	0.0	0.189	6.9	LOS A	0.7	5.3	0.47	0.42	51.9
4	T1	2	0.0	0.189	6.9	LOS A	0.7	5.3	0.47	0.42	52.0
14	R2	47	10.0	0.189	6.9	LOS A	0.7	5.3	0.47	0.42	50.5
Approach		140	3.4	0.189	6.9	LOS A	0.7	5.3	0.47	0.42	51.4
West: Old Montreal Road											
5	L2	6	33.0	0.787	19.3	LOS C	8.6	66.8	0.64	0.39	44.5
2	T1	777	2.0	0.787	19.3	LOS C	8.6	66.8	0.64	0.39	45.9
12	R2	9	0.0	0.787	19.3	LOS C	8.6	66.8	0.64	0.39	45.1
Approach		792	2.2	0.787	19.3	LOS C	8.6	66.8	0.64	0.39	45.9
All Vehicles		1325	3.3	0.787	14.4	LOS B	8.6	66.8	0.47	0.29	48.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	121	751	0	0	316	4	0	0	0	2	0	67
Future Vol, veh/h	121	751	0	0	316	4	0	0	0	2	0	67
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1450	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	5	0	0	0	0	0	0	0
Mvmt Flow	121	751	0	0	316	4	0	0	0	2	0	67

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	320	0	0	751	0	0	1311	1311	318
Stage 1	-	-	-	-	-	-	318	318	-
Stage 2	-	-	-	-	-	-	993	993	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1251	-	-	868	-	-	177	160	727
Stage 1	-	-	-	-	-	-	742	657	-
Stage 2	-	-	-	-	-	-	362	326	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	1251	-	-	868	-	-	160	0	727
Mov Cap-2 Maneuver	-	-	-	-	-	-	160	0	-
Stage 1	-	-	-	-	-	-	670	0	-
Stage 2	-	-	-	-	-	-	362	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	11.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1251	-	-	868	-	-	659
HCM Lane V/C Ratio	0.097	-	-	-	-	-	0.105
HCM Control Delay (s)	8.2	-	-	0	-	-	11.1
HCM Lane LOS	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	0	-	-	0.3

LANE SUMMARY

Site: BG2027AM

Trim Road & St Joseph Boulevard / Old Montreal Road
Future (2022) Background Traffic
AM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Trim Road													
Lane 1[d]	798	1.7	930	0.858	100	26.4	LOS D	9.8	75.9	Full	500	0.0	0.0
Lane 2	774	3.6	901	0.858	100	27.0	LOS D	9.8	77.0	Full	500	0.0	0.0
Approach	1572	2.6		0.858		26.7	LOS D	9.8	77.0				
East: Old Montreal Road													
Lane 1	202	7.3	323	0.626	100	31.3	LOS D	2.2	17.7	Full	500	0.0	0.0
Lane 2[d]	230	2.0	368	0.626	100	28.0	LOS D	2.3	17.7	Full	500	0.0	0.0
Lane 3	167	2.0	439	0.381	100	15.1	LOS C	1.2	9.0	Short	95	0.0	NA
Approach	600	3.8		0.626		25.5	LOS D	2.3	17.7				
North: Trim Road													
Lane 1	263	5.9	629	0.417	100	11.9	LOS B	1.4	11.6	Full	500	0.0	0.0
Lane 2[d]	270	6.6	647	0.417	100	11.6	LOS B	1.4	11.0	Full	500	0.0	0.0
Approach	533	6.2		0.417		11.7	LOS B	1.4	11.6				
West: St Joseph Boulevard													
Lane 1[d]	80	10.0	621	0.130	100	7.3	LOS A	0.3	2.6	Full	500	0.0	0.0
Lane 2	59	8.0	610	0.096	74[5]	7.0	LOS A	0.2	2.0	Full	500	0.0	0.0
Lane 3	54	10.0	667	0.081	100	6.3	LOS A	0.2	1.6	Short	135	0.0	NA
Approach	193	9.4		0.130		6.9	LOS A	0.3	2.6				
Intersection	2898	4.0		0.858		22.4	LOS C	9.8	77.0				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

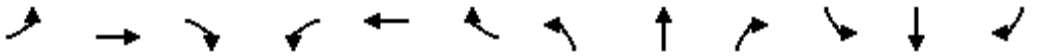
Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	145	5	0	457	102	9	7	0	7	0	7
Future Vol, veh/h	32	145	5	0	457	102	9	7	0	7	0	7
Conflicting Peds, #/hr	0	0	1	1	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	10	0	0	3	0	0	0	0	17	0	0
Mvmt Flow	32	145	5	0	457	102	9	7	0	7	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	559	0	0	151	0	0	727	772	149	723	723	510
Stage 1	-	-	-	-	-	-	213	213	-	508	508	-
Stage 2	-	-	-	-	-	-	514	559	-	215	215	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.27	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.27	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.27	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.653	4	3.3
Pot Cap-1 Maneuver	1022	-	-	1442	-	-	342	333	903	323	355	567
Stage 1	-	-	-	-	-	-	794	730	-	521	542	-
Stage 2	-	-	-	-	-	-	547	514	-	754	729	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1022	-	-	1441	-	-	329	322	902	310	344	566
Mov Cap-2 Maneuver	-	-	-	-	-	-	329	322	-	310	344	-
Stage 1	-	-	-	-	-	-	769	707	-	505	542	-
Stage 2	-	-	-	-	-	-	539	514	-	723	706	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	0	16.6	14.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	326	1022	-	-	1441	-	-	310	566
HCM Lane V/C Ratio	0.049	0.031	-	-	-	-	-	0.023	0.012
HCM Control Delay (s)	16.6	8.6	-	-	0	-	-	16.9	11.4
HCM Lane LOS	C	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.1	0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	145	5	0	457	102	9	7	0	7	0	7
Future Volume (vph)	32	145	5	0	457	102	9	7	0	7	0	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.6			7.6			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00						1.00			0.98	
Frt		0.995			0.973						0.850	
Flt Protected	0.950							0.973		0.950		
Satd. Flow (prot)	1729	1650	0	1820	1728	0	0	1771	0	1478	1509	0
Flt Permitted	0.950							0.977				
Satd. Flow (perm)	1729	1650	0	1820	1728	0	0	1774	0	1556	1509	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			15						428	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		225.2			532.9			285.3			278.3	
Travel Time (s)		13.5			32.0			20.5			20.0	
Confl. Peds. (#/hr)			1	1			2					2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	10%	0%	0%	3%	0%	0%	0%	0%	17%	0%	0%
Adj. Flow (vph)	32	145	5	0	457	102	9	7	0	7	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	150	0	0	559	0	0	16	0	7	7	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	34.1		11.1	34.1		32.7	32.7		32.7	32.7	
Total Split (s)	14.0	75.9		11.1	73.0		33.0	33.0		33.0	33.0	
Total Split (%)	11.7%	63.3%		9.3%	60.8%		27.5%	27.5%		27.5%	27.5%	
Maximum Green (s)	7.9	69.8		5.0	66.9		27.3	27.3		27.3	27.3	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			5.7		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0			21.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	7.7	112.1			101.9			6.8		6.7	6.7	
Actuated g/C Ratio	0.06	0.93			0.85			0.06		0.06	0.06	
v/c Ratio	0.29	0.10			0.38			0.16		0.08	0.01	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	59.4	1.2			5.3			56.8		54.9	0.0	
Queue Delay	0.0	0.0			0.0			0.0		0.0	0.0	
Total Delay	59.4	1.2			5.3			56.8		54.9	0.0	
LOS	E	A			A			E		D	A	
Approach Delay		11.4			5.3			56.8			27.4	
Approach LOS		B			A			E			C	
Queue Length 50th (m)	7.3	0.0			23.3			3.7		1.6	0.0	
Queue Length 95th (m)	17.2	8.2			73.7			10.8		6.4	0.0	
Internal Link Dist (m)		201.2			508.9			261.3			254.3	
Turn Bay Length (m)	50.0									25.0		
Base Capacity (vph)	122	1541			1469			403		353	673	
Starvation Cap Reductn	0	0			0			0		0	0	
Spillback Cap Reductn	0	0			0			0		0	0	
Storage Cap Reductn	0	0			0			0		0	0	
Reduced v/c Ratio	0.26	0.10			0.38			0.04		0.02	0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 8.2		Intersection LOS: A	
Intersection Capacity Utilization 49.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 2: Aveia Private/Dairy Drive & Old Montreal Road

MOVEMENT SUMMARY

Site: Old Montreal / Dairy FB2027AM

Old Montreal Road & Dairy Drive / Aveia Private
Future (2027) Background Traffic
AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Aveia Private											
3	L2	9	0.0	0.018	4.1	LOS A	0.1	0.5	0.30	0.17	54.5
8	T1	7	0.0	0.018	4.1	LOS A	0.1	0.5	0.30	0.17	54.7
18	R2	1	0.0	0.018	4.1	LOS A	0.1	0.5	0.30	0.17	53.4
Approach		17	0.0	0.018	4.1	LOS A	0.1	0.5	0.30	0.17	54.5
East: Old Montreal Road											
1	L2	1	0.0	0.533	9.9	LOS A	3.5	26.9	0.26	0.12	51.9
6	T1	457	3.0	0.533	9.9	LOS A	3.5	26.9	0.26	0.12	51.9
16	R2	102	0.0	0.533	9.9	LOS A	3.5	26.9	0.26	0.12	50.9
Approach		560	2.4	0.533	9.9	LOS A	3.5	26.9	0.26	0.12	51.7
North: Dairy Drive											
7	L2	7	17.0	0.023	5.8	LOS A	0.1	0.6	0.46	0.36	52.6
4	T1	1	0.0	0.023	5.8	LOS A	0.1	0.6	0.46	0.36	53.7
14	R2	7	0.0	0.023	5.8	LOS A	0.1	0.6	0.46	0.36	52.5
Approach		15	7.9	0.023	5.8	LOS A	0.1	0.6	0.46	0.36	52.6
West: Old Montreal Road											
5	L2	32	0.0	0.176	5.1	LOS A	0.7	5.3	0.06	0.01	54.9
2	T1	145	10.0	0.176	5.1	LOS A	0.7	5.3	0.06	0.01	54.6
12	R2	5	0.0	0.176	5.1	LOS A	0.7	5.3	0.06	0.01	53.8
Approach		182	8.0	0.176	5.1	LOS A	0.7	5.3	0.06	0.01	54.7
All Vehicles		774	3.8	0.533	8.6	LOS A	3.5	26.9	0.22	0.10	52.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	132	0	0	489	1	0	0	0	2	0	82
Future Vol, veh/h	21	132	0	0	489	1	0	0	0	2	0	82
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1450	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	11	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	21	132	0	0	489	1	0	0	0	2	0	82

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	490	0	0	132	0	0	664	664	490
Stage 1	-	-	-	-	-	-	490	490	-
Stage 2	-	-	-	-	-	-	174	174	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1084	-	-	1466	-	-	429	384	582
Stage 1	-	-	-	-	-	-	620	552	-
Stage 2	-	-	-	-	-	-	861	759	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	1084	-	-	1466	-	-	421	0	582
Mov Cap-2 Maneuver	-	-	-	-	-	-	421	0	-
Stage 1	-	-	-	-	-	-	608	0	-
Stage 2	-	-	-	-	-	-	861	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1084	-	-	1466	-	-	577
HCM Lane V/C Ratio	0.019	-	-	-	-	-	0.146
HCM Control Delay (s)	8.4	-	-	0	-	-	12.3
HCM Lane LOS	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	0.5

LANE SUMMARY

Site: BG2027PM

Trim Road & St Joseph Boulevard / Old Montreal Road
Future (2022) Background Traffic
PM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Trim Road													
Lane 1	484	2.7	792	0.612	100	14.5	LOS B	3.2	25.2	Full	500	0.0	0.0
Lane 2[d]	496	2.5	811	0.612	100	14.2	LOS B	3.1	24.0	Full	500	0.0	0.0
Approach	980	2.6		0.612		14.4	LOS B	3.2	25.2				
East: Old Montreal Road													
Lane 1[d]	165	0.0	586	0.282	100	10.0	LOS A	0.8	6.3	Full	500	0.0	0.0
Lane 2	154	0.0	559	0.276	98[5]	10.3	LOS B	0.8	6.4	Full	500	0.0	0.0
Lane 3	100	0.0	656	0.152	100	7.2	LOS A	0.4	3.1	Short	95	0.0	NA
Approach	420	0.0		0.282		9.4	LOS A	0.8	6.4				
North: Trim Road													
Lane 1	945	1.3	778	1.215	100	127.7	LOS F	66.2	508.2	Full	500	0.0	5.5
Lane 2[d]	969	1.1	798	1.215	100	127.1	LOS F	67.3	515.9	Full	500	0.0	5.9
Approach	1914	1.2		1.215		127.4	LOS F	67.3	515.9				
West: St Joseph Boulevard													
Lane 1	114	0.0	322	0.354	100	19.0	LOS C	1.1	8.0	Full	500	0.0	0.0
Lane 2[d]	124	0.0	350	0.354	100	17.6	LOS C	1.0	7.8	Full	500	0.0	0.0
Lane 3	302	1.0	399	0.757	100	36.0	LOS E	3.4	26.3	Short	135	0.0	NA
Approach	540	0.6		0.757		28.2	LOS D	3.4	26.3				
Intersection	3854	1.3		1.215		71.9	LOS F	67.3	515.9				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

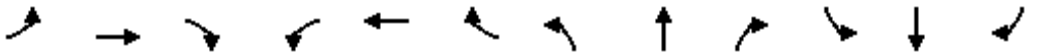
Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	582	9	1	275	21	4	6	1	91	2	47
Future Vol, veh/h	6	582	9	1	275	21	4	6	1	91	2	47
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	33	2	0	0	6	0	0	0	0	0	0	10
Mvmt Flow	6	582	9	1	275	21	4	6	1	91	2	47

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	297	0	0	591	0	0	911	898	589	893	892	287
Stage 1	-	-	-	-	-	-	599	599	-	289	289	-
Stage 2	-	-	-	-	-	-	312	299	-	604	603	-
Critical Hdwy	4.43	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.497	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.39
Pot Cap-1 Maneuver	1107	-	-	995	-	-	257	281	512	264	283	733
Stage 1	-	-	-	-	-	-	492	494	-	723	677	-
Stage 2	-	-	-	-	-	-	703	670	-	489	492	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1106	-	-	995	-	-	238	279	511	257	281	732
Mov Cap-2 Maneuver	-	-	-	-	-	-	238	279	-	257	281	-
Stage 1	-	-	-	-	-	-	490	492	-	719	676	-
Stage 2	-	-	-	-	-	-	655	669	-	479	490	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	18.7	20.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	273	1106	-	-	995	-	-	257	687
HCM Lane V/C Ratio	0.04	0.005	-	-	0.001	-	-	0.354	0.071
HCM Control Delay (s)	18.7	8.3	-	-	8.6	-	-	26.5	10.6
HCM Lane LOS	C	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	1.5	0.2



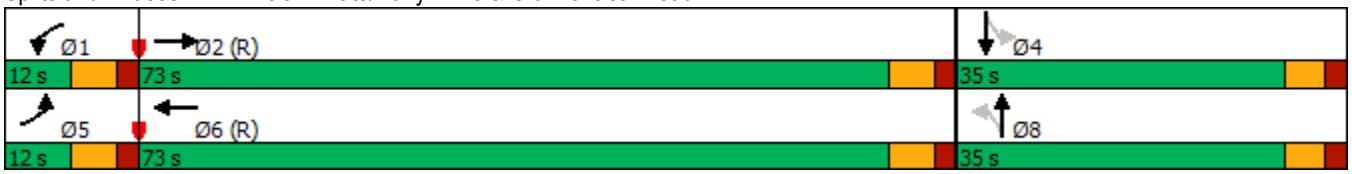
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	582	9	1	275	21	4	6	1	91	2	47
Future Volume (vph)	6	582	9	1	275	21	4	6	1	91	2	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.6			7.6			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			1.00		1.00	0.98	
Frt		0.998			0.989			0.988			0.856	
Flt Protected	0.950			0.950				0.982		0.950		
Satd. Flow (prot)	1300	1781	0	1729	1702	0	0	1762	0	1729	1392	0
Flt Permitted	0.950			0.950				0.910		0.750		
Satd. Flow (perm)	1298	1781	0	1729	1702	0	0	1633	0	1359	1392	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			5			1			47	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		225.2			532.9			285.3			278.3	
Travel Time (s)		13.5			32.0			20.5			20.0	
Confl. Peds. (#/hr)	1					1			2	2		
Confl. Bikes (#/hr)												1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	33%	2%	0%	0%	6%	0%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	6	582	9	1	275	21	4	6	1	91	2	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	591	0	1	296	0	0	11	0	91	49	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	34.1		11.1	34.1		32.7	32.7		32.7	32.7	
Total Split (s)	12.0	73.0		12.0	73.0		35.0	35.0		35.0	35.0	
Total Split (%)	10.0%	60.8%		10.0%	60.8%		29.2%	29.2%		29.2%	29.2%	
Maximum Green (s)	5.9	66.9		5.9	66.9		29.3	29.3		29.3	29.3	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			5.7		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0			21.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	6.2	92.4		5.6	92.1			13.4		13.4	13.4	
Actuated g/C Ratio	0.05	0.77		0.05	0.77			0.11		0.11	0.11	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.09	0.43		0.01	0.23			0.06		0.60	0.25	
Control Delay	56.5	7.2		55.0	5.6			42.7		66.5	16.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	56.5	7.2		55.0	5.6			42.7		66.5	16.7	
LOS	E	A		D	A			D		E	B	
Approach Delay		7.7			5.8			42.7			49.0	
Approach LOS		A			A			D			D	
Queue Length 50th (m)	1.4	35.8		0.2	14.3			2.2		20.7	0.4	
Queue Length 95th (m)	5.7	96.6		2.1	42.9			7.4		36.0	11.2	
Internal Link Dist (m)		201.2			508.9			261.3			254.3	
Turn Bay Length (m)	50.0			60.0						25.0		
Base Capacity (vph)	69	1371		85	1307			399		331	375	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.09	0.43		0.01	0.23			0.03		0.27	0.13	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 54.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Aveia Private/Dairy Drive & Old Montreal Road



MOVEMENT SUMMARY

Site: Old Montreal / Dairy FB2027PM

Old Montreal Road & Dairy Drive / Aveia Private
Future (2027) Background Traffic
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Aveia Private											
3	L2	4	0.0	0.019	6.6	LOS A	0.1	0.5	0.53	0.46	53.1
8	T1	6	0.0	0.019	6.6	LOS A	0.1	0.5	0.53	0.46	53.3
18	R2	1	0.0	0.019	6.6	LOS A	0.1	0.5	0.53	0.46	52.1
Approach		11	0.0	0.019	6.6	LOS A	0.1	0.5	0.53	0.46	53.1
East: Old Montreal Road											
1	L2	1	0.0	0.283	6.2	LOS A	1.2	9.7	0.10	0.03	54.7
6	T1	275	6.0	0.283	6.2	LOS A	1.2	9.7	0.10	0.03	54.6
16	R2	21	0.0	0.283	6.2	LOS A	1.2	9.7	0.10	0.03	53.6
Approach		297	5.6	0.283	6.2	LOS A	1.2	9.7	0.10	0.03	54.5
North: Dairy Drive											
7	L2	91	0.0	0.172	6.2	LOS A	0.6	4.9	0.41	0.33	52.4
4	T1	2	0.0	0.172	6.2	LOS A	0.6	4.9	0.41	0.33	52.5
14	R2	47	10.0	0.172	6.2	LOS A	0.6	4.9	0.41	0.33	51.0
Approach		140	3.4	0.172	6.2	LOS A	0.6	4.9	0.41	0.33	51.9
West: Old Montreal Road											
5	L2	6	33.0	0.594	11.6	LOS B	4.1	31.9	0.41	0.24	49.0
2	T1	582	2.0	0.594	11.6	LOS B	4.1	31.9	0.41	0.24	50.7
12	R2	9	0.0	0.594	11.6	LOS B	4.1	31.9	0.41	0.24	49.7
Approach		597	2.3	0.594	11.6	LOS B	4.1	31.9	0.41	0.24	50.6
All Vehicles		1045	3.3	0.594	9.3	LOS A	4.1	31.9	0.32	0.20	51.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	627	0	0	268	1	0	0	0	1	0	32
Future Vol, veh/h	58	627	0	0	268	1	0	0	0	1	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1450	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	5	0	0	0	0	0	0	0
Mvmt Flow	58	627	0	0	268	1	0	0	0	1	0	32

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	269	0	0	627	0	0	1012	1012	269
Stage 1	-	-	-	-	-	-	269	269	-
Stage 2	-	-	-	-	-	-	743	743	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1306	-	-	965	-	-	267	241	775
Stage 1	-	-	-	-	-	-	781	690	-
Stage 2	-	-	-	-	-	-	474	425	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	1306	-	-	965	-	-	255	0	775
Mov Cap-2 Maneuver	-	-	-	-	-	-	255	0	-
Stage 1	-	-	-	-	-	-	747	0	-
Stage 2	-	-	-	-	-	-	474	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1306	-	-	965	-	-	730
HCM Lane V/C Ratio	0.044	-	-	-	-	-	0.045
HCM Control Delay (s)	7.9	-	-	0	-	-	10.2
HCM Lane LOS	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	0.1

LANE SUMMARY

Site: TO2022AM

Trim Road & St Joseph Boulevard / Old Montreal Road
Future (2022) Total Traffic
AM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Trim Road													
Lane 1[d]	737	1.7	878	0.840	100	25.6	LOS D	8.3	64.1	Full	500	0.0	0.0
Lane 2	711	3.7	847	0.840	100	26.3	LOS D	8.3	65.2	Full	500	0.0	0.0
Approach	1448	2.7		0.840		25.9	LOS D	8.3	65.2				
East: Old Montreal Road													
Lane 1	264	6.9	359	0.736	100	37.1	LOS E	3.1	24.8	Full	500	0.0	0.0
Lane 2[d]	298	2.0	404	0.736	100	33.7	LOS D	3.2	24.9	Full	500	0.0	0.0
Lane 3	349	2.0	476	0.733	100	29.3	LOS D	3.4	26.6	Short	95	0.0	NA
Approach	911	3.4		0.736		33.0	LOS D	3.4	26.6				
North: Trim Road													
Lane 1	269	5.2	581	0.463	100	13.8	LOS B	1.7	13.3	Full	500	0.0	0.0
Lane 2[d]	276	6.7	597	0.463	100	13.5	LOS B	1.6	12.7	Full	500	0.0	0.0
Approach	546	6.0		0.463		13.6	LOS B	1.7	13.3				
West: St Joseph Boulevard													
Lane 1	75	9.9	572	0.131	100	7.9	LOS A	0.3	2.7	Full	500	0.0	0.0
Lane 2[d]	79	8.0	605	0.131	100	7.5	LOS A	0.3	2.6	Full	500	0.0	0.0
Lane 3	50	10.0	668	0.075	100	6.2	LOS A	0.2	1.4	Short	135	0.0	NA
Approach	204	9.2		0.131		7.3	LOS A	0.3	2.7				
Intersection	3109	3.9		0.840		24.6	LOS C	8.3	65.2				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

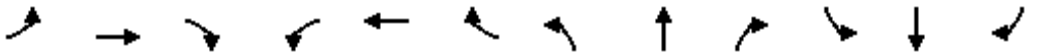
Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	231	5	0	745	134	9	7	0	14	0	7
Future Vol, veh/h	32	231	5	0	745	134	9	7	0	14	0	7
Conflicting Peds, #/hr	0	0	1	1	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	10	0	0	3	0	0	0	0	17	0	0
Mvmt Flow	32	231	5	0	745	134	9	7	0	14	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	879	0	0	237	0	0	1117	1178	235	1113	1113	814
Stage 1	-	-	-	-	-	-	299	299	-	812	812	-
Stage 2	-	-	-	-	-	-	818	879	-	301	301	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.27	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.27	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.27	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.653	4	3.3
Pot Cap-1 Maneuver	777	-	-	1342	-	-	186	192	809	174	210	381
Stage 1	-	-	-	-	-	-	714	670	-	352	395	-
Stage 2	-	-	-	-	-	-	373	368	-	677	669	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	777	-	-	1341	-	-	176	184	808	164	201	380
Mov Cap-2 Maneuver	-	-	-	-	-	-	176	184	-	164	201	-
Stage 1	-	-	-	-	-	-	684	642	-	338	395	-
Stage 2	-	-	-	-	-	-	365	368	-	642	641	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	0	27.1	24.2
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	179	777	-	-	1341	-	-	164	380
HCM Lane V/C Ratio	0.089	0.041	-	-	-	-	-	0.085	0.018
HCM Control Delay (s)	27.1	9.8	-	-	0	-	-	29	14.7
HCM Lane LOS	D	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0.3	0.1



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	231	5	0	745	134	9	7	0	14	0	7
Future Volume (vph)	32	231	5	0	745	134	9	7	0	14	0	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.6			7.6			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00						1.00			0.98	
Frt		0.997			0.977						0.850	
Flt Protected	0.950							0.973		0.950		
Satd. Flow (prot)	1729	1652	0	1820	1734	0	0	1771	0	1478	1509	0
Flt Permitted	0.950							0.893				
Satd. Flow (perm)	1729	1652	0	1820	1734	0	0	1621	0	1556	1509	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			13						263	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		225.2			532.9			285.3			278.3	
Travel Time (s)		13.5			32.0			20.5			20.0	
Confl. Peds. (#/hr)			1	1			2					2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	10%	0%	0%	3%	0%	0%	0%	0%	17%	0%	0%
Adj. Flow (vph)	32	231	5	0	745	134	9	7	0	14	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	236	0	0	879	0	0	16	0	14	7	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	34.1		11.1	34.1		32.7	32.7		32.7	32.7	
Total Split (s)	11.4	76.1		11.1	75.8		32.8	32.8		32.8	32.8	
Total Split (%)	9.5%	63.4%		9.3%	63.2%		27.3%	27.3%		27.3%	27.3%	
Maximum Green (s)	5.3	70.0		5.0	69.7		27.1	27.1		27.1	27.1	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			5.7		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0			21.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	7.7	111.8			101.6			7.1		7.1	7.1	
Actuated g/C Ratio	0.06	0.93			0.85			0.06		0.06	0.06	
v/c Ratio	0.29	0.15			0.60			0.17		0.15	0.02	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	59.4	1.4			8.7			56.8		56.3	0.1	
Queue Delay	0.0	0.0			0.0			0.0		0.0	0.0	
Total Delay	59.4	1.4			8.7			56.8		56.3	0.1	
LOS	E	A			A			E		E	A	
Approach Delay		8.3			8.7			56.8			37.6	
Approach LOS		A			A			E			D	
Queue Length 50th (m)	7.3	0.0			51.0			3.7		3.2	0.0	
Queue Length 95th (m)	17.2	13.6			167.6			10.7		9.8	0.0	
Internal Link Dist (m)		201.2			508.9			261.3			254.3	
Turn Bay Length (m)	50.0									25.0		
Base Capacity (vph)	111	1539			1470			366		351	544	
Starvation Cap Reductn	0	0			0			0		0	0	
Spillback Cap Reductn	0	0			0			0		0	0	
Storage Cap Reductn	0	0			0			0		0	0	
Reduced v/c Ratio	0.29	0.15			0.60			0.04		0.04	0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 9.8		Intersection LOS: A	
Intersection Capacity Utilization 67.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Aveia Private/Dairy Drive & Old Montreal Road

MOVEMENT SUMMARY

Site: Old Montreal / Dairy FT2022AM

Old Montreal Road & Dairy Drive / Aveia Private
Future (2022) Total Traffic
AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Aveia Private											
3	L2	9	0.0	0.020	4.5	LOS A	0.1	0.5	0.37	0.24	54.2
8	T1	7	0.0	0.020	4.5	LOS A	0.1	0.5	0.37	0.24	54.3
18	R2	1	0.0	0.020	4.5	LOS A	0.1	0.5	0.37	0.24	53.1
Approach		17	0.0	0.020	4.5	LOS A	0.1	0.5	0.37	0.24	54.2
East: Old Montreal Road											
1	L2	1	0.0	0.838	22.3	LOS C	12.4	96.3	0.59	0.28	44.2
6	T1	745	3.0	0.838	22.3	LOS C	12.4	96.3	0.59	0.28	44.2
16	R2	134	0.0	0.838	22.3	LOS C	12.4	96.3	0.59	0.28	43.5
Approach		880	2.5	0.838	22.3	LOS C	12.4	96.3	0.59	0.28	44.1
North: Dairy Drive											
7	L2	14	17.0	0.047	8.3	LOS A	0.1	1.1	0.56	0.54	50.3
4	T1	1	0.0	0.047	8.3	LOS A	0.1	1.1	0.56	0.54	51.3
14	R2	7	0.0	0.047	8.3	LOS A	0.1	1.1	0.56	0.54	50.2
Approach		22	10.8	0.047	8.3	LOS A	0.1	1.1	0.56	0.54	50.3
West: Old Montreal Road											
5	L2	32	0.0	0.262	6.1	LOS A	1.1	8.7	0.10	0.03	54.3
2	T1	231	10.0	0.262	6.1	LOS A	1.1	8.7	0.10	0.03	54.1
12	R2	5	0.0	0.262	6.1	LOS A	1.1	8.7	0.10	0.03	53.2
Approach		268	8.6	0.262	6.1	LOS A	1.1	8.7	0.10	0.03	54.1
All Vehicles		1187	4.0	0.838	18.2	LOS C	12.4	96.3	0.47	0.23	46.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	191	22	1	766	1	0	0	0	2	0	117
Future Vol, veh/h	32	191	22	1	766	1	0	0	0	2	0	117
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1450	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	11	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	32	191	22	1	766	1	0	0	0	2	0	117

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	767	0	0	213	0	0			1035	1046	767
Stage 1	-	-	-	-	-	-			769	769	-
Stage 2	-	-	-	-	-	-			266	277	-
Critical Hdwy	4.1	-	-	4.1	-	-			6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-			5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-			3.5	4	3.3
Pot Cap-1 Maneuver	856	-	-	1369	-	-			259	230	405
Stage 1	-	-	-	-	-	-			461	413	-
Stage 2	-	-	-	-	-	-			783	685	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	856	-	-	1369	-	-			249	0	405
Mov Cap-2 Maneuver	-	-	-	-	-	-			249	0	-
Stage 1	-	-	-	-	-	-			444	0	-
Stage 2	-	-	-	-	-	-			782	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	856	-	-	1369	-	-	401
HCM Lane V/C Ratio	0.037	-	-	0.001	-	-	0.297
HCM Control Delay (s)	9.4	-	-	7.6	0	-	17.7
HCM Lane LOS	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	1.2

Intersection	
Int Delay, s/veh	3.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	159	34	2	618	150	8
Future Vol, veh/h	159	34	2	618	150	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	11	0	0	2	0	0
Mvmt Flow	159	34	2	618	150	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	193	0	798	176
Stage 1	-	-	-	-	176	-
Stage 2	-	-	-	-	622	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1392	-	358	872
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	539	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1392	-	357	872
Mov Cap-2 Maneuver	-	-	-	-	357	-
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	538	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	21.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	368	-	-	1392	-
HCM Lane V/C Ratio	0.429	-	-	0.001	-
HCM Control Delay (s)	21.9	-	-	7.6	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2.1	-	-	0	-

LANE SUMMARY

Site: TO2022PM

Trim Road & St Joseph Boulevard / Old Montreal Road
Future (2022) Total Traffic
PM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Trim Road													
Lane 1	450	2.7	658	0.685	100	19.9	LOS C	3.7	29.0	Full	500	0.0	0.0
Lane 2[d]	468	2.2	684	0.685	100	19.3	LOS C	3.6	28.0	Full	500	0.0	0.0
Approach	918	2.5		0.685		19.6	LOS C	3.7	29.0				
East: Old Montreal Road													
Lane 1	188	0.0	616	0.305	100	9.9	LOS A	1.0	7.4	Full	500	0.0	0.0
Lane 2[d]	196	0.0	641	0.305	100	9.6	LOS A	0.9	7.1	Full	500	0.0	0.0
Lane 3	214	0.0	711	0.301	100	8.7	LOS A	0.9	7.0	Short	95	0.0	NA
Approach	598	0.0		0.305		9.4	LOS A	1.0	7.4				
North: Trim Road													
Lane 1	951	1.5	747	1.273	100	152.1	LOS F	76.6	589.5	Full	500	0.0	10.1
Lane 2[d]	981	1.1	770	1.273	100	151.4	LOS F	78.4	601.3	Full	500	0.0	10.7
Approach	1932	1.3		1.273		151.7	LOS F	78.4	601.3				
West: St Joseph Boulevard													
Lane 1	156	0.0	328	0.475	100	22.9	LOS C	1.6	11.9	Full	500	0.0	0.0
Lane 2[d]	169	0.0	356	0.475	100	21.3	LOS C	1.5	11.6	Full	500	0.0	0.0
Lane 3	278	1.0	454	0.613	100	22.8	LOS C	2.4	18.4	Short	135	0.0	NA
Approach	603	0.5		0.613		22.4	LOS C	2.4	18.4				
Intersection	4051	1.2		1.273		81.5	LOS F	78.4	601.3				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

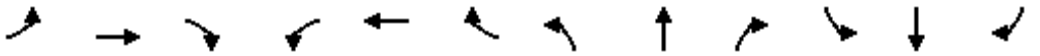
Intersection	
Int Delay, s/veh	11.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	908	9	1	443	44	4	6	1	111	2	47
Future Vol, veh/h	6	908	9	1	443	44	4	6	1	111	2	47
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	33	2	0	0	6	0	0	0	0	0	0	10
Mvmt Flow	6	908	9	1	443	44	4	6	1	111	2	47

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	488	0	0	917	0	0	1417	1415	915	1398	1397	466
Stage 1	-	-	-	-	-	-	925	925	-	468	468	-
Stage 2	-	-	-	-	-	-	492	490	-	930	929	-
Critical Hdwy	4.43	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.497	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.39
Pot Cap-1 Maneuver	932	-	-	752	-	-	116	139	333	119	142	580
Stage 1	-	-	-	-	-	-	325	351	-	579	565	-
Stage 2	-	-	-	-	-	-	562	552	-	323	349	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	931	-	-	752	-	-	105	138	332	114	141	579
Mov Cap-2 Maneuver	-	-	-	-	-	-	105	138	-	114	141	-
Stage 1	-	-	-	-	-	-	323	349	-	575	564	-
Stage 2	-	-	-	-	-	-	514	551	-	314	347	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	35.2	106.8
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	130	931	-	-	752	-	-	114	514
HCM Lane V/C Ratio	0.085	0.006	-	-	0.001	-	-	0.974	0.095
HCM Control Delay (s)	35.2	8.9	-	-	9.8	-	-	148.4	12.7
HCM Lane LOS	E	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	6.3	0.3



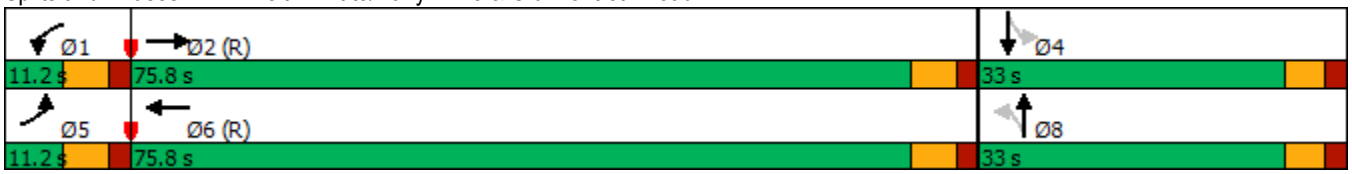
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	908	9	1	443	44	4	6	1	111	2	47
Future Volume (vph)	6	908	9	1	443	44	4	6	1	111	2	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.6			7.6			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			1.00		1.00	0.98	
Frt		0.999			0.986			0.988			0.856	
Flt Protected	0.950			0.950				0.982		0.950		
Satd. Flow (prot)	1300	1783	0	1729	1698	0	0	1762	0	1729	1392	0
Flt Permitted	0.950			0.950				0.917		0.750		
Satd. Flow (perm)	1299	1783	0	1729	1698	0	0	1645	0	1359	1392	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			7			1			47	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		225.2			532.9			285.3			278.3	
Travel Time (s)		13.5			32.0			20.5			20.0	
Confl. Peds. (#/hr)	1					1			2	2		
Confl. Bikes (#/hr)												1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	33%	2%	0%	0%	6%	0%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	6	908	9	1	443	44	4	6	1	111	2	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	917	0	1	487	0	0	11	0	111	49	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	34.1		11.1	34.1		32.7	32.7		32.7	32.7	
Total Split (s)	11.2	75.8		11.2	75.8		33.0	33.0		33.0	33.0	
Total Split (%)	9.3%	63.2%		9.3%	63.2%		27.5%	27.5%		27.5%	27.5%	
Maximum Green (s)	5.1	69.7		5.1	69.7		27.3	27.3		27.3	27.3	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			5.7		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0			21.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	6.2	90.7		5.6	90.4			15.1		15.1	15.1	
Actuated g/C Ratio	0.05	0.76		0.05	0.75			0.13		0.13	0.13	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.09	0.68		0.01	0.38			0.05		0.65	0.23	
Control Delay	56.5	12.9		55.0	7.6			40.8		66.6	15.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	56.5	12.9		55.0	7.6			40.8		66.6	15.5	
LOS	E	B		D	A			D		E	B	
Approach Delay		13.2			7.6			40.8			51.0	
Approach LOS		B			A			D			D	
Queue Length 50th (m)	1.4	83.3		0.2	29.6			2.1		25.3	0.4	
Queue Length 95th (m)	5.7	223.0		2.1	82.6			7.2		41.9	11.0	
Internal Link Dist (m)		201.2			508.9			261.3			254.3	
Turn Bay Length (m)	50.0			60.0						25.0		
Base Capacity (vph)	67	1347		81	1280			375		309	352	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.09	0.68		0.01	0.38			0.03		0.36	0.14	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 15.5 Intersection LOS: B
Intersection Capacity Utilization 74.0% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Aveia Private/Dairy Drive & Old Montreal Road



MOVEMENT SUMMARY

Site: Old Montreal / Dairy FT2022PM

Old Montreal Road & Dairy Drive / Aveia Private
Future (2022) Total Traffic
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Aveia Private											
3	L2	4	0.0	0.028	9.4	LOS A	0.1	0.6	0.65	0.65	51.1
8	T1	6	0.0	0.028	9.4	LOS A	0.1	0.6	0.65	0.65	51.2
18	R2	1	0.0	0.028	9.4	LOS A	0.1	0.6	0.65	0.65	50.1
Approach		11	0.0	0.028	9.4	LOS A	0.1	0.6	0.65	0.65	51.0
East: Old Montreal Road											
1	L2	1	0.0	0.464	8.7	LOS A	2.6	20.7	0.13	0.04	52.8
6	T1	443	6.0	0.464	8.7	LOS A	2.6	20.7	0.13	0.04	52.7
16	R2	44	0.0	0.464	8.7	LOS A	2.6	20.7	0.13	0.04	51.8
Approach		488	5.4	0.464	8.7	LOS A	2.6	20.7	0.13	0.04	52.6
North: Dairy Drive											
7	L2	111	0.0	0.234	8.0	LOS A	0.9	6.7	0.52	0.51	51.0
4	T1	2	0.0	0.234	8.0	LOS A	0.9	6.7	0.52	0.51	51.1
14	R2	47	10.0	0.234	8.0	LOS A	0.9	6.7	0.52	0.51	49.6
Approach		160	2.9	0.234	8.0	LOS A	0.9	6.7	0.52	0.51	50.6
West: Old Montreal Road											
5	L2	6	33.0	0.934	35.4	LOS E	22.9	177.4	1.00	0.77	37.3
2	T1	907	2.0	0.934	35.4	LOS E	22.9	177.4	1.00	0.77	38.3
12	R2	9	0.0	0.934	35.4	LOS E	22.9	177.4	1.00	0.77	37.7
Approach		922	2.2	0.934	35.4	LOS E	22.9	177.4	1.00	0.77	38.3
All Vehicles		1581	3.3	0.934	24.2	LOS C	22.9	177.4	0.68	0.52	43.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	121	842	60	3	422	4	0	0	0	2	0	67
Future Vol, veh/h	121	842	60	3	422	4	0	0	0	2	0	67
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1450	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	5	0	0	0	0	0	0	0
Mvmt Flow	121	842	60	3	422	4	0	0	0	2	0	67

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	426	0	0	902	0	0	1544	1574	424
Stage 1	-	-	-	-	-	-	430	430	-
Stage 2	-	-	-	-	-	-	1114	1144	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1144	-	-	762	-	-	128	111	634
Stage 1	-	-	-	-	-	-	660	587	-
Stage 2	-	-	-	-	-	-	317	277	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	1144	-	-	762	-	-	114	0	634
Mov Cap-2 Maneuver	-	-	-	-	-	-	114	0	-
Stage 1	-	-	-	-	-	-	590	0	-
Stage 2	-	-	-	-	-	-	315	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0.1	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1144	-	-	762	-	-	560
HCM Lane V/C Ratio	0.106	-	-	0.004	-	-	0.123
HCM Control Delay (s)	8.5	-	-	9.7	0	-	12.3
HCM Lane LOS	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	-	-	0	-	-	0.4

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	753	91	5	323	106	6
Future Vol, veh/h	753	91	5	323	106	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	0	0	5	0	0
Mvmt Flow	753	91	5	323	106	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	844	0	1132	799
Stage 1	-	-	-	-	799	-
Stage 2	-	-	-	-	333	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	801	-	227	389
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	731	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	801	-	225	389
Mov Cap-2 Maneuver	-	-	-	-	225	-
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	725	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	34.7
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	230	-	-	801	-
HCM Lane V/C Ratio	0.487	-	-	0.006	-
HCM Control Delay (s)	34.7	-	-	9.5	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	2.4	-	-	0	-

LANE SUMMARY

Site: TO2027AM

Trim Road & St Joseph Boulevard / Old Montreal Road
Future (2022) Total Traffic
AM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Trim Road													
Lane 1[d]	808	1.7	906	0.893	100	31.0	LOS D	11.6	89.1	Full	500	0.0	0.0
Lane 2	781	3.8	874	0.893	100	31.7	LOS D	11.4	89.8	Full	500	0.0	0.0
Approach	1589	2.7		0.893		31.4	LOS D	11.6	89.8				
East: Old Montreal Road													
Lane 1	240	7.5	322	0.744	100	41.3	LOS E	3.0	24.2	Full	500	0.0	0.0
Lane 2[d]	273	2.0	368	0.744	100	37.1	LOS E	3.2	24.4	Full	500	0.0	0.0
Lane 3	215	2.0	439	0.490	100	18.3	LOS C	1.7	12.8	Short	95	0.0	NA
Approach	728	3.8		0.744		32.9	LOS D	3.2	24.4				
North: Trim Road													
Lane 1	275	5.6	591	0.465	100	13.6	LOS B	1.7	13.5	Full	500	0.0	0.0
Lane 2[d]	284	6.6	610	0.465	100	13.3	LOS B	1.6	12.9	Full	500	0.0	0.0
Approach	559	6.1		0.465		13.4	LOS B	1.7	13.5				
West: St Joseph Boulevard													
Lane 1[d]	80	10.0	590	0.136	100	7.7	LOS A	0.3	2.7	Full	500	0.0	0.0
Lane 2	68	8.0	577	0.119	87[5]	7.7	LOS A	0.3	2.4	Full	500	0.0	0.0
Lane 3	54	10.0	646	0.084	100	6.5	LOS A	0.2	1.6	Short	135	0.0	NA
Approach	203	9.3		0.136		7.4	LOS A	0.3	2.7				
Intersection	3079	4.0		0.893		26.9	LOS D	11.6	89.8				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

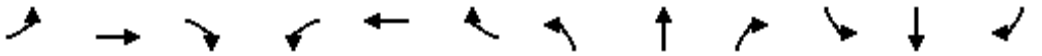
Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	194	5	0	575	134	9	7	0	14	0	7
Future Vol, veh/h	32	194	5	0	575	134	9	7	0	14	0	7
Conflicting Peds, #/hr	0	0	1	1	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	10	0	0	3	0	0	0	0	17	0	0
Mvmt Flow	32	194	5	0	575	134	9	7	0	14	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	709	0	0	200	0	0	910	971	198	906	906	644
Stage 1	-	-	-	-	-	-	262	262	-	642	642	-
Stage 2	-	-	-	-	-	-	648	709	-	264	264	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.27	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.27	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.27	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.653	4	3.3
Pot Cap-1 Maneuver	899	-	-	1384	-	-	258	255	848	242	278	476
Stage 1	-	-	-	-	-	-	747	695	-	438	472	-
Stage 2	-	-	-	-	-	-	462	440	-	709	694	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	899	-	-	1383	-	-	247	246	847	230	268	475
Mov Cap-2 Maneuver	-	-	-	-	-	-	247	246	-	230	268	-
Stage 1	-	-	-	-	-	-	720	669	-	422	472	-
Stage 2	-	-	-	-	-	-	454	440	-	677	668	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0	20.6	18.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	247	899	-	-	1383	-	-	230	475
HCM Lane V/C Ratio	0.065	0.036	-	-	-	-	-	0.061	0.015
HCM Control Delay (s)	20.6	9.2	-	-	0	-	-	21.7	12.7
HCM Lane LOS	C	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.2	0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	194	5	0	575	134	9	7	0	14	0	7
Future Volume (vph)	32	194	5	0	575	134	9	7	0	14	0	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.6			7.6			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00						1.00			0.98	
Frt		0.996			0.972						0.850	
Flt Protected	0.950							0.973		0.950		
Satd. Flow (prot)	1729	1651	0	1820	1727	0	0	1771	0	1478	1509	0
Flt Permitted	0.950							0.893				
Satd. Flow (perm)	1729	1651	0	1820	1727	0	0	1621	0	1556	1509	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			16						360	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		225.2			532.9			285.3			278.3	
Travel Time (s)		13.5			32.0			20.5			20.0	
Confl. Peds. (#/hr)			1	1			2					2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	10%	0%	0%	3%	0%	0%	0%	0%	17%	0%	0%
Adj. Flow (vph)	32	194	5	0	575	134	9	7	0	14	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	199	0	0	709	0	0	16	0	14	7	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	34.1		11.1	34.1		32.7	32.7		32.7	32.7	
Total Split (s)	12.0	75.0		12.0	75.0		33.0	33.0		33.0	33.0	
Total Split (%)	10.0%	62.5%		10.0%	62.5%		27.5%	27.5%		27.5%	27.5%	
Maximum Green (s)	5.9	68.9		5.9	68.9		27.3	27.3		27.3	27.3	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			5.7		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0			21.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	7.7	111.8			101.6			7.1		7.1	7.1	
Actuated g/C Ratio	0.06	0.93			0.85			0.06		0.06	0.06	
v/c Ratio	0.29	0.13			0.48			0.17		0.15	0.02	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	59.4	1.3			6.7			56.8		56.3	0.0	
Queue Delay	0.0	0.0			0.0			0.0		0.0	0.0	
Total Delay	59.4	1.3			6.7			56.8		56.3	0.0	
LOS	E	A			A			E		E	A	
Approach Delay		9.4			6.7			56.8			37.5	
Approach LOS		A			A			E			D	
Queue Length 50th (m)	7.3	0.0			34.0			3.7		3.2	0.0	
Queue Length 95th (m)	17.2	11.4			110.6			10.7		9.8	0.0	
Internal Link Dist (m)		201.2			508.9			261.3			254.3	
Turn Bay Length (m)	50.0									25.0		
Base Capacity (vph)	112	1538			1464			368		353	621	
Starvation Cap Reductn	0	0			0			0		0	0	
Spillback Cap Reductn	0	0			0			0		0	0	
Storage Cap Reductn	0	0			0			0		0	0	
Reduced v/c Ratio	0.29	0.13			0.48			0.04		0.04	0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 8.8		Intersection LOS: A	
Intersection Capacity Utilization 58.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Aveia Private/Dairy Drive & Old Montreal Road

MOVEMENT SUMMARY

Site: Old Montreal / Dairy FT2027AM

Old Montreal Road & Dairy Drive / Aveia Private
Future (2027) Total Traffic
AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Aveia Private											
3	L2	9	0.0	0.020	4.3	LOS A	0.1	0.5	0.34	0.21	54.3
8	T1	7	0.0	0.020	4.3	LOS A	0.1	0.5	0.34	0.21	54.5
18	R2	1	0.0	0.020	4.3	LOS A	0.1	0.5	0.34	0.21	53.2
Approach		17	0.0	0.020	4.3	LOS A	0.1	0.5	0.34	0.21	54.3
East: Old Montreal Road											
1	L2	1	0.0	0.675	13.6	LOS B	6.0	46.2	0.35	0.16	49.3
6	T1	575	3.0	0.675	13.6	LOS B	6.0	46.2	0.35	0.16	49.3
16	R2	134	0.0	0.675	13.6	LOS B	6.0	46.2	0.35	0.16	48.4
Approach		710	2.4	0.675	13.6	LOS B	6.0	46.2	0.35	0.16	49.2
North: Dairy Drive											
7	L2	14	17.0	0.039	6.9	LOS A	0.1	1.0	0.51	0.45	51.3
4	T1	1	0.0	0.039	6.9	LOS A	0.1	1.0	0.51	0.45	52.3
14	R2	7	0.0	0.039	6.9	LOS A	0.1	1.0	0.51	0.45	51.2
Approach		22	10.8	0.039	6.9	LOS A	0.1	1.0	0.51	0.45	51.3
West: Old Montreal Road											
5	L2	32	0.0	0.226	5.7	LOS A	0.9	7.2	0.09	0.03	54.6
2	T1	194	10.0	0.226	5.7	LOS A	0.9	7.2	0.09	0.03	54.3
12	R2	5	0.0	0.226	5.7	LOS A	0.9	7.2	0.09	0.03	53.5
Approach		231	8.4	0.226	5.7	LOS A	0.9	7.2	0.09	0.03	54.3
All Vehicles		980	4.0	0.675	11.4	LOS B	6.0	46.2	0.29	0.14	50.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	166	22	1	639	1	0	0	0	2	0	82
Future Vol, veh/h	21	166	22	1	639	1	0	0	0	2	0	82
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1450	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	11	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	21	166	22	1	639	1	0	0	0	2	0	82

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	640	0	0	188	0	0	861	872	640
Stage 1	-	-	-	-	-	-	642	642	-
Stage 2	-	-	-	-	-	-	219	230	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	954	-	-	1398	-	-	329	291	479
Stage 1	-	-	-	-	-	-	528	472	-
Stage 2	-	-	-	-	-	-	822	718	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	954	-	-	1398	-	-	321	0	479
Mov Cap-2 Maneuver	-	-	-	-	-	-	321	0	-
Stage 1	-	-	-	-	-	-	516	0	-
Stage 2	-	-	-	-	-	-	821	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	954	-	-	1398	-	-	473
HCM Lane V/C Ratio	0.022	-	-	0.001	-	-	0.178
HCM Control Delay (s)	8.9	-	-	7.6	0	-	14.2
HCM Lane LOS	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	134	34	2	491	150	8
Future Vol, veh/h	134	34	2	491	150	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	11	0	0	2	0	0
Mvmt Flow	134	34	2	491	150	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	168	0	646	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	495	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1422	-	439	901
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	617	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1422	-	438	901
Mov Cap-2 Maneuver	-	-	-	-	438	-
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	616	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	450	-	-	1422	-
HCM Lane V/C Ratio	0.351	-	-	0.001	-
HCM Control Delay (s)	17.3	-	-	7.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.6	-	-	0	-

LANE SUMMARY

Site: TO2027PM

Trim Road & St Joseph Boulevard / Old Montreal Road
Future (2022) Total Traffic
PM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Trim Road													
Lane 1	506	2.7	754	0.671	100	17.3	LOS C	3.9	30.2	Full	500	0.0	0.0
Lane 2[d]	521	2.3	776	0.671	100	16.9	LOS C	3.7	29.0	Full	500	0.0	0.0
Approach	1027	2.5		0.671		17.1	LOS C	3.9	30.2				
East: Old Montreal Road													
Lane 1[d]	196	0.0	586	0.334	100	10.9	LOS B	1.0	7.9	Full	500	0.0	0.0
Lane 2	180	0.0	559	0.323	97[5]	11.1	LOS B	1.0	7.9	Full	500	0.0	0.0
Lane 3	134	0.0	656	0.204	100	7.9	LOS A	0.6	4.3	Short	95	0.0	NA
Approach	510	0.0		0.334		10.2	LOS B	1.0	7.9				
North: Trim Road													
Lane 1	978	1.3	745	1.313	100	168.5	LOS F	85.6	657.9	Full	500	0.0	13.8
Lane 2[d]	1007	1.1	767	1.313	100	167.9	LOS F	87.6	671.6	Full	500	0.0	14.5
Approach	1985	1.2		1.313		168.2	LOS F	87.6	671.6				
West: St Joseph Boulevard													
Lane 1	126	0.0	329	0.384	100	19.5	LOS C	1.2	8.9	Full	500	0.0	0.0
Lane 2[d]	137	0.0	357	0.384	100	18.1	LOS C	1.1	8.7	Full	500	0.0	0.0
Lane 3	302	1.0	418	0.723	100	31.6	LOS D	3.2	24.3	Short	135	0.0	NA
Approach	565	0.5		0.723		25.7	LOS D	3.2	24.3				
Intersection	4087	1.3		1.313		90.8	LOS F	87.6	671.6				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

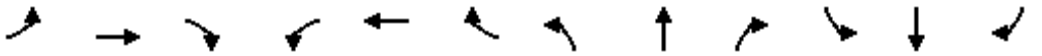
Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	713	9	1	358	44	4	6	1	111	2	47
Future Vol, veh/h	6	713	9	1	358	44	4	6	1	111	2	47
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	600	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	33	2	0	0	6	0	0	0	0	0	0	10
Mvmt Flow	6	713	9	1	358	44	4	6	1	111	2	47

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	403	0	0	722	0	0	1137	1135	720	1118	1117	381
Stage 1	-	-	-	-	-	-	730	730	-	383	383	-
Stage 2	-	-	-	-	-	-	407	405	-	735	734	-
Critical Hdwy	4.43	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.497	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.39
Pot Cap-1 Maneuver	1006	-	-	889	-	-	181	204	431	186	209	649
Stage 1	-	-	-	-	-	-	417	431	-	644	616	-
Stage 2	-	-	-	-	-	-	625	602	-	414	429	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1005	-	-	889	-	-	166	202	430	180	207	648
Mov Cap-2 Maneuver	-	-	-	-	-	-	166	202	-	180	207	-
Stage 1	-	-	-	-	-	-	414	428	-	639	615	-
Stage 2	-	-	-	-	-	-	577	601	-	404	426	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	24.5	40.1
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	196	1005	-	-	889	-	-	180	596
HCM Lane V/C Ratio	0.056	0.006	-	-	0.001	-	-	0.617	0.082
HCM Control Delay (s)	24.5	8.6	-	-	9.1	-	-	52.7	11.6
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	3.4	0.3



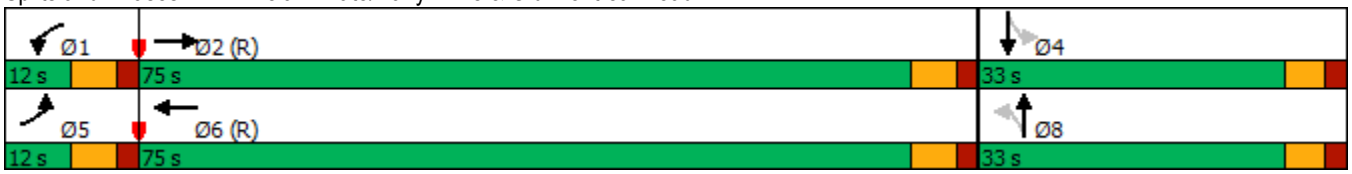
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	713	9	1	358	44	4	6	1	111	2	47
Future Volume (vph)	6	713	9	1	358	44	4	6	1	111	2	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	60.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.6			7.6			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			1.00		1.00	0.98	
Frt		0.998			0.984			0.988			0.856	
Flt Protected	0.950			0.950				0.982		0.950		
Satd. Flow (prot)	1300	1781	0	1729	1696	0	0	1762	0	1729	1392	0
Flt Permitted	0.950			0.950				0.917		0.750		
Satd. Flow (perm)	1298	1781	0	1729	1696	0	0	1645	0	1359	1392	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			9			1			47	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		225.2			532.9			285.3			278.3	
Travel Time (s)		13.5			32.0			20.5			20.0	
Confl. Peds. (#/hr)	1					1			2	2		
Confl. Bikes (#/hr)												1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	33%	2%	0%	0%	6%	0%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	6	713	9	1	358	44	4	6	1	111	2	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	722	0	1	402	0	0	11	0	111	49	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	34.1		11.1	34.1		32.7	32.7		32.7	32.7	
Total Split (s)	12.0	75.0		12.0	75.0		33.0	33.0		33.0	33.0	
Total Split (%)	10.0%	62.5%		10.0%	62.5%		27.5%	27.5%		27.5%	27.5%	
Maximum Green (s)	5.9	68.9		5.9	68.9		27.3	27.3		27.3	27.3	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			5.7		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0			21.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	6.2	90.7		5.6	90.4			15.1		15.1	15.1	
Actuated g/C Ratio	0.05	0.76		0.05	0.75			0.13		0.13	0.13	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.09	0.54		0.01	0.31			0.05		0.65	0.23	
Control Delay	56.5	9.5		55.0	6.9			40.8		66.6	15.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	56.5	9.5		55.0	6.9			40.8		66.6	15.5	
LOS	E	A		D	A			D		E	B	
Approach Delay		9.9			7.0			40.8			51.0	
Approach LOS		A			A			D			D	
Queue Length 50th (m)	1.4	53.7		0.2	22.6			2.1		25.3	0.4	
Queue Length 95th (m)	5.7	140.9		2.1	64.5			7.2		41.9	11.0	
Internal Link Dist (m)		201.2			508.9			261.3			254.3	
Turn Bay Length (m)	50.0			60.0						25.0		
Base Capacity (vph)	69	1345		85	1279			375		309	352	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.09	0.54		0.01	0.31			0.03		0.36	0.14	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 14.3		Intersection LOS: B	
Intersection Capacity Utilization 63.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Aveia Private/Dairy Drive & Old Montreal Road



MOVEMENT SUMMARY

Site: Old Montreal / Dairy FT2027PM

Old Montreal Road & Dairy Drive / Aveia Private
Future (2027) Total Traffic
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Aveia Private											
3	L2	4	0.0	0.023	7.7	LOS A	0.1	0.5	0.58	0.53	52.3
8	T1	6	0.0	0.023	7.7	LOS A	0.1	0.5	0.58	0.53	52.4
18	R2	1	0.0	0.023	7.7	LOS A	0.1	0.5	0.58	0.53	51.3
Approach		11	0.0	0.023	7.7	LOS A	0.1	0.5	0.58	0.53	52.3
East: Old Montreal Road											
1	L2	1	0.0	0.383	7.4	LOS A	1.9	15.1	0.11	0.03	53.7
6	T1	358	6.0	0.383	7.4	LOS A	1.9	15.1	0.11	0.03	53.6
16	R2	44	0.0	0.383	7.4	LOS A	1.9	15.1	0.11	0.03	52.7
Approach		403	5.3	0.383	7.4	LOS A	1.9	15.1	0.11	0.03	53.5
North: Dairy Drive											
7	L2	111	0.0	0.214	7.2	LOS A	0.8	6.2	0.48	0.43	51.6
4	T1	2	0.0	0.214	7.2	LOS A	0.8	6.2	0.48	0.43	51.7
14	R2	47	10.0	0.214	7.2	LOS A	0.8	6.2	0.48	0.43	50.2
Approach		160	2.9	0.214	7.2	LOS A	0.8	6.2	0.48	0.43	51.2
West: Old Montreal Road											
5	L2	6	33.0	0.737	16.8	LOS C	6.8	52.6	0.60	0.39	45.9
2	T1	712	2.0	0.737	16.8	LOS C	6.8	52.6	0.60	0.39	47.3
12	R2	9	0.0	0.737	16.8	LOS C	6.8	52.6	0.60	0.39	46.5
Approach		727	2.2	0.737	16.8	LOS C	6.8	52.6	0.60	0.39	47.3
All Vehicles		1301	3.3	0.737	12.6	LOS B	6.8	52.6	0.43	0.29	49.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	718	60	3	374	1	0	0	0	1	0	32
Future Vol, veh/h	58	718	60	3	374	1	0	0	0	1	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1450	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	5	0	0	0	0	0	0	0
Mvmt Flow	58	718	60	3	374	1	0	0	0	1	0	32

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	375	0	0	778	0	0	1245	1275	375
Stage 1	-	-	-	-	-	-	381	381	-
Stage 2	-	-	-	-	-	-	864	894	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1195	-	-	848	-	-	194	168	676
Stage 1	-	-	-	-	-	-	695	617	-
Stage 2	-	-	-	-	-	-	416	362	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	1195	-	-	848	-	-	184	0	676
Mov Cap-2 Maneuver	-	-	-	-	-	-	184	0	-
Stage 1	-	-	-	-	-	-	661	0	-
Stage 2	-	-	-	-	-	-	414	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0.1	11.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1195	-	-	848	-	-	625
HCM Lane V/C Ratio	0.049	-	-	0.004	-	-	0.053
HCM Control Delay (s)	8.2	-	-	9.3	0	-	11.1
HCM Lane LOS	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	628	91	5	272	106	6
Future Vol, veh/h	628	91	5	272	106	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	0	0	5	0	0
Mvmt Flow	628	91	5	272	106	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	719	0	956	674
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	282	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	892	-	289	458
Stage 1	-	-	-	-	510	-
Stage 2	-	-	-	-	770	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	892	-	287	458
Mov Cap-2 Maneuver	-	-	-	-	287	-
Stage 1	-	-	-	-	510	-
Stage 2	-	-	-	-	765	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	24.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	293	-	-	892	-
HCM Lane V/C Ratio	0.382	-	-	0.006	-
HCM Control Delay (s)	24.7	-	-	9.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.7	-	-	0	-

IBI GROUP MEMORANDUM

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Appendix H – Multi-Modal Level of Service

Multi-Modal Level of Service
1154-1208 Old Montreal Road
Scenario: Existing (2020) Conditions

November 13, 2020

IBI

SEGMENTS			Old Montreal Road - Adjacent to Site		
			1	2	3
Pedestrian	Sidewalk Width		No Sidewalk		
	Boulevard Width		N/A		
	AADT		N/A		
	On-Street Parking		N/A		
	Operating Speed		61 km/h or more		
	Level of Service		**F 3**		
			F		
Cyclist	Type of Bikeway		Bike Lanes Not Adjacent Parking Lane		
	Number of Travel Lanes (per direction)		1 Travel Lane Per Direction		
	Raised Median?		No		
	Bike Lane Width		≥1.8 m wide bike lane		
	Bike Lane Plus Parking Lane Width		N/A		
	Operating Speed		≥ 70 km/h		
	Bike Lane Blockages (Commercial Areas)		Rare		
	Median Refuge				
	Number of Travel Lanes on Sidestreet				
	Sidestreet Operating Speed				
	Level of Service		**E**		
Transit	Facility Type		Mixed Traffic		
	Friction		Limited parking/driveway friction		
	Level of Service		**D**		
Truck	Curb Lane Width		≤3.5		
	Number of Travel Lanes		2		
			C		
			C		

Multi-Modal Level of Service
1154-1208 Old Montreal Road
Scenario: Future (2027) Conditions

November 13, 2020

IBI

INTERSECTIONS		Trim Rd & St Joseph Blvd / Old Montreal Rd				Old Montreal Rd & Dairy Dr / Aveia Private				Old Montreal Rd / Famille-Laporte Ave / Street 1			
		NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg
Pedestrian	Lanes (do NOT include lanes protected by bulb-outs)	6	6	6	6	3	2	3	3	2	2	3	3
	Median	Median (>2.4m)	Median (>2.4m)	Median (>2.4m)	Median (>2.4m)	No Median	No Median	Median (>2.4m)	Median (>2.4m)	No Median	No Median	No Median	No Median
	Island Refuge												
	Conflicting Left Turns (from street to right)	Protected/permissive	Protected/permissive	Protected/permissive	Protected/permissive	Protected	Protected	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns (from street to left)	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	RTOR? (from street to left)	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Leading Interval? (on cross street)	No	No	No	No	No	No	No	No	No	No	No	No
	Corner Radius	> 10m to 15m	> 10m to 15m	> 10m to 15m	> 10m to 15m	> 10m to 15m	> 5m to 10m	> 10m to 15m	> 5m to 10m	> 5m to 10m	> 3m to 5m	> 5m to 10m	> 3m to 5m
	Right Turn Channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel
	Crosswalk Type	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings
	LOS (PETSI)	**25 F**	**25 F**	**25 F**	**25 F**	**78 B**	**94 A**	**70 C**	**71 C**	**86 B**	**87 B**	**71 C**	**72 C**
	Cycle Length (sec)	120	120	120	120	120	120	120	120	120	120	120	120
	Pedestrian Walk Time (solid white symbol) (sec)	7	7	7	7	7	7	7	7	7	7	7	7
	LOS (Delay,seconds)	**54.3 E**	**54.3 E**	**54.3 E**	**54.3 E**	**54.3 E**	**54.3 E**	**54.3 E**	**54.3 E**	**54.3 E**	**54.3 E**	**54.3 E**	**54.3 E**
	Overall Level of Service	**F**				**E**				**E**			
Cyclist	Type of Bikeway	Bike Lanes/Cycle Track	Bike Lanes/Cycle Track	Bike Lanes/Cycle Track	Bike Lanes/Cycle Track	Mixed Traffic	Mixed Traffic	Bike Lanes/Cycle Track	Bike Lanes/Cycle Track	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Turning Speed (based on corner radius & angle)												
	Right Turn Storage Length												
	Dual Right Turn?												
	Shared Through-Right?					Yes	Yes			Yes	Yes	Yes	Yes
	Bike Box / Two-Stage Left-Turn?	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No
	Number of Lanes Crossed for Left Turns	No Lanes Crossed	No Lanes Crossed	No Lanes Crossed	No Lanes Crossed	1 Lane Crossed	No Lanes Crossed	1 Lane Crossed	1 Lane Crossed	No Lanes Crossed	No Lanes Crossed	1 Lane Crossed	1 Lane Crossed
	Operating Speed on Approach	≥ 60km/h	≥ 40km/h	≥ 60km/h	≥ 60km/h	≥ 60km/h	≤ 40km/h	≥ 60km/h	≥ 60km/h	≥ 60km/h	≤ 40km/h	≥ 60km/h	≥ 60km/h
	Dual Left Turn Lanes?	No	No	No	No	No	No	No	No	No	No	No	No
	Level of Service	**C**	**C**	**C**	**C**	**F**	**B**	**E**	**E**	**D**	**B**	**F**	**F**
		C				**F**				**F**			
Transit	Average Signal Delay	≤40 sec	>40 sec	≤10 sec	≤10 sec			≤10 sec	≤10 sec	≤20 sec		≤10 sec	≤10 sec
	Level of Service	**E**	**F**	**B**	**B**			**B**	**B**	**C**		**B**	**B**
		F				**B**				**C**			
Truck	Turning Radius (Right Turn)	10 to 15m	10 to 15m	10 to 15m	10 to 15m	10 to 15m		10 to 15m					
	Number of Receiving Lanes	2+	2+	2+	2+	1		1					
		B	**B**	**B**	**B**	**E**		**E**					
		B				**E**							

SEGMENTS			Old Montreal Road - Adjacent to Site				Section				Section		
			1	2	3		1	2	3		1	2	3
Pedestrian	Sidewalk Width		1.5										
	Boulevard Width		> 2										
	AADT		> 3000										
	On-Street Parking		No										
	Operating Speed		61 km/h or more										
	Level of Service		**E**										
			E										
Cyclist	Type of Bikeway		Bike Lanes Not Adjacent Parking Lane										
	Number of Travel Lanes (per direction)		1 Travel Lane Per Direction										
	Raised Median?		No										
	Bike Lane Width		≥1.8 m wide bike lane										
	Bike Lane Plus Parking Lane Width		N/A										
	Operating Speed		≥ 70 km/h										
	Bike Lane Blockages (Commercial Areas)		Rare										
	Median Refuge												
	Number of Travel Lanes on Sidestreet												
	Sidestreet Operating Speed												
	Level of Service		**E**										
Transit	Facility Type		Mixed Traffic										
	Friction		Limited parking/driveway friction										
	Level of Service		**D**										
Truck	Curb Lane Width		≤3.5										
	Number of Travel Lanes		2										
			C										
			C										

Multi-Modal Level of Service
1154-1208 Old Montreal Road
Scenario: Conceptual Complete Street

November 13, 2020

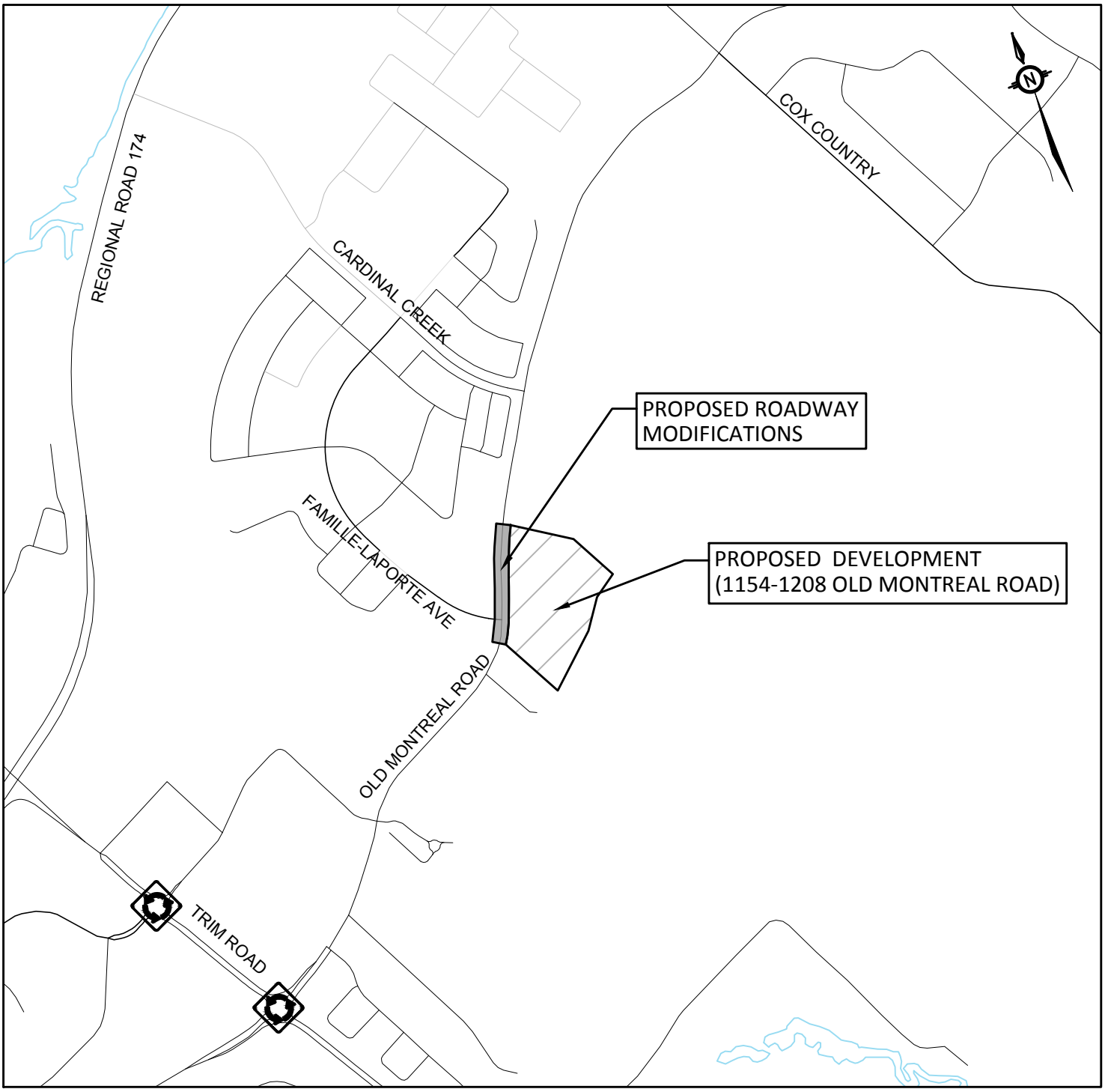
IBI

SEGMENTS			Old Montreal Road - Adjacent to Site		
			1	2	3
Pedestrian	Sidewalk Width		2.0 or more		
	Boulevard Width		> 2		
	AADT		> 3000		
	On-Street Parking		No		
	Operating Speed		61 km/h or more		
	Level of Service		**D**		
			D		
Cyclist	Type of Bikeway		Physically Separated Bikeway		
	Number of Travel Lanes (per direction)				
	Raised Median?				
	Bike Lane Width				
	Bike Lane Plus Parking Lane Width				
	Operating Speed				
	Bike Lane Blockages (Commercial Areas)				
	Median Refuge				
	Number of Travel Lanes on Sidestreet				
	Sidestreet Operating Speed				
	Level of Service		**A**		
Transit	Facility Type		Mixed Traffic		
	Friction		Limited parking/driveway friction		
	Level of Service		**D**		
Truck	Curb Lane Width		≤3.5		
	Number of Travel Lanes		3+		
			A		
			A		

IBI GROUP MEMORANDUM

Mike Giampa - City of Ottawa Transportation Project Manager – February 16, 2021

Appendix I – Roadway Modification Approval Drawings



LEGEND:

- PROPOSED DEVELOPMENT
- AREA OF PROPOSED ROADWAY MODIFICATIONS
- EXISTING ROUNDABOUT

Ottawa

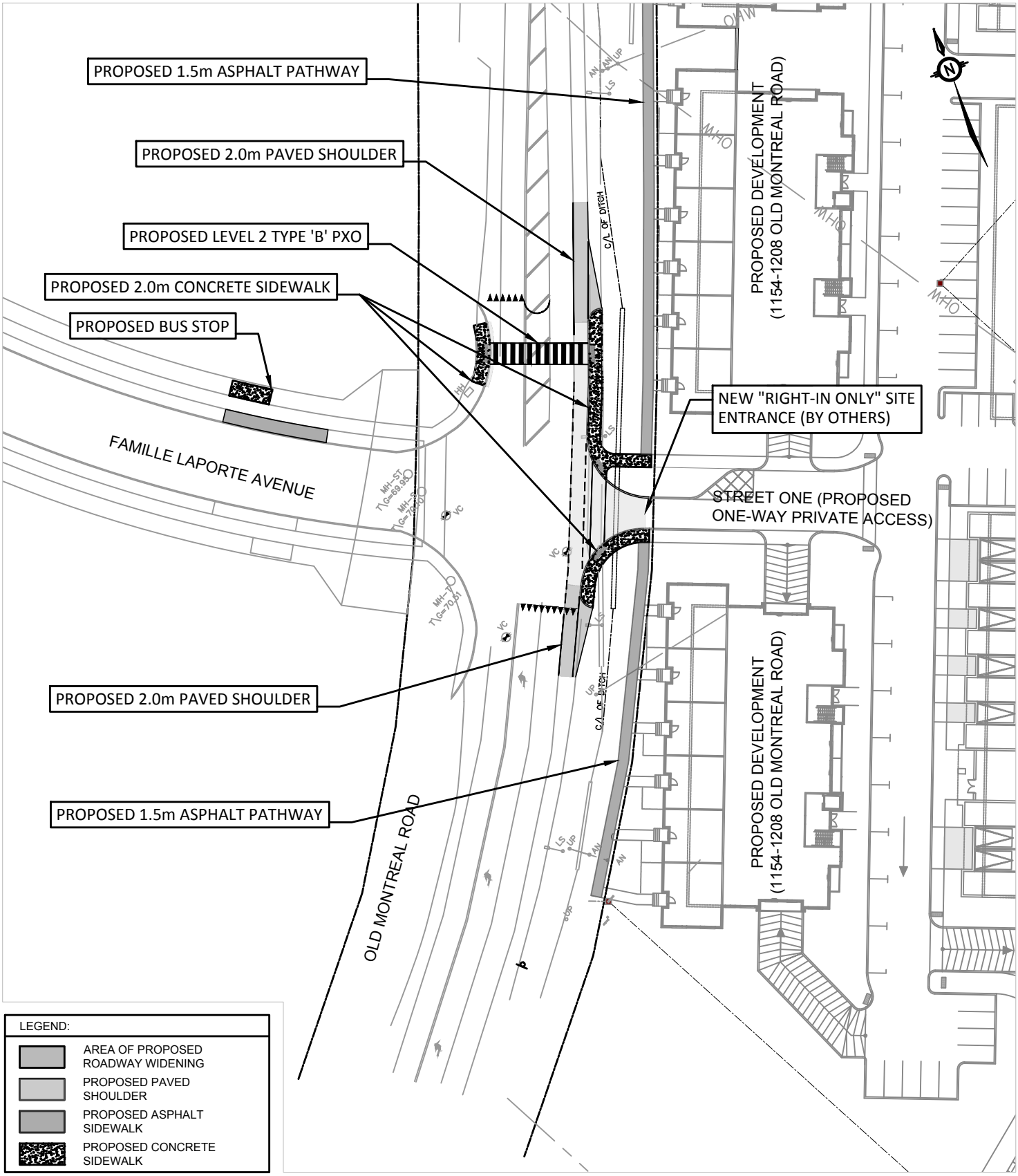
PLANNING AND GROWTH MANAGEMENT

KEY PLAN

OLD MONTREAL ROAD MODIFICATIONS (DRAFT)

Transportation Engineering Services

Approved By:	Drawing No.:
Completed By: IBI GROUP	RMA-2021-TPD-XXXA
Scale: N.T.S.	Date: FEBRUARY 2021



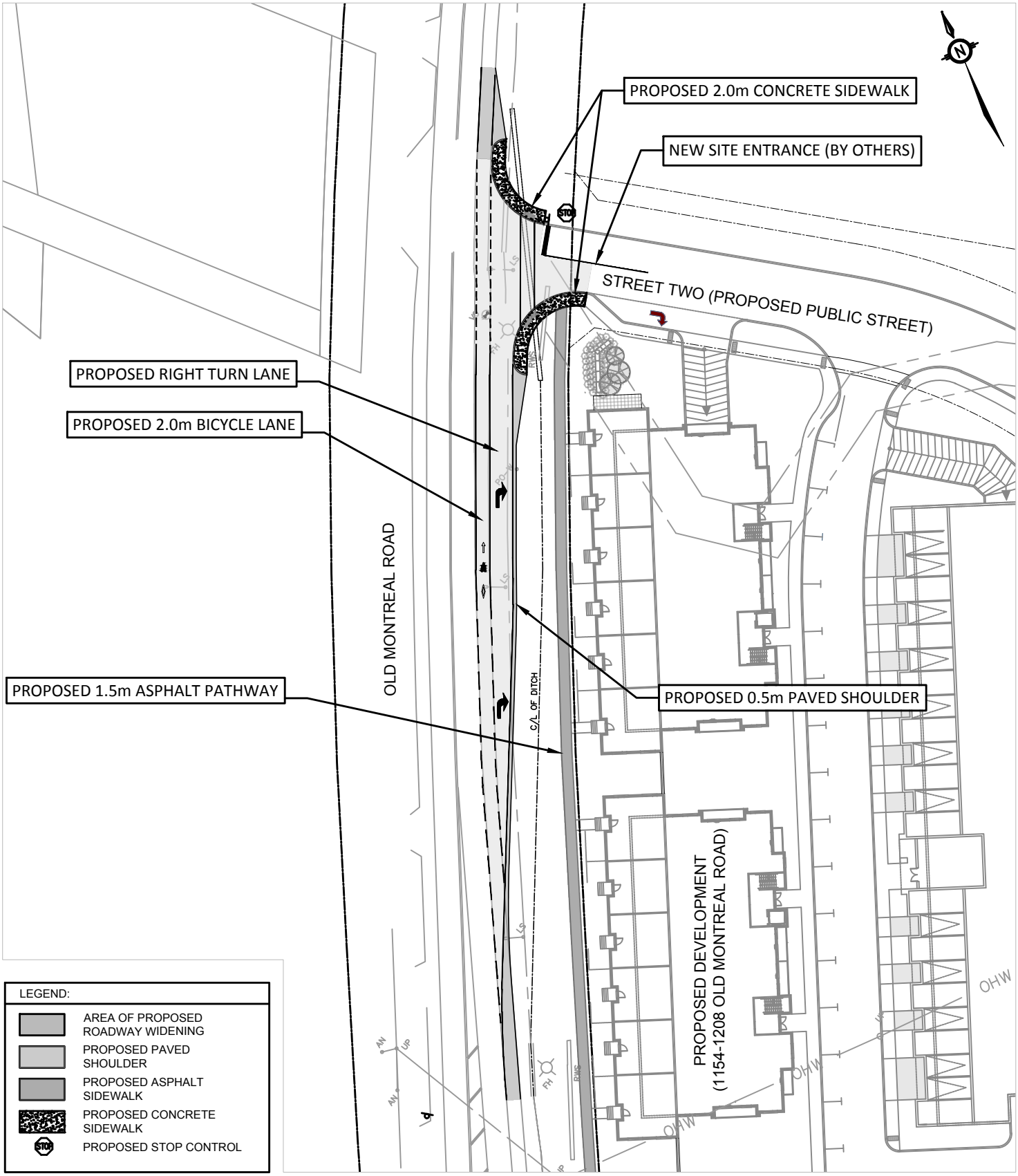
PLANNING AND GROWTH MANAGEMENT

PROPOSED ROADWAY MODIFICATIONS

OLD MONTREAL ROAD MODIFICATIONS (DRAFT)

Transportation Engineering Services

Approved By:	Drawing No.:
Completed By: IBI GROUP	RMA-2021-TPD-XXXB
Scale: N.T.S.	Date: FEBRUARY 2021



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PLANNING AND GROWTH MANAGEMENT

PROPOSED ROADWAY MODIFICATIONS

OLD MONTREAL ROAD MODIFICATIONS (DRAFT)

Transportation Engineering Services

Approved By:	Drawing No.:
Completed By: IBI GROUP	RMA-2021-TPD-XXXC
Scale: N.T.S.	Date: FEBRUARY 2021