Transportation Impact Assessment – Step 4: Analysis

Mer Bleue Phase 1

Prepared for Claridge Homes
by IBI Group
November 5, 2021

TIA Plan Reports - Certification

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associate documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below:

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;

2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;

3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and

4. I am either a licensed[1] or registered[1] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering □ or transportation planning □.

[1] **License or registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.**

Dated at Ottawa this 5th day of November, 2021.
(City)

Name: David Hook, P.Eng.

Professional Title: Project Engineer

Signature of Individual certifier that she/he meets the above four criteria

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Executive Summary

IBI Group (IBI) was retained by Claridge Homes to undertake a Transportation Impact Assessment (TIA) in support of a Draft Plan of Subdivision application for a proposed residential development to be located within the Mer Bleue Urban Expansion Area at 2503 and 2559 Mer Bleue Road and 2666 Tenth Line Road, Ottawa. The site represents Phase 1 of Claridge's development lands, and is generally bound by Mattamy's Summerside (Phases 4, 5 and 6) development to the north, Wall Road to the south, Tenth Line Road to the east and Mer Bleue Road to the west. The Draft Plan consists of 274 single-family homes, 370 street townhomes and an approximate 2,100 square metre commercial component. The development will generally be constructed from east to west over a two-year period, with full build-out and occupancy assumed by 2025.

Direct access to the site from Mer Bleue Road and Tenth Line Road will be provided via two existing access intersections off Wall Road. Additional access will be provided from Mer Bleue Road adjacent to the 'Summerside' development via Street 1. The small, isolated portion of the development in the northeast will be accessed by Sweetvalley Drive (S), a new intersection with Tenth Line Road. All four access intersections described above will provide full-movement connections to the adjacent transportation network.

Given the small size of the commercial component within the proposed development, it is not expected that it will generate many new external trips. Most of the traffic to and from the commercial component is expected to be either pass-by or active internal trips. As such, the external trip generation of the commercial component has been assumed to be negligible and therefore it was excluded from the analysis. As a result, the analysis in this study focused on the residential portion of the development and the evaluation of traffic impacts during the weekday morning and afternoon peak hours.

The proposed Mer Bleue Phase 1 development is expected to generate up to 709 and 812 two-way person-trips during the weekday morning and afternoon peak hours, respectively. These person-trips were subdivided into *local* trips and *regional* trips and assigned separate mode share targets and trip distributions, consistent with the methodology from the Mer Bleue Expansion Master Transportation Study (MTS). The resulting two-way trip generation is, therefore, 376 and 430 vehicles per hour during the weekday morning and afternoon peak hours, respectively.

The impacts of the proposed development were previously evaluated through the Mer Bleue Urban Expansion Area Master Transportation Study (MTS), completed in January 2018. In order to provide an analysis of interim conditions (i.e. the evaluation of Phase 1 build-out) adjacent development traffic volume projections from the MTS have been interpolated and considered in addition to the current development status of the Mer Bleue Expansion Area lands. As subsequent phases of the Mer Bleue Expansion Lands to the south do not currently have active development applications, they are not considered in this study.

The development is anticipated to integrate well with the surrounding transportation network. As identified in the Mer Bleue Expansion Master Transportation Study (MTS), cycle tracks will be implemented along the realigned Wall Road, Street 1 and Jerome Jodoin Drive. Concrete sidewalks are proposed on both sides of all collector roadways and on one side of select local roads. In conjunction with Phase 1, Street 1 and Wall Road will be designed as a Complete Street per the City of Ottawa's 2019 Collector Road Guidelines with segregated cycling and pedestrian facilities, as well as paved shoulders (by others) on Mer Bleue Road from Renaud Road to Street 1.

To promote sustainable transportation for local trips, the internal road network of the proposed development has been configured with short street segments and frequent intersections to provide direct connections to the internal collector roads which will be capable of supporting transit service.

The proposed development aligns with the objectives of the Mer Bleue Expansion Area Community Design Plan (CDP) and Building Better and Smarter Suburbs (BBSS) policy documents, which promote sustainable and compact growth. The majority of units are street townhomes, providing an appropriate level of density for a development situated within close proximity to the Urban Boundary and far removed from a Transit-Oriented Development (TOD) zone or Design Priority Area (DPA).

Multi-Modal Level of Service (MMLOS) analysis was conducted for all existing boundary streets and all future proposed signalized intersections to determine the roadway and intersection design elements required for these facilities to achieve their MMLOS targets as best as possible. Deficiencies in the MMLOS analyses were identified and mitigation measures were recommended to achieve the required targets.

The results of the intersection capacity analysis at the Mer Bleue & Renaud intersection indicate that traffic signals will be operationally required under Future (2025) Background Traffic conditions and warranted shortly thereafter under interpolated 2026 Total and 2028 Background Traffic volumes. A roundabout was found to be suitable at this location, however this form of traffic control is not recommended due to existing property constraints. The widening of Mer Bleue from two to four lanes through its intersection with Renaud Road, as well as its upgrade to a signalized intersection, is a City initiative that will be completed separately from this development application.

Within the timeframe of this study, the Tenth Line Road & Sweetvalley Drive (S) and Tenth Line Road & Wall Road intersections are expected to operate slightly above acceptable capacity (i.e. LOS 'E') during the weekday afternoon peak hour with two-way stop control, provided Tenth Line Road maintains its current two-lane cross-section. Sensitivity analysis conducted at the 2030 study horizon year indicated that slight reductions in mainline traffic volumes in the order of 39 vehicles per direction at the intersection of Tenth Line/Sweetvalley Drive (S) and 21 vehicles per direction on Tenth Line/ Wall Road would allow LOS 'D' to be achieved. If Tenth Line Road is widened during the timeframe of this study, however, both intersections would be expected to operate acceptably (i.e. LOS 'D' or better) without these reductions. It was, therefore, determined that no signalization is required for either intersection to accommodate Phase 1 traffic, even if the scheduled widening of Tenth Line from two to four lanes through the study area does not occur within the timeframe of this study. Although traffic signals are not warranted or operationally-required at the Tenth Line Road & Sweetvalley Drive (S) or Tenth Line Road & Wall Road intersections, the City should consider signalization of these intersections upon the widening of Tenth Line Road to four lanes for safety reasons.

As determined through the queuing analyses, an RMA for the intersection of Mer Bleue & Street 1 is required, however it is assumed this will be undertaken in conjunction with the adjacent Summerside West as part of the Street 1 construction and outside of the development limits of this application.

The auxiliary lane analysis conducted for this study also indicated a potential need for a southbound right-turn taper at the Tenth Line & Wall intersection prior to the implementation of the Tenth Line Road widening. Upon further consideration of the low southbound through volumes at the 2030 study horizon year and the relatively short-term timeframe associated with the Tenth Line widening which is planned for implementation soon after full build-out of the site, however, a southbound right-turn taper is not expected to be required to safely accommodate site-generated traffic volumes at this intersection.

As all background and site-generated traffic impacts will ultimately be addressed through road network modifications, a post-occupancy Monitoring Plan will not be included in this TIA.

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.

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1 Introduction

IBI Group (IBI) was retained by Claridge Homes to undertake a Transportation Impact Assessment (TIA) in support of a Draft Plan of Subdivision application for a proposed residential development to be located within the Mer Bleue Urban Expansion Area at 2503 and 2559 Mer Bleue Road and 2666 Tenth Line Road, Ottawa.

In accordance with the City of Ottawa's Transportation Impact Assessment Guidelines, published in June 2017, the following report is divided into four major components:

- **Screening** – Prior to the commencement of a TIA, an initial assessment of the proposed development is undertaken to establish the need for a comprehensive review of the site based on three triggers: Trip Generation, Location and Safety.
- **Scoping** – This component of the TIA report describes both the existing and planned conditions in the vicinity of the development and defines study parameters such as the study area, analysis periods and analysis years of the development. It also provides an opportunity to identify any scope exemptions that would eliminate elements of scope described in the TIA Guidelines but not relevant to the development proposal, based on consultation with City staff.
- **Forecasting** – The Forecasting component of the TIA is intended to review both the development-generated travel demand and the background network travel demand. It also provides an opportunity to rationalize this demand to ensure projections are within the capacity constraints of the transportation network.
- **Analysis** – This component documents the results of any analyses undertaken to ensure that the transportation related features of the proposed development are in conformance with prescribed technical standards and that its impacts on the transportation network are both sustainable and effectively managed. It also identifies a development strategy to ensure that what is being proposed is aligned with the City of Ottawa's policies and city-building objectives.

Throughout the development of a TIA report, each of the four study components above are submitted in draft form to the City of Ottawa and undergo a review by a designated Transportation Project Manager. Any comments received are addressed to the satisfaction of the City's Transportation Project Manager before proceeding with subsequent components of the study. All technical comments and responses throughout this process are included in **Appendix A**.

Dependent on the findings of this report, the complete submission of this Transportation Impact Assessment may also require Functional Design Drawings of recommended roadway improvements to support a Roadway Modification Application (RMA). The submission may also require a post-development Monitoring Plan to track performance of the planned TIA Strategy. The need for these two elements will be confirmed through the analysis undertaken for this report.

2 TIA Screening

An initial screening was completed to confirm the need for a Transportation Impact Assessment by reviewing the following three triggers:

- **Trip Generation**: Based on the proposed number of residential units and the assumed size of the retail component within the proposed development, the minimum development size threshold has been exceeded and therefore the Trip Generation trigger is satisfied.
- **Location**: The proposed development will not be accessed from a boundary street that is designated as part of the City's Transit Priority or Rapid Transit network and is not within a Design Priority Area or Transit-Oriented Development zone. The site is however located adjacent to a spine cycling route, therefore the Location trigger is satisfied.
- **Safety**: Boundary street conditions were reviewed to determine if there is an elevated potential for safety concerns adjacent the site. Based on this review, there is no elevated potential for safety concerns adjacent to the site, therefore the Safety trigger is not satisfied.

As the proposed development meets the Trip Generation and Location triggers, the need to undertake a Transportation Impact Assessment is confirmed.

A copy of the Screening Form is provided in **Appendix B**.

3 Project Scoping

3.1 Description of Proposed Development

3.1.1 Site Location

The proposed development is located in the centre of Mer Bleue Urban Expansion Area and represents the first phase of development by Claridge. The Phase 1 site occupies approximately 48.46 hectares and is generally bound by Mattamy's Summerside (Phases 4, 5 and 6) development to the north, Wall Road to the south, Tenth Line Road to the east and Mer Bleue Road to the west.

The site location and its surrounding context is illustrated in **Exhibit 1**.

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Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 1:
Site Location

PROJECT No. 116761

SCALE: 0m 100m 200m

3.1.2 Land Use Details

Table 1 summarizes the proposed land uses included in this development.

Table 1 - Land Use Statistics

LAND USE	SIZE
Single-Family Homes	274 units
Townhomes	370 units
Shopping Centre	~ 2,100 m^2

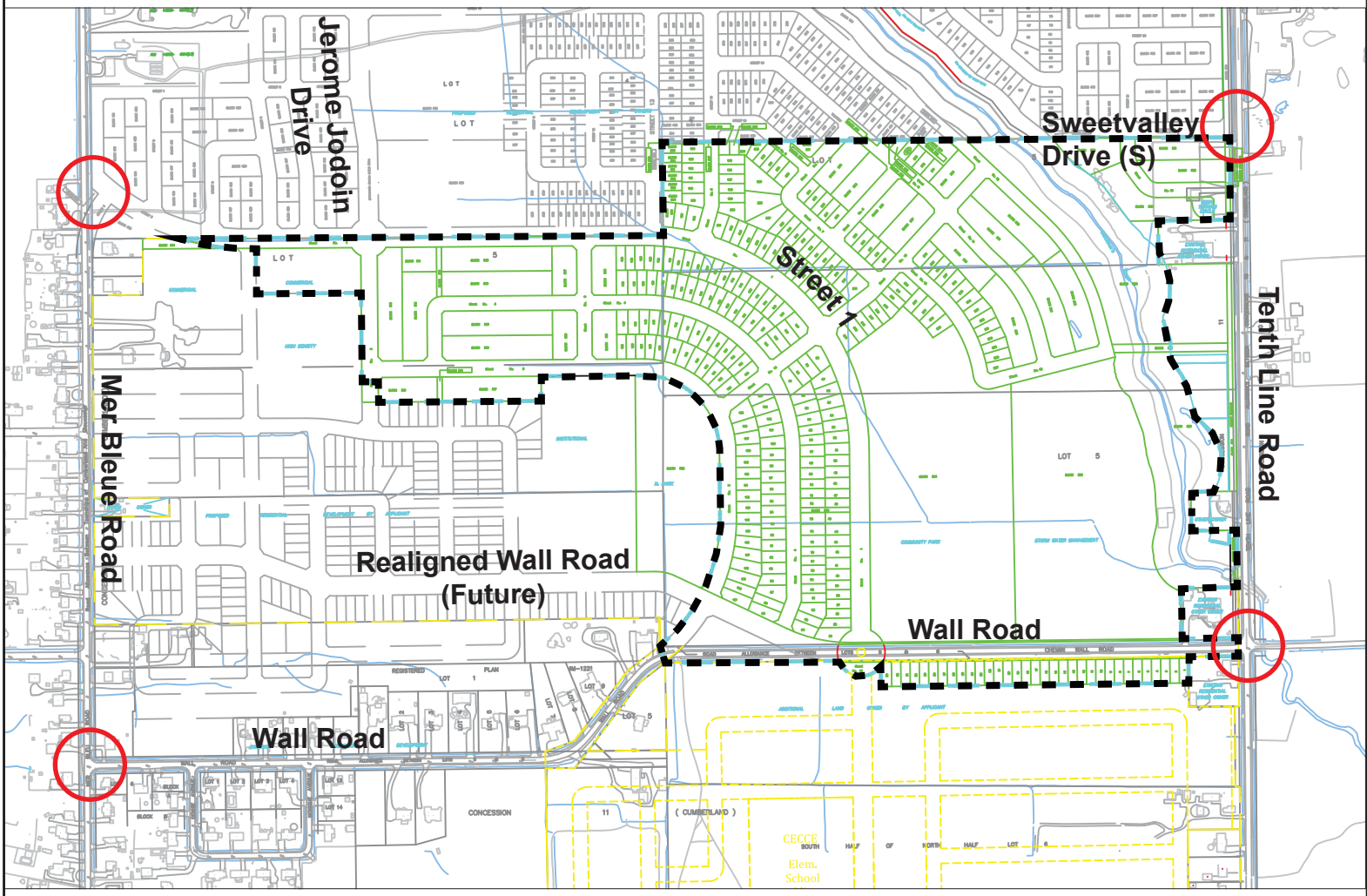
The proposed Draft Plan of Subdivision the proposed development is illustrated in **Exhibit 2**.

Direct access to the site from Mer Bleue Road and Tenth Line Road will be provided via two existing access intersections off Wall Road. Additional access will be provided from Mer Bleue Road adjacent the 'Summerside' development. The small, isolated portion of the development in the northeast will be accessed via the new intersection with Tenth Line Road. All four access intersections described above will provide full-movement connections to the adjacent transportation network.

The subject site is currently an undeveloped greenfield site and, according to GeoOttawa, is zoned RU – Rural Countryside.

3.1.3 Development Phasing & Date of Occupancy

The proposed Mer Bleue Phase 1 development will be constructed over a period of three years and is expected to be fully built out and occupied by 2025. The proposed development will be generally built out from east to west, beginning with the portion to the east of McKinnon's Creek.



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Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 2:
Proposed Development

PROJECT No. 116761

SCALE: 0m 100m 200m

3.2 Existing Conditions

3.2.1 Existing Road Network

3.2.1.1 Roadways

The proposed development is bound by the following street(s):

- **Mer Bleue Road** is an arterial road oriented north-south that extends from Innes Road to Navan Road. North of Innes Road, Mer Bleue Road becomes Jeanne d'Arc Boulevard which provides connectivity to Ottawa Road 174. The section of Mer Bleue Road adjacent to the proposed development has a two-lane rural cross-section with a posted speed limit of 50 km/h and a right-of-way protection of 37.5m.
- **Tenth Line Road** is an arterial road oriented north-south that extends from Jeanne d'Arc Boulevard North to Smith Road. The section of Tenth Line Road adjacent to the proposed development has a two-lane rural cross-section with a posted speed limit of 60 km/h and a right-of-way protection of 37.5m with an additional 5.0m potentially required on the rural side to accommodate a rural cross-section.
- **Wall Road** is a two-lane rural collector road connecting Mer Bleue Road in the west to Frank Kenny Road in the east. The posted speed limit is 50 km/h within the residential portion near Mer Bleue Road, and transitions to 60 km/h midway between Mer Bleue Road and Tenth Line Road. East of Tenth Line Road, Wall Road has an unpaved surface.

Other streets within the vicinity of the proposed development are as follows:

- **Brian Coburn Boulevard** is a two-lane urban arterial roadway with an east-west orientation connecting Navan Road to Trim Road. The extension of Brian Coburn Boulevard from Navan to Mer Bleue was completed and open to the public in October 2017. The posted speed limit along Brian Coburn Boulevard is 70 km/h west of Mer Bleue Road, reducing to 60 km/h east of Mer Bleue Road. The right-of-way protection for Brian Coburn Boulevard is 40m.
- **Renaud Road** is a two-lane rural collector road connecting Anderson Road in the west to Mer Bleue Road in the east. Within the vicinity of the context area of this study, Renaud Road has a posted speed limit is 50 km/h and a right-of-way protection of 24m.
- **Navan Road** is a two-lane rural arterial roadway which connects the community of Blackburn Hamlet with the village of Navan in the southeast. Within the context area of this study, Navan Road has a posted speed limit of 60 km/h and a right-of-way protection of 37.5m west of Mer Bleue Road and 34m east of Mer Bleue Road.
- **Harvest Valley Avenue** is a two-lane urban collector road that extends from Esprit Drive in the east to Tenth Line Road in the west. The posted speed limit of this road is 50 km/h with a right-of-way of 26 m. West of Tenth Line Road, Harvest Valley Avenue transitions to Sweetvalley Drive.
- **Jerome Jodoin Drive** is a two-lane urban collector road that extends south from Brian Coburn Boulevard opposite Gerry Lalonde Drive. The posted speed limit is 50km/h with a 24m right-of-way. Jerome Jodoin Drive does not currently have exclusive cycling facilities.

The following existing intersections have been identified as having the greatest potential to be impacted by the proposed development:

- Mer Bleue Road and Renaud Road
- Mer Bleue Road and Wall Road
- Tenth Line Road and Wall Road

The intersection control and lane configurations of each intersection are shown in **Exhibit 3**.

3.2.1.2 Driveways Adjacent to Development Access

Two new intersections along the adjacent arterial road network are proposed: Mer Bleue Road & Street 1 and Tenth Line Road & Sweetvalley Drive (S). All existing private approaches within 200m of both accesses serve either single-family homes or small businesses.

3.2.1.3 Traffic Management Measures

Existing traffic management or traffic calming measures on the boundary streets within the vicinity of the proposed development are limited to on-road painted messaging indicating a 50 km/h speed limit on Wall Road east of Mer Bleue Road.

NORTH

Renaud Road

Mer Bleue Road

Wall Road

Tenth Line Road

LEGEND

- Stop Sign
- Signalized Intersection
- Lane Configurations
- Storage Length (xxxm xxxm)
- Existing Roads

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Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 3:
Existing (2019)
Lane Configurations and
Intersection Controls

PROJECT No. 116761

SCALE: N.T.S.

3.2.1.4 Existing Traffic Volumes

As the proposed development will be primarily comprised of residential land uses, the weekday morning and afternoon peak hour traffic conditions will be most affected by the associated increase in traffic. A small amount of commercial area is indicated in the Draft Plan, however, it is intended to be local-serving as opposed to destination retail. Weekday morning and afternoon peak hour turning movement counts were therefore obtained from the City of Ottawa at the following intersections within close proximity to the site:

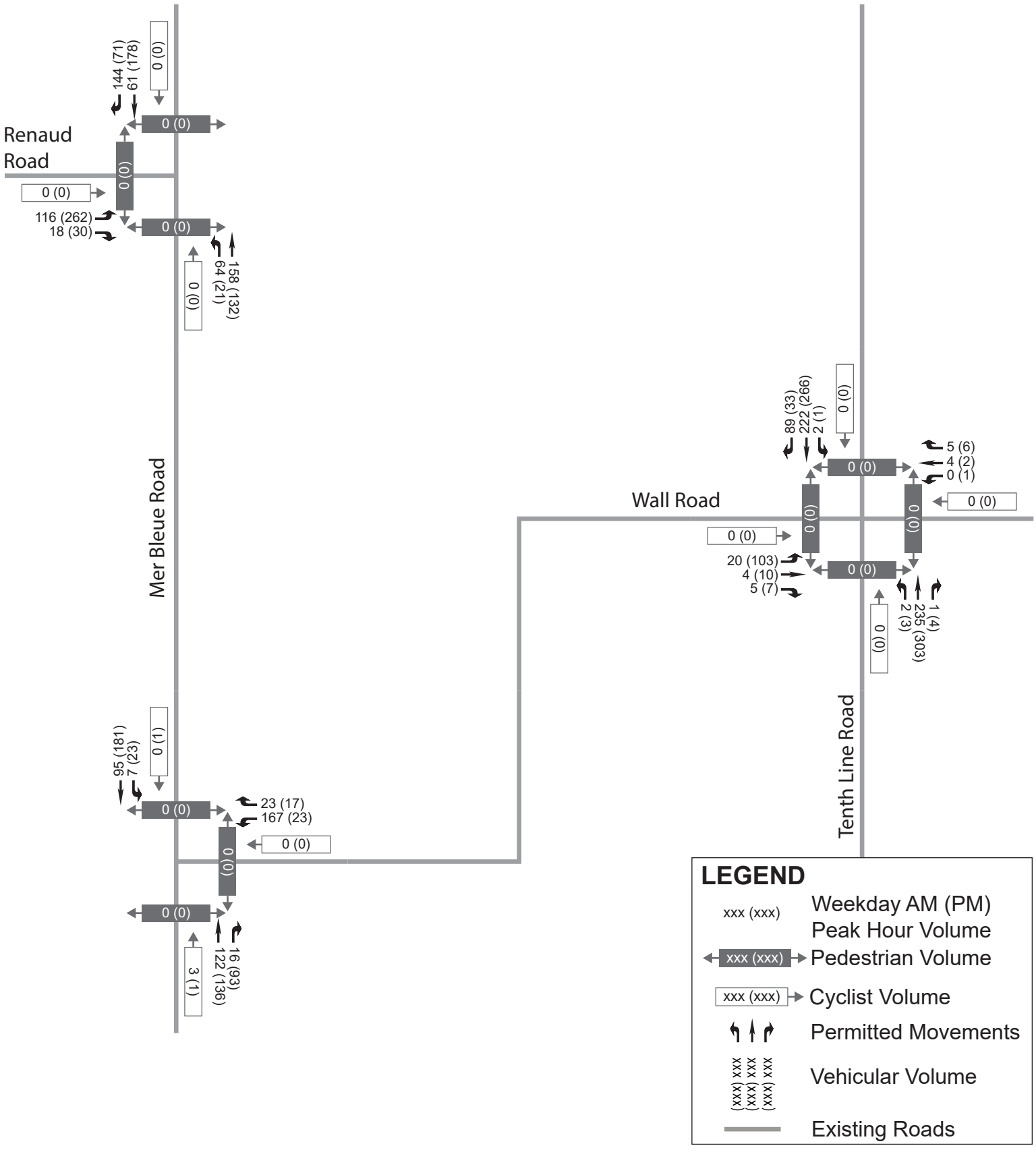
- Mer Bleue Road and Renaud Road (City of Ottawa, November 2018)
- Mer Bleue Road and Wall Road (City of Ottawa, June 2017)
- Tenth Line Road and Harvest Valley Avenue (City of Ottawa, April 2018)

In addition to the above, a traffic count was completed in October 2013 at the Tenth Line Road and Wall Road intersection by Geospace Research Associates on behalf of IBI Group for the Mer Bleue Expansion Master Transportation Study (IBI, 2018). Although traffic volumes along Tenth Line Road have likely increased since 2013, there has been no development along Wall Road and therefore it is unlikely that traffic volumes along Wall Road have increased. As such, existing (2019) traffic volumes at the Tenth Line Road and Wall Road intersection have been estimated using the sidestreet traffic volumes from the October 2013 traffic count and by balancing the through volumes with the traffic volumes at the Tenth Line Road and Harvest Valley Avenue intersection to the north.

It shall be noted that the Brian Coburn Boulevard extension from Mer Bleue Road to Navan Road in 2017 likely resulted in a significant shift in traffic patterns in the area. The impact of this shift in traffic patterns would have been captured in the Mer Bleue Road and Renaud Road, and the Tenth Line Road and Harvest Valley Avenue traffic counts. The Mer Bleue Road and Wall Road traffic count was conducted before the extension was completed, however, it is expected that the impact of this shift in traffic patterns would be relatively limited at this intersection and the traffic count is therefore assumed to remain representative of the traffic volumes at this intersection.

Consistent with the Mer Bleue Expansion Master Transportation Study, a 1% linear growth rate per annum was applied to through volumes along Mer Bleue Road and Tenth Line Road as well as the turning volumes at the Mer Bleue Road and Renaud Road intersection to approximate existing (2019) traffic volumes. Further justification for this growth rate will be provided in the Forecasting section of this report.

Peak hour traffic volumes representative of existing conditions are shown in **Exhibit 4**. Traffic count data is provided in **Appendix C**.



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Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 4:
Existing (2019)
Traffic

PROJECT No. 116761

SCALE: N.T.S.

3.2.2 Existing Bicycle and Pedestrian Facilities

Currently paved shoulders are provided for cyclists along both sides of Tenth Line Road through the context area. Paved shoulders also exist along a segment of Mer Bleue Road within the vicinity of Renaud Road.

No specific pedestrian facilities are provided within the context area.

3.2.3 Existing Transit Facilities and Service

A single transit route, operated by OC Transpo, exists within the context area of the site:

- **Route #225** provides weekday peak period service between Blair Station and Willow Aster Circle and operates on a 20-minute headway.

The nearest bus stops providing access to the above noted route are located at Mer Bleue/ Renaud intersection and on Jerome Jodoin Drive. A transit service map of Route 225 is provided in **Appendix D**.

3.2.4 Collision History

A review of historical collision data has been conducted for the road network surrounding the proposed development. The TIA Guidelines require a safety review if at least six collisions for any one movement or of a discernible pattern, over a five-year period have occurred. **Table 2** summarizes all reported collisions between January 1, 2014 and December 31, 2018.

Table 2 – Reported Collisions within Vicinity of Proposed Development

LOCATION	# OF REPORTED COLLISIONS
INTERSECTIONS	
Mer Bleue Road and Renaud Road	3
Tenth Line Road and Wall Road	5
Mer Bleue Road and Wall Road	1
SEGMENTS	
Mer Bleue Road – Wall Road to Saphir Avenue	1
Tenth Line Road – Harvest Valley Avenue/ Sweetvalley Drive to Wall Road	2
Renaud Road – White Street to Mer Bleue Road	3
Wall Road – Mer Bleue Road to Denise Avenue	1
Wall Road – Denise Avenue to Monique Avenue	0
Wall Road – Monique Avenue to Tenth Line Road	4
Mer Bleue Road – Renaud Road to Du Palais Street	0
Mer Bleue Road – Du Palais Street to Du Domaine Street	1
Mer Bleue Road – Du Domaine Street to Wall Road	0

Based on the collision history summarized above, there are no notable areas of concern within the context area of this study.

Detailed collision records are provided in **Appendix E**.

3.3 Planned Conditions

3.3.1 Transportation Network

3.3.1.1 Future Road Network Projects

The 2013 Transportation Master Plan (TMP) outlines future road network modifications in the 2031 'Affordable Network'. The following projects were noted that may have an impact on traffic patterns within the vicinity of the site:

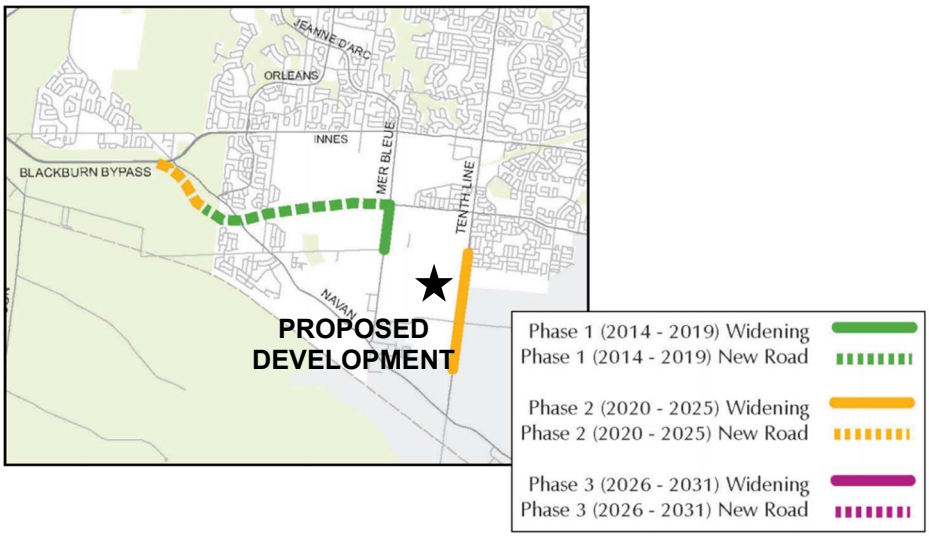
- **Blackburn Hamlet Bypass Extension** – New four-lane road from the Blackburn Hamlet Bypass to the intersection of Navan Road and Brian Coburn Boulevard, to be built in two sections. The first section will extend from Orléans Boulevard to Navan Road (Phase 1: 2014-2019) and second section will extend from the Blackburn Hamlet Bypass to Orléans Boulevard (Phase 2: 2020-2025). In May 2018, the City of Ottawa initiated an Environmental Assessment (EA) study to explore alternative alignments for the Brian Coburn Boulevard Extension (formerly the Blackburn Hamlet Bypass Extension) and western portion of the Cumberland Transitway after a geotechnical analysis concluded that the soil conditions in the area were very poor in the study area, which could result in higher construction costs than previously anticipated for the previously recommended alignment.
- **Tenth Line Road** – Planned widening from two to four lanes from Harvest Valley Avenue to south of Wall Road (Phase 3: 2020-2025).
- **Mer Bleue Road** – Planned widening from two to four lanes from Brian Coburn Boulevard to Renaud Road (Phase 1: 2014-2019).

The *2019 City-Wide Development Charges Background Study* identifies the following revisions for the timing of the TMP road network modifications described above:

- **Blackburn Hamlet Bypass Extension** – The timing of construction for the first and second sections have been modified to 2020-2024 and 2025-2029, respectively.
- **Tenth Line Road** – Planned widening has been revised to 2025-2029.
- **Mer Bleue Road** – Planned widening was implemented with the exception of the southernmost section passing through the Renaud Road intersection. The planned widening of this section has been revised to 2020-2024.

Figure 1 illustrates the planned changes to the arterial road network projects in the broader area, as per the TMP Affordable Plan. It should be noted that the Brian Coburn Boulevard extension from Navan Road to Mer Bleue Road is now in place.

Figure 1 - Future Road Network Projects



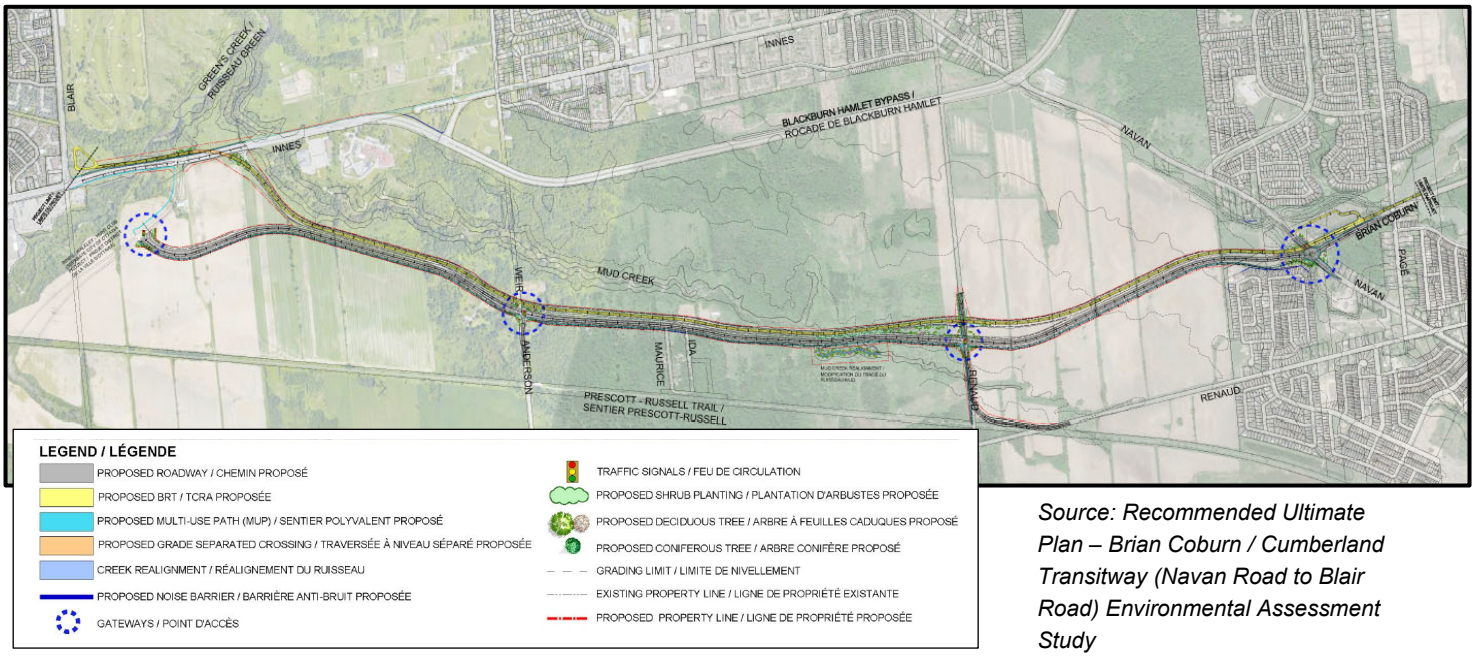
Source: 2013 Transportation Master Plan – Map 11 '2031 Affordable Network'

Although not part of the '2031 Affordable Network' the TMP indicates that Mer Bleue Road may be widened and realigned between Renaud Road and Navan Road some time beyond the TMP's 2031 horizon.

Blackburn Hamlet Bypass

The Blackburn Hamlett Bypass Environmental Assessment (EA) Study is in the final stages of the EA process. As of June 2021, interim and ultimate designs have been established and were presented at the final Public Open House. The interim design includes only transit priority measures, while the ultimate alignment would connect the future Innes-Walkley-Hunt Club corridor with the existing roundabout at Navan/Brian Coburn. The ultimate design is shown in **Figure 2** below.

Figure 2 - Blackburn Hamlett Bypass - Ultimate Design



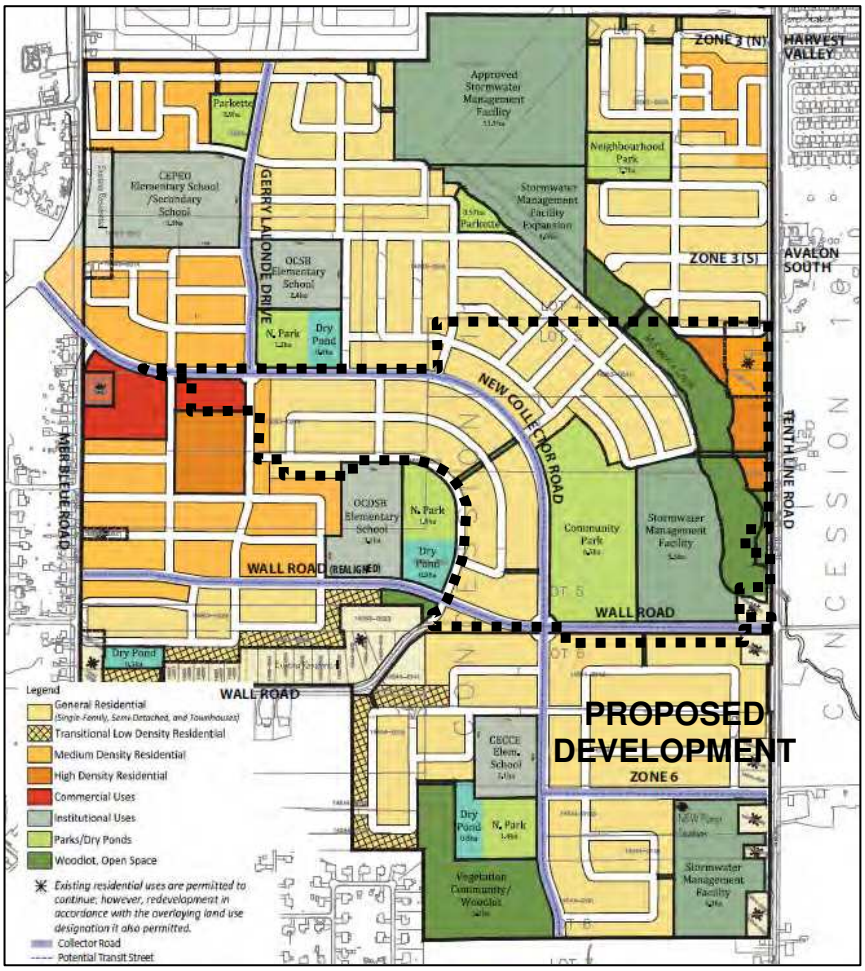
Source: Recommended Ultimate Plan – Brian Coburn / Cumberland Transitway (Navan Road to Blair Road) Environmental Assessment Study

The Mer Bleue Expansion Master Transportation Study (MTS) identifies the future road network within the Mer Bleue Expansion area. The MTS indicates that Wall Road will be realigned north of the existing residential development east of Mer Bleue Road and the former section of Wall Road will be downgraded from a collector road to a local road. A new collector road (referred to as Street 1 hereafter) will extend from the southern boundary of the Mer Bleue Expansion area, intersect with Wall Road then curve westward to intersect with Mer Bleue Road. Jerome Jodoin Drive (formerly referred to as Gerry Lalonde Drive in the figure below) will be extended south to intersect with Street 1. A second new collector road is planned to the south of Wall Road between Street 1 and Tenth Line Road. Two local roads (Zone 3 (N) and Zone 3 (S)) will extend west of Tenth Line Road to provide access to the northeastern quadrant of the expansion area. For the purposes of this study, Zone 3 (S) will be referred as Sweetvalley Drive (S) herein.

Consistent with the Mer Bleue Urban Expansion Area (UEA) concept plan presented in the MTS, it is assumed that the internal intersections of Street 1/Jerome Jodoin Drive and Street 1/Wall Road will be configured as single-lane roundabouts.

The planned road network indicated in the MTS is shown in **Figure 3** below.

Figure 3 - Future Mer Bleue Expansion Area Road Network



Source: Mer Bleue Expansion Master Transportation Study – Exhibit 7-1: Proposed Concept Plan

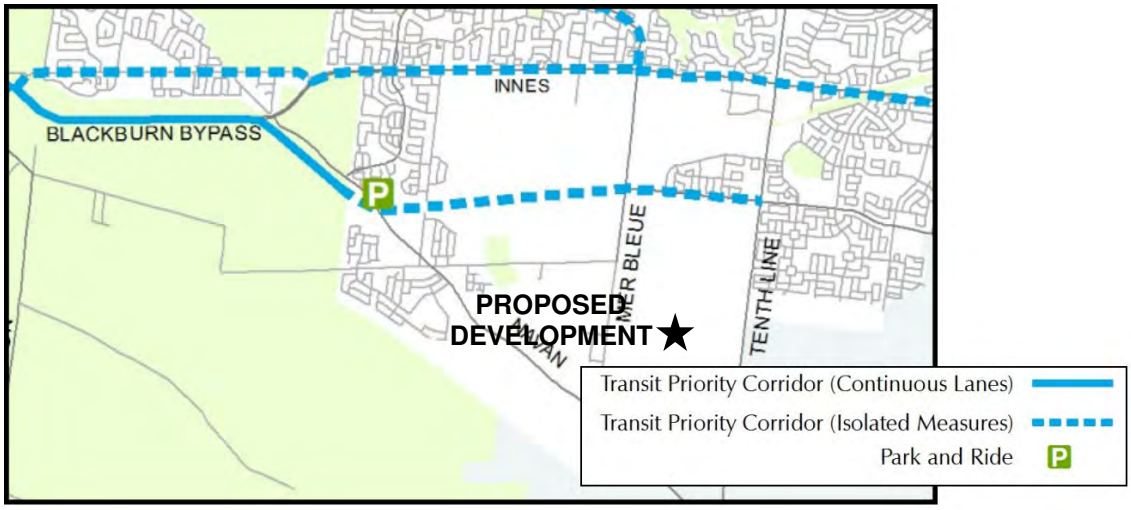
3.3.1.2 Future Transit Facilities and Services

The 2013 TMP outlines the future rapid transit and transit priority (RTTP) network. The following projects were noted in the 'Affordable RTTP Network' that may have a future impact on study area traffic:

- **Blackburn Hamlet Bypass / Brian Coburn Boulevard Transit Priority Corridor** – Continuous bus lanes along the Blackburn Hamlet Bypass and isolated transit priority measures along Brian Coburn Boulevard.

Figure 4 shows the transit infrastructure projects in the vicinity of the proposed development that are part of the 2031 Affordable Network.

Figure 4 - Future 'Affordable RTTP Network Projects'



Source: 2013 Transportation Master Plan – Map 5 '2031 Affordable Network'

The Blackburn Hamlett Bypass Environmental Assessment Study recommended an interim design which includes transit priority measures along the bypass, while the ultimate design includes a rapid transit corridor that will parallel the road along the north side, as seen previously in **Figure 2**.

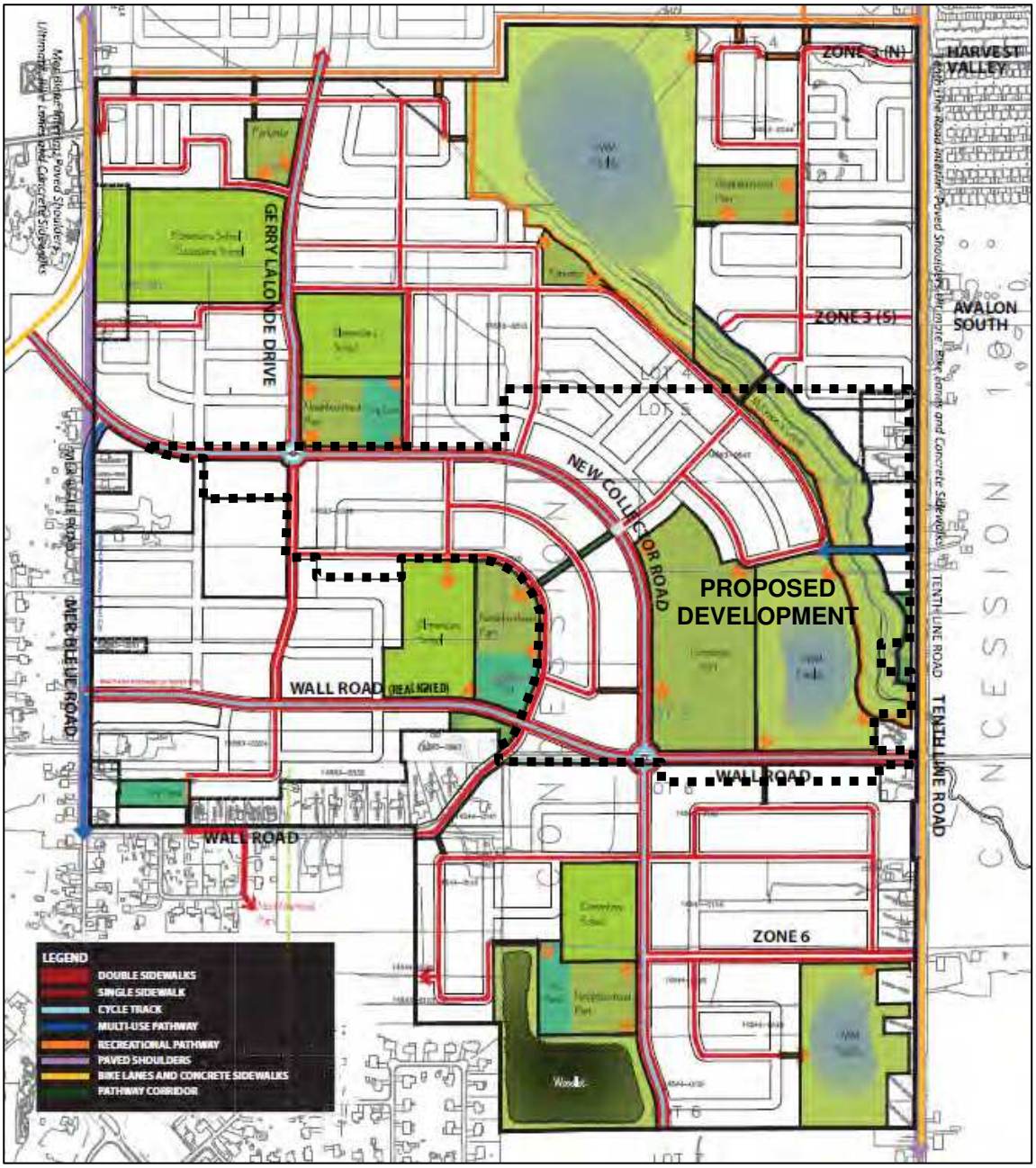
3.3.1.3 Future Cycling and Pedestrian Facilities

The 2013 Ottawa Cycling Plan (OCP) designates Mer Bleue Road and Tenth Line Road as 'Spine Routes', which form part of a system linking the commercial, employment, institutional, residential and educational nodes throughout the City of Ottawa. Renaud Road is designated as a 'Local Route'.

The Mer Bleue Expansion MTS provides details on the proposed active transportation facilities within the area, including cycle tracks and concrete sidewalks on both sides of the realigned Wall Road, Jerome Jodoin Drive (formerly Gerry Lalonde Drive) and Street 1. A multi-use pathway (MUP) will also be provided on the north side of the realigned Wall Road. The MTS indicates that paved shoulders will be provided along both Mer Bleue Road and Tenth Line Road in the interim. Ultimately, exclusive bicycle facilities and concrete sidewalks will be provided along both sides of Tenth Line Road and the realigned Mer Bleue Road. Along the former section of Mer Bleue Road, a MUP will be provided on the east side of the roadway. In addition to the above facilities, a recreational pathway will be provided adjacent to McKinnon's Creek and along the north edge of the Mer Bleue Expansion area.

The planned cycling and pedestrian facilities indicated in the MTS are shown below in **Figure 5**.

Figure 5 - Future Mer Bleue Expansion Area Pedestrian and Cycling Network



Source: Mer Bleue Expansion Master Transportation Study – Exhibit 7-2: Proposed Bicycle & Pedestrian Facilities

3.3.2 Future Adjacent Developments

The City of Ottawa Transportation Impact Assessment (TIA) Guidelines specify that all significant developments proposed within the surrounding area which are likely to occur within the study's horizon year must be identified and taken into consideration in the development of future background traffic projections.

There are 6 known developments of significance in the vicinity of the proposed development. For these developments, all unoccupied units have been accounted for in the development of background traffic volumes using consistent trip generation assumptions. Traffic generated by built/ occupied units is assumed to have been captured in the existing traffic data.

All ongoing developments or current development applications adjacent to the site are summarized in **Table 3**. The approximate locations of all developments and planned future developments are shown in **Exhibit 5**. The targeted build-out dates identified are those stated in the respective studies.

It should be noted that targeted build-out of all developments have been revised to reflect delays in projects where necessary, and it assumed that these sites will now be full constructed/occupied by the 2025 study analysis year.

Table 3 - Adjacent Developments (Ongoing or Current Development Applications)

DEVELOPMENT	LAND USE	SIZE	BUILT/ OCCUPIED	% BUILT/ OCCUPIED	TARGETED BUILD-OUT [1]
Summerside West (Phase 4) [2]	Single Family Residential	100 units	-	0%	2025
	Townhome	145 units	-	0%	
Summerside West (Phases 5 & 6) [2]	Single Family Residential	302 units	-	0%	2025
	Townhome	191 units	-	0%	
2405 Mer Bleue Road [3]	Single Family Residential	430 units	136 units	32%	2024
	Townhome	260 units	114 units	44%	
	Apartment	120 units	-	0%	
Minto Vista [4] (formerly Avalon Isgar)	Single Family Residential	283 units	-	0%	2025
	Townhome	356 units	-	0%	
Avalon West (Phase 5) [5]	Residential Units	1,120 units	1,120 units	100%	2025
	High School	175,000 sqft	-	0%	
Trailsedge East [6]	Single Family Residential	25 units	256 units	~10%	2025
	Townhome	65 units	644 units	~10%	

Note: Approximate build-out status was based on a review using Google Streetview and satellite imagery from Google Earth taken in June 2021.
[1] Targeted build-out dates have been revised to coincide with build-out of the proposed development in 2025 where previous targets identified outlined in their respective TIAs are no longer achievable.
[2] Summerside Phase 4-6: Strategy Report. Parsons, September 2018.
[3] 2405 Mer Bleue Orléans: Transportation Impact Study. Stantec, April 2014.
[4] Minto Vista Traffic Update Addendum: CGH, Oct. 2020; 2605 Tenth Line Road: Delcan, March 2014.
[5] Traffic Impact Brief: Avalon West (Phase 3-4): CastleGlenn Consultants Inc., July, 2015.
[6] Proposed TrailsEdge East Development: Community Transportation Study (CTS). CastleGlenn Consultants Inc., November 2016.

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Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 5:
Adjacent Developments

PROJECT No. 116761

SCALE: 0m 100m 200m

3.3.3 Network Concept Screenline

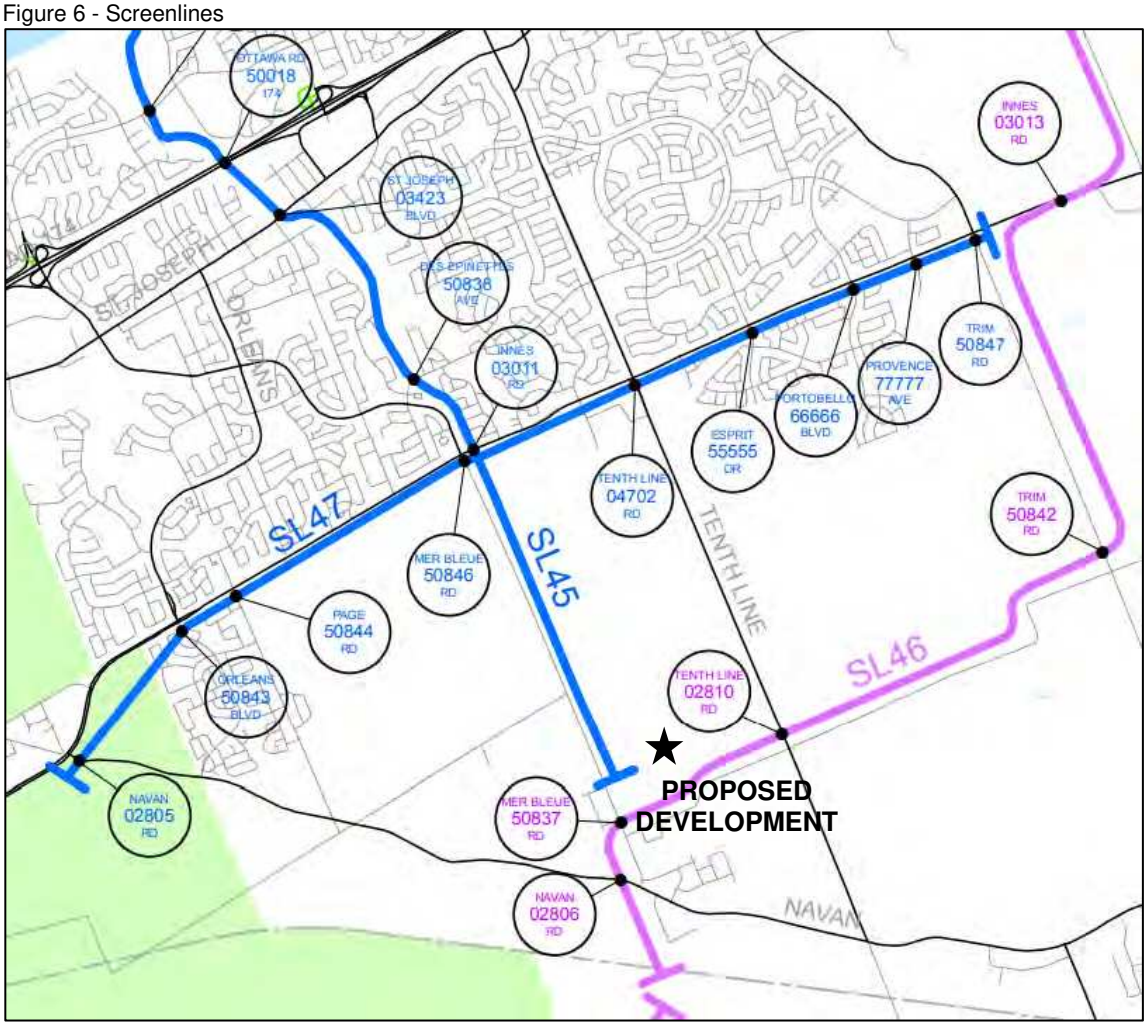
A screenline is an artificial boundary between areas of major traffic generation that captures all significant points of entry from one area to another to compare crossing demand with the available roadway capacity. Screenlines are typically located along geographical barriers such as rivers, rail lines or within the greenbelt where the number of alternative crossing locations are limited. To capture existing flow and model future demand, count stations were established by the City of Ottawa at each crossing point along the screenline.

The nearest City of Ottawa strategic planning screenlines adjacent to the development have been considered in the screenline analysis:

- **SL45 – Bilberry Creek** – This is the nearest north/south screenline to the study area, and it follows Bilberry Creek from the Ottawa River to Wall Road. This screenline has six crossing points: the Ottawa River Pathway, Jeanne d'Arc Boulevard North, Ottawa Road 174, St Joseph Boulevard, Des Épinettes Avenue and Innes Road.
- **SL46 – Frank Kenny** – This is the nearest east/west screenline to the south of the study area. This screenline follows Ted Kelly Lane, Cox County Road from the Ottawa River down to Innes Road, Wall Road westward to Navan Road and ends at the Greenbelt. This screenline has seven crossing points: Ottawa Road 174, Old Montreal Road, Innes Road, Trim Road, Tenth Line Road, Mer Bleue Road and Navan Road.
- **SL47 – Innes** – This is the nearest east/west screenline to the north of the study area, and it follows the southern side of Innes Road from Navan Road to Trim Road. It has nine crossing points: Navan Road, Orléans Boulevard, Page Road, Mer Bleue Road, Tenth Line Road, Esprit Drive, Portobello Boulevard, Provence Avenue and Trim Road.

SL45, SL46 and SL47 are shown in **Figure 5**, as determined from the City of Ottawa's Road Network Development Report (2013), a supporting document to the 2013 Transportation Master Plan (TMP). The Network Impact at these screenlines will be assessed in the Analysis section of this report.

Figure 6 - Screenlines



Source: Road Network Development Report (IBI, 2013)

3.4 Study Area

The Mer Bleue Expansion Master Transportation Study (MTS), completed in January 2018 by IBI Group, analysed the impact of the Mer Bleue Expansion area, including the proposed development, and adjacent developments on the arterial and collector network encompassed by Brian Coburn Boulevard, Navan Road, Mer Bleue Road and Tenth Line Road. As the impact of the proposed development on the broader arterial and collector network has already been captured as part of the MTS, this analysis will be focused on the immediate impacts of the proposed development.

Based on a review of the information presented thus far, a study area bound by Tenth Line Road to the east, Mer Bleue Road to the west, Wall Road to the south, and Renaud Road and Sweetvalley Drive (S) to the north will provide a sufficient assessment of the development's impact on the adjacent transportation network.

The following intersections will therefore be assessed for vehicular capacity as part of this study:

- Mer Bleue Road and Renaud Road
- Mer Bleue Road and Street 1
- Mer Bleue Road and Wall Road
- Tenth Line Road and Sweetvalley Drive (S)
- Tenth Line Road and Wall Road

Multi-modal Level of Service (MMLOS) will be conducted for all signalized intersections within the study area described above as well as the sections of Mer Bleue Road, Tenth Line Road and Wall Road within the study area.

The Tenth Line Road and Harvest Valley Avenue intersection was not included in the study area, as the site-generated traffic volumes from this development will only be assigned to through movements along Tenth Line Road at this intersection in keeping with typical road classification hierarchy, and the traffic volumes are not expected to impact any critical turning movements. As a result, any added traffic volumes should have minimal impact on the overall operations of the intersection. Furthermore, traffic analysis results in the MTS, which considered full build-out of the proposed development, indicated that the intersection would operate within capacity beyond the City's 2031 horizon year. The Future (2031) Total Traffic intersection capacity analysis results from the MTS have been provided in **Appendix F** for reference.

3.5 Time Periods

As the proposed development will primarily consist of residential land uses, traffic generated during the weekday morning and afternoon peak hours is expected to result in the most significant impact to traffic operations on the adjacent network.

3.6 Study Horizon Year

The following future analysis years will be assessed in this study:

- Year 2025 – Full Build-out / Occupancy of Proposed Development
- Year 2030 – 5 years Beyond Full Build-out / Occupancy

3.7 Exemptions Review

The TIA Guidelines provide exemption considerations for elements of the Design Review and Network Impact components. **Table 4** summarizes the TIA modules that are not applicable to this study.

Table 4 - Exemptions Review

TIA MODULE	ELEMENT	EXEMPTION CONISDERATIONS	REQUIRED
DESIGN REVIEW COMPONENT			
4.1 Development Design	4.1.2 Circulation and Access	• Only required for site plans	✗
	4.1.3 New Street Networks	• Only required for plans of subdivision	✓
4.2 Parking	4.2.1 Parking Supply	• Only required for site plans	✗
	4.2.2 Spillover Parking	• Only required for site plans where parking supply is 15% below unconstrained demand	✗
NETWORK IMPACT COMPONENT			
4.5 Transportation Demand Management	All Elements	• Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	✓
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	• Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	✓
4.8 Network Concept	n/a	• Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning	✓

4 Forecasting

4.1 Development Generated Traffic

4.1.1 Trip Generation Methodology

Peak hour site-generated traffic volumes were developed using the 2009 TRANS Trip Generation Residential Trip Rates Study Report. The TRANS trip generation rates are based on a blended rate derived from 17 trip generation studies undertaken in 2008, the ITE Trip Generation Manual and the 2005 TRANS Origin-Destination (OD) Travel Survey. Separate trip generation rates exist for each of the four general geographic areas in Ottawa: Core, Urban (Inside the Greenbelt), Suburban (Outside the Greenbelt) and Rural. These trip generation rates reflect existing travel behavior by dwelling type and geographic area. The TIA Guidelines recommend that the TRANS trip generation rates be converted to person-trips based on the vehicular mode share proportions detailed in the TRANS Trip Generation study.

Given the small size of the retail component within the proposed development, it is not expected that it will generate many new external trips. Most of the traffic to and from the retail component is expected to be either pass-by or active internal trips. As such, the external trip generation of the retail component has been assumed to be negligible and therefore it was exempt from the analysis.

The person-trips for the residential land uses are subdivided based on representative mode share percentages applicable to the study area to determine the number of vehicle, transit, pedestrian, cycling and other trip types. Target mode shares were developed based on the local mode shares from the 2011 Origin-Destination (OD) Survey and the Mer Bleue Expansion Master Transportation Study.

4.1.2 Trip Generation Results

4.1.2.1 Base Vehicle Trip Generation

Peak hour vehicular traffic volumes associated with the Mer Bleue Phase 1 development were determined using the peak hour trip generation rates in the TRANS Trip Generation study.

The base vehicular trip generation results for the proposed development have been summarized in **Table 5** below.

Table 5 - Base Vehicular Trip Generation Results

LAND USE	SIZE	PERIOD	GENERATED TRIPS (VPH)		
			IN	OUT	TOTAL
Single Family Homes	274 units	AM	56	136	192
		PM	153	96	247
Townhomes	370 units	AM	73	125	196
		PM	137	121	258

Note: vph = vehicles per hour

4.1.2.2 Person Trip Generation

The person-trip to vehicle-trip conversion factors for TRANS trip generation rates vary depending on the peak hour, geographic location and land use considered. The vehicular trip generation results for the residential land uses from the previous section were divided by the vehicle mode shares to determine the number of person-trips generated.

The results after applying the corresponding conversion factors have been summarized in **Table 6** below.

Table 6 - Person-Trip Results

LAND USE	AUTO MODE SHARE	PERIOD	PERSON TRIPS (PPH)		
			IN	OUT	TOTAL
Single Family Homes	55%	AM	101	248	349
	64%	PM	239	150	389
Townhomes	55%	AM	132	228	360
	61%	PM	224	199	423
		AM Total	**233**	**476**	**709**
		PM Total	**463**	**349**	**812**

Notes: pph = persons per hour

4.1.2.3 Mode Share Proportions

The 2011 TRANS Origin-Destination (O-D) Survey provides approximations of the existing modal share within the Orléans Traffic Assessment Zone (TAZ). Relevant extracts from the 2011 O-D Survey are provided in **Appendix G**.

To maintain consistency with the Mer Bleue Expansion Master Transportation Study (MTS), site-generated person-trips have been subdivided into *local* (Orléans) and *regional* trips with separate mode share targets. The rationale for subdividing the person-trips into local and regional trips is based on the OD Survey which indicates that approximately 46% of trips originating within Orléans remain within the community. The mode share distributions of local and regional trips are significantly different, therefore, the application of separate mode share targets for each trip type was considered more representative of actual conditions.

The local and regional mode share targets were developed by averaging the weekday peak period mode shares of the Orléans TAZ from the 2011 OD Survey. The resulting mode share targets are consistent with the mode share targets of the MTS. Given the limited improvements in transit infrastructure planned within the vicinity of the study area within the horizon year of this study, it is not expected that transit mode shares will increase significantly. It has therefore been assumed that the existing transit mode share will remain constant within the timeframe of this study. This approach should be considered conservative.

Appropriate mode share targets for the proposed development are outlined in **Table 7** below.

Table 7 - Proposed Mode Share Targets

TRAVEL MODE	EXISTING MODE SHARES [1]						MODE SHARE TARGETS [2]	
	AM FROM	AM TO	AM WITHIN	PM FROM	PM TO	PM WITHIN	LOCAL (46%)	REGIONAL (54%)
Auto Driver	55%	61%	38%	64%	56%	54%	46%	59%
Auto Passenger	8%	13%	20%	21%	11%	23%	22%	13%
Transit	35%	10%	7%	12%	32%	3%	5%	22%
Cycling	1%	0%	2%	0%	1%	1%	1%	1%
Walking	0%	0%	16%	0%	0%	11%	14%	0%
Other	2%	16%	17%	3%	1%	7%	12%	6%

Notes:

[1] 2011 TRANS O-D Survey for the Orléans Traffic Assessment Zone

[2] Regional is equal to average of 'To/From' and local is equal to the average of 'Within'.

4.1.2.4 Trip Reduction Factors

Deduction of Existing Development Trips

Not Applicable: The proposed development lands are currently undeveloped, and do not generate any traffic volumes.

Pass-by Traffic

Not Applicable: As discussed in Section 4.1.1, it has been assumed that all traffic to and from the retail component of the proposed development will be internal pass-by or active transportation trips from within the development. No significant impact to external study area intersections is expected as a result of the retail component of the development.

Synergy/ Internalization

Based on its size, the retail component of the proposed development is not likely to generate a significant volume of traffic from outside of the local area and can be considered entirely internal with no impact on external study area intersections.

4.1.2.5 Trip Generation by Mode

The mode share targets, as shown in **Table 7** above, were applied to the number of development-generated person-trips to determine the number of trips stratified by travel mode. The results after applying the mode share targets are summarized in **Table 8**.

Table 8 – Peak Hour Person Trips by Mode

MODE	AM		PM	
	IN	OUT	IN	OUT
Auto Driver	**124**	**252**	**245**	**185**
Transit	40	82	79	60
Auto Passenger	33	67	66	49
Walking	15	31	30	22
Cycling	2	5	5	4
Other	19	39	38	29
Total	**709**		**812**	

4.1.3 Trip Distribution and Assignment

Consistent with the Mer Bleue Expansion Master Transportation Study (MTS), site-generated vehicle trips are distributed in accordance to the following two distributions:

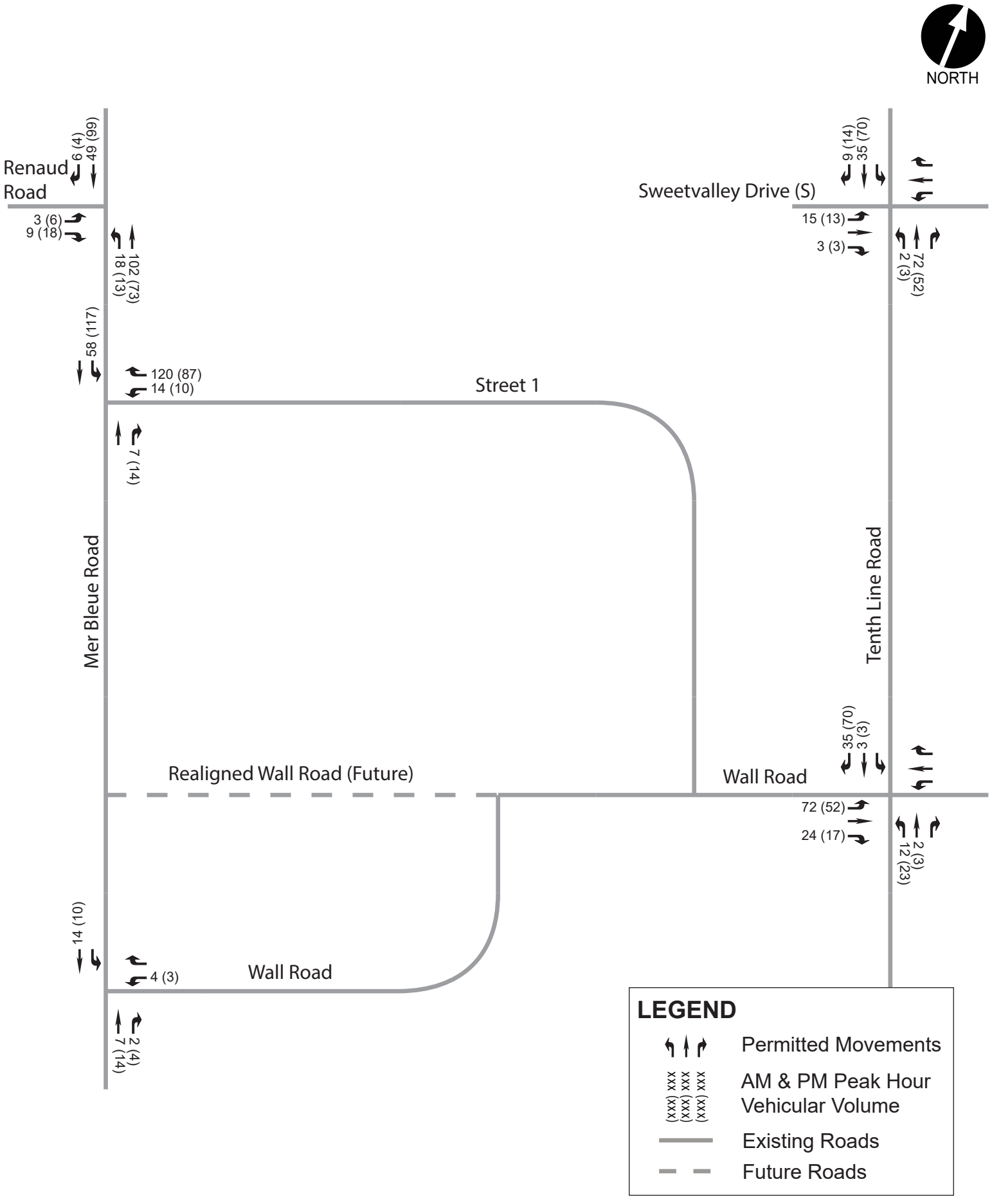
Local Traffic (46%):

- 50% to/from the north via Mer Bleue Road
- 50% to/from the north via Tenth Line Road

Regional Traffic (54%):

- 65% via Mer Bleue Road
    - 10% to/from the north via Mer Bleue Road
    - 50% to/from the west via Mer Bleue Road and Brian Coburn Boulevard
    - 20% to/from the west via Mer Bleue Road and Renaud Road
    - 20% to/from the west via Mer Bleue Road and Navan Road
- 35% via Tenth Line Road
    - 10% to/from the north via Tenth Line Road
    - 30% to/from the west via Tenth Line Road and Brian Coburn Boulevard
    - 10% to/from the west via Tenth Line Road and Renaud Road
    - 50% to/from the west via Tenth Line Road and Navan Road

Relevant extracts from the MTS have been provided in **Appendix F**. Utilizing the estimated number of new auto trips from **Table 8** and applying the above distribution, future site-generated traffic volumes are illustrated for each of the study area intersections in **Exhibit 6**.



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Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 6:
Site Generated
AM & PM Peak Hour
Traffic Volumes

PROJECT No. 116761

SCALE: N.T.S.

4.2 Background Network Traffic

4.2.1 Changes to the Background Transportation Network

To properly assess future traffic conditions, planned modifications to the transportation network that may impact travel patterns or demand within the study area have been considered. The Scoping section of this study reviewed the anticipated changes to the area transportation network based on the Transportation Master Plan (TMP), Capital Budget Forecasts and the *2019 City-Wide Development Charges Background Study* and determined that the following modifications are expected to occur:

- Tenth Line Road is planned to be widened to four lanes between 2025 and 2029.
- Phases 1 and 2 of the Blackburn Hamlet Bypass Extension are expected to be completed by 2020-2024 and 2025-2029, respectively, however no changes to traffic patterns within the study area are expected given the distance between the study area and the location of the Blackburn Hamlet Bypass Extension.
- Mer Bleue Road is planned to be widened to four lanes at Renaud Road between 2020 and 2024.
- In addition to the above roadway modifications, there are a number of anticipated transportation network changes triggered by development in the surrounding area. A summary of the relevant local transportation network changes has been provided below:
- The Mer Bleue Expansion Master Transportation Study (MTS) indicates that Jerome Jodoin Drive, a future collector road, will extend south from the Brian Coburn Boulevard and Gerry Lalonde Drive intersection and intersect with Street 1 within the proposed development. Based on the expected build-out for Phase 5 and 6 of the Summerside West development north of the proposed development, this connection is expected to be completed by 2024.
- Street 1, a future collector road, will be constructed to serve both the Phase 5 and 6 Summerside West development as well as the subject development. The transportation study for the Summerside West Phases 4 to 6 development recommended that the Mer Bleue Road & Street 1 intersection be configured with stop-control on the westbound (Street 1) approach and a southbound auxiliary left-turn lane on Mer Bleue Road with 45m of storage.
- Sweetvalley Drive (S), a local road, was constructed as part of Phase 4 of the Summerside West development and provides access to the isolated portion of the proposed Mer Bleue Phase 1 development. East of Tenth Line Road, a new collector road will be constructed as part of the Minto Vista development. Based on the transportation studies from both aforementioned developments, the Tenth Line Road & Sweetvalley Drive (S) intersection is expected to be initially configured as a two-way stop-controlled intersection with free-flow on Tenth Line Road. Upon widening of Tenth Line, this intersection is expected to be signalized.

4.2.2 General Background Growth Rates

The background growth rate is intended to represent regional growth from outside the study area. Consistent with the Mer Bleue Expansion Master Transportation Study (MTS) and aforementioned traffic studies relating to the nearby adjacent developments, a 1% linear annual growth rate is proposed within the study area for the calculation of future background traffic.

The background growth rate has only been applied to arterial roadways and has not been applied to collector or local roadways within the study area, as traffic generation relating to all known future

adjacent developments has been explicitly accounted for in the analysis. The exception is Renaud Road which operates as an alternative parallel route to Navan Road and Brian Coburn Boulevard and is therefore subject to background traffic growth.

4.2.3 Other Area Development

Adjacent developments within the context area of the proposed development have been identified previously in **Table 3**. The Mer Bleue Expansion Master Transportation Study (MTS) considered these and other area developments in the projection of future traffic volumes. As the subject development forms part of the Mer Bleue Urban Expansion Area, its impacts have been previously evaluated through the MTS. In order to provide an analysis of interim conditions (i.e. the evaluation of Phase 1 buildout) adjacent development traffic volume projections from the MTS have been interpolated and considered in addition to the current development status of the Mer Bleue Expansion Area lands. Relevant extracts from the MTS have been provided in **Appendix F**.

Current development applications within the Mer Bleue Expansion area include:

- Summerside West Phase 4-6
- 2405 Mer Bleue Road

As subsequent phases of the Mer Bleue Expansion Lands to the south do currently not have active development applications, they are not considered in this study.

4.3 Demand Rationalization

The purpose of this section is to rationalize future travel demands within the study area to account for potential capacity limitations in the transportation network and its ability to effectively accommodate the additional demand generated by a new development.

4.3.1 Description of Capacity Issues

4.3.1.1 Mer Bleue Road and Renaud Road

The Mer Bleue Expansion Master Transportation Study (MTS) as well as the transportation studies conducted for many of the adjacent developments documented capacity issues at the Mer Bleue Road and Renaud Road intersection. The MTS recommended signalizing the intersection by 2025. Intersection capacity analysis results will be presented and discussed in the Analysis section of this report.

4.3.1.2 Other Study Area Intersections

An intersection capacity analysis conducted as part of the MTS indicated that all other intersections were expected to operate at acceptable levels of service (i.e. LOS 'D' or better) beyond the 2031 horizon year of the MTS with the following road network modifications in place:

- Traffic signals at the Mer Bleue Road & Street 1 intersection by 2031;
- Traffic signals at the Tenth Line Road & Sweetvalley Drive (S) intersection when Tenth Line Road is widened to four lanes; and
- All-way stop control at the Tenth Line Road & Wall Road intersection by 2025[1].

[1] Note: This configuration had previously assumed the widening of Tenth Line Road would terminate to the north of the Wall Road intersection.

The operational performance of each study area intersection will be verified with the inclusion of site-generated traffic in the Analysis section of this report.

4.3.2 Adjustment to Development Generated Demands

Given the limited planned improvements in transit, pedestrian and cycling infrastructure in the vicinity of the proposed development, it is not expected that the respective mode shares will increase significantly within the horizon year of this study. As such, no adjustments have been made to the mode share targets presented previously in **Table 7**.

With regards to site-generated traffic distribution, it should be noted that even though Jerome Jodoin Drive is expected to connect from Brian Coburn Boulevard and extend south through the proposed development within the timeframe of this study, there are numerous more direct connections proposed with the arterial road network that are more likely to be attractive commuter routes. Once Jerome Jodoin Drive is extended through the proposed development, this road may experience a minor increase in demand, however, the overall demand on the arterial road network is expected to remain relatively unchanged as dominant travel patterns will continue to favour direct access to the arterial road network. As such, no redistribution of traffic is necessary to account for the extension of Jerome Jodoin Drive.

4.3.3 Adjustment to Background Network Demands

Traffic analyses conducted as part of the MTS had taken into consideration the expected redistribution of future traffic patterns within the area as a result of the Brian Coburn Boulevard extension. As the MTS traffic projections have been used as a basis for this study, no further adjustments to background travel demands are necessary.

4.4 Traffic Volume Summary

4.4.1 Future Background Traffic Volumes

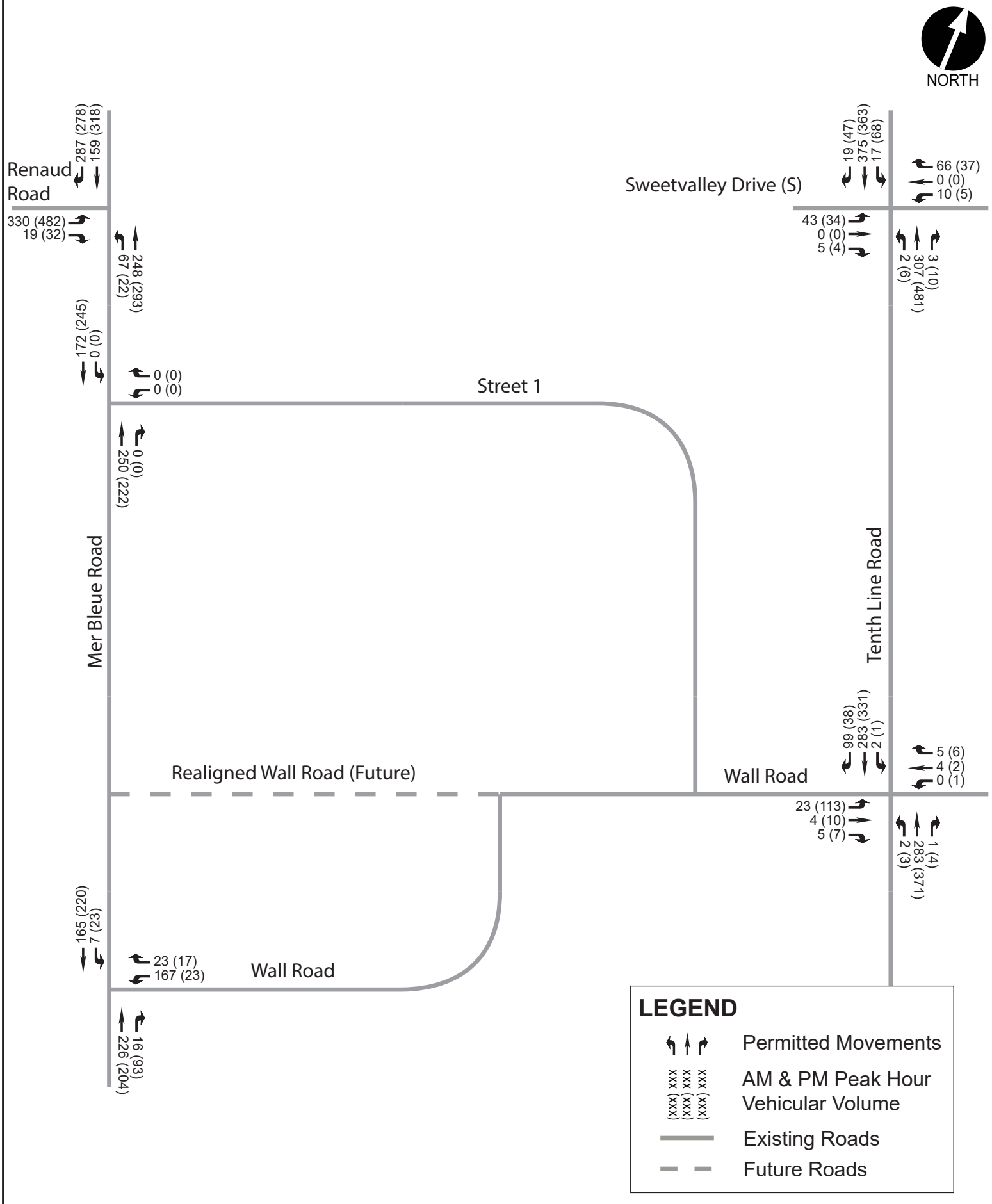
Future background traffic volumes have been established by applying a linear background growth rate to existing (2019) traffic counts, as described in previous sections of this report, and superimposing the total adjacent development traffic volumes derived from the MTS and ongoing development applications within the Mer Bleue Expansion Area (i.e. Summerside West Phase 4-6 and 2405 Mer Bleue Road).

Exhibit 7 and **Exhibit 8** present the future background traffic volumes anticipated for the 2025 build-out year, as well as the 2030 study horizon, respectively.

4.4.2 Future Total Traffic Volumes

Future total volumes have been derived by combining the site-generated traffic with the future background volumes from **Exhibit 7** and **Exhibit 8**.

Exhibit 9 and **Exhibit 10** present the future total traffic volumes anticipated for 2025 and 2030 analysis years, respectively.



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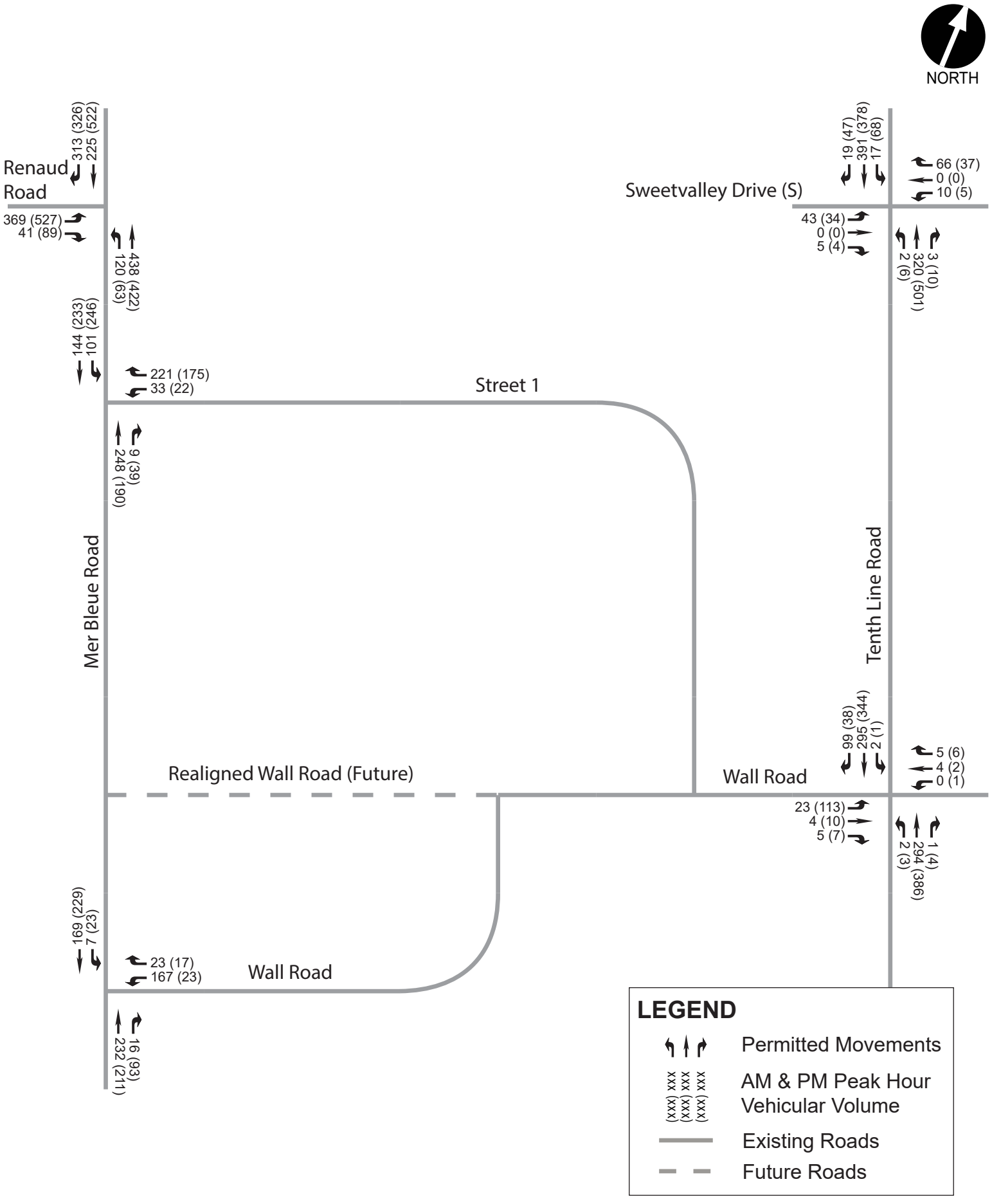
Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 7 - Future (2025)
Background Traffic

PROJECT No. 116761

SCALE: N.T.S.



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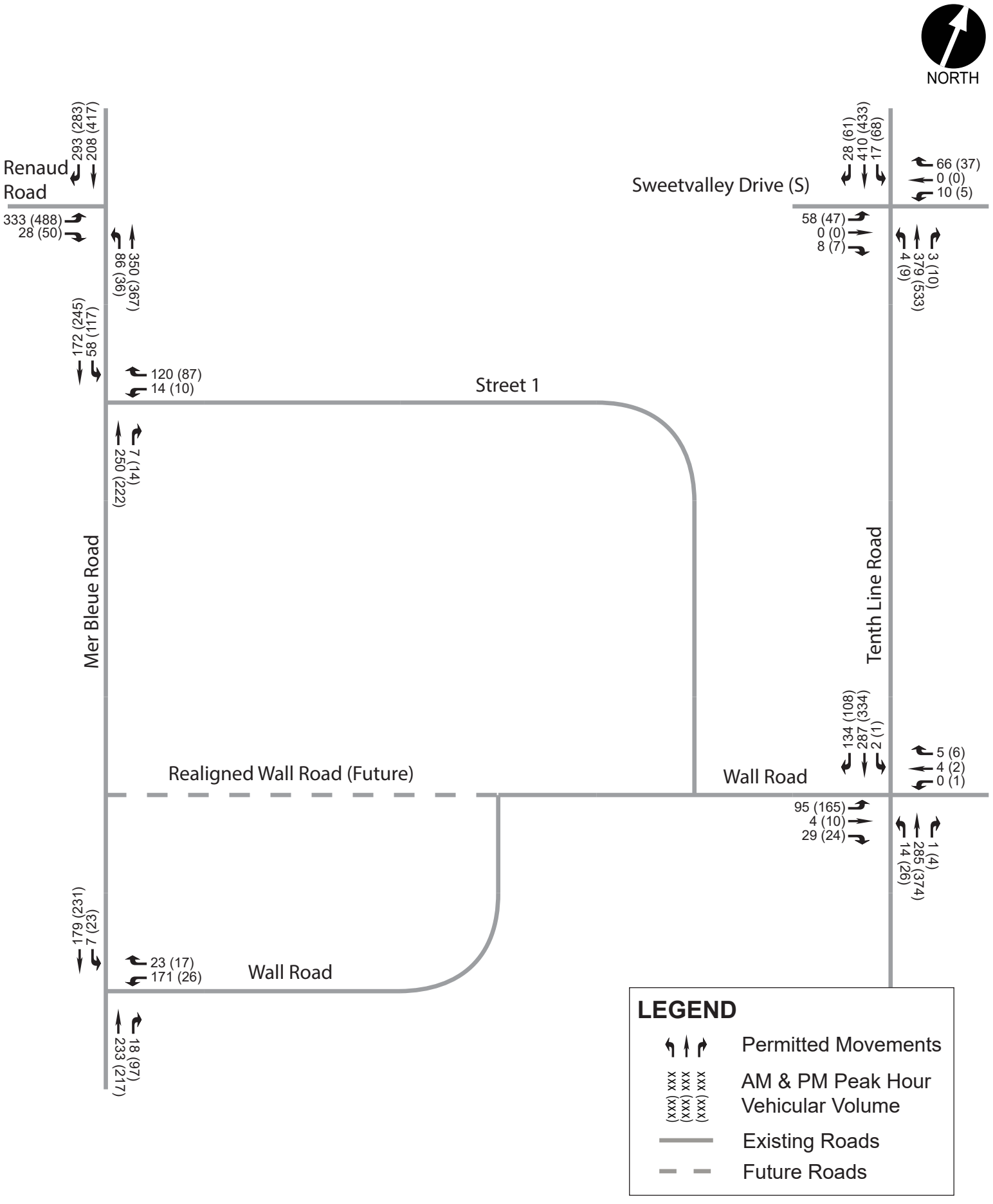
Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 8 - Future (2030) Background Traffic

PROJECT No. 116761

SCALE: N.T.S.



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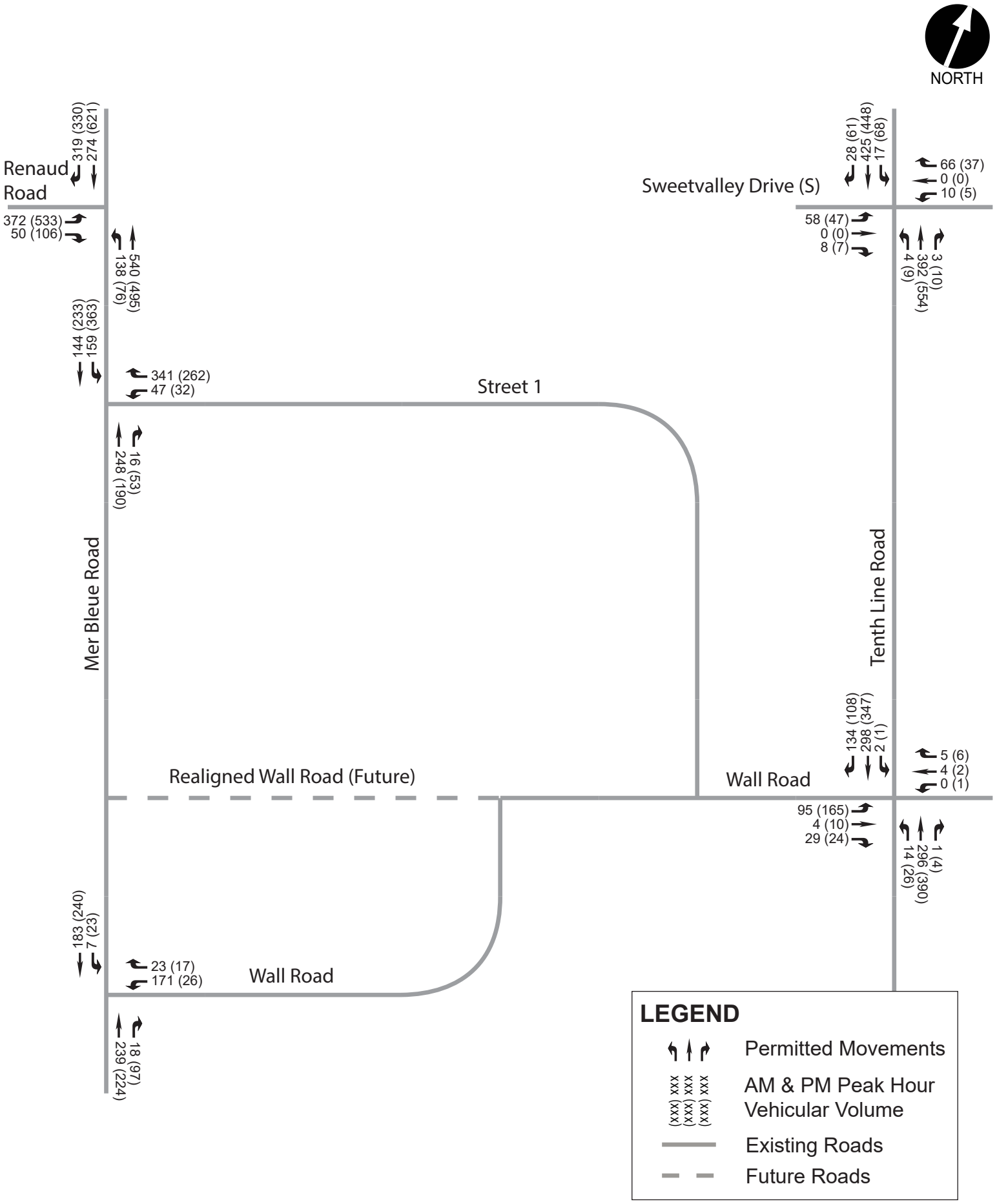
Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 9 - Future (2025)
Total Traffic

PROJECT No. 116761

SCALE: N.T.S.



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Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 10 - Future (2030)
Total Traffic

PROJECT No. 116761

SCALE: N.T.S.

5 Analysis

5.1 Development Design

5.1.1 Design for Sustainable Modes

The extension of existing transit routes and/or the addition of new routes will be required to provide adequate transit service coverage within the proposed development. All-day transit service can potentially be extended along Mer Bleue Road, Street 1, Wall Road and Tenth Line Road, with strategically placed stops to capture the majority of the proposed residential units within a 400m walking distance, as shown in **Exhibit 11** below.

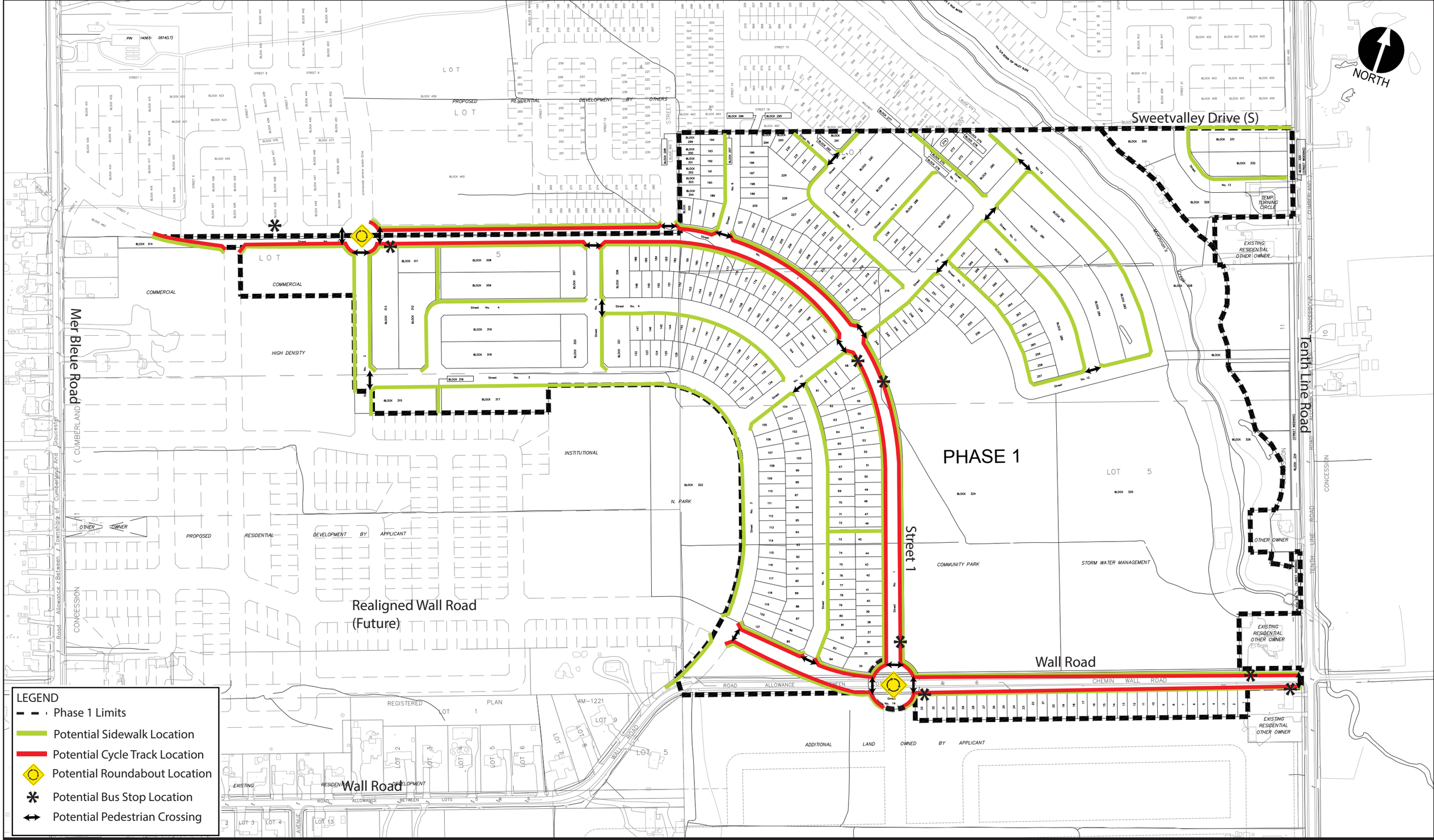
The layout of the internal road network has been configured as a modified grid to maximize mobility within the development as well as provide connectivity to adjacent pedestrian and cycling facilities. Internal collector roads and select local roads will provide sidewalks on at least one side to facilitate connections to schools, parks, pathways and other community attractions. Internal roadways have been designed to discourage high vehicular speeds through the use of curvilinear alignments. Further, the Draft Plan provisions for connectivity to adjacent pedestrian and cycling facilities within the surrounding area.

There are presently no specific pedestrian or cycling facilities along Mer Bleue Road or Tenth Line Road within the study area. It is expected, however, that with the Tenth Line Road widening (2025-2029) and the future widening and realignment of Mer Bleue Road that provisions for more formalized facilities with connections to the proposed development will be provided.

The TDM-Supportive Development Design and Infrastructure Checklist is only applicable to multi-family or residential condominium developments and, as such, was not completed for this development.

5.1.2 Circulation and Access

Not Applicable: The Circulation and Access element is exempt from this TIA, as defined in the study scope. This element is not required for Draft Plan of Subdivision applications.



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Mer Bleue Phase 1
Transportation Impact Assessment

Exhibit 11: Proposed Mobility Plan

PROJECT No. 116761

SCALE: 0m 50m 100m

5.1.3 New Street Networks

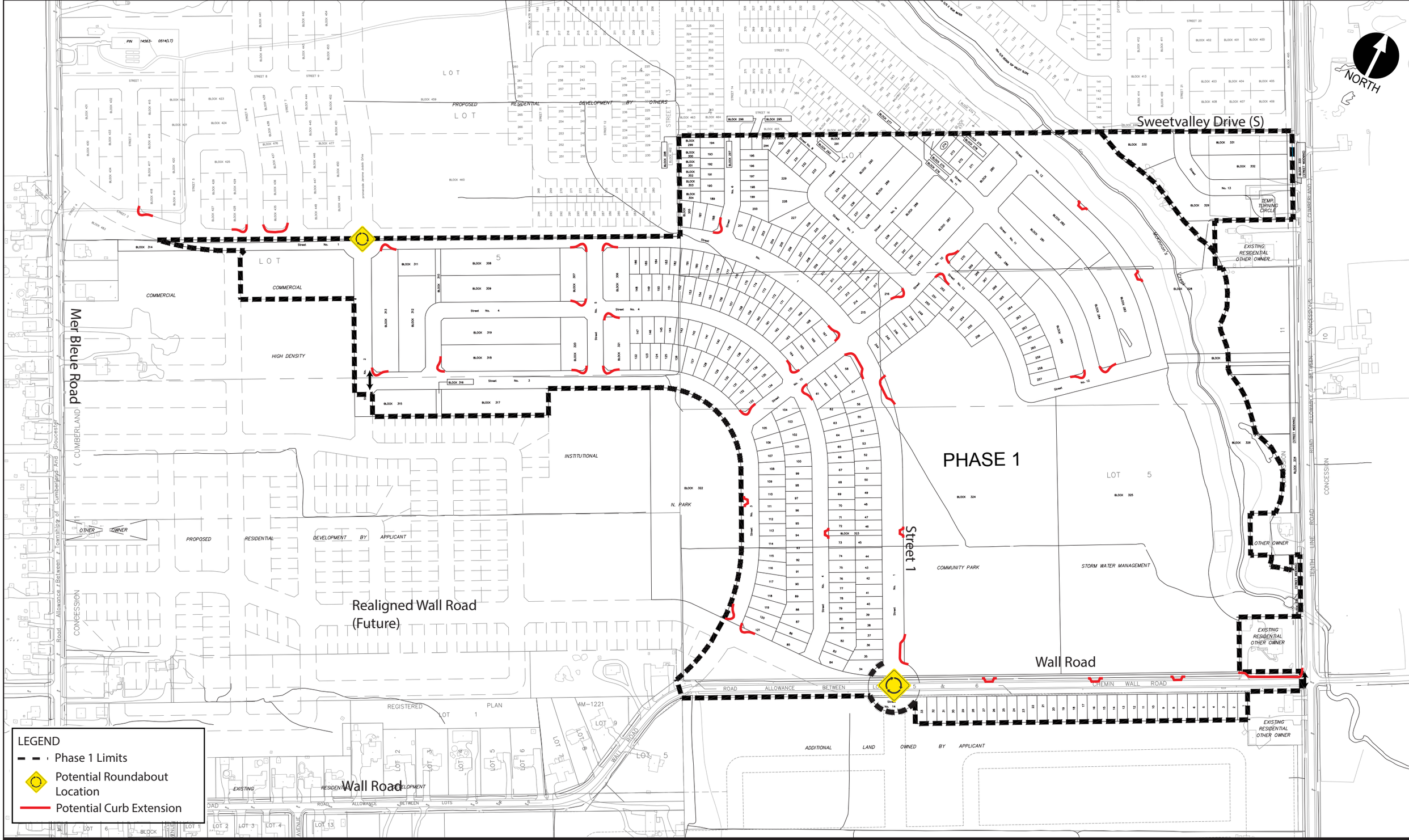
Consistent with the MTS, the road network within the proposed development features two collector roads, Wall Road and Street 1, and will serve as the main thoroughfares within the development. The local roadways are configured with relatively short road segments and strategic mid-block pathway connections to create a more porous, walkable community.

The MTS concept plan identified the internal intersections of Street 1/Jerome Jodoin Drive and Street 1/Wall Road with single-lane roundabout configurations.

In late 2019, Ottawa City Council approved a set of Neighborhood Collector Road Guidelines intended to encourage future network roadways within developing communities that provide a more balanced distribution of infrastructure within the City right-of-way to support active transportation modes while calming traffic. Within the limits of this subdivision, active transportation facilities including cycle tracks and concrete sidewalks are planned on both sides of the realigned Wall Road and Street 1 and will therefore conform to current Collector Road Guidelines. Jerome Jodoin Drive is also identified in the CDP as requiring cycle tracks, but it is outside the limits of this development.

In December 2019, Ottawa City Council also approved a Strategic Road Safety Action Safety Plan which established that all new local residential streets constructed within new developments be designed for a 30km/h operating speed. Following the approval of this plan, the City of Ottawa has developed a 30km/h Design Toolbox, which provides more specific guidance on how to achieve these reduced operating speeds. The design of the local roads within the proposed development will include traffic calming measures, focusing primarily on uninterrupted road segments of greater than 200m in length.

A conceptual traffic calming plan for the proposed development is provided in **Exhibit 12** below, and will be refined following Draft Plan approval.


Mer Bleue Road
Sweetvalley Drive (S)
Street 1
Wall Road
Realigned Wall Road
(Future)
PHASE 1
NORTH
COMMERCIAL
HIGH DENSITY
INSTITUTIONAL
PROPOSED RESIDENTIAL DEVELOPMENT BY OTHERS
PROPOSED RESIDENTIAL DEVELOPMENT BY APPLICANT
ADDITIONAL LAND OWNED BY APPLICANT
COMMUNITY PARK
STORM WATER MANAGEMENT
N. PARK
TEMP. TURNING CIRCLE
EXISTING RESIDENTIAL OTHER OWNER
OTHER OWNER
LEGEND
Phase 1 Limits
Potential Roundabout Location
Potential Curb Extension

5.2 Parking

Not Applicable: The Parking Supply and Spillover Parking elements are exempt from this TIA, as previously defined in the Scoping section of this report. These elements are not required for Draft Plan of Subdivision applications.

5.3 Boundary Streets

There are three existing boundary streets adjacent to the proposed development: Mer Bleue Road, Tenth Line Road and Wall Road. None of the boundary streets currently have an existing Complete Streets concept plan, therefore segment Multi-Modal Level of Service (MMLOS) analysis is provided below.

5.3.1 Mobility

Segment-based MMLOS results for Mer Bleue Road, Tenth Line Road and Wall Road are provided in **Table 9** below and were conducted in accordance with standardized spreadsheet included with the 2017 addendum to the MMLOS Guidelines. The MMLOS targets for each road vary based on a variety of factors such as the Official Plan designation / policy area the road is in, its road classification, cycling network classification, transit network classification and whether the road is a truck route or not.

Details of the MMLOS analysis are provided in **Appendix H**.

Table 9 – Segment-based MMLOS

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
SEGMENTS				
Mer Bleue Road – Renaud Road to Wall Road	**F** (Target: C)	**E** (Target: C)	**E** (Target: D)	C (Target: E)
Tenth Line Road – Sweetvalley Drive (S) to Wall Road	**F** (Target: C)	**F** (Target: C)	D (Target: D)	C (Target: D)
Wall Road – Mer Bleue Road to Tenth Line Road	**F** (Target: C)	**F** (Target: D)	**E** (Target: D)	E (Target: N/A[1])

Notes:

[1] Collector roads in the General Urban Area that are not on a truck route do not have a TkLOS target.

The results of the segment-based MMLOS indicate that each of the boundary streets currently do not meet the Pedestrian and Bicycle Level of Service (PLOS and BLOS) targets. Mer Bleue and Wall Road operate slightly over their Transit Level of Service (TLOS) target with a TLOS of 'E'.

In order to meet the MMLOS targets, the following modifications have been identified which could improve conditions along each boundary street:

- **Mer Bleue Road** – Design features such as 2.0m wide sidewalks with minimum 0.5m wide boulevards (PLOS: C), as well as, curbside bike lanes (BLOS: C) would be required in order to meet the PLOS and BLOS targets. It is anticipated that concrete sidewalks at least 2.0m wide will be provided (by others) along Mer Bleue Road from Renaud Road to Street 1. This configuration would be consistent with the recommended configuration from the Mer Bleue Expansion Master Transportation Study (MTS). Given the frequency of driveways on Mer Bleue Road, it is not feasible to reduce the level of driveway friction in

order to improve the TLOS results. Given the eventual realignment of Mer Bleue Road from Renaud Road to Navan Road, it is not anticipated that Mer Bleue Road will be reconstructed per the City of Ottawa's current collector road standards and that retrofit upgrades would be made on an interim basis only.

- **Tenth Line Road** – Design features such as 2.0m wide sidewalks with 2.0m wide boulevards (PLOS: D), as well as, minimum 1.2m wide bike lanes (BLOS: C) on both sides of the roadway would be required in order to improve the PLOS and meet the BLOS target. This configuration is similar to the configuration for Tenth Line Road north of Harvest Valley Avenue/Sweetvalley Drive where Tenth Line Road is urbanized and has a four-lane divided cross-section. The above-noted features, however, are not feasible with the current 2-lane rural cross-section within the project limits. It should be noted that given the high traffic volume and operating speed on Tenth Line Road a PLOS of 'C' is not achievable. In order to meet the PLOS target, a reduction in operating speed would be required, though this is not feasible based on the existing roadway characteristics. It is anticipated that once Tenth Line Road is reconstructed as a four-lane cross-section that sidewalks with boulevards and exclusive cycling facilities will be provided along the development frontage, helping to improve the PLOS and BLOS along the corridor, consistent with the Tenth Line cross-section north of the site.
- **Wall Road** – Minimum design features such as 1.5m wide sidewalks with 2.0m wide boulevards (PLOS: C) as well as 1.2m wide bike lanes (BLOS: C) on both sides of the roadway would be required in order to meet the PLOS and BLOS targets. Alternatively, a physically separated bikeway can be considered instead of bike lanes (BLOS: A). Given the frequency of driveways on Wall Road, it is not feasible to reduce the level of driveway friction in order to improve the TLOS results. The Mer Bleue Expansion MTS recommended implementing cycle tracks and sidewalks along the eastern half of Wall Road. As such, the eastern portion of Wall Road will be designed per the City of Ottawa's 2019 Collector Road Guidelines, consisting of on-street parking, segregated unidirectional cycle tracks and sidewalks on both sides of the street. A single sidewalk along the western half of Wall Road is appropriate, given the intent to downgrade this section to a local road once the future realignment to the north is completed.

It should be noted that these deficiencies in the segment-based MMLOS along the boundary streets represent existing conditions and should be considered for implementation by the City of Ottawa in order to facilitate travel by non-auto modes. Measures to improve MMLOS will be implemented along the eastern portion of Wall Road from Street 1 to Tenth Line Road as part of this development, while new streets will be designed to meet current City standards.

5.3.2 Road Safety

A summary of all reported collisions within the study period over the past five years was presented in the Section 3.2.4. The City requires a safety review if at least six collisions for any one movement or of a discernible pattern, over a five-year period have occurred. The analysis concluded that there have been no significant reoccurring collision patterns within the study area, therefore no further collision analysis is warranted.

5.4 Access Intersections

5.4.1 Location and Design of Access

The proposed development will provide two new access intersections:

- **Mer Bleue Road & Street 1** – A three-leg intersection is proposed approximately 720m north of Wall Road and 460m south of Renaud Road with a 24.0m wide right-of-way (ROW) on the Street 1 approach. As previously discussed in Section 4.2.1, the

transportation study for the Summerside West Phases 4 to 6 development analysed this intersection as well and recommended that the intersection be configured with stop control on the westbound approach and a southbound auxiliary left-turn lane with 45m of storage. The MTS previously noted that a minimum of 60m would be required ultimately. The auxiliary lane analysis for this intersection has been revisited in subsequent sections of this report to verify the storage bay requirements with the inclusion of Phase 1 site-generated traffic.

- **Tenth Line Road & Sweetvalley Drive (S)** – A three-leg intersection was recently constructed (by others) approximately 630m north of Wall Road and 550m south of Harvest Valley Avenue with an 18.0m wide right-of-way (ROW) on the Sweetvalley Drive (S) approach. The transportation studies for both the Summerside West Phases 4 to 6 and Minto Vista developments both recommended that the intersection be configured with stop-control on the eastbound and westbound approaches and no auxiliary lanes. It should be noted that the TIA for the Summerside West Phases 4 to 6 development indicated that by 2029 the eastbound approach of this intersection would operate at a Level of Service of 'E' during the afternoon peak hour.

In addition to the above, there are two existing access intersections, both via Wall Road, that provide connections to Mer Bleue Road and Tenth Line Road.

5.4.2 Intersection Control

5.4.2.1 Traffic Signal Warrants

The proposed development will access the arterial road network via the following intersections:

- Mer Bleue Road & Street 1
- Mer Bleue Road & Wall Road
- Tenth Line Road & Sweetvalley Drive (S)
- Tenth Line Road & Wall Road

Based on the projected Future (2030) Total Traffic volumes these intersections are not expected to trigger traffic signal warrants.

The results of the traffic signal warrants are provided in **Appendix I**.

5.4.2.2 All-Way Stop-Control Warrants

All-way stop-control was recommended for the intersection of Tenth Line Road & Wall Road in the Mer Bleue Expansion Master Transportation Study (MTS) under Future (2025) Total Traffic conditions. As such, all-way stop-control warrants have been completed for this intersection based on the projected Future (2030) Total Traffic volumes presented in this study. For an all-way stop to be considered, the proportion of sidestreet traffic must represent at least 30% of the overall approach volume. The proposed development is not expected to generate sufficient traffic on its own to satisfy this requirement and therefore all-way stop control is not likely to be warranted until subsequent phases of development.

It is recommended that all-way stop control warrants be re-evaluated as subsequent phases of development within the Mer Bleue Urban Expansion Area are proposed.

The results of the all-way stop control warrant are provided in **Appendix I**.

5.4.2.3 Roundabout Analysis

As per the City's Roundabout Implementation Policy, 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
- At intersections where capacity or safety problems are being experienced

As the Mer Bleue & Street 1 intersection is a 'new City intersection', the Roundabout Feasibility Screening Tool was utilized to assess the feasibility of implementing a roundabout at this intersection.

The results of the Roundabout Feasibility Screening Tool indicate that at this location a roundabout may be problematic due to potential property constraints.

The results of the Roundabout Feasibility Screening Tool are provided in **Appendix I**.

5.4.3 Intersection Design (MMLOS)

There is currently no methodology for evaluating Multi-Modal Level of Service (MMLOS) at unsignalized intersections. As all site access intersections are anticipated to remain unsignalized beyond the 2030 study horizon, MMLOS analysis was not conducted for these intersections. Assumptions regarding intersection control at all site access intersections were verified through intersection capacity analysis results presented in Section 5.9 of this TIA report.

5.5 Transportation Demand Management (TDM)

The City of Ottawa is committed to implementing Transportation Demand Management (TDM) measures on a City-wide basis in an effort to reduce automobile dependence, particularly during the weekday peak travel periods, and all new developments are expected to comply with this policy.

5.5.1 Context for TDM

As described in the Forecasting section of this report, the mode share targets used to estimate future development traffic are consistent with the Mer Bleue Expansion Master Transportation Study (MTS) and the 2011 TRANS Origin-Destination (O-D) Survey peak period mode shares for the Orléans Traffic Assessment Zone (TAZ). No adjustments have been applied to the mode shares at any of the study analysis years.

The proposed development aligns with the objectives of the Mer Bleue Expansion Area Community Design Plan (CDP) and Building Better and Smarter Suburbs (BBSS) policy documents, which promote sustainable and compact growth. The development is approximately 2 km from a future rapid transit corridor and within close proximity to collector roads capable of supporting local transit routes. As such, providing the majority of units as townhomes is deemed to be an appropriate level of density in this context.

5.5.2 Need and Opportunity

The surrounding community is presently auto-oriented with limited transit access, which presents an opportunity to shift travel pattern to more sustainable modes through the timely implementation of active transportation infrastructure and transit service through the development.

To promote sustainable transportation for local trips, the internal local road network of the proposed development has been configured with short street segments and frequent intersections to provide direct connections to the internal collector roads which will be capable of supporting

transit service. Sidewalks and strategically located mid-block pedestrian connections will be provided throughout the subdivision to facilitate access to local amenities, recreational pathways and the adjacent road and transit network. The development also includes both a commercial node and substantial land designated for future recreational use.

There is an opportunity for the City to expand the transit service network as the internal road network within the development is constructed, in order to capture trips within the development lands and provide direct connections to major transit hubs such as Jeanne d'Arc Station and major east-west transit routes such as Route #25 on Innes Road. There are plans for future Bus Rapid Transit (BRT) stations on both Mer Bleue Road and Tenth Line Road approximately 2 kilometres north of the proposed development. Providing high quality transit service within the community will help promote the use of transit as a convenient and efficient mode of transportation, thereby reducing dependence on private automobile usage.

Based on the projected rate of development, construction staging and the establishment of a new collector road linkage between Mer Bleue Road and Tenth Line Road, it is expected that there will be sufficient population density within the first year of development to warrant transit service adjustments by the City of Ottawa.

5.5.3 TDM Program

The proposed development conforms to the City's TDM principles by providing convenient and direct connections to adjacent pedestrian, cycling and transit facilities where available.

The City of Ottawa's TDM Measures Checklist was completed for the proposed development and are provided in **Appendix J**. As per Section 6.1.1 of the checklist, a Multi-Modal Information Package will be provided to new homeowners and will include information about how to get around the area by modes other than private automobile. This package may include information about local walking trails, available bicycle infrastructure, nearby services or amenities, nearby bus stops/routes/schedules, schools, local taxi compagnies, etc. The intent of this package will provide new residents with options to get around their new community without reliance on a private automobile for at least some of their daily needs.

5.6 Neighbourhood Traffic Management

5.6.1 Adjacent Neighbourhoods

The proposed development will utilize Wall Road, a rural collector road, for access to the subdivision from the south. Based on projected Future (2030) Total Traffic, this road may experience volumes in the order of 340 two-way vehicles per hour between Tenth Line Road and Street 1 during the weekday afternoon peak hour. This is slightly in excess of livability threshold for collector roads of 300 vehicles per hour during the peak hours, however, this is only expected to occur on the segment of road between Tenth Line Road and Street 1 before it disperses throughout the proposed development. Between Mer Bleue Road and Wall Road, Street 1 is expected to only experience two-way volumes up to 210 vehicles per hour east of Jerome Jodoin Drive.

5.7 Transit

5.7.1 Route Capacity

The estimated Future (2030) Total transit passenger demand within the study area was provided in Section 4.1.2.5. The results have been summarized in **Table 10**.

Table 10 - 2030 Development Generated Transit Demand

PERIOD	PEAK PERIOD DEMAND		
	IN	OUT	TOTAL
AM	40	82	122
PM	79	60	139

As indicated above, site-generated two-way transit ridership of roughly 122 and 139 passengers are expected during the weekday morning and afternoon peak hours, respectively. There are currently no transit routes that operate near the proposed development. It is recommended that OC Transpo extend existing transit routes or plan future transit routes to accommodate the transit demand of the proposed development.

5.7.1 Transit Priority Measures

The Transportation Master Plan (TMP) does not identify the need for any isolated transit priority measures within the study area. As there are no transit routes presently operating on any of the boundary streets within the study area, there is no need for transit priority measures.

5.8 Review of Network Concept

As discussed in Section 3.3.3 Network Concept Screenline, the following screenlines are applicable to this study: SL45 – Bilberry Creek, SL46 – Frank Kenny and SL47 - Innes. A summary comparison of the City 2031 Network Concept demand and capacity has been provided in **Table 11**.

Table 11 – 2031 Network Concept

SCREENLINE	AM 2031 PREFERRED INBOUND		
	DEMAND	CAPACITY	V/C RATIO
SL45 – Bilberry Creek	7,681	11,600	0.66
SL46 – Frank Kenny	3,880	9,800	0.40
SL47 - Innes	4,278	12,200	0.35

Note - Table results from Road Network Development Report: Final Report (December 2013)

As shown above, significant excess capacity is projected across all three nearby screenlines and as a result, network capacity deficiencies are not expected due to the addition of site-generated traffic.

5.9 Intersection Design

The following sections summarize the methodology and results of the Multi-Modal Level of Service (MMLOS) analysis conducted within the study area.

5.9.1 Intersection Control

The results of the intersection control warrants discussed below are provided in **Appendix I**.

5.9.1.1 Traffic Signal Warrants

As part of this study, traffic signal warrant analysis was completed for the Mer Bleue Road & Renaud Road intersection. This intersection is expected to meet traffic signal warrants under interpolated 2026 total traffic conditions and shortly thereafter under interpolated 2028 background traffic conditions. It is also worth noting that the intersection capacity analysis presented in subsequent sections of this report indicates that traffic signals are required operationally to support Future (2025) Background traffic conditions.

Traffic signal warrants for site access intersections were discussed previously in Section 5.4.

5.9.1.2 Roundabout Analysis

The feasibility of implementing a roundabout at the following study area intersection was evaluated using the Roundabout Feasibility Screening Tool:

- Mer Bleue Road & Renaud Road

Based on the results of the evaluation, a roundabout is not recommended at the intersection of Mer Bleue Road & Renaud Road. Due to property constraints there is insufficient space to accommodate the inscribed circle of a roundabout which is a leading factor for ruling out this form of traffic control.

5.9.2 Intersection Analysis Criteria (Automobile)

The following section outlines the City of Ottawa's methodology for determining motor vehicle Level-of-Service (LOS) at signalized and unsignalized intersections.

5.9.2.1 Signalized Intersections

In qualitative terms, the Level-of-Service (LOS) defines operational conditions within a traffic stream and their perception by motorists. A LOS definition generally describes these conditions in terms of such factors as 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 are given letter designations 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 intersection is operating beyond its theoretical capacity.

The City of Ottawa has developed criteria 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. These criteria are summarized in **Table 12** below.

Table 12 - LOS Criteria for Signalized Intersections

LOS	VOLUME TO CAPACITY RATIO (v/c)
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	> 1.00

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 existing conditions utilized a Peak Hour Factor (PHF) of 0.90, while future conditions considers optimized signal timing plans and use of a Peak Hour Factor (PHF) of 1.0 to recognize peak spreading beyond a 15-minute period in congested conditions.

5.9.2.2 Unsignalized Intersections

The capacity of an unsignalized intersection can also be expressed in terms of the LOS it provides. For an unsignalized intersection, the Level of Service is defined in terms of the average movement delays at the intersection. This 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 the un-signalized intersection is a function of the capacity of the approach and the degree of saturation.

The Highway Capacity Manual 2010 (HCM), prepared by the Transportation Research Board, includes the following Levels of Service criteria for un-signalized intersections, related to average movement delays at the intersection, as indicated in **Table 13** below.

Table 13 - LOS Criteria for Unsignalized Intersections

LOS	DELAY (seconds)
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 scenarios, 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 the downtown and its vicinity). Level of Service 'F' indicates that the movement is operating beyond its design capacity.

5.9.3 Intersection Capacity Analysis

Following the established intersection capacity analysis criteria described above, the existing and future conditions are analysed using the weekday peak hour traffic volumes derived in this study.

The following section presents the results of the intersection capacity analysis. All tables summarize study area intersection LOS results during the weekday morning and afternoon peak hour periods.

The Synchro output files have been provided in **Appendix K**.

5.9.3.1 Existing (2019) Traffic

An intersection capacity analysis has been undertaken using the Existing (2019) Traffic volumes presented in **Exhibit 4**, yielding the following results:

Table 14 - Intersection Capacity Analysis: Existing (2019) 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)
Mer Bleue Road & Renaud Road	All-Way Stop	B (10.1s)	NBTL (10.1s)	B (12.6s)	EBRL (12.6s)
Mer Bleue Road & Wall Road	WB Stop	B (11.9s)	WBRL (11.9s)	B (11.1s)	WBRL (11.1s)
Tenth Line Road & Wall Road	EB & WB Stop	B (13.4s)	EBTRL (13.4s)	C (19.5s)	EBTRL (19.5s)

The results of the intersection capacity analysis indicate that the study area intersections are operating at acceptable Levels of Service (i.e. LOS 'D' or better) under existing traffic conditions during both the weekday morning and afternoon peak hour.

5.9.3.2 Future (2025) Background Traffic

An intersection capacity analysis has been undertaken using the Future (2025) Background Traffic volumes presented in **Exhibit 7**. It has been assumed that the base road network would be identical to the existing road network with the following road network modifications:

- The widening of Mer Bleue from two to four lanes at Renaud Road is assumed to be in place
- Tenth Line Road & Sweetvalley Drive (S) has been assumed to be initially configured with stop control on the eastbound and westbound approaches.

The results of the intersection capacity analysis are summarized in **Table 15**.

Table 15 - Intersection Capacity Analysis: 2025 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)
Mer Bleue Road & Renaud Road	All-Way Stop	C (19.1s)	SBTR (19.1s)	**F (74.5s)**	**SBTR (74.5s)**
	Signalized [1]	A (0.38)	EBL (0.51)	A (0.45)	EBL (0.60)
Mer Bleue Road & Wall Road	WB Stop	B (13.5s)	WBRL (13.5s)	B (11.6s)	WBRL (11.6s)
Tenth Line Road & Sweetvalley Drive (S)	EB & WB Stop	C (18.8s)	EBTRL (18.8s)	D (27.5s)	EBTRL (27.5s)
Tenth Line Road & Wall Road	EB & WB Stop	B (14.2s)	EBTRL (14.2s)	C (21.7s)	EBTRL (21.7s)

Notes:
[1] Intersection configuration consistent with MTS. Assumptions: includes a northbound left-turn lane, two northbound through lanes, a southbound right-turn lane, a southbound through lane, an eastbound double left-turn lane and an eastbound single right-turn lane.

During the weekday afternoon peak hour, the Mer Bleue Road & Renaud Road intersection is expected to exceed its theoretical capacity under Future (2025) Background Traffic conditions with all-way stop control. Signalizing the intersection has been shown to improve the operating condition at the intersection to Level of Service 'A' during the weekday morning and afternoon peak hours. The Mer Bleue Expansion Master Transportation Study (MTS) previously identified that signalization of this intersection would likely be required by 2025 under background traffic conditions. The MTS assumed that with signalization, auxiliary left-turn and right-turn lanes would be added to the northbound and southbound approaches, respectively, and the eastbound approach would be reconfigured with a double left-turn lane and single right-turn lane. To maintain consistency with the MTS, it was assumed that these auxiliary lane reconfigurations would occur in conjunction with the signalization of the intersection.

5.9.3.3 Future (2030) Background Traffic

An intersection capacity analysis has been undertaken using the Future (2030) Background Traffic volumes presented in **Exhibit 8**. It has been assumed that the base road network would be identical to the existing road network with the following road network modifications:

- Mer Bleue Road & Renaud Road signalized and configured as indicated in the Future (2025) Background Traffic analysis.
- Tenth Line Road & Sweetvalley Drive (S) has been assumed to be initially configured with stop control on the eastbound and westbound approaches.

Despite funding for the planned four-lane widening of Tenth Line Road has been allocated for some time between 2025 and 2029, it is recognized that the four-lane cross configuration may not be fully implemented in 2030. As such, the analysis has conservatively evaluated the Tenth Line Road intersections under both a two-lane and four-lane configuration.

The results of the intersection capacity analysis are summarized in **Table 16** below.

Table 16 - Intersection Capacity Analysis: 2030 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)
Mer Bleue Road & Renaud Road	Signalized	A (0.41)	EBL (0.55)	A (0.57)	EBL (0.63)
Mer Bleue Road & Street 1	WB Stop	B (12.8s)	WBRL (12.8s)	B (12.9s)	WBRL (12.9s)
Mer Bleue Road & Wall Road	WB Stop	B (13.7s)	WBRL (13.7s)	B (11.7s)	WBRL (11.7s)
Tenth Line Road & Sweetvalley Drive (S)	EB & WB Stop [1]	C (19.6s)	EBTRL (19.6s)	D (28.9s)	EBTRL (28.9s)
	EB & WB Stop [2]	C (15.9s)	EBTRL (15.9s)	C (20.8s)	EBTRL (20.8s)
Tenth Line Road & Wall Road	EB & WB Stop [1]	B (14.6s)	EBTRL (14.6s)	C (22.9s)	EBTRL (22.9s)
	EB & WB Stop [2]	B (13.2s)	EBTRL (13.2s)	C (17.8s)	EBTRL (17.8s)

Notes:
[1] Two-lane Tenth Line Road configuration.
[2] Four-lane Tenth Line Road configuration.

The results of the intersection capacity analysis indicate that with the recommended road network modifications from the Future (2025) Background Traffic analysis, all the study area intersections are expected to operate at acceptable Levels of Service (i.e. LOS 'D' or better) under Future (2030) Background Traffic conditions. Both Tenth Line Road intersections are expected to operate at acceptable Levels of Service (i.e. LOS 'D' or better) as well with and without the four-lane widening of Tenth Line Road.

5.9.3.4 Future (2025) Total Traffic

An intersection capacity analysis has been undertaken using the Future (2025) Total Traffic volumes presented in **Exhibit 9**. It has been assumed that the base road network would be identical to the existing road network with the following road network modifications:

- Mer Bleue Road & Renaud Road is expected to meet the signal warrants by 2026 under interpolated Total Traffic conditions and is DC-refundable based on the 2019 Development Charges (DC) Background Study. As with the Future (2025) Background Traffic condition, the configuration of this intersection will remain consistent with the recommendations of the Mer Bleue MTS.
- Mer Bleue Road & Street 1 has been assumed to be configured with stop control on the westbound approach.
- Tenth Line Road & Sweetvalley Drive (S) has been assumed to be configured with stop control on the eastbound and westbound approaches.

The results of the intersection capacity analysis are summarized in **Table 17**.

Table 17 - Intersection Capacity Analysis: 2025 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)
Mer Bleue Road & Renaud Road	Signalized	A (0.38)	EBL (0.51)	A (0.49)	EBL (0.60)
Mer Bleue Road & Street 1	WB Stop	B (10.9s)	WBRL (10.9s)	B (10.8s)	WBRL (10.8s)
Mer Bleue Road & Wall Road	WB Stop	B (14.0s)	WBRL (14.0s)	B (11.9s)	WBRL (11.9s)
Tenth Line Road & Sweetvalley Drive (S)	EB & WB Stop	C (23.6s)	EBTRL (23.9s)	**E (38.0s)**	**EBTRL (38.0s)**
Tenth Line Road & Wall Road	EB & WB Stop	C (17.9s)	EBTRL (17.9s)	D (36.2s)	EBTRL (36.2s)

Tenth Line Road & Sweetvalley Drive (S) is expected to operate marginally above acceptable levels of service (LOS 'D' or better) under Future (2025) Total Traffic conditions. Sensitivity analysis reveals that a reduction in volumes of just 21 vehicles per direction along Tenth Line Road would allow the intersection to achieve Level of Service 'D' under Future (2025) Total Traffic conditions, therefore no changes to traffic control are recommended as a result of intersection capacity.

Development Charge funds have been allocated for the widening of Tenth Line to four lanes through the study area to occur between 2025 and 2029, according to the 2019 DC Background Study, however it has been conservatively assumed in this analysis that the Tenth Line widening will not be in place at the 2025 build-out year.

5.9.3.5 Future (2030) Total Traffic

An intersection capacity analysis has been undertaken using the Future (2030) Total Traffic volumes presented in **Exhibit 10**. It has been assumed that the base road network would be identical to the existing road network with the following road network modifications:

- Mer Bleue Road & Renaud Road signalized and configured as indicated in the Future (2025) Background Traffic analysis.
- Mer Bleue Road & Street 1 has been assumed to be configured with stop control on the westbound approach.
- Tenth Line Road & Sweetvalley Drive (S) has been assumed to be configured with stop control on the eastbound and westbound approaches.

As funds for the planned four-lane widening of Tenth Line Road has been allocated for between 2025 and 2029, the analysis has evaluated both Tenth Line Road intersections under both the two-lane and four-lane configuration of Tenth Line Road.

The results of the intersection capacity analysis are summarized in **Table 18**.

Table 18 - Intersection Capacity Analysis: 2030 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)
Mer Bleue Road & Renaud Road	Signalized	A (0.42)	EBL (0.55)	B (0.62)	EBL (0.63)
Mer Bleue Road & Street 1	WB Stop	C (17.0s)	WBRL (17.0s)	C (18.8s)	WBRL (18.8s)
Mer Bleue Road & Wall Road	WB Stop	B (14.2s)	WBRL (14.2s)	B (12.1s)	WBRL (12.1s)
Tenth Line Road & Sweetvalley Drive (S)	EB & WB Stop [1]	C (24.8s)	EBTRL (24.8s)	**E (40.8s)**	**EBTRL (40.8s)**
	EB & WB Stop [2]	C (18.5s)	EBTRL (18.5s)	D (26.1s)	EBTRL (26.1s)
Tenth Line Road & Wall Road	EB & WB Stop [1]	C (18.6s)	EBTRL (18.6s)	**E (39.8s)**	**EBTRL (39.8s)**
	EB & WB Stop [2]	C (15.8s)	EBTRL (15.8s)	D (26.0s)	EBTRL (26.0s)

Notes:

[1] Two-lane Tenth Line Road configuration.

[2] Four-lane Tenth Line Road configuration.

Both Tenth Line Road intersections are expected to operate marginally above acceptable levels of service (i.e. LOS 'D' or better) under Future (2030) Total Traffic conditions with Tenth Line Road maintaining its two-lane cross-section. As discussed previously, Development Charges funds have been allocated for the widening of Tenth Line Road to occur between 2025 and 2029, which

would allow both intersections to operate at a Level of Service 'D' or better while maintaining a two-way stop-controlled configuration. It is acknowledged, however, that both locations are likely to be signalized in conjunction with the eventual widening for safety reasons as stop-controlled side streets on a multi-lane, divided road are typically not recommended.

In the event that the Tenth Line Road widening is delayed beyond the study time horizon, additional analysis was conducted to determine the magnitude of traffic volume reductions required to achieve intersection operational standards (i.e. LOS 'D'). This sensitivity analysis indicated that both intersections would operate at LOS 'D' with only minor reductions in mainline through volumes during the critical weekday afternoon peak hour. At Sweetvalley Drive (S), a decrease in the order of 39 vehicles per direction on Tenth Line, representing 7 to 9% of mainline through volumes, would allow the intersection to operate at a LOS 'D'. Similarly, the Wall Road intersection would operate at an LOS 'D' with an even smaller reduction in the order of 21 vehicles per direction along Tenth Line, equating to approximately 6% mainline through volumes.

As both intersections are able to achieve acceptable levels of service with only slight reductions in through volumes along Tenth Line Road, no change to intersection control is required as a direct consequence of any delays, even if the Tenth Line Road widening is postponed until beyond the 2030 study horizon year. Although traffic signals are not warranted or operationally-required at the Tenth Line Road & Sweetvalley Drive (S) or Tenth Line Road & Wall Road intersections, the City should consider signalization of these intersections upon the four-lane widening of Tenth Line Road for safety reasons.

5.9.4 Intersection Analysis (MMLOS)

An analysis of existing and future conditions has been conducted based on the methodology prescribed in the 2017 addendum to the Ottawa Multi-Modal Level of Service (MMLOS) Guidelines which includes a standardized spreadsheet to evaluate LOS for each mode. The MMLOS has been calculated for each intersection where signals exist or are anticipated. As there are currently no existing signalized intersections within the study area, the analysis was limited to future conditions.

The intersection MMLOS results of the Mer Bleue Road & Renaud Road intersection under future background and total traffic conditions are summarized in **Table 19**. The analysis was focused on determining the intersection design elements required to meet the MMLOS targets.

Detailed intersection MMLOS analysis results for future conditions are provided **Appendix H**.

Table 19 - Intersection MMLOS - Future Conditions

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
INTERSECTIONS				
Mer Bleue Road & Renaud Road (future signalized)	C (Target: C)	C (Target: C)	D (Target: D)	E (Target: E)

5.9.4.1 Summary of Potential Improvements

Based on the MMLOS results outlined in **Table 19**, the following measures have been identified that could improve conditions for each travel mode:

Pedestrians

The PLOS at intersections is based on several factors including the number of traffic 'lanes' that pedestrians must cross (crossing distance/3.5m), corner radii and whether the crossing allows for permissive or protective right or left turns, among others. The City of Ottawa minimum target for PLOS is 'C'.

In order to achieve a PLOS of 'C' at the Mer Bleue Road & Renaud Road intersection, the north-south crossing would require a leading pedestrian interval, a refuge median, and zebra stripe high-visibility crosswalk markings. These additional measures would be required to offset the negative impact the number of lanes on this approach would have on the PLOS evaluation. A 'protected intersection' design would also achieve the PLOS target.

Cyclists

The BLOS at intersections is dependent on several factors: the number of lanes that the cyclist is required to cross to make a left-turn, the presence of a dedicated right-turn lane on the approach and the operating speed of each approach. The City target for BLOS is 'C'.

In order to achieve a BLOS of 'C' at the Mer Bleue Road & Renaud Road intersection, pocket bike lanes would be required on both the southbound and eastbound approach and two-stage left-turn bike boxes would be required for both the northbound and eastbound directions. A 'protected intersection' design would also achieve the BLOS target.

Transit

Intersection TLOS is based on the average signal delay experienced by transit vehicles on each approach. The City Target TLOS is 'D'.

The results of the analysis indicate that the average signal delay at the intersection complies with the TLOS target.

Truck

The Truck LOS (TKLOS) is based on the right-turn radii, as well as the number of receiving lanes for vehicles making a right-turn from the traffic lane being analyzed. The City of Ottawa target for TKLOS is 'E'.

The results of the analysis indicate that the intersection will meet its TkLOS targets, provided the effective right-turn turning radius on all approaches is greater than or equal to 10m. As this junction is an arterial-collector intersection, this minimum radius is expected to be met.

The recommended measures listed above are intended only as suggestions to the City on how the MMLOS within the study area could be improved and do not identify measures to be implemented as a direct consequence of this development. The remediation measures described above would improve mobility and comfort for all transportation modes but are not required to safely accommodate the proposed development.

5.10 Geometric Review

The following section provides a review of all geometric requirements for the study area intersections.

5.10.1 Sight Distance and Corner Clearances

The proposed Street 1 access intersection will be located on straight sections of Mer Bleue with no significant horizontal or vertical alignment constraints. Sight distance and corner clearances are therefore not expected to be a concern at this locations.

The future realignment of Mer Bleue and extension of Street 1 is expected to occur beyond the horizon year of this study, therefore it is not within the scope of this TIA.

5.10.2 Auxiliary Lane Analysis

Auxiliary turning lane requirements for all intersections within the study area under Future (2030) Total Traffic conditions are described below.

5.10.2.1 Auxiliary Left-Turn Lane Requirements (Unsignalized Intersections)

Left-turn lane warrants were completed for the following intersections:

- Mer Bleue Road & Street 1
- Mer Bleue Road & Wall Road
- Tenth Line Road & Sweetvalley Drive (S)
- Tenth Line Road & Wall Road

The operating speeds on Mer Bleue Road and Tenth Line Road were assumed to be 60 km/h and 70 km/h, respectively, representing 10 km/h above their posted speed limits.

The results of the left-turn lane warrant analyses are summarised below in **Table 20**. Relevant extracts from the MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads have been provided in **Appendix L**.

Table 20 - Auxiliary Left-Turn Storage Analysis at Unsignalized Intersections

INTERSECTION	APPROACH	VOLUME ADVANCING (V_A)	VOLUME OPPOSING (V_O)	% LEFT TURN IN V_A	MINIMUM RECOMMENDED STORAGE
AM Peak Hour					
Mer Bleue Road & Street 1	SB	303	264	52%	15m
Mer Bleue Road & Wall Road	SB	190	257	4%	-
Tenth Line Road & Sweetvalley Drive (S)	NB	399	470	1% [1]	-
	SB	470	399	6%	-
Tenth Line Road & Wall Road	NB	311	434	4%	-
	SB	434	311	0% [1]	-
PM Peak Hour					
Mer Bleue Road & Street 1	SB	596	243	61%	30m
Mer Bleue Road & Wall Road	SB	263	321	9%	-
Tenth Line Road & Sweetvalley Drive (S)	NB	573	578	2% [1]	-
	SB	578	573	11%	30m
Tenth Line Road & Wall Road	NB	420	456	6%	-
	SB	456	420	0% [1]	-

Notes: [1] Left-turn volume projections well below 5% of approach volumes, therefore no warrant analysis required.

The results of the analyses presented in **Table 20** above indicate that a southbound left-turn lane with a minimum of 30m of storage is warranted at Mer Bleue Road & Street 1 to accommodate total traffic volumes at the study horizon year. The MTS recommended that 60m of storage would be ultimately required at the Mer Bleue Road & Street 1 intersection, therefore it is recommended that a southbound left-turn auxiliary lane with a minimum of 60m of storage be implemented at this intersection to accommodate the proposed development and subsequent phases.

- An RMA for the intersection of Mer Bleue & Street 1 is required, however it is assumed this will be undertaken in conjunction with the adjacent Summerside West as part of the Street 1 construction and outside of the development limits of this application.

It should be noted as well that a 30m southbound left-turn auxiliary lane is warranted at the intersection of Tenth Line Road & Sweetvalley Drive (S) under Future (2030) Background and Total Traffic conditions, provided it remains as an unsignalized intersection. As site-generated traffic volumes are not expected to contribute to this movement, the requirement is entirely a result of background traffic volumes from the Minto Vista development on the east side of Tenth Line Road and therefore is not required to support the demands of the proposed development.

5.10.2.2 Auxiliary Left-Turn Requirements (Signalized Intersections)

A review of auxiliary left-turn lane storage requirements was completed at all signalized intersections within the study area under Future (2030) Total Traffic conditions. The review compared the projected 95th percentile queue lengths from the Synchro analysis operational results, and the standard queue length calculation based on the following equation:

$$Storage\ Length = \frac{NL}{C} \times 1.5$$

Where:
N = number of vehicles per hour
L = Length occupied by a vehicle in the queue = 7 m
C = number of traffic signal cycles per hour = 3600s / cycle length

In accordance with Appendix C of the TIA Guidelines, a 45%/55% distribution of traffic between lanes was assumed for double left-turn lanes.

The widening of Mer Bleue Road through Renaud Road and its upgrade to a signalized intersection will be completed as a City initiative through Development Charges funding.

The results of the auxiliary left-turn lane analysis are summarized in **Table 21** below.

Table 21 - Auxiliary Left-Turn Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	95TH %ILE QUEUE LENGTH (m)	CALCULATED QUEUE LENGTH (m)	MINIMUM RECOMMENDED STORAGE (m)
Mer Bleue Road & Renaud Road	NB	14.5	16.1	20
	EB	36.2 (D)	34.2 (D)	35 (D)

(D) = Double-Left Auxiliary Turn Lane.

As indicated in **Table 21** above, queuing analysis under Future (2030) Total Traffic conditions indicates that minimum storage required to accommodate proposed development traffic volumes are a northbound left-turn lane with 15m of storage and a double eastbound left-turn lane with 35m of storage.

The Mer Bleue Expansion Master Transportation Study (MTS) did not recommend minimum storage lengths for the intersection of Mer Bleue Road & Renaud Road. Supplementary analysis was therefore undertaken based on the MTS 2031 Total Traffic conditions with the widening of Mer Bleue Road from two to four lanes carried through its intersection with Renaud Road. This supplementary analysis is summarized in **Table 22** below.

Table 22 – MTS Auxiliary Left-Turn Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	95TH %ILE QUEUE LENGTH (m)	CALCULATED QUEUE LENGTH (m)	MINIMUM RECOMMENDED STORAGE (m)
Mer Bleue Road & Renaud Road	NB	15.6	27.5	30
	EB	83.0 (D)	81.7 (D)	85 (D)

(D) = Double-Left Auxiliary Turn Lane.

As per the results of the queue length analyses presented above, it is recommended that the Mer Bleue Road & Renaud Road intersection be designed to accommodate at least 30m and 85m of storage for the northbound left-turn lane and eastbound double left-turn lanes, respectively. Based on the analysis conducted for this study, these storage lengths are anticipated to provide sufficient storage to accommodate the subject development, as well as, future adjacent developments within the Mer Bleue Expansion Area.

As the upgrade of the Mer Bleue Road & Renaud Road is a City initiative, an RMA is not required as part of this TIA submission to support the modifications outlined above.

5.10.2.3 Auxiliary Right-Turn Lane Requirements (Unsignalized Intersections)

The Transportation Association of Canada (TAC) suggests that auxiliary right-turn lanes 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.

Although the northbound approach at Mer Bleue & Wall Road technically meets these criteria under Existing (2019) Traffic conditions, a right-turn lane is not recommended, as Wall Road east of Mer Bleue will be downgraded to a local road within the foreseeable future. Further, the proposed development is not expected to contribute significantly to this movement during either the weekday morning or afternoon peak hours.

The southbound right-turn volume at Tenth Line & Wall is presently in the order of 90 vehicles during the weekday morning peak hour, which constitutes approximately 28% of the approach volume, therefore a right-turn lane should be considered at this location. Site-generated traffic volumes in the order of 35 and 70 additional vehicles per hour are anticipated to make this movement during the morning and afternoon peak hours, respectively.

Consideration of TAC design standards indicates a potential need for a southbound right-turn taper with no parallel section to accommodate Phase 1 traffic at the Tenth Line & Wall intersection. It should be recognized, however, that with the relatively low southbound through volumes at the study horizon year (less than 350 vehicles per hour), omitting this southbound right-turn taper is not expected to result in hazardous operating conditions within the timeframe of this study. It is instead recommended that a southbound right-turn lane or taper be considered when Tenth Line is widened to four lanes through Wall Road, which is expected soon after full build-out of the Phase 1 development.

Based on the traffic volumes developed for this study, no additional right-turn facilities are required as a result of projected background or site-generated traffic volumes.

5.10.2.4 Auxiliary Right-Turn Lane Requirements (Signalized Intersections)

Similarly, for signalized intersections Section 9.14 of TAC suggests that auxiliary right-turn lanes should be considered when more than 10% of vehicles on an approach are turning right and when the peak hour demand exceeds 60 vehicles. The purpose of this guideline is to mitigate operational impacts to through-traffic, particularly on high-speed or high-volume arterial roadways, and may not be applicable in all circumstances.

The results of the auxiliary right-turn lane analysis are summarized in **Table 23** below:

Table 23 – Auxiliary Right-Turn Lane Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	PERIOD	RIGHT TURN VOLUME	APPROACH VEHICLES TURNING RIGHT (%)	95TH %ILE QUEUE LENGTH (m)	MINIMUM RECOMMENDED STORAGE (m)
Mer Bleue Road & Renaud Road	SB	AM	319	54%	8.4	15
		PM	330	35%	9.6	

Based on the analysis presented in **Table 23** above, a southbound right-turn lane with at least 15m of storage will be required in the signalized design of the Mer Bleue Road & Renaud Road intersection to accommodate a queue of up to two vehicles.

A review of the MTS right-turn lane analyses indicates that at least 25m of storage length is ultimately required to accommodate the development of the Mer Bleue Expansion Area. It is therefore recommended that the City incorporate a southbound right-turn lane with at least 25m of storage Mer Bleue Road and Renaud Road.

5.11 Summary of Recommended Improvements

Based on the intersection capacity, Multi-Modal Level of Service and auxiliary lane analysis results presented above, off-site improvements to the adjacent road network have been recommended in order to accommodate multi-modal demands of both background and site-generated traffic.

A summary of modifications required to accommodate Phase 1 traffic in comparison to the overall traffic generation associated with the Mer Bleue Urban Expansion Area from the MTS are shown in **Table 24** below.

Table 24 – Comparison of Recommended Intersection Modifications (Phase 1 vs. MTS)

INTERSECTION	PHASE 1 BUILDOUT (2025)	MER BLEUE MTS (ULTIMATE)	MODIFICATIONS REQUIRED BY 2025
Mer Bleue Road & Renaud Road [1]	Traffic Signals 20m NBL 35m 2xEBL 15m SBR	Traffic Signals 30m NBL 85m 2xEBL 25m SBR	Traffic Signals 30m NBL 85m 2xEBL 25m SBR
Mer Bleue Road & Street 1	30m SBL	60m SBL	60m SBL
Mer Bleue Road & Wall Road	-	-	None Required
Tenth Line Road & Sweetvalley Drive (S) [2]	-	-	30m SBL

[1] Intersection upgrade is a City initiative. Modifications not triggered solely by Phase 1 or MTS development traffic.
[2] *Tenth Line Road & Sweetvalley Drive (S) was identified as requiring a 30m southbound left-turn lane to accommodate development from the Minto Vista (formerly Avalon Isgar) development. This modification is not required to accommodate traffic demand from the Phase 1 development.*

As indicated in **Table 24** above, an RMA for the intersection of Mer Bleue & Street 1 is required, however it is assumed this will be undertaken in conjunction with the adjacent Summerside West as part of the Street 1 construction and outside of the development limits of this application.

As discussed previously, a southbound right-turn taper was identified as a potential interim off-site road modification which could be required prior to the widening of Tenth Line through its intersection with Wall Road. Upon further review of the relatively low southbound through volumes at this intersection in combination with the Tenth Line widening, which is expected to occur soon after full build-out of the proposed development, this auxiliary taper is not expected to be required to safely accommodate future traffic volume projections for this intersection. The need for this auxiliary lane, however, should be a design consideration in the 4-lane widening of Tenth Line Road to accommodate the ultimate traffic demands indicated in the MTS.

Details regarding the performance of each study area intersection are provided below:

5.11.1 Mer Bleue Road & Renaud Road

The intersection capacity analysis results indicate that traffic signals at the Mer Bleue & Renaud intersection are expected to be operationally-required under Future (2025) Background Traffic conditions and warranted shortly thereafter under interpolated 2028 background conditions. With the addition of site-generated traffic, the intersection is expected to meet the signal warrants under 2026 Total Traffic conditions. Consistent with the Mer Bleue Expansion Master Transportation Study (MTS), it is recommended that, upon signalization, the intersection is designed to include

an eastbound double left-turn lane, northbound left-turn lane and southbound right-turn lane, as well as necessary features to support high Levels of Service for all travel modes.

The auxiliary lane analysis indicates that, in order to accommodate total traffic volumes, the northbound left-turn lane and eastbound double left-turn lanes should provision for at least 15m and 35m of storage, respectively, while a minimum of 15m of storage should be provided for the southbound right-turn lane. Supplementary analysis undertaken using the MTS 2031 traffic projections indicate that, ultimately, a minimum of 30m and 85m of storage should be provided for the northbound and eastbound left-turn lanes, respectively, while a minimum storage length of 25m should be provided for the southbound right-turn lane.

Based on the MMLOS analysis, in order to meet the Pedestrian Level of Service (PLOS) and Bicycle Level of Service (BLOS) targets various measures must be implemented. To attain the PLOS target, zebra stripe high-visibility crosswalk markings as well as a pedestrian leading interval and median are required on the eastbound approach. The implementation of pocket bike lanes on the southbound and eastbound approaches as well as two-stage left-turn bike boxes on the northbound and eastbound approaches are required in order to meet the BLOS targets. Alternatively, design of the intersection as a 'protected intersection' will help attain the PLOS and BLOS targets.

As the upgrade of Mer Bleue Road & Renaud Road is a City initiative, an RMA is not required as part of this TIA submission to support the modifications outlined above.

5.11.2 Mer Bleue Road & Street 1

The analysis undertaken for this study indicates that the Mer Bleue & Street 1 intersection will operate at an acceptable Level of Service as a two-way stop-controlled intersection through to the 2030 study horizon. A southbound left-turn lane with at least 30m of storage is warranted at the intersection to accommodate Phase 1 site-generated traffic volumes. The MTS indicates that, ultimately, a southbound left-turn lane with a minimum of 60m of storage will be required when the intersection is signalized in the future. It is assumed that a functional design of this intersection will be undertaken in conjunction with the westernmost segment of Street 1 to support the Summerside West development and therefore RMA materials are not included in this TIA submission.

5.11.3 Mer Bleue Road & Wall Road

The intersection is expected to operate at an acceptable Level of Service (LOS 'D' or better) beyond the 2030 study horizon with its current configuration. Although potentially warranted, a northbound right-turn lane is not recommended at this intersection as Wall Road will be realigned in the future and the existing western portion of Wall Road will be downgraded to a local road. Following the realignment, it is expected that there will be a decrease in traffic volumes on the existing western portion of Wall Road. Based on the analysis conducted for this study, no modifications to this intersection are necessary.

5.11.4 Tenth Line Road & Sweetvalley Drive (S)

The addition of site-generated traffic to the Tenth Line Road & Sweetvalley Drive (S) intersection may cause the intersection to operate at LOS 'E' by 2025 and remain at that LOS beyond the 2030 horizon year. Sensitivity analysis indicates that a reduction in traffic in the order of 39 vehicles per hour per direction, representing 7% to 9% of mainline through volumes, will permit the intersection to operate at LOS 'D' under Future (2030) Total Traffic conditions. Therefore, no change in intersection control is required to support the proposed development. Following the four-lane widening of Tenth Line Road, it is expected that this intersection will resume operating at an

acceptable Level of Service (i.e. LOS 'D' or better) as an unsignalized intersection. The widening of Tenth Line Road may potentially occur as early as 2025.

Following the four-lane widening of Tenth Line Road, traffic signal warrants and operational review suggest that the intersection configuration could maintain two-way stop-control on the eastbound and westbound approaches, however the City should consider signalization for safety reasons once widened to four lanes.

A 30m southbound left-turn lane is warranted at this intersection under Future (2030) Total Traffic conditions. It should be noted, however, that site-generated traffic volumes do not contribute to this movement and this requirement is entirely due to background traffic volumes. As such, an RMA will not be required as a direct result of the proposed development traffic contributions.

5.11.5 Tenth Line Road & Wall Road

Tenth Line & Wall Road is expected to approach its theoretical capacity (LOS 'E') as a two-way stop-controlled intersection under Future (2030) Total Traffic conditions. Following the four-lane widening of Tenth Line Road, the intersection is expected to resume operating at an acceptable Level of Service (LOS 'D') with two-way stop-control.

Additional analysis was conducted to determine the magnitude of traffic volume reductions required to achieve acceptable intersection operations (i.e. LOS 'D' or better). This sensitivity analysis indicated that the intersection could operate at LOS 'D' with only minor reductions in mainline through volumes during the critical weekday afternoon peak hour if it were to remain unsignalized. A reduction in the order of 21 vehicles per direction along Tenth Line, equating to approximately 6% mainline through volumes, would be required to achieve this acceptable operating condition. As it is assumed traffic signals will accompany the 4-lane widening of Tenth Line Road, the Level of Service would improve.

The auxiliary lane analysis conducted for this study indicated a potential need for a southbound right-turn taper at the Tenth Line & Wall intersection. Upon further consideration of the low southbound through volumes at the 2030 study horizon year (less than 350 vehicles per hour) and the widening of Tenth Line Road to four lanes planned for implementation soon after full build-out of the proposed development, a southbound right-turn taper is not expected to be required to safely accommodate site-generated traffic volumes at this intersection for phase 1 but should be a design consideration in the future 4-lane widening of this road.

6 Conclusion

The proposed Mer Bleue Phase 1 development is expected to generate up to 709 and 812 two-way person-trips during the weekday morning and afternoon peak hours, respectively. These person-trips were subdivided into *local* trips and *regional* trips, assigned separate mode share targets and trip distributions, consistent with the methodology from the Mer Bleue Expansion Master Transportation Study (MTS). The resulting two-way trip generation is, therefore, 376 and 430 vehicles per hour during the weekday morning and afternoon peak hours, respectively.

The results of the intersection capacity analysis indicate that traffic signals will be operationally required at the Mer Bleue/Wall Road intersection under Future (2025) Background Traffic conditions and warranted shortly thereafter under interpolated 2026 Total and 2028 Background Traffic volumes. The widening of Mer Bleue from two to four lanes through its intersection with Renaud Road, as well as its upgrade to a signalized intersection is a City initiative that will be completed separately from this TIA process to address traffic operational issues that are expected to occur as a result of significant growth within the south Orléans area. These intersection modifications are intended as a long-term solution, therefore auxiliary lane storage requirements were conducted based on full build-out of the Mer Bleue Urban Expansion Area in the MTS. The auxiliary lane analyses indicated a minimum of 30m and 85m of storage are required for the northbound left-turn lane and eastbound double left-turn lane, respectively, as well as at least 25m of storage on the southbound right-turn lane to support full build-out of the Mer Bleue Urban Expansion Area.

Within the 2030 horizon year of this study, the Tenth Line Road & Sweetvalley Drive (S) and Tenth Line Road & Wall Road intersections are expected to operate slightly above acceptable capacity (i.e. LOS ‘E’) during the weekday afternoon peak hour with two-way stop control, provided Tenth Line maintains its two-lane cross-section. Sensitivity analysis conducted at the study horizon year indicated that slight reductions in mainline traffic volumes in the order of 39 vehicles per direction at the intersection of Tenth Line/Sweetvalley Drive (S) and 21 vehicles per direction on Tenth Line/Wall Road would allow LOS ‘D’ to be achieved. It was, therefore, determined that no signalization is required to address capacity concerns at either intersection, even if the scheduled widening of Tenth Line from two to four lanes through the study area does not occur within the timeframe of this study. Although not warranted or operationally required, the City should consider signalization of these intersections upon widening of Tenth Line Road to four lanes for safety reasons.

Multi-Modal Level of Service (MMLOS) analysis was conducted for all existing boundary streets and future proposed signalized intersections to determine the roadway and intersection design elements required for these facilities to help achieve their MMLOS targets. Deficiencies in the MMLOS analyses were identified and mitigation measures were recommended to help bridge the gap between the existing conditions and required targets.

As determined through the queuing analyses, an RMA for the intersection of Mer Bleue & Street 1 is required, however it is assumed this will be undertaken in conjunction with the adjacent Summerside West as part of the Street 1 construction and outside of the development limits of this application.

The auxiliary lane analysis conducted for this study also indicated a potential need for a southbound right-turn taper at the Tenth Line & Wall intersection prior to the implementation of the Tenth Line Road widening. Upon further consideration of the low southbound through volumes at the 2030 study horizon year and the relatively short-term timeframe associated with the Tenth Line widening which is planned for implementation soon after full build-out of the site, however, a southbound right-turn taper is not expected to be required to safely accommodate Phase 1 site-generated traffic volumes at this intersection but should be a design consideration in the future 4-lane widening of this road.

As all background and site-generated traffic impacts will ultimately be addressed through road network modifications, a post-development Monitoring Plan will not be included in this TIA.

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.

Appendix A – City Circulation Comments

Step 1 & 2 Submission (Screening & Scoping) – Circulation Comments & Response

Report Submitted: September 20, 2019
Comments Received: October 1, 2019
Transportation Project Manager: Josiane Gervais

Formatting

- Verify 'List of Figures' reference.
  - **References relating to the 'List of Figures' have been updated.**

Module 2.1 - Existing and Planned Conditions

Element 2.1.1 - Proposed Development

- Missing - Existing land uses or permitted use provisions in the Official Plan, Zoning By-law, etc.
  - **The above noted information has been incorporated into Section 3.1.2.**
- Exhibit 1 and/or Exhibit 2 – Clearly depict all accesses to/from the development (due to the resolution and the overlapping plans, is unclear where the main accesses are into/out of the subdivision). Indicating any restrictions (e.g., full movements, right-in/right-out, turning restrictions, etc.)
  - **The four primary site access intersections considered in this study have been highlighted on Exhibit 2. Each of these intersections will permit full movements. Please refer to Section 3.1.2.**
- Revise Exhibit 1 – Harvest Valley Ave & Tenth Line Ave is a signalized intersection. Revise the context area, the radius depicted is inferior to 1km.
  - **Exhibit 1 has been revised to reflect Harvest Valley & Tenth Line as a signalized intersection, and the radius of the context area has been adjusted. Since Harvest Valley falls within the context area, Section 3.2.1.1 has been updated with a description of this road.**

Element 2.1.2 - Existing Conditions

- Missing - Existing driveways to adjacent developments (both sides of all roads bordering the site) within 200 m of proposed site driveway, indicating the land use associated with the driveway.
  - **Section 3.2.1.2 has been added, describing existing access driveways within proximity to the proposed development.**
- Section 3.2.1.4 – Reference/justify the growth rate applied for the through-volumes to approximate 2019 counts.
  - **The growth rate applied to approximate 2019 counts was 1% per annum along arterial roads, which is consistent with growth rate from the Mer Bleue Expansion Study Area MTS (IBI, 2018). A brief explanation of the growth rate utilized for the development of existing (2019) traffic volumes is provided at the end of Section 3.2.1.4. Further explanation of this growth rate will be provided in the Forecasting section of the TIA as it relates to future conditions.**

Element 2.1.3 - Planned Conditions

- Revise Section 3.3.1.1 - Tenth Line Road widening is presented within Phase 2 (2020-2025) of the TMP.

- **The timing of the Tenth Line Road widening has been corrected to Phase 2 (2020-2025) in accordance with the TMP.**

- Section 3.3.2, Table 3 - Include references of studies (i.e. names, dates of reports, etc.).
  - **References to each of the traffic studies included in Section 3.3.2 have been added.**

Module 2.2 - Study Area and Time Periods

- Section 3.4 – Include Tenth Line Road & Harvest Valley Ave
  - **The traffic analysis results reported in the MTS, which took into consideration of the full build-out of the Mer Bleue Urban Expansion Area, indicated that this intersection would operate well under capacity beyond the 2028 horizon year. As site-generated traffic volumes will only impact through movements along Tenth Line Road at this intersection, and not to any critical turning movements, any added traffic volumes will have little to no impact on the overall operations of the intersection.**
  - **The above explanation has been incorporated into Section 3.4, as justification for not including the Harvest Valley and Tenth Line intersection in the study area.**

- Section 3.4 indicates that the Mer Bleue Expansion MTS assessed the impacts to the greater study area, i.e. intersections along Brian Coburn and Navan Road. Please include relevant supporting portions as references within the appendix of this TIA.
  - **Intersections along Brian Coburn Boulevard and Navan Road are well outside of the 1km Context Area of this study, and even farther removed from the study area established in the Section 3.4 of this report. The MTS shall be referred to for future operating conditions of these corridors.**

Step 3 Submission (Forecasting) – Circulation Comments & Response

Report Submitted: October 21, 2019
Comments Received: November 8, 2019
Transportation Project Manager: Josiane Gervais

Transportation Engineering Services:

- Include the referenced excerpts from the Mer Bleue Expansion Master Transportation Study in an appendix. Assuming that the referenced material supports the projected volumes, resubmission of the Forecasting report is not required.
  - **Appendix F – Mer Bleue Expansion Area Master Transportation Study Extracts has been added to the report which contains both the pages from the MTS describing the development of future background and site-generated traffic volumes, and the pages from the MTS summarizing the Future (2031) Total Traffic intersection capacity analysis results.**
- Ensure that signal warrants are reviewed for all unsignalized intersections in the study area.
  - **Acknowledged. Traffic signal warrants will be completed as part of Step 4 – Analysis.**

Traffic Signal Operations:

- Supporting analysis from MTS should have been provided.
  - **Please see the response to the first comment.**

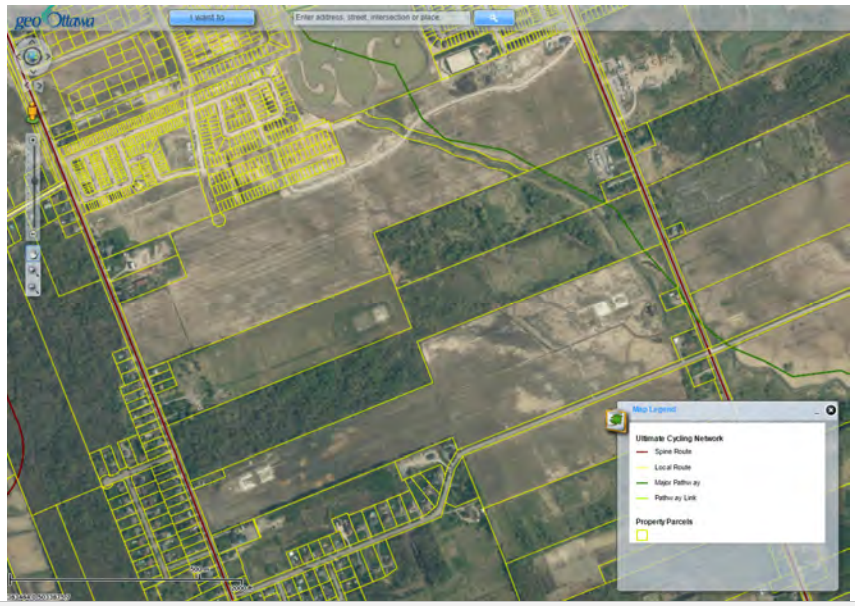
Additional Comments:

- The City's TIA Guidelines indicates the following: "Existing driveways to adjacent developments (both sides of all roads bordering the site) within 200 m of proposed site driveway, indicating the land use associated with the driveway". To clarify, the information to be provided is simply a description of existing accesses/driveways within 200 m of the proposed area and their associated land uses. This section should not include a discussion of the proposed site accesses and/or operational issues related to the proposed accesses. Please revise section 3.2.1.2 of the report accordingly.
  - **Acknowledged. This section will be revised accordingly.**

Appendix B – TIA Screening Form

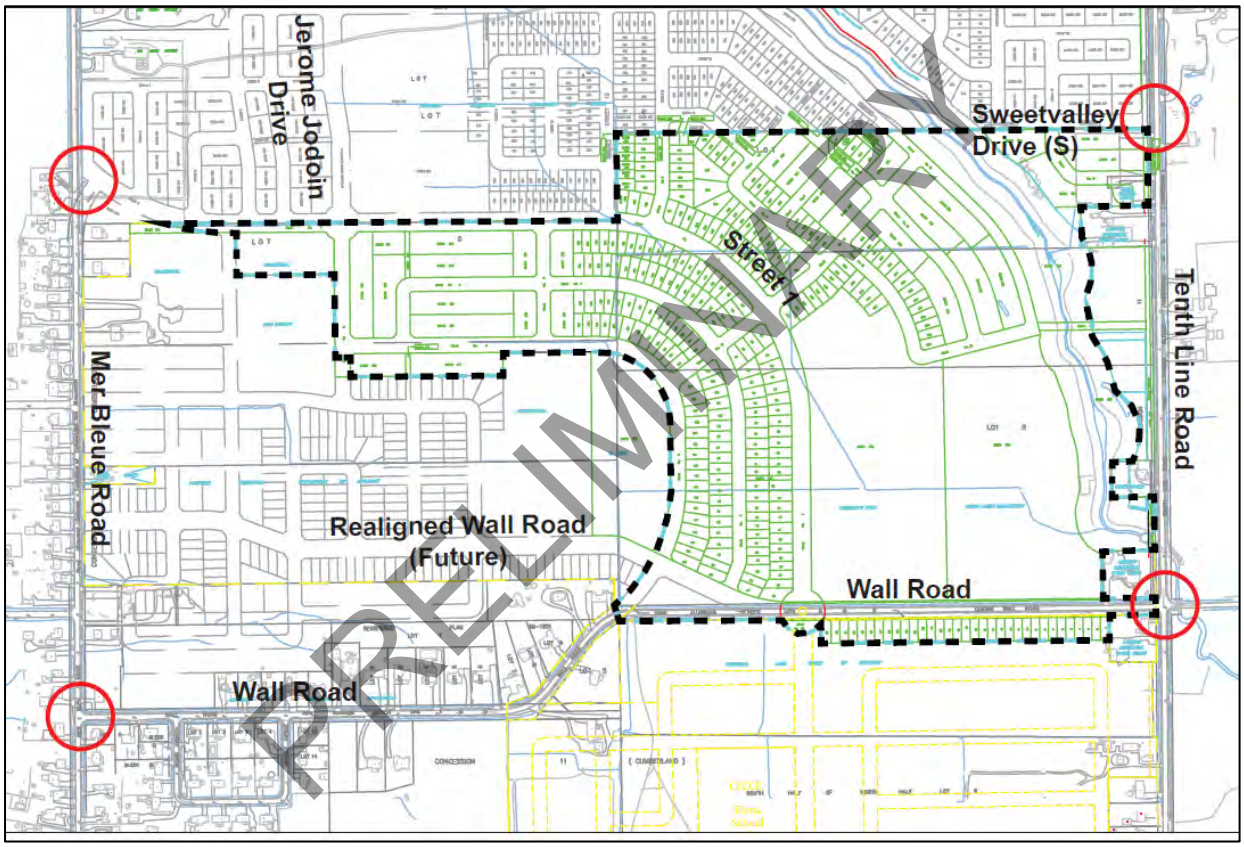
City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	2503 and 2559 Mer Bleue Road and 2666 Tenth Line Road
Description of Location	Orleans – North of Wall Road and between Mer Bleue Road and Tenth Line Road 
Land Use Classification	Single-Detached, Townhomes and Retail
Development Size (units)	274 Single-Detached Units 370 Townhome Units
Development Size (m^2)	2,100 m^2 Retail (assumed)
Number of Accesses and Locations	Two (2) access intersections on Mer Bleue Road Two (2) access intersections on Tenth Line Road One (1) access on Jerome Jodoin Drive
Phase of Development	Phase 1
Buildout Year	2023

If available, please attach a sketch of the development or site plan to this form.

Proposed Development:



2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units ✓
Townhomes or apartments	90 units ✓
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2 ✓
Gas station or convenience market	75 m^2

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

Based on the results above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	✓	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		✓

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

Based on the above, the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		✓
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		✓
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?		✓
Is the proposed driveway within auxiliary lanes of an intersection?		✓
Does the proposed driveway make use of an existing median break that serves an existing site?		✓
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		✓
Does the development include a drive-thru facility?		✓

Based on the results above, the Safety Trigger is NOT satisfied.

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	✓	
Does the development satisfy the Location Trigger?	✓	
Does the development satisfy the Safety Trigger?		✓

CONCLUSION: As one or more of the above triggers has been satisfied, a TIA will be required.

Appendix C – Traffic Data

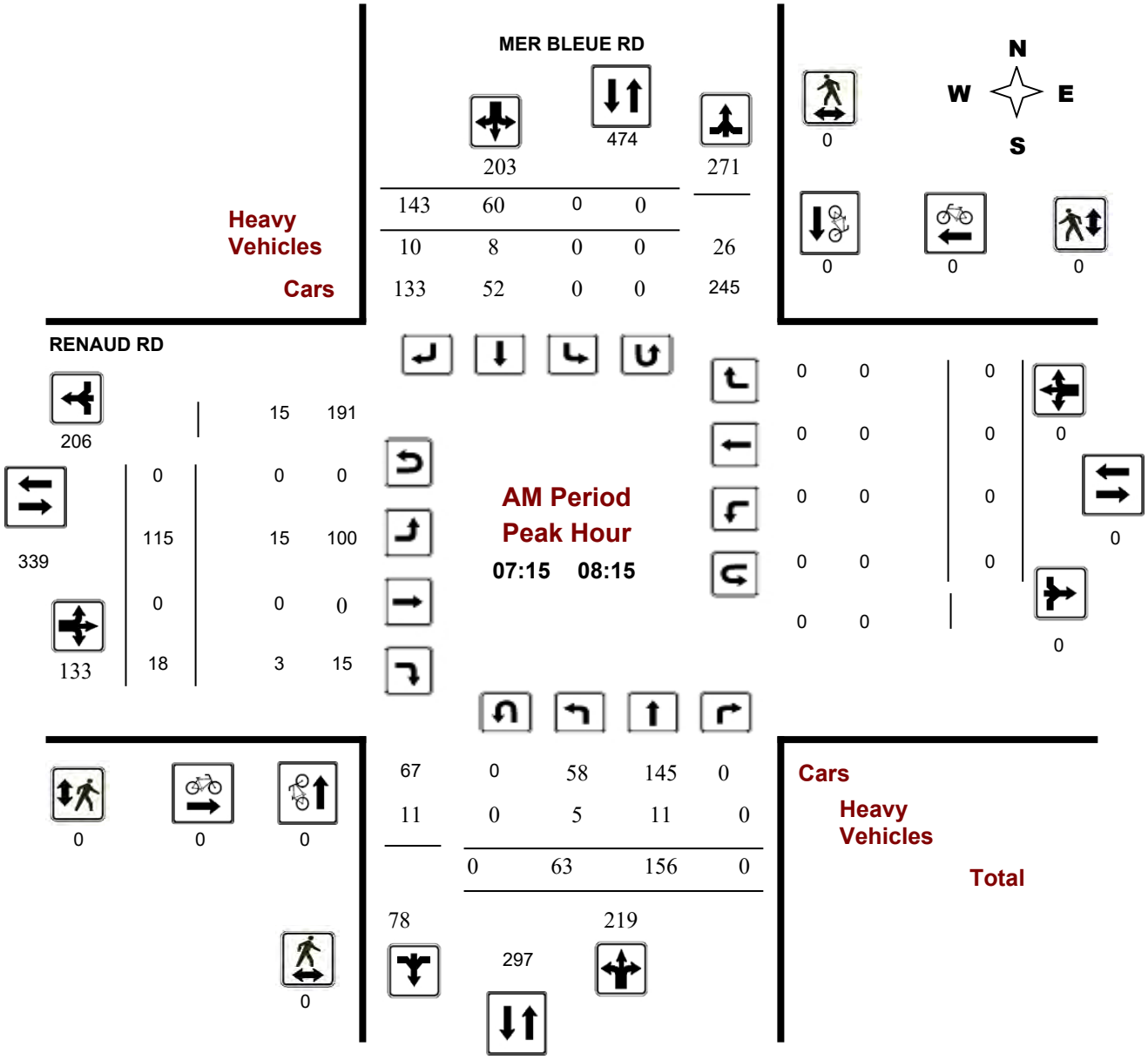
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38121

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



Comments

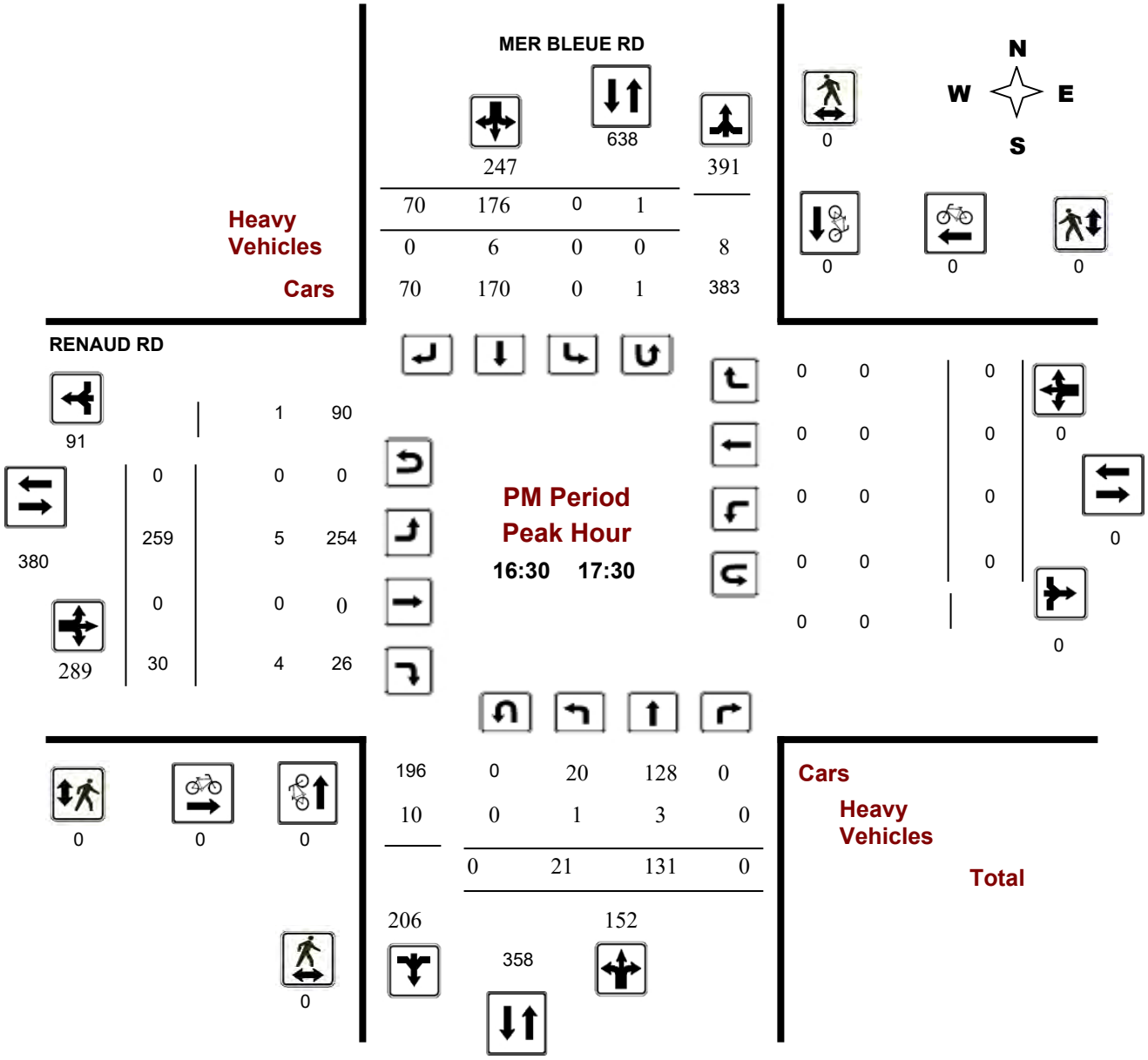
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38121

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



Comments

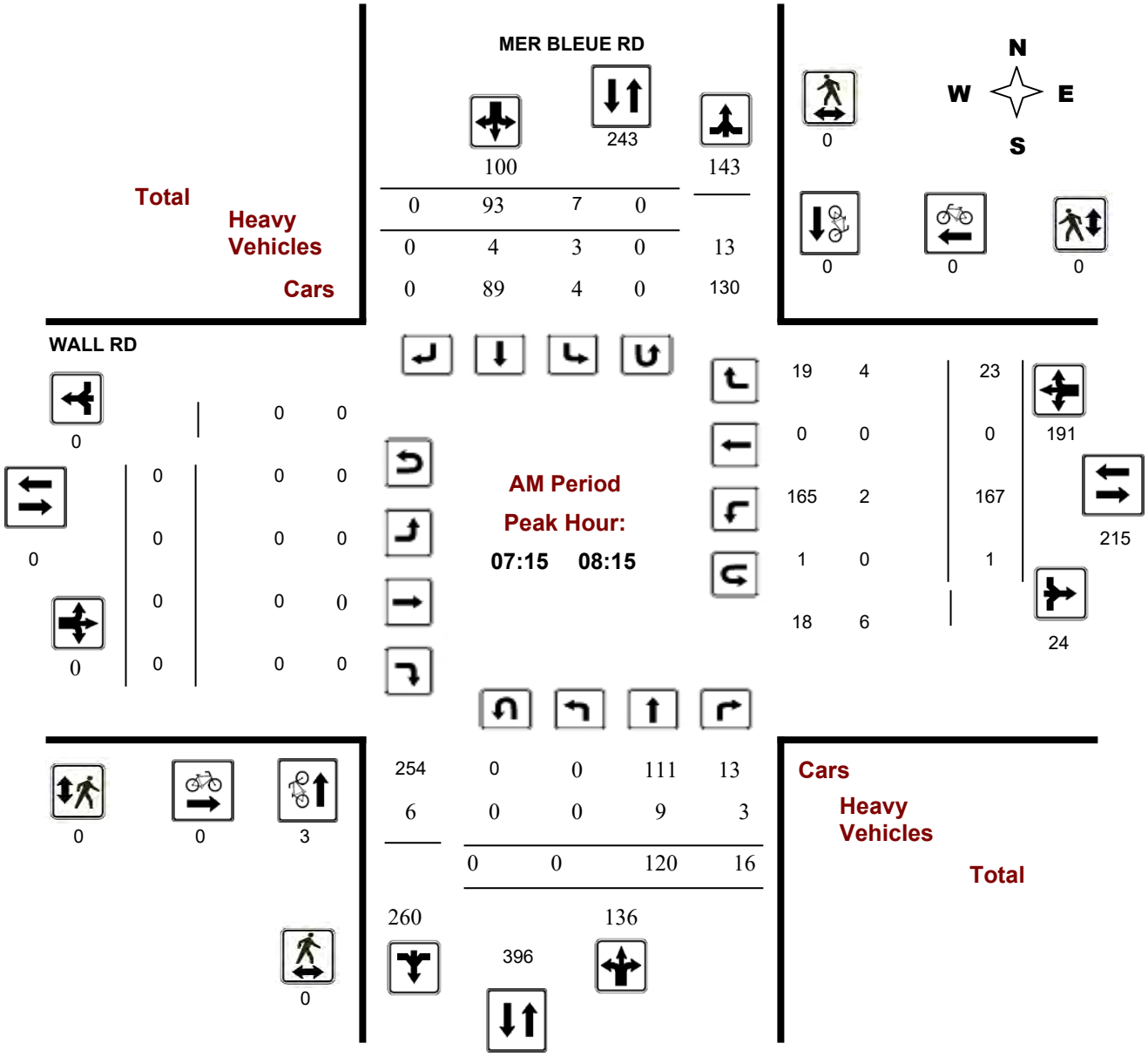
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

MER BLEUE RD @ WALL RD

Survey Date: Thursday, June 15, 2017
Start Time: 07:00

WO No: 37128
Device: Miovision



Comments

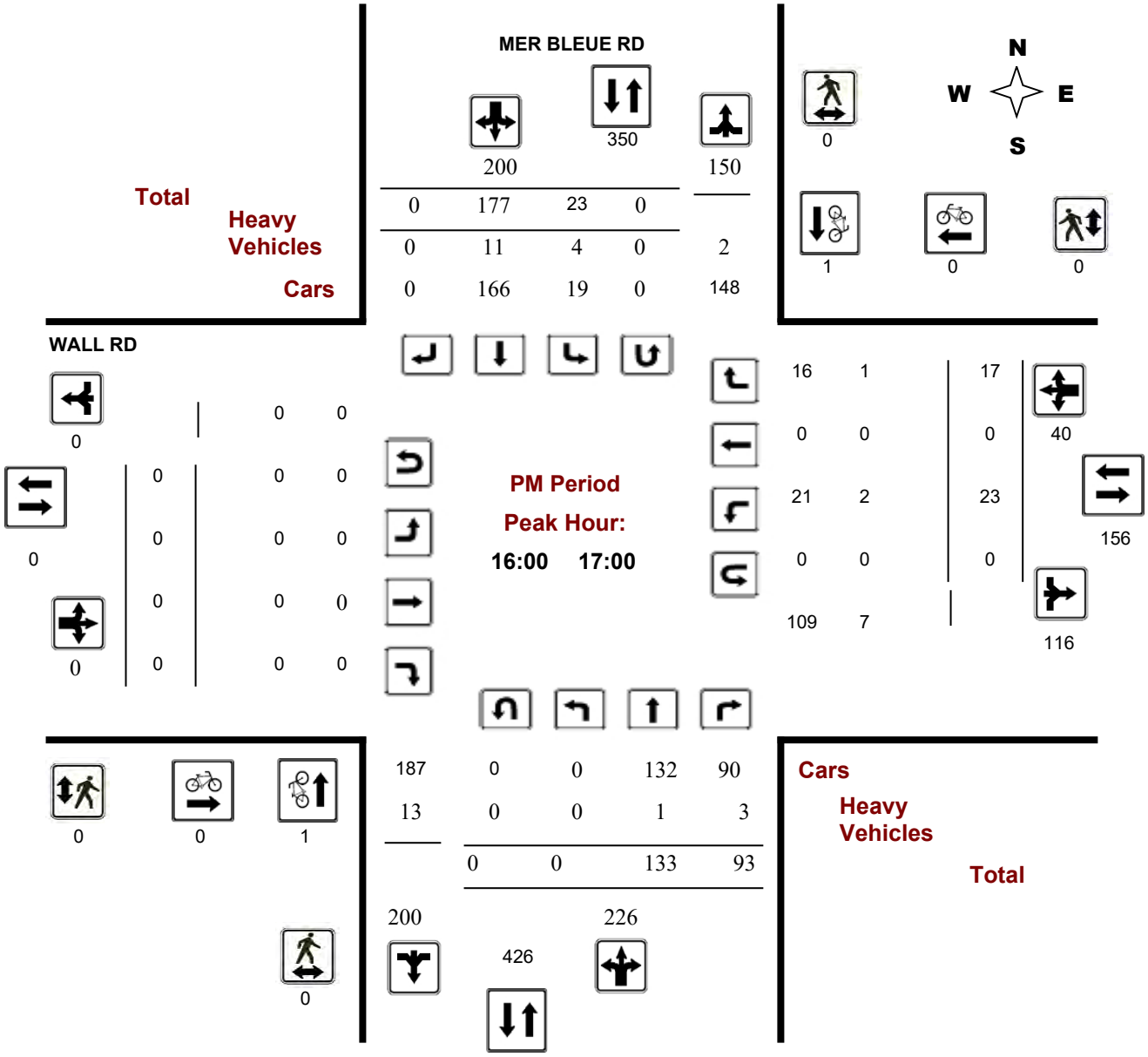
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

MER BLEUE RD @ WALL RD

Survey Date: Thursday, June 15, 2017
Start Time: 07:00

WO No: 37128
Device: Miovision



Comments

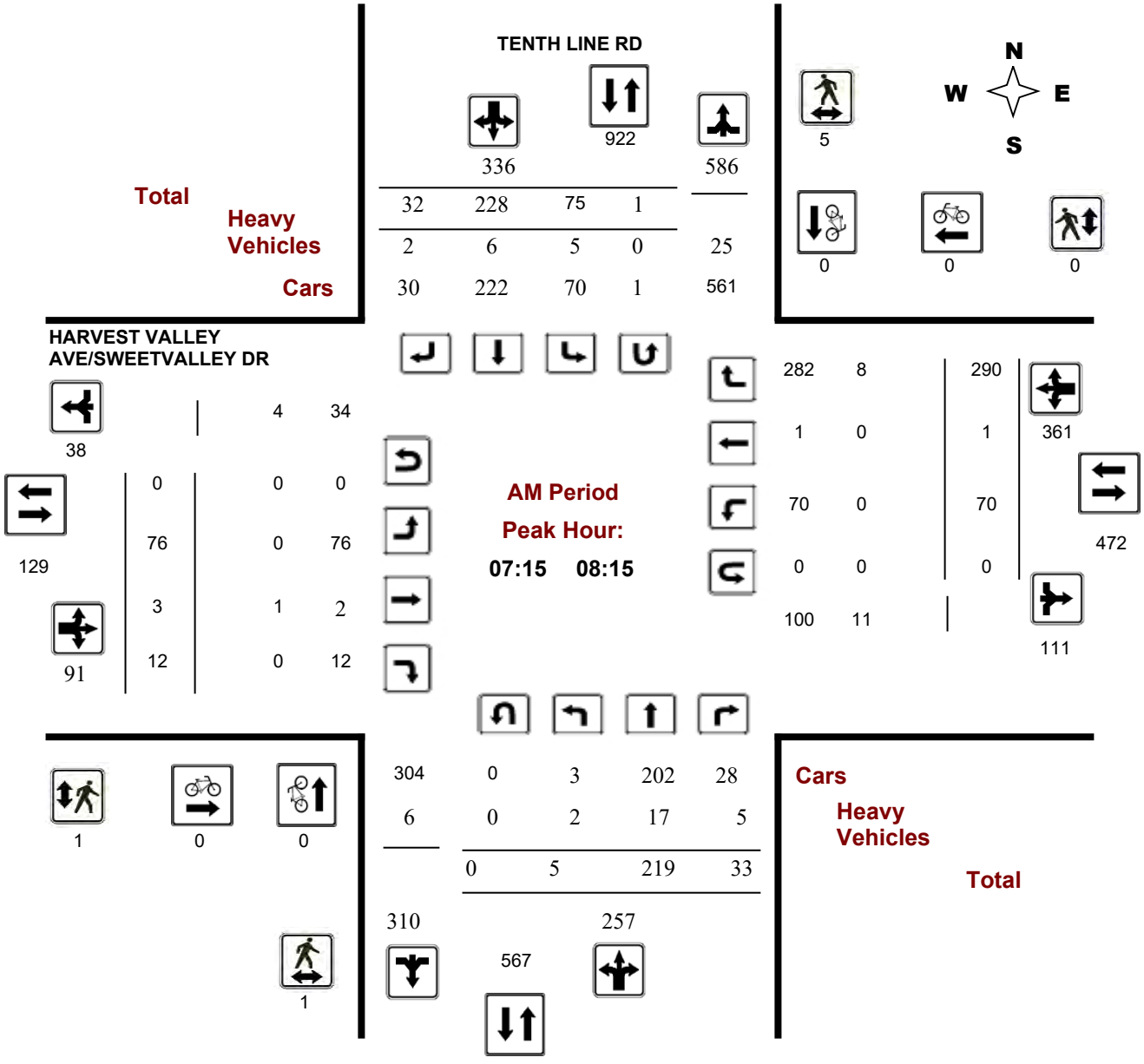
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

HARVEST VALLEY AVE/SWEETVALLEY DR @ TENTH LINE RD

Survey Date: Thursday, April 19, 2018 **WO No:** 37740

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



Comments

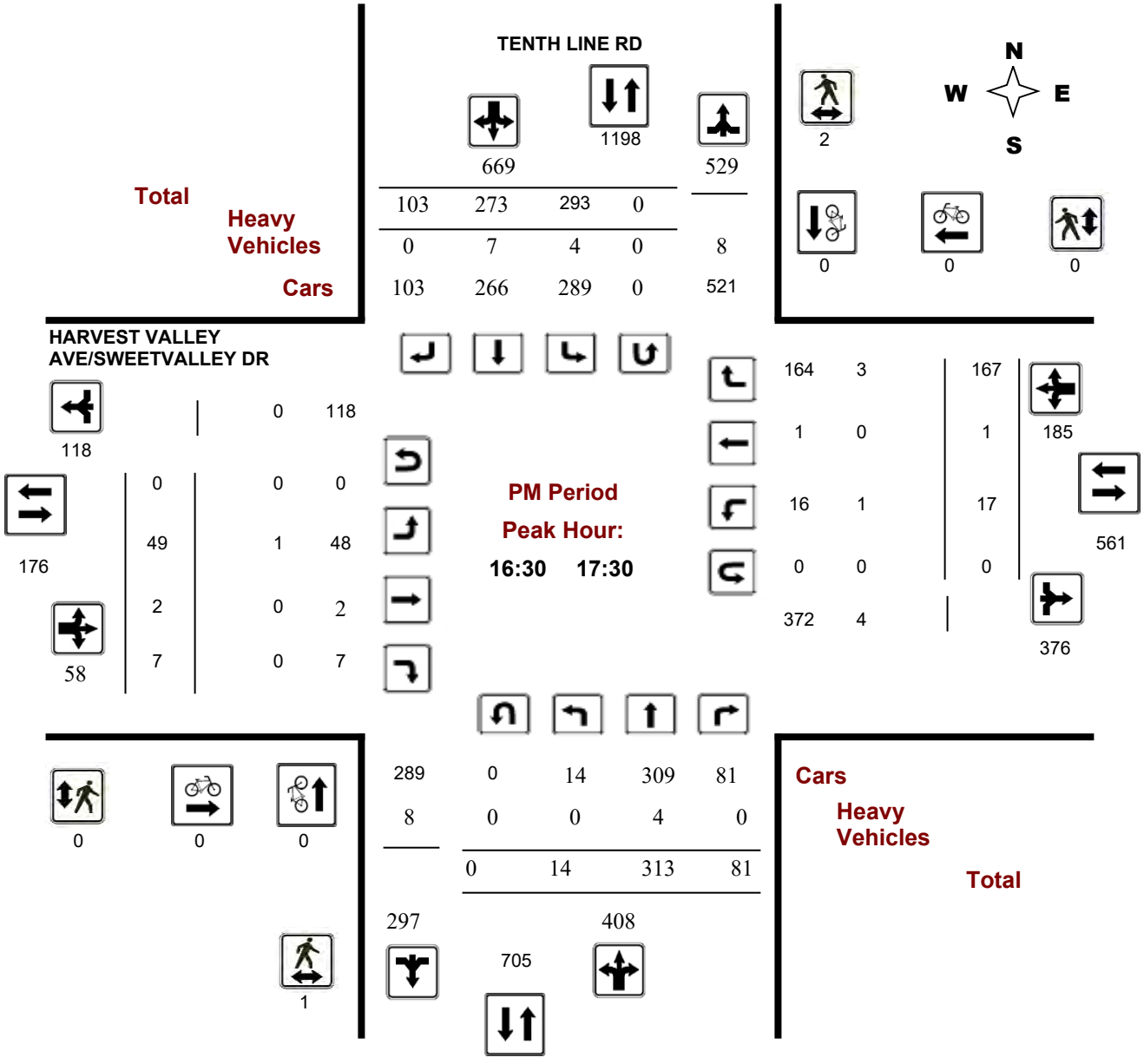
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

HARVEST VALLEY AVE/SWEETVALLEY DR @ TENTH LINE RD

Survey Date: Thursday, April 19, 2018 **WO No:** 37740

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



Comments

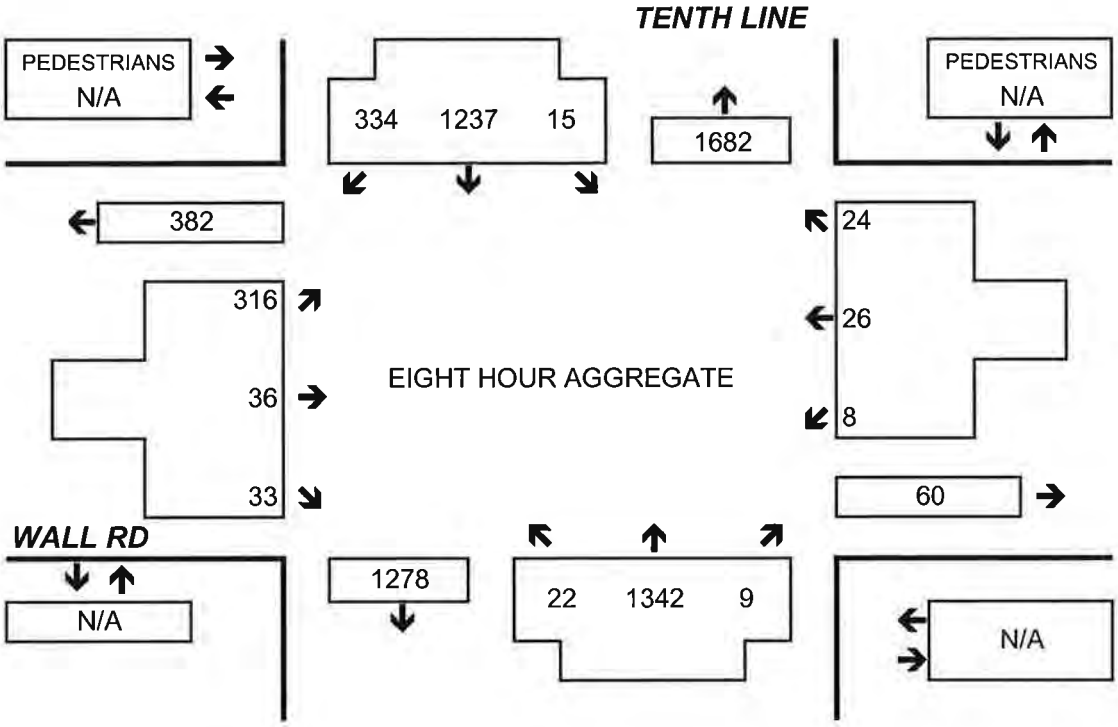
Geospace Research Associates

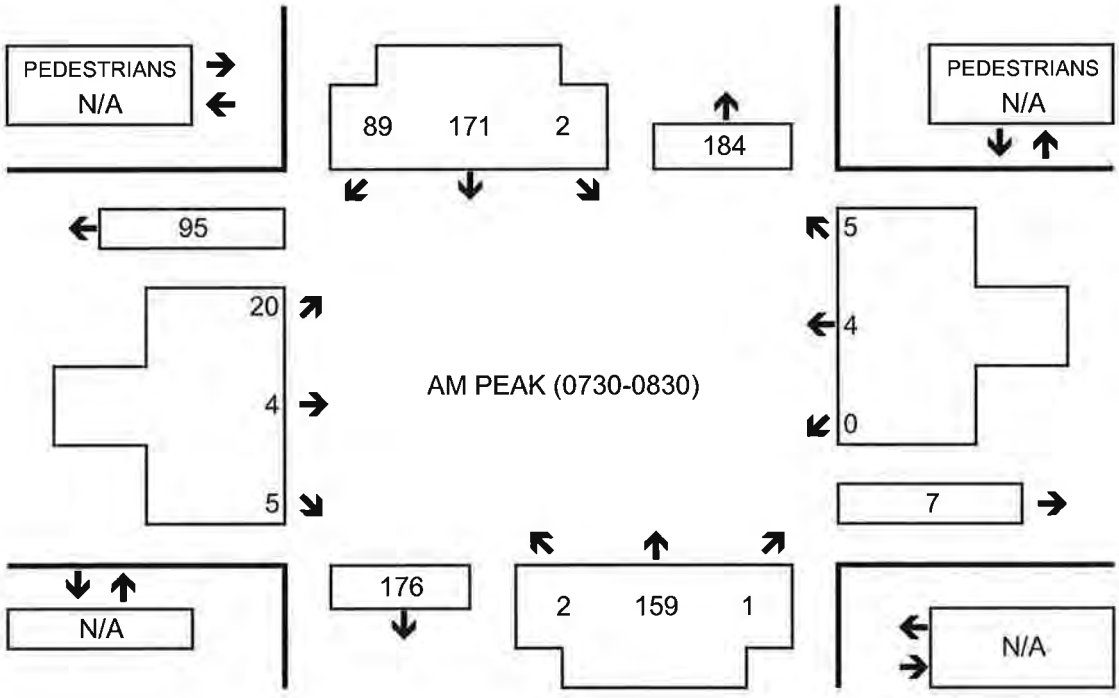
Urban and Regional Geographers. 491 Edgeworth Avenue, Ottawa, Ontario. K2B 5L2

TENTH LINE RD. AND WALL RD.

N

Turning Movement Survey Date: 09/10/13 **Conditions:** dry **Start Time:** 0700 **Duration**





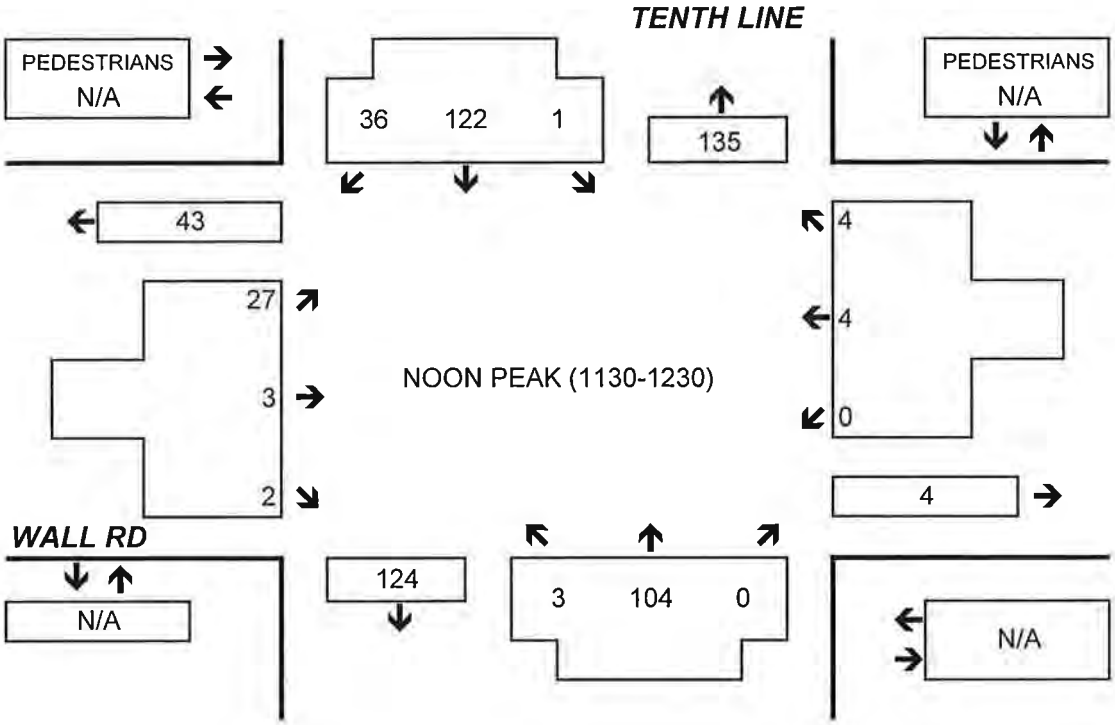
Geospace Research Associates

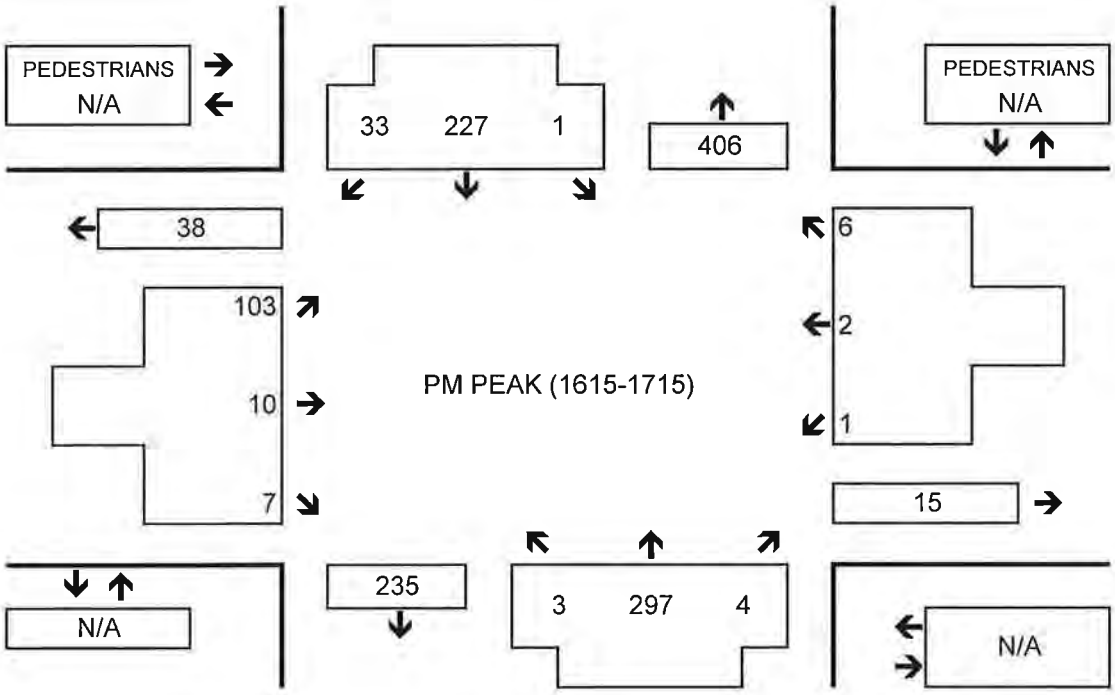
Urban and Regional Geographers. 491 Edgeworth Avenue, Ottawa, Ontario. K2B 5L2

TENTH LINE RD. AND WALL RD.

N

Turning Movement Survey Date: 09/10/13 **Conditions:** dry **Start Time:** 0700 **Duration**





Appendix D – OC Transpo Routes

NEW / NOUVEAU

225 Connexion

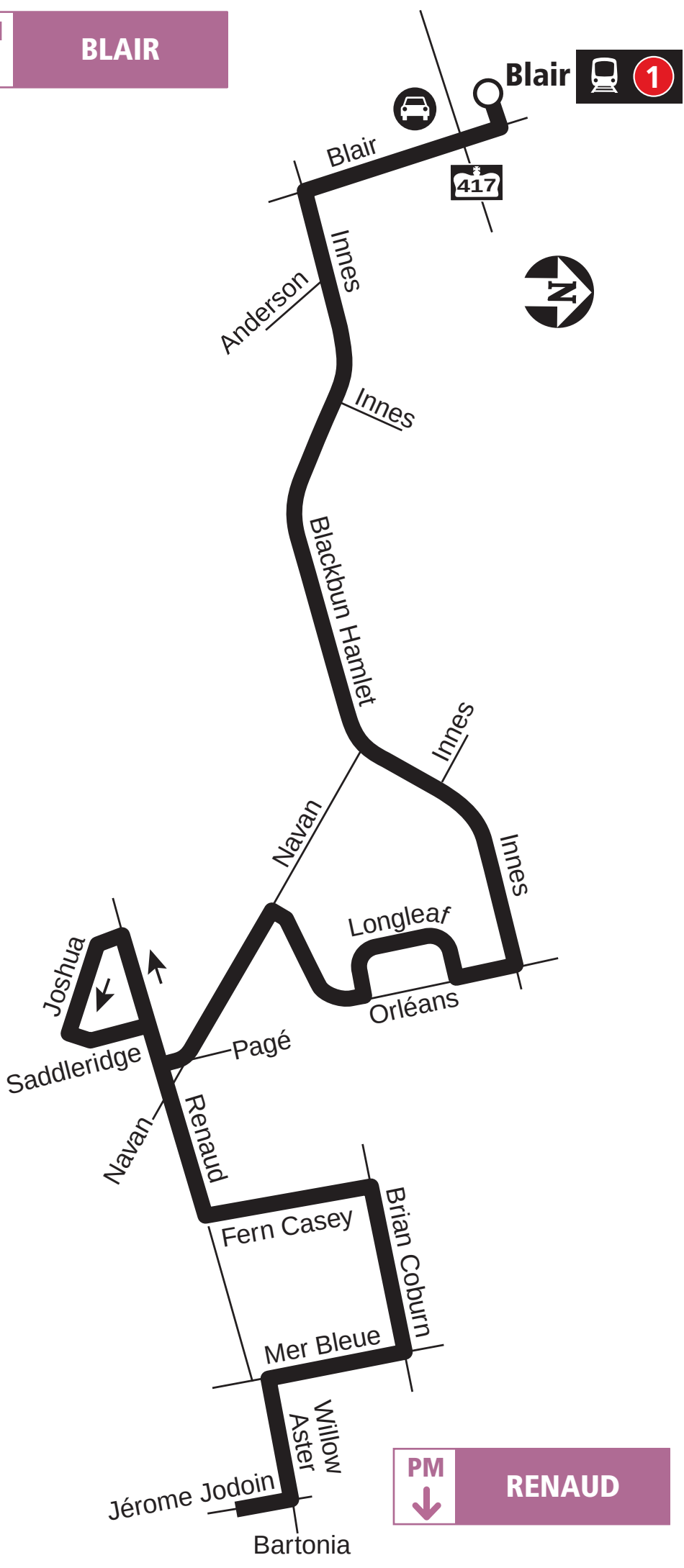
BLAIR
RENAUD

Monday to Friday / Lundi au vendredi

Peak periods only

Périodes de pointe seulement

AM ↑ **BLAIR**



PM ↓ **RENAUD**

○ Transitway Station / Station du Transitway

Park & Ride / Parc-o-bus

2017.12

Schedule / Horaire.....613-560-1000
Text / Texto 560560

plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres

Customer Relations
Service à la clientèle **613-842-3600**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité **613-741-2478**

Effective December 24, 2017
En vigueur 24 décembre 2017

OC Transpo

INFO 613-741-4390
octranspo.com

Appendix E – Collision Data

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: MER BLEUE RD @ WALL 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
2018-Jun-12, Tue,09:56	Clear	SMV other	P.D. only	Loose sand or gravel	South	Turning left	Automobile, station wagon	Skidding/sliding	

Location: MER BLEUE RD btwn 210 S OF INNES RD & RENAUD RD

Traffic Control: No control **Total Collisions:** 6

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Feb-26, Thu,17:06	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Pick-up truck	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Nov-04, Tue,02:18	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Pole (sign, parking meter)	
2014-Sep-23, Tue,20:57	Fog, mist, smoke, dust	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Animal - wild	
2015-Feb-08, Sun,10:53	Snow	Other	P.D. only	Loose snow	North	Going ahead	Pick-up truck	Ran off road	
					North	Going ahead	Pick-up truck	Other motor vehicle	
2016-May-31, Tue,12:02	Clear	Sideswipe	P.D. only	Dry	South	Slowing or stopping	Pick-up truck	Other motor vehicle	
					South	Going ahead	Passenger van	Other motor vehicle	

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: MER BLEUE RD btwn 210 S OF INNES RD & RENAUD RD

Traffic Control: No control **Total Collisions:** 6

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Nov-03, Thu,07:19	Rain	Sideswipe	P.D. only	Wet	North	Slowing or stopping	Pick-up truck	Other motor vehicle	
					North	Turning right	Automobile, station wagon	Other motor vehicle	

Location: MER BLEUE RD btwn DU PALAIS ST & DU DOMAINE ST

Traffic Control: No control **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Apr-16, Thu,11:07	Clear	Sideswipe	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Pick-up truck	Other motor vehicle	

Location: MER BLEUE RD btwn NAVAN RD & MER BLEUE RD

Traffic Control: No control **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-15, Wed,16:39	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	

Location: MER BLEUE RD btwn WALL RD & MER BLEUE RD

Traffic Control: No control **Total Collisions:** 1

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

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: MER BLEUE RD btwn WALL RD & MER BLEUE RD

Traffic Control: No control **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2017-May-17, Wed,17:30	Clear	Rear end	P.D. only	Dry	South	Stopped	Automobile, station wagon	Other motor vehicle	
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

Location: RENAUD RD @ MER BLEUE RD

Traffic Control: Stop sign **Total Collisions:** 3

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Aug-14, Sun,08:47	Clear	SMV other	P.D. only	Dry	East	Turning left	Automobile, station wagon	Ran off road	
2017-Feb-03, Fri,16:33	Clear	Angle	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Mar-02, Thu,16:06	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Unknown	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	

Location: RENAUD RD btwn NAVAN RD & WHITE ST

Traffic Control: No control **Total Collisions:** 8

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

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: RENAUD RD btwn NAVAN RD & WHITE ST

Traffic Control: No control **Total Collisions:** 8

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Feb-18, Wed,10:31	Clear	Angle	Non-fatal injury	Wet	South	Turning left	Pick-up truck	Other motor vehicle	
					East	Going ahead	Delivery van	Other motor vehicle	
2014-May-30, Fri,08:00	Clear	SMV other	P.D. only	Dry	West	Going ahead	Pick-up truck	Animal - wild	
2014-Nov-12, Wed,05:49	Clear	Rear end	P.D. only	Wet	East	Stopped	Automobile, station wagon	Skidding/sliding	
					East	Going ahead	Pick-up truck	Other motor vehicle	
2015-Jun-23, Tue,14:20	Clear	Other	P.D. only	Dry	East	Reversing	Delivery van	Other motor vehicle	
					West	Stopped	Passenger van	Other motor vehicle	
2015-Apr-16, Thu,10:34	Clear	SMV unattended vehicle	P.D. only	Dry	South	Reversing	Truck-other	Unattended vehicle	
2016-Jun-14, Tue,18:59	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
2016-Jul-07, Thu,06:17	Rain	SMV other	P.D. only	Wet	East	Going ahead	Pick-up truck	Animal - wild	

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: RENAUD RD btwn NAVAN RD & WHITE ST

Traffic Control: No control **Total Collisions:** 8

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Mar-14, Wed,06:25	Snow	Angle	P.D. only	Slush	South	Reversing	Farm tractor	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	

Location: RENAUD RD btwn WHITE ST & MER BLEUE RD

Traffic Control: No control **Total Collisions:** 3

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Feb-14, Sat,14:40	Clear	Angle	Non-fatal injury	Loose snow	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Passenger van	Other motor vehicle	
2015-Feb-21, Sat,10:42	Snow	SMV other	P.D. only	Loose snow	East	Going ahead	Automobile, station wagon	Ditch	
2016-Jun-30, Thu,07:01	Clear	Turning movement	P.D. only	Dry	West	Overtaking	Pick-up truck	Other motor vehicle	
					West	Turning left	Pick-up truck	Other motor vehicle	

Location: TENTH LINE RD @ WALL RD

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

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: TENTH LINE RD @ WALL RD

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
2014-Nov-02, Sun,18:44	Clear	Angle	P.D. only	Dry	East	Turning left	Passenger van	Other motor vehicle	
					South	Going ahead	Pick-up truck	Other motor vehicle	
2016-Nov-22, Tue,07:40	Clear	Angle	P.D. only	Slush	East	Turning left	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Passenger van	Other motor vehicle	
2017-Feb-26, Sun,09:15	Clear	Other	P.D. only	Dry	North	Reversing	Police vehicle	Other motor vehicle	
					South	Stopped	Police vehicle	Other motor vehicle	
2017-Nov-09, Thu,15:55	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2018-Jun-26, Tue,17:36	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: TENTH LINE RD btwn HARVEST VALLEY AVE/SWEETVALLEY DR & WALL RD

Traffic Control: No control **Total Collisions:** 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Sep-23, Wed,13:17	Clear	Sideswipe	P.D. only	Dry	South	Unknown	Unknown	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Sep-22, Tue,06:32	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	
					South	Stopped	Passenger van	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	

Location: TENTH LINE RD btwn WALL RD & NAVAN RD

Traffic Control: No control **Total Collisions:** 3

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Oct-26, Mon,14:51	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Turning left	Pick-up truck	Other motor vehicle	
2016-Jun-24, Fri,01:42	Clear	SMV other	P.D. only	Dry	North	Going ahead	Pick-up truck	Ran off road	
2017-Oct-28, Sat,06:00	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Ran off road	

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: WALL RD btwn DENISE AVE & MER BLEUE RD

Traffic Control: No control **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Mar-22, Sat,12:39	Snow	Angle	P.D. only	Slush	North	Reversing	Pick-up truck	Other motor vehicle	
					East	Going ahead	Pick-up truck	Other motor vehicle	

Location: WALL RD btwn MONIQUE AVE & TENTH LINE RD

Traffic Control: No control **Total Collisions:** 4

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-27, Mon,07:51	Snow	Approaching	P.D. only	Packed snow	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Pick-up truck	Other motor vehicle	
2016-Jan-13, Wed,16:45	Clear	SMV unattended vehicle	P.D. only	Wet	North	Reversing	Pick-up truck	Unattended vehicle	
2018-Feb-15, Thu,08:54	Freezing Rain	Approaching	P.D. only	Ice	East	Going ahead	Automobile, station wagon	Skidding/sliding	
					West	Going ahead	School bus	Other motor vehicle	
2018-Aug-11, Sat,21:31	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Ran off road	

Appendix F – Mer Bleue Expansion Area Master Transportation Study Extracts

Future (2031) Total Traffic Results

INTERSECTION	INTERSECTION CONTROL	PEAK HOUR	OVERALL INTERSECTION		CRITICAL MOVEMENTS	
			LOS	V/C RATIO or DELAY	MOVEMENT	V/C RATIO or DELAY
Tenth Line & Navan		PM	B	0.63	-	-
New Collector & Gerry Lalonde (internal)	NEW –Roundabout	AM	A	5.0s	-	-
		PM	A	4.9s	-	-
New Collector & Wall (internal)	NEW –Roundabout	AM	A	4.7s	-	-
		PM	A	4.9s	-	-

Notes:

1. Widening of Brian Coburn Boulevard to four lanes through the intersections of Mer Bleue Road and Tenth Line Road.
2. Addition of auxiliary right-turn lanes at each approach to the Mer Bleue/Brian Coburn roundabout.
3. Modifications to the Tenth Line Road/Brian Coburn Boulevard intersection: double left-turn lanes on each approach; right-turn lanes on the southbound and eastbound approaches.
4. Traffic signals triggered by the planned widening of Tenth Line Road to four lanes from Harvest Valley Drive to Wall Road.

Under 2025 total traffic conditions the modified roundabout at Mer Bleue Road and Brian Coburn Boulevard would continue to operate at acceptable overall levels of service during the morning peak hour but would operate at level service 'E' during the afternoon peak hour.

With the additional traffic generated by the proposed development, the Tenth Line Road/ Wall Road intersection will operate at an acceptable level of service (LOS 'C') during the morning peak hour but will approach its capacity (LOS 'E') as a two-way stop controlled intersection during the afternoon peak hour. Conversion of the intersection to All-Way Stop Control would improve the operating condition to acceptable levels of service—LOS 'B' and 'C', respectively—during the morning and afternoon peak hours.

Future (2031) Total Traffic

Intersection capacity analyses have been undertaken for future (2031) total traffic conditions utilizing the traffic volumes presented in Exhibit 8-7. The arterial road network within the study area is not expected to change since the 2025 analysis year.

TABLE 8-10: INTERSECTION CAPACITY ANALYSIS RESULTS - FUTURE (2031) TOTAL TRAFFIC

INTERSECTION	INTERSECTION CONTROL	PEAK HOUR	OVERALL INTERSECTION		CRITICAL MOVEMENTS	
			LOS	V/C RATIO or DELAY	MOVEMENT	V/C RATIO or DELAY
Mer Bleue & Brian Coburn	Roundabout[1,2]	AM	F	73.1s	WBTL WBT WBR	126.5s 126.5s 194.0s
		PM	F	83.3s	NBTL NBTR SBTL SBTR EBTL EBTR	59.7s 57.5s 110.5s 109.3s 173.7s 171.0s
Mer Bleue & Renaud	Signalized	AM	A	0.51	-	-
		PM	B	0.69	-	-
Mer Bleue & New Collector	WB Stop	AM	D	27.7s	-	-
		PM	F	55.9s	WBR	55.9s
Mer Bleue & New Collector	Signalized	AM	A	0.53	-	-
		PM	A	0.52	-	-
Mer Bleue & Wall (Realigned)	WB Stop	AM	C	21.9s	-	-
		PM	C	19.1s	-	-

INTERSECTION	INTERSECTION CONTROL	PEAK HOUR	OVERALL INTERSECTION		CRITICAL MOVEMENTS	
			LOS	V/C RATIO or DELAY	MOVEMENT	V/C RATIO or DELAY
Mer Bleue & Wall	WB Stop	AM	B	13.4s	-	-
		PM	C	16.0s	-	-
Mer Bleue & Navan	Signalized	AM	A	0.59	-	-
		PM	C	0.74	-	-
Tenth Line & Brian Coburn	Signalized[1,3]	AM	C	0.78	-	-
		PM	C	0.77	-	-
Tenth Line & Zone 3 (N)/Harvest Valley	Signalized[4]	AM	A	0.43	-	-
		PM	A	0.39	-	-
Tenth Line & Zone 3 (S)/Avalon South	Signalized[4]	AM	A	0.17	-	-
		PM	A	0.26	-	-
Tenth Line & Wall	All-Way Stop	AM	D	13.0s	-	-
		PM	C	24.1s	-	-
Tenth Line & Zone 6	EB Stop	AM	B	12.9s	-	-
		PM	C	15.2s	-	-
Tenth Line & Navan	Signalized	AM	A	0.47	-	-
		PM	B	0.66	-	-
New Collector & Gerry Lalonde (internal)	Roundabout	AM	A	5.0s	-	-
		PM	A	5.0s	-	-
New Collector & Wall (internal)	Roundabout	AM	A	4.7s	-	-
		PM	A	4.9s	-	-

Notes:

1. Widening of Brian Coburn Boulevard to four lanes through the intersections of Mer Bleue Road and Tenth Line Road.
2. Addition of auxiliary right-turn lanes at each approach to the Mer Bleue/Brian Coburn roundabout.
3. Modifications to the Tenth Line Road/Brian Coburn Boulevard intersection: double left-turn lanes on each approach; right-turn lanes on the southbound and eastbound approaches.
4. Traffic signals triggered by the planned widening of Tenth Line Road to four lanes from Harvest Valley Drive to Wall Road.

The modified Mer Bleue Road/Brian Coburn Boulevard roundabout is projected to operate above its theoretical capacity during the morning and afternoon peak hours under 2031 total traffic conditions, resulting in average vehicular delays of approximately 73 seconds and 83 seconds, respectively. The eastbound and southbound approaches are the critical movements in the afternoon peak hour with estimated 95th percentile queue lengths of 296 m and 316 m, respectively. These queue lengths are considered to be manageable as they will not spill back to the upstream intersections on these approaches.

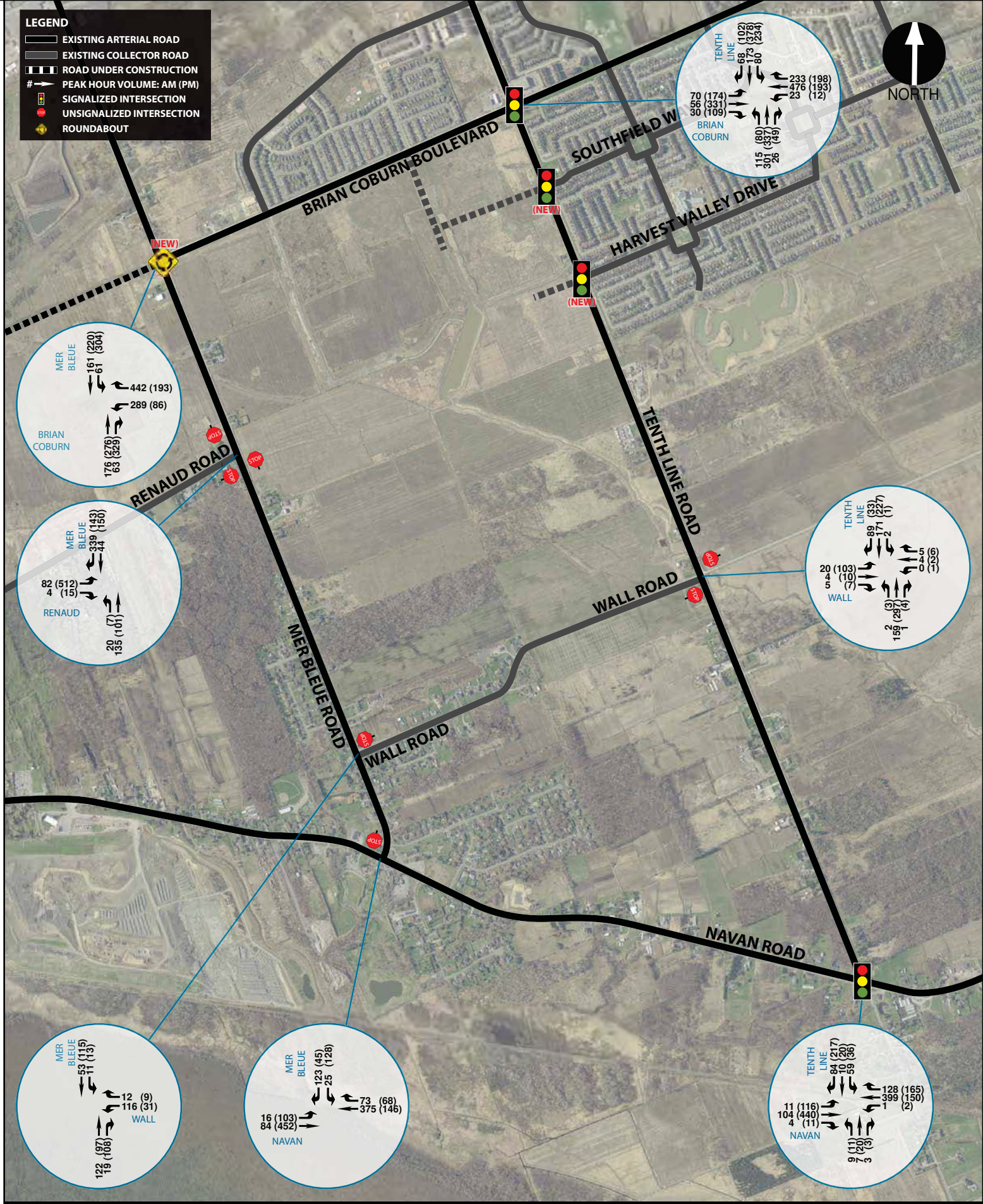
Under 2031 total traffic conditions, the proposed intersection of Mer Bleue and the New Collector Road will operate above capacity—level of service 'F'— during the afternoon peak hour as a stop controlled intersection. Further analysis indicates that the intersection would operate at a high level of service ('A') with traffic control signals in place.

8.5.1 Intersection Capacity Analysis Summary

Mer Bleue Road/Brian Coburn Boulevard

The existing Mer Bleue Road/Brian Coburn roundabout is projected to reach its capacity under 2025 background traffic conditions. Widening of Brian Coburn Boulevard to four lanes and the addition of auxiliary right turn lanes on all approaches to the roundabout will

Future Background & Site-Generated Traffic Sections



IBI

Mer Bleue Expansion
Master Transportation Study

EXHIBIT 4-2:
Existing Traffic

PROJECT No. 34739
DATE: January 2018
SCALE:
0m 200m 500m

Appendix G – 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 (Inside the greenbelt) %▽	Suburban (Outside the greenbelt) Person Trip Rate	Suburban (Outside the greenbelt) %▽	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 (Inside the greenbelt) Transit Share	Urban Area (Inside the greenbelt) Non-Motorised	Suburban (Outside the greenbelt) Vehicle Trips	Suburban (Outside the greenbelt) Transit Share	Suburban (Outside the greenbelt) 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.

Orleans

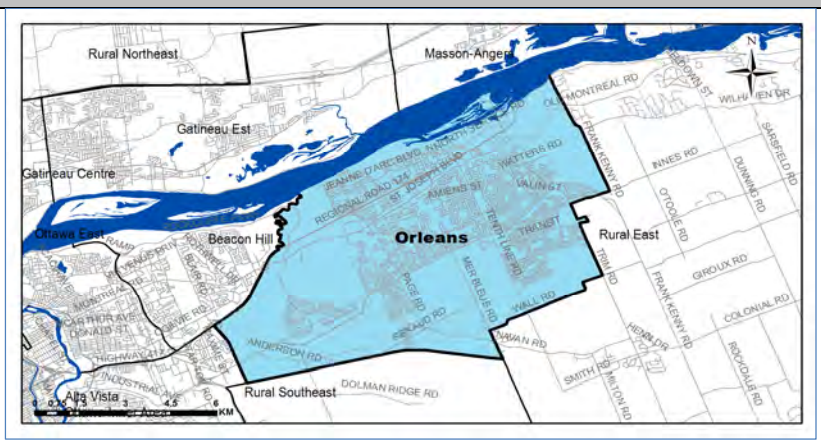
Demographic Characteristics

Population	117,440	Actively Travelled	95,100
Employed Population	57,400	Number of Vehicles	70,160
Households	42,950	Area (km^2)	88.6

Occupation Status (age 5+)	Male	Female	Total
Full Time Employed	27,630	24,540	52,170
Part Time Employed	2,040	3,200	5,240
Student	14,100	14,710	28,800
Retiree	8,240	9,820	18,060
Unemployed	890	790	1,670
Homemaker	110	2,990	3,090
Other	630	1,030	1,660
Total:	53,630	57,060	110,690

Traveller Characteristics	Male	Female	Total
Transit Pass Holders	11,690	13,440	25,130
Licensed Drivers	41,780	42,490	84,270
Telecommuters	270	260	530
Trips made by residents	147,960	163,290	311,250

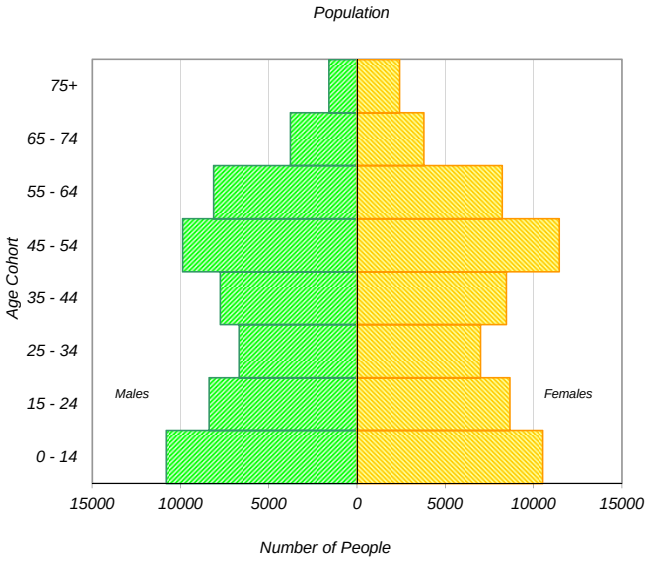
Selected Indicators	
Daily Trips per Person (age 5+)	2.81
Vehicles per Person	0.60
Number of Persons per Household	2.73
Daily Trips per Household	7.25
Vehicles per Household	1.63
Workers per Household	1.34
Population Density (Pop/km2)	1330

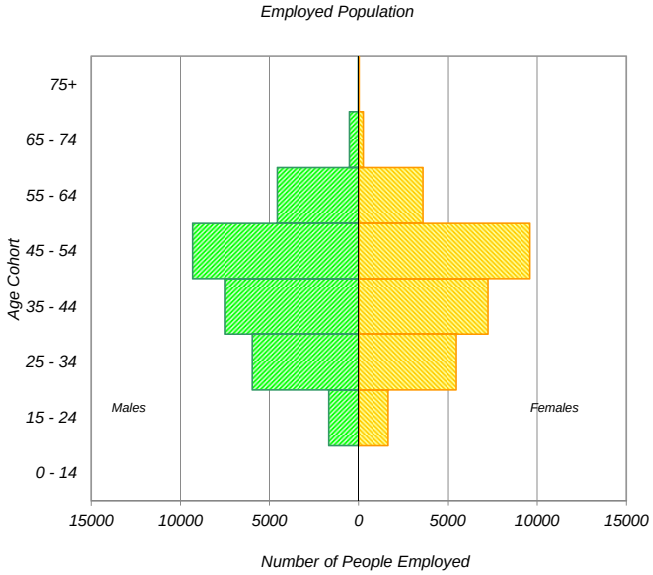


Household Size		
1 person	6,490	15%
2 persons	14,600	34%
3 persons	8,630	20%
4 persons	9,090	21%
5+ persons	4,130	10%
Total:	42,950	100%

Households by Vehicle Availability		
0 vehicles	1,390	3%
1 vehicle	18,250	42%
2 vehicles	19,080	44%
3 vehicles	3,330	8%
4+ vehicles	890	2%
Total:	42,950	100%

Households by Dwelling Type		
Single-detached	25,970	60%
Semi-detached	3,250	8%
Townhouse	10,730	25%
Apartment/Condo	3,010	7%
Total:	42,950	100%



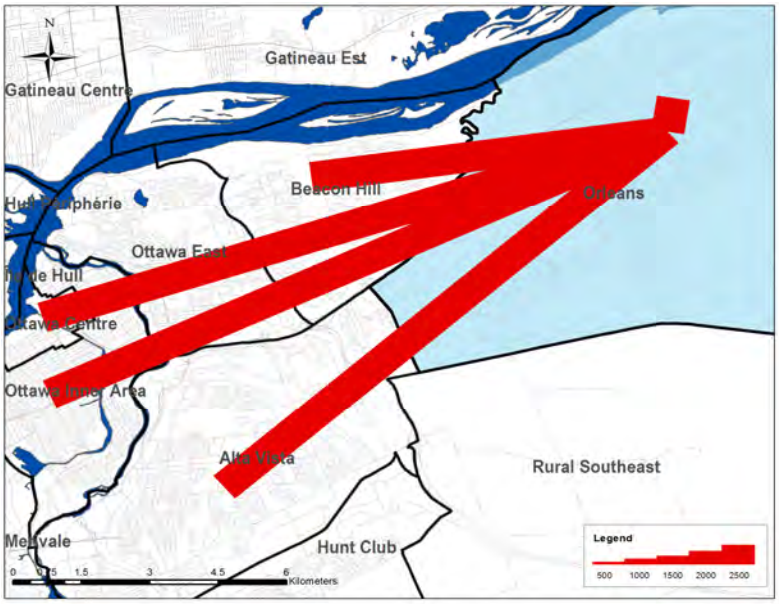


* In 2005 data was only collected for household members aged 11+ therefore these results cannot be compared to the 2011 data.

Travel Patterns

Top Five Destinations of Trips from Orleans

AM Peak Period



Summary of Trips to and from Orleans

AM Peak Period (6:30 - 8:59) Districts	Destinations of Trips From District	% Total	Origins of Trips To District	% Total
Ottawa Centre	7,330	11%	130	0%
Ottawa Inner Area	4,800	7%	630	2%
Ottawa East	2,840	4%	600	2%
Beacon Hill	4,180	6%	760	2%
Alta Vista	5,890	9%	1,050	3%
Hunt Club	950	1%	630	2%
Merivale	1,940	3%	460	1%
Ottawa West	1,460	2%	220	1%
Bayshore / Cedarview	1,210	2%	310	1%
Orléans	29,900	46%	29,900	78%
Rural East	1,000	2%	1,970	5%
Rural Southeast	70	0%	290	1%
South Gloucester / Leitrim	170	0%	50	0%
South Nepean	200	0%	330	1%
Rural Southwest	70	0%	70	0%
Kanata / Stittsvile	500	1%	290	1%
Rural West	70	0%	0	0%
Île de Hull	1,530	2%	80	0%
Hull Périphérie	460	1%	200	1%
Plateau	10	0%	80	0%
Aylmer	60	0%	90	0%
Rural Northwest	50	0%	40	0%
Pointe Gatineau	200	0%	70	0%
Gatineau Est	40	0%	60	0%
Rural Northeast	10	0%	20	0%
Buckingham / Masson-Angers	0	0%	30	0%
Ontario Sub-Total:	62,580	96%	37,690	98%
Québec Sub-Total:	2,360	4%	670	2%
Total:	64,940	100%	38,360	100%

Trips by Trip Purpose

24 Hours	From District		To District		Within District	
Work or related	38,220	40%	7,250	8%	9,470	6%
School	9,890	10%	2,120	2%	15,080	10%
Shopping	7,210	8%	7,770	8%	23,480	16%
Leisure	8,640	9%	6,050	6%	15,650	10%
Medical	2,450	3%	1,950	2%	2,610	2%
Pick-up / drive passenger	6,060	6%	5,730	6%	12,910	9%
Return Home	18,630	20%	60,820	64%	65,050	43%
Other	3,880	4%	2,890	3%	6,970	5%
Total:	94,980	100%	94,580	100%	151,220	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Work or related	25,310	72%	3,910	46%	4,740	16%
School	5,870	17%	1,940	23%	13,930	47%
Shopping	240	1%	240	3%	840	3%
Leisure	470	1%	400	5%	1,190	4%
Medical	560	2%	310	4%	230	1%
Pick-up / drive passenger	1,780	5%	550	7%	4,540	15%
Return Home	210	1%	710	8%	2,160	7%
Other	630	2%	400	5%	2,280	8%
Total:	35,070	100%	8,460	100%	29,910	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Work or related	970	8%	370	1%	660	2%
School	420	3%	10	0%	30	0%
Shopping	1,090	9%	1,910	5%	4,480	13%
Leisure	2,110	17%	1,300	4%	3,470	10%
Medical	250	2%	520	1%	470	1%
Pick-up / drive passenger	1,220	10%	2,850	8%	3,080	9%
Return Home	5,530	46%	26,920	77%	20,320	60%
Other	470	4%	870	3%	1,190	4%
Total:	12,060	100%	34,750	100%	33,700	100%

Peak Period (%)	Total:	% of 24 Hours	Within District (%)
24 Hours	340,780		44%
AM Peak Period	73,440	22%	41%
PM Peak Period	80,510	24%	42%

Trips by Primary Travel Mode

24 Hours	From District		To District		Within District	
Auto Driver	57,110	60%	57,360	61%	82,890	55%
Auto Passenger	14,260	15%	13,790	15%	30,320	20%
Transit	21,040	22%	20,690	22%	6,650	4%
Bicycle	400	0%	400	0%	1,600	1%
Walk	70	0%	30	0%	18,160	12%
Other	2,110	2%	2,320	2%	11,590	8%
Total:	94,990	100%	94,590	100%	151,210	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Auto Driver	19,140	55%	5,160	61%	11,450	38%
Auto Passenger	2,970	8%	1,080	13%	5,840	20%
Transit	12,140	35%	870	10%	2,170	7%
Bicycle	230	1%	0	0%	490	2%
Walk	30	0%	10	0%	4,780	16%
Other	550	2%	1,340	16%	5,170	17%
Total:	35,060	100%	8,460	100%	29,900	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Auto Driver	7,680	64%	19,440	56%	18,250	54%
Auto Passenger	2,580	21%	3,680	11%	7,810	23%
Transit	1,420	12%	11,050	32%	1,130	3%
Bicycle	0	0%	230	1%	380	1%
Walk	0	0%	20	0%	3,660	11%
Other	380	3%	320	1%	2,460	7%
Total:	12,060	100%	34,740	100%	33,690	100%

Avg Vehicle Occupancy	From District	To District	Within District
24 Hours	1.25	1.24	1.37
AM Peak Period	1.16	1.21	1.51
PM Peak Period	1.34	1.19	1.43

Transit Modal Split	From District	To District	Within District
24 Hours	23%	23%	6%
AM Peak Period	35%	12%	11%
PM Peak Period	12%	32%	4%

Appendix H – MMLOS Analyses

Multi-Modal Level of Service - Segments Form

Consultant	**IBI Group**	**Project**	**Mer Bleue Phase 1**
Scenario	**Existing Conditions**	**Date**	**02-Jun-21**
Comments			

SEGMENTS			Mer Bleue Road - Renaud to Wall	Tenth Line - Sweetvalley (S) to Wall	Wall Road - Mer Bleue to Tenth Line	Wall Road - Mer Bleue to Tenth Line	Section	Section	Section	Section	Section
			1	2	3	4	5	6	7	8	9
Pedestrian	Sidewalk Width Boulevard Width	**F**	no sidewalk n/a	no sidewalk n/a	no sidewalk n/a	no sidewalk n/a					
	Avg Daily Curb Lane Traffic Volume		≤ 3000	> 3000	≤ 3000	≤ 3000					
	Operating Speed On-Street Parking		> 50 to 60 km/h no	> 60 km/h no	> 50 to 60 km/h no	> 60 km/h no					
	Exposure to Traffic PLoS		**F**	**F**	**F**	**F**	-	-	-	-	-
	Effective Sidewalk Width		1.2 m	1.2 m	1.2 m	1.2 m					
	Pedestrian Volume		500 ped /hr	500 ped /hr	500 ped /hr	250 ped/hr					
	Crowding PLoS		**B**	**B**	**B**	**B**	-	-	-	-	-
	Level of Service		**F**	**F**	**F**	**F**	-	-	-	-	-
Bicycle	Type of Cycling Facility	**F**	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic					
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total	2-3 lanes total	2-3 lanes total					
	Operating Speed		≥ 50 to 60 km/h	≥ 60 km/h	≥ 50 to 60 km/h	≥ 60 km/h					
	# of Lanes & Operating Speed LoS		**E**	**F**	**E**	**F**	-	-	-	-	-
	Bike Lane (+ Parking Lane) Width										
	Bike Lane Width LoS		-	-	-	-	-	-	-	-	-
	Bike Lane Blockages										
	Blockage LoS		-	-	-	-	-	-	-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge	< 1.8 m refuge	< 1.8 m refuge					
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes					
	Sidestreet Operating Speed		>50 to 60 km/h	>50 to 60 km/h	>50 to 60 km/h	>50 to 60 km/h					
	Unsignalized Crossing - Lowest LoS		**C**	**C**	**C**	**C**	-	-	-	-	-
	Level of Service		**E**	**F**	**E**	**F**	-	-	-	-	-
Transit	Facility Type	**E**	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic					
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≤ 0.6	Vt/Vp ≥ 0.8	Vt/Vp ≤ 0.6	Vt/Vp ≤ 0.6					
	Level of Service		**E**	**D**	**E**	**E**	-	-	-	-	-
Truck	Truck Lane Width	**E**	≤ 3.5 m	≤ 3.5 m	≤ 3.2 m	≤ 3.2 m					
	Travel Lanes per Direction		1	1	1	1					
	Level of Service		**C**	**C**	**E**	**E**	-	-	-	-	-

Multi-Modal Level of Service - Intersections Form

Consultant	IBI Group	Project	Mer Bleue Phase 1
Scenario	Future Background & Total Conditions	Date	02-Jun-21
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Copied Cells*

INTERSECTIONS		Mer Bleue Road & Renaud Road				Intersection B				Intersection C			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3		4								
	Median	No Median - 2.4 m	No Median - 2.4 m		Median > 2.4 m								
	Conflicting Left Turns	Permissive	No left turn / Prohib.		Permissive								
	Conflicting Right Turns	No right turn	Permissive or yield control		Permissive or yield control								
	Right Turns on Red (RToR) ?	RTOR prohibited	RTOR allowed		RTOR allowed								
	Ped Signal Leading Interval?	No	No		Yes								
	Right Turn Channel	No Channel	No Right Turn		No Channel								
	Corner Radius	10-15m	No Right Turn		10-15m								
	Crosswalk Type	Std transverse markings	Std transverse markings		Zebra stripe hi-vis markings								
	PETSI Score	**78**	**88**		**60**								
	Ped. Exposure to Traffic LoS	**B**	**B**	-	**C**	-	-	-	-	-	-	-	-
	Cycle Length	60	60		60								
	Effective Walk Time	12	12		12								
	Average Pedestrian Delay	**19**	**19**		**19**								
	Pedestrian Delay LoS	**B**	**B**	-	**B**	-	-	-	-	-	-	-	-
	Level of Service	**B**	**B**	-	**C**	-	-	-	-	-	-	-	-
		C				**-**				**-**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Mixed Traffic		Pocket Bike Lane								
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	≤ 50 m Introduced right turn lane			≤ 50 m Introduced right turn lane								
	Dedicated Right Turning Speed	>25 to 30 km/h			>25 to 30 km/h								
	Cyclist Through Movement	**C**		-	**C**	-	-	-	-	-	-	-	-
	Separated or Mixed Traffic	**Separated**	**Mixed Traffic**	-	**Separated**	-	-	-	-	-	-	-	-
	Left Turn Approach		2-stage, LT box		2-stage, LT box								
	Operating Speed		≥ 60 km/h		≥ 60 km/h								
	Left Turning Cyclist	-	**A**	-	**A**	-	-	-	-	-	-	-	-
	Level of Service	-	**A**	-	**C**	-	-	-	-	-	-	-	-
		C				**-**				**-**			
Transit	Average Signal Delay	≤ 20 sec	≤ 10 sec		≤ 30 sec								
	Level of Service	**C**	**B**	-	**D**	-	-	-	-	-	-	-	-
		D				**-**				**-**			
Truck	Effective Corner Radius	10 - 15 m			10 - 15 m								
	Number of Receiving Lanes on Departure from Intersection	1			1								
	Level of Service	**E**	-	-	**E**	-	-	-	-	-	-	-	-
		E				**-**				**-**			
Auto	Volume to Capacity Ratio												
	Level of Service	**-**				**-**				**-**			

Appendix I – Intersection Control Warrants

Traffic Signal Warrants

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision | GO TO Justification:

What are the intersecting roadways? Mer Bleue Road & Street 1

What is the direction of the Main Road street? North-South

When was the data collected? Future (2030) Total Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 3

d.- What is the operating environment? Urban **Population >= 10,000 AND Speed < 70 km/hr**

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	0	248	16	0	0	0	159	144	0	47	0	341	
8:00	0	124	8	0	0	0	80	72	0	24	0	171	
9:00	0	124	8	0	0	0	80	72	0	24	0	171	
10:00	0	124	8	0	0	0	80	72	0	24	0	171	
15:00	0	190	53	0	0	0	363	233	0	32	0	262	
16:00	0	95	27	0	0	0	182	117	0	16	0	131	
17:00	0	95	27	0	0	0	182	117	0	16	0	131	
18:00	0	95	27	0	0	0	182	117	0	16	0	131	
Total	**0**	**1,095**	**173**	**0**	**0**	**0**	**1,305**	**943**	**0**	**198**	**0**	**1,508**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	
13-24	
25-36	

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume									
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate									
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds									
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	0%		0%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision | GO TO Justification:

Intersection: Mer Bleue Road & Street 1 Count Date: N/A

Summary Results

Justification			Compliance	Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	79 %	☐	☑
	B	Crossing Volume	75 %		
2. Delay to Cross Traffic	A	Main Road	59 %	☐	☑
	B	Crossing Road	33 %		
3. Combination	A	Justificaton 1	75 %	☐	☑
	B	Justification 2	33 %		
4. 4-Hr Volume			74 %	☐	☑
5. Collision Experience			0 %	☐	☑
6. Pedestrians	A	Volume	Justification not met	☐	☑
	B	Delay	Justification not met		

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision | GO TO Justification:

What are the intersecting roadways? Mer Bleue Road & Wall Road

What is the direction of the Main Road street? North-South

When was the data collected? Future (2030) Total Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 3

d.- What is the operating environment? Urban **Population >= 10,000 AND Speed < 70 km/hr**

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	0	239	18	0	0	0	7	183	0	171	0	23	
8:00	0	120	9	0	0	0	4	92	0	86	0	12	
9:00	0	120	9	0	0	0	4	92	0	86	0	12	
10:00	0	120	9	0	0	0	4	92	0	86	0	12	
15:00	0	2,224	97	0	0	0	23	240	0	26	0	17	
16:00	0	1,112	49	0	0	0	12	120	0	13	0	9	
17:00	0	1,112	49	0	0	0	12	120	0	13	0	9	
18:00	0	1,112	49	0	0	0	12	120	0	13	0	9	
Total	**0**	**6,158**	**288**	**0**	**0**	**0**	**75**	**1,058**	**0**	**493**	**0**	**100**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	
13-24	
25-36	

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume									
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate									
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds									
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	0%		0%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision | GO TO Justification:

Intersection: Mer Bleue Road & Wall Road Count Date: N/A

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	78	%	☐	☑
	B	Crossing Volume	29	%		
2. Delay to Cross Traffic	A	Main Road	69	%	☐	☑
	B	Crossing Road	61	%		
3. Combination	A	Justificaton 1	29	%	☐	☑
	B	Justification 2	61	%		
4. 4-Hr Volume			24	%	☐	☑
5. Collision Experience			0	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision | GO TO Justification:

What are the intersecting roadways? Tenth Line Road & Sweetvalley Drive (S)

What is the direction of the Main Road street? North-South

When was the data collected? Future (2030) Total Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 4

d.- What is the operating environment? Urban **Population >= 10,000 AND Speed < 70 km/hr**

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	4	392	3	58	0	8	17	425	28	10	0	66	
8:00	2	196	2	29	0	4	9	213	14	5	0	33	
9:00	2	196	2	29	0	4	9	213	14	5	0	33	
10:00	2	196	2	29	0	4	9	213	14	5	0	33	
15:00	9	554	10	47	0	7	68	448	61	5	0	37	
16:00	5	277	5	24	0	4	34	224	31	3	0	19	
17:00	5	277	5	24	0	4	34	224	31	3	0	19	
18:00	5	277	5	24	0	4	34	224	31	3	0	19	
Total	**33**	**2,365**	**33**	**263**	**0**	**38**	**213**	**2,183**	**223**	**38**	**0**	**258**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	
13-24	
25-36	

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume									
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate									
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds									
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	0%		0%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision | GO TO Justification:

Intersection: Tenth Line Road & Sweetvalley Drive (S) Count Date: N/A

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	84	%	☐	☑
	B	Crossing Volume	44	%		
2. Delay to Cross Traffic	A	Main Road	78	%	☐	☑
	B	Crossing Road	50	%		
3. Combination	A	Justificaton 1	44	%	☐	☑
	B	Justification 2	50	%		
4. 4-Hr Volume			37	%	☐	☑
5. Collision Experience			0	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision | GO TO Justification:

What are the intersecting roadways? Tenth Line Road & Wall Road

What is the direction of the Main Road street? North-South

When was the data collected? Future (2030) Total Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 4

d.- What is the operating environment? Urban **Population >= 10,000 AND Speed < 70 km/hr**

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	14	296	1	95	4	29	2	298	134	0	4	5	
8:00	7	148	1	48	2	15	1	149	67	0	2	3	
9:00	7	148	1	48	2	15	1	149	67	0	2	3	
10:00	7	148	1	48	2	15	1	149	67	0	2	3	
15:00	26	390	26	165	10	24	1	347	108	1	2	6	
16:00	13	195	13	83	5	12	1	174	54	1	1	3	
17:00	13	195	13	83	5	12	1	174	54	1	1	3	
18:00	13	195	13	83	5	12	1	174	54	1	1	3	
Total	**100**	**1,715**	**68**	**650**	**35**	**133**	**8**	**1,613**	**605**	**3**	**15**	**28**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	
13-24	
25-36	

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume									
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate									
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds									
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	0%		0%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Tenth Line Road & Wall Road Count Date: N/A

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	77	%	☐	☑
	B	Crossing Volume	61	%		
2. Delay to Cross Traffic	A	Main Road	68	%	☐	☑
	B	Crossing Road	87	%		
3. Combination	A	Justificaton 1	61	%	☐	☑
	B	Justification 2	68	%		
4. 4-Hr Volume			56	%	☐	☑
5. Collision Experience			0	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision | GO TO Justification:

What are the intersecting roadways? Mer Bleue Road & Renaud Road

What is the direction of the Main Road street? North-South

When was the data collected? Future (2028) Background Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 3

d.- What is the operating environment? Urban **Population >= 10,000 AND Speed < 70 km/hr**

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	99	362	0	353	0	32	0	199	303	0	0	0	
8:00	50	181	0	177	0	16	0	100	152	0	0	0	
9:00	50	181	0	177	0	16	0	100	152	0	0	0	
10:00	50	181	0	177	0	16	0	100	152	0	0	0	
15:00	47	370	0	509	0	66	0	440	307	0	0	0	
16:00	24	185	0	255	0	33	0	220	154	0	0	0	
17:00	24	185	0	255	0	33	0	220	154	0	0	0	
18:00	24	185	0	255	0	33	0	220	154	0	0	0	
Total	**365**	**1,830**	**0**	**2,155**	**0**	**245**	**0**	**1,598**	**1,525**	**0**	**0**	**0**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	
13-24	
25-36	

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume									
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate									
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds									
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	0%		0%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision | GO TO Justification:

Intersection: Mer Bleue Road & Renaud Road Count Date: N/A

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	98	%	☐	☑
	B	Crossing Volume	91	%		
2. Delay to Cross Traffic	A	Main Road	80	%	☐	☑
	B	Crossing Road	100	%		
3. Combination	A	Justificaton 1	91	%	☑	☐
	B	Justification 2	80	%		
4. 4-Hr Volume			100	%	☑	☐
5. Collision Experience			0	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision | GO TO Justification:

What are the intersecting roadways? Mer Bleue Road & Renaud Road

What is the direction of the Main Road street? North-South

When was the data collected? Future (2026) Total Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 3

d.- What is the operating environment? Urban **Population >= 10,000 AND Speed < 70 km/hr**

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	96	388	0	341	0	32	0	221	298	0	0	0	
8:00	48	194	0	171	0	16	0	111	149	0	0	0	
9:00	48	194	0	171	0	16	0	111	149	0	0	0	
10:00	48	194	0	171	0	16	0	111	149	0	0	0	
15:00	43	392	0	497	0	61	0	458	292	0	0	0	
16:00	22	196	0	249	0	31	0	229	146	0	0	0	
17:00	22	196	0	249	0	31	0	229	146	0	0	0	
18:00	22	196	0	249	0	31	0	229	146	0	0	0	
Total	**348**	**1,950**	**0**	**2,095**	**0**	**233**	**0**	**1,698**	**1,475**	**0**	**0**	**0**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	
13-24	
25-36	

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume									
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate									
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds									
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	0%		0%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision | GO TO Justification:

Intersection: Mer Bleue Road & Renaud Road Count Date: N/A

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	98	%	☐	☑
	B	Crossing Volume	90	%		
2. Delay to Cross Traffic	A	Main Road	82	%	☐	☑
	B	Crossing Road	100	%		
3. Combination	A	Justificaton 1	90	%	☑	☐
	B	Justification 2	82	%		
4. 4-Hr Volume			100	%	☑	☐
5. Collision Experience			0	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

All-Way Stop Control (AWSC) Warrant

All-Way Stop Control Warrant
(Arterial / Major Roadway)

Intersection: Intersection: Tenth Line Road & Wall Road
Scenario: Future (2030) Total Traffic
Major Roadway: Tenth Line Road
Minor Roadway: Wall Road

Contra-Indication Factors

No.	Contra-Indication	Outcome
1	Is the **primary** function of the all-way stop control: 1. to provide safety to pedestrians, 2. to act as a speed control device, or 3. to act as a deterrent for the movement of through traffic in a residential area?	Yes [ ] No [x]
2	Do progressive signal timing plans exist on either of the intersecting roads?	Yes [ ] No [x]
3	Is one or both of the intersecting roads located in an urban area with a posted speed of greater than 60km/h?	Yes [ ] No [x]
4	Does the intersection have less than 3 OR greater than 4 approaches?	Yes [ ] No [x]
5	If the intersection is on a bus or truck route, is the all-way stop located anywhere NOT in an industrial area or where two such routes cross?	Yes [x] No [ ]
7	Are any of the approaches of the all-way stop control: 1. offset, 2. skewed, or 3. not the same number of lanes?	Yes [ ] No [x]
8	Is the all-way stop control located on a multilane roadway, where the stop sign may be obscured by a parked or stopped vehicle?	Yes [ ] No [x]
9	Will vehicles be required to stop on grades?	Yes [ ] No [x]
10	Is there insufficient visibilty for a safe stopping distance?	Yes [ ] No [x]
11	Is there a traffic controlling device (with the exception of yield signs) within 250m of this intersection?	Yes [ ] No [x]

If "Yes" is indicated for any of the above, then the use of an All-Way Stop control may be in inappropriate.

All-Way Stop Control Warrant
(Arterial / Major Roadway)

Suitability Factors

No.	Suitability Factor	Outcome
1	Is it likely that the total vehicle volume on all approaches will exceed 500 vehicles per hour for eight (8) hours based on the volume at the peak hour?	Yes [ ] No [x] Based on the 8-hour traffic count of Tenth Line & Harvest Valley, the total NB/SB two-way traffic volume does not exceed 500 vehicles per hour for every hour of the 8 hours.
2	Is it likely that the total unit volume on minor streets exceed 200 units per hour for eight (8) hours based on the volume at the peak hour?[1]	Yes [ ] No [x]
3	Does the volume split remain below 70/30 for major roads and minor roads, respectfully. [2]	Yes [ ] No [x]
4	Do vehicles on the minor roadway have a wait time of greater than 30 seconds?	Yes [x] No [ ]
6	Do visibilty problems exist which limit the safe approach speed to less than 15km/h?	Yes [ ] No [x]

[1] Unit volume: combined pedestrian and vehicular volume

[2] Major roadway includes vehicle volume. Minor roadway includes unit volume.

If "Yes" is indicated for two or more suitability factors, then an All-Way Stop should be considered.

All-Way Stop Control Warrant
(Arterial / Major Roadway)

Time Period	Wall Road		Tenth Line Road		Total
	Unit Volume [1] (units/h)	Volume Split	Vehicle Volume (veh/h)	Volume Split	
AM Peak Hour	137	16%	745	84%	882
PM Peak Hour	208	19%	876	81%	1084

Roundabout Screening

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 detail.

1	Project Name:	Mer Bleue Phase 1 - Transportation Impact Assessment
2	Intersection:	Mer Bleue Road & Renaud Road
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	Currently configured as a all-way stop controlled intersection.
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?	As an alternative to traffic signals.

7 Are there contra-indications for a roundabout?

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

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 structures?	Yes [X] 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 [X]
3	Is there an existing uncontrolled approach with a grade in excess of 4 percent?	Yes [ ] No [X]
4	Is the intersection located within a coordinated signal system?	Yes [ ] No [X]
5	Is there a closely-spaced traffic signal or railway crossing that could not be controlled with a nearby roundabout?	Yes [ ] No [X]
6	Are significant differences in directional flows or any situations of sudden high demand expected?	Yes [ ] No [X]
7	Are there known visually-impaired pedestrians that cross this intersection?	Yes [ ] No [X]

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 [X]
2	Has there been a fatal crash at the intersection in the last 10 years?	Yes [ ] No [X]
3	Are capacity problems currently being experienced, or expected in the future?	Yes [X] No [ ]
4	Are traffic signals warranted, or expected to be warranted in the future?	Yes [X] No [ ]
5	Does the intersection have more than 4 legs, or unusual geometry?	Yes [ ] No [X]
6	Will Planned modifications to the intersection require that nearby structures be widened (i.e. to accommodate left-turn lanes)?	Yes [ ] No [X]
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 [X]

9	Conclusions/recommendation whether to proceed with an Intersection Control Study:	There are currently private properties located directly adjacent to the intersection as well as a new local road parallel to Mer Bleue Road just to the east of the intersection. Implementing an roundabout would require expropriating the adjacent properties and shifting Mer Bleue Road west to avoid the new local road to the east, therefore a roundabout is not recommended at this location.

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 [X] No [ ]
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 [X] No [ ]
7	Intersections with no more than four legs	Yes [X] No [ ]

Conclusion

Given that the intersection is between a collector road and an arterial road, a mini-roundabout is not appropriate at this location.

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 detail.

1	Project Name:	Mer Bleue Phase 1 - Transportation Impact Assessment
2	Intersection:	Mer Bleue Road & Street 1
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	Future intersection on Mer Bleue Road located approximately 720m north of Wall Road and 460m south of Renaud Road.
4	What traditional modifications are proposed? All-way stop control, traffic signals, auxiliary lanes, etc. Attach or sketch a diagram if necessary.	Two-way stop control.
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?	As an alternative to two-way stop control.

7 Are there contra-indications for a roundabout?

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

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 structures?	Yes [X] 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 [X]
3	Is there an existing uncontrolled approach with a grade in excess of 4 percent?	Yes [ ] No [X]
4	Is the intersection located within a coordinated signal system?	Yes [ ] No [X]
5	Is there a closely-spaced traffic signal or railway crossing that could not be controlled with a nearby roundabout?	Yes [ ] No [X]
6	Are significant differences in directional flows or any situations of sudden high demand expected?	Yes [ ] No [X]
7	Are there known visually-impaired pedestrians that cross this intersection?	Yes [ ] No [X]

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 [X]
2	Has there been a fatal crash at the intersection in the last 10 years?	Yes [ ] No [X]
3	Are capacity problems currently being experienced, or expected in the future?	Yes [ ] No [X]
4	Are traffic signals warranted, or expected to be warranted in the future?	Yes [ ] No [X]
5	Does the intersection have more than 4 legs, or unusual geometry?	Yes [ ] No [X]
6	Will Planned modifications to the intersection require that nearby structures be widened (i.e. to accommodate left-turn lanes)?	Yes [ ] No [X]
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 [X]

9	Conclusions/recommendation whether to proceed with an Intersection Control Study:	As implementing a roundabout at this location is expected to result in property impacts and is not operationally required, it is not recommended that a roundabout be considered at this location.

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 [X] No [ ]
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 [X] No [ ]
7	Intersections with no more than four legs	Yes [X] No [ ]

Conclusion

Given that the intersection is between a collector road and an arterial road, a mini-roundabout is not appropriate at this location.

Appendix J – TDM Checklist

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐ Not Applicable to Subdivisions
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☐ Not Applicable to Subdivisions
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☐ Not Applicable to Subdivisions
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐ Not Applicable to Subdivisions
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☐
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐ Not Applicable to Subdivisions
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐ Not Applicable to Subdivisions
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐ Not Applicable to Subdivisions
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐ Not Applicable to Subdivisions
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐ Not Applicable to Subdivisions
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐ Not Applicable to Subdivisions
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☐ Not Applicable to Subdivisions

TDM measures: *Residential developments*				Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☑ Information on available local travel options such as walking trails, bike infrastructure, etc.
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

Appendix K – Intersection Capacity Analyses

Existing (2019) Traffic

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	116	18	64	158	61	144
Future Vol, veh/h	116	18	64	158	61	144
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	13	17	8	7	13	7
Mvmt Flow	129	20	71	176	68	160
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.8	10.1	9.1
HCM LOS	A	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	29%	87%	0%
Vol Thru, %	71%	0%	30%
Vol Right, %	0%	13%	70%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	222	134	205
LT Vol	64	116	0
Through Vol	158	0	61
RT Vol	0	18	144
Lane Flow Rate	247	149	228
Geometry Grp	1	1	1
Degree of Util (X)	0.325	0.218	0.278
Departure Headway (Hd)	4.745	5.282	4.393
Convergence, Y/N	Yes	Yes	Yes
Cap	757	677	815
Service Time	2.782	3.332	2.429
HCM Lane V/C Ratio	0.326	0.22	0.28
HCM Control Delay	10.1	9.8	9.1
HCM Lane LOS	B	A	A
HCM 95th-tile Q	1.4	0.8	1.1

Intersection	
Int Delay, s/veh	5.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	167	23	122	16	7	95
Future Vol, veh/h	167	23	122	16	7	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	17	8	19	43	4
Mvmt Flow	186	26	136	18	8	106

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	267	145	0	0	154	0
Stage 1	145	-	-	-	-	-
Stage 2	122	-	-	-	-	-
Critical Hdwy	6.41	6.37	-	-	4.53	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.453	-	-	2.587	-
Pot Cap-1 Maneuver	724	864	-	-	1211	-
Stage 1	885	-	-	-	-	-
Stage 2	906	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	719	864	-	-	1211	-
Mov Cap-2 Maneuver	719	-	-	-	-	-
Stage 1	885	-	-	-	-	-
Stage 2	900	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	734	1211	-
HCM Lane V/C Ratio	-	-	0.288	0.006	-
HCM Control Delay (s)	-	-	11.9	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1.2	0	-

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	20	4	5	0	4	5	2	235	1	2	222	89
Future Vol, veh/h	20	4	5	0	4	5	2	235	1	2	222	89
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	22	4	6	0	4	6	2	261	1	2	247	99

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	572	567	297	572	616	262	346	0	0	262	0	0
Stage 1	301	301	-	266	266	-	-	-	-	-	-	-
Stage 2	271	266	-	306	350	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	434	436	747	434	409	782	1224	-	-	1314	-	-
Stage 1	712	669	-	744	692	-	-	-	-	-	-	-
Stage 2	739	692	-	708	636	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	426	434	747	426	407	782	1224	-	-	1314	-	-
Mov Cap-2 Maneuver	426	434	-	426	407	-	-	-	-	-	-	-
Stage 1	711	668	-	743	691	-	-	-	-	-	-	-
Stage 2	728	691	-	697	635	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.4	11.6	0.1	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1224	-	-	461	555	1314	-	-
HCM Lane V/C Ratio	0.002	-	-	0.07	0.018	0.002	-	-
HCM Control Delay (s)	7.9	0	-	13.4	11.6	7.7	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	262	30	21	132	178	71
Future Vol, veh/h	262	30	21	132	178	71
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	13	5	2	3	0
Mvmt Flow	291	33	23	147	198	79
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	12.6	10	10.9
HCM LOS	B	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	14%	90%	0%
Vol Thru, %	86%	0%	71%
Vol Right, %	0%	10%	29%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	153	292	249
LT Vol	21	262	0
Through Vol	132	0	178
RT Vol	0	30	71
Lane Flow Rate	170	324	277
Geometry Grp	1	1	1
Degree of Util (X)	0.246	0.461	0.374
Departure Headway (Hd)	5.219	5.117	4.864
Convergence, Y/N	Yes	Yes	Yes
Cap	680	698	733
Service Time	3.308	3.201	2.941
HCM Lane V/C Ratio	0.25	0.464	0.378
HCM Control Delay	10	12.6	10.9
HCM Lane LOS	A	B	B
HCM 95th-tile Q	1	2.4	1.7

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	23	17	136	93	23	181
Future Vol, veh/h	23	17	136	93	23	181
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	9	6	1	3	17	6
Mvmt Flow	26	19	151	103	26	201

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	456	203	0	0	254	0
Stage 1	203	-	-	-	-	-
Stage 2	253	-	-	-	-	-
Critical Hdwy	6.49	6.26	-	-	4.27	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.354	-	-	2.353	-
Pot Cap-1 Maneuver	550	828	-	-	1229	-
Stage 1	815	-	-	-	-	-
Stage 2	773	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	537	828	-	-	1229	-
Mov Cap-2 Maneuver	537	-	-	-	-	-
Stage 1	815	-	-	-	-	-
Stage 2	754	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.1	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	631	1229	-
HCM Lane V/C Ratio	-	-	0.07	0.021	-
HCM Control Delay (s)	-	-	11.1	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	103	10	7	1	2	6	3	303	4	1	266	33
Future Vol, veh/h	103	10	7	1	2	6	3	303	4	1	266	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	114	11	8	1	2	7	3	337	4	1	296	37

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	667	664	315	671	680	339	333	0	0	341	0	0
Stage 1	317	317	-	345	345	-	-	-	-	-	-	-
Stage 2	350	347	-	326	335	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	375	384	730	373	376	708	1238	-	-	1229	-	-
Stage 1	698	658	-	675	640	-	-	-	-	-	-	-
Stage 2	671	638	-	691	646	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	369	382	730	360	374	708	1238	-	-	1229	-	-
Mov Cap-2 Maneuver	369	382	-	360	374	-	-	-	-	-	-	-
Stage 1	696	657	-	673	638	-	-	-	-	-	-	-
Stage 2	660	636	-	671	645	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.5	11.8	0.1	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1238	-	-	381	542	1229	-	-
HCM Lane V/C Ratio	0.003	-	-	0.35	0.018	0.001	-	-
HCM Control Delay (s)	7.9	0	-	19.5	11.8	7.9	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.5	0.1	0	-	-

Future (2025) Background Traffic

Intersection	
Intersection Delay, s/veh	18
Intersection LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	330	19	67	248	159	287
Future Vol, veh/h	330	19	67	248	159	287
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	13	17	8	7	13	7
Mvmt Flow	330	19	67	248	159	287
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	18.9	15.4	19.1
HCM LOS	C	C	C

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	21%	95%	0%
Vol Thru, %	79%	0%	36%
Vol Right, %	0%	5%	64%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	315	349	446
LT Vol	67	330	0
Through Vol	248	0	159
RT Vol	0	19	287
Lane Flow Rate	315	349	446
Geometry Grp	1	1	1
Degree of Util (X)	0.521	0.612	0.674
Departure Headway (Hd)	5.955	6.316	5.443
Convergence, Y/N	Yes	Yes	Yes
Cap	602	569	660
Service Time	4.026	4.378	3.509
HCM Lane V/C Ratio	0.523	0.613	0.676
HCM Control Delay	15.4	18.9	19.1
HCM Lane LOS	C	C	C
HCM 95th-tile Q	3	4.1	5.2

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	167	23	226	16	7	165
Future Vol, veh/h	167	23	226	16	7	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	1	17	8	19	43	4
Mvmt Flow	167	23	226	16	7	165

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	413	234	0	0	242	0
Stage 1	234	-	-	-	-	-
Stage 2	179	-	-	-	-	-
Critical Hdwy	6.41	6.37	-	-	4.53	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.453	-	-	2.587	-
Pot Cap-1 Maneuver	597	769	-	-	1118	-
Stage 1	807	-	-	-	-	-
Stage 2	854	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	593	769	-	-	1118	-
Mov Cap-2 Maneuver	593	-	-	-	-	-
Stage 1	807	-	-	-	-	-
Stage 2	848	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.5	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	610	1118	-
HCM Lane V/C Ratio	-	-	0.311	0.006	-
HCM Control Delay (s)	-	-	13.5	8.2	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1.3	0	-

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	23	4	5	0	4	5	2	283	1	2	283	99
Future Vol, veh/h	23	4	5	0	4	5	2	283	1	2	283	99
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	23	4	5	0	4	5	2	283	1	2	283	99

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	629	625	333	629	674	284	382	0	0	284	0	0
Stage 1	337	337	-	288	288	-	-	-	-	-	-	-
Stage 2	292	288	-	341	386	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	398	404	713	398	379	760	1188	-	-	1290	-	-
Stage 1	681	645	-	724	677	-	-	-	-	-	-	-
Stage 2	720	677	-	678	614	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	391	402	713	391	377	760	1188	-	-	1290	-	-
Mov Cap-2 Maneuver	391	402	-	391	377	-	-	-	-	-	-	-
Stage 1	680	644	-	723	676	-	-	-	-	-	-	-
Stage 2	710	676	-	668	613	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.2	12	0.1	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1188	-	-	422	524	1290	-	-
HCM Lane V/C Ratio	0.002	-	-	0.076	0.017	0.002	-	-
HCM Control Delay (s)	8	0	-	14.2	12	7.8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	43	0	5	10	0	66	2	307	3	17	375	19
Future Vol, veh/h	43	0	5	10	0	66	2	307	3	17	375	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	43	0	5	10	0	66	2	307	3	17	375	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	765	733	385	734	741	309	394	0	0	310	0	0
Stage 1	419	419	-	313	313	-	-	-	-	-	-	-
Stage 2	346	314	-	421	428	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	323	350	667	338	347	736	1176	-	-	1262	-	-
Stage 1	616	593	-	702	661	-	-	-	-	-	-	-
Stage 2	674	660	-	614	588	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	290	343	667	331	340	736	1176	-	-	1262	-	-
Mov Cap-2 Maneuver	290	343	-	331	340	-	-	-	-	-	-	-
Stage 1	615	583	-	701	660	-	-	-	-	-	-	-
Stage 2	612	659	-	599	578	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.8	11.5	0.1	0.3
HCM LOS	C	B		

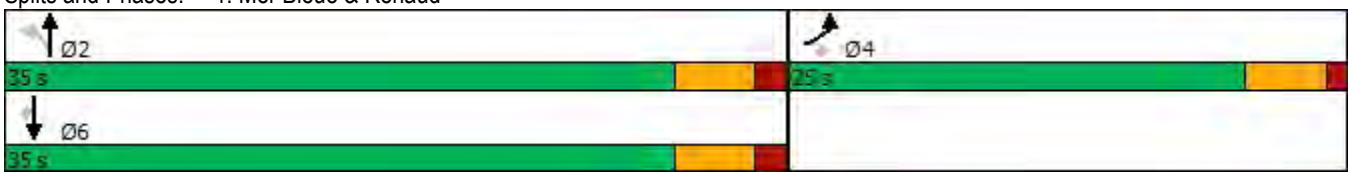
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1176	-	-	308	634	1262	-	-
HCM Lane V/C Ratio	0.002	-	-	0.156	0.12	0.013	-	-
HCM Control Delay (s)	8.1	0	-	18.8	11.5	7.9	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.4	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	328	19	66	245	157	284
Future Volume (vph)	328	19	66	245	157	284
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	2968	1322	1601	3232	1611	1446
Flt Permitted	0.950		0.657			
Satd. Flow (perm)	2968	1322	1107	3232	1611	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		19				284
Link Speed (k/h)	50			50	50	
Link Distance (m)	300.6			461.3	289.3	
Travel Time (s)	21.6			33.2	20.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	8%	7%	13%	7%
Adj. Flow (vph)	328	19	66	245	157	284
Shared Lane Traffic (%)						
Lane Group Flow (vph)	328	19	66	245	157	284
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	19.6	19.6	26.6	26.6	26.6	26.6
Total Split (s)	25.0	25.0	35.0	35.0	35.0	35.0
Total Split (%)	41.7%	41.7%	58.3%	58.3%	58.3%	58.3%
Maximum Green (s)	20.4	20.4	29.9	29.9	29.9	29.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.1	5.1	5.1	5.1
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	14.5	14.5	14.5	14.5
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	11.4	11.4	30.9	30.9	30.9	30.9
Actuated g/C Ratio	0.22	0.22	0.59	0.59	0.59	0.59
v/c Ratio	0.51	0.06	0.10	0.13	0.16	0.29
Control Delay	20.5	8.5	5.6	5.2	5.7	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	8.5	5.6	5.2	5.7	1.8
LOS	C	A	A	A	A	A
Approach Delay	19.8			5.3	3.2	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			A	A	
Queue Length 50th (m)	13.5	0.0	2.1	4.2	5.3	0.0
Queue Length 95th (m)	22.8	3.8	6.9	9.2	13.5	7.6
Internal Link Dist (m)	276.6			437.3	265.3	
Turn Bay Length (m)						
Base Capacity (vph)	1166	531	658	1921	957	974
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	0.04	0.10	0.13	0.16	0.29

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 52			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 9.0		Intersection LOS: A	
Intersection Capacity Utilization 35.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Mer Bleue & Renaud



Intersection	
Intersection Delay, s/veh	55.8
Intersection LOS	F

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	482	32	22	293	318	278
Future Vol, veh/h	482	32	22	293	318	278
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	13	5	2	3	0
Mvmt Flow	482	32	22	293	318	278
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	55.5	20.7	74.5
HCM LOS	F	C	F

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	7%	94%	0%
Vol Thru, %	93%	0%	53%
Vol Right, %	0%	6%	47%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	315	514	596
LT Vol	22	482	0
Through Vol	293	0	318
RT Vol	0	32	278
Lane Flow Rate	315	514	596
Geometry Grp	1	1	1
Degree of Util (X)	0.608	0.957	1.044
Departure Headway (Hd)	7.185	6.881	6.307
Convergence, Y/N	Yes	Yes	Yes
Cap	507	529	578
Service Time	5.185	4.881	4.307
HCM Lane V/C Ratio	0.621	0.972	1.031
HCM Control Delay	20.7	55.5	74.5
HCM Lane LOS	C	F	F
HCM 95th-tile Q	4	12.4	16.6

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	23	17	204	93	23	220
Future Vol, veh/h	23	17	204	93	23	220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	9	6	1	3	17	6
Mvmt Flow	23	17	204	93	23	220

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	517	251	0	0	297	0
Stage 1	251	-	-	-	-	-
Stage 2	266	-	-	-	-	-
Critical Hdwy	6.49	6.26	-	-	4.27	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.354	-	-	2.353	-
Pot Cap-1 Maneuver	506	778	-	-	1183	-
Stage 1	775	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	495	778	-	-	1183	-
Mov Cap-2 Maneuver	495	-	-	-	-	-
Stage 1	775	-	-	-	-	-
Stage 2	746	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.6	0	0.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	586	1183	-
HCM Lane V/C Ratio	-	-	0.068	0.019	-
HCM Control Delay (s)	-	-	11.6	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	113	10	7	1	2	6	3	371	4	1	331	38
Future Vol, veh/h	113	10	7	1	2	6	3	371	4	1	331	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	113	10	7	1	2	6	3	371	4	1	331	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	735	733	350	740	750	373	369	0	0	375	0	0
Stage 1	352	352	-	379	379	-	-	-	-	-	-	-
Stage 2	383	381	-	361	371	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	338	350	698	335	342	678	1201	-	-	1195	-	-
Stage 1	669	635	-	647	618	-	-	-	-	-	-	-
Stage 2	644	617	-	662	623	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	333	349	698	323	341	678	1201	-	-	1195	-	-
Mov Cap-2 Maneuver	333	349	-	323	341	-	-	-	-	-	-	-
Stage 1	667	634	-	645	616	-	-	-	-	-	-	-
Stage 2	634	615	-	644	622	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.7	12.3	0.1	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1201	-	-	344	505	1195	-	-
HCM Lane V/C Ratio	0.002	-	-	0.378	0.018	0.001	-	-
HCM Control Delay (s)	8	0	-	21.7	12.3	8	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.7	0.1	0	-	-

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	34	0	4	5	0	37	6	481	10	68	363	47
Future Vol, veh/h	34	0	4	5	0	37	6	481	10	68	363	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	34	0	4	5	0	37	6	481	10	68	363	47

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1040	1026	387	1023	1044	486	410	0	0	491	0	0
Stage 1	523	523	-	498	498	-	-	-	-	-	-	-
Stage 2	517	503	-	525	546	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	210	237	665	216	231	585	1160	-	-	1083	-	-
Stage 1	541	534	-	558	548	-	-	-	-	-	-	-
Stage 2	545	545	-	540	521	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	183	216	665	200	211	585	1160	-	-	1083	-	-
Mov Cap-2 Maneuver	183	216	-	200	211	-	-	-	-	-	-	-
Stage 1	537	490	-	554	544	-	-	-	-	-	-	-
Stage 2	507	541	-	493	478	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27.5	13.3	0.1	1.2
HCM LOS	D	B		

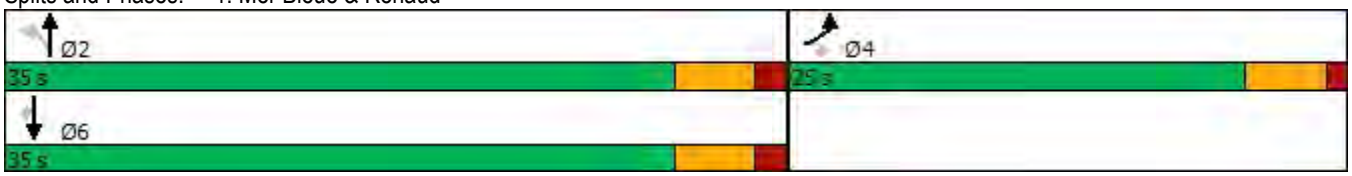
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1160	-	-	198	476	1083	-	-
HCM Lane V/C Ratio	0.005	-	-	0.192	0.088	0.063	-	-
HCM Control Delay (s)	8.1	0	-	27.5	13.3	8.5	0	-
HCM Lane LOS	A	A	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.3	0.2	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	482	32	22	293	318	278
Future Volume (vph)	482	32	22	293	318	278
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3288	1369	1647	3390	1767	1547
Flt Permitted	0.950		0.568			
Satd. Flow (perm)	3288	1369	985	3390	1767	1547
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		32				278
Link Speed (k/h)	50			50	50	
Link Distance (m)	300.6			461.3	289.3	
Travel Time (s)	21.6			33.2	20.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	13%	5%	2%	3%	0%
Adj. Flow (vph)	482	32	22	293	318	278
Shared Lane Traffic (%)						
Lane Group Flow (vph)	482	32	22	293	318	278
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	19.6	19.6	26.6	26.6	26.6	26.6
Total Split (s)	25.0	25.0	35.0	35.0	35.0	35.0
Total Split (%)	41.7%	41.7%	58.3%	58.3%	58.3%	58.3%
Maximum Green (s)	20.4	20.4	29.9	29.9	29.9	29.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.1	5.1	5.1	5.1
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	14.5	14.5	14.5	14.5
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	12.9	12.9	30.0	30.0	30.0	30.0
Actuated g/C Ratio	0.25	0.25	0.57	0.57	0.57	0.57
v/c Ratio	0.60	0.09	0.04	0.15	0.32	0.28
Control Delay	20.8	6.9	6.2	6.0	7.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.8	6.9	6.2	6.0	7.6	1.9
LOS	C	A	A	A	A	A
Approach Delay	19.9			6.1	4.9	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			A	A	
Queue Length 50th (m)	20.7	0.0	0.8	5.8	13.5	0.0
Queue Length 95th (m)	32.1	4.7	3.6	12.3	30.0	8.2
Internal Link Dist (m)	276.6			437.3	265.3	
Turn Bay Length (m)						
Base Capacity (vph)	1277	551	561	1931	1006	1000
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	0.38	0.06	0.04	0.15	0.32	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 52.6			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 10.6		Intersection LOS: B	
Intersection Capacity Utilization 41.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Mer Bleue & Renaud



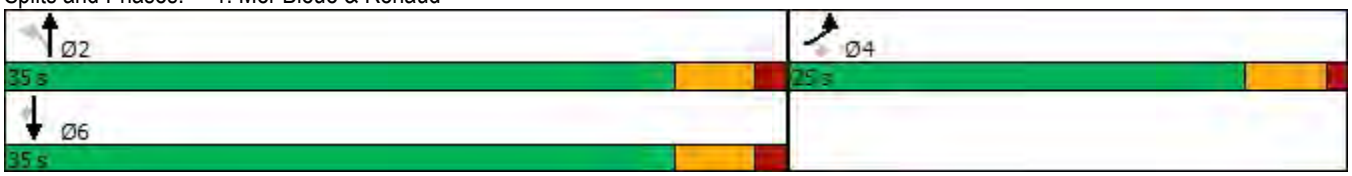
Future (2030) Background Traffic

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	369	41	120	438	225	313
Future Volume (vph)	369	41	120	438	225	313
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	2968	1322	1601	3232	1611	1446
Flt Permitted	0.950		0.618			
Satd. Flow (perm)	2968	1322	1041	3232	1611	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		41				313
Link Speed (k/h)	50			50	50	
Link Distance (m)	300.6			461.3	289.3	
Travel Time (s)	21.6			33.2	20.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	8%	7%	13%	7%
Adj. Flow (vph)	369	41	120	438	225	313
Shared Lane Traffic (%)						
Lane Group Flow (vph)	369	41	120	438	225	313
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	19.6	19.6	26.6	26.6	26.6	26.6
Total Split (s)	25.0	25.0	35.0	35.0	35.0	35.0
Total Split (%)	41.7%	41.7%	58.3%	58.3%	58.3%	58.3%
Maximum Green (s)	20.4	20.4	29.9	29.9	29.9	29.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.1	5.1	5.1	5.1
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	14.5	14.5	14.5	14.5
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	11.8	11.8	30.4	30.4	30.4	30.4
Actuated g/C Ratio	0.23	0.23	0.59	0.59	0.59	0.59
v/c Ratio	0.55	0.12	0.20	0.23	0.24	0.32
Control Delay	20.7	7.0	6.7	5.9	6.5	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	7.0	6.7	5.9	6.5	1.9
LOS	C	A	A	A	A	A
Approach Delay	19.4			6.1	3.8	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			A	A	
Queue Length 50th (m)	15.4	0.0	4.3	8.5	8.3	0.0
Queue Length 95th (m)	25.4	5.4	12.4	16.9	20.0	8.3
Internal Link Dist (m)	276.6			437.3	265.3	
Turn Bay Length (m)						
Base Capacity (vph)	1166	544	608	1889	942	975
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	0.32	0.08	0.20	0.23	0.24	0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 51.9			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 8.9		Intersection LOS: A	
Intersection Capacity Utilization 43.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Mer Bleue & Renaud



Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	167	23	232	16	7	169
Future Vol, veh/h	167	23	232	16	7	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	1	17	8	19	43	4
Mvmt Flow	167	23	232	16	7	169

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	423	240	0	0	248	0
Stage 1	240	-	-	-	-	-
Stage 2	183	-	-	-	-	-
Critical Hdwy	6.41	6.37	-	-	4.53	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.453	-	-	2.587	-
Pot Cap-1 Maneuver	589	763	-	-	1112	-
Stage 1	802	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	585	763	-	-	1112	-
Mov Cap-2 Maneuver	585	-	-	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	845	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.7	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	602	1112	-
HCM Lane V/C Ratio	-	-	0.316	0.006	-
HCM Control Delay (s)	-	-	13.7	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1.3	0	-

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	23	4	5	0	4	5	2	294	1	2	295	99
Future Vol, veh/h	23	4	5	0	4	5	2	294	1	2	295	99
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	23	4	5	0	4	5	2	294	1	2	295	99

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	652	648	345	652	697	295	394	0	0	295	0	0
Stage 1	349	349	-	299	299	-	-	-	-	-	-	-
Stage 2	303	299	-	353	398	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	384	392	702	384	367	749	1176	-	-	1278	-	-
Stage 1	671	637	-	714	670	-	-	-	-	-	-	-
Stage 2	711	670	-	668	606	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	377	390	702	377	366	749	1176	-	-	1278	-	-
Mov Cap-2 Maneuver	377	390	-	377	366	-	-	-	-	-	-	-
Stage 1	670	636	-	713	669	-	-	-	-	-	-	-
Stage 2	701	669	-	658	605	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.6	12.2	0.1	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1176	-	-	408	511	1278	-	-
HCM Lane V/C Ratio	0.002	-	-	0.078	0.018	0.002	-	-
HCM Control Delay (s)	8.1	0	-	14.6	12.2	7.8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0	-	-

Intersection	
Int Delay, s/veh	5.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	221	248	9	101	144
Future Vol, veh/h	33	221	248	9	101	144
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	0
Mvmt Flow	33	221	248	9	101	144

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	599	253	0	0	257	0
Stage 1	253	-	-	-	-	-
Stage 2	346	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	468	791	-	-	1320	-
Stage 1	794	-	-	-	-	-
Stage 2	721	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	429	791	-	-	1320	-
Mov Cap-2 Maneuver	429	-	-	-	-	-
Stage 1	794	-	-	-	-	-
Stage 2	661	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	3.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	713	1320	-
HCM Lane V/C Ratio	-	-	0.356	0.077	-
HCM Control Delay (s)	-	-	12.8	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1.6	0.2	-

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	43	0	5	10	0	66	2	320	3	17	391	19
Future Vol, veh/h	43	0	5	10	0	66	2	320	3	17	391	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	43	0	5	10	0	66	2	320	3	17	391	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	794	762	401	763	770	322	410	0	0	323	0	0
Stage 1	435	435	-	326	326	-	-	-	-	-	-	-
Stage 2	359	327	-	437	444	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	308	337	653	324	333	724	1160	-	-	1248	-	-
Stage 1	604	584	-	691	652	-	-	-	-	-	-	-
Stage 2	663	651	-	602	579	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	276	330	653	317	326	724	1160	-	-	1248	-	-
Mov Cap-2 Maneuver	276	330	-	317	326	-	-	-	-	-	-	-
Stage 1	603	573	-	690	651	-	-	-	-	-	-	-
Stage 2	601	650	-	587	569	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.6	11.6	0	0.3
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1160	-	-	294	619	1248	-	-
HCM Lane V/C Ratio	0.002	-	-	0.163	0.123	0.014	-	-
HCM Control Delay (s)	8.1	0	-	19.6	11.6	7.9	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.6	0.4	0	-	-

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	23	4	5	0	4	5	2	294	1	2	295	99
Future Vol, veh/h	23	4	5	0	4	5	2	294	1	2	295	99
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	23	4	5	0	4	5	2	294	1	2	295	99

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	502	648	197	453	697	148	394	0	0	295	0	0
Stage 1	349	349	-	299	299	-	-	-	-	-	-	-
Stage 2	153	299	-	154	398	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	457	392	817	495	367	878	1176	-	-	1278	-	-
Stage 1	646	637	-	691	670	-	-	-	-	-	-	-
Stage 2	840	670	-	839	606	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	449	390	817	487	366	878	1176	-	-	1278	-	-
Mov Cap-2 Maneuver	449	390	-	487	366	-	-	-	-	-	-	-
Stage 1	645	636	-	690	669	-	-	-	-	-	-	-
Stage 2	829	669	-	827	605	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.2	11.8	0.1	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1176	-	-	473	541	1278	-	-
HCM Lane V/C Ratio	0.002	-	-	0.068	0.017	0.002	-	-
HCM Control Delay (s)	8.1	0	-	13.2	11.8	7.8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↕			↕	
Traffic Vol, veh/h	43	0	5	10	0	66	2	320	3	17	391	19
Future Vol, veh/h	43	0	5	10	0	66	2	320	3	17	391	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	43	0	5	10	0	66	2	320	3	17	391	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	599	762	205	556	770	162	410	0	0	323	0	0
Stage 1	435	435	-	326	326	-	-	-	-	-	-	-
Stage 2	164	327	-	230	444	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	390	337	808	418	333	861	1160	-	-	1248	-	-
Stage 1	575	584	-	666	652	-	-	-	-	-	-	-
Stage 2	828	651	-	758	579	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	355	330	808	409	326	861	1160	-	-	1248	-	-
Mov Cap-2 Maneuver	355	330	-	409	326	-	-	-	-	-	-	-
Stage 1	574	573	-	665	651	-	-	-	-	-	-	-
Stage 2	763	650	-	740	569	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.9	10.3	0	0.4
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1160	-	-	377	752	1248	-	-
HCM Lane V/C Ratio	0.002	-	-	0.127	0.101	0.014	-	-
HCM Control Delay (s)	8.1	0	-	15.9	10.3	7.9	0.1	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.3	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	527	89	63	422	522	326
Future Volume (vph)	527	89	63	422	522	326
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3288	1369	1647	3390	1767	1547
Flt Permitted	0.950		0.401			
Satd. Flow (perm)	3288	1369	695	3390	1767	1547
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		89				326
Link Speed (k/h)	50			50	50	
Link Distance (m)	300.6			461.3	289.3	
Travel Time (s)	21.6			33.2	20.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	13%	5%	2%	3%	0%
Adj. Flow (vph)	527	89	63	422	522	326
Shared Lane Traffic (%)						
Lane Group Flow (vph)	527	89	63	422	522	326
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.6	22.6	26.6	26.6	26.6	26.6
Total Split (s)	24.0	24.0	36.0	36.0	36.0	36.0
Total Split (%)	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%
Maximum Green (s)	19.4	19.4	30.9	30.9	30.9	30.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.1	5.1	5.1	5.1
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	14.5	14.5	14.5	14.5
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	14.0	14.0	31.0	31.0	31.0	31.0
Actuated g/C Ratio	0.26	0.26	0.57	0.57	0.57	0.57
v/c Ratio	0.63	0.21	0.16	0.22	0.52	0.32
Control Delay	21.5	5.6	8.0	6.8	10.4	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.5	5.6	8.0	6.8	10.4	2.0
LOS	C	A	A	A	B	A
Approach Delay	19.2			7.0	7.2	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			A	A	
Queue Length 50th (m)	23.6	0.0	2.6	9.3	27.3	0.0
Queue Length 95th (m)	35.8	7.8	9.2	19.2	60.8	9.5
Internal Link Dist (m)	276.6			437.3	265.3	
Turn Bay Length (m)						
Base Capacity (vph)	1169	544	393	1921	1001	1017
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	0.45	0.16	0.16	0.22	0.52	0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 54.7			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 10.9		Intersection LOS: B	
Intersection Capacity Utilization 61.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Mer Bleue & Renaud

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	23	17	211	93	23	229
Future Vol, veh/h	23	17	211	93	23	229
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	9	6	1	3	17	6
Mvmt Flow	23	17	211	93	23	229

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	533	258	0	0	304	0
Stage 1	258	-	-	-	-	-
Stage 2	275	-	-	-	-	-
Critical Hdwy	6.49	6.26	-	-	4.27	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.354	-	-	2.353	-
Pot Cap-1 Maneuver	496	771	-	-	1176	-
Stage 1	769	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	485	771	-	-	1176	-
Mov Cap-2 Maneuver	485	-	-	-	-	-
Stage 1	769	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	576	1176	-
HCM Lane V/C Ratio	-	-	0.069	0.02	-
HCM Control Delay (s)	-	-	11.7	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	113	10	7	1	2	6	3	386	4	1	344	38
Future Vol, veh/h	113	10	7	1	2	6	3	386	4	1	344	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	113	10	7	1	2	6	3	386	4	1	344	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	763	761	363	768	778	388	382	0	0	390	0	0
Stage 1	365	365	-	394	394	-	-	-	-	-	-	-
Stage 2	398	396	-	374	384	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	324	337	686	321	330	665	1188	-	-	1180	-	-
Stage 1	658	627	-	635	609	-	-	-	-	-	-	-
Stage 2	632	607	-	651	615	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	318	336	686	309	329	665	1188	-	-	1180	-	-
Mov Cap-2 Maneuver	318	336	-	309	329	-	-	-	-	-	-	-
Stage 1	656	626	-	633	607	-	-	-	-	-	-	-
Stage 2	622	605	-	633	614	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.9	12.5	0.1	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1188	-	-	329	491	1180	-	-
HCM Lane V/C Ratio	0.003	-	-	0.395	0.018	0.001	-	-
HCM Control Delay (s)	8	0	-	22.9	12.5	8.1	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.8	0.1	0	-	-

Intersection	
Int Delay, s/veh	5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	175	190	39	246	233
Future Vol, veh/h	22	175	190	39	246	233
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	0
Mvmt Flow	22	175	190	39	246	233

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	935	210	0	0	229	0
Stage 1	210	-	-	-	-	-
Stage 2	725	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	297	835	-	-	1351	-
Stage 1	830	-	-	-	-	-
Stage 2	483	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	235	835	-	-	1351	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	382	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	0	4.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	650	1351	-
HCM Lane V/C Ratio	-	-	0.303	0.182	-
HCM Control Delay (s)	-	-	12.9	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1.3	0.7	-

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	34	0	4	5	0	37	6	501	10	68	378	47
Future Vol, veh/h	34	0	4	5	0	37	6	501	10	68	378	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	34	0	4	5	0	37	6	501	10	68	378	47

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1075	1061	402	1058	1079	506	425	0	0	511	0	0
Stage 1	538	538	-	518	518	-	-	-	-	-	-	-
Stage 2	537	523	-	540	561	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	199	226	653	204	220	570	1145	-	-	1065	-	-
Stage 1	531	526	-	544	536	-	-	-	-	-	-	-
Stage 2	532	534	-	530	513	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	173	206	653	189	200	570	1145	-	-	1065	-	-
Mov Cap-2 Maneuver	173	206	-	189	200	-	-	-	-	-	-	-
Stage 1	527	482	-	540	532	-	-	-	-	-	-	-
Stage 2	494	530	-	483	470	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	28.9	13.6	0.1	1.2
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1145	-	-	188	460	1065	-	-
HCM Lane V/C Ratio	0.005	-	-	0.202	0.091	0.064	-	-
HCM Control Delay (s)	8.2	0	-	28.9	13.6	8.6	0	-
HCM Lane LOS	A	A	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.3	0.2	-	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	113	10	7	1	2	6	3	386	4	1	344	38
Future Vol, veh/h	113	10	7	1	2	6	3	386	4	1	344	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	113	10	7	1	2	6	3	386	4	1	344	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	565	761	191	573	778	195	382	0	0	390	0	0
Stage 1	365	365	-	394	394	-	-	-	-	-	-	-
Stage 2	200	396	-	179	384	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	412	337	825	407	330	820	1188	-	-	1180	-	-
Stage 1	632	627	-	608	609	-	-	-	-	-	-	-
Stage 2	789	607	-	811	615	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	406	336	825	393	329	820	1188	-	-	1180	-	-
Mov Cap-2 Maneuver	406	336	-	393	329	-	-	-	-	-	-	-
Stage 1	630	626	-	606	607	-	-	-	-	-	-	-
Stage 2	778	605	-	790	614	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.8	11.5	0.1	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1188	-	-	411	565	1180	-	-
HCM Lane V/C Ratio	0.003	-	-	0.316	0.016	0.001	-	-
HCM Control Delay (s)	8	0	-	17.8	11.5	8.1	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.3	0	0	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	0	4	5	0	37	6	501	10	68	378	47
Future Vol, veh/h	34	0	4	5	0	37	6	501	10	68	378	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	34	0	4	5	0	37	6	501	10	68	378	47

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	801	1061	213	843	1079	256	425	0	0	511	0	0
Stage 1	538	538	-	518	518	-	-	-	-	-	-	-
Stage 2	263	523	-	325	561	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	279	226	798	260	220	749	1145	-	-	1065	-	-
Stage 1	500	526	-	514	536	-	-	-	-	-	-	-
Stage 2	725	534	-	667	513	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	247	206	798	241	200	749	1145	-	-	1065	-	-
Mov Cap-2 Maneuver	247	206	-	241	200	-	-	-	-	-	-	-
Stage 1	497	482	-	510	532	-	-	-	-	-	-	-
Stage 2	684	530	-	608	470	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.8	11.5	0.1	1.4
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1145	-	-	266	599	1065	-	-
HCM Lane V/C Ratio	0.005	-	-	0.143	0.07	0.064	-	-
HCM Control Delay (s)	8.2	0	-	20.8	11.5	8.6	0.3	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.2	0.2	-	-

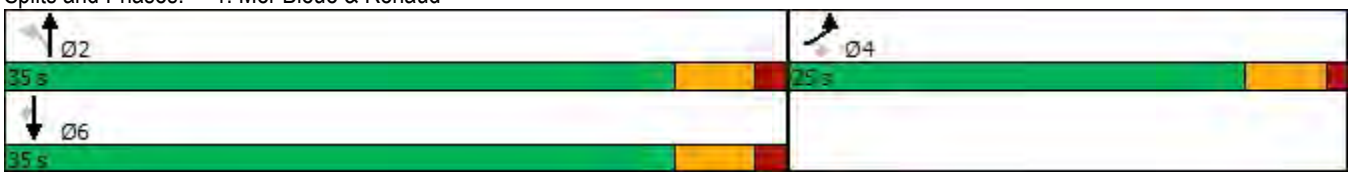
Future (2025) Total Traffic

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	333	28	86	350	208	293
Future Volume (vph)	333	28	86	350	208	293
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	2968	1322	1601	3232	1611	1446
Flt Permitted	0.950		0.628			
Satd. Flow (perm)	2968	1322	1058	3232	1611	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		28				293
Link Speed (k/h)	50			50	50	
Link Distance (m)	300.6			461.3	289.3	
Travel Time (s)	21.6			33.2	20.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	8%	7%	13%	7%
Adj. Flow (vph)	333	28	86	350	208	293
Shared Lane Traffic (%)						
Lane Group Flow (vph)	333	28	86	350	208	293
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	19.6	19.6	26.6	26.6	26.6	26.6
Total Split (s)	25.0	25.0	35.0	35.0	35.0	35.0
Total Split (%)	41.7%	41.7%	58.3%	58.3%	58.3%	58.3%
Maximum Green (s)	20.4	20.4	29.9	29.9	29.9	29.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.1	5.1	5.1	5.1
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	14.5	14.5	14.5	14.5
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	11.4	11.4	30.8	30.8	30.8	30.8
Actuated g/C Ratio	0.22	0.22	0.59	0.59	0.59	0.59
v/c Ratio	0.51	0.09	0.14	0.18	0.22	0.30
Control Delay	20.5	7.7	5.9	5.4	6.1	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	7.7	5.9	5.4	6.1	1.8
LOS	C	A	A	A	A	A
Approach Delay	19.5			5.5	3.6	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			A	A	
Queue Length 50th (m)	13.7	0.0	2.9	6.3	7.3	0.0
Queue Length 95th (m)	23.0	4.5	8.8	13.0	17.8	7.7
Internal Link Dist (m)	276.6			437.3	265.3	
Turn Bay Length (m)						
Base Capacity (vph)	1166	536	627	1917	955	976
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	0.05	0.14	0.18	0.22	0.30

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 52			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 8.7		Intersection LOS: A	
Intersection Capacity Utilization 38.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Mer Bleue & Renaud



Intersection	
Int Delay, s/veh	4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	171	23	233	18	7	179
Future Vol, veh/h	171	23	233	18	7	179
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	1	17	8	19	43	4
Mvmt Flow	171	23	233	18	7	179

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	435	242	0	0	251	0
Stage 1	242	-	-	-	-	-
Stage 2	193	-	-	-	-	-
Critical Hdwy	6.41	6.37	-	-	4.53	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.453	-	-	2.587	-
Pot Cap-1 Maneuver	580	761	-	-	1109	-
Stage 1	801	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	576	761	-	-	1109	-
Mov Cap-2 Maneuver	576	-	-	-	-	-
Stage 1	801	-	-	-	-	-
Stage 2	836	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	593	1109	-
HCM Lane V/C Ratio	-	-	0.327	0.006	-
HCM Control Delay (s)	-	-	14	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1.4	0	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	95	4	29	0	4	5	14	285	1	2	287	134
Future Vol, veh/h	95	4	29	0	4	5	14	285	1	2	287	134
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	95	4	29	0	4	5	14	285	1	2	287	134

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	676	672	354	689	739	286	421	0	0	286	0	0
Stage 1	358	358	-	314	314	-	-	-	-	-	-	-
Stage 2	318	314	-	375	425	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	370	380	694	363	347	758	1149	-	-	1288	-	-
Stage 1	664	631	-	701	660	-	-	-	-	-	-	-
Stage 2	698	660	-	650	590	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	360	374	694	341	341	758	1149	-	-	1288	-	-
Mov Cap-2 Maneuver	360	374	-	341	341	-	-	-	-	-	-	-
Stage 1	655	630	-	691	651	-	-	-	-	-	-	-
Stage 2	679	651	-	618	589	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.9	12.5	0.4	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1149	-	-	405	491	1288	-	-
HCM Lane V/C Ratio	0.012	-	-	0.316	0.018	0.002	-	-
HCM Control Delay (s)	8.2	0	-	17.9	12.5	7.8	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.3	0.1	0	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	120	250	7	58	172
Future Vol, veh/h	14	120	250	7	58	172
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	0
Mvmt Flow	14	120	250	7	58	172

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	542	254	0	0	257	0
Stage 1	254	-	-	-	-	-
Stage 2	288	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	505	790	-	-	1320	-
Stage 1	793	-	-	-	-	-
Stage 2	766	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	480	790	-	-	1320	-
Mov Cap-2 Maneuver	480	-	-	-	-	-
Stage 1	793	-	-	-	-	-
Stage 2	728	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	740	1320	-
HCM Lane V/C Ratio	-	-	0.181	0.044	-
HCM Control Delay (s)	-	-	10.9	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	58	0	8	10	0	66	4	379	3	17	410	28
Future Vol, veh/h	58	0	8	10	0	66	4	379	3	17	410	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	58	0	8	10	0	66	4	379	3	17	410	28

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	880	848	424	851	861	381	438	0	0	382	0	0
Stage 1	458	458	-	389	389	-	-	-	-	-	-	-
Stage 2	422	390	-	462	472	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	270	301	634	282	295	671	1133	-	-	1188	-	-
Stage 1	587	570	-	639	612	-	-	-	-	-	-	-
Stage 2	613	611	-	584	562	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	239	294	634	274	288	671	1133	-	-	1188	-	-
Mov Cap-2 Maneuver	239	294	-	274	288	-	-	-	-	-	-	-
Stage 1	585	559	-	636	610	-	-	-	-	-	-	-
Stage 2	550	609	-	566	551	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	23.6	12.4	0.1	0.3
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1133	-	-	259	564	1188	-	-
HCM Lane V/C Ratio	0.004	-	-	0.255	0.135	0.014	-	-
HCM Control Delay (s)	8.2	0	-	23.6	12.4	8.1	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	0.5	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	488	50	36	367	417	283
Future Volume (vph)	488	50	36	367	417	283
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3288	1369	1647	3390	1767	1547
Flt Permitted	0.950		0.488			
Satd. Flow (perm)	3288	1369	846	3390	1767	1547
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		50				283
Link Speed (k/h)	50			50	50	
Link Distance (m)	300.6			461.3	289.3	
Travel Time (s)	21.6			33.2	20.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	13%	5%	2%	3%	0%
Adj. Flow (vph)	488	50	36	367	417	283
Shared Lane Traffic (%)						
Lane Group Flow (vph)	488	50	36	367	417	283
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	19.6	19.6	26.6	26.6	26.6	26.6
Total Split (s)	24.0	24.0	36.0	36.0	36.0	36.0
Total Split (%)	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%
Maximum Green (s)	19.4	19.4	30.9	30.9	30.9	30.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.1	5.1	5.1	5.1
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	14.5	14.5	14.5	14.5
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	13.4	13.4	31.0	31.0	31.0	31.0
Actuated g/C Ratio	0.25	0.25	0.57	0.57	0.57	0.57
v/c Ratio	0.60	0.13	0.07	0.19	0.41	0.28
Control Delay	21.2	6.3	6.7	6.4	8.7	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.2	6.3	6.7	6.4	8.7	1.9
LOS	C	A	A	A	A	A
Approach Delay	19.8			6.4	5.9	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			A	A	
Queue Length 50th (m)	21.5	0.0	1.3	7.6	19.3	0.0
Queue Length 95th (m)	33.1	6.0	5.4	16.1	43.6	8.6
Internal Link Dist (m)	276.6			437.3	265.3	
Turn Bay Length (m)						
Base Capacity (vph)	1183	524	484	1943	1013	1007
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	0.41	0.10	0.07	0.19	0.41	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 54.1			
Natural Cycle: 50			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 10.6		Intersection LOS: B	
Intersection Capacity Utilization 54.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Mer Bleue & Renaud

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	17	217	97	23	231
Future Vol, veh/h	26	17	217	97	23	231
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	9	6	1	3	17	6
Mvmt Flow	26	17	217	97	23	231

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	543	266	0	0	314	0
Stage 1	266	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Critical Hdwy	6.49	6.26	-	-	4.27	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.354	-	-	2.353	-
Pot Cap-1 Maneuver	489	763	-	-	1166	-
Stage 1	763	-	-	-	-	-
Stage 2	754	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	478	763	-	-	1166	-
Mov Cap-2 Maneuver	478	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	737	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	561	1166	-
HCM Lane V/C Ratio	-	-	0.077	0.02	-
HCM Control Delay (s)	-	-	11.9	8.2	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	165	10	24	1	2	6	26	374	4	1	334	108
Future Vol, veh/h	165	10	24	1	2	6	26	374	4	1	334	108
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	165	10	24	1	2	6	26	374	4	1	334	108

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	822	820	388	835	872	376	442	0	0	378	0	0
Stage 1	390	390	-	428	428	-	-	-	-	-	-	-
Stage 2	432	430	-	407	444	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	295	312	665	289	291	675	1129	-	-	1192	-	-
Stage 1	638	611	-	609	588	-	-	-	-	-	-	-
Stage 2	606	587	-	625	579	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	284	303	665	265	282	675	1129	-	-	1192	-	-
Mov Cap-2 Maneuver	284	303	-	265	282	-	-	-	-	-	-	-
Stage 1	619	610	-	591	571	-	-	-	-	-	-	-
Stage 2	581	570	-	592	578	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	36.2	13.1	0.5	0
HCM LOS	E	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1129	-	-	306	456	1192	-	-
HCM Lane V/C Ratio	0.023	-	-	0.65	0.02	0.001	-	-
HCM Control Delay (s)	8.3	0	-	36.2	13.1	8	0	-
HCM Lane LOS	A	A	-	E	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	4.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	87	222	14	117	245
Future Vol, veh/h	10	87	222	14	117	245
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	0
Mvmt Flow	10	87	222	14	117	245

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	708	229	0	0	236	0
Stage 1	229	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	404	815	-	-	1343	-
Stage 1	814	-	-	-	-	-
Stage 2	627	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	363	815	-	-	1343	-
Mov Cap-2 Maneuver	363	-	-	-	-	-
Stage 1	814	-	-	-	-	-
Stage 2	564	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	2.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	722	1343	-
HCM Lane V/C Ratio	-	-	0.134	0.087	-
HCM Control Delay (s)	-	-	10.8	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.3	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	47	0	7	5	0	37	9	533	10	68	433	61
Future Vol, veh/h	47	0	7	5	0	37	9	533	10	68	433	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	47	0	7	5	0	37	9	533	10	68	433	61

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1175	1161	464	1159	1186	538	494	0	0	543	0	0
Stage 1	600	600	-	556	556	-	-	-	-	-	-	-
Stage 2	575	561	-	603	630	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	170	197	602	174	190	547	1080	-	-	1036	-	-
Stage 1	491	493	-	519	516	-	-	-	-	-	-	-
Stage 2	507	513	-	489	478	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	146	177	602	159	171	547	1080	-	-	1036	-	-
Mov Cap-2 Maneuver	146	177	-	159	171	-	-	-	-	-	-	-
Stage 1	485	448	-	513	510	-	-	-	-	-	-	-
Stage 2	467	507	-	439	435	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	38	14.4	0.1	1.1
HCM LOS	E	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1080	-	-	162	424	1036	-	-
HCM Lane V/C Ratio	0.008	-	-	0.333	0.099	0.066	-	-
HCM Control Delay (s)	8.4	0	-	38	14.4	8.7	0	-
HCM Lane LOS	A	A	-	E	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.4	0.3	0.2	-	-

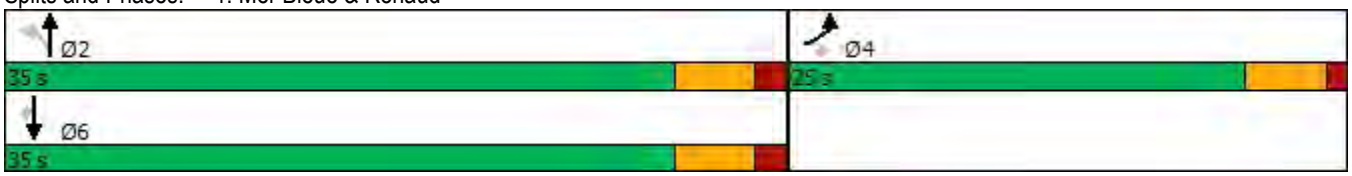
Future (2030) Total Traffic

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	372	50	138	540	274	319
Future Volume (vph)	372	50	138	540	274	319
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	2968	1322	1601	3232	1611	1446
Flt Permitted	0.950		0.591			
Satd. Flow (perm)	2968	1322	996	3232	1611	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		50				319
Link Speed (k/h)	50			50	50	
Link Distance (m)	300.6			461.3	289.3	
Travel Time (s)	21.6			33.2	20.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	17%	8%	7%	13%	7%
Adj. Flow (vph)	372	50	138	540	274	319
Shared Lane Traffic (%)						
Lane Group Flow (vph)	372	50	138	540	274	319
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	19.6	19.6	26.6	26.6	26.6	26.6
Total Split (s)	25.0	25.0	35.0	35.0	35.0	35.0
Total Split (%)	41.7%	41.7%	58.3%	58.3%	58.3%	58.3%
Maximum Green (s)	20.4	20.4	29.9	29.9	29.9	29.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.1	5.1	5.1	5.1
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	14.5	14.5	14.5	14.5
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	11.9	11.9	30.4	30.4	30.4	30.4
Actuated g/C Ratio	0.23	0.23	0.58	0.58	0.58	0.58
v/c Ratio	0.55	0.15	0.24	0.29	0.29	0.33
Control Delay	20.7	6.7	7.2	6.3	6.9	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	6.7	7.2	6.3	6.9	1.9
LOS	C	A	A	A	A	A
Approach Delay	19.1			6.4	4.3	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			A	A	
Queue Length 50th (m)	15.5	0.0	5.2	10.9	10.6	0.0
Queue Length 95th (m)	25.6	6.1	14.5	21.2	24.7	8.4
Internal Link Dist (m)	276.6			437.3	265.3	
Turn Bay Length (m)						
Base Capacity (vph)	1165	549	581	1886	940	976
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	0.32	0.09	0.24	0.29	0.29	0.33

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 52			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 8.8		Intersection LOS: A	
Intersection Capacity Utilization 46.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Mer Bleue & Renaud



Intersection	
Int Delay, s/veh	4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	171	23	239	18	7	183
Future Vol, veh/h	171	23	239	18	7	183
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	1	17	8	19	43	4
Mvmt Flow	171	23	239	18	7	183

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	445	248	0	0	257	0
Stage 1	248	-	-	-	-	-
Stage 2	197	-	-	-	-	-
Critical Hdwy	6.41	6.37	-	-	4.53	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.453	-	-	2.587	-
Pot Cap-1 Maneuver	573	755	-	-	1103	-
Stage 1	796	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	569	755	-	-	1103	-
Mov Cap-2 Maneuver	569	-	-	-	-	-
Stage 1	796	-	-	-	-	-
Stage 2	833	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.2	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	586	1103	-
HCM Lane V/C Ratio	-	-	0.331	0.006	-
HCM Control Delay (s)	-	-	14.2	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1.4	0	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	95	4	29	0	4	5	14	296	1	2	298	134
Future Vol, veh/h	95	4	29	0	4	5	14	296	1	2	298	134
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	95	4	29	0	4	5	14	296	1	2	298	134

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	698	694	365	711	761	297	432	0	0	297	0	0
Stage 1	369	369	-	325	325	-	-	-	-	-	-	-
Stage 2	329	325	-	386	436	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	358	369	685	351	337	747	1138	-	-	1276	-	-
Stage 1	655	624	-	692	653	-	-	-	-	-	-	-
Stage 2	688	653	-	641	583	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	348	363	685	329	331	747	1138	-	-	1276	-	-
Mov Cap-2 Maneuver	348	363	-	329	331	-	-	-	-	-	-	-
Stage 1	645	623	-	682	643	-	-	-	-	-	-	-
Stage 2	669	643	-	609	582	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.6	12.7	0.4	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1138	-	-	392	479	1276	-	-
HCM Lane V/C Ratio	0.012	-	-	0.327	0.019	0.002	-	-
HCM Control Delay (s)	8.2	0	-	18.6	12.7	7.8	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.4	0.1	0	-	-

Intersection	
Int Delay, s/veh	8.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	47	341	248	16	159	144
Future Vol, veh/h	47	341	248	16	159	144
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	0
Mvmt Flow	47	341	248	16	159	144

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	718	256	0	0	264	0
Stage 1	256	-	-	-	-	-
Stage 2	462	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	399	788	-	-	1312	-
Stage 1	791	-	-	-	-	-
Stage 2	638	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	346	788	-	-	1312	-
Mov Cap-2 Maneuver	346	-	-	-	-	-
Stage 1	791	-	-	-	-	-
Stage 2	554	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17	0	4.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	682	1312	-
HCM Lane V/C Ratio	-	-	0.569	0.121	-
HCM Control Delay (s)	-	-	17	8.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	3.6	0.4	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	58	0	8	10	0	66	4	392	3	17	425	28
Future Vol, veh/h	58	0	8	10	0	66	4	392	3	17	425	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	58	0	8	10	0	66	4	392	3	17	425	28

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	908	876	439	879	889	394	453	0	0	395	0	0
Stage 1	473	473	-	402	402	-	-	-	-	-	-	-
Stage 2	435	403	-	477	487	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	258	290	622	270	285	659	1118	-	-	1175	-	-
Stage 1	576	562	-	629	604	-	-	-	-	-	-	-
Stage 2	604	603	-	573	554	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	228	283	622	262	278	659	1118	-	-	1175	-	-
Mov Cap-2 Maneuver	228	283	-	262	278	-	-	-	-	-	-	-
Stage 1	573	551	-	626	601	-	-	-	-	-	-	-
Stage 2	541	600	-	555	543	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.8	12.6	0.1	0.3
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1118	-	-	247	549	1175	-	-
HCM Lane V/C Ratio	0.004	-	-	0.267	0.138	0.014	-	-
HCM Control Delay (s)	8.2	0	-	24.8	12.6	8.1	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	0.5	0	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	95	4	29	0	4	5	14	296	1	2	298	134
Future Vol, veh/h	95	4	29	0	4	5	14	296	1	2	298	134
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	95	4	29	0	4	5	14	296	1	2	298	134

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	547	694	216	480	761	149	432	0	0	297	0	0
Stage 1	369	369	-	325	325	-	-	-	-	-	-	-
Stage 2	178	325	-	155	436	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	424	369	795	474	337	877	1138	-	-	1276	-	-
Stage 1	629	624	-	667	653	-	-	-	-	-	-	-
Stage 2	812	653	-	838	583	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	412	363	795	447	331	877	1138	-	-	1276	-	-
Mov Cap-2 Maneuver	412	363	-	447	331	-	-	-	-	-	-	-
Stage 1	620	623	-	657	643	-	-	-	-	-	-	-
Stage 2	790	643	-	801	582	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.8	12.2	0.5	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1138	-	-	460	506	1276	-	-
HCM Lane V/C Ratio	0.012	-	-	0.278	0.018	0.002	-	-
HCM Control Delay (s)	8.2	0.1	-	15.8	12.2	7.8	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.1	0	-	-

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	58	0	8	10	0	66	4	392	3	17	425	28
Future Vol, veh/h	58	0	8	10	0	66	4	392	3	17	425	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	9	0	0	2	0
Mvmt Flow	58	0	8	10	0	66	4	392	3	17	425	28

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	677	876	227	649	889	198	453	0	0	395	0	0
Stage 1	473	473	-	402	402	-	-	-	-	-	-	-
Stage 2	204	403	-	247	487	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	343	290	782	359	285	816	1118	-	-	1175	-	-
Stage 1	546	562	-	601	604	-	-	-	-	-	-	-
Stage 2	785	603	-	741	554	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	309	283	782	349	278	816	1118	-	-	1175	-	-
Mov Cap-2 Maneuver	309	283	-	349	278	-	-	-	-	-	-	-
Stage 1	543	551	-	598	601	-	-	-	-	-	-	-
Stage 2	718	600	-	719	543	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.5	10.8	0.1	0.4
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1118	-	-	333	694	1175	-	-
HCM Lane V/C Ratio	0.004	-	-	0.198	0.11	0.014	-	-
HCM Control Delay (s)	8.2	0	-	18.5	10.8	8.1	0.1	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.4	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	533	106	76	495	621	330
Future Volume (vph)	533	106	76	495	621	330
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	0.97	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3288	1369	1647	3390	1767	1547
Flt Permitted	0.950		0.327			
Satd. Flow (perm)	3288	1369	567	3390	1767	1547
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		106				330
Link Speed (k/h)	50			50	50	
Link Distance (m)	300.6			461.3	289.3	
Travel Time (s)	21.6			33.2	20.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	13%	5%	2%	3%	0%
Adj. Flow (vph)	533	106	76	495	621	330
Shared Lane Traffic (%)						
Lane Group Flow (vph)	533	106	76	495	621	330
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	19.6	19.6	26.6	26.6	26.6	26.6
Total Split (s)	24.0	24.0	36.0	36.0	36.0	36.0
Total Split (%)	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%
Maximum Green (s)	19.4	19.4	30.9	30.9	30.9	30.9
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	5.1	5.1	5.1	5.1
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	14.5	14.5	14.5	14.5
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	14.0	14.0	31.0	31.0	31.0	31.0
Actuated g/C Ratio	0.26	0.26	0.57	0.57	0.57	0.57
v/c Ratio	0.63	0.25	0.24	0.26	0.62	0.32
Control Delay	21.6	5.5	9.5	7.0	12.3	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	5.5	9.5	7.0	12.3	2.0
LOS	C	A	A	A	B	A
Approach Delay	18.9			7.4	8.7	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	B			A	A	
Queue Length 50th (m)	23.9	0.0	3.2	11.3	35.5	0.0
Queue Length 95th (m)	36.2	8.5	11.7	22.6	79.1	9.6
Internal Link Dist (m)	276.6			437.3	265.3	
Turn Bay Length (m)						
Base Capacity (vph)	1168	554	321	1918	1000	1018
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	0.46	0.19	0.24	0.26	0.62	0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 54.8			
Natural Cycle: 50			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 11.4		Intersection LOS: B	
Intersection Capacity Utilization 67.3%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Mer Bleue & Renaud

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	17	224	97	23	240
Future Vol, veh/h	26	17	224	97	23	240
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	9	6	1	3	17	6
Mvmt Flow	26	17	224	97	23	240

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	559	273	0	0	321	0
Stage 1	273	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Critical Hdwy	6.49	6.26	-	-	4.27	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.354	-	-	2.353	-
Pot Cap-1 Maneuver	478	756	-	-	1159	-
Stage 1	757	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	467	756	-	-	1159	-
Mov Cap-2 Maneuver	467	-	-	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	730	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.1	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	550	1159	-
HCM Lane V/C Ratio	-	-	0.078	0.02	-
HCM Control Delay (s)	-	-	12.1	8.2	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	7.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	165	10	24	1	2	6	26	390	4	1	347	108
Future Vol, veh/h	165	10	24	1	2	6	26	390	4	1	347	108
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	165	10	24	1	2	6	26	390	4	1	347	108

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	851	849	401	864	901	392	455	0	0	394	0	0
Stage 1	403	403	-	444	444	-	-	-	-	-	-	-
Stage 2	448	446	-	420	457	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	282	300	653	277	280	661	1116	-	-	1176	-	-
Stage 1	628	603	-	597	579	-	-	-	-	-	-	-
Stage 2	594	577	-	615	571	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	271	291	653	254	271	661	1116	-	-	1176	-	-
Mov Cap-2 Maneuver	271	291	-	254	271	-	-	-	-	-	-	-
Stage 1	609	602	-	579	562	-	-	-	-	-	-	-
Stage 2	569	560	-	582	570	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	39.8	13.3	0.5	0
HCM LOS	E	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1116	-	-	293	441	1176	-	-
HCM Lane V/C Ratio	0.023	-	-	0.679	0.02	0.001	-	-
HCM Control Delay (s)	8.3	0	-	39.8	13.3	8.1	0	-
HCM Lane LOS	A	A	-	E	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	4.6	0.1	0	-	-

Intersection	
Int Delay, s/veh	7.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	32	262	190	53	363	233
Future Vol, veh/h	32	262	190	53	363	233
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	0
Mvmt Flow	32	262	190	53	363	233

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1176	217	0	0	243	0
Stage 1	217	-	-	-	-	-
Stage 2	959	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	213	828	-	-	1335	-
Stage 1	824	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	147	828	-	-	1335	-
Mov Cap-2 Maneuver	147	-	-	-	-	-
Stage 1	824	-	-	-	-	-
Stage 2	258	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.8	0	5.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	550	1335	-
HCM Lane V/C Ratio	-	-	0.535	0.272	-
HCM Control Delay (s)	-	-	18.8	8.7	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	3.1	1.1	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	47	0	7	5	0	37	9	554	10	68	448	61
Future Vol, veh/h	47	0	7	5	0	37	9	554	10	68	448	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	47	0	7	5	0	37	9	554	10	68	448	61

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1211	1197	479	1195	1222	559	509	0	0	564	0	0
Stage 1	615	615	-	577	577	-	-	-	-	-	-	-
Stage 2	596	582	-	618	645	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
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	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	161	187	591	165	181	532	1066	-	-	1018	-	-
Stage 1	482	485	-	506	505	-	-	-	-	-	-	-
Stage 2	494	502	-	480	471	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	138	167	591	150	162	532	1066	-	-	1018	-	-
Mov Cap-2 Maneuver	138	167	-	150	162	-	-	-	-	-	-	-
Stage 1	476	439	-	500	499	-	-	-	-	-	-	-
Stage 2	454	496	-	430	427	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	40.8	14.8	0.1	1
HCM LOS	E	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1066	-	-	153	408	1018	-	-
HCM Lane V/C Ratio	0.008	-	-	0.353	0.103	0.067	-	-
HCM Control Delay (s)	8.4	0	-	40.8	14.8	8.8	0	-
HCM Lane LOS	A	A	-	E	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.5	0.3	0.2	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	165	10	24	1	2	6	26	390	4	1	347	108
Future Vol, veh/h	165	10	24	1	2	6	26	390	4	1	347	108
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	165	10	24	1	2	6	26	390	4	1	347	108

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	651	849	228	625	901	197	455	0	0	394	0	0
Stage 1	403	403	-	444	444	-	-	-	-	-	-	-
Stage 2	248	446	-	181	457	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	358	300	781	373	280	817	1116	-	-	1176	-	-
Stage 1	601	603	-	568	579	-	-	-	-	-	-	-
Stage 2	740	577	-	809	571	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	345	291	781	344	271	817	1116	-	-	1176	-	-
Mov Cap-2 Maneuver	345	291	-	344	271	-	-	-	-	-	-	-
Stage 1	583	602	-	551	562	-	-	-	-	-	-	-
Stage 2	710	560	-	770	570	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26	12.2	0.6	0
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1116	-	-	366	510	1176	-	-
HCM Lane V/C Ratio	0.023	-	-	0.544	0.018	0.001	-	-
HCM Control Delay (s)	8.3	0.1	-	26	12.2	8.1	0	-
HCM Lane LOS	A	A	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	3.1	0.1	0	-	-

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	47	0	7	5	0	37	9	554	10	68	448	61
Future Vol, veh/h	47	0	7	5	0	37	9	554	10	68	448	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	1	0	0	3	0
Mvmt Flow	47	0	7	5	0	37	9	554	10	68	448	61

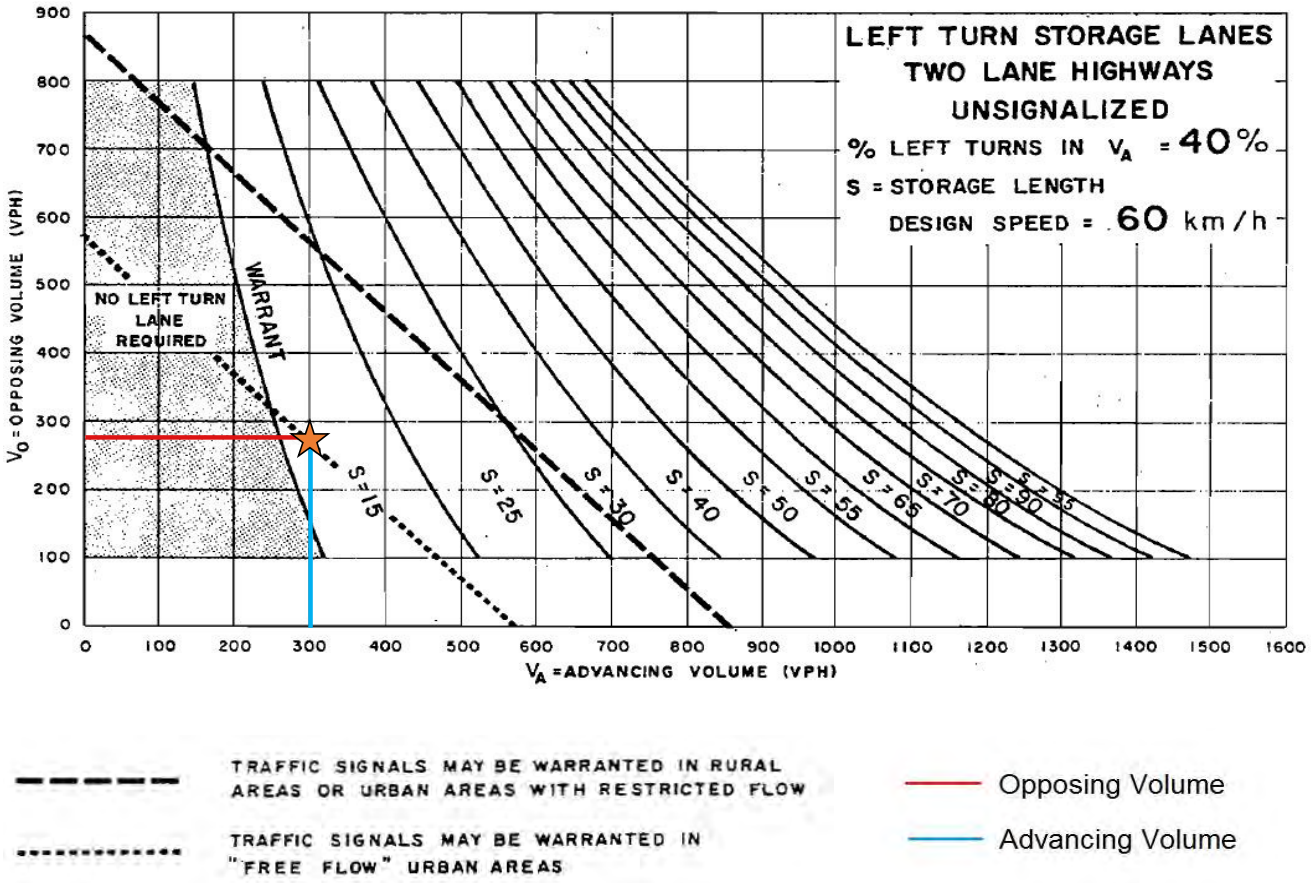
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	910	1197	255	937	1222	282	509	0	0	564	0	0
Stage 1	615	615	-	577	577	-	-	-	-	-	-	-
Stage 2	295	582	-	360	645	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	233	187	750	223	181	721	1066	-	-	1018	-	-
Stage 1	450	485	-	474	505	-	-	-	-	-	-	-
Stage 2	695	502	-	636	471	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	203	167	750	203	162	721	1066	-	-	1018	-	-
Mov Cap-2 Maneuver	203	167	-	203	162	-	-	-	-	-	-	-
Stage 1	445	439	-	468	499	-	-	-	-	-	-	-
Stage 2	651	496	-	571	427	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26.1	12	0.1	1.3
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1066	-	-	224	553	1018	-	-
HCM Lane V/C Ratio	0.008	-	-	0.241	0.076	0.067	-	-
HCM Control Delay (s)	8.4	0	-	26.1	12	8.8	0.3	-
HCM Lane LOS	A	A	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	0.2	0.2	-	-

Appendix L – Auxiliary Lane Analyses

Future (2030) Total AM - SBL Turn Warrant at Mer Bleue Road & Street 1



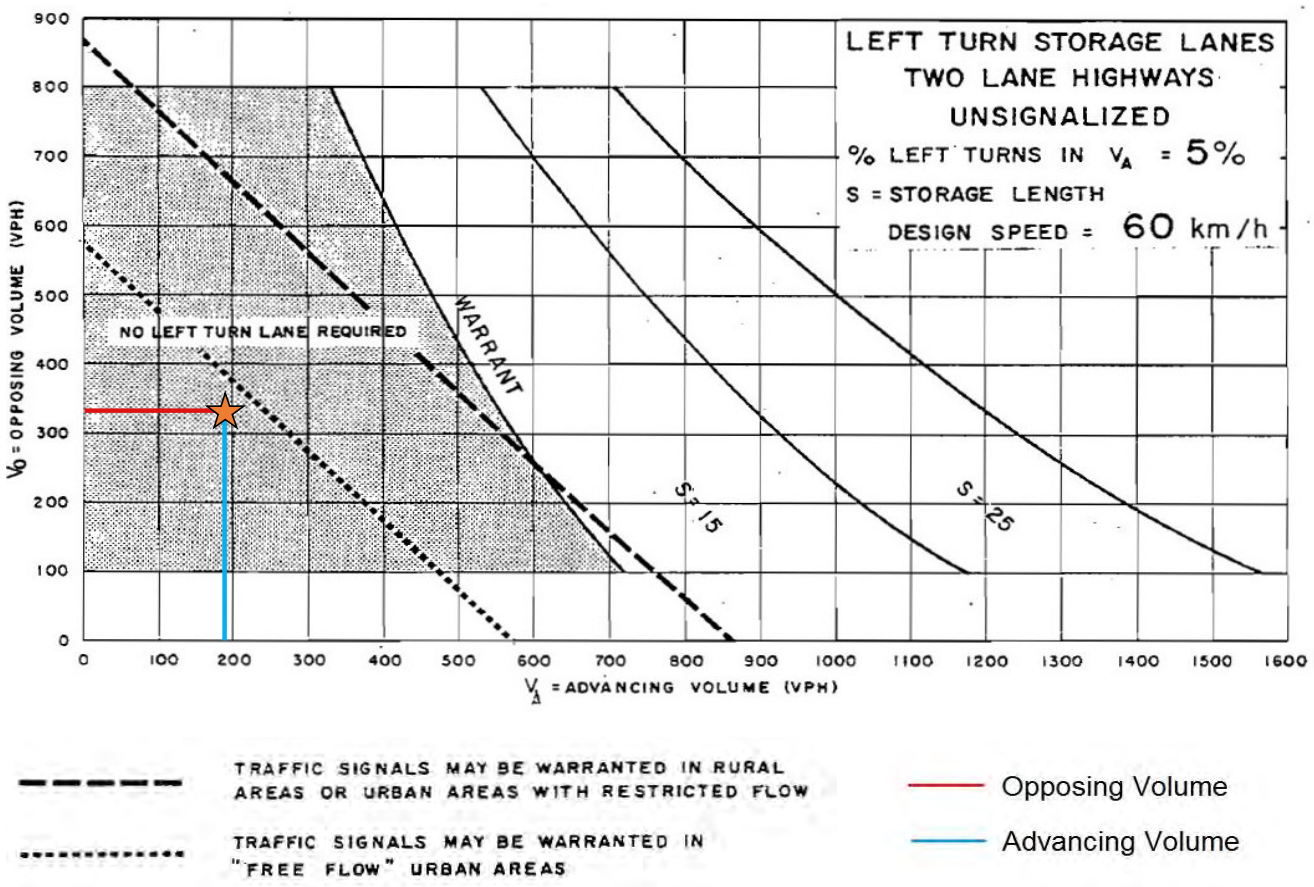
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

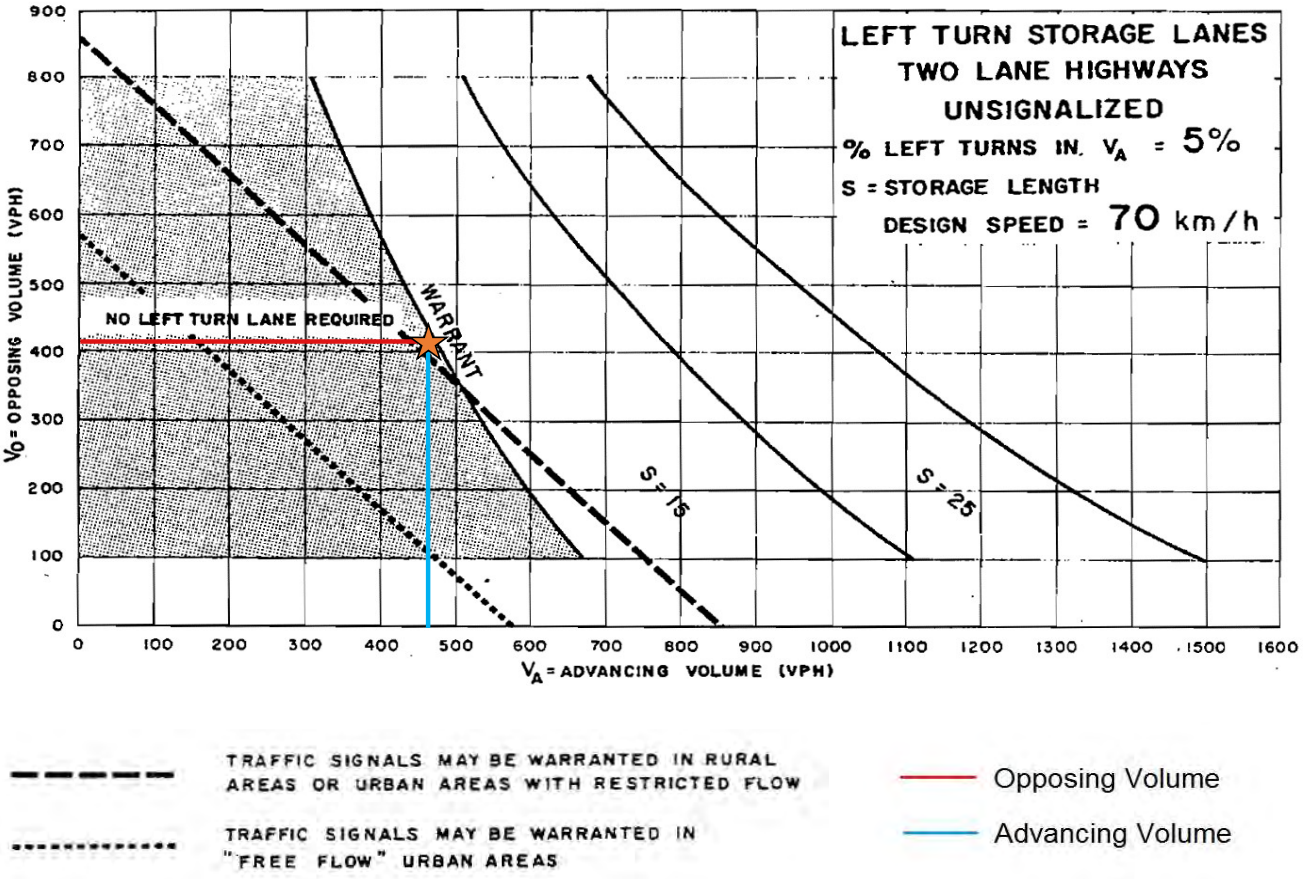
Opposing Volume

Advancing Volume

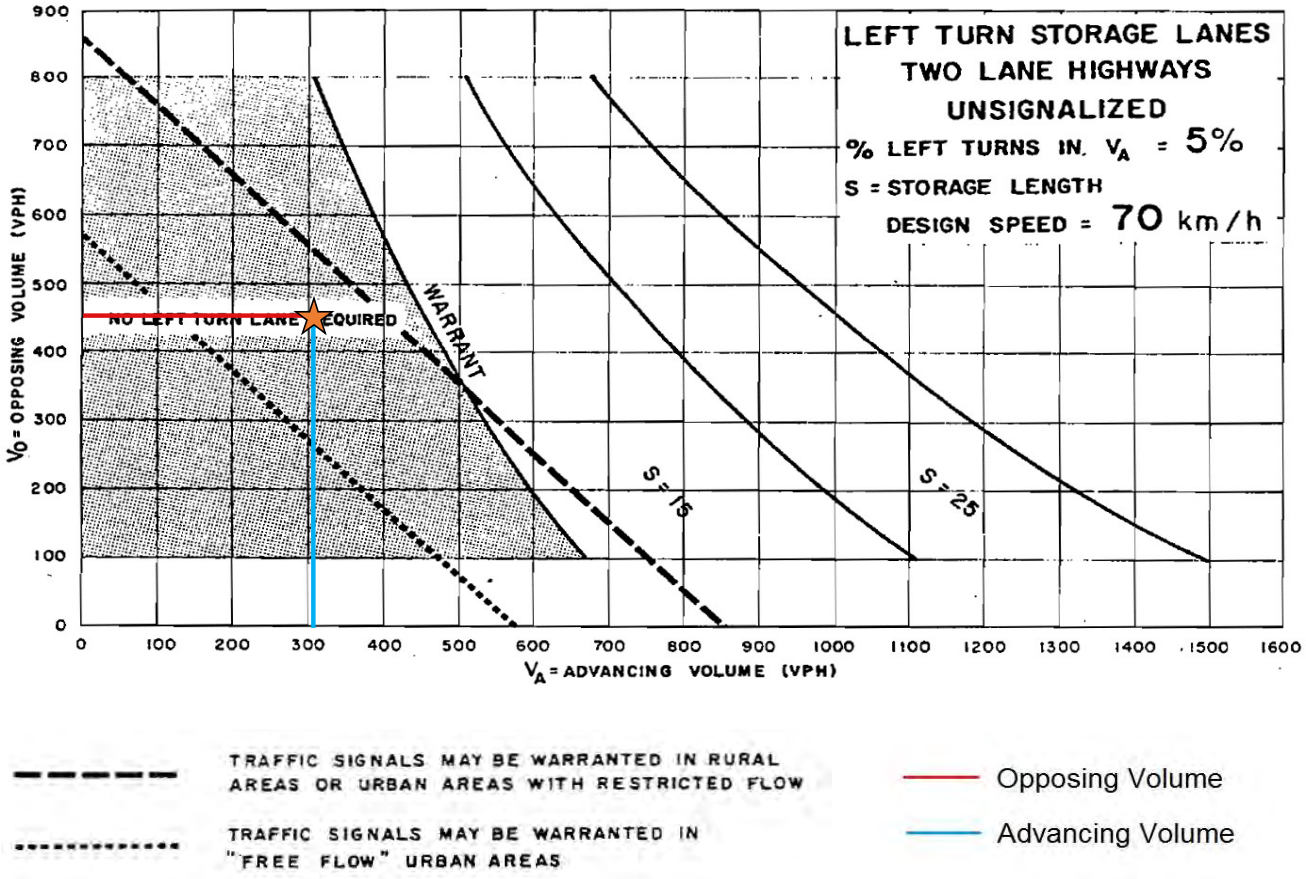
Future (2030) Total AM - SBL Turn Warrant at Mer Bleue Road & Wall Road



Future (2030) Total AM - SBL Turn Warrant at Tenth Line Road & Sweetvalley Drive (S)



Future (2030) Total AM - NBL Turn Warrant at Tenth Line Road & Wall Road



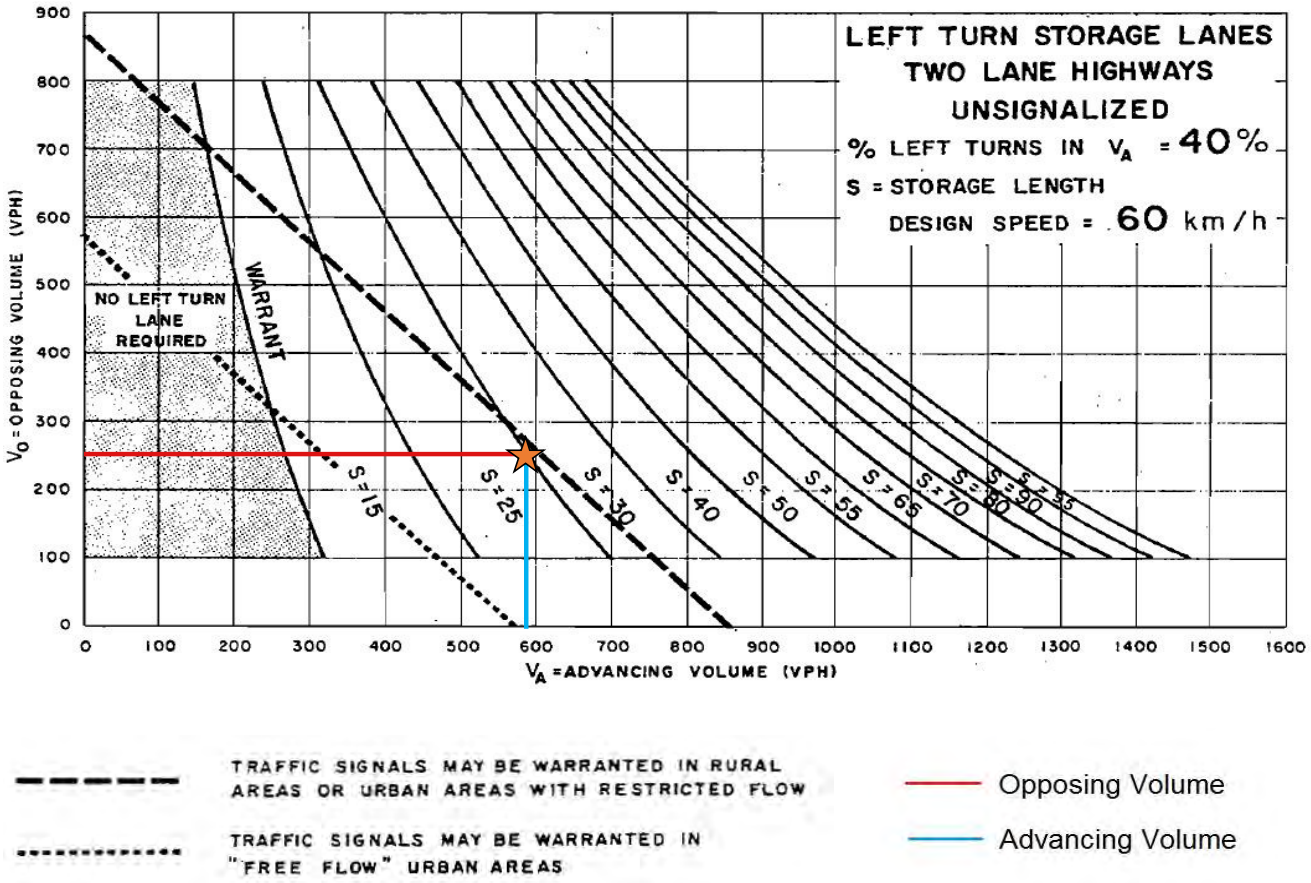
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Opposing Volume

Advancing Volume

Future (2030) Total PM - SBL Turn Warrant at Mer Bleue Road & Street 1



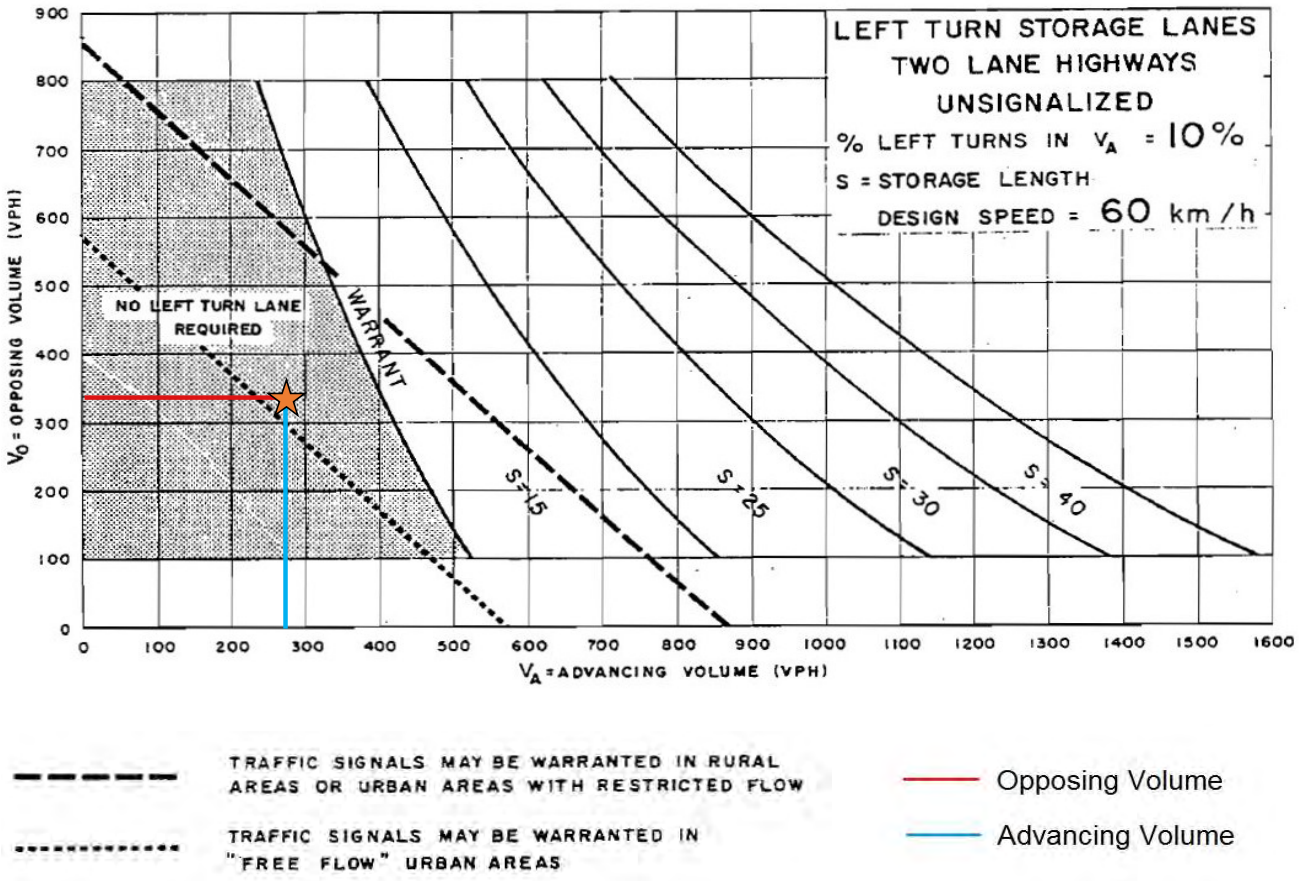
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Opposing Volume

Advancing Volume

Future (2030) Total PM - SBL Turn Warrant at Mer Bleue Road & Wall Road



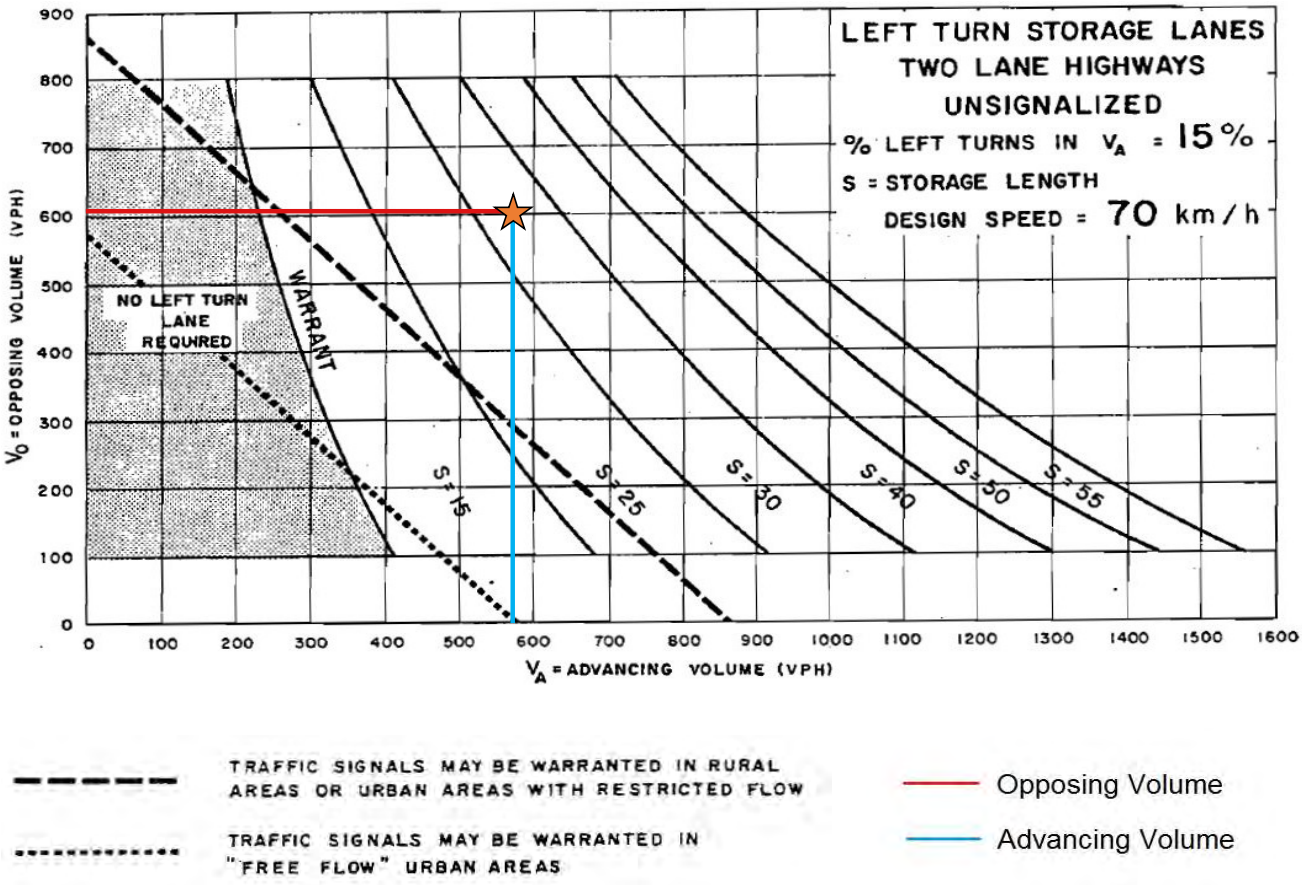
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Opposing Volume

Advancing Volume

Future (2030) Total PM - SBL Turn Warrant at Tenth Line Road & Sweetvalley Drive (S)



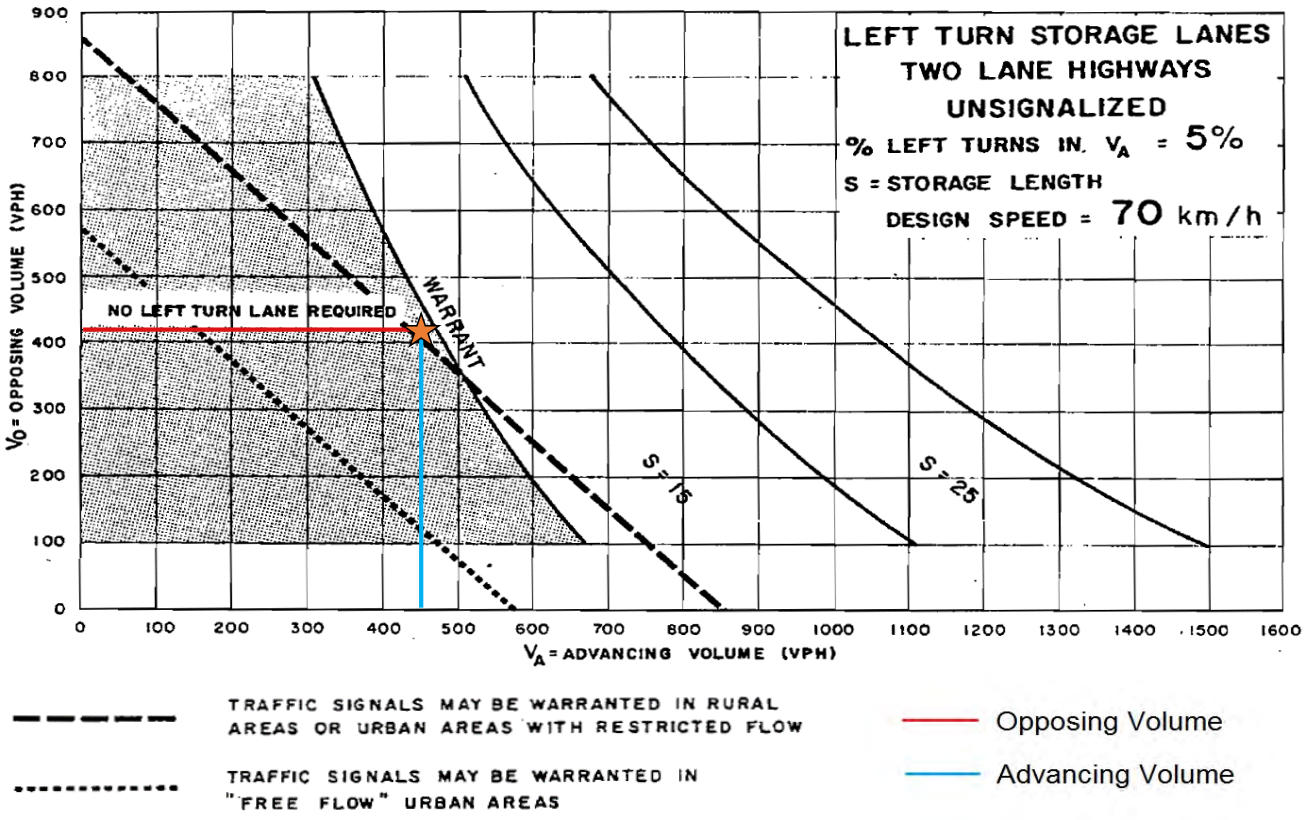
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Opposing Volume

Advancing Volume

Future (2030) Total PM - NBL Turn Warrant at Tenth Line Road & Wall Road



TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Opposing Volume

Advancing Volume