MORRISON HERSHFIELD

FINAL REPORT

OCH 200-201 Friel Street

Transportation Impact Assessment Strategy Report

Ottawa, Ontario

Presented to:

City of Ottawa
110 Laurier Avenue West, Ottawa ON, K1P 1J1

July 11, 2023

TABLE OF CONTENTS

1. SCREENING FORM

The proposed development is located at 200-201 Friel Street, just off Rideau Street in Lowertown, Ottawa. The development will demolish the existing unused underground parking garage on-site and construct a high-rise apartment building that is approximately 20-storeys in height, with a 6-storey podium. The proposed development will provide affordable options for rental units serving the needs of all age groups and will be owned and operated by Ottawa Community Housing (OCH). It is anticipated that the portion of the site to be developed will not be severed from the existing sites at 200 and 201 Friel Street, which also feature OCH buildings.

As required by the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines, a Screening Form was completed for the proposed development. The Screening Form satisfied the Trip Generation Trigger criteria outlined in the City's TIA Step 1 – Screening Form. Since only one trigger was met, a formal TIA, encompassing Step 1 – Screening and Step 2 – Scoping is required to accompany the development application. The Screening Form is provided on the subsequent pages.

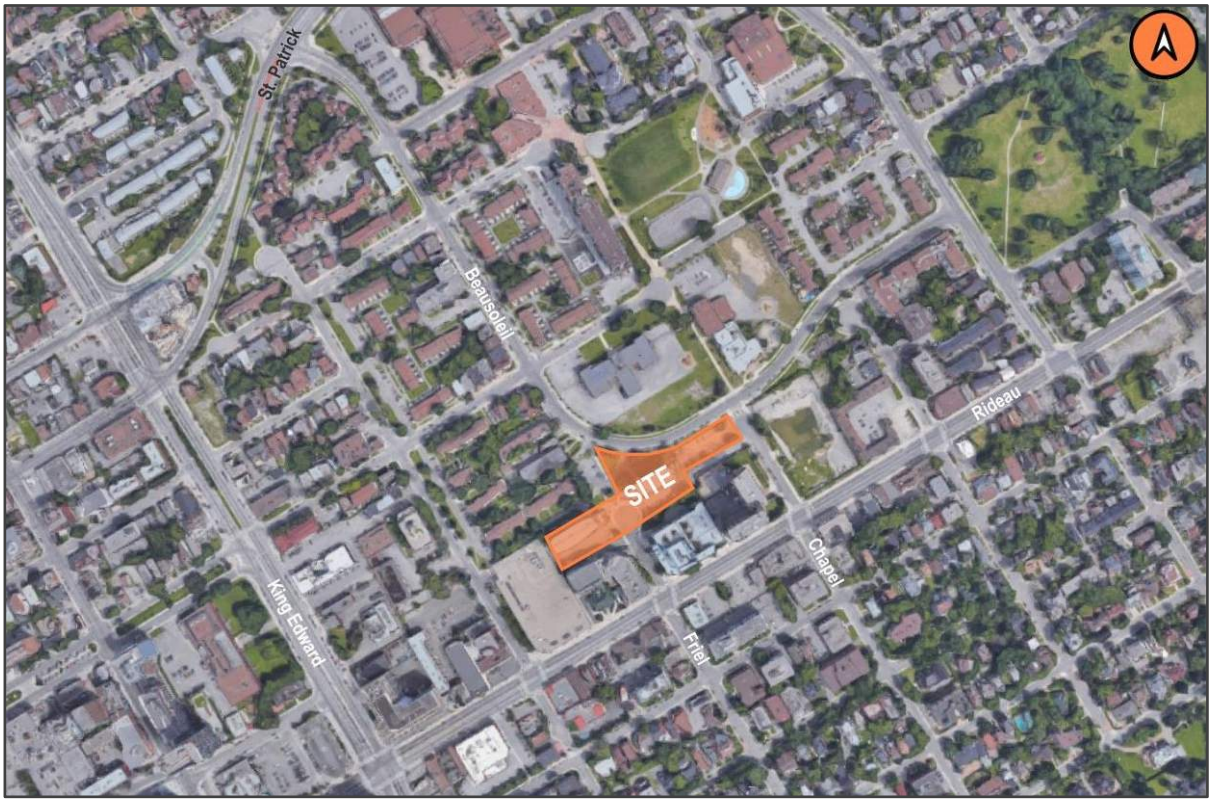
2. SCOPING

2.1 Existing and Planned Conditions

2.1.1 Proposed Development

The subject lands are located at 200-201 Friel Street, generally situated within the area bound by Chapel Street to the east, Nelson Street to the west, Beausoleil Drive to the north and Rideau Street to the south.

Figure 1: Site Location



Land Uses, Permitted Use and Relevant Planning Regulations

Please refer to the Planning Rationale submission for a detailed review of all land use requirements, including the City's New Official Plan (OP). In the New OP, the proposed development is located within the urban boundary and is part of the Downtown Core Transect as per Schedule A – Transect Areas. The Downtown Core Transect is intended to develop into healthy 15-minute communities within a highly mixed-use environmental.

Under Section 5.1.2 of the New OP, it states that the transportation network for the Downtown Core prioritizes walking, cycling and transit. Section 5.1.2.3 states that motor vehicle parking in the Downtown Core shall be managed as follows:

a. Motor vehicle parking shall not be required in new development, other than visitor parking for large-scale residential development;

b. New surface parking lots, and expansions to existing surface parking lots, shall be prohibited in the Downtown Core;

c. Where new development includes parking as an accessory use, such parking shall be located underground or, if within the principal building, never at grade along the frontage of any public street;

d. The City shall encourage car share parking and electric charging facilities in larger parking lots and parking garages; and

e. When the City receives proposals for significant reductions in parking below what is required in the Zoning By-law, the City may seek compensatory provision of enhanced bicycle parking.

In Subsection 3.3.2 (Development) of the Central and East Downtown Core Secondary Plan, the following provisions are identified related to transportation and parking

15. The City will ensure the provision of ample protected bicycle parking for residents, visitors and commuters. For further clarification, protected facilities do not include outdoor spaces.

17. Development will locate loading and other vehicular access infrastructure in a manner which does not compromise or otherwise negatively impact sustainable modes. Where possible, they should be accessed from within the building envelope and not the public right of way.

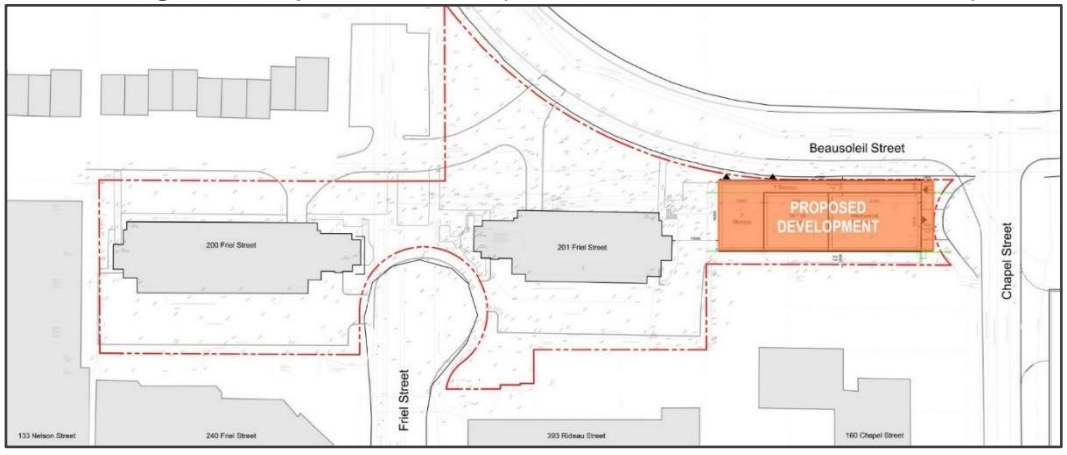
18. Development will minimize the provision of motor vehicle parking. Alternatives should be prioritized over increases in the parking supply. Examples of alternatives include the sharing of existing facilities within walking distance and various transportation demand management strategies. Zoning By-laws should review the maximum limit on parking spaces to support the City's Transportation Master Plan's modal targets for the area.

20. The City may require publicly accessible pedestrian routes through large development parcels to enhance connectivity for active modes, especially around rapid transit stations and mid-block locations. Existing and future mid-block routes should be supported by mid-block street crossing facilities for pedestrians. Above or below-grade pedway alternatives are generally discouraged.

Development Size and Location On Site

The proposed development is planned to include 160 residential units, 20m^2 office space for Ottawa Community Housing (2 employees), and potentially up to 200m^2 of community space. The development is expected to be 20-storeys tall with a 6-storey podium. As shown in the site plan below, the development will be located in the northeastern corner of the existing site.

Figure 2: Proposed Site Plan *(Source: Diamond Schmitt Architects)*



Estimated Date of Occupancy

It is anticipated that construction will be completed in time for building occupancy by 2025.

Planned Phasing of Development

The development will be constructed in a single phase.

Parking Spaces

As shown in the figure below, 8 parking spaces are proposed for the new below-grade parking garage included as part of the new development. It is our understanding that previous discussions with the City have been held where the City agreed that this was the appropriate number of vehicular parking spaces for this building, given the usage of existing parking spaces at the 200-201 Friel Street site today. A breakdown of this previously completed and agreed-to analysis, taken from the *200/201 Friel Street, City of Ottawa, ON – Preliminary Planning Review*, is provided below.

Figure 3: Proposed Below-Grade Parking Garage *(Source: Diamond Schmitt Architects)*

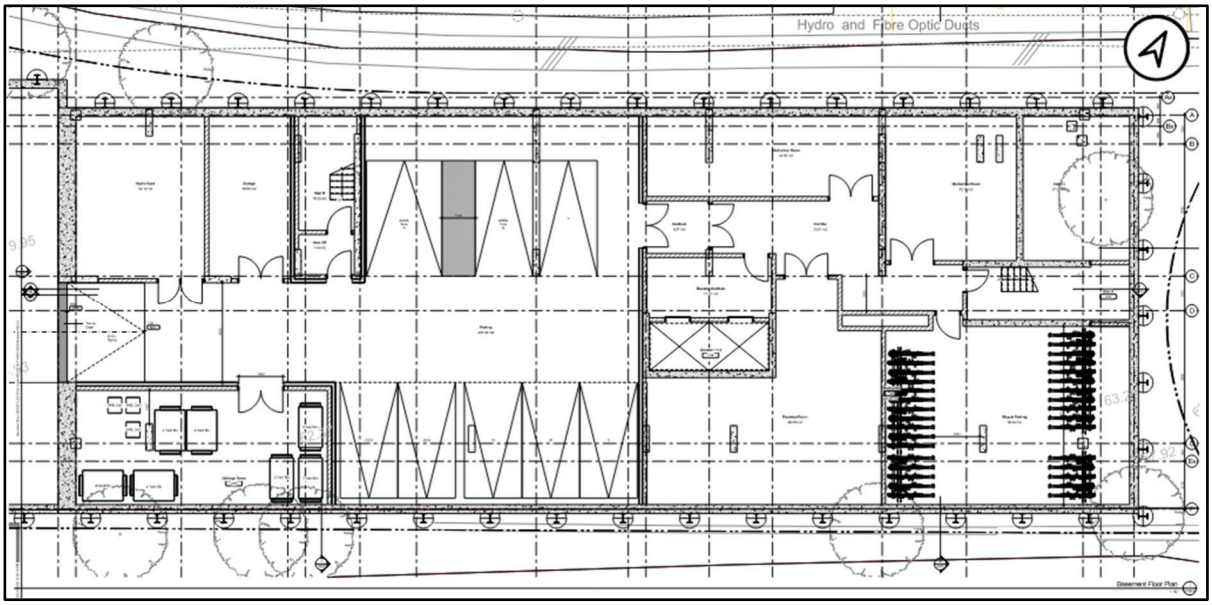


Table 1: Existing Off-Street Parking, 200-201 Friel Street

Site Address	No. of Storeys	No. of Dwelling Units	Existing Off-Street Parking	Parking Breakdown	
				Resident Parking	Additional Parking (Visitor / Staff)
200 Friel Street	13	80	Lot A – 37 spaces	28 spaces	9 spaces
201 Friel Street	13	75	Lot B – 28 spaces	25 spaces	3 spaces

- Current total parking supply is 65 spaces (53 resident, 12 visitor) for 155 units. This equates to a parking supply of 0.42 spaces per unit. The existing underground parking garage at the development site is currently not being used, so these parking spaces are not included in this count.
- Per OCH operations statistics, approximately 60% of spaces are vacant. Therefore approximately 26 spaces are used (0.17 spaces per unit).
- New development for 200-201 Friel Street would offer additional 8 spaces, for a total of 73 spaces across all buildings.

- New 160-unit development would require, per current Zoning provisions:
    - New resident supply: 74 spaces
    - New visitor supply: 15 spaces
    - Total new supply: 89 spaces
- Considered holistically, parking supply across all three buildings (2 existing, 1 new) would equal 0.24 parking spaces per unit. This parking supply would still be higher than required per the operational findings of OCH for parking usage. As per the City's New OP, no motor vehicle parking is required in new developments in the Downtown Core.

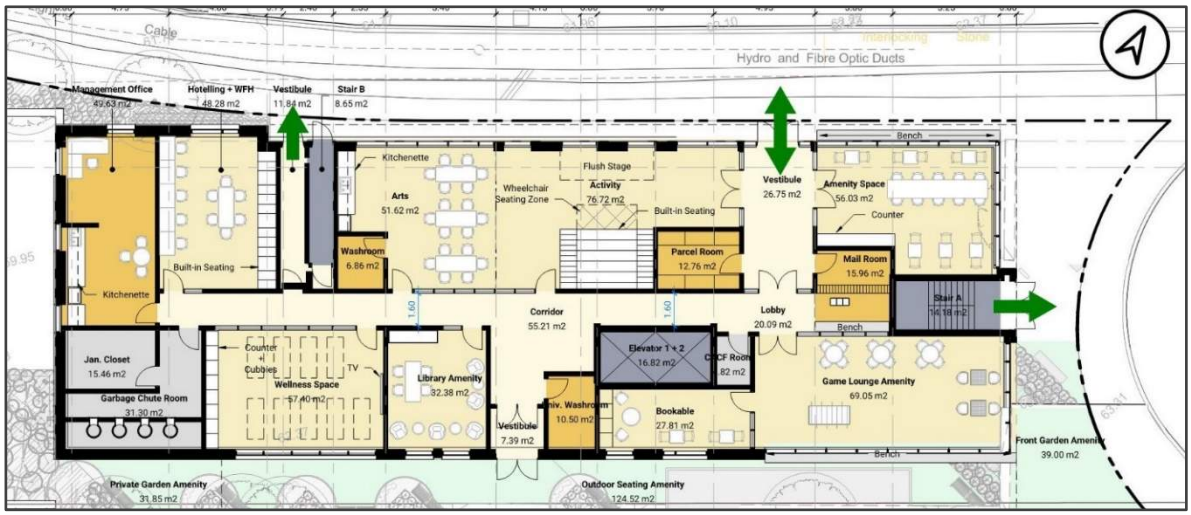
Access Points

The proposed site plan, as shown in Figure 2, depicts one vehicular and bicycle access point which uses the existing driveway for 201 Friel Street. Vehicles would enter and exit the site from this driveway and enter the 1-storey below-grade parking garage (Figure 3) via the west side of the building. All on-site vehicular and bicycle parking will be provided in the parking garage on the west side of the building, or in the existing parking facilities for the 200-201 Friel Street buildings. No new roadways or internal streets are proposed as part of this development. All vehicles using the parking garage (or the other existing parking on-site at 200-201 Friel Street) will use the signalized intersection of Rideau Street / Friel Street to access the site.

The main pedestrian access to the building is expected to be provided off Beausoleil Drive on the north side of the building. Additional access will be provided on the eastern side of the building off Chapel Street and at the northwestern corner of the building off Beausoleil Drive. It is likely that any drop-off / pick-up activity will take place at the northern end of Friel Street (i.e., where it takes place today for 200-201 Friel Street). A sidewalk cut-through is provided between the existing buildings at 200-201 Friel Street; it is likely that any pedestrians destined for the new development will use this sidewalk to connect to the sidewalk on Beausoleil Drive and enter the building.

Bicycle parking is provided in the below-grade parking garage, with visitor bicycle parking provided outside at the northwest corner of the building, between this development and 201 Friel Street. This makes it likely that the majority of cyclists will use either the parking garage from Friel Street or the pathway cut-through from the end of Friel Street to Beausoleil Drive. In total, 80 bicycle parking stalls are provided at the development, which meets the City's Zoning By-Law of 0.5 parking stalls per unit.

Figure 4: Proposed Main Floor *(Source: Diamond Schmitt Architects)*



2.1.2 Existing Conditions

Road Network

Friel Street is a 50 km/h, two-lane Local roadway with sidewalks on both sides, that extends from Laurier Avenue in the south to its termination at the subject site just north of Rideau Street. Within the vicinity of the subject site, two paid on-street parking spaces are provided on the east side of Friel Street. Friel Street has no truck route or cycling designation for its entire extent.

Chapel Street is a 50 km/h, two-lane Local roadway with sidewalks on both sides, that extends from Lees Avenue in the south to Beausoleil Drive in the north. While there are no cycling facilities on Chapel Street, it is identified as a Suggested Route for its entire extent. Within the vicinity of the subject site, Chapel Street is classified as a Local roadway and has free on-street parking on the west side of the street. Chapel Street has no truck route designation for its entire extent.

Beausoleil Drive is a 50 km/h, two-lane Collector roadway with sidewalks on both sides, that extends from Cobourg Street in the east to St Patrick Street in the north. The sidewalk on the south side of the street, adjacent to the site, is approximately 1.5m to 1.8m in width. While there are no cycling facilities on Beausoleil Drive, it is identified as a Suggested Route from Chapel Street to St Patrick Street. Within the vicinity of the subject site, Beausoleil Drive has free on-street parking on the west and south side of the street. Beausoleil Drive has no truck route designation for its entire extent.

Rideau Street is a 50 km/h, four-lane Arterial roadway with sidewalks on both sides, that extends from Sussex Drive in the west to the Rideau River in the east. Beyond Sussex Drive and the Rideau River, Rideau Street continues as Wellington Street and Montreal Road, respectively. Rideau Street is classified as a full-season truck route from the Rideau River to Waller Street, and a restricted load truck route from Waller Street to Sussex Drive. Within the vicinity of the subject site, the curbside lanes on both sides of the roadway operate as transit-priority lanes during the peak hours and paid on-street parking during the off-peak hours.

Intersections

Rideau/Friel - The Rideau Street/Friel Street intersection is a signalized, four-legged intersection. The north and south approaches (Friel Street) consist of one lane each. The east and west approaches (Rideau Street) consist of two lanes, with the curbside lane a shared right-turn/transit priority lane and the median lane a through/left lane. Pedestrian crosswalks with 'ladder' style markings are provided on all approaches at this intersection.

The eastbound and westbound left turn movements are prohibited from 7:00 to 9:00 AM from Monday to Friday.

Rideau/Chapel - The Rideau Street/Chapel Street intersection is a signalized, four-legged intersection. The north and south approaches (Friel Street) consist of one lane in each direction. The east and west approaches (Rideau Street) consist of two lanes in each direction, with the curbside lane a shared right-turn/transit priority lane and the median lane a through/left lane. Pedestrian crosswalks with 'ladder' style markings are provided on all approaches at this intersection.

The eastbound and westbound left turn movements are prohibited from 7:00 to 9:00 AM and 3:30 PM to 5:30 PM from Monday to Friday.

Beausoleil/Chapel - The Beausoleil Drive/Chapel Street intersection is a stop-controlled, three-legged intersection. The east and west approaches (Beausoleil Drive) consist of one lane in each direction. The south approaches (Chapel Street) previously had one lane in each direction but has been closed to vehicular traffic, with only pedestrians and cycling access permitted. Pedestrian crosswalks with 'ladder' style markings are provided on all approaches at this intersection. Given the closure of the south leg to vehicles, the eastbound right turn and westbound left turn movements are prohibited.

Driveways

As show in **Figure 5**, there are 37 driveways that fall within a 200m boundary of the site. These exclude driveways that only serve a single private dwelling.

Figure 5: Nearby Driveways

- 5 driveways are located on Friel Street north of Rideau Street.
  - 2 driveways provide access to the proposed development site: one to 200 Friel Street and one to 201 Friel Street.
  - 2 driveways provide access to parking garages, one for 240 Friel Street and one for 393 Rideau Street.
  - 1 driveway provides loading and delivery access to 393 Rideau Street.
- 4 driveways are located on Friel Street south of Rideau Street, two providing access to commercial properties and two providing access to multi-unit residential properties.
- 3 driveways are located on Chapel Street north of Rideau Street.
  - 1 driveway provides access to the at-grade parking lot currently located on the development site. As part of this project this parking lot and access will be removed.
  - 1 driveway provides access to the parking garage for 160 Chapel Street.
  - 1 driveway access to 151 Chapel Street.
- 4 driveways are located on Chapel Street south of Rideau Street.
- 7 driveways are located on Beausoleil Drive, generally providing access to multi-unit residential properties.

- 12 driveways are located on Rideau Street, with one providing loading access and the remainder generally providing access to commercial properties.
- 2 driveways are located on York Street, one providing access to a multi-unit residential property and one providing access to York Street Public School.

Pedestrian Network

The pedestrian network in the vicinity of the site is well developed and offers sidewalks on both sides of all streets nearby. Most driveways do not have pedestrian facilities. There are two north-south pedestrian cut-throughs provided near the site: one that connects Friel Street to Beausoleil Drive through the 200-201 Friel Street site, and one that connects Beausoleil Drive to Murray Street, east of York Street Public School

Cycling Network

With regard to cycling facilities, there is a Suggested Route that runs north-south along Chapel Street and connects to the suggested route along Beausoleil Drive. This route has no cycling facilities, but follows Collector Streets that feature traffic calming measures. There are bike lanes that run north-south along Cobourg Street between Rideau Street and St Patrick Street, and east-west along Stewart Street (westbound) and Wilbrod Street (eastbound) between Cumberland Street and Cobourg Street. These bike lanes make up part of the City's Cross-Town Bikeways and the Winter-Maintained Cycling Network. Rideau Street east of Cobourg Street is identified as a cycling spine route as defined by the Ottawa Cycling Plan 2013. The existing cycling network within the vicinity of the proposed development, as sourced from GeoOttawa, is shown in the following **Figure 6**.

Figure 6: Existing Multi-Use Path/Cycling Network

Transit Network

OC Transpo currently provides high-order transit service through the heart of Lowertown on Rideau Street. The site will benefit from direct access to the numerous bus routes along Rideau Street (including Routes 7, 14, 15 and 18), as well as being approximately a 1 kilometre walk from Rideau Station on the Confederation Line LRT.

The following **Table 2** summarizes the existing stops, their associated routes and direction of travel. Given the numerous bus stops located within walking distance to/from the development site, only the ones located closest to the site for each route were included. In addition to OC Transpo, STO also provides service between downtown Ottawa and Hull, with a stop at Rideau/Cumberland that is served by STO Routes 31, 33, 35, 36, 37, 38 and 371.

Table 2: Transit Information

Stop #	Location (Distance from Development)	OC Transpo Route	Direction
#7591	Rideau / Chapel (120m)	7, 14, 15, 18	Westbound
#7593	Rideau / Friel (200m)	7, 14, 15, 18	Eastbound
#1692	Cobourg / Beausoleil (360m)	7, 19	Northbound
#6822	Cobourg / Beausoleil (350m)	7, 19	Southbound
#6828	Old St Patrick / De La Salle H.S. (470m)	6	Westbound
#6827	Old St Patrick / De La Salle H.S. (450m)	6	Eastbound
#8974	King Edward / York (500m)	56	Northbound
#8977	King Edward / York (550m)	56	Southbound
#3009	Rideau LRT Station (1 km)	Confederation Line	East/Westbound
#3009A	Rideau Station A (1 km)	5, 6, 7, 14, 15, 18	Westbound
#3009B	Rideau Station B (1.2 km)	5, 6, 7, 14, 15, 18	Eastbound
#7576	Dalhousie / Rideau Station D (900m)	6, 9	Southbound

The following **Figure 7** depicts the OC Transpo routes within the vicinity of the site, and **Table 3** provides additional information with respect OC Transpo service identified in Table 1.

Figure 7: Transit Routes Within Study Area *(Source: OC Transpo System Map)*

Table 3: OC Transpo Route Information

Route	Origin/Destination	Service Type	Peak Hour Headway
1	Confederation Line (Tunney's Pasture ↔ Blair)	LRT	5 min
5	Billings Bridge ↔ Rideau	Local	30 min
6	Greenboro ↔ Rockcliffe	Frequent	~12 min
7	Carleton ↔ St Laurent	Frequent	~9 min
9	Rideau ↔ Hurdman	Local	15 min
14	St Laurent ↔ Tunney's Pasture	Frequent	15 min
15	Blair ↔ Parliament	Frequent	~9 min
18	St Laurent ↔ Rideau	Local	30 min
19	Parliament ↔ St Laurent	Local	30 min
56	King Edward ↔ Tunney's Pasture	Local	30 min

Area Traffic Management Measures

There are numerous traffic calming measures in place within the vicinity of the development. The closest is located at the intersection of Beausoleil/Chapel, which closed the south leg of the intersection to traffic and is now for pedestrians and cyclists only. This is one example of a location where vehicular traffic is restricted but active transportation is permitted. These are also provided at numerous locations south of Rideau Street at Nelson/Besserer and Cobourg/Besserer.

There are various locations close to the site that feature curb bulb-outs at intersections, such as the example here from Friel/Daly. These can also be seen at Friel/Besserer, Friel/Stewart, Friel/Wilbrod, Chapel/Stewart and Chapel/Wilbrod.

Peak Hour Travel Demands

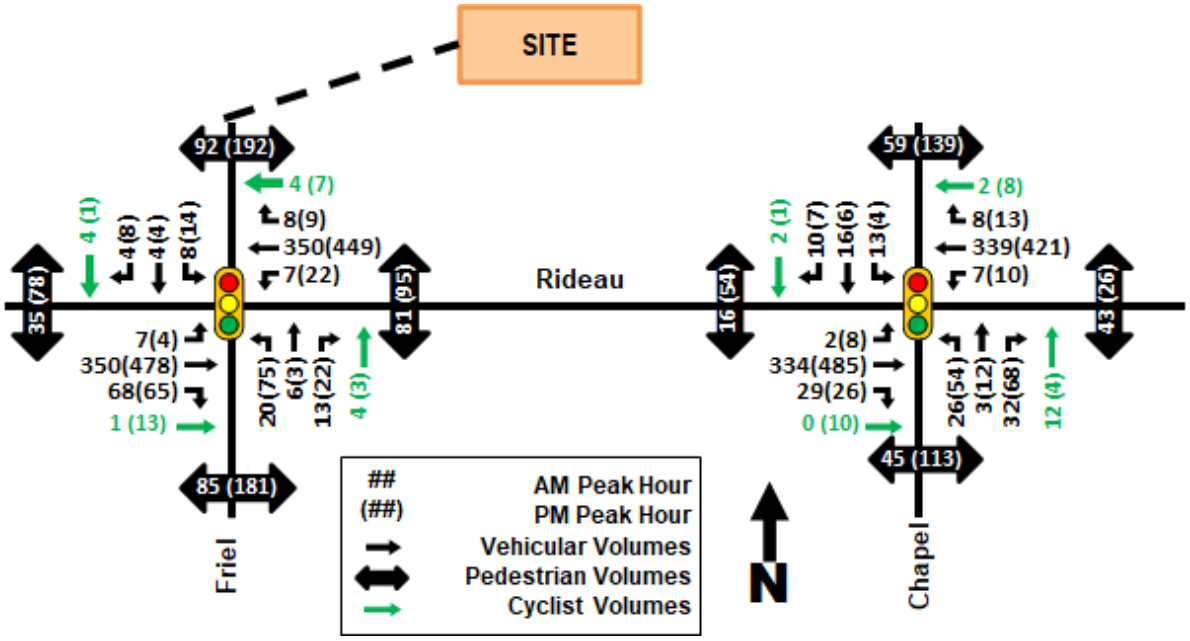
For the purpose of this assessment, only two study area intersections have been identified for intersection capacity analysis (traffic count date included in parentheses):

- Rideau/Friel (May 2017), signalized
- Rideau/Chapel (May 2017), signalized

These are the two closest intersections on the boundary streets of Friel Street and Chapel Street. As previously noted, there is an all-way stop control T-intersection at Beausoleil Drive and Chapel Street, however the third leg of this intersection is closed to vehicles, resulting in east-west operations that don't require review. Furthermore, using the City of Ottawa's TRANS Trip Generation Manual, it is anticipated that only 13 vehicular trips (AM peak hour) and 12 vehicular trips (PM peak hour) will be generated, therefore a widespread impact on traffic signal operations is not anticipated from this development.

The following **Figure 8** depicts observed weekday morning and afternoon peak hour volumes at the study area intersections.

Figure 8: Existing Traffic Volumes, AM (PM)



Existing Road Safety Conditions

Available collision data for the years 2016 – 2020 was obtained from the City of Ottawa's Open Data Catalogue. The collision data includes all collisions occurring at the intersections and the roadway segments within the area surrounding the subject development site, including Friel Street and Chapel Street north of Rideau Street, Rideau Street from Friel Street to Chapel Street, and Beausoleil Drive from York Street to Cobourg Street.

The 5-year total number of recorded collisions within the study area is 36. Most collisions within the study area (25 incidents or 69%) resulted in property damage only, and the remaining collisions resulted in personal injuries (11 incidents or 31%). The most frequent types of collisions, as cited by police, were single motor vehicles (14 incidents or 39%), rear ends (7 incidents or 19%) and sideswipes (7 incidents or 19%). 9 collisions (25%) occurred when it was dark outside, and 7 collisions (19%) occurred when the road surface wasn't dry (i.e., snow, rain or slush).

It is noteworthy that within the five years of recorded collision data, there were 6 collisions involving pedestrians and 2 collisions involving cyclists. Fortunately, all the reported collisions involving pedestrians or cyclists were non-fatal; however, personal injuries were reported. 3 of the collisions involving pedestrians or cyclists occurred at Rideau/Chapel; 3 of the collisions occurred at Rideau/Friel; 1 collision with a pedestrian occurred on Rideau Street between Friel Street and Chapel Street, and 1 collision with a cyclist occurred on Beausoleil Drive between York Street and Cobourg Street. Of these collisions, one occurred in the rain, and one occurred in the snow. All other occurred in daylight with dry conditions.

When considering the requirement to accommodate all modes on Rideau Street, the four-lane cross-section is fairly small for pedestrians and cyclists to cross. The crosswalk markings at both intersections are 'ladder' markings, which are the highest scoring (i.e., best) crosswalk pavement markings according to the City's Multi-Modal Level of Service (MMLOS) Guidelines. One item to note is that neither signalized intersection provides leading pedestrian intervals (LPIs), which allow pedestrians to enter the crosswalk in advance of traffic, providing a better line of sight for drivers to see pedestrians. Given the heavy pedestrian volumes at this intersection, consideration should be given to implementing LPIs at both intersections.

2.1.3 Planned Conditions

The following section summarizes the known projects ongoing in and around the study area that may have a benefit or impact on residents of the proposed development. Information is taken from the City of Ottawa website, as well as through discussions with City of Ottawa staff. Where available, dates are provided on the progress of each project.

Active Transportation Projects

Cycling and walking projects underway or planned in the area include:

- Removal of the westbound bike lane at intersection of St. Patrick Street and King Edward Avenue intersection to provide a westbound cycle track and appropriate treatment for crossing of channelized right turn. Construction expected to be completed by the end of 2023.
- Provision of a north-south bi-directional facility at the intersection of Wellington Street and Mackenzie Street to provide a connection to the Rideau Canal Eastern Pathway. Construction expected to be completed by the end of 2023. In addition, a bi-directional facility along the north side of Wellington Street connecting to the future cycle track on O'Connor Street has been proposed, however this will likely be looped into larger discussions about the future of Wellington Street in front of the Parliament Buildings.
- Provision of an east-west cycling connection across King Edward Avenue and York while continuing to restrict vehicular access. Public consultation was completed in May 2022.
- Provision of a westbound cycling facility on St Patrick Street between King Edward Avenue and Dalhousie Street.
- Provision of an eastbound bike lane on Old St Patrick Street between Beausoleil Drive and Cobourg Street, with a shared lane in the eastbound direction.
- Provision of cycling facilities on Murray Street from Sussex Drive to King Edward Avenue, and Cumberland Street from George Street to St Patrick Street. May include removal of on-street parking.

Transit Projects

With the completion of Ottawa's Confederation LRT line in 2019, there are no proposed or ongoing transit projects within the vicinity of the site. Construction work for the Stage 2 LRT extension of the Confederation Line is ongoing at the time of this study. While no construction on Stage 2 is located within the study area, the extension of the line will increase the usage of the Confederation Line, and may make transit more appealing.

The NCC has indicated an interest in pursuing a "Downtown Transit Loop" dating back to 2020, connecting the downtowns of Ottawa and Gatineau[1], as well as providing connections between Ottawa's Confederation Line and Gatineau's future West Gatineau Tramway.

Road Projects

No major road projects are identified within the study area for the near future, including road resurfacing and watermain/sewer renewals. It is worth noting that in 2016 the Downtown Ottawa Truck Tunnel Feasibility Study was completed, which identified a potential link between the Macdonald-Cartier Bridge

[1] https://ncc-ccn.gc.ca/news/national-capital-region-loop-the-idea-whose-time-has-come

and Highway 417. While there are currently no long term plans to construct the truck tunnel, if it were built it would likely reduce traffic volumes in Lowertown and on Rideau Street, as well as diverting a large number of heavy vehicles away from the area.

Other Area Development

Planned developments within the study area have been identified using the City's Development Application Search Tool. The following **Table 4** below summarizes planned and active developments within the vicinity of the subject development lands.

Table 4: Area Development

Location	Description	Status
112 Nelson	9 storeys, 176 units residential	Zoning By-law Amendment Application approved 2021, Site Plan Control Application pending
80 Nelson	2 buildings, 3-4 storeys, 46 units	Zoning By-law Amendment Application pending
151 Chapel	25 storeys, 633 units, 45,382m^2	Built and occupied
340 York	Ecole Sainte-Anne expansion (3 storeys, 1,682m^2)	Built and occupied
305 Rideau	13 storeys, 194 units	Built and occupied
333 King Edward	3 storeys, ,975 m^2 commercial	Built and occupied

2.2 Study Area and Time Periods

2.2.1 Study Area

The following study area intersections are proposed for this TIA:

- Rideau Street / Friel Street
- Rideau Street / Chapel Street

Given the low number of parking provided on-site today and proposed as part of this development, these two intersections should capture the majority of the projected traffic generated by the development. Traffic impacts outside these two intersections should be relatively small relative to existing traffic volumes.

2.2.2 Time Periods

Given the surrounding road network (e.g., Rideau Street, King Edward Avenue) typically experience the heaviest traffic volumes during the weekday morning and afternoon peak hours, this assessment considered weekday morning and afternoon peak hours for analysis purposes only.

2.2.3 Horizon Years

As noted in the TIA Screening Form, the buildout year for this development is expected to be 2025. Given the relatively low volume of traffic expected to be generated by the development (supported by the low level of additional parking provided) it is proposed that the only required horizon for additional analysis be 2030, which fulfills the build-out plus five years horizon set out in the TIA guidelines.

2.3 Exemptions Review

Given that the proposed development does not require any new connections to City of Ottawa roadways (i.e., it uses an existing access through the 201 Friel Street site), and the minimal vehicular traffic expected to be generated (13 vph in the AM peak and 12 vph in the PM peak) it is proposed that this exempt the TIA from the following modules:

- 4.1.2 (Circulation and Access)
- 4.1.3 (New Street Network)
- 4.3 (Boundary Street Design)
- 4.4 (Access Intersections)
- 4.6 (Neighbourhood Traffic Management)
- 4.8 (Review of Network Concept)
- 4.9 (Intersection Design)

Given the previous discussions with the City of Ottawa on existing and projected parking usage of the site today that were used to advise the number of parking spaces provided on-site, it is proposed that this TIA also be exempt from Modules 4.2 (Parking) and 4.5 (Transportation Demand Management). The following **Table 5** summarizes the modules that are proposed for exemption.

Table 5: Module Exemption Review

Module	Element	Exemption Criteria	Status
Design Review			
4.1 Develop. Design	4.1.2 Circulation and Access	Required for Site Plans	**Exempt**
	4.1.3 New Street Network	Required for Plans of Subdivision	**Exempt**
4.2 Parking	4.2.1 Parking Supply	Required for Site Plans	**Exempt**
	4.2.2 Spillover Parking	Required for Site Plans where parking supply will be 15% below unconstrained demand	**Exempt**
4.3 Boundary Streets	Mobility	Proposed for exemption due to fewer than 20 vph generated during AM and PM peak hours.	**Exempt**
	Road Safety		
	Neighbourhood Traffic Management		
4.4 Access Intersections	4.4.1 Location and Design of Access		**Exempt**
	4.4.2 Intersection Control		
	4.4.3 Intersection Design		
Network Impact			
4.6 Area Traffic Management	All Elements	Required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	**Exempt**
4.8 Network Concept	All Elements	Required when development is projected to generate more than 200 person-trips during the peak hour, in excess of the equivalent volume permitted by the established zoning	**Exempt**
4.9 Intersection Design	All Elements	Proposed for exemption due to fewer than 20 vph generated during AM and PM peak hours.	**Exempt**

3. FORECASTING

3.1 Development-Generated Travel Demand

3.1.1 Trip Generation and Mode Share

For the purpose of this assessment, projected residential site-generated trips were estimated using the City of Ottawa TRANS Trip Generation Manual (2020). According to OCH, only two employees will be present each day, therefore for the office land use it was assumed that the two employees would arrive during the AM peak hour and depart during the PM peak hour, with the mode share for Employment Generators used from the TRANS Trip Generation Manual. The community space that is envisioned to be included in the development has no trips associated with it, as its specific use is still to be determined but is currently assumed to be for residents of the development only, therefore no new trips will be generated by it.

Based on the foregoing and the information provided, the following **Table 6** summarizes appropriate vehicle trip generation rates for estimating projected site-generated trips by land use. It should be noted that for ITE rates, the first listed equation is an average person trip generation rate, and the second equation is a "line of best fit" equation that more accurately represents the trend of person trip generation based on land use size. Typical industry practice is to use the "line of best fit" equation for site-generated traffic projections, if available.

Table 6: Trip Generation Rates

Land Use	Land Use Code (TRANS / ITE)	AM Peak Hour	PM Peak Hour
High-Rise Multi-family Housing *(X = Dwelling Units)*	TRANS Multi-Unit (High-Rise)	T = 0.4(X)	T = 0.4(X)

Note: T = Average Person Trip Ends

With respect to TRANS residential trip generation rates, the TRANS Trip Generation Manual provides a person trip rate for the AM and PM peak periods. Adjustment factors are also provided in the TRANS Trip Generation Manual to convert the person peak period trip rates into walking, cycling, transit, vehicle driver, and vehicle passenger trip rates. The mode share for this development is taken from Table 8 of the TRANS Trip Generation Manual - Residential Mode Share for High-Rise Multifamily Housing. For the Ottawa Centre District, this is a mode share across both peak periods of approximately 52% pedestrian, 1% cyclist, 24% transit, 18% vehicle driver, and 5% vehicle passenger.

The following **Table 7** summarizes the resulting projected two-way person site trip generation for each land use of development. **Table 8** provides the projected trip generation broken down into each mode.

Table 7: Projected Site Person Trip Generation, Peak Hours

Block	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
High-Rise Multi-family Housing	20	44	64	37	27	64
General Office Building	2	0	2	0	2	2
Total Person Trips	22	44	66	37	29	66

Table 8: Projected Site Trip Generation, Peak Hours

Block		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
High-Rise Multi-family Housing	Pedestrian	10	23	33	19	14	33
	Cycling	1	0	1	1	0	1
	Transit	5	12	17	8	6	14
	Vehicle Driver	4	8	12	6	5	11
	Vehicle Passenger	0	1	1	3	2	5
	Person	**20**	**44**	**64**	**37**	**27**	**64**
General Office Building	Pedestrian	0	0	0	0	0	0
	Cycling	0	0	0	0	0	0
	Transit	1	0	1	0	1	1
	Vehicle Driver	1	0	1	0	1	1
	Vehicle Passenger	0	0	0	0	0	0
	Person	**2**	**0**	**2**	**0**	**2**	**2**
Total Person Trips		**22**	**44**	**66**	**37**	**29**	**66**

As shown in Table 7 and 8, the site is expected to generate 66 person trips in both peak hours, with the majority of the trips made by walking. 13 vehicular trips are expected to be made in the AM peak hour, with 12 vehicular trips expected to be made in the PM peak hour.

3.1.2 Trip Distribution and Assignment

The projected distribution of site-generated vehicular traffic was derived based on existing travel patterns, the site's connections to/from the surrounding road network, and local area knowledge. (e.g., the location and proximity of other employment areas, residential communities, entertainment, etc.). For analysis purposes, the following approximate distribution of projected site-generated traffic was assumed, which is consistent with data from the most recent 2011 TRANS Origin-Destination (OD) travel survey (i.e., "existing travel patterns"). It should be noted that for all "Vehicle Passenger" trips, it was assumed that pick-up and drop-off activity will take place at the north end of Chapel Street.

Departure

- 15% to the east via Rideau Street and Montreal Road
- 30% to the west via Rideau Street and Wellington Street
- 5% to the north via King Edward Avenue
- 50% to the south via King Edward Avenue and Nicholas Street

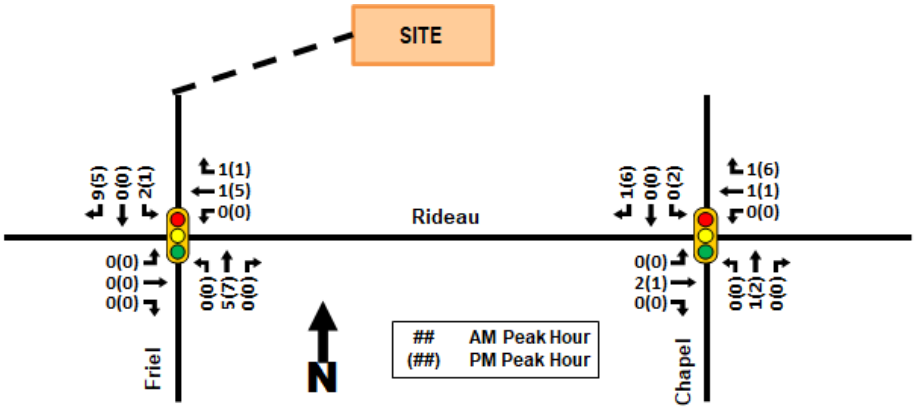
Arrival

- 10% from the east via Rideau Street and Montreal Road
- 30% from the west via Rideau Street and Wellington Street[2]
- 10% from the north via King Edward Avenue
- 50% from the south via King Edward Avenue and Nicholas Street

[2] It should be noted that left turns from Rideau Street to side streets are restricted during AM and PM peak periods. Therefore, movements arriving from the west will be assigned to northbound through movements, as it is assumed these users will navigate through the neighbourhood to the south to access the development site.

Based on the above assumed distribution, projected site-generated traffic was assigned to the study area network, which is depicted on the following **Figure 9**.

Figure 9: Vehicular Trip Distribution, AM (PM)



3.2 Background Network Travel Demand

3.2.1 Transportation Network Plans

As identified in Section 2.1.3, there are numerous proposed improvements to the active transportation realm in the area. There are no proposed changes to the road or transit networks at this point in time. With the expansion of the Confederation Line LRT further east and west, it is expected that more residents will use the LRT, especially those living within the vicinity of an LRT station such as residents of the proposed development.

3.2.2 Background Growth

It is noted in the City's 2013 TMP that reliance on vehicles to enter and exit the downtown has been diminishing for some time now. The TMP makes it clear that between 1986 and 2011, the number of vehicles arriving downtown in the morning peak period has decreased while the number of people arriving downtown has increased. An Origin-Destination Travel Survey that was planned for 2021 has been delayed due to the COVID pandemic, but the trend is expected to have continued from 2011 onwards due to the increased residential development in the downtown, improved transit service (including the Confederation Line LRT), and limited roadway capacity to enter the downtown. Therefore, for the purposes of this study, no background traffic growth (i.e., background traffic growth of 0%) was assumed.

3.2.3 Other Developments

Of the six developments within the study area identified in Section 2.1.3, four of them are built and occupied. The two that are not yet built are the developments located at 80 Nelson Street (46 residential units across two 3-4 storey buildings) and 112 Nelson Street (176 residential units in a 9-storey building). No information regarding trip generation for 80 Nelson Street is available, but a 2021 TIA is available for 112 Nelson Street. That TIA identified the following new trips to study area intersections:

- AM Peak Hour: 4 eastbound trips on Rideau Street, 0 westbound trips on Rideau Street
- PM Peak Hour: 2 eastbound trips on Rideau Street, 1 westbound trip on Rideau Street.

These trips will be added to the Future Traffic Volumes.

3.3 Demand Rationalization

The following section summarizes the study area intersection capacity analysis for Existing and Future Total Volume scenarios. For analysis purposes, the Existing Conditions scenario is considered to be 2023 and the Future Total Volume scenario is assumed to be 2030, five years after the completion of the development.

Using the intersection capacity analysis software Synchro (v11), study area intersections were assessed in terms of vehicle delay, volume-to-capacity ratio (v/c) and the corresponding Level of Service (LOS). It should be noted that the overall performance of a signalized intersection is calculated as a weighted v/c ratio and assigned a corresponding LOS, with critical movements assigned a LOS based on their respective v/c ratio. **Table 9** shows the vehicular level of service that corresponds to each v/c ratio.

Table 9: Level of Service vs. V/C Ratio

Level of Service	Volume to Capacity Ratio
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	> 1.00

The City of Ottawa follows a Multi-Modal Level of Service (MMLOS) policy, which evaluates all modes of transportation, including pedestrians, cyclists, transit, trucks, and vehicles. The MMLOS analysis allows for trade-offs between the different modes of transportation, prioritizing different modes depending on the location within the City. The City's MMLOS Guidelines define the LOS targets for each mode of transportation based on the Official Plan Designation / Policy Area, as well as roadway classification, cycling facilities, transit priority and truck route status. These targets for Rideau Street are presented in **Table 10**. It should be noted that the current MMLOS Guidelines refer to the previous Official Plan, which states that this development is not located in the "Central Area". However, given that in the New Official Plan this development falls within the Downtown Core Transect, the "Central Area" designation from the MMLOS Guidelines was used as the target.

Table 10: Minimum Desirable MMLOS Targets by Official Plan Policy/Designation & Road Classification (Source: City of Ottawa MMLOS Guidelines)

OP Designation (Roadway Characteristics)	Street	Pedestrian LOS	Bike LOS	Transit LOS	Truck LOS	Auto LOS
Central Area (Arterial)	Rideau	A	C	C	D	E

Due to the central location of the study area, all roadways and intersections within the study area have a Pedestrian LOS (PLOS) target of LOS 'A', and an Auto LOS target of LOS 'E', indicating the focus on pedestrians. The spine route designation along Rideau Street requires that the corridor meet the Bike LOS (BLOS) target of LOS 'C'. There are no plans for transit priority above and beyond the existing continuous transit priority lanes, therefore the Transit LOS (TLOS) target is LOS 'C' for all intersections. Rideau Street is a full-season truck route, therefore its Truck LOS (TrLOS) target is LOS 'D'.

3.3.1 Existing (2023) and Future (2030) Conditions

Based on existing volumes depicted in Figure 8 and existing signal timing plans provided by the City, the following **Table 11** summarizes the existing performance of study area intersections. Detailed Synchro output data is provided in **Appendix A**.

Table 11: Study Area Intersection Operations - Existing Conditions

Intersections	Mvmts	Delay (s)	v/c Ratio	v/c LOS	95th Queue (m)
Rideau at Friel	EBLT	4 (9)	0.30 (0.45)	A (A)	28 (69)
	EBR	2 (4)	0.08 (0.12)	A (A)	3 (6)
	WBLT	4 (9)	0.27 (0.41)	A (A)	24 (84)
	WBR	0 (2)	0.01 (0.02)	A (A)	m0 (m0)
	NBLTR	29 (48)	0.28 (0.66)	A (B)	12 (27)
	SBLTR	28 (23)	0.10 (0.13)	A (A)	7 (9)
	Overall	**5 (12)**	**0.28 (0.44)**	**A (A)**	**-**
Rideau at Chapel	EBLT	10 (7)	0.30 (0.46)	A (A)	56 (48)
	EBR	6 (2)	0.03 (0.03)	A (A)	5 (m2)
	WBLT	5 (7)	0.32 (0.39)	A (A)	28 (49)
	WBR	0 (1)	0.01 (0.02)	A (A)	0 (1)
	NBLTR	24 (35)	0.35 (0.63)	A (B)	14 (30)
	SBLTR	28 (24)	0.22 (0.08)	A (A)	12 (7)
	Overall	**9 (10)**	**0.31 (0.45)**	**A (A)**	**-**

Both intersections within the study are operate well, with a LOS 'A' in both peak hours and no individual movement operating worse than a LOS 'B'. There are no concerns with capacity or 95th percentile queue lengths at either intersection.

The total traffic volumes for the future 2030 horizon are shown in **Figure 10**, including the existing volumes, background volumes from adjacent developments, and trips generated by the proposed development. Based on the future traffic volumes depicted in Figure 10, the future projected performance of study area intersections is summarized in **Table 12**. Detailed Synchro output data is provided in Appendix A.

Figure 10: Total Future (2030) Volumes, AM (PM)

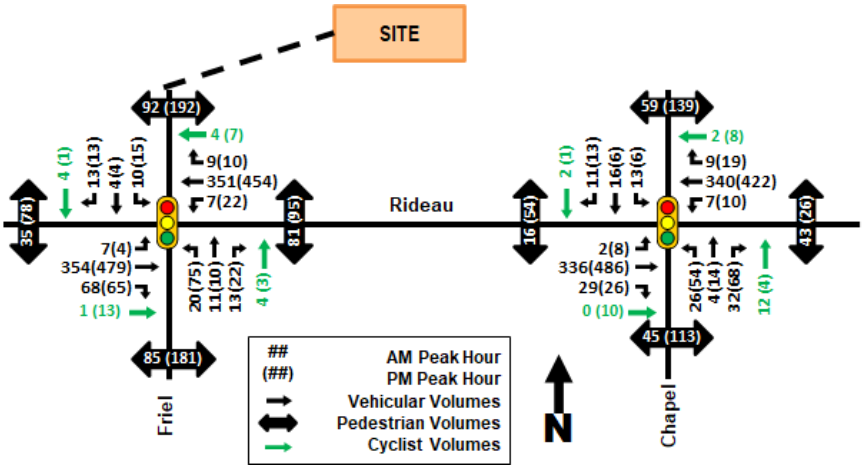


Table 12: Study Area Intersection Operations – Future (2030) Conditions

Intersections	Mvmts	Delay (s)	v/c Ratio	v/c LOS	95th Queue (m)
Rideau at Friel	EBLT	4 (9)	0.30 (0.45)	A (A)	29 (71)
	EBR	2 (4)	0.08 (0.12)	A (A)	3 (6)
	WBLT	3 (9)	0.27 (0.42)	A (A)	16 (85)
	WBR	0 (2)	0.01 (0.02)	A (A)	m0 (m1)
	NBLTR	30 (48)	0.30 (0.67)	A (B)	13 (29)
	SBLTR	23 (21)	0.16 (0.15)	A (A)	8 (9)
	Overall	**5 (12)**	**0.28 (0.45)**	**A (A)**	**-**
Rideau at Chapel	EBLT	3 (7)	0.30 (0.46)	A (A)	9 (49)
	EBR	1 (3)	0.03 (0.03)	A (A)	0 (m2)
	WBLT	5 (7)	0.32 (0.39)	A (A)	28 (49)
	WBR	0 (2)	0.01 (0.03)	A (A)	0 (1)
	NBLTR	24 (37)	0.35 (0.65)	A (B)	14 (31)
	SBLTR	28 (22)	0.22 (0.13)	A (A)	12 (8)
	Overall	**6 (10)**	**0.31 (0.45)**	**A (A)**	**-**

Similar to the existing conditions, there are no intersection operation issues anticipated in the Future 2030 horizon. Given the low level of vehicular trips generated by the proposed development, as well as by adjacent developments this is not a surprising result. No future mitigation measures are required at either intersection.

4. ANALYSIS

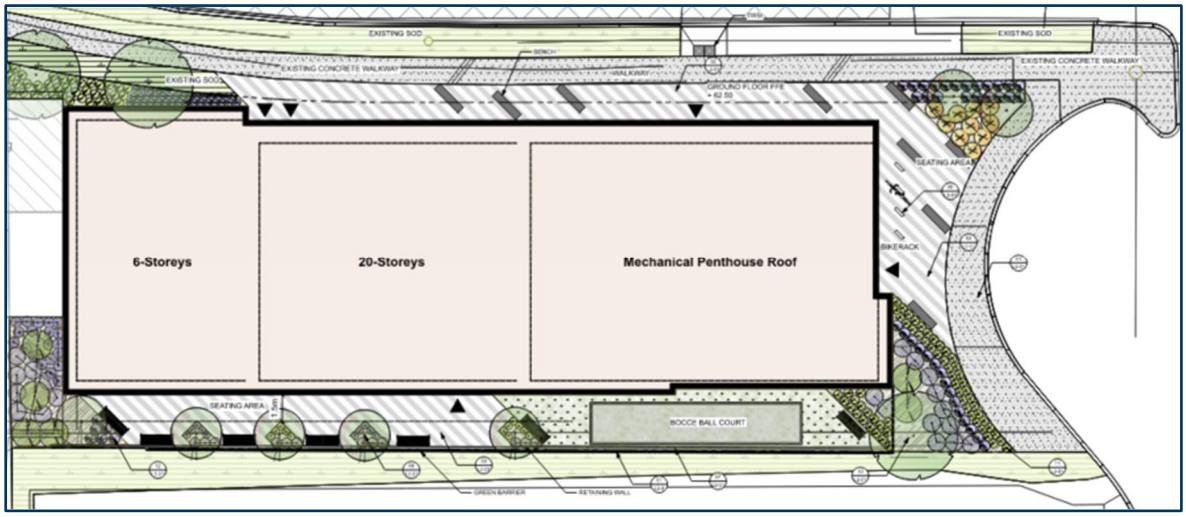
As noted in Section 2.3, the following modules have been exempted from this TIA, as approved by the City: 4.1.2 Circulation and Access, 4.1.3 New Street Network, 4.3 Boundary Street Design, 4.4 Access Intersections, 4.6 Neighbourhood Traffic Management, 4.8 Network Concept, 4.9 Intersection Design.

4.1 Development-Design

Design for Sustainable Modes

Access for all modes of transportation is conveniently provided at the proposed development. Two pedestrian access doors are located on Beausoleil Drive, with the main entrance and exit located at the northeast corner of the building, with the access at the northwest corner of the building exit-only. A third pedestrian exit is provided on Chapel Street. Cyclist access will be off of Friel Street directly into the parking garage. Figure 11 reflects the proposed landscape plan for the development, which includes pavers connecting the building to adjacent sidewalks on Beausoleil Drive and Chapel Street. Seating and some bicycle parking are also provided on the pavers. It should be noted that given there is no existing sidewalk on the west side of Chapel Street near Beausoleil Drive, the sidewalk shown in the image below is for reference purposes only, and will not be constructed as part of this project.

Figure 11: Proposed Landscape Plan *(Source: Diamond Schmitt Architects)*



As previously outlined in Section 2.1.1, the below grade parking garage is also the only location where additional parking will be provided as part of the development. There is excess capacity on the rest of the OCH site for parking, therefore no additional parking is required.

Sidewalks are provided on all streets adjacent to the site, allow for easy pedestrian connections to the transit stops on Rideau Street. The closest eastbound bus stop (i.e., for Routes 7, 14, 15 and 18) is stop #7593, which is a 260m walk from the main access. The closest westbound bus stops (i.e., for Routes 7, 14, 15 and 18) is stop #7591, which is a 170m walk from the main access. All other accesses to the building are 210m – 300m away from the bus stops. This meets OC Transpo's service guidelines for peak period service to be within a five minute (400m) walk of the home, school and work location of 95% of urban residents.

4.2 Transportation Demand Management

4.2.1 Context for TDM

Section 3.1.1 identified the mode share for the development, which according to the TRANS Trip Generation Manual, is expected to be approximately 52% pedestrian, 1% cyclist, 24% transit, 18% vehicle driver, and 5% vehicle passenger, depending on peak period. As outlined in Section 2.1.1, the existing OCH buildings adjacent to this development see only 26 spaces being used (0.17 parking spaces per unit). The proposed development would increase the parking supply across the three buildings to 0.24 parking spaces per unit. The low amount of parking spaces per unit is a form of transportation demand management (TDM) that supports the City's New OP to encourage active transportation and transit usage in the Downtown Core Transect.

The principal entrance of the building is located less than 3m from the sidewalk on Beausoleil Drive, with a small, landscaped buffer between the building and the sidewalk. This provides a convenient, safe and accessible entrance for residents. Convenient, secure bike storage for 80% of the bicycle parking on-site is provided in the parking garage as part of a TDM measure. The remaining 20% are located outside the building for visitor and short-term bicycle parking. In addition, the development's proximity to frequent transit routes (approximately 200m from principal entrance to eastbound and westbound routes on Rideau Street), as well as to Rideau Station on the Confederation Line LRT, will encourage a high transit usage consistent with the City's New OP.

Additional TDM measures above and beyond those identified here are encouraged as per the City of Ottawa's TIA guidelines. The City of Ottawa's TDM Checklist has been completed, and is included in **Appendix B**. Section 4.2.3 gets into more detail regarding potential TDM supportive measures.

4.2.2 Need and Opportunity

Section 2.1.1. provides important context for the current vehicular usage at the adjacent sites, as it is based on real-world information from the existing OCH buildings. While it is unlikely that this development will see an increase in vehicular usage, if such an increase occurred the following outcomes may occur:

- Inadequate parking supply on-site would require residents to use on-street parking on surrounding streets.
- Increase in vehicular usage may result in negative impacts to transit operations to nearby signals that are operating poorly. As identified in Section 3.3.1, the two signals adjacent to the development currently have no operational issues.

4.2.3 TDM Program

Notwithstanding the existing TDM measures included as part of the proposed building, additional measures above and beyond are recommended for consideration as part of the TIA process. The City's TDM Checklist has been included in Appendix B, with relevant measures summarized below:

- Display local area maps in the lobby, with walking / cycling access routes, key destinations nearby, relevant transit schedules and routes maps. If a TV screen is not provided in the lobby, this information will be provided on community boards.
- While no transit-fare supportive measures will be undertaken by OCH, it is our understanding that some residents will be eligible for Equipass, Para Transpo, Ontario Disability Support Program (ODSP) Community Pass and Seniors 65+ Pass.
- OCH has existing partnerships with Communauto for car share sites at their buildings.
- The parking fee is separate from the cost of OCH housing.
- OCH will consider providing multimodal travel information as part of the new tenant package.

4.3 Transit

Route Capacity

As outlined in Section 3.1.1, it is expected that the proposed development will generate 6 inbound and 12 outbound transit trips in the AM peak hour, and 8 inbound and 7 outbound transit trips in the PM peak hour. According to OC Transpo's schedule, there are on average 18 buses travelling in the peak direction during the AM and PM peak hours. This indicates that the proposed development is expected to increase ridership for the buses on the corridor by less than one person per bus. This development is not expected to impact transit operations or transit travel time due to passenger demands.

5. CONCLUSION AND RECOMMENDATION

The proposed Ottawa Community Housing development at 200-201 Friel Street will demolish the existing unused underground parking garage on-site and construct a high-rise apartment building. This Transportation Impact Assessment followed the City of Ottawa TIA Guidelines to assess and evaluate the potential benefits and impacts that are anticipated to the City of Ottawa transportation network within the vicinity of the proposed development.

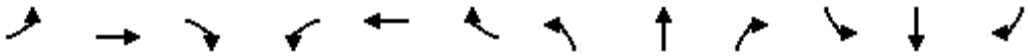
The development proposes only 8 below-grade parking spaces, as the existing parking usage at adjacent OCH buildings is relatively low. Considered holistically, parking supply across all three buildings would equal 0.24 parking spaces per unit, which is higher than required per the operational findings of OCH for parking usage.

With the location of the development in Lowertown, in close proximity to transit priority routes on Rideau Street, and approximately 1.0 km from the Rideau LRT Station, it was expected that the majority of trips will be made by walking or transit. This was confirmed through the trip generation calculation, which showed 50% of trips will be by pedestrians, with 23% of trips on transit and 18% by vehicle drivers. Given the low level of vehicular trips generated by the proposed development, no future mitigation measures are required at intersections close to the development.

Notwithstanding the TDM measures included as part of the proposed building, additional measures to be considered as part of the development include:

- Display local area maps in the lobby, with walking / cycling access routes, key destinations nearby, relevant transit schedules and routes maps. If a TV screen is not provided in the lobby, this information will be provided on community boards.
- While no transit-fare supportive measures will be undertaken by OCH, it is our understanding that some residents will be eligible for Equipass, Para Transpo, Ontario Disability Support Program (ODSP) Community Pass and Seniors 65+ Pass.
- OCH has existing partnerships with Communauto for car share sites at their buildings.
- The parking fee is separate from the cost of OCH housing.
- OCH will consider providing multimodal travel information as part of the new tenant package.

APPENDIX A: Synchro Model Outputs



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	350	68	7	350	8	20	6	13	8	4	4
Future Volume (vph)	7	350	68	7	350	8	20	6	13	8	4	4
Satd. Flow (prot)	0	1605	1351	0	1778	1513	0	1335	0	0	1646	0
Flt Permitted		0.993			0.993			0.830			0.811	
Satd. Flow (perm)	0	1593	1098	0	1764	1207	0	1104	0	0	1278	0
Satd. Flow (RTOR)			74			38		14			4	
Lane Group Flow (vph)	0	397	76	0	397	9	0	43	0	0	17	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8		29.8	29.8	
Total Split (s)	50.0	50.0	50.0	50.0	50.0	50.0	30.0	30.0		30.0	30.0	
Total Split (%)	62.5%	62.5%	62.5%	62.5%	62.5%	62.5%	37.5%	37.5%		37.5%	37.5%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8			5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		66.9	66.9		66.9	66.9		10.2			10.2	
Actuated g/C Ratio		0.84	0.84		0.84	0.84		0.13			0.13	
v/c Ratio		0.30	0.08		0.27	0.01		0.28			0.10	
Control Delay		3.7	1.1		2.7	0.0		28.6			27.9	
Queue Delay		0.0	0.0		0.0	0.0		0.0			0.0	
Total Delay		3.7	1.1		2.7	0.0		28.6			27.9	
LOS		A	A		A	A		C			C	
Approach Delay		3.3			2.6			28.6			27.9	
Approach LOS		A			A			C			C	
Queue Length 50th (m)		16.0	0.1		11.0	0.0		3.7			1.6	
Queue Length 95th (m)		27.7	2.8		15.9	m0.0		12.0			6.6	
Internal Link Dist (m)		284.2			111.8			136.9			66.3	
Turn Bay Length (m)			20.0			20.0						
Base Capacity (vph)		1331	929		1474	1015		343			389	
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		0.30	0.08		0.27	0.01		0.13			0.04	

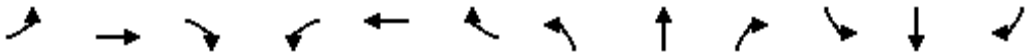
Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 50 (63%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.30

Intersection Signal Delay: 4.6	Intersection LOS: A
Intersection Capacity Utilization 70.1%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Friel & Rideau



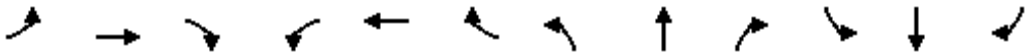
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	334	29	7	339	8	26	3	32	13	16	10
Future Volume (vph)	2	334	29	7	339	8	26	3	32	13	16	10
Satd. Flow (prot)	0	1604	1513	0	1560	1513	0	1488	0	0	1666	0
Flt Permitted		0.999			0.993			0.842			0.879	
Satd. Flow (perm)	0	1602	1372	0	1549	1335	0	1262	0	0	1448	0
Satd. Flow (RTOR)			38			38		36			11	
Lane Group Flow (vph)	0	373	32	0	385	9	0	68	0	0	43	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	29.7	29.7	29.7	29.7	29.7	29.7	24.8	24.8		24.8	24.8	
Total Split (s)	55.0	55.0	55.0	55.0	55.0	55.0	25.0	25.0		25.0	25.0	
Total Split (%)	68.8%	68.8%	68.8%	68.8%	68.8%	68.8%	31.3%	31.3%		31.3%	31.3%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8			5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		62.5	62.5		62.5	62.5		10.3			10.3	
Actuated g/C Ratio		0.78	0.78		0.78	0.78		0.13			0.13	
v/c Ratio		0.30	0.03		0.32	0.01		0.35			0.22	
Control Delay		2.4	0.2		4.5	0.0		23.4			27.8	
Queue Delay		0.0	0.0		0.0	0.0		0.0			0.0	
Total Delay		2.4	0.2		4.5	0.0		23.4			27.8	
LOS		A	A		A	A		C			C	
Approach Delay		2.3			4.4			23.4			27.8	
Approach LOS		A			A			C			C	
Queue Length 50th (m)		5.8	0.1		15.5	0.0		4.1			4.1	
Queue Length 95th (m)		8.8	0.2		27.9	0.0		14.2			12.1	
Internal Link Dist (m)		111.8			587.5			136.7			81.5	
Turn Bay Length (m)			20.0			20.0						
Base Capacity (vph)		1250	1079		1209	1050		330			355	
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		0.30	0.03		0.32	0.01		0.21			0.12	

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 50 (63%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.35

Intersection Signal Delay: 6.0	Intersection LOS: A
Intersection Capacity Utilization 68.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Chapel & Rideau



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	478	65	22	449	9	75	3	22	14	4	8
Future Volume (vph)	4	478	65	22	449	9	75	3	22	14	4	8
Satd. Flow (prot)	0	1605	1351	0	1775	1513	0	1260	0	0	1574	0
Flt Permitted		0.997			0.967			0.760			0.841	
Satd. Flow (perm)	0	1598	778	0	1708	841	0	888	0	0	1251	0
Satd. Flow (RTOR)			52			34		15			9	
Lane Group Flow (vph)	0	535	72	0	523	10	0	110	0	0	29	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8		29.8	29.8	
Total Split (s)	60.0	60.0	60.0	60.0	60.0	60.0	30.0	30.0		30.0	30.0	
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8			5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		67.1	67.1		67.1	67.1		15.7			15.7	
Actuated g/C Ratio		0.75	0.75		0.75	0.75		0.17			0.17	
v/c Ratio		0.45	0.12		0.41	0.02		0.66			0.13	
Control Delay		8.3	3.2		8.3	1.3		47.5			23.0	
Queue Delay		0.0	0.0		0.3	0.0		0.0			0.0	
Total Delay		8.3	3.2		8.5	1.3		47.5			23.0	
LOS		A	A		A	A		D			C	
Approach Delay		7.7			8.4			47.5			23.0	
Approach LOS		A			A			D			C	
Queue Length 50th (m)		32.1	0.8		42.8	0.0		14.4			2.7	
Queue Length 95th (m)		69.4	5.9		84.3	m0.4		27.4			8.5	
Internal Link Dist (m)		284.2			111.8			136.9			66.3	
Turn Bay Length (m)			20.0			20.0						
Base Capacity (vph)		1192	593		1274	636		249			342	
Starvation Cap Reductn		0	0		252	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	0.12		0.51	0.02		0.44			0.08	

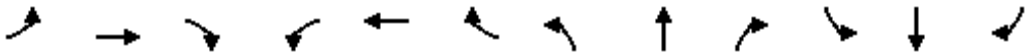
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 48 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 11.7	Intersection LOS: B
Intersection Capacity Utilization 77.3%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Friel & Rideau



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	485	26	10	421	13	54	12	68	4	6	7
Future Volume (vph)	8	485	26	10	421	13	54	12	68	4	6	7
Satd. Flow (prot)	0	1679	1513	0	1711	1513	0	1539	0	0	1559	0
Flt Permitted		0.992			0.987			0.860			0.940	
Satd. Flow (perm)	0	1664	1162	0	1688	1094	0	1283	0	0	1467	0
Satd. Flow (RTOR)			34			34		53			8	
Lane Group Flow (vph)	0	548	29	0	479	14	0	149	0	0	19	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	29.7	29.7	29.7	29.7	29.7	29.7	24.8	24.8		24.8	24.8	
Total Split (s)	65.0	65.0	65.0	55.0	55.0	55.0	25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%	72.2%	61.1%	61.1%	61.1%	27.8%	27.8%		27.8%	27.8%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8			5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		65.2	65.2		65.2	65.2		13.3			13.3	
Actuated g/C Ratio		0.72	0.72		0.72	0.72		0.15			0.15	
v/c Ratio		0.46	0.03		0.39	0.02		0.63			0.08	
Control Delay		6.6	2.0		6.5	0.7		34.9			23.1	
Queue Delay		0.1	0.0		0.0	0.0		0.0			0.0	
Total Delay		6.7	2.0		6.5	0.7		34.9			23.1	
LOS		A	A		A	A		C			C	
Approach Delay		6.4			6.3			34.9			23.1	
Approach LOS		A			A			C			C	
Queue Length 50th (m)		26.2	0.0		23.2	0.0		14.5			1.6	
Queue Length 95th (m)		47.5	m1.8		49.0	0.7		29.7			6.5	
Internal Link Dist (m)		111.8			587.5			136.7			81.5	
Turn Bay Length (m)			20.0			20.0						
Base Capacity (vph)		1204	850		1222	801		315			319	
Starvation Cap Reductn		79	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		0.49	0.03		0.39	0.02		0.47			0.06	

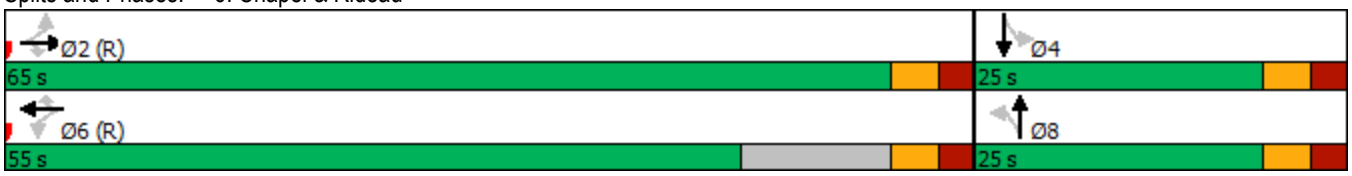
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 23 (26%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

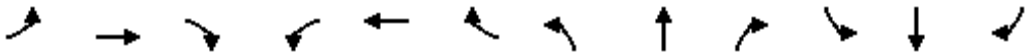
Maximum v/c Ratio: 0.63

Intersection Signal Delay: 10.1	Intersection LOS: B
Intersection Capacity Utilization 74.9%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Chapel & Rideau





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	354	68	7	351	9	20	11	13	10	4	13
Future Volume (vph)	7	354	68	7	351	9	20	11	13	10	4	13
Satd. Flow (prot)	0	1605	1351	0	1778	1513	0	1376	0	0	1568	0
Flt Permitted		0.993			0.993			0.839			0.855	
Satd. Flow (perm)	0	1593	1098	0	1764	1207	0	1150	0	0	1301	0
Satd. Flow (RTOR)			74			38		14			14	
Lane Group Flow (vph)	0	401	76	0	398	10	0	48	0	0	29	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8		29.8	29.8	
Total Split (s)	50.0	50.0	50.0	50.0	50.0	50.0	30.0	30.0		30.0	30.0	
Total Split (%)	62.5%	62.5%	62.5%	62.5%	62.5%	62.5%	37.5%	37.5%		37.5%	37.5%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8			5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		66.8	66.8		66.8	66.8		10.3			10.3	
Actuated g/C Ratio		0.84	0.84		0.84	0.84		0.13			0.13	
v/c Ratio		0.30	0.08		0.27	0.01		0.30			0.16	
Control Delay		3.8	1.2		2.7	0.0		29.6			23.0	
Queue Delay		0.0	0.0		0.0	0.0		0.0			0.0	
Total Delay		3.8	1.2		2.7	0.0		29.6			23.0	
LOS		A	A		A	A		C			C	
Approach Delay		3.4			2.7			29.6			23.0	
Approach LOS		A			A			C			C	
Queue Length 50th (m)		16.2	0.1		11.0	0.0		4.4			1.9	
Queue Length 95th (m)		28.6	2.9		16.4	m0.0		13.0			8.3	
Internal Link Dist (m)		284.2			111.8			136.9			66.3	
Turn Bay Length (m)			20.0			20.0						
Base Capacity (vph)		1330	929		1472	1014		357			403	
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		0.30	0.08		0.27	0.01		0.13			0.07	

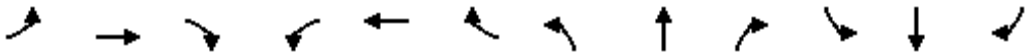
Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 50 (63%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.30

Intersection Signal Delay: 5.0	Intersection LOS: A
Intersection Capacity Utilization 70.3%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Friel & Rideau



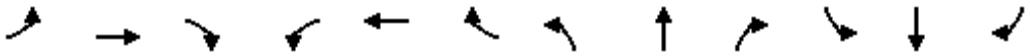
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	336	29	7	340	9	26	4	32	13	16	11
Future Volume (vph)	2	336	29	7	340	9	26	4	32	13	16	11
Satd. Flow (prot)	0	1604	1513	0	1560	1513	0	1491	0	0	1661	0
Flt Permitted		0.999			0.993			0.843			0.884	
Satd. Flow (perm)	0	1602	1372	0	1549	1335	0	1267	0	0	1453	0
Satd. Flow (RTOR)			38			38		36			12	
Lane Group Flow (vph)	0	375	32	0	386	10	0	69	0	0	44	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	29.7	29.7	29.7	29.7	29.7	29.7	24.8	24.8		24.8	24.8	
Total Split (s)	55.0	55.0	55.0	55.0	55.0	55.0	25.0	25.0		25.0	25.0	
Total Split (%)	68.8%	68.8%	68.8%	68.8%	68.8%	68.8%	31.3%	31.3%		31.3%	31.3%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8			5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		62.4	62.4		62.4	62.4		10.4			10.4	
Actuated g/C Ratio		0.78	0.78		0.78	0.78		0.13			0.13	
v/c Ratio		0.30	0.03		0.32	0.01		0.35			0.22	
Control Delay		2.5	0.2		4.5	0.0		23.6			27.4	
Queue Delay		0.0	0.0		0.0	0.0		0.0			0.0	
Total Delay		2.5	0.2		4.5	0.0		23.6			27.4	
LOS		A	A		A	A		C			C	
Approach Delay		2.3			4.4			23.6			27.4	
Approach LOS		A			A			C			C	
Queue Length 50th (m)		5.7	0.0		15.5	0.0		4.2			4.1	
Queue Length 95th (m)		9.0	0.2		28.2	0.1		14.4			12.0	
Internal Link Dist (m)		111.8			587.5			136.7			81.5	
Turn Bay Length (m)			20.0			20.0						
Base Capacity (vph)		1250	1079		1208	1050		331			357	
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		0.30	0.03		0.32	0.01		0.21			0.12	

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 50 (63%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.35

Intersection Signal Delay: 6.0	Intersection LOS: A
Intersection Capacity Utilization 68.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Chapel & Rideau



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	479	65	22	454	10	75	10	22	15	4	13
Future Volume (vph)	4	479	65	22	454	10	75	10	22	15	4	13
Satd. Flow (prot)	0	1605	1351	0	1775	1513	0	1287	0	0	1535	0
Flt Permitted		0.997			0.967			0.769			0.857	
Satd. Flow (perm)	0	1598	778	0	1708	841	0	924	0	0	1254	0
Satd. Flow (RTOR)			52			34		14			14	
Lane Group Flow (vph)	0	536	72	0	528	11	0	118	0	0	35	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8		29.8	29.8	
Total Split (s)	60.0	60.0	60.0	60.0	60.0	60.0	30.0	30.0		30.0	30.0	
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8			5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		66.8	66.8		66.8	66.8		16.0			16.0	
Actuated g/C Ratio		0.74	0.74		0.74	0.74		0.18			0.18	
v/c Ratio		0.45	0.12		0.42	0.02		0.67			0.15	
Control Delay		8.5	3.3		8.5	1.4		47.9			20.8	
Queue Delay		0.0	0.0		0.3	0.0		0.0			0.0	
Total Delay		8.5	3.3		8.8	1.4		47.9			20.8	
LOS		A	A		A	A		D			C	
Approach Delay		7.9			8.6			47.9			20.8	
Approach LOS		A			A			D			C	
Queue Length 50th (m)		33.0	0.9		43.9	0.0		15.7			2.9	
Queue Length 95th (m)		70.6	5.9		85.4	m0.5		29.2			9.1	
Internal Link Dist (m)		284.2			111.8			136.9			66.3	
Turn Bay Length (m)			20.0			20.0						
Base Capacity (vph)		1185	590		1267	632		258			347	
Starvation Cap Reductn		0	0		247	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	0.12		0.52	0.02		0.46			0.10	

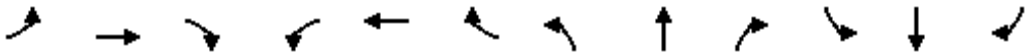
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 48 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 77.4%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Friel & Rideau



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	486	26	10	422	19	54	14	68	6	6	13
Future Volume (vph)	8	486	26	10	422	19	54	14	68	6	6	13
Satd. Flow (prot)	0	1679	1513	0	1711	1513	0	1544	0	0	1519	0
Flt Permitted		0.992			0.987			0.859			0.930	
Satd. Flow (perm)	0	1664	1162	0	1688	1094	0	1286	0	0	1414	0
Satd. Flow (RTOR)			34			34		51			14	
Lane Group Flow (vph)	0	549	29	0	480	21	0	152	0	0	28	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	29.7	29.7	29.7	29.7	29.7	29.7	24.8	24.8		24.8	24.8	
Total Split (s)	65.0	65.0	65.0	55.0	55.0	55.0	25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%	72.2%	61.1%	61.1%	61.1%	27.8%	27.8%		27.8%	27.8%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8			5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		65.1	65.1		65.1	65.1		13.4			13.4	
Actuated g/C Ratio		0.72	0.72		0.72	0.72		0.15			0.15	
v/c Ratio		0.46	0.03		0.39	0.03		0.65			0.13	
Control Delay		6.8	2.2		6.5	1.2		36.1			21.4	
Queue Delay		0.1	0.0		0.0	0.0		0.0			0.0	
Total Delay		6.8	2.2		6.5	1.2		36.1			21.4	
LOS		A	A		A	A		D			C	
Approach Delay		6.6			6.3			36.1			21.4	
Approach LOS		A			A			D			C	
Queue Length 50th (m)		26.7	0.0		23.6	0.0		15.2			2.0	
Queue Length 95th (m)		48.9	m2.1		49.2	1.4		30.8			8.0	
Internal Link Dist (m)		111.8			587.5			136.7			81.5	
Turn Bay Length (m)			20.0			20.0						
Base Capacity (vph)		1202	849		1220	800		314			312	
Starvation Cap Reductn		79	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		0.49	0.03		0.39	0.03		0.48			0.09	

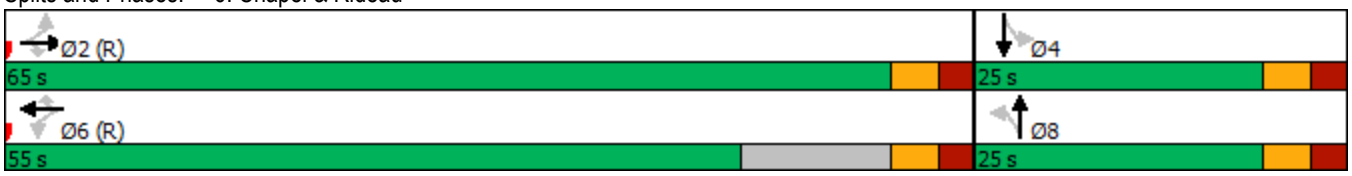
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 23 (26%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 10.4	Intersection LOS: B
Intersection Capacity Utilization 75.0%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Chapel & Rideau



APPENDIX B: City of Ottawa 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	☐
	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)*	☑ If a TV screen is not provided in the lobby, info will be provided on community boards
	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)*	☑ If a TV screen is not provided, info will be provided on community boards
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
		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	☑ While these items will not be undertaken by OCH, it is assumed that some residents will be eligible for Equipass, Para Transpo, ODSP Community Pass and Seniors 65+ Pass.
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)	☐
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☑
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐ OCH has existing partnerships with Communauto for car share sites at their buildings.
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☑
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☑ The parking fee is separate from the cost of OCH housing
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☑

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	☑ OCH will consider providing as part of the new tenant packages
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

Introduction

The City of Ottawa's *Transportation Impact Assessment (TIA) Guidelines* (specifically Module 4.1—Development Design) requires proponents of qualifying developments to use the City's **TDM-Supportive Development Design and Infrastructure Checklist** to assess the opportunity to implement design elements that are supportive of sustainable modes. The goal of this assessment is to ensure that the development provides safe and efficient access for all users, while creating an environment that encourages walking, cycling and transit use.

The remaining sections of this document are:

- Using the Checklist
- Glossary
- TDM-Supportive Development Design and Infrastructure Checklist: Non-Residential Developments
- TDM-Supportive Development Design and Infrastructure Checklist: Residential Developments

Readers are encouraged to contact the City of Ottawa's TDM Officer for any guidance and assistance they require to complete this checklist.

Using the Checklist

This **TDM-Supportive Development Design and Infrastructure Checklist** document includes two actual checklists, one for non-residential developments (office, institutional, retail or industrial) and one for residential developments (multi-family or condominium only; subdivisions are exempt). Readers may download the applicable checklist in electronic format and complete it electronically, or print it out and complete it by hand. As an alternative, they may create a freestanding document that lists the design and infrastructure measures being proposed and provides additional detail on them.

Each measure in the checklist is numbered for easy reference. Each measure is also flagged as:

- REQUIRED —The Official Plan or Zoning By-law provides related guidance that must be followed.
- 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.

Glossary

This glossary defines and describes the following measures that are identified in the **TDM-Supportive Development Design and Infrastructure Checklist**:

Walking & cycling: Routes
- Building location & access points
- Facilities for walking & cycling
- Amenities for walking & cycling

Walking & cycling: End-of-trip facilities
- Bicycle parking
- Secure bicycle parking
- Shower & change facilities
- Bicycle repair station

Transit
- Walking routes to transit
- Customer amenities

Ridesharing
- Pick-up & drop-off facilities
- Carpool parking

Carsharing & bikesharing
- Carshare parking spaces
- Bikeshare station location

Parking
- Number of parking spaces
- Separate long-term & short-term parking areas

Other
- On-site amenities to minimize off-site trips

In addition to specific references made in this glossary, readers should consult the City of Ottawa's design and planning guidelines for a variety of different land uses and contexts, available on the City's website at www.ottawa.ca. Readers may also find the following resources to be helpful:

- *Promoting Sustainable Transportation through Site Design*, Institute of Transportation Engineers, 2004 (www.cite7.org/wpdm-package/iterp-promoting-sustainable-transportation)
- *Bicycle End-of-Trip Facilities: A Guide for Canadian Municipalities and Employers*, Transport Canada, 2010 (www.fcm.ca/Documents/tools/GMF/Transport_Canada/BikeEndofTrip_EN.pdf)

▶ *Walking & cycling: Routes*

Building location & access points. Correctly positioning buildings and their entrances can help make walking convenient, comfortable and safe. Minimizing travel distances and maximizing visibility are key.

Facilities for walking & cycling. The Official Plan gives clear direction on the provision and design of walking and cycling facilities for both access and circulation. On larger, busier sites (e.g. multi-building campuses) the inclusion of sidewalks, pathways, marked crossings, stop signs and traffic calming features can create a safer and more supportive environment for active transportation.

Amenities for walking & cycling. Lighting, landscaping, benches and wayfinding can make walking and cycling safer and more secure, comfortable and accessible.

▶ *Walking & cycling: End-of-trip facilities*

Bicycle parking. The Official Plan and Zoning By-law both address the need for adequate bicycle parking at developments. Weather protection and theft prevention are major concerns for commuters who spend hundreds or thousands of dollars on a quality bicycle. Bicycle racks should have a design that enables secure locking while preventing damage to wheels. They should be located within sight of busy areas such as main building entrances or staffed parking kiosks.

Secure bicycle parking. Ottawa's Zoning By-law requires a secure area for bicycles at office or residential developments having more than 50 bicycle parking spaces. Lockable outdoor bike cages or indoor storage rooms that limit access to registered users are ideal.

Shower & change facilities. Longer-distance cyclists, joggers and even pedestrians can need a place to shower and change at work; the lack of such facilities is a major barrier to active commuting. Lockers and drying racks provide a place to store gear away from workspaces, and showers and grooming stations allow commuters to make themselves presentable for the office.

Bicycle repair station. Cycling commuters can experience maintenance issues that make the homeward trip difficult or impossible. A small supply of tools (e.g. air pump, Allen keys, wrenches) and supplies (e.g. inner tube patches, chain lubricant) in the workplace can help.

▶ *Transit*

Customer amenities. Larger developments that feature an on-site transit stop can make transit use more attractive by providing shelters, lighting and benches. Even better, they could integrate the passenger waiting area into a building entrance.

▶ *Ridesharing*

Pick-up & drop-off facilities. Having a safe place to load or unload passengers (for carpools as well as taxis and ride-hailing services) without obstructing pedestrians, cyclists or other vehicles can help make carpooling work.

Carpool parking. At destinations with large parking lots (or lots that regularly fill to capacity), signed priority carpool parking spaces can be an effective ridesharing incentive. Priority spaces are frequently abused by non-carpoolers, so a system to provide registered users with vehicle identification tags is recommended.

▶ *Carsharing & bikesharing*

Carshare parking spaces. For developments where carsharing could be an attractive option for employees, visitors or residents, ensuring an attractive location for future carshare parking spaces can avoid challenges associated with future retrofits.

Bikeshare station location. For developments where bikesharing could be an attractive option for employees, visitor or residents, ensuring an attractive location for a future bikeshare station can avoid challenges associated with future retrofits.

▶ *Parking*

Number of parking spaces. Parking capacity is an important variable in development design, as it can either support or subvert the mode share targets set during the transportation impact analysis (TIA). While the Zoning By-law establishes any minimum and/or maximum requirements for parking capacity, it also allows a reduction in any minimum to reflect the existence of on-site shower, change and locker rooms provided for cyclists.

Separate long-term & short-term parking areas. Because access to unused parking spaces can be a powerful incentive to drive, developments can better manage their parking supply and travel behaviours by separating long-term from short-term parking through the use of landscaping, gated controls or signs. Doing so makes it difficult for long-term parkers (e.g. commuters) to park in short-term areas (e.g. for visitors) as long as enforcement occurs; it also protects long-term parking capacity for its intended users.

▶ *Other*

On-site amenities to minimize off-site trips. Developments that offer facilities to limit employees' need for a car during their commute (e.g. to drop off children at daycare) or during their workday (e.g. to hit the gym) can free employees to make the commuting decision that otherwise works best for them.

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑ Principal entrance is located less than 3m from the sidewalk on Beausoleil Dr, with small landscaped buffer between building and sidewalks.
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☑ The closest bus stops on Rideau St from the principal entrance are 170m (westbound) and 260m (eastbound) away.
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑ Principal entrance is located less than 3m from the sidewalk on Beausoleil Dr, with small landscaped buffer between building and sidewalks.

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☐ N/A
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☐ N/A
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☐ N/A
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☐ Development has provided safe walking and cycling facilities within property limits.
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☐
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☐
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☐ N/A
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐ N/A

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☑ 16 bicycle parking spaces are provided outside the building, the remaining 64 are provided in a secure room in the parking garage.
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☑ 16 bicycle parking spaces are provided outside the building, the remaining 64 are provided in a secure room in the parking garage.
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐ N/A
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐ N/A
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐ N/A

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐ The cul-de-sac at the north end of Chapel Street provides an informal drop-off and pick-up area.
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐ OCH has existing partnerships with Communauto for car share sites at their buildings.
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑ Please refer to parking discussion under Section 2.1.1.
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐