240-270 Lamarche Avenue & 3484 Innes Road

TIA Step 4 - Strategy Report

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TABLE OF CONTENTS

DOCUMENT CONTROL PAGE I
TIA STRATEGY REPORT 1
1. SCREENING FORM 1
2. SCOPING REPORT 1
2.1. EXISTING AND PLANNED CONDITIONS 1
2.1.1. PROPOSED DEVELOPMENT 1
2.1.2. EXISTING CONDITIONS 4
2.1.3. PLANNED CONDITIONS 10
2.2. STUDY AREA AND TIME PERIODS 14
2.3. EXEMPTION REVIEW 15
3. FORECASTING REPORT 15
3.1. DEVELOPMENT GENERATED TRAVEL DEMAND 15
3.1.1. TRIP GENERATION AND MODE SHARES 15
3.1.2. TRIP DISTRIBUTION 17
3.1.3. TRIP ASSIGNMENT 17
3.2. BACKGROUND NETWORK TRAVEL DEMANDS 18
3.2.1. TRANSPORTATION NETWORK PLANS 18
3.2.2. BACKGROUND GROWTH 18
3.2.3. OTHER AREA DEVELOPMENTS 18
3.3. DEMAND RATIONALIZATION 20
4. STRATEGY REPORT 22
4.1. DEVELOPMENT DESIGN 22
4.1.1. DESIGN FOR SUSTAINABLE MODES 22
4.1.2. CIRCULATION AND ACCESS 22
4.1.3. NEW STREETS NETWORK 22
4.2. PARKING 23
4.3. BOUNDARY STREET DESIGN 24
4.3.1. EXISTING CONDITIONS 24
4.4. ACCESS INTERSECTION DESIGN 25
4.4.1. LOCATION AND DESIGN OF ACCESS 25
4.4.2. INTERSECTION CONTROL 26
4.4.3. INTERSECTION DESIGN 26
4.5. TRANSPORTATION DEMAND MANAGEMENT 27
4.5.1. CONTEXT FOR TDM 27
4.5.2. NEED AND OPPORTUNITY 27
4.5.3. TDM PROGRAM 27
4.6. NEIGHBORHOOD TRAFFIC MANAGEMENT 27
4.6.1. ADJACENT NEIGHBORHOODS 27
4.7. TRANSIT 27
4.7.1. ROUTE CAPACITY 27
4.7.2. TRANSIT PRIORITY 28
4.8. REVIEW OF NETWORK CONCEPT 28
4.9. INTERSECTION DESIGN 28

4.9.1. INTERSECTION CONTROL 28
4.9.2. INTERSECTION DESIGN 28
5. FINDINGS AND RECOMMENDATIONS 32

LIST OF FIGURES

FIGURE 1: LOCAL CONTEXT 1
FIGURE 2: PROPOSED SITE PLAN – OPTION 1 3
FIGURE 3: EXISTING DRIVEWAYS ADJACENT TO DEVELOPMENT 6
FIGURE 4: AREA TRANSIT NETWORK 7
FIGURE 5: NEARBY TRANSIT STOPS 8
FIGURE 6: EXISTING PEAK HOUR TRAFFIC VOLUMES (BALANCED) 8
FIGURE 7: EXISTING PEAK HOUR PEDESTRIAN/CYCLING VOLUMES 9
FIGURE 8: TMP TRANSIT AFFORDABLE NETWORK (MAP 5) 10
FIGURE 9: TMP ROAD NETWORK (MAP 6) 11
FIGURE 10: FUTURE 'ULTIMATE CYCLING NETWORK" 12
FIGURE 11: OTHER AREA DEVELOPMENTS 12
FIGURE 12: PROPOSED ROAD CONNECTIONS BETWEEN LAMARCHE AND NEIGHBOURING DEVELOPMENTS 14
FIGURE 13: STUDY AREA BOUNDARIES AND INTERSECTIONS 14
FIGURE 14: 'NEW' SITE-GENERATED PEAK HOUR TRAFFIC 18
FIGURE 15: 3443 INNES ROAD PROJECTED PEAK HOUR TRAFFIC VOLUMES – FULL BUILD OUT 19
FIGURE 16: 3604 INNES ROAD PROJECTED PEAK HOUR TRAFFIC VOLUMES – FULL BUILD OUT 19
FIGURE 17: 3817 INNES ROAD PROJECTED TRAFFIC VOLUMES – FULL BUILD OUT 20
FIGURE 18: EAST URBAN COMMUNITY ROAD PROJECTED PEAK HOUR TRAFFIC VOLUMES – PHASE 1 20
FIGURE 19: 2029 BACKGROUND PEAK HOUR TRAFFIC VOLUMES 21
FIGURE 20: PROPOSED STREET SECTION AT FUTURE MUNICIPAL LOOP ROAD (CROISSANT FRANÇOISE) 23
FIGURE 21: FULL-BUILDOUT TOTAL PROJECTED PEAK HOUR TRAFFIC VOLUMES 31

LIST OF TABLES

TABLE 1: ZONE 1 DEVELOPMENT BREAKDOWN 2
TABLE 2: EXEMPTIONS REVIEW SUMMARY 15
TABLE 3: 2020 TRANS RESIDENTIAL TRIP GENERATION RATES 15
TABLE 4: RESIDENTIAL UNIT PEAK PERIOD PERSON TRIP GENERATION 15
TABLE 5: RESIDENTIAL PEAK PERIOD TRIPS USING TRANS 2020 MODE SHARES 15
TABLE 6: PEAK PERIOD TO PEAK HOUR CONVERSION FACTOR (2020 TRANS MANUAL) 16
TABLE 7: ZONE 1 PEAK HOUR TRIPS GENERATED USING TRANS 2020 MODE SHARES 16
TABLE 8: RESIDENTIAL MODE SHARE COMPARISON– TRANS AND TARGET MODE SHARE 17
TABLE 9: RESIDENTIAL PEAK HOUR TRIPS GENERATED USING TARGET MODE SHARES 17
TABLE 10: ORLÉANS/INNES HISTORICAL BACKGROUND GROWTH (2003 – 2017) 18
TABLE 11: VEHICLE PARKING SPACE SUPPLY 24
TABLE 12: BICYCLE PARKING REQUIREMENTS 24
TABLE 13: MMLOS – BOUNDARY STREET SEGMENTS EXISTING AND FUTURE PROPOSED 25
TABLE 14: MMLOS – EXISTING AND FUTURE INTERSECTIONS 28
TABLE 15: EXISTING INTERSECTION PERFORMANCE 29
TABLE 16: 2029 BACKGROUND INTERSECTION PERFORMANCE 30
TABLE 17: FULL-BUILDOUT INTERSECTION PERFORMANCE 31
TABLE 18: QUEUEING ANALYSIS FOR LAMARCHE/INNES BY HORIZON AND MODE SHARE ASSUMPTION 32

LIST OF APPENDICES

APPENDIX A – SCREENING FORM AND COMMENT RESPONSES
APPENDIX B – TRAFFIC COUNT DATA
APPENDIX C – COLLISION DATA
APPENDIX D – EAST URBAN COMMUNITY & GLENVIEW SITE PLANS
APPENDIX E – PROJECTED BACKGROUND GROWTH
APPENDIX F – CAIVAN LANDS PLAN & LAMARCHE AVENUE ACTIVE TRANSPORTATION FACILITIES
APPENDIX G – TRUCK TURNING TEMPLATES
APPENDIX H – DESIGN SKETCH LAMARCHE/INESS INTERSECTION
APPENDIX I – MMLOS: BOUNDARY STREET ROAD SEGMENTS
APPENDIX J – WARRANTS ANALYSIS
APPENDIX K – TDM CHECKLIST
APPENDIX L – MMLOS: INTERSECTION ANALYSIS
APPENDIX M – SYNCHRO ANALYSIS: EXISTING CONDITIONS
APPENDIX N – SYNCHRO ANALYSIS: BACKGROUND INTERSECTION PERFORMANCE
APPENDIX O – SYNCHRO ANALYSIS: FUTURE INTERSECTION PERFORMANCE

TIA Strategy Report

Parsons has been retained by Lépine Corp. (Lépine) to prepare a Transportation Impact Assessment (TIA) in support of a Site Plan Application (SPA) for a new residential focused development located at 240-270 Lamarche Avenue and 3484 Innes Road (former 3490 Innes Road) in the Orléans Ward. This document follows the new TIA process, as outlined in the City Transportation Impact Assessment (TIA) Guidelines (2017).

The applicant previously submitted a TIA in support of a Zoning By-Law Amendment (ZBLA) on February 13, 2020. Since that time, Lépine has developed four (4) different development proposals that significantly reduce the scale and density to better align with the ultimate vision for the property. As of October 2021, the new ZBLA and Plan of Subdivision (PoS) Application has been submitted. This report represents Step 4 – Strategy Report that details the transportation implications related to the Zone 1 of the proposal by Lépine.

1. Screening Form

The screening form confirmed the need for a TIA Report based on the Trip Generation trigger, given that the proposed development consists of more than 89 residential apartment units; the Location trigger given that the development is located within a future cycling spine route, transit priority corridor with isolated measures and is within the Innes Arterial Mainstreet Design Priority Area (DPA); and the Safety trigger given that the proposed driveway is within the influence of potential future signalized intersection at Lamarche/Innes. The Screening Form has been provided in **Appendix A**.

2. Scoping Report

2.1. Existing and Planned Conditions

2.1.1. PROPOSED DEVELOPMENT

The proposed development is located at the municipal addresses of 240-270 Lamarche Avenue and 3484 Innes Road (former 3490 Innes Road), on the southwest corner of the Lamarche/Innes intersection. The site is currently occupied by small scale commercial properties, including an insurance company, food truck, mini-put facility and driving range. The proposed study area includes the intersections of Orléans/Innes, Pagé/Innes, Lamarche/Innes, Boyer/Innes and roadway segments adjacent to site or between intersections as shown in **Figure 1**. More details regarding the study area elements can be found in **Section 2.1.2**.

Figure 1: Local Context

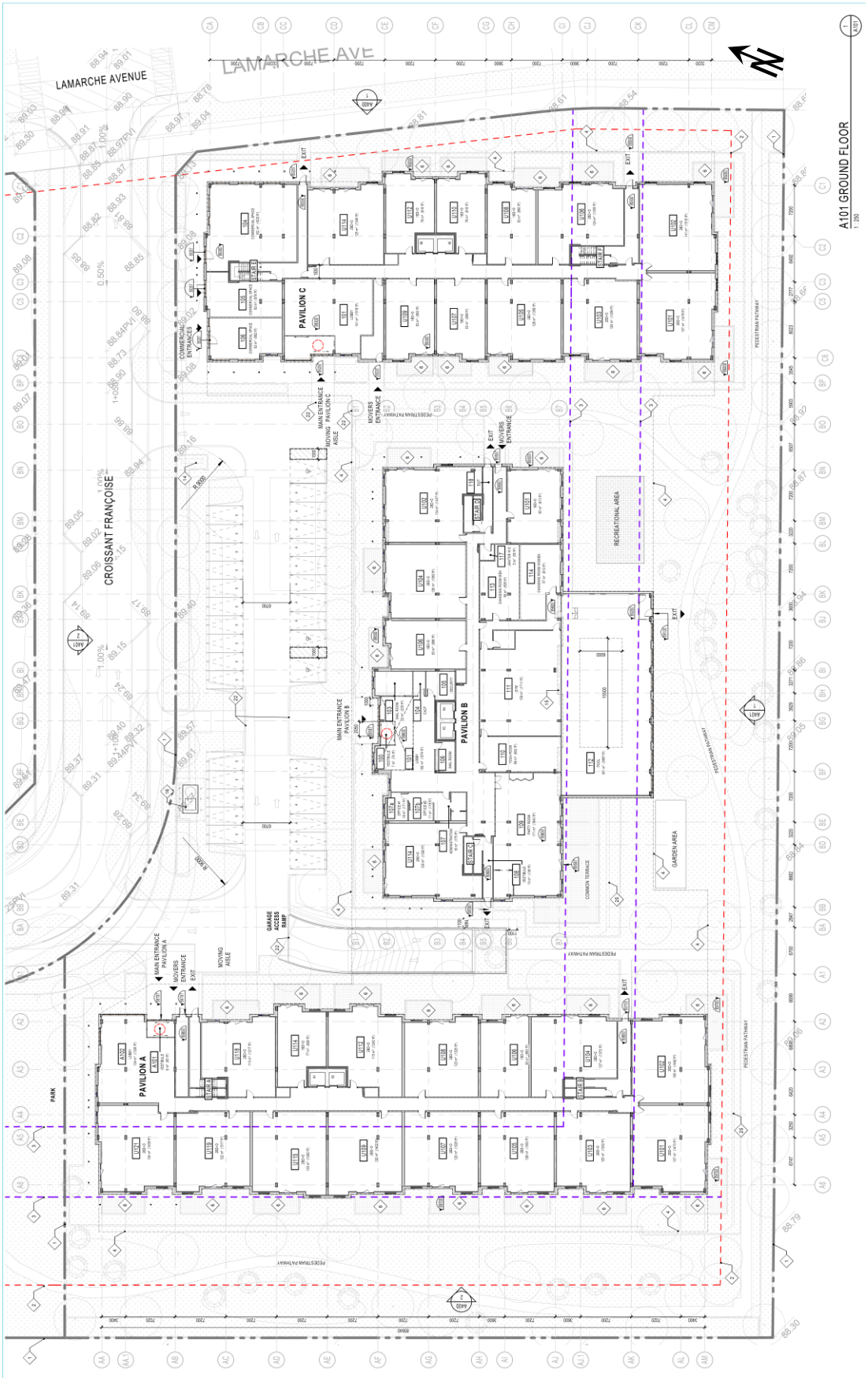
A recent report completed by Parsons in October 2021 analyzed the transportation impacts for the totality of the site, consisting of three individual zones with multiple different uses proposed such as a full residential development, some residential with commercial or a retirement home or both.

The purpose of this report is to address the transportation needs related to a Site Plan Application, focusing on more specific details. This report will focus on Zone 1 of the 3 Zones proposed. Zone 1, the most southern zone within the site, is proposed as a predominant residential phase consisting of three residential buildings with 283 units total, broken down as summarized in **Table 1.** A small commercial unit of approximately 2,996 ft^2 is proposed in Pavilion C, which is assumed to be catered to the local community only given the size and location of the commercial uses. Zone 1 is proposed to be complete by 2024, with the latest site plan in **Figure 2.**

Table 1: Zone 1 Development Breakdown

Development	Number of Storeys	Number of Units	Description
Residential Pavilion A	6	105	Located in the southwest of property
Residential Pavilion B	7	81	Located in the south of property between buildings A and C
Residential Pavilion C	7	97	Located in the southeast of property fronting Lamarche

Figure 2: Proposed Site Plan – Option 1



2.1.2. EXISTING CONDITIONS

Area Road Network

Innes Road is an east-west arterial roadway with a 4-lane cross-section and auxiliary turn lanes at major intersections. It extends from St. Laurent Boulevard in the west to Dunning Road in the east. Beyond St. Laurent Boulevard, Innes Road continues as Industrial Avenue, and beyond Dunning Road, it continues as Beaton Road. Within the study area, the posted speed limit is 60 km/h.

Orléans Boulevard is a north-south arterial roadway that extends from Navan Road in the south to Cairine Wilson Secondary School in the north. The posted speed limit is 50 km/h south of Innes Road and 60 km/h north of Innes Road. Within the study area, Orléans Boulevard has a four-lane cross-section with auxiliary turn lanes provided at major intersections. South of Silverbirch Street, Orléans Boulevard has a two-lane cross-section.

Pagé Road is a north-south collector roadway south of Innes Road and a local roadway north of Innes Road. Within the study area, it has a two-lane cross-section with auxiliary turn lanes provided at major intersections. The posted speed limit is 40 km/h.

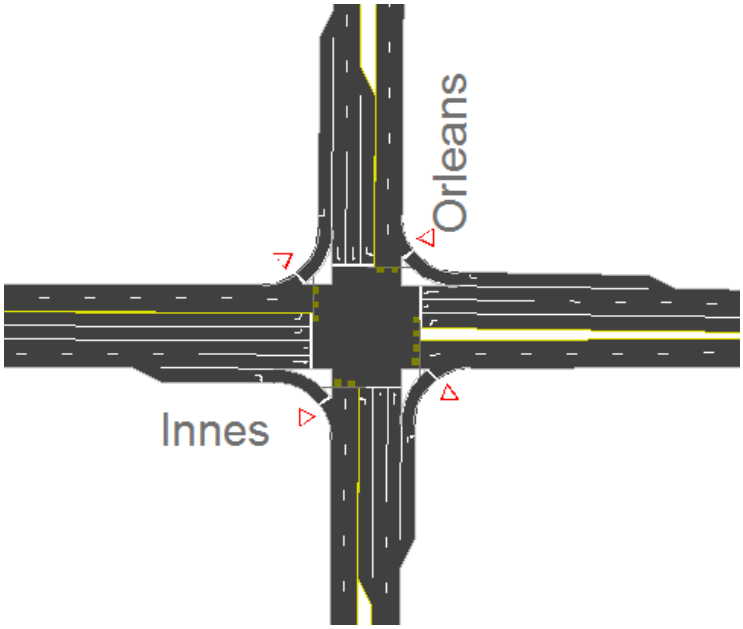
Lamarche Avenue is a north-south collector roadway that extends approximately 850m south from Innes Road. There is no other connection at this time to the wider municipal road network besides Innes Road. This roadway has been partially built with a two-lane cross-section with no auxiliary turn lanes provided at Innes Road. The posted speed limit is assumed 50 km/h.

Boyer Road is a north-south local roadway that has been segmented in multiple locations to prevent cut-through traffic. There is no connection to or from Boyer Road and Innes except for active transportation. South of Innes Road, it functions as a driveway to commercial stores such as U-Haul and a car wash.

Existing Study Area Intersections

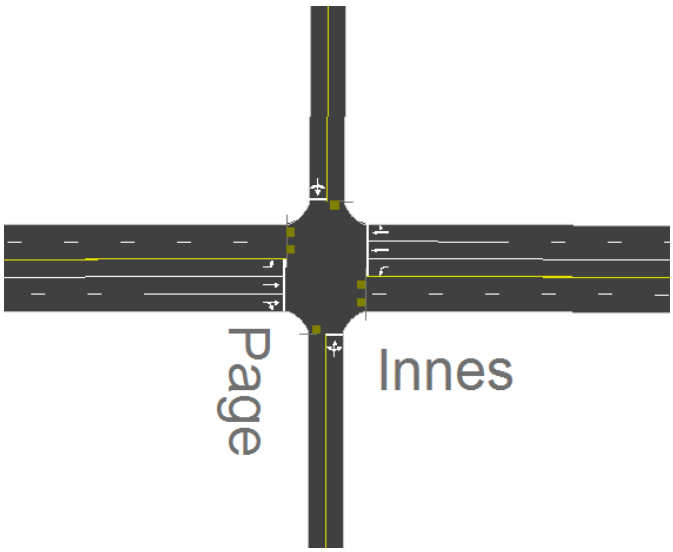
Orléans/Innes

The Orléans/Innes intersection is a four-legged signalized intersection. The eastbound approach consists of dual left-turn lanes, two through lanes and a channelized right-turn lane. The westbound approach consists of a single left-turn lane, two through lanes, and a channelized right-turn lane. The north and southbound approaches both consist of a single left-turn lane, two through lanes and a channelized right-turn lane. All movements are permitted at this location.



Pagé/Innes

The Pagé/Innes intersection is a four-legged signalized intersection. The west and eastbound approaches both consist of a single left-turn lane, a through lane and a shared through/right-turn lane. The north and southbound approaches both consist of a single full-movement lane. All movements are permitted at this location.

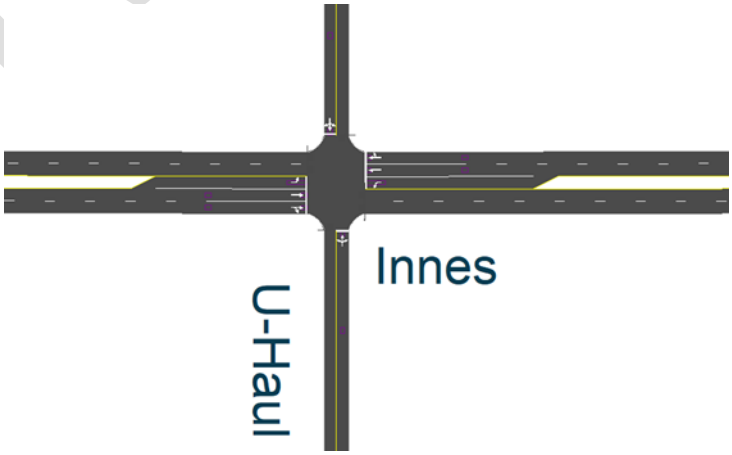


Lamarche/Innes

The Lamarche/Innes intersection is a three-legged unsignalized intersection with a STOP control on Lamarche. The eastbound approach consists of a through lane and a through-right lane. The westbound approach consists of a double through lane. The northbound approach consists of a single all movement lane. There is a two-way center left-turn lane for the east and westbound movements. All movements are permitted at this location.

U-Haul–Boyer/Innes

The U-Haul–Boyer/Innes access (former BMR access and referred to Boyer/Innes herein) intersection is a four-legged signalized intersection. The west and eastbound approaches both consist of a single left-turn lane, a through lane and a shared through/right-turn lane. The north and southbound approaches both consist of a single full-movement lane. All movements are permitted at this location.



Existing Driveways to Adjacent Developments

There are multiple existing driveways along Innes Road between Pagé Road and Boyer Road. The existing driveways as shown in **Figure 3** include:

- Access Driveways to Innes Road on north side:

- 3496 Innes – two accesses to a small shopping plaza with a gas bar and approximately 40 parking stalls (135m & 200m west of Lamarche/Innes)
- 3493 to 3581 Innes – private driveways to single detached homes (from 90m west of to 135m east of Lamarche/Innes intersection. 3523 Innes almost lines up with Lamarche)
- 3591 Innes – access to Lepage Osteopathic Clinic, which has parking for approximately 22 vehicles (155m east of Lamarche/Innes)
- 3605 Innes – two accesses to a Bell maintenance building. Though there is parking in the back, it is not normally accessible via Innes Road (180m & 210m east of Lamarche/Innes)

- Access Driveways to Innes Road on south side:
  - 3484 Innes –private driveway to single detached home (within site boundaries, site access will be removed with new development)
  - 3490 Innes – access to driving range, insurance company and food truck. Multiple parking accessible via two driveways (within site boundaries, site access will be removed with new development)
  - 3554 to 3564 Innes – private driveways to single detached homes (from just east of the site to 120m east of Lamarche/Innes intersection)
  - 245 Lamarche – access to a school bus storage facility with multiple parking stalls (135m east of Lamarche/Innes intersection)
  - 3592 Innes - private driveway to single detached home (155m east of Lamarche/Innes)

Figure 3: Existing Driveways Adjacent to Development

Existing Area Traffic Management Measures

Below are the known existing area traffic management measures within the study area:

- Sidewalk facilities with some crosswalks including high-visibility zebra stripes at the intersection of Orléans/Innes and share the road with cyclist sign (further details in following section);
- Red light camera at Orléans/Innes intersection;
- Channelized right-turns at Orléans/Innes intersection;
- On-street parking on Lamarche Avenue and Pagé Road;
- Cul-de-sac treatment on Boyer Road to prevent shortcutting; and,
- Speed bumps on Pagé Road;

Pedestrian/Cycling Network

Sidewalk facilities near she site are provided along both sides of Innes Road, Orléans Boulevard and Pagé Road (north of Innes Road, sidewalks are provided along the west side of Pagé Road only). A multi-use pathway was recently constructed on the west side of Lamarche Avenue, and a future sidewalk is planned on the east side of Lamarche Avenue.

According to the City's Existing Cycling Network, Pagé Road and Boyer Road are classified as suggested routes. Dedicated bicycle facilities are currently provided in the form of bike lanes in both directions along Innes Road.

Transit Network

The transit network for the study area is illustrated in **Figure 4** with nearby transit stops shown in **Figure 5**. The following OC Transpo routes currently operate within 600m walking distance to the site:

- **Route #25 (La Cité <-> Millennium)**: identified by OC Transpo as a "Frequent Route", this route operates at a frequency of every 15 minutes or less on weekdays and operates 7 days a week. Route #25 provides quick connection to the Confederation LRT Line at Blair Station and provides connection to La Cité Collegial. Bus stops for this route are available on both sides of Innes Road, less than 200m from the site to the east or the west of Lamarche/Innes as seen in **Figure 5**.
- **Route #231 (Blair <-> Hurdman)**: identified by OC Transpo as a "Connexion Route", this route provides convenient connection to the Confederation LRT Line during weekday peak periods only. Bus stops for this route are available on both sides of Meadowglen Drive, approximately 550m from the site.
- **Route #131 (Hurdman <-> Billings Bridge)**: identified by OC Transpo as a "Local Route", this route operates on customized routing and schedules, to serve local destinations with connection to the Confederation LRT Line at Hurdman and provides connection to the BRT Transitway at Billings Bridge. Route #46 operates at an average rate of every 30 minutes during weekdays. Bus stops for this route are available on both sides of Meadowglen Drive, approximately 550m from the site.

Figure 4: Area Transit Network

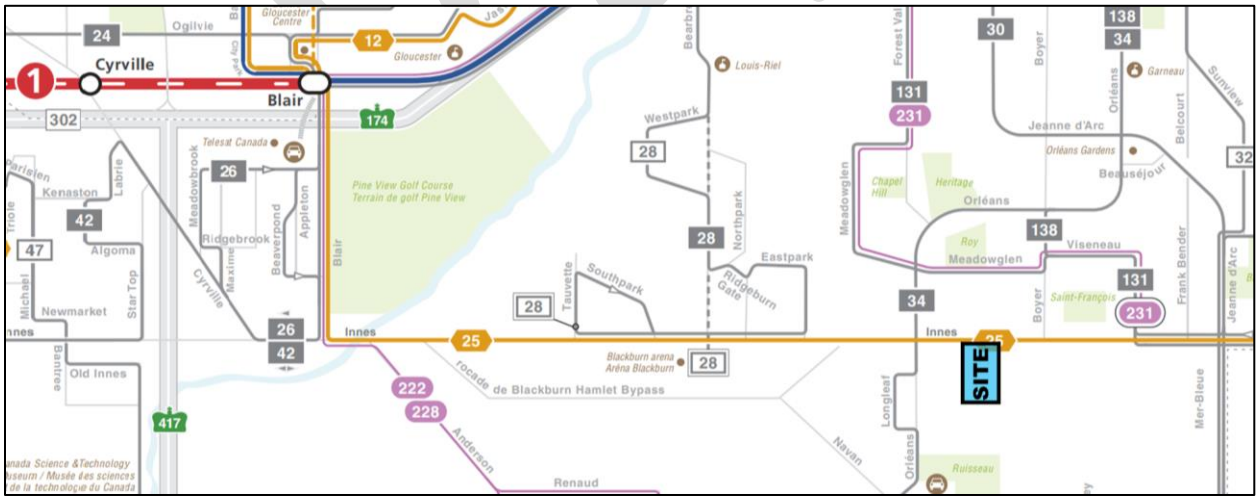
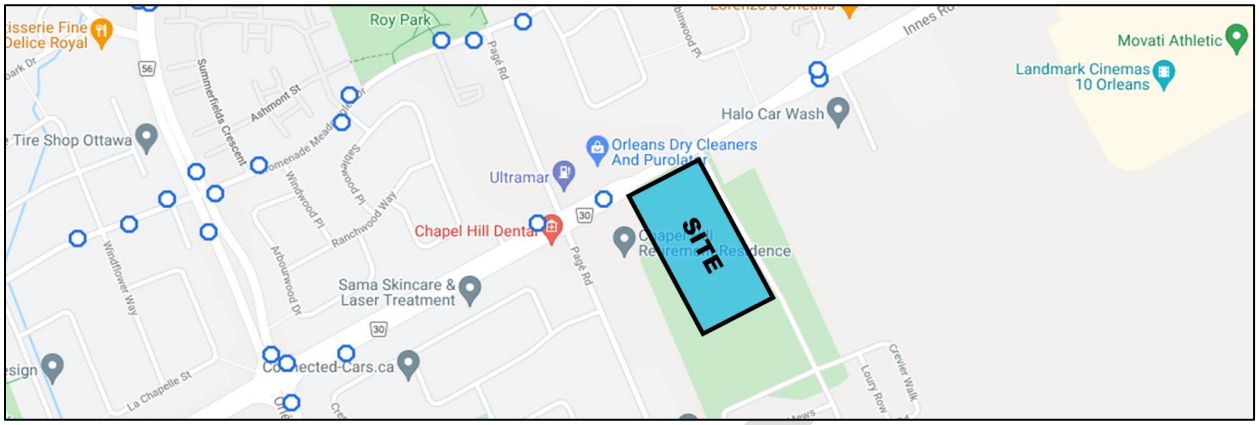


Figure 5: Nearby Transit Stops



Peak Hour Travel Demands

The existing peak hour vehicle traffic and active travel volumes within the study area are illustrated in **Figure 6** and **Figure 7** respectively. These volumes were obtained from the City of Ottawa (2017 and 2019 counts pre-COVID-19 conditions). Count data has been provided in **Appendix B**.

The City did not have peak hour turning movement data at the Lamarche/Innes intersection, despite recent residential development (Caivan Lands) south of the proposed site. A site visit confirmed that approximately 75% of the Caivan residences have been constructed and are currently occupied. Parsons completed a turning movement count at this intersection in August 2021, which was used to inform the trip distribution/patterns, not the trip generation due to the ongoing COVID pandemic conditions that would underrepresent vehicle traffic volumes.

Therefore, the total number of trips generated by the Caivan Lands at full buildout were still based on trip generation estimates provided in the 2016 TIA Report by Parsons (more detail provided in **Section 2.1.3**). These estimates were then factored by 75% to represent the existing buildout of the Caivan Lands.

Historically, TIA's completed for adjacent developments in the area have assumed a strong traffic draw to/from the west, based on the assumption that primary employment location for local residents is downtown. The most recent counts at Lamarche/Innes suggested a more balanced traffic distribution east and west, which supports the 2011 NCR Household Origin-Destination Survey that reports approximately 46% of outbound trips and 78% of inbound trips stay within Orléans.

This more balanced trip distribution was applied to the Caivan Lands trip generation estimates (at 75% buildout) to represent existing peak hour traffic volumes at the Lamarche/Innes intersection. This same trip distribution was also applied to the proposed development trip generation estimates, as discussed in **Section 3.1.2**.

Figure 6: Existing Peak Hour Traffic Volumes (Balanced)

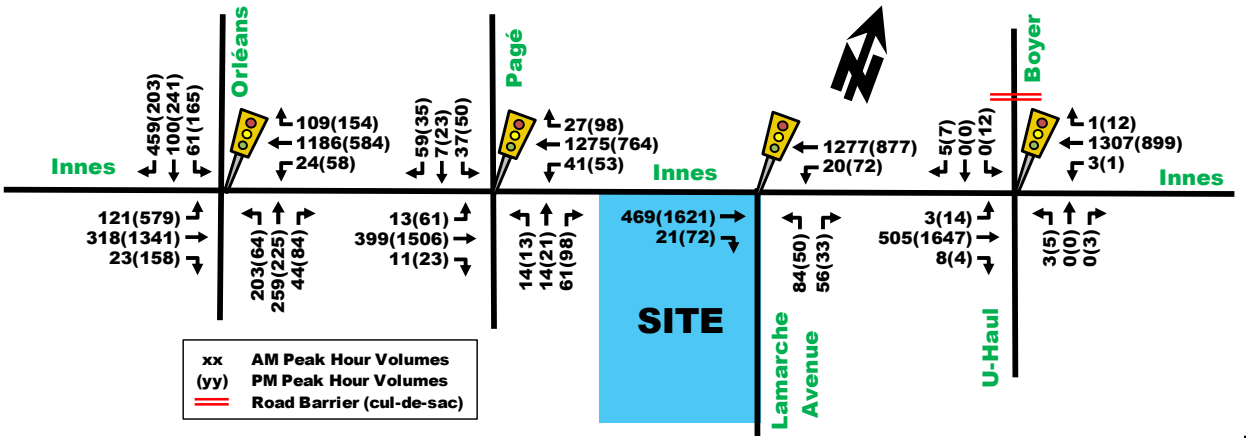
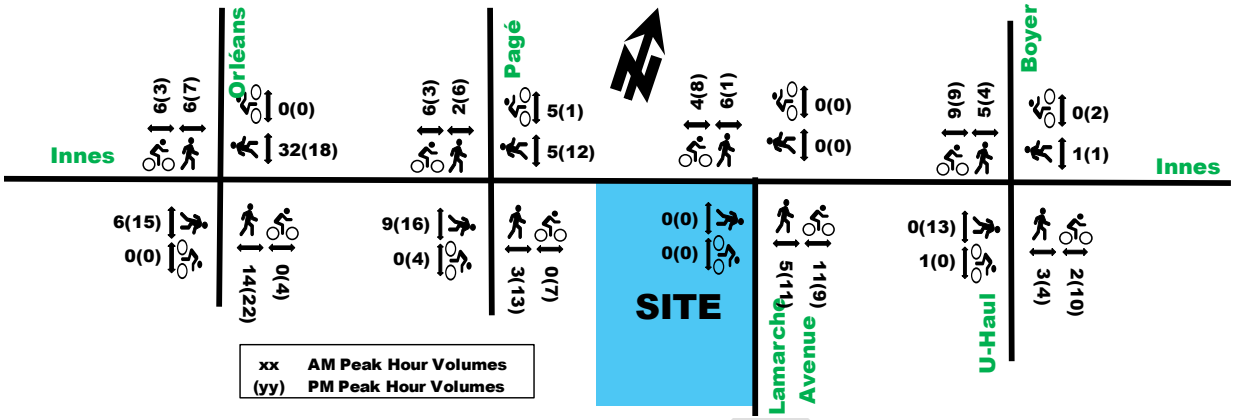


Figure 7: Existing Peak Hour Pedestrian/Cycling Volumes



Existing Road Safety Conditions

A five-year collision history data (2015-2019, inclusive) was requested and obtained from the City of Ottawa for all intersections and road segments within the study area. Upon analyzing the collision data, the total number of collisions observed within the study area was determined to be 136 collisions within the past five-years. Within the study area, the quantity of collisions at each location has occurred at a rate of:

- Orléans/Innes: 68
- Pagé/Innes: 31
- Lamarche/Innes: 0
- Boyer/Innes: 5
- Mid-Block Innes-Orléans: 9
- Mid-block Orléans-Pagé: 8
- Mid-block Pagé-Boyer: 15

To help quantify the relative safety risk at intersections within the study area, an industry standard unit of measure for assessing collisions at an intersection was used based on the number collisions per million entering vehicles (MEV). An MEV value greater than 1.00 indicates a relatively high frequency of collisions; however, it does not explain the type or severity of collision. A secondary analysis is done to determine the severity of collision by representing the number of personal injuries rate as a percentage (%PIR) of the total number of collisions at a given intersection.

A high propensity (MEV > 1.00 or %PIR > 30%) would signal a potential intersection design deficiency or other contributing factor, such as poor intersection geometry, blind spots, poor lighting, excessive speeds, high amount of entry/exit driveways etc.

Intersections that met the MEV or PIR threshold include:

- Pagé/Innes – 0.60 Collisions/MEV with 32% causing injury. Total of 31 collisions with 11 (45%) of all collisions involving rear end, 6 (19%) of all collisions involving turning movements, 5 (16%) involving single motor vehicle other, 3 (10%) involving angle, 2 (6%) sideswipe and 1 (3%) other.

  Overall, Pagé/Innes does not have a high propensity to collisions (medium MEV of 0.6), but it was observed that of the 31 collisions, 3 involved pedestrians and 1 involved a cyclist, all which led to non-fatal injuries. Of the 4 collisions with active transportation modes, 3 of them occurred from motorists failing to yield to them and 1 was categorized as 'unknown'.

  This intersection does not have a contemporary design that meets AODA standards. The City may consider pedestrian and cycling enhancements as part of the life-cycle of this corridor, such as ladder crosswalks and TWSIs, which may help reduce the risk of pedestrian collisions.

Intersections that did not meet the MEV or PIR threshold and do not warrant further analysis include:

- Orléans/Innes – 0.93 Collisions/MEV with 28% causing injury. Total of 68 collisions with 35 (51%) of all collisions involving rear end. Of the 35 rear end collisions, 22 (63%) occurred from vehicles following

too close and 20 of 35 rear end collisions (57% occurred with vehicles travelling east or westbound on Innes Road

- Boyer/Innes – 0.10 Collisions/MEV with 20% causing injury. Total of 5 collisions with 3 (60%) of all collisions involving rear end
- Lamarche/Innes – No collision registered at this intersection

Other collisions within the study area include:

- There was a total of 32 collisions between intersections (mid-block segments), with the majority, 15 (47%) of them occurring on Innes Road between Pagé/Innes and Boyer/Innes. All mid-block segment collisions experienced PIR of less than 30% and none involved active transportation modes
- Out of all collisions, only 1 (<1%) involved cyclists and it occurred at the intersection of Pagé/Innes
- There was a total of 6 registered collisions with pedestrians (4% of all collisions), 3 occurring at Orléans/Innes and 3 at Pagé/Innes

Many of the collisions noted above are reflective of the sheer volume of vehicle traffic on Innes Road, to which there are limited mitigation options. Over time, the City should consider more contemporary designs along the entire corridor to meet AODA compliance and prioritize active modes (i.e. complete streets approach) to help reduce risks to pedestrians and cyclists.

The source collision data as provided by the City of Ottawa and related analysis is provided as **Appendix C**.

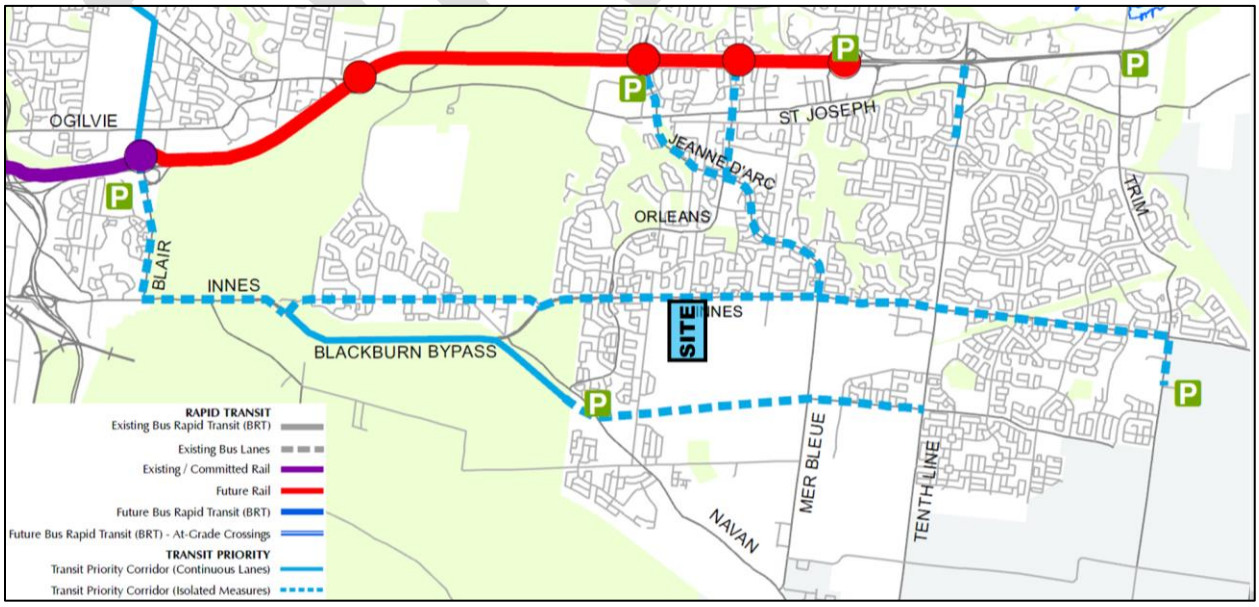
2.1.3. PLANNED CONDITIONS

Planned Study Area Transportation Network Changes

Transit Network

Within Ottawa's 2013 Transportation Master Plan (TMP) affordable network as shown in **Figure 8**, Innes Road is proposed a transit priority corridor with isolated measures between Blair Road and Millennium, passing through adjacent to the site. Blackburn Bypass is proposed as a continuous measure transit priority linking to the Brian Coburn isolated measure transit priority. Note that the most recent public consultation for the Brian Coburn BRT suggests an extension to Renaud Road and connecting to Innes Road near Anderson/Innes intersection. The projected timing for the implementation of the Blackburn Bypass is prior to 2024.

Figure 8: TMP Transit Affordable Network (Map 5)



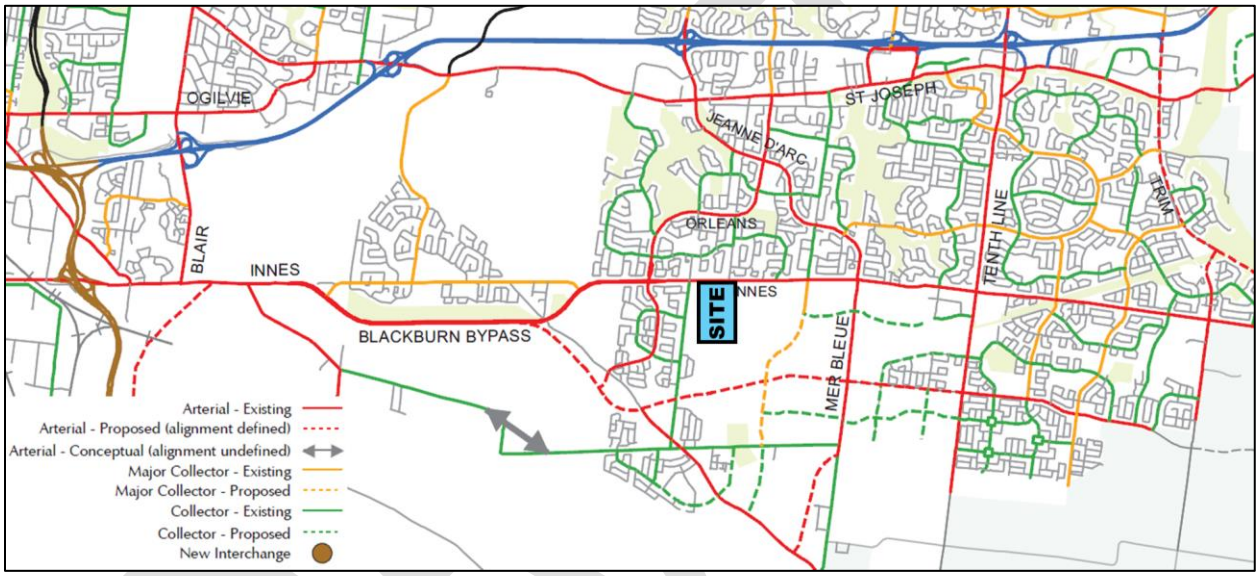
Road Network

Within Ottawa's 2013 Transportation Master Plan (TMP) road network as shown in **Figure 9**, new roads are proposed within the vicinity of the site. Some of the roadway expansions or new roadways proposed include Frank Bender Street (major north-south collector), Harvest Valley Avenue (east-west collector) extensions and the Blackburn Bypass connecting to Brian Coburn Boulevard.

Vanguard Drive is currently underway (east-west collector) which will extend from Lanthier Drive in the east to Mer Bleue Road in the west and will serve as one of the primary east-west collectors through the proposed Orléans Industrial Park.

Brian Coburn Boulevard has already been built since the writing of this report. The most recent draft site plans for 3604 Innes Road and the East Urban Community Mixed Use Centre (EUC) CDP propose road connections to Lamarche Avenue and the Boyer/Innes intersection. Further detail has been provided below within this section, in the **"Other Area Developments"** subsection.

Figure 9: TMP Road Network (Map 6)



Cycling Network

Within the Ottawa Ultimate Cycling Network, Innes Road and Pagé Road are classified as 'spine bike routes'. Orléans Boulevard, Boyer Road and Meadowglen Drive are classified as 'local bike routes'. There is a major pathway proposed east of the site connecting Innes Road to the major pathway on the north side of Brian Coburn Boulevard. **Figure 10** depicts the future cycling network.

Figure 10: Future 'Ultimate Cycling Network"

Other Area Developments

The following section outlines adjacent developments in the general area that were considered in the TIA. The criteria for inclusion of other area developments are either approved developments or developments that have an active planning application that are generally within a 1-km radius of the subject site. **Figure 11** illustrates the location and relative size of relevant other area developments.

Figure 11: Other Area Developments

1 – 3443 Innes

A 6-storey mixed use building is proposed at this location, with 35 residential units and ground floor commercial. A TIA prepared by Novatech in December 2017, projects approximately 30 new two-way trips. These trips will be layered on to background volume trips.

2 – 3490 Innes (Caivan Lands)

The Caivan Plan of Subdivision consists of approximately 534 residential units which have access to Innes Road via Lamarche Avenue, south of the proposed development. The majority of the Caivan Lands is already constructed and occupied (approximately 75%), which has been reflected in the existing traffic volumes.

The remaining 25% of forecasted traffic volumes based on the 2016 TIA Report will be added to the future background forecasts.

3 – 3604 Innes

A plan for subdivision, Glenview Residential Development, consisting of approximately 457 dwellings, including 180 single-detached homes, 109 townhouse units and 168 stacked townhouses. This development plans on having two road connections to Lamarche Avenue south of Lépine's proposed development, uses Boyer/Innes as its main access and connects to future East Urban Community (see 'other area development #6').

A TIA prepared by Novatech in October 2019, projects approximately 200 to 260 new two-way trips for the AM and PM peak periods respectively. It is assumed that this development will be fully built out by 2028. These trips will be layered on to background volume trips.

4 – 3636 Innes

A self-storage building is proposed for this site. Given the low number of forecasted new vehicle trips and the new site uses having a lower trip generation than existing site uses, it is not anticipated to have any adverse effects on the study road network.

5 – 3817 Innes

Three apartment buildings ranging from 3 to 5-storeys high are proposed at this location with a combined 97 residential rental units. A TIA prepared by D.J Halpenny & Associates in March 2021, projects approximately 35 to 45 new two-way trips for the AM and PM peak hours respectively. These trips will be layered on to background volume trips.

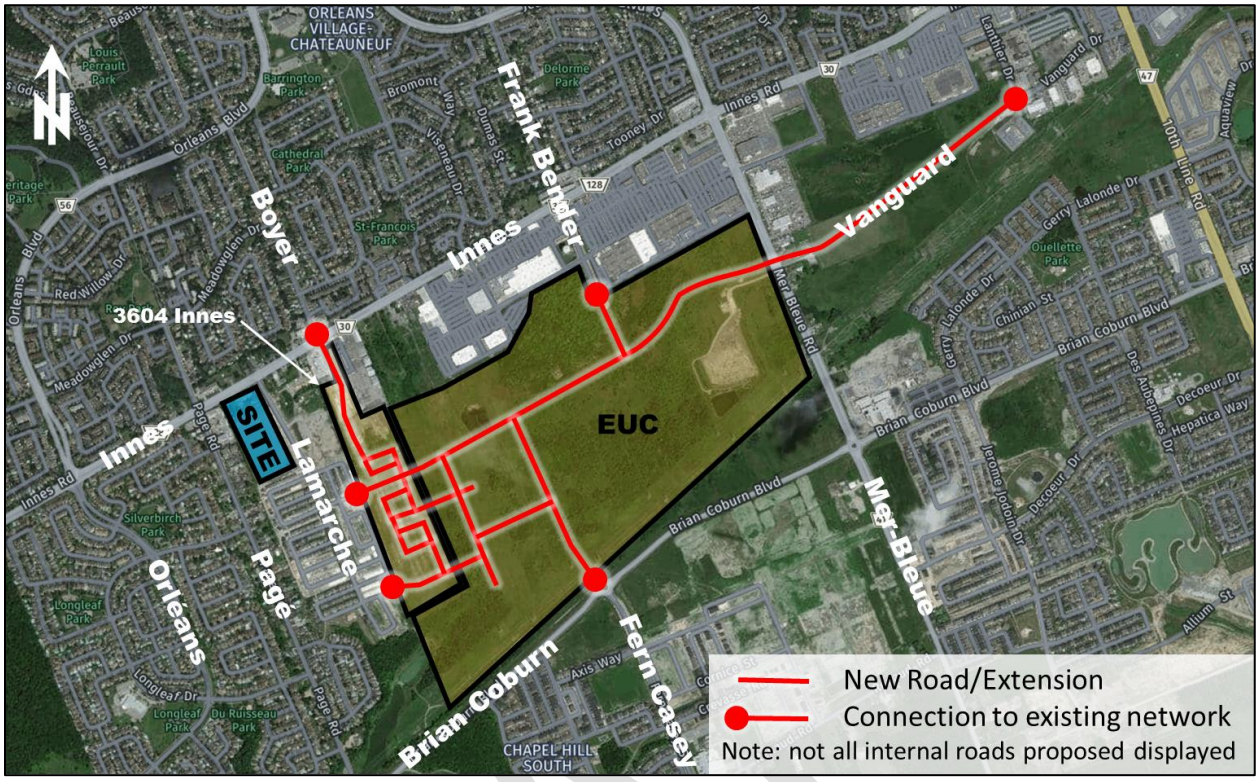
6 – East Urban Community Mixed Use Centre CDP

The City is in the process of completing the East Urban Community Mixed Use Centre Community Design Plan (EUC CDP) process. The CDP area is located between Mer Bleue Road, the hydro corridor, Brian Coburn Boulevard and 3604 Innes Road development. The aim of the CDP is to create a mixed used community with an area of approximately 570 hectares.

The latest site plan, provided in **Appendix D**, proposes approximately 2,040 dwellings (340 single homes, 529 townhomes, 114 back-to-back townhomes and 1,060 apartment units) along with an employment area consisting of approximately 830 new jobs. A TIA prepared by CastleGlenn Consultants in April 2021 (EUC TIA), projects approximately 2,120 new two-way trips, distributed to the surrounding road network via multiple new accesses, including connection to Vanguard Drive Extension/Mer Bleue, Fern Casey/Brian Coburn, Frank Bender/Innes and 3 local road connections to the 3604 Innes development which also connects to Lamarche Avenue as seen in **Figure 12**.

The first phase for this project was estimated by 2037, which is well beyond the analysis horizon set in this study. However, a high-level sensitivity analysis was completed in Section 4.9.2 of the ZBLA and PoS TIA for Lépine on October 6th, 2021 submission by Parsons to identify potential impacts if the first phase of the EUC CDP lands were completed.

Figure 12: Proposed Road Connections Between Lamarche and Neighbouring Developments



2.2. Study Area and Time Periods

Zone 1 of the proposed residential development is planned by 2024. Therefore, the horizon years to be analyzed within this report includes 2024 and 2029 (buildout plus five years), using the weekday morning and afternoon peak hour time periods.

Proposed study area intersections and boundary roads are outlined below and highlighted in **Figure 13**.

- Orléans/Innes intersection;
- Pagé/Innes intersection;
- Lamarche/Innes intersection;
- Boyer/Innes intersection;
- Along Innes Road adjacent to the site; and,
- Along Lamarche Avenue adjacent to the site.

Figure 13: Study Area Boundaries and Intersections

2.3. Exemption Review

The following modules/elements of the TIA process recommended to be exempt in the subsequent steps of the TIA process, based on the City's TIA guidelines and the subject site:

Table 2: Exemptions Review Summary

Module	Element	Exemption Consideration
4.2 Parking	4.2.2. Spillover	parking is expected to meet By-Law requirements, will be confirmed in Section 4.2.1.
4.8 Review of Network Concept	All elements	It is anticipated that ZBLA will be approved before this SPA report is approved.

3. Forecasting Report

3.1. Development Generated Travel Demand

3.1.1. TRIP GENERATION AND MODE SHARES

As discussed in Section 2.1.1, Lépine is proposing 3 development phases, starting with Zone 1 in the south, followed by Zone 2 in the middle and Zone 3 fronting Innes Road in the north. This report focuses on Zone 1, which consists of three residential buildings consisting of approximately 285 units and approximately 3,000 ft^2 of commercial. The commercial uses are proposed on Pavilion C, which does not front Innes Road. Given its location and small size, it is assumed that this portion of commercial is catered to local residents and will not generate any new external trips. Note, the latest site plan shows 283 units, for ease, the more conservative former 285 units proposed will be used.

Trip generation rates for Zone 1 were obtained from the City's 2020 TRANS Trip Generation Manual Report for residential uses. These rates have been summarized in Table 3.

Table 3: 2020 TRANS Residential Trip Generation Rates

Land Use	Data Source	Size	Trip Rates	
			AM Peak	PM Peak
High-Rise Apartments	TRANS 2020	285 units	T = 0.80(du)	T = 0.90(du)
Note: T = Average Vehicle Trip Ends; du = dwelling units				

The total number of person trips generated by Zone 1 of the development during the morning and afternoon peak periods can be found in Table 4.

Table 4: Residential Unit Peak Period Person Trip Generation

Land Use	Dwelling Units	AM Peak Period Person Trips	PM Peak Period Person Trips
Three Residential Buildings	285	228	257

The projected site peak period person trips were then divided based on the mode shares for Orléans according to TRANS 2020 table 5, as summarized in Table 5.

Table 5: Residential Peak Period Trips using TRANS 2020 Mode Shares

Travel Mode	AM Peak Period		PM Peak Period	
	Mode Share	Person Trip	Mode Share	Person Trips
Auto Driver	54%	123	61%	155
Auto Passenger	7%	16	12%	32
Transit	29%	65	21%	54
Cycling	0%	0	0%	0
Walking	10%	23	6%	15
Total Person Trips	100%	228	100%	257

Standard traffic analysis is usually conducted using the morning and afternoon peak hour trips as they represent a worst-case scenario. The 2020 TRANS Manual uses peak periods which can exceed the peak hours. Table 4

within the 2020 TRANS Manual includes factors for converting peak periods into peak hour traffic volumes as seen in **Table 6**. Note that conversion factors for passenger trips are assumed to be the same as auto driver.

Table 6: Peak Period to Peak Hour Conversion Factor (2020 TRANS Manual)

Travel Mode	Peak Period to Peak Hour Conversion Factors	
	AM	PM
Auto Driver	0.48	0.44
Passenger	0.48	0.44
Transit	0.55	0.47
Bike	0.58	0.48
Walk	0.58	0.52

Using the peak period to peak hour conversion rates from **Table 6**, the derived peak period trips by mode shares from **Table 5**, and the inbound and outbound splits from table 9 within the TRANS 2020 Manual, then the residential peak hour trips generated by the site for TRANS 2020 Orléans mode share can be calculated, as seen summarized in **Table 7**.

Table 7: Zone 1 Peak Hour Trips Generated using TRANS 2020 Mode Shares

Travel Mode	Mode Share	AM Peak (Person Trips/h)			Mode Share	PM Peak (Person Trips/h)		
		In	Out	Total		In	Out	Total
Auto Driver	54%	18	41	59	61%	40	29	68
Auto Passenger	7%	2	5	8	12%	8	6	14
Transit	29%	11	25	36	21%	15	11	25
Cycling	0%	0	0	0	0%	0	0	0
Walking	10%	4	9	13	6%	5	3	8
Total Person Trips	**100%**	**36**	**80**	**116**	**100%**	**67**	**49**	**116**
Total 'New' Residential Auto Trips		**18**	**41**	**59**	-	**40**	**29**	**68**

As shown in **Table 7**, based on the 2020 TRANS Trip Generation Manual, the proposed site is projected to generate approximately 60 to 70 new auto-trips per hour during the weekday commuter peak hours if the proposed three buildings at 285 units total was constructed. The increase in two-way transit trips is estimated to be approximately 25 to 35 persons per hour, and the increase in walk trips is approximately 10 to 15 persons per hour.

Mode Share Assumptions

The mode shares within the TRANS 2020 Trip Generation Manual for residential land uses for Orléans district were considered too conservative given the site's location near transit and higher density as opposed to the greater Orléans district which is predominantly suburbia. The site's location is within:

- TMP Affordable Network, transit priority (isolated measures) on Innes Road adjacent to the site
- TMP Affordable Network, transit priority (continuous measures) on Blackburn Bypass to Navan/Brian Coburn Park and Ride
- TMP Network Concept, the Cumberland Transitway (date and status uncertain)
- Mer-Bleue Expansion CDP suggests possible transit services connecting Innes Road to Vanguard Drive extension via Lamarche Avenue adjacent to the site

Therefore, the mode share assumptions for the proposed development were adjusted to reflect lower auto-driver mode share, and higher transit mode share targets for residential uses compared to the TRANS model mode share assumptions as shown in **Table 8**.

Table 8: Residential Mode Share Comparison – TRANS and Target Mode Share

Travel Mode	TRANS Residential Mode Shares		Target Residential Mode Share (AM & PM)	Target Rationale
	AM	PM		
Auto Driver	54%	61%	45%	Given the close proximity to transit and commercial services, the auto driver and passenger mode splits are forecasted to be lower than other areas of Orléans.
Auto Passenger	7%	12%	8%	
Transit	29%	21%	35%	Development is located in close proximity to major bus route #25 (former #94). Innes Road is in the TMP's affordable network for transit priority with major updates in transit services in the near future.
Cycling	0%	0%	2%	This is consistent with the 2020 TRANS active travel for High-Rise in Orléans (table 8).
Walking	10%	6%	10%	

Using the adjusted mode shares as shown in **Table 8** and the same number of person trips generated (but taking different modes of transportation compared to TRANS 2020), then the target mode share trip generation can be derived as summarized in **Table 9**.

Table 9: Residential Peak Hour Trips Generated using Target Mode Shares

Travel Mode	Mode Share	AM Peak (Person Trips/h)			Mode Share	PM Peak (Person Trips/h)		
		In	Out	Total		In	Out	Total
Auto Driver	45%	16	36	52	45%	30	22	52
Auto Passenger	8%	3	6	9	8%	5	4	9
Transit	35%	13	28	41	35%	23	17	40
Cycling	2%	1	2	2	2%	1	1	2
Walking	10%	4	8	12	10%	7	5	12
Total Person Trips	**100%**	**36**	**80**	**116**	**100%**	**67**	**49**	**116**
Total 'New' Residential Auto Trips		**16**	**36**	**52**	-	**30**	**22**	**52**

As shown in **Table 9**, Zone 1 is expected to generate approximately 115 morning and afternoon peak hour total person trips.

Roughly 50 new vehicle trips are expected in the peak hours, with approximately 40 new transit trips and approximately 15 new active mode trips.

3.1.2. TRIP DISTRIBUTION

The estimated traffic distribution was based on a variation of the August 2021 turning movement count at Lamarche/Innes and the 2011 OD-Survey for Orléans as discussed in **Section 2.1.2: Peak Hour Travel Demands**. A more balanced distribution was developed that reflects these two sources, as outlined below:

Inbound vehicles to Lamarche Avenue

- 50% from Innes Road West;
- 50% from Innes Road East;

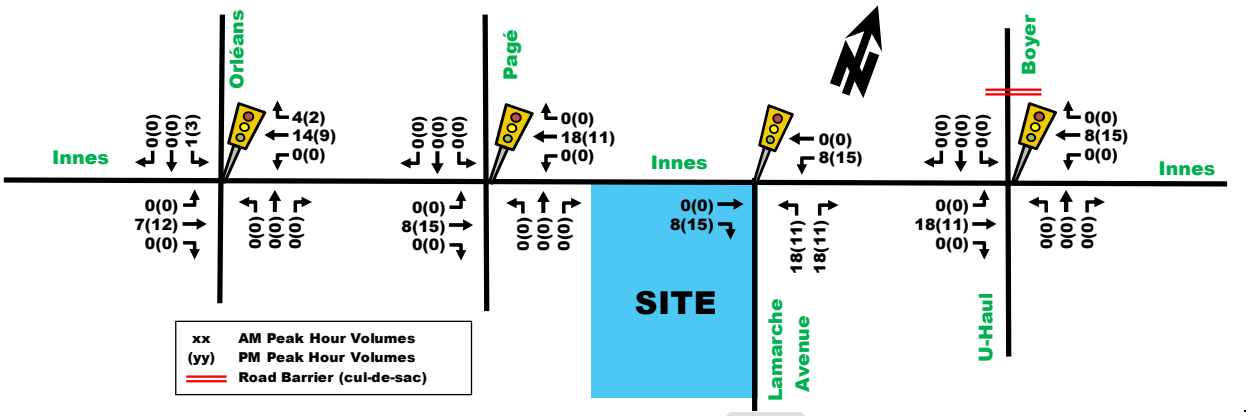
Outbound vehicles from Lamarche Avenue

- 60% to Innes Road West;
- 40% to Innes Road East;

3.1.3. TRIP ASSIGNMENT

The 'new' site-generated vehicle trips outlined in **Table 9** were assigned to the study area network based on the trip distribution discussed above and are illustrated as **Figure 14**.

Figure 14: 'New' Site-Generated Peak Hour Traffic



3.2. Background Network Travel Demands

3.2.1. TRANSPORTATION NETWORK PLANS

Refer to section 2.1.3 Planned Conditions – Planned Study Area Transportation Network Changes.

3.2.2. BACKGROUND GROWTH

The background traffic growth through the immediate study area, summarized in **Table 10,** was calculated based on historical traffic count data (years 2003, 2004, 2014, and 2017) provided by the City of Ottawa at the Orléans/Innes intersection. Detailed analysis of the background growth is included in **Appendix E**.

Table 10: Orléans/Innes Historical Background Growth (2003 – 2017)

Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	1.35%	-0.20%	4.38%	2.53%	**2.70%**
AM Peak	0.69%	0.14%	3.81%	1.75%	**2.08%**
PM Peak	0.01%	-0.68%	3.45%	1.60%	**1.66%**

In past years, Innes Road and Orléans Boulevard experienced an average annual growth ranging from +1.66% to +2.70%. Overall, minimal growth was observed on north-south movements (side-streets) and growth rates ranging from +1.6% to +4.38% were observed on Innes Road. These high traffic growth rates were a direct result of urban expansion along the Innes corridor towards Trim Road since 2003. Today, there are few undeveloped areas left within the Urban Boundary along Innes Road to fuel significant traffic growth. The few nearby developments that are expected to contribute traffic within the study area were accounted for independently, in the following section.

Additionally, the City has already constructed some adjacent road network connections (e.g. to Brian Coburn Boulevard) and alternate mode infrastructure (e.g. transit priority measures and pedestrian/cycling facilities) to promote more sustainable travel modes over single occupant vehicle travel on Innes Road. Therefore, a 1% annual growth rate for traffic on Innes Road east-west through movement was considered appropriate to estimate future traffic growth.

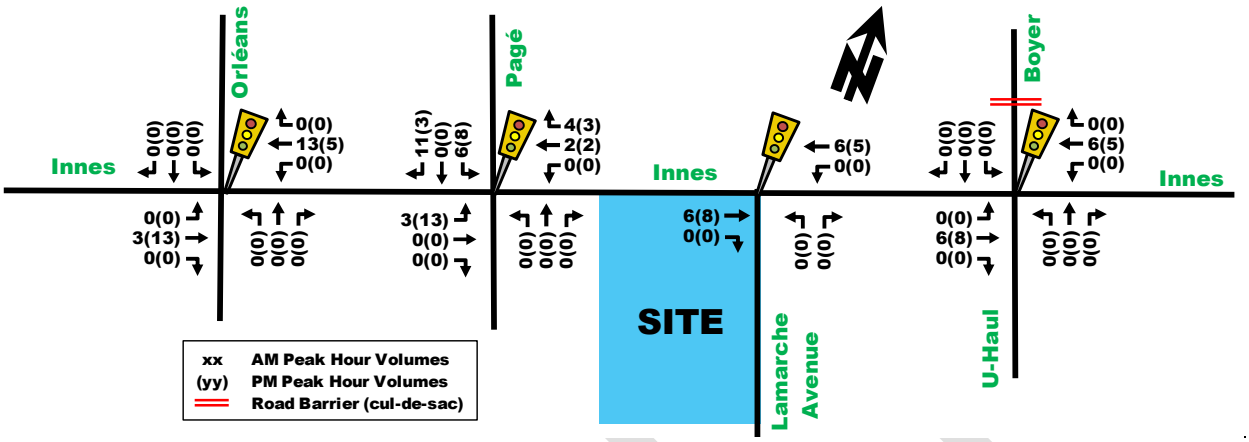
3.2.3. OTHER AREA DEVELOPMENTS

Trips generated by other area developments were accounted within the study area. A summary of each development was provided in **Section 2.1.3**. Note that most other area development trip generation was derived using TRANS 2011 Trip Generation manual projections which are more conservative than current industry 2020 TRANS Trip Generation manual projections.

3443 Innes

Figure 15 illustrates the projected traffic volumes for 3443 Innes Road at full build-out, obtained from the TIA Report completed by Novatech. This 35-unit residential mixed-use building is expected to be built prior to the horizon year plus 5, 2029.

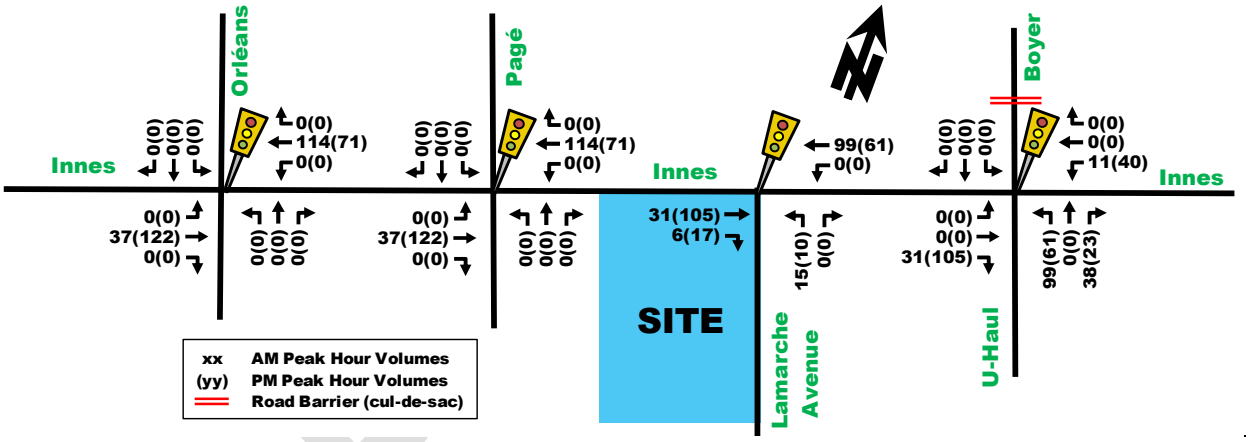
Figure 15: 3443 Innes Road Projected Peak Hour Traffic Volumes – Full Build Out



3604 Innes

Figure 16 illustrates the projected traffic volumes for 3604 Innes Road at full build-out, obtained from the TIA Report completed by Novatech. This plan of subdivision consisting of approximately 457 residential dwellings is expected to be built prior to the horizon year plus 5, 2029 and will provide connection to Lamarche Avenue.

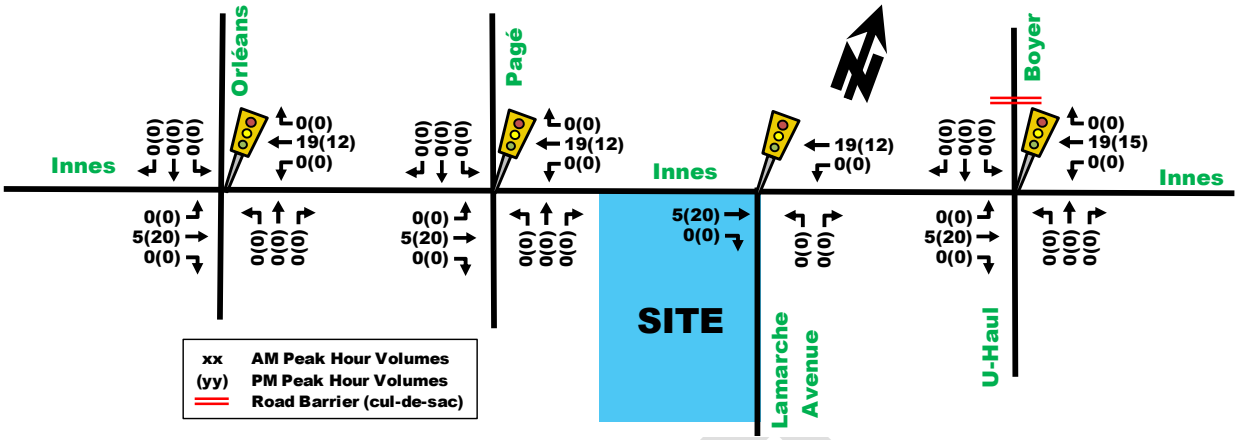
Figure 16: 3604 Innes Road Projected Peak Hour Traffic Volumes – Full Build Out



3817 Innes

Figure 17 illustrates the projected traffic volumes for 3817 Innes Road at full build-out, obtained from the TIA Report completed by D.J Halpenny & Associates. This 97-unit residential dwelling building is expected to be built prior to the horizon year plus 5, 2029.

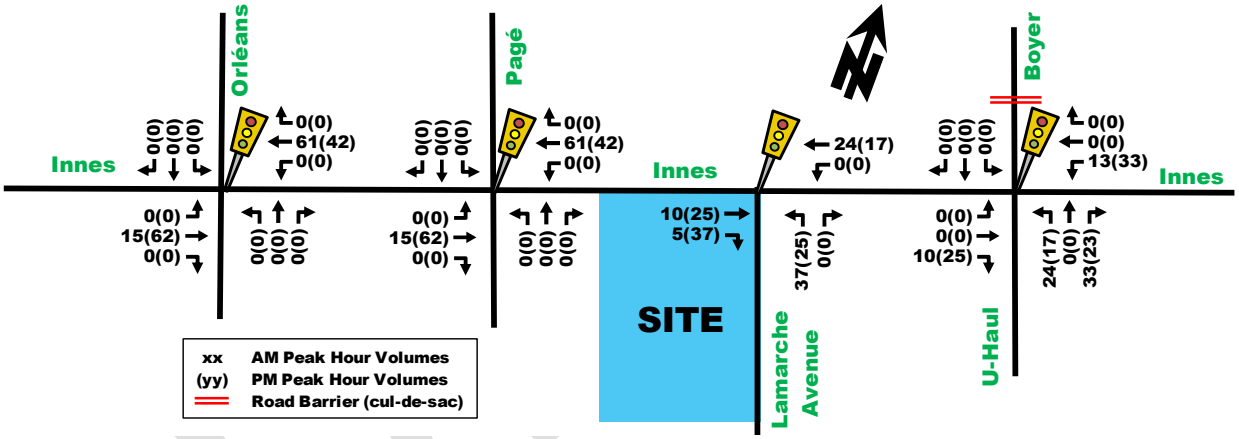
Figure 17: 3817 Innes Road Projected Traffic Volumes – Full Build Out



East Urban Community

Figure 18 illustrates the projected traffic volumes for the East Urban Community at phase 1, obtained from the TIA Report completed by CastleGlenn Consultants. This plan of subdivision consisting of approximately 2,040 residential dwellings and location for approximately 830 new jobs is expected to be built after the horizon year 2029. Phase 1 is anticipated by 2037. These volumes were not added to the background volumes.

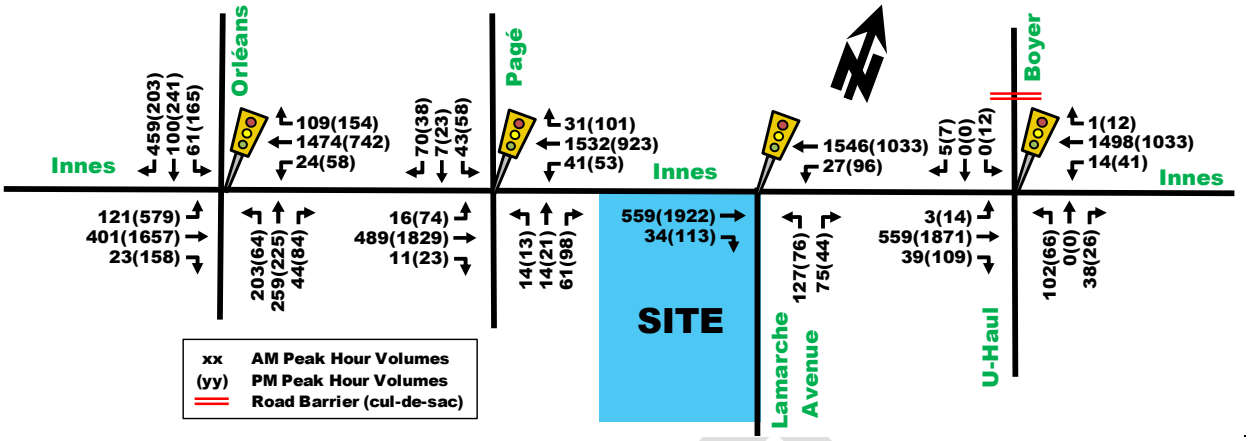
Figure 18: East Urban Community Road Projected Peak Hour Traffic Volumes – Phase 1



3.3. Demand Rationalization

Based on the assumptions from **Section 3.2**, the future background 2029 volumes are shown in **Figure 19**, including the remaining 25% of Caivan Lands that were not accounted for in the existing traffic count volumes.

Figure 19: 2029 Background Peak Hour Traffic Volumes



The mode shares from the OD-Survey 2011 for Orléans and TRANS 2020 demonstrate a relatively low transit usage for local residents. Considering the location of the site on major bus route #25 (former #94) with frequent service and planned transit investments such as transit priority (isolated measures) proposed along Innes Road and future Brian Coburn Boulevard extension, plus continuous lanes along the Blackburn Bypass west of the site as seen within the TMP Affordable Network, it is projected that the actual transit usage from this site will be higher than forecasted by the OD-Survey and TRANS 2020.

The TMP Network Concept includes the Cumberland Transitway that would provide fully exclusive bus rapid transit between Blair Station and Frank Kenny Road by 2031, however funding and actual implementation dates are uncertain at this time. Therefore, the target mode share assumptions appropriately reflect the future transit opportunities in the study area network.

From a capacity perspective, Innes Road is not expected to be widened by 2029, so potential traffic will be constrained and eventually plateau. Some vehicles will likely choose alternate arterials proposed to be built or widened, such as Brian Coburn Boulevard, the Brian Coburn Bypass and Vanguard Drive extension. It is unlikely that future growth along the Innes Road corridor will maintain the current growth pattern, particularly with the City's focus on investing in alternate modes of transportation, as described above. Therefore, the 1% background growth rate assumption was considered conservative.

The East Urban Community TIA by CastleGlenn forecasts approximately 30% of trips to and from Glenview and Caivan Lands using Lamarche/Innes and Boyer/Innes (3604 Innes and 3490 Innes developments) will alter their travel route to use Brian Coburn Boulevard once the Vanguard Drive extension is built (in Phase 1 of the EUC CDP). It also forecasts a potential 5% reduction in overall existing auto demand trips (excluding new proposed developments) and proposes a reduced background growth rate from 1% annual growth to a lesser 0.25% annual growth rate to reflect forecasted impacts of transit improvements, changes to travel route choices, and changes in travel trip times.

To better understand the implications of these demand rationalizations triggered by the EUC, an additional scenario based on the assumptions from the EUC TIA at 2037 (Phase 1) was completed in Section 4.9 of the October 2021 ZBLA and Plan of Subdivision Application Report by Parsons, including full buildout of the proposed Lépine development and other area developments as described in **Sections 3.1 – 3.2**.

4. Strategy Report

4.1. Development Design

4.1.1. DESIGN FOR SUSTAINABLE MODES

Location of Transit Facilities

Innes Road is envisioned as a transit priority corridor with isolated measures as shown in **Figure 8**. There are existing bus stops on Innes Road near the Pagé/Innes and Boyer/Innes intersections as shown in **Figure 5**. Pavilions A, B and C are located approximately 400m walking distance from existing stops for OC-Transpo frequent bus route #25 located on both sides of Innes Road.

Pedestrian/Cycling Routes and Facilities

All buildings within Phase 1 propose internal pedestrian pathways connecting to Croissant Françoise, the proposed loop which connects to Lamarche Avenue. The latest site plan shows 2m wide sidewalks on both sides of Croissant Françoise. There are also proposed pathways on the south side of the development, connecting all pavilions and Lamarche Avenue.

The approved and nearly completed Caivan Lands proposes a 3m wide multi-use pathway (MUP) on the west side of Lamarche Avenue, which has already been built, and a 2m wide concrete sidewalk on the east side of Lamarche Avenue, which has yet to be built at the time of this report. The proposed pavement markings and signage plan from the Caivan Lands has been provided in **Appendix F.**

The existing 3m wide MUP on the west side of Lamarche Avenue provides direct connectivity for cyclists and pedestrians from Croissant Françoise to Innes Road, which also has cycling facilities and sidewalks on both sides of the road.

Preliminary design considerations for Innes Road include a unidirectional cycle track along development frontage, augmenting the existing on-street facility. Potential driveway conflicts have been identified at the future signalized Innes/Lamarche intersection, across Lamarche Avenue at 3523 Innes Road. This driveway would conflict with potential east crossings for pedestrians and cyclists. Therefore, crosswalks and bi-directional cycle facilities should be considered on the south and west legs of the future signalized Lamarche/Innes intersection.

Bicycle Parking

Bicycle parking will all be located indoors, in a secure, well-lit area, near to elevators.

4.1.2. CIRCULATION AND ACCESS

Phase 1 proposes a private driveway loop with access to surface parking and the ramp to underground parking. The private driveway loop provides two-way traffic via a 6.7m wide road which connects to the municipal loop (Croissant Françoise) approximately 50m from Croissant Françoise South/Lamarche and a second at the southwestern curvature of the municipal loop. A single 6m wide ramp from the westerly edge of the private driveway loop provides two-way vehicular traffic to and from the two-level underground parking garage, shared by Buildings A, B and C. Garbage pickup is proposed at ground level, near the underground garage access, with truck turning templates provided in **Appendix G**.

4.1.3. NEW STREETS NETWORK

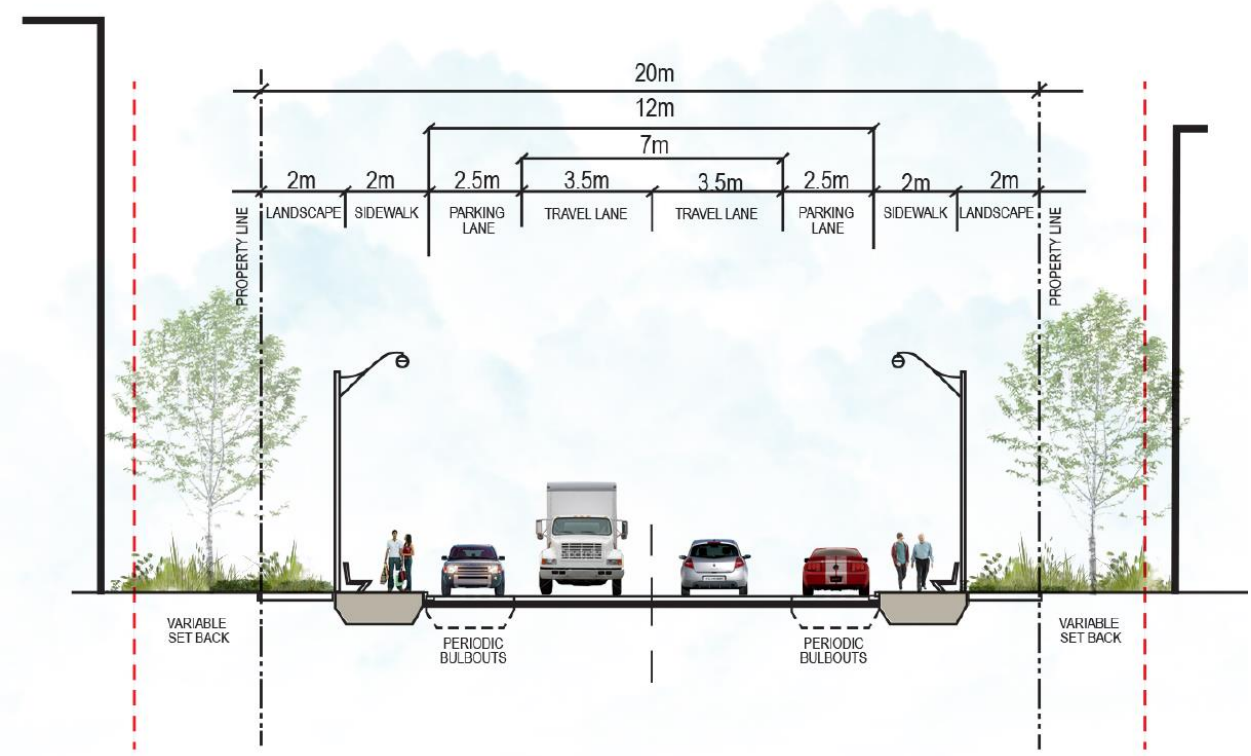
Municipal Loop Road (Croissant Françoise)

The development proposes a municipal loop road (Croissant Françoise) which connects to Lamarche Avenue twice, approximately 120m and 240m south of Innes Road. The loop envisions a single travel lane per direction with periodic bulb-outs for loading and on-street parking. The road is designed for 30km/h speed limit, with horizontal deflections and speed bumps as traffic calming measures. The plan also proposes 2m sidewalks on

both sides of the road. The internal street will be classified municipal local road. A sample street cross-section has been provided in **Figure 20**.

During Phase 1, the entire municipal loop will not be fully built out and will only provide connection to the southern link with Lamarche Avenue. A cul-de-sac treatment is proposed during the interim, allowing vehicles easy turn around and to serve as potential snow storage during winter. The private driveway has been designed to allow heavy vehicles to turn around, functioning as a loop as shown in **Appendix G**.

Figure 20: Proposed Street Section at Future Municipal Loop Road (Croissant Françoise)



EUC MUC CDP Street Network

Additionally, there will be future road connections to Lamarche Avenue from other developments such as Glenview (located at 3604 Innes Road) and the East Urban Community, as illustrated in **Figure 12**. It is envisioned that Lamarche Avenue will function as a collector road from Innes Road to Vanguard Drive extension. Vanguard Drive will function as a major collector once the Glenview and EUC developments reach maturity, providing new connections to Brian Coburn Boulevard at Fern Casey Street, Mer-Bleue Road via Vanguard Drive and new Innes Road connections at Frank Bender Street and Boyer/Innes. The latest site plans for Glenview and the East Urban Community have been provided in **Appendix D.**

4.2. Parking

The site is located in Area C according to Schedule 1, Area C in Schedule 1A, and is not within 600m walk to any rapid transit station within Schedule 2A or B. **Table 11** summarizes the vehicle parking minimum and maximums allowed within the parking by-law. **Table 12** summarizes the bicycle parking requirements as per City of Ottawa Zoning By-Law-Part 4, sections 100-114.

Table 11: Vehicle Parking Space Supply

Land Use		Rate per Unit		Required Vehicle Spaces				Proposed Spaces
		Base	Visitor	Base	Visitors	Min Req.	Max Allowed[1]	
Residential	283 units	1.2 per unit	0.2 per unit	340	57	397	495	386
1) Maximum parking allowed is at a rate of 1.75 parking stalls per unit (combined base and visitor) Note: Commercial land uses are not anticipated to generate any new trips, only intended for local residents								

Table 12: Bicycle Parking Requirements

Land Use		Rate	Required Bicycle Spaces	Proposed Spaces
			Required	
Residential	283 units	0.5 per unit	142	143

According to **Table 12**, bicycle parking stall quantities are within the Parking By-Law requirements. Vehicle parking does not meet the parking by-laws, having a deficiency of approximately 11 parking stalls. Given the site's location near frequent transit route #25, a small reduction in minimum parking requirement is justifiable and recommended to incentivize the use of transit services. Note that developments located near rapid transit generally have a resident parking rate of 0.5 per unit and visitor rate of 0.1 per unit. Furthermore, the municipal loop, Croissant Françoise, proposes on-street parking as a traffic calming measure and to provide additional overflow parking if needed.

The vehicle parking is proposed within two levels of underground parking and surface parking. The lowest level of parking, P2, proposes 193 parking spaces. The next level up, P1, proposes 161 parking spaces, and the ground floor proposes 32 surface spaces. Of the total proposed parking, 37 should be catered to visitor parking. Bicycle parking is proposed within P1, located 1 level beneath the surface, in well-lit secure storage, with access to the elevators.

4.3. Boundary Street Design

4.3.1. EXISTING CONDITIONS

The boundary streets for the development are Lamarche Avenue, and Croissant Françoise.

Lamarche Avenue has been recently constructed as part of the Caivan Lands just south of the site. The original Caivan Lands Plan of Subdivision proposed a double northbound left, as it assumed the previously proposed Lépine Design which had much larger density than currently proposed. Within the recent TIA report by Parsons on October 6th, 2021 in support of a Zoning By-Law Amendment (ZBLA) and plan of subdivision, a double left was no longer required for the ultimate buildout. For this reason, a new design with a single northbound left-turn has been proposed, as shown in **Appendix H**. The analysis also reviewed the proposed cross-section design for the municipal loop road.

- *Lamarche Avenue (Caivan design):*
  - 1 vehicle travel lane in each direction;
  - >2m MUP on west side of road, 2m sidewalk on east side of road, both with 2m boulevards;
  - Less than 3,000 vehicles per day;
  - Assumed unposted speed 50km/h (used 60km/h) with parking on both sides of road;
  - Classified as collector roadway;
  - Not a bike route, has a 3m wide MUP on west side of road; and,
  - Not identified as a Truck Route.
- *Croissant Françoise (Proposed design):*
  - 1 vehicle travel lane in each direction;

- 2m sidewalk with a 2m boulevard or periodic bulbout on both sides;
- Less than 3,000 vehicles per day;
- Assumed unposted speed 40km/h (used 50km/h) with parking on both sides of road;
- Classified as local roadway;
- Not a bike route; and,
- Not identified as a Truck Route.

The proposed site is not located within 600m of a rapid transit and not within 300m of a school. Multi-modal Level of Service analysis for the subject road segments adjacent to the site is summarized in **Table 13** with detail analysis provided in **Appendix I**.

Table 13: MMLOS – Boundary Street Segments Existing and Future Proposed

Road Segment	Level of Service							
	Pedestrian		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)	
	PLoS	Target	BLoS	Target	TLoS	Target	TkLoS	Target
Lamarche Ave between Innes & Caivan Lands west side of road	A	C	A	D	D	D	-	N/A
Lamarche Ave between Innes & Caivan Lands east side of road	B	C	D	D	D	D	-	N/A
Croissant Françoise Site Access to/from Lamarche Ave	B	C	A	D	-	N/A	-	N/A

Pedestrian

- *Lamarche Avenue* will meet the PLoS on both sides of the road once the east sidewalk is constructed.
- *Croissant Françoise* will meet the pedestrian PLoS desirable targets as proposed.

Bicycle

- The cycling BLoS desirable targets were met for all road segments.

Transit

- Croissant Françoise does not have transit routes. Lamarche Avenue does not currently have public transit services, but it is envisioned that once the East Urban Community and Vanguard Drive are built, that transit services will likely be provided using Lamarche Avenue.

Truck

- Neither Croissant Françoise nor Lamarche Avenue are truck routes.

4.4. Access Intersection Design

4.4.1. LOCATION AND DESIGN OF ACCESS

The ultimate design of the development, including all three phases, envisions a municipal loop road (Croissant Françoise) which connects to Lamarche Avenue approximately 120m and 240m south of Innes Road. Private driveway accesses to surface parking and underground parking are proposed to connect to the municipal loop at various locations and are subject to change. The private driveways proposes as part of Phase 1 have been discussed in **Section 4.1.2.** The municipal loop accesses will function as STOP-controlled on the minor (the municipal loop) and free flow on Lamarche Avenue.

The nearest intersecting street to the municipal loop is Lamarche/Innes, which is located approximately 120m north of the northern leg of Croissant Françoise. This distance adheres to the By-law (No. 2003-447) Section 24(m)(ii), which suggests a separation between the site access and nearest intersection of 60m for a site with more than 300 parking spaces. The distance between the two loop accesses is also satisfactory, at a separation of approximately 120m and minimum suggested separation of 75m.

4.4.2. INTERSECTION CONTROL

A traffic signal warrant at Lamarche/Innes was completed and the need for traffic signals at this location for Phase 1 was not needed; the need for traffic signals will be confirmed in **Section 4.9** based on Synchro Analysis. Note that the site, assuming all 3 phases (as discussed in ZBLA application) does trigger a traffic signal warrant. According to TAC Chapter 9, Section 9.4.2.1, a minimum signalized to signalized intersection separation of 200m is recommended. The nearest signalized intersection is Pagé/Innes and it is located further than 200m, thus meeting the minimum recommended separation distance.

An all-way stop control (AWSC) warrant for Croissant Françoise/Lamarche was completed. For Phase 1, only one side of the loop will be constructed, the southern access which is located closest to Zone 1. Even with 100% distribution of Phase 1 traffic at the southern intersection of Croissant Françoise/Lamarche, the AWSC warrant is not triggered.

Once the development is built to its full maturity, with all 3 phases complete, it was determined that approximately 65% of all site-generated traffic would need to use a single Croissant Françoise/Lamarche access to trigger an AWSC. The conservative approach in the trip generation and future influence of the EUC Phase 1 road network on area traffic patterns suggests this outcome is unlikely. Additionally, the quantity of trips generated will be influenced upon the type of development that will be proposed for the subsequent phases, which could include further residential, a retirement home or commercial uses. The need for an AWSC is not required for Phase 1 but will be reviewed as part of each additional phase Site Plan Control Application.

All warrant analysis has been provided in **Appendix J**.

4.4.3. INTERSECTION DESIGN

The proposed municipal loop road, Croissant Françoise, to be designed to a local road standard, will provide two-way vehicular access via Lamarche Avenue. TAC Chapter 8, Section 8.9.10 suggests a minimum clear throat length for driveways on to collector and arterial roads only. Since the municipal loop will be a local road, there are no minimum clear throat lengths suggested.

The Lamarche/Innes intersection will need to be retrofitted from an unsignalized intersection into a signalized intersection by the full buildout of all three phases for this development. Given the large number of northbound left-turning movements, westbound left-turning movements, and eastbound right-turning movements, auxiliary left- or right-turn lanes will be considered on all approaches.

The ultimate Lamarche/Innes intersection envisions a contemporary protected intersection design, that prioritizes pedestrian and cycling movements. Crosswalks and bi-directional cycle facilities have been considered on the south and west legs of the future signalized intersection, which would require time separated crossings and turning restrictions such as no-right-on-red turns for eastbound and northbound movements. The forthcoming analysis for Phase 1 will confirm whether this design will be required for Phase 1, in which case, an RMA design will be required.

The original Caivan Lands Plan of Subdivision proposed a double northbound left, as it assumed the previously proposed Lépine Design which had much larger density than currently proposed. Within the recent TIA Report by Parsons on October 6th, 2021 in support of a Zoning By-Law Amendment (ZBLA) and plan of subdivision for Lépine, a double left was no longer required for the ultimate buildout. For this reason, a new design with a single northbound left-turn has been proposed which includes two bi-directional crossrides, as shown in **Appendix H**. The outcome of the intersection capacity results in this study (**Section 4.9**) will confirm the auxiliary lane requirements.

It is important to note that the construction of the East Urban Community will trigger significant changes in local travel patterns as new connections from the local community will become available, such as connectivity from Lamarche Avenue to Brian Coburn Boulevard, Vanguard Drive and Frank Bender Street. This will affect the future design requirements at Lamarche/Innes. The potential capacity implications were reviewed as part of the 2037

sensitivity analysis scenario within the October 6th, 2021 TIA report by Parsons, in support of a ZBLA and plan of subdivision.

4.5. Transportation Demand Management

4.5.1. CONTEXT FOR TDM

Most trips generated by the proposed site will be residents leaving the site in the morning peak period to go to work and returning from work in the afternoon peak period.

Sections 3.1.1 and 3.1.2 describe how many trips are anticipated per travel mode and anticipates the likely locations that they will travel to and from based on the OD-Survey 2011 for Orléans. The site is located adjacent to Innes Road transit priority with isolated measures, making it a good candidate to promote transit use for residential trips. Additionally, shared parking provisions for residential/commercial uses could reduce the overall need for quantity of parking provided, given that commercial parking likely occurs at different times than residential visitor parking.

4.5.2. NEED AND OPPORTUNITY

The proposed development will predominantly be accessed by Innes Road, which is currently operating near capacity. With investments planned for transit priority on Innes Road, new opportunities for travel are immerging adjacent to the site. A strong focus on TDM measures to encourage sustainable active mode shares is recommended, both to relieve stress on an already congested Innes Road and to promote environmentally conscious ways of commuting. Such measures are described in more detail in Section 4.5.3 below, but can include, more aggressive Multi-Modal Levels of Service (MMLOS) as described in Section 4.3 and 4.9 and safe and efficient connectivity to public transit as described in Section 4.7, to name a few.

4.5.3. TDM PROGRAM

The TDM infrastructure and measures checklist have been completed and have been provided in Appendix K. Some of the TDM measures that are proposed include:

- Unbundled car parking spot from monthly rent
- Meets vehicle and bicycle parking by-laws
- Majority of parking located underground, including bike storage in secure well-lit areas
- Easy and direct connection to sidewalks and Lamarche MUP

4.6. Neighborhood Traffic Management

4.6.1. ADJACENT NEIGHBORHOODS

The future projected 2029 volumes along Lamarche Avenue are anticipated to be approximately 240 peak hour volumes per direction during the AM and PM peak hours respectively which is consistent with a collector road. Major collector roadways have a recommended capacity up to 600 peak hour volumes, based on City of Ottawa TIA Guidelines. It is not anticipated that this development will impact Lamarche Avenue's envisioned roadway classification as a collector road. Croissant Françoise has been designed as a 30km/h local loop, including speed bumps, horizontal deflections and bulb-outs as well as on-street parking as traffic calming methods.

4.7. Transit

4.7.1. ROUTE CAPACITY

Approximately 40 'new' two-way transit trips are projected for Phase 1 for the AM and PM peak hours. The site will be located approximately 400m away from transit stops to high frequency route #25 (former #94). Route

#25 operates at approximately 5-minute intervals during peak hours and approximately 15-minute intervals during non-peak hours with service from as early as 4:33am until midnight.

Given the high frequency of route #25, planned transit priority measures on Innes Road and the additional transit capacity added to parallel transit routes on both the future Confederation LRT Line expansion to Orléans anticipated for 2024 (north of Innes Road) and new Brian Coburn Transitway (south of Innes Road), there is expected sufficient capacity for route #25.

4.7.2. TRANSIT PRIORITY

As discussed in **Section 2.1.3**, there are transit priority with isolated measures planned on Innes Road, however a design for these measures has yet to be completed. Considerations for transit priority measures along the corridor may include:

- Queue jumps if space is available
- Provide signal priority at intersections such as green extensions or red truncations

4.8. Review of Network Concept

It is assumed that zoning permits for this site will have been granted before the approval of this report. The site plan proposed in this report is consistent with the TIA in support of ZBLA and plan of subdivision submitted by Parsons on October 6th, 2021, and should be within approved zoning permits. A general review of the greater site (phases 1 to 3) was completed within the zoning and plan of subdivision TIA.

4.9. Intersection Design

4.9.1. INTERSECTION CONTROL

See **Section 4.4.2**.

4.9.2. INTERSECTION DESIGN

For the purpose of this evaluation, the single northbound left-turn protected intersection concept design was assumed for the Lamarche/Innes intersection, as illustrated in **Appendix H**.

Multi-Modal Level of Service

As stated in the MMLOS Guidelines, only signalized intersections are considered for the intersection Level of Service measures. All intersections within the study area are signalized or are planned to be signalized. The MMLOS analysis is summarized in **Table 14**, with detailed analyses provided in **Appendix L**. Note, Innes Road is classified a traditional main street from Pagé Road to Tenth Line Road.

Table 14: MMLOS – Existing and Future Intersections

Road Segment	Level of Service							
	Pedestrian		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)	
	PLoS	Target	BLoS	Target	TLoS	Target	TkLoS	Target
Orléans/Innes intersection	F	C	F	C	F	D	A	D
Pagé/Innes intersection	F	B	D	C	B	D	-	N/A
Boyer/Innes intersection	F	B	D	C	C	D	-	N/A
Lamarche/Innes intersection[1]	F	B	C	C	E	D	-	N/A

1.) Based on most recent protected intersection design (single northbound left-turn lane) - refer to Appendix H.

Pedestrian

- No intersection met the pedestrian minimum desirable target of PLoS 'B or C'. All intersections had a PLoS of 'F' predominantly based on the number of lanes that would need to be crossed for pedestrians

crossing Innes Road (note that the number of lanes was determined from dividing the crossing distance by 3.5m and not by actual visible lanes). No mitigation would lower the PLoS to a level close to the desired MMLOS target without significantly reducing the vehicle capacity.

Bicycle

- Lamarche Avenue, as proposed, is expected to meet BLoS targets.
- The remainder intersections have mixed traffic facilities on the minor approaches, resulting in a BLoS inferior to the desired target.

  Providing cycling facilities on minor approaches and assuming cyclists cross Innes Road at the crosswalks would meet the BLoS desired target for all intersections with the exception of Orléans/Innes.
- The Orléans/Innes intersection could meet BLoS targets if cycling facilities were added to all approaches and the introduction of right-turn lanes is less than 50m long from the start of pocket bike lanes.

Transit

- Transit TLoS targets were met at Pagé/Innes and Boyer/Innes due to modest intersection delays for east-westbound through movement.
- Orléans/Innes and Lamarche/Innes had certain movements used by buses which surpassed 30 second delays and triggers the TLoS of 'E' or worse, exceeding the desired TLoS target of 'D' or better. Possible transit priority measures, such as a queue jump could reduce bus delays and improve the TLoS.

Truck

- Only Orléans/Innes intersection has a truck route with possible turning movements. The TkLoS was met.

Existing Conditions

The following **Table 15** provides a summary of the existing traffic operations at the study area intersection based on volumes from **Figure 6** and Synchro (V10) traffic analysis software. The subject intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The Synchro model outputs of existing conditions are provided within **Appendix M**.

Table 15: Existing Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Orléans/Innes	C(F)	0.79(1.13)	WBT(EBT)	28.6(58.0)	C(E)	0.73(0.97)
Pagé/Innes	A(B)	0.56(0.69)	WBT(EBT)	8.0(11.5)	A(B)	0.55(0.67)
Lamarche/Innes (unsig.)	F(F)	53(1,266)	NB(NB)	4(39)	A(F)	-
Boyer/Innes	A(B)	0.46(0.64)	WBT(EBT)	3.0(4.8)	A(B)	0.46(0.63)
Note: Analysis of signalized intersections assumes a PHF of 0.90 and a saturation flow rate of 1800 veh/h/lane.						

As shown in **Table 15**, all the intersections within the subject area are currently operating 'as a whole' at acceptable LoS 'E' or better during the AM and PM peak hours with the exception of Lamarche/Innes. Most of the 'critical movements' at study area intersections are currently operating at a good LoS 'C' or better during both peak hours with the exception of Orléans/Innes which has a critical movement of 'F' in the PM peak and Lamarche/Innes which is operating at capacity for the AM and PM peaks.

Given the very poor critical movement performance of Lamarche/Innes intersection as currently unsignalized, the need for signalization as part of this development is highly recommended and will be assumed for all future analysis.

It is also important to note that the side street volumes at the Orléans/Innes intersection correspond to 2017 counts completed prior to the opening of Brian Coburn Boulevard in 2018, which may lead to higher vehicle traffic volumes at this intersection.

Background Conditions

As discussed in **Section 3.2**, a conservative 1% annual growth up to year 2029 on through movements on Innes Road was assumed and other area developments were also added to estimate background traffic conditions. Lamarche/Innes is expected to be a signalized intersection by this horizon year and was modelled with a separate northbound left and northbound right turn lanes but without auxiliary eastbound right-turn lane.

Figure 19 shows the projected background volumes from other area developments, including the completion of Caivan's remaining units to be completed. The projected operational results are shown in **Table 16**. The detailed Synchro results can be found in **Appendix N**.

Table 16: 2029 Background Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Orléans/Innes	D(F)	0.83(1.12)	WBT(EBT)	28.3(57.0)	C(E)	0.77(0.98)
Pagé/Innes	B(C)	0.61(0.75)	WBT(EBT)	9.4(9.0)	A(C)	0.59(0.72)
Lamarche/Innes	B(D)	0.62(0.90)	NBL(EBT)	11.8(17.3)	B(D)	0.61(0.87)
U-Haul/Innes	B(C)	0.67(0.73)	NBT(EBT)	9.6(15.4)	A(C)	0.59(0.71)
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.						

As seen in **Table 16**, all intersections operate overall at good LoS 'D' with critical movements operating at LoS 'E' or better during the 2029 background volumes, with the exception of Orléans/Innes which operates with a critical movement above capacity in the PM peak hour.

The largest factor in worsening conditions is the background growth assumed at 1% annually up to the 2029 planning horizon, which may be conservative based on planned infrastructure changes in the study area network and their effects on Innes Road vehicle traffic volumes, as discussed in **Section 3.3. Demand Rationalization**.

Lamarche/Innes was shown to operate well as a signalized intersection.

Future Conditions at Full-Buildout

The future projected full-buildout volumes are illustrated in **Figure 21**, which assumes the layering of site generated traffic volumes for Phase 1 on to the 2029 background volumes. Note that this scenario does not take into account Phase 2 and 3 of the Lépine development, those phases will be analyzed separately within their Site Plan Applications.

The Lamarche/Innes intersection has been modelled as follows:

- Northbound approach has auxiliary left- and right-turn lanes;
- Auxiliary eastbound right-turn and a westbound left-turn lanes;
- No-right-on-red for eastbound right-turns and northbound right-turn movements, to accommodate the bidirectional cycling facilities as a time separated crossing; and,
- 15s time separated phase for crossing Innes Road on the west leg and a 5s time separated advance for crossing Lamarche Avenue on the south leg.

The projected traffic volumes are summarized in **Table 17**, with detailed Synchro results provided in **Appendix O**.

Figure 21: Full-Buildout Total Projected Peak Hour Traffic Volumes

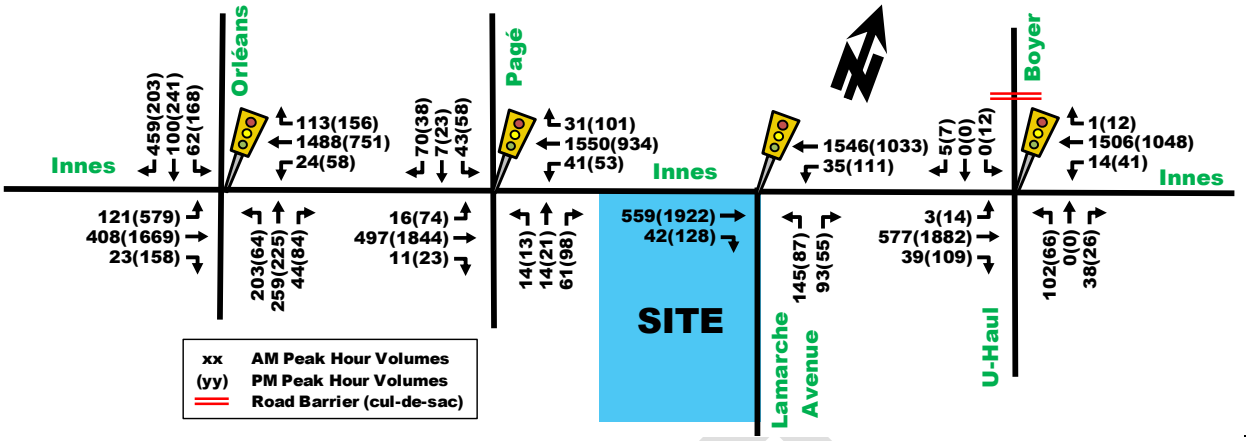


Table 17: Full-Buildout Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Orléans/Innes	D(F)	0.83(1.12)	WBT(EBT)	28.3(58.6)	C(E)	0.77(0.98)
Pagé/Innes	B(C)	0.62(0.75)	WBT(EBT)	9.6(9.1)	A(C)	0.60(0.72)
Lamarche/Innes	B(D)	0.66(0.85)	NBL(EBT)	11.3(21.1)	B(D)	0.63(0.82)
U-Haul/Innes	B(C)	0.67(0.74)	NBT(EBT)	9.6(15.5)	A(C)	0.60(0.72)
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.						

As seen in **Table 17**, all study area intersections are expected to operate very similarly to background conditions.

The addition of time separated phases and no-right-on-red at Lamarche/Innes reduced effective green time for all vehicular movements, slightly reducing vehicle level of service but greatly improving active transportation priority to support the protected intersection design.

Overall, no modifications are recommended.

As mentioned previously, the need for double northbound left-turn lanes at Lamarche/Innes was not shown to be required for Phase 1, nor at full buildout of the subject site if mode share targets are met.

Future Conditions Assuming TRANS Mode Shares

The TRANS mode shares project an increase of approximately 5 and 15 new two-way trips for the AM and PM peaks respectively, compared to target mode shares. Considering that this is an increase of up to 1 new vehicle every 4 minutes, the changes to performance for the study area intersections is considered marginal and is not expected to create any additional congestion. No further analysis for TRANS mode shares will be conducted.

Queueing Analysis

Estimated vehicle queues at the Lamarche/Innes intersection was assessed to determine the length of storage lanes required. The queueing results were based on Synchro outputs, the same analysis program used to generate the preceding intersection operational analysis.

The three analysis scenarios for full buildout (assuming Option 2 from ZBLA) were evaluated:

1. Based on the 2029 Phase 1 Lépine buildout only,
2. Based on the most conservative full buildout of all phases for Lépine, and
3. Based on the EUC TIA 2037 horizon and Lépine ZBLA TIA assumptions.

The following **Table 18** summarizes queuing results for various scenarios at Lamarche/Innes.

Table 18: Queueing Analysis for Lamarche/Innes by Horizon and Mode Share Assumption

Movement	Approx. Storage Length	Horizon Year & Mode Share Scenario – 95th Percentile Queue AM (PM) (m)		
		Phase 1 2029	Full Buildout 2031[2]	EUC 2037[3]
Eastbound Through	220 m	30 (277)	35 (250)	30 (166)
Eastbound Right-Turn	-	6 (18)	23 (34)	14 (28)
Northbound Left-Turn	-	52 (30)	80 (51)	62 (43)
Northbound Right-Turn	-	36 (21)	59 (58)	40 (31)
Westbound Left-Turn	135 m[1]	2 (23)	11 (64)	2 (23)

1.) Westbound left-turn is currently a two way left turn lane (TWLTL)
2.) Assumes the most conservative full buildout of Lépine for all 3 phases from ZBLA & Plan of Subdivision TIA by Parsons
3.) Long term projections for Lamarche/Innes based on EUC and Lépine ZBLA TIA

As seen in **Table 18**, over time there is expected to be a reduction in queue lengths (a reflection of congestion) as the transportation network evolves with gradual improvements to transit facilities and future alternative road connections. Long term planning with Phase 1 of the EUC will provide new connections to Brian Coburn Boulevard that will reduce demand on Innes Road by local communities such as Caivan Lands and Glenview Developments.

To reduce having to reconstruct the intersection more than once (such as when other phases are built and vehicular volumes are anticipated highest), the most conservative scenario approach is recommended. To reduce chances of spillback from storage turn lanes while maintaining active transportation priority, the following storage lengths at the Lamarche/Innes intersection are recommended:

- Eastbound right-turn: 40m
- Northbound left-turn: 80m
- Westbound left-turn: 80m

The need for a double northbound left-turn lane that was noted in the EUC TIA is not required. The updated development proposal represents a significant reduction in scale and density from what was assumed in the EUC TIA. There is expected to be adequate intersection capacity at this location to accommodate the development proposal with a single northbound left-turn lane. An RMA design package will be prepared as part of this submission.

5. Findings and Recommendations

Based on the results summarized herein the following findings and recommendations are provided:

Existing Conditions

- The site is currently occupied by small scale commercial properties, including an insurance company, food truck, mini-put facility and driving range.
- Bus stops for frequent transit route #25 is located approximately 400-meter walk from the subject site.
- Historical collision records confirm elevated incident typical of major urban arterial corridors in the City. The Pagé/Innes intersection was noted as a sensitive location, which is likely contributed to not having a contemporary design that meets AODA standards. The City may consider pedestrian and cycling enhancements as part of the life-cycle of the corridor, such as ladder crosswalks and TWSIs, which may help reduce the risk of pedestrian collisions.
- Most existing study area intersections operate at very good levels of service, overall LoS 'B' with critical movements LoS 'C' or better. The Orléans/Innes intersection does experience additional congestion in the afternoon peak hour based on the level of traffic along the corridor. The Lamarche/Innes is also shown to experience peak hour congestion with its current unsignalized design.

Proposed Development

- Lépine is moving forward with the 1st of 3 phases for the site. Phase 1 consists of three residential buildings, ranging from 6 to 7-storeys high and totaling 283 apartment units. The remaining two phases have not been confirmed yet but could include more residential uses (up to approximately 875 units total including Phase 1), a retirement home addition or commercial uses including a grocery store. Future land uses will be confirmed in ensuing Site Plan Applications.
- Phase 1 is projected to generate approximately 50 'new' vehicle trips during the weekday morning and afternoon peak hours. Phase 1 is anticipated to be built by 2024, with a 5-year horizon post built out of 2029.
- Phase 1 is projected to generate approximately 40 'new' transit trips during the AM and PM peak hour periods respectively, which is expected to be accommodated by existing frequent transit route #25. The City's TMP Affordable Network Plan identifies Innes Road and Brian Coburn Boulevard as target corridors for isolated transit priority measures, with continuous measures on Blackburn Hamlet Bypass, connecting to Blair LRT Station.
- The site proposes a new municipal loop road (Croissant Françoise) connecting to Lamarche Avenue that will be classified a local road with a speed limit of 30km/h. The loop proposes 2m wide sidewalks on both sides as well as periodic bulbouts for on-street parking and loading. Phase 1 proposes an additional private driveway loop on to Croissant Françoise which provides access to surface parking and to the ramp accessing the underground parking facilities.
- Given the site's close proximity to frequent transit route #25, the number of parking spaces provided by the site is proposed at a reduced rate of 1.1 spaces per resident from 1.2 and 0.1 spaces for visitor parking spaces from 0.2. There is additional on-street parking proposed on Croissant Françoise in the event of overflow. Bicycle parking will meet the parking by-law.
- TDM measures include unbundled car parking from monthly rent and shared commercial/residential visitor parking provisions for this phase of the development. Additional TDM measures will be confirmed in each following Site Plan Application.

Future Conditions

- Peak hour traffic volumes from nearby adjacent developments were incorporated into the future traffic volume projections. A background growth rate of 1% on Innes Road was applied.
- Pedestrian and cycling facilities are proposed within the site which connect to existing facilities on the west side of Lamarche Avenue and future facilities on the east side of Lamarche Avenue. The Lamarche facilities will connect to existing facilities on Innes Road.
- The MMLOS road segment analysis confirmed the east side of Lamarche Avenue does not currently meet PLoS as no facilities have been built as of the time of this report writing, however a sidewalk has been approved and will be built in the near future, meeting the PLoS for both sides of Lamarche Avenue. All other MMLOS road segment categories were met.
- The MMLOS intersection analysis showed that all truck target goals were met. Transit targets were met at Pagé and Boyer intersections with Innes given the estimated delays.

  Bicycle targets were only met at Lamarche/Innes based on the proposed design concept, which promotes a protected intersection design. The remaining cycling targets were not met due to minor streets not having cycling facilities, the introduction of pocket bike lanes being too long (on Orléans Boulevard) or operating speeds being too high.

  The pedestrian targets were not met at any intersection due to the quantity of lanes required to cross on Innes Road.

- The Lamarche/Innes intersection is required to be upgraded from an unsignalized STOP-controlled intersection to a signalized protected intersection design prior to full buildout of Phase 1. Due to conflicts with the opposing driveway to the north, pedestrian and cycling crossings will only be provided on the north, south and west legs of the intersection. Time separated timings are proposed on the cycling crossing movements, to increase cycling priority at the intersection, including bi-directional crossrides on the west and south legs.
- All study area intersections were shown to operate acceptably by the 2029 planning horizon including full buildout of the proposed and other area developments, even if the target mode shares are not met (i.e. the average Orléans mode share assumptions were applied). The Orléans/Innes intersection will continue to experience congestion during the peak hour periods, but similar to existing conditions.
- The East Urban Community Mixed Use Centre Community Design Plan (EUC) proposes new road connections to Lamarche Avenue in the long-range scope (2037). New road connections to Brian Coburn Boulevard will be established, and ultimately a connection to the future Vanguard Drive extension further east. Lamarche Avenue is expected to operate within its designated classification of a collector road for all time periods.
- It is anticipated that once the EUC begins construction around 2037, the study area intersection operations will improve, including the Orléans/Innes intersection, due to a new road connection established between Lamarche Avenue and Brian Coburn Boulevard that will draw significant traffic away from the Glenview and Caivan Lands that currently use the Lamarche/Innes intersection to access/egress their community.
- It is recommended that once Lamarche/Innes intersection is built to include traffic signals and built to its final design, that storage queue lengths of the following lengths be incorporated:
    - A 40m for eastbound right-turn,
    - An 80m for northbound left-turn lane, and
    - An 80m for westbound left-turn lanes.
- The need for a double northbound left-turn lane on Lamarche/Innes is not required for this phase of construction as intersection is forecasted to perform sufficiently well with a single northbound left-turn lane in all future analysis scenarios.
- The traffic implications will be revisited in future Site Plan Control Applications for subsequent phases of development.

Based on the preceding report, the proposed Lépine Development located at 240-270 Lamarche Avenue & 3484 Innes Road is recommended from a transportation perspective.

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