DILLON CONSULTING

MONTGOMERY SISAM ARCHITECTS INC.

Transportation Impact Assessment

Proposed Development at 1161 Old Montreal Road

May 2022 – 21-2647

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1.0 Screening

1.1 Summary of Development

Municipal Address	1161 Old Montreal Road
Description of Location	The site is located on the northeast corner of Famille-Laporte Avenue and Old Montreal Road, municipally addressed as 1161 Old Montreal Road in the City of Ottawa Ontario.
Land Use Classification	Residential – a retirement home and a long term care facility
Development Size	• Retirement Home: A long-term care facility to the northwest of the Long Term Care Facility with 60 staff and 87 residents. • Long Term Care Facility: The development is sited on a 1.43 Ha lot. The proposed four storey long term care home with 154 staff will provide beds for 224 residents. Surface parking and landscape areas will be provided.
Number of accesses and locations	Three full access driveways are proposed on Famille-Laporte Avenue. Two driveways are located across from Minoterie Ridge and Brouage Way. The third is just South of the access to Capital City Church. The two sites provide an internal connection.
Phases of development	1
Build-out year	2023

1.2 Trip Generation Trigger

It is anticipated that the retirement home and long-term care facility will generate enough trips to meet the trip generation trigger.

Land Use Type	Minimum Development Size	Yes	No
Single-family homes	40 units		x
Townhomes or apartments	90 units		x
Office	3,500 sq.m.		x
Industrial	5,000 sq.m.		x
Fast-food restaurant or coffee shop	100 sq.m.		x
Destination retail	1,000 sq.m.		x
Gas station or convenience market	75 sq.m.		x
Other	60 person trips or more during weekday peak hours	x	

1.3 Location Triggers

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

1.4 Safety Triggers

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

1.5 Summary

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

Since the development satisfies the trip generation, but not the location or safety triggers, the TIA will proceed to Step 2 and the network impact component will be addressed in the TIA.

Figure 1 illustrates the site location. **Figure 2** illustrates the site servicing plan.

Figure 1: Site Location

Background map source: geoOttawa, accessed September 2021.

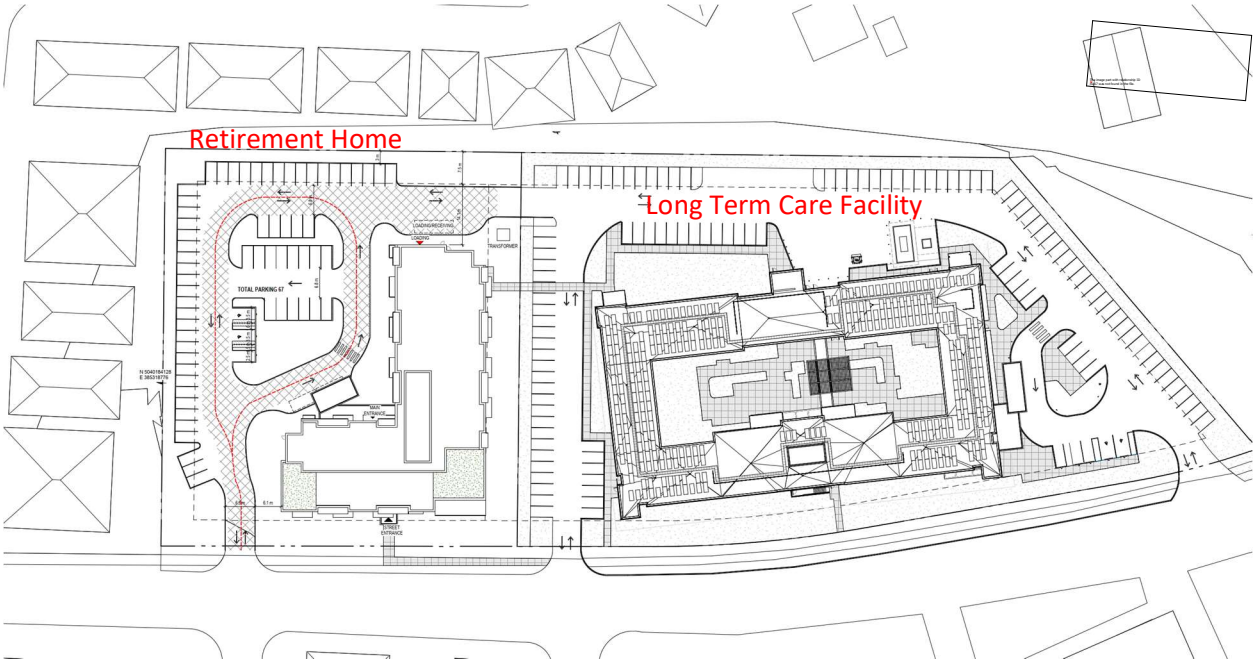


Figure 2: Site Servicing Plan

2.0 Scoping

2.1 Existing and Planned Conditions

2.1.1 Proposed Development

The proposed development, 1161 Old Montreal Road, is within the Cumberland Ward and the district of Orleans, on the eastern border of the City of Ottawa. The site is located within the actively developing Cardinal Creek Village subdivision. The site is bound by Mishawashkode Street to the North, Cartographe Street to the East, Old Montreal Road to the South, and Famille-Laporte Avenue to the West. The proposed development is to be constructed on vacant lands, and will include a retirement home and a long term care home as well as a parking lot and three new driveways to Famille-Laporte Avenue. For the purpose of conducting a conservative analysis, only the two accesses located across from Minoterie Ridge and Brouage Way have been analyzed. The proposed development is shown in **Figure 2**.

2.1.2 Existing Conditions

2.1.2.1 Roads and Traffic Control

The roadways under consideration in the vicinity of the study area are described as follows:

Table 1: Existing Area Roads

Road	Description	Posted Speed
Old Montreal Road	Old Montreal Road is two-lane municipally-owned Arterial road running East-West, bordering the proposed development on the South side. Old Montreal Road connects to Famille-Laporte Avenue. Old Montreal road runs from Cumberland in the east to St. Joseph Boulevard in the west.	60 km/h
Famille-Laporte Avenue	Famille-Laporte Avenue is a two-lane municipally-owned Collector, connecting Old Montreal Road to Antonio Farley Street (a local street) within the Cardinal Creek Subdivision.	40 km/h
Mishawashkode Street	Mishawashkode Street is a local residential, two-lane municipally-owned road bordering the site on the North side.	40 km/h
Brouage Way	Brouage Way is a local residential, two-lane municipally-owned road directly opposite the driveway entrance for long-term care facility #1.	40 km/h
Minoterie Ridge	Minoterie Ridge is a local residential, two-lane municipally-owned road directly opposite the driveway entrance for long-term care facility #2.	40 km/h
Dairy Drive	Dairy Drive is a two-lane designated local roadway servicing industrial land uses to the West of the site, bordering Old Montreal Road.	50 km/h
Cardinal Creek Drive	Cardinal Creek Drive is a two-lane municipally-owned Collector to the East of the site, connecting Famille-Laporte Avenue and Old Montreal Road.	40 km/h

Figure 3 shows the road classification in the study area. The blue star indicates the location of the proposed development.

Figure 3: Urban Road Network

Background image source: geoOttawa, accessed February 16, 2022

2.1.2.2 Walking and Cycling

Sidewalks exist along both sides of Famille-Laporte Avenue as well as on one side of most local residential streets in the Cardinal Creek Village development.

There are currently no existing cycling facilities on Old Montreal Road in the vicinity of Famille-Laporte Avenue.

2.1.2.3 Transit

The closest transit priority corridors to the site are along Innes Road and Tenth Line Road, and are not in close proximity to the Cardinal Creek subdivision. Within the subdivision, existing transit route 221 operates 5 days/week during specific time periods along Famille-Laporte Avenue, Cardinal Creek Drive and Old Montreal Road. Route 221 is only operational in one direction during the AM period and the opposing direction during the PM period. The route does not operate on weekends. Transit service operates on headways of 30 minutes. A summary of the transit operation information is provided in **Table 2. Figure 4** illustrates the route through the study area as well as stop locations.

Table 2: Existing Transit Routes

Route	Stop Location	Destination	Service Hours	Headway (Minutes)
221	Famille-Laporte/Old Montreal	Blair C (Stop ID: 3027)	Weekday 6:36 AM - 8:06 AM	30
221	Famille-Laporte/Old Montreal	Old Montreal/Peter Harkness (Stop ID: 1460)	Weekday 4:00 PM - 5:22 PM	30

The TRANS Committee's 2011 *NCR Household Origin-Destination Survey* (O-D Survey) indicates that within the Orleans district, approximately 54% of residents make trips destined outside of the area during the AM peak period and 22% of trips originating elsewhere conclude their trip within the Orleans district.

Furthermore, during the AM Peak Hour approximately 35% of residents originating from the Orleans district use transit as their primary mode of transportation, compared to 55% using a personal vehicle. During the PM peak hour, approximately 32% of residents destined to the Orleans district use transit, compared to 56% that use a personal vehicle. Roughly 7% of residents travelling within the Orleans district (internal trips) use transit as their primary travel mode during the AM peak period, compared to 3% during the PM peak period.

The appropriate data from the TRANS Committee's 2011 *NCR Household Origin-Destination Survey* (O-D Survey) is located in **Appendix A**.

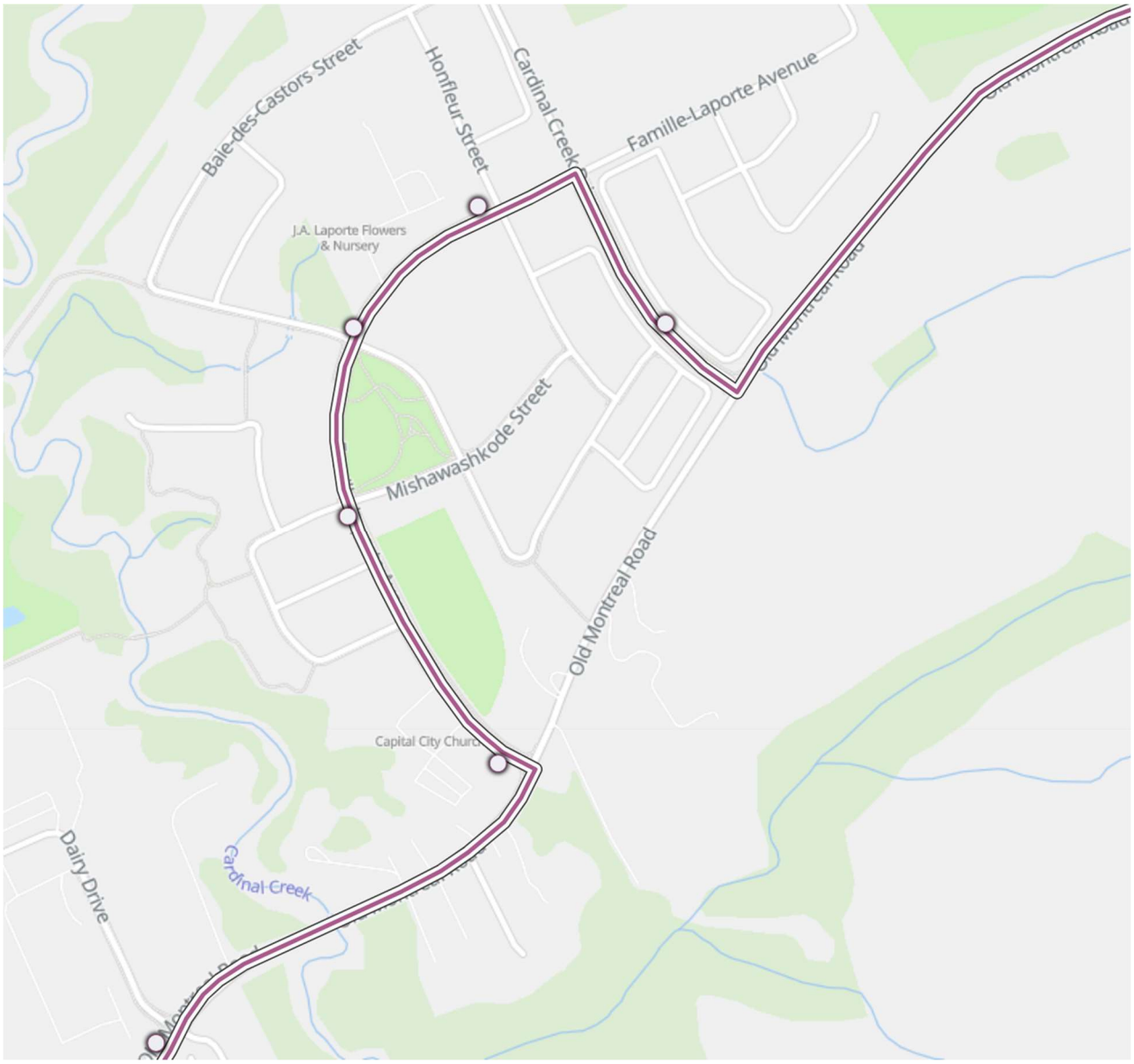


Figure 4: Route 221

Image source: Excerpt from OC Transpo, accessed February 17, 2022.

2.1.2.4 Traffic Management Measures

There are no traffic management measures in the Study Area.

2.1.2.5 Traffic Volumes

Existing traffic volumes have been based on a new turning movement count undertaken by the City of Ottawa at the intersection of Old Montreal Road and Famille-Laporte Avenue in February 2022, a recent TIA undertaken for the nearby Phoenix Homes subdivision, and based on a review of the number of undeveloped units within the Cardinal Creek subdivision.

Table 3 summarizes the traffic counts used within this study. An 8-hour turning movement count was conducted at the intersection of Old Montreal Road and Famille-Laporte Avenue between the hours of 7:00 AM and 6:00 PM on Tuesday February 1, 2022. The AM and PM peak hours were found to be from 7:45 AM to 8:45 AM and 3:45 PM to 4:45 PM respectively.

Table 3: Traffic Counts

Intersection	Date	Source
Old Montreal Road and Famille-Laporte Avenue	February 2022	City of Ottawa
Old Montreal Road and Dairy Drive/Aveia Private	December 2014	City of Ottawa – from 1154-1208 Old Montreal Road - Transportation Impact Assessment Update

A field investigation was undertaken by Dillon at the Cardinal Creek Village development in February 2022 for the purpose of verifying the current status and occupancy of the development. The site visit assisted in determining the current and expected vehicle volumes through the area, particularly at the intersection of Cardinal Creek Drive and Old Montreal Road – where a traffic count was not available.

The City advised not to apply a factor to the existing volumes to account for any changes in travel behaviour due to the ongoing COVID-19 pandemic.

The 2014 traffic count at the intersection of Old Montreal Road and Dairy Drive/Aveia Private that was undertaken by the City of Ottawa and included within the TIA update for 1154-1208 Old Montreal Road, was utilized to estimate the existing traffic volumes at the intersection of Dairy Drive and Old Montreal Road. The 2014 traffic volumes were grown by 2% annually to 2022, and balanced using the recent traffic volumes at the intersection of Famille-Laporte Avenue and Old Montreal Road. This growth rate was determined based on the 1.8% growth rate utilized in 1154-1208 Old Montreal Road - Transportation Impact Assessment Update. An annual compounded growth rate of 2% represents a conservative growth estimate for this TIA.

To estimate existing vehicle volumes at the intersection of Cardinal Creek Drive and Old Montreal Road, as well as Famille-Laporte Avenue and Brouage Way and Famille-Laporte Avenue and Minoterie Ridge – an estimate of the number of occupied units was used to determine in/out movements at the intersections. Table 6 and Table 7 in the 2020 Trans Trip Generation Manual Summary Report were used to determine an appropriate modal split for these trips and Table 9 of the Trans Manual was used to determine appropriate directional splits. Through movements were balanced across the study area road network using the traffic volumes at the Famille-Laporte Avenue and Old Montreal Road intersection. The trips were distributed based on the trip distribution shown in **Section 3.1.2**.

The appropriate tables, taken for this report from the Trans Trip Generation Manual, are located in **Appendix B**. **Figure 5** illustrates the existing 2022 Study Area traffic volumes.

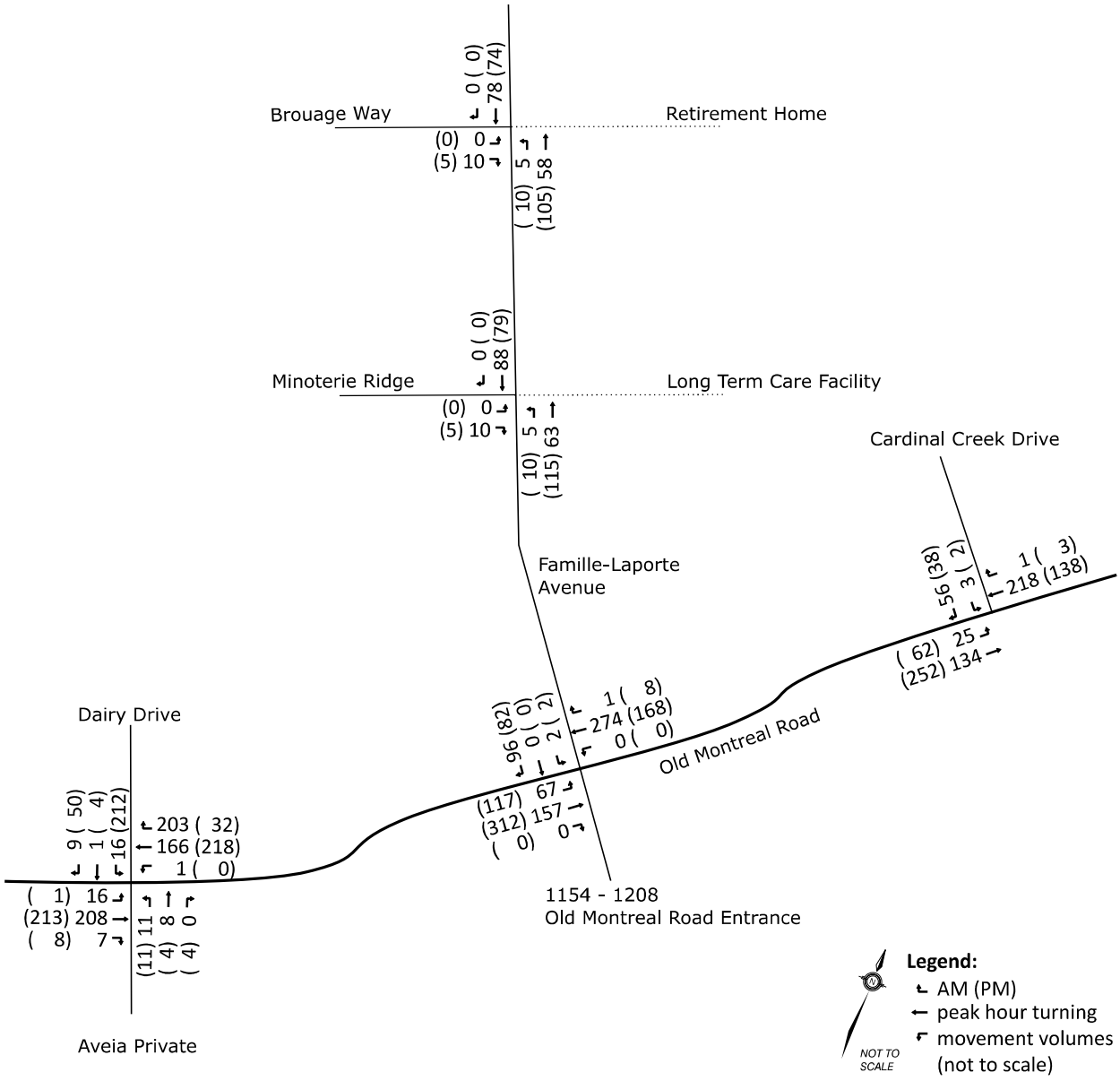


Figure 5: Existing Traffic Volumes (2022)

2.1.2.6 Collision History

Figure 6 illustrates the location of collisions occurring in the Study Area between 2015 and 2019.

Four collisions occurred from 2015 to 2019 at the intersection of Dairy Drive/Aveia Private and Old Montreal Road. Only two collisions occurred from 2015 to 2019 at the intersection of Old Montreal Road and Famille-Laporte Avenue from 2015 to 2019. One collision occurred during this time period at the intersection of Famille-Laporte Avenue and Cardinal Creek Drive. The collision data is summarized in

Table 4. None of the study area intersections are within the top 10 intersection collision areas within Ottawa based on the data from the 2016 City of Ottawa Road Safety Report.

Table 4: Collision Data

Intersection	Year	Total
Dairy Drive / Aveia Private and Old Montreal Road	2015	1
	2016	0
	2017	0
	2018	1
	2019	2
	Total	**4**
Famille-Laporte Avenue and Old Montreal Road	2015	0
	2016	0
	2017	0
	2018	0
	2019	2
	Total	**2**
Famille-Laporte Avenue and Cardinal Creek Drive	2015	0
	2016	0
	2017	0
	2018	0
	2019	1
	Total	**1**

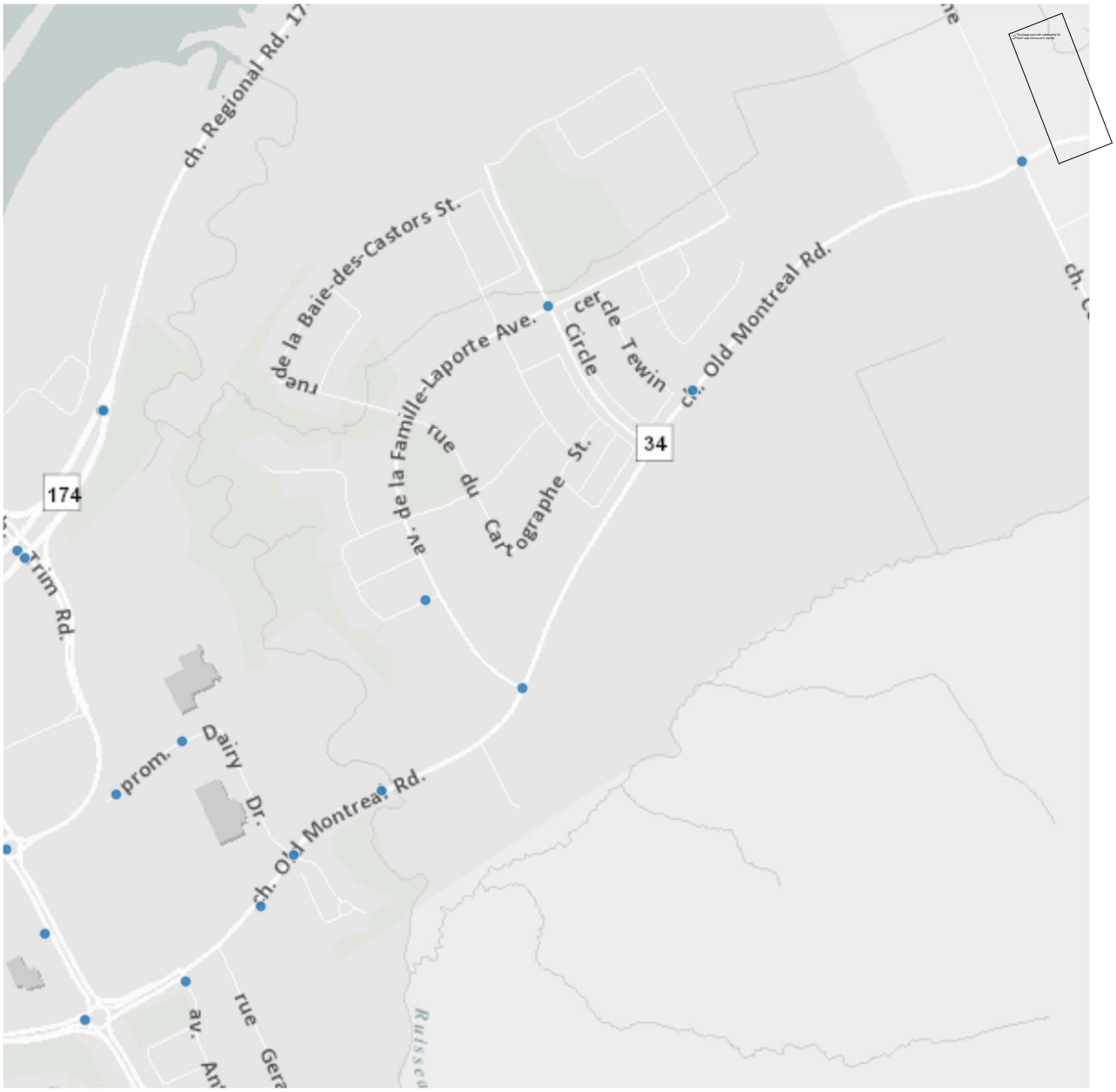


Figure 6: Collision Data by Location – 2015 to 2019

Image source: City of Ottawa Open Data Portal, accessed February 23, 2022

2.1.3 Planned Conditions

2.1.3.1 Road Network

The City's 2013 TMP identified that Old Montreal Road was to be widened from two to four lanes between Trim Road and the edge of the urban boundary by 2031. The rationale for this road widening was to provide capacity for the development areas east of Trim Road. The widening is proposed to provide capacity for development areas east of Trim Road.

This widening will not be included in this traffic impact assessment as the analysis will include conditions up to the year 2028, reconstruction of Old Montreal Road is expected beyond the horizon of this study. This section of Old Montreal Road is designated as part of the cycling Spine Route and as a conceptual future transit corridor in the TMP.

There are currently no planned road network or transit network improvements within the timeframe of this study, based on the 2013 TMP, that are expected to have an impact on local traffic patterns or the mode share distribution.

It is noted that the O-Train Confederation Line extension to Trim Road is expected to be open for full revenue service by the end of 2024; however, given the distance between the future Trim Station and the proposed development it has been assumed that this extension will not have a significant impact on local mode shares. The Rapid Transit & Transit Priority 2031 Network Concept from also indicates that the O-Train Confederation Line may be extended further east along Old Montreal Road. These network modifications are also unlikely to occur by the year 2028.

A connection from Cardinal Creek Village to Ottawa Road 174 is planned as well; however, the timeframe of this connection is unknown.

Figure 7 illustrates the existing intersection layout as well as the proposed lane configuration of the development and traffic control.

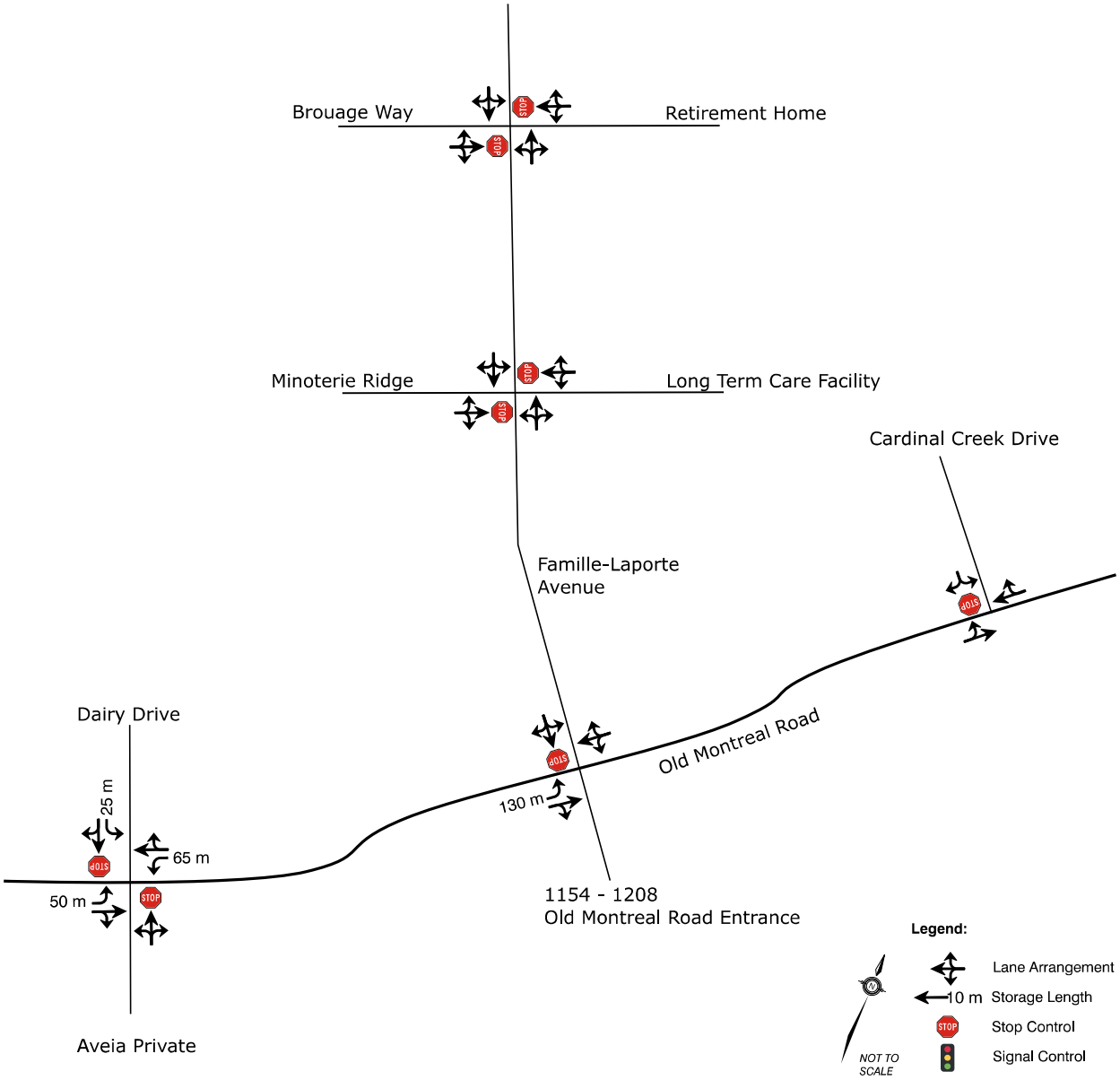


Figure 7: Study Area Lane Configuration and Traffic Control

2.1.3.2 Walking and Cycling

The City's 2013 Transportation Master Plan (TMP) identifies Old Montreal Road as a Spine Route within the Cycling Network. There are no current plans to implement cycling infrastructure on Old Montreal Road.

2.1.3.3 Transit

Figure 8 shows the 2031 Affordable Transit Network while **Figure 9** shows the Ultimate Transit Network in the study area. This will include LRT service to the intersection of Trim Road and Old Montreal Road. The ultimate transit network indicates a future transit corridor on Old Montreal Road, well beyond the horizon of this traffic study.

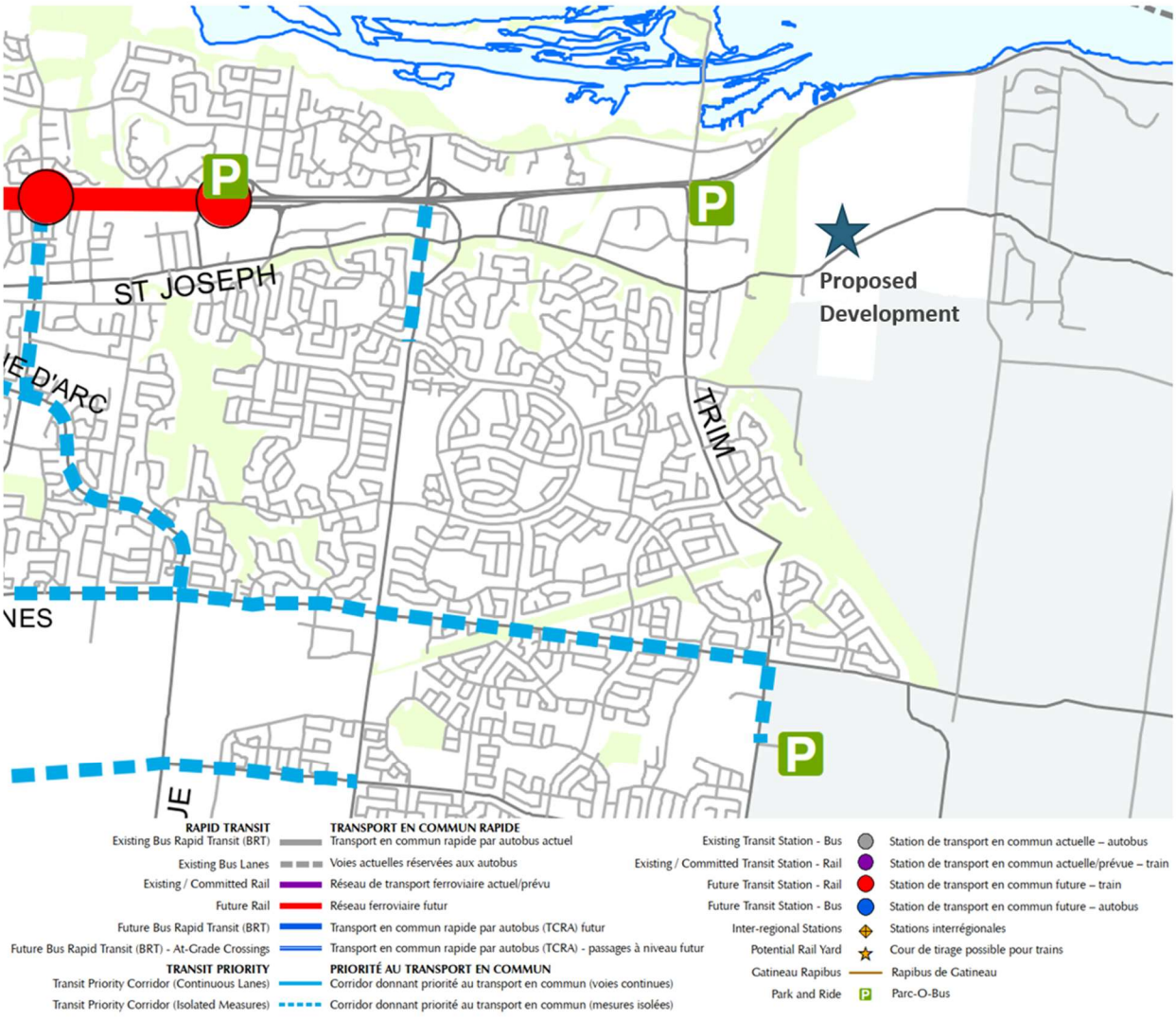


Figure 8: 2031 Affordable Transit Network

Image source: City of Ottawa 2013 TMP, 2031 Affordable Transit Network, accessed January 18, 2022.

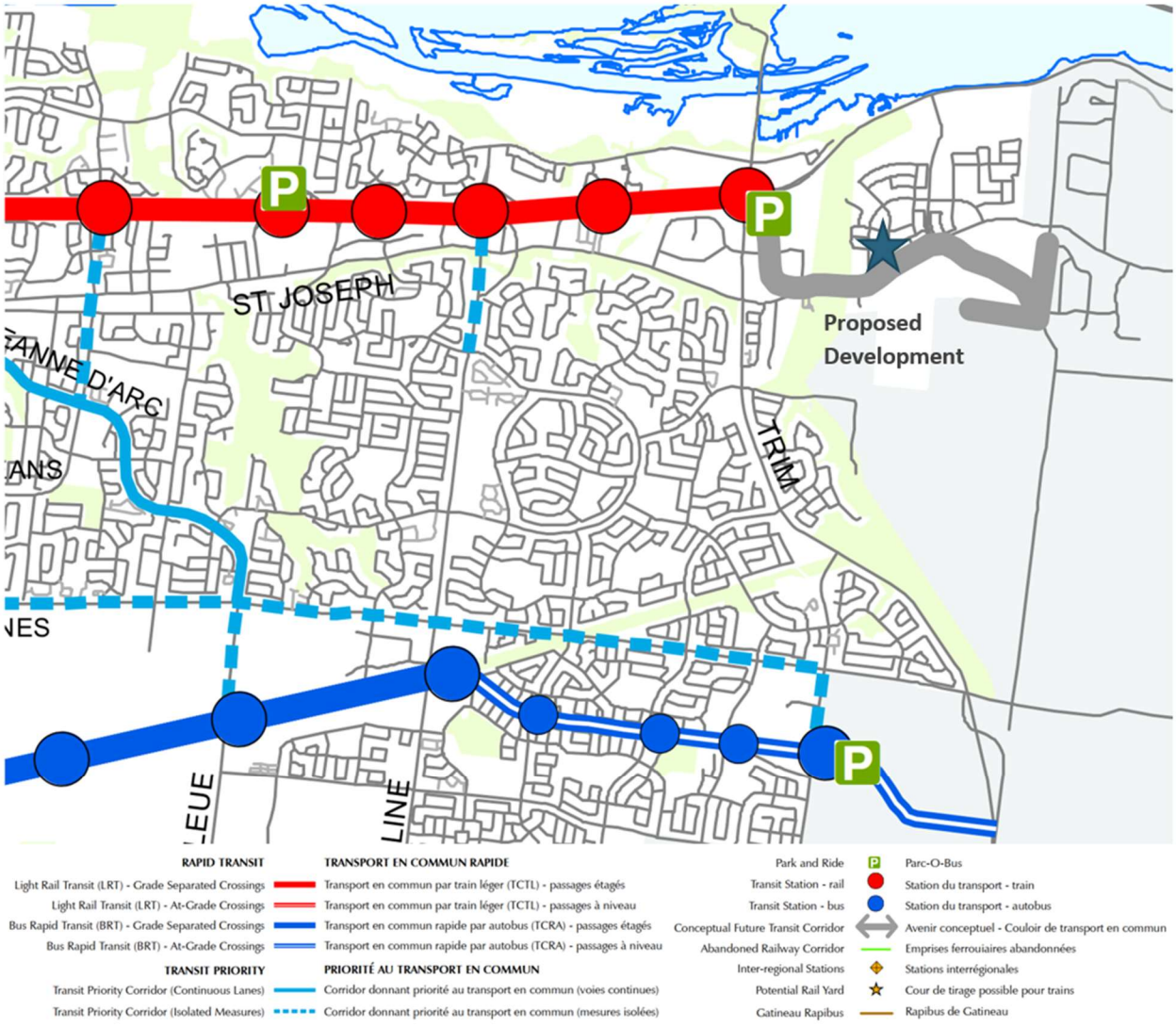


Figure 9: Ultimate Transit Network (2013 TMP)

Image source: City of Ottawa 2013 TMP, 2031 Affordable Transit Network, accessed January 18, 2022

2.1.3.4 Future Traffic Volumes

An annual growth rate was determined by examining previous traffic turning movement counts as well as the City accepted 2018 Phoenix Homes Subdivision TIS.

The collected 2022 traffic volumes were grown by 2% per year to simulate future conditions, as was noted in **Section 2.1.2.5**.

2.1.3.5 Future Background Developments

The City of Ottawa's development applications search tool was used to identify other developments within the Study Area that could impact Study Area intersections. The following developments have been determined to be within the analysis time frame and to have a measurable impact on the proposed development:

- Cardinal Creek Village
- 1015 Dairy Drive (Drytech International Headquarters)
- 1154-1208 Old Montreal Road – Transportation Impact Assessment Update (originally drafted in 2018).

Cardinal Creek Village is large subdivision being developed along Famille-Laporte Avenue on the North side of Old Montreal Road. The subdivision will ultimately accommodate 569 single/semi-detached dwellings and 681 attached dwellings, and several large blocks for mixed-use/commercial, school, and parkland purposes. At this time of this TIA, the subdivision has been almost entirely built-out; however, a site visit has confirmed there are approximately 9 single family residential homes and 21 attached townhomes that are unoccupied – all near Cardinal Creek Drive. Table 6 and Table 7 in the 2020 Trans Trip Generation Manual Summary Report were used to determine an appropriate modal split for the number of vehicle trips based on unoccupied units and Table 9 was used to determine appropriate directional splits.

1015 Dairy Drive will serve as the corporate headquarters of Drytech International (disaster restoration equipment and services). Although the build-out year was originally estimated at 2015, it is not yet developed. The trips to/from the development have been included in the 2023 future background conditions.

1154-1208 Old Montreal Road is a large subdivision development on the south side of Old Montreal Road, consisting of 432 terrace flats, 35 townhomes, and 16 semi-detached homes. It includes the construction of one new public road and one private street, connecting to Old Montreal Road, East of Famille-Laporte Avenue. It has been assumed that the development will be fully occupied in December 2022; however, the development is not yet started. For the purposes of this TIA it has been assumed to be in place under 2023 future background conditions.

The background development trips for 1015 Dairy Drive and 1154-1208 Old Montreal Road were assigned using the distribution for each of the separate background studies. Trips to/from Cardinal Creek drive were assigned based on the distribution discussed in **Section 3.1.2**.

2.2 Study Parameters

2.2.1 Study Area

The Study Area will consist of the two driveway access intersections on Famille-Laporte Avenue, adjacent to Brouage Way and Minoterie Ridge, respectively, as well as the existing intersections along Old Montreal Road, located at: Dairy Drive/Aveia Private, Famille-Laporte Avenue and Cardinal Creek Drive. The Study Area, along with intersections to be analyzed is shown in **Figure 10**.

Figure 10: Study Area/Intersections

2.2.2 Time Periods

The development is solely residential, consisting of two long-term care homes, and therefore the weekday AM and PM peak hours will govern the analysis.

2.2.3 Horizon Years

Construction will commence in 2022 and is planned to be completed in 2023. The transportation analysis will assess the 2023 horizon year, and in 2028, five years after build-out.

2.3 Exemptions Review

Table 5 presents the exemptions review table from the City of Ottawa's 2017 *Transportation Impact Assessment Guidelines*. The exemptions were rationalized as follows:

1. The TIA is not being submitted for a plan of subdivision therefore elements 4.1.3 is exempt;
2. The site provides the required parking supply, therefore Section 4.2.2 is exempt;
3. Neighbourhood Traffic Management is exempt as we do not anticipate adjacent roadway traffic volumes to exceed their capacity thresholds; and,
4. The proposed development generates less than 200 person trips in excess of the equivalent volume permitted by established zoning, therefore section 4.8 is exempt.

Table 5: Exemptions Review

Module	Element	Exemption Consideration	Status
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Included
	4.1.3 New Street Networks	Only required for plans of subdivision	Exempt
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Included
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
Network Impact Component			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	Included
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on Local or Collector streets for access and total volumes exceed ATM capacity thresholds	Included
4.8 Network Concept		Only required when proposed development generates more than 200 person trips during the peak hour in excess of the equivalent volume permitted by established zoning	Exempt
4.9 Intersection Design	All Elements	Not required if site generation trigger is not met	Included

3.0 Forecasting

3.1 Development-Generated Travel Demand

3.1.1 Trip Generation and Mode Shares

The proposed development consists of a retirement home and long term care home. Several data sources were referenced to estimate the trip generation for the proposed development.

As per the City of Ottawa TIA Guidelines, vehicle trips to the site are to be converted to person trip rates so that custom mode shares can be applied for the Orleans development context. The mode share for each land use has been determined using Table 12 of the 2020 TRANS Trip Generation Manual.

3.1.1.1 First Principles Approach

A first principles approach was taken to estimate the anticipated person trips to and from the retirement home and long term care home. A first principles approach was chosen based on the information provided by the developer, in order to accurately and conservatively estimate the trips to/from the site.

Table 6 illustrates the staff schedules for the two care homes. The facility will be in operation 24 hours per day, 7 days a week with three main shift change times. It is anticipated that the 224 bed long term care facility will have 154 employees, while the smaller 87-resident retirement home will have 60 staff members. Person trips calculations were performed assuming 214 total employees would depart and arrive as shown in **Table 6**.

Table 6: Staff Shift Schedules

Shift	Arriving	Leaving
AM Peak	60%	3%
PM Peak	37%	60%
Evening Shift	3%	37%
TOTAL	100%	100%

Table 7 provides the estimated person trip generation based on a first principles approach and the distribution shown in **Table 6**.

Table 7: Person Trip Generation Estimates

Estimated Vehicle Trip Generation	Land Use	AM Peak Hour		Total	PM Peak Hour		Total
		IN	OUT		IN	OUT	
First Principle's Approach	Retirement home	36	2	38	22	36	58
	Long-term care facility	92	5	97	57	92	149
	Total	128	7	135	79	128	207

Table 8 summarizes the trip generation by mode for both care homes. The travel modes were determined using Table 12 from the 2020 TRANS Trip Generation Manual. This table was chosen as the majority of trips are assumed to be from staff, rather than a typical residential mode share. It was assumed that that AM and PM modes shares would be the same.

Table 8: Trip Generation by Mode

Land Use	Travel Mode	Mode Share		AM Peak Hour			PM Peak Hour		
		AM	PM	Total	In	Out	Total	In	Out
Trips by Primary Travel Mode	**Auto Driver**	71%	71%	96	91	5	147	56	91
	Auto Pass.	7%	7%	9	9	0	14	6	9
	Transit	13%	13%	18	17	1	27	10	17
	Other	9%	9%	12	12	1	19	7	12
	Total	**100%**	**100%**	**135**	**128**	**7**	**207**	**79**	**128**

Source: TRANS O-D Survey Report

Overall, a 13% transit mode share is forecast for the AM peak period representing a total of 17 inbound and 1 outbound transit passenger trips. In the PM peak hour the 13% transit mode share generates 10 inbound and 17 outbound transit trips.

The 'other' category includes walking, cycling, school bus, paratransit, and scooter, and accounts for 9% of AM and PM Peak hour trips.

This TIA assumes that 71% AM and PM peak period trips would result in additional vehicles on the area road network.

3.1.1.2 Internal Capture

This analysis includes only residential trips; therefore, no internal capture was applied.

3.1.1.3 Pass-By and Diverted Traffic

This analysis includes only residential trips; therefore, no internal capture was applied.

3.1.2 Trip Distribution

The trip distribution of the new site trips was determined using the TRANS O-D Survey, which indicated that the majority of trips are destined to/from west of the site. Only 2 - 5% of trips are destined to/from east. This aligns well with the distribution observed in the 1154-1208 Old Montreal Road - Transportation Impact Assessment Update.

Table 9 summarizes the trip distribution used for this analysis.

Table 9: Trip Distribution

Cardinal Direction	New Residential Trip Distribution
East	5%
West	95%
Total	**100%**

3.1.3 Trip Assignment

Figure 11 illustrates the trip assignment to the Study Area road network.

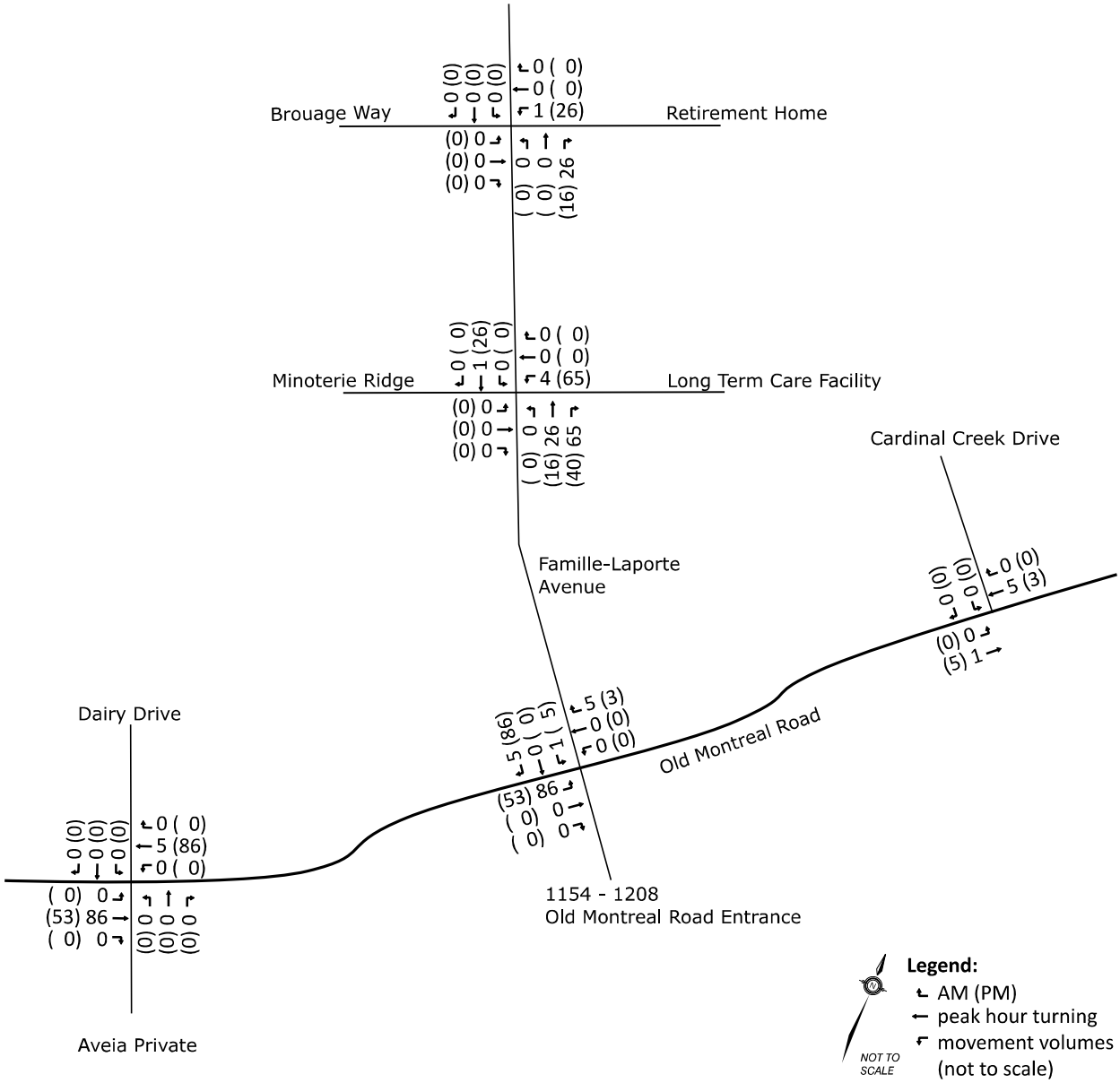


Figure 11: Site Trip Assignment

3.2 Background Network Travel Demand

3.2.1 Transportation Network Plans

There are several road network projects identified in the Transportation Master Plan, however, City staff indicated that these projects are unlikely to be completed prior to 2031 and therefore the impact of these road network projects has not been included in this analysis.

3.2.2 Background Growth

The background growth rate was determined based on the 1.8% growth rate utilized in 1154-1208 Old Montreal Road - Transportation Impact Assessment Update. An annual compounded growth rate of 2% represents a conservative growth estimate for this TIA. The background traffic volumes were grown by 2% per year to simulate future 2023 and 2028 conditions.

3.2.3 Other Developments

There are three planned developments near the proposed development which will impact Study Area intersections. Details for each planned development were listed on the City of Ottawa's development applications tool and were outlined in **Section 2.1.3.4.** These development volumes have been included as part of the 2023 and 2028 background traffic analysis and applied to the future road networks separately.

3.2.4 Background Traffic Volumes

Background traffic volume for the 2023 and 2028 horizon years have been forecast based on growing the existing traffic volume by an annual compound growth rate of 2% (reflective of the Study Area). Other background developments were also included within the background traffic volume forecasts. Background traffic along Famille-Laporte Avenue as part of the Cardinal Creek Village development was not grown, since new construction has already been accounted for in this TIA.

Figure 12 and **Figure 13** illustrate the forecasted 2023 and 2028 background traffic volumes, respectively.

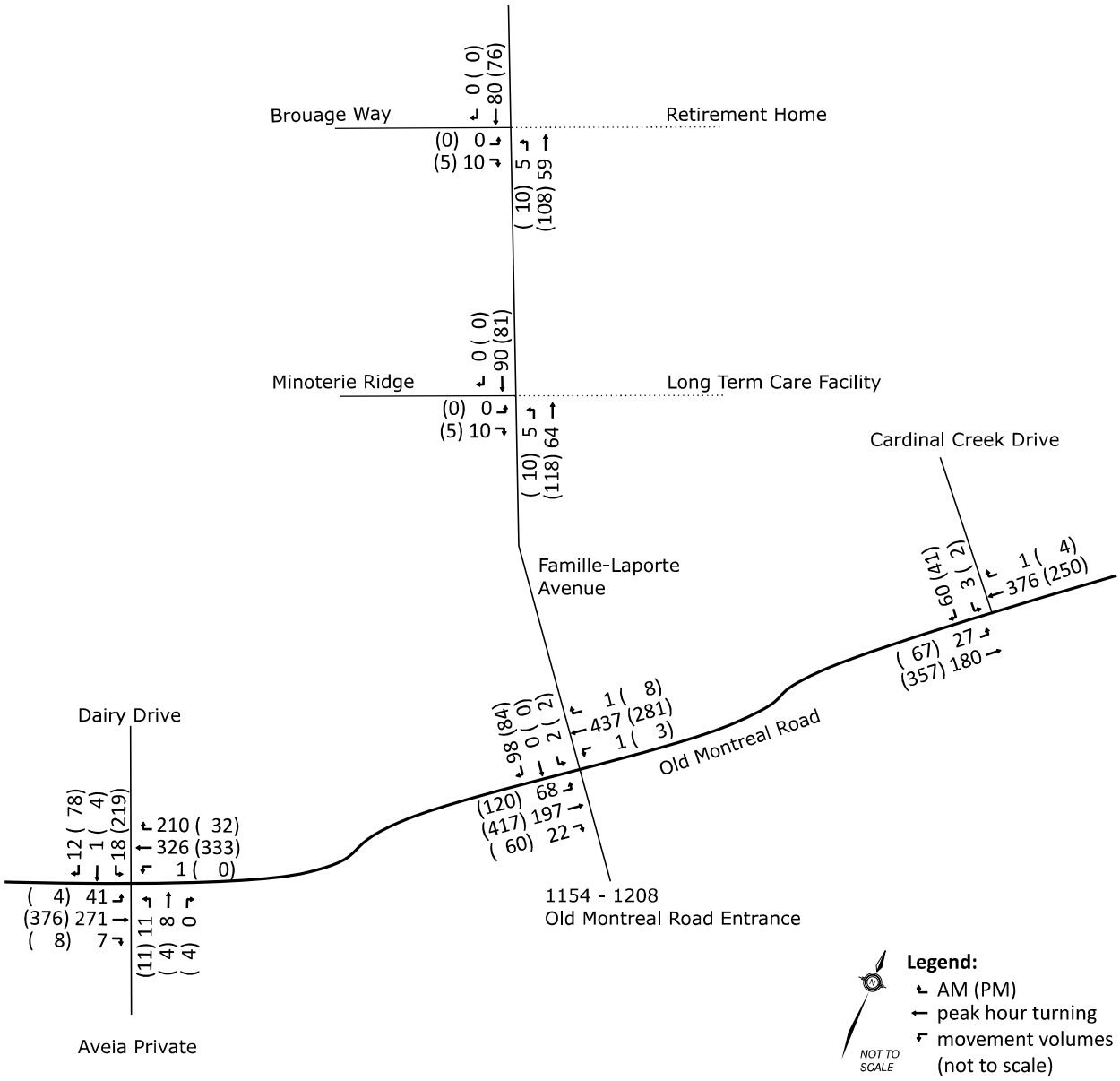


Figure 12: Background Traffic Volumes (2023)

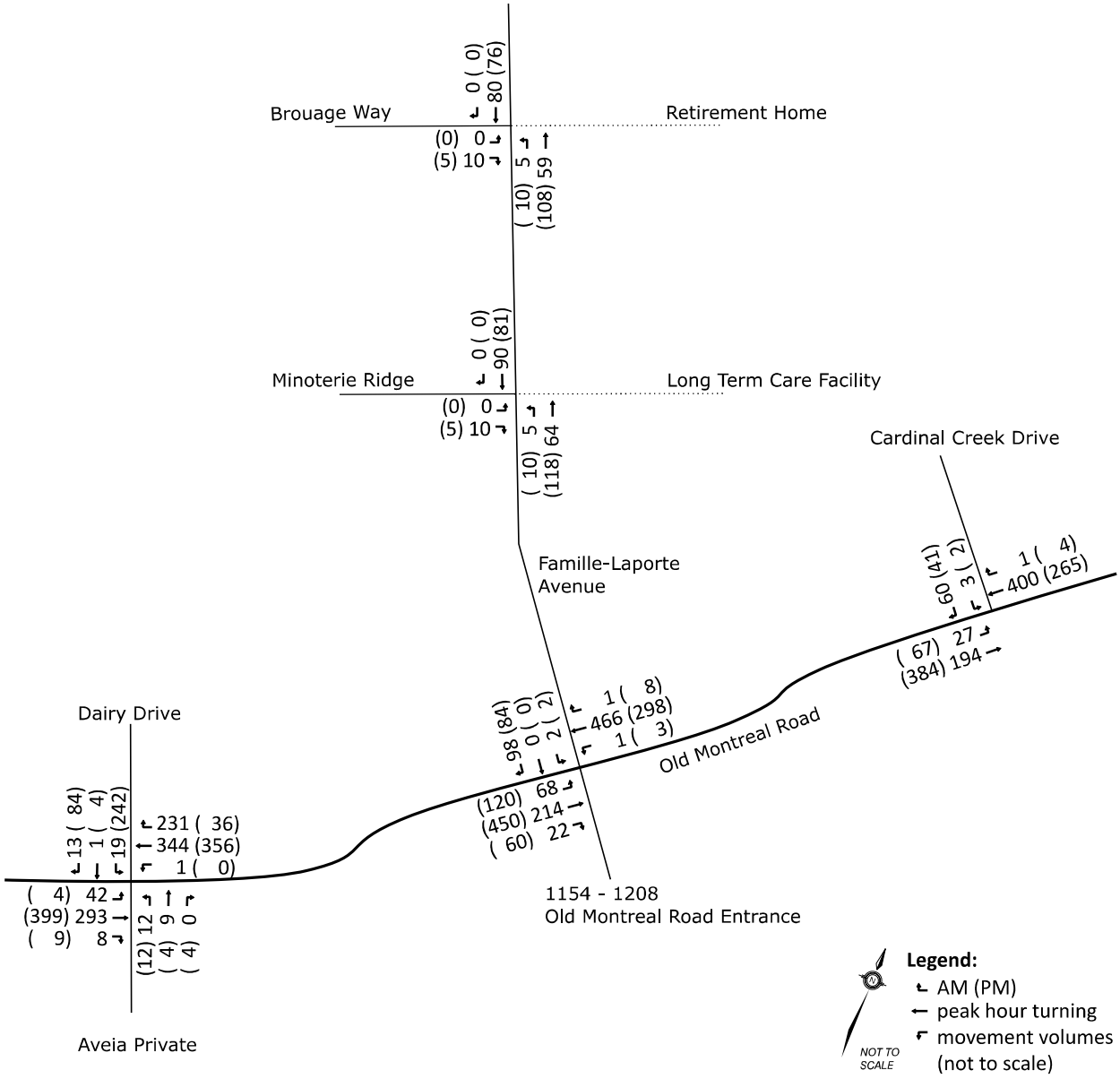


Figure 13: Background Traffic Volumes (2028)

3.3 Demand Rationalization

The proposed development is expected to generate additional vehicle trips that are to be accommodated by the roadway network. The analysis is based on application of transit mode shares representative of the area. Future rapid transit would encourage increase the transit use share and would minimize the proposed vehicle network impacts. Without a full commitment that the widening of Old Montreal Road would be complete by the 2028 planning horizon, the analysis is based on accommodating the forecast vehicle volumes via the existing road network. Our traffic analysis is therefore a conservative estimate of potential vehicle impacts. The future O-Train Confederation Line

extension to Trim Road will increase vehicle capacity and improve connectivity, but is beyond the timeframe of this TIA.

3.3.1 2023 and 2028 Vehicle Volumes

Figure 14 and **Figure 15** show the total 2023 and 2028 AM and PM peak hour traffic volumes used in the analysis.

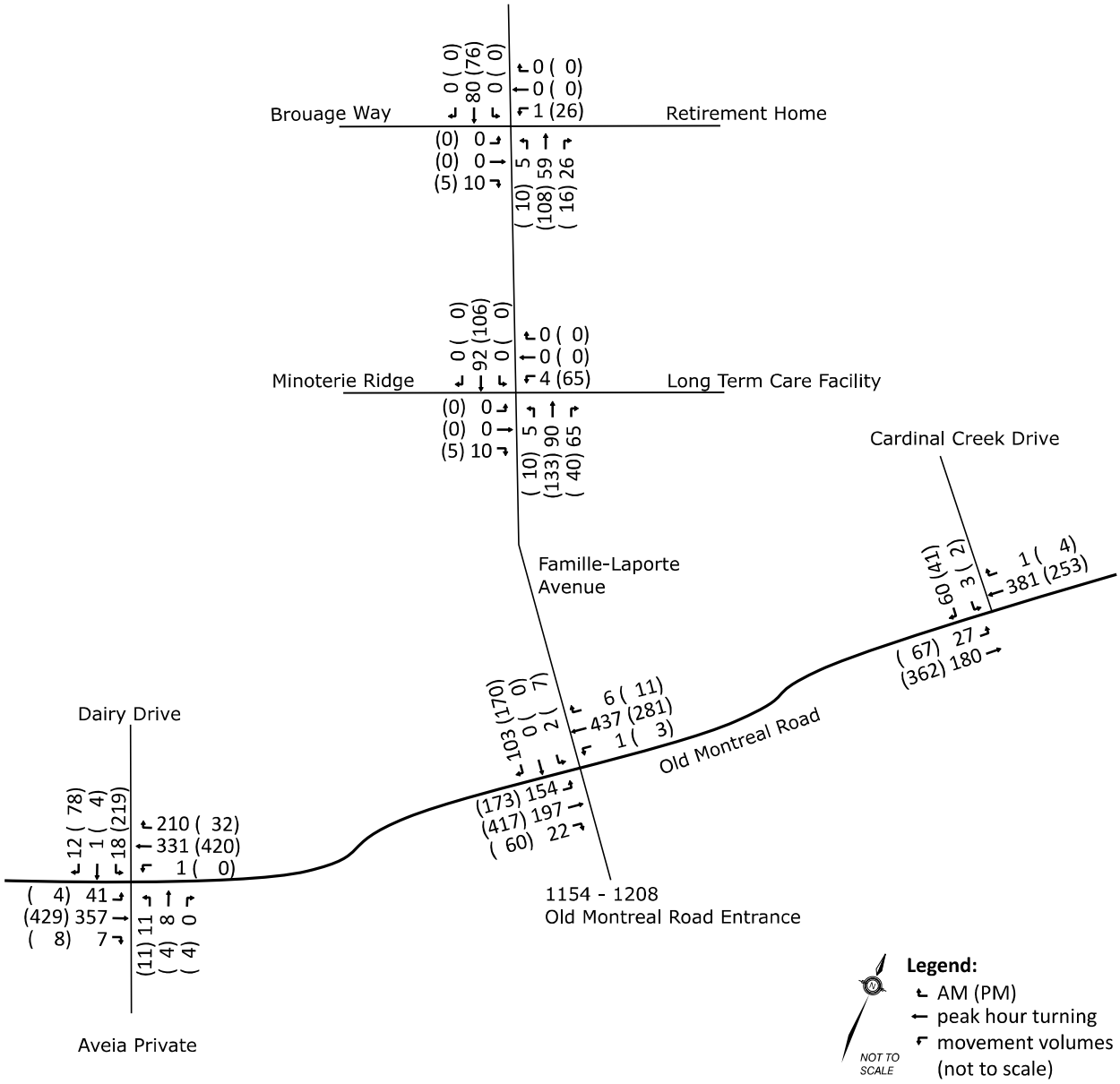


Figure 14: Total Traffic Volumes (2023)

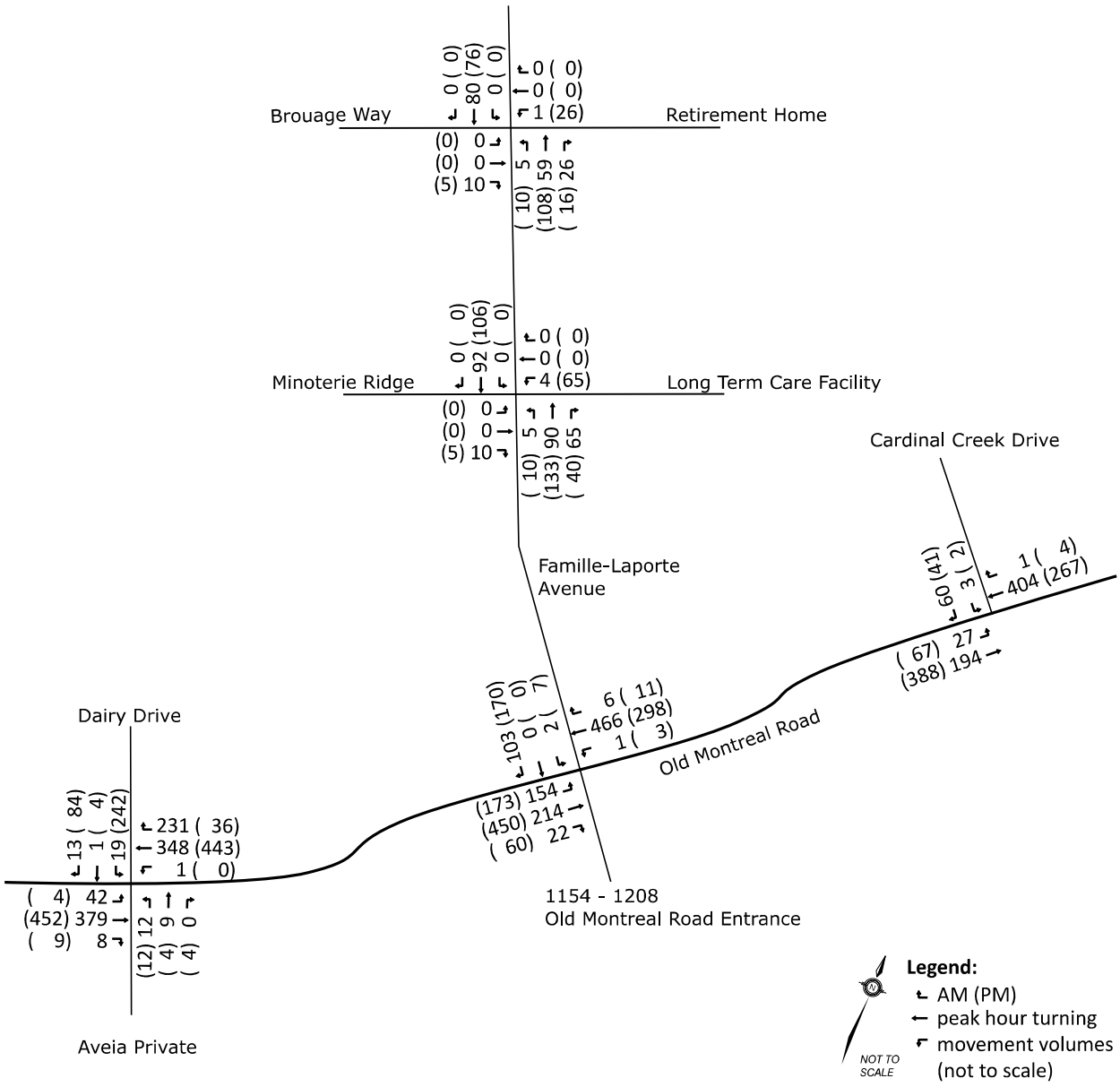


Figure 15: Total Traffic Volumes (2028)

4.0 Analysis

The following transportation analysis has been undertaken based on both Multi-Modal level of service as per the City of Ottawa MMLOS Guidelines, as well as Operational level of service (LOS) analysis using Trafficware's Synchro software version 10.0. This software package, which uses the methodologies of the Highway Capacity Manual (HCM), produces results in terms of level-of-service (LOS), volume to capacity ratio (V/C), vehicle delay, and 95th percentile queues,.

The overall volume-to-capacity ratio (V/C) is a measure of the utilization of the capacity of the intersection using the intersection's critical movements and approaches. The worst movement listed denotes the highest V/C ratio of the critical movements at each intersection. **Appendix C** contains the Synchro performance worksheets.

4.1 Development Design

4.1.1 Design for Sustainable Modes

No new streets will be created for this proposed development. As such, additional cycling, pedestrian, transit or parking facilities will not be provided within the development area.

4.1.1.1 Pedestrian Connectivity

Pedestrian connectivity should be provided between the development and Famille-Laporte Avenue, providing a connection to the public road network. Sidewalks are present in the vicinity of the area and currently provide an adequate level of connectivity for pedestrians.

4.1.1.2 Cycling Connectivity

The City's 2013 Transportation Master Plan (TMP) identifies Old Montreal Road as a Spine Route within the Cycling Network. There are no current plans to implement cycling infrastructure on Old Montreal Road. It is recommended that dedicated cycling facilities be implemented with plans for future connectivity, along Old Montreal Road and Famille-Laporte Avenue. This could be implemented in conjunction with the planned widening of Old Montreal Road between Trim Road and the edge of the urban boundary.

4.1.1.3 Transit Connectivity

Transit service is currently provided along Old Montreal Road and Famille-Laporte Avenue. As service expands in the area with planned LRT service to the intersection of Trim Road and Old Montreal Road, decreased headways and additional buses should be provided in the vicinity of the site to increase

transit mode share. Further information on current transit services and planned transit connectivity is listed in **Section 2.1.2.3** and **Section 2.1.3.3**.

4.1.2 Circulation and Access

Circulation and access has not been assessed as the site is expected to attract mostly staff passenger vehicles. No vehicles will be expected to be accommodated on Famille-Laporte Avenue as the planned parking lot provides plenty of storage space for loading/short-stay delivery vehicles. Three access points, shown in Figure 2, will provide adequate site circulation within and to/from the site.

4.1.3 New Street Networks

Not applicable; exempted during screening and scoping.

4.2 Parking

4.2.1 Parking Supply

The City of Ottawa zoning bylaw states that a retirement home should have a parking supply of 0.25 spaces per dwelling unit plus 1 space per 100 metres square of gross floor area used for medical, health or personal services. There are currently no medical, health or personal services planned for either the retirement home or the long term care facility. A total of 311 residents are anticipated to occupy the two buildings, resulting in a parking supply of approximately 78. The site servicing plan, shown in Figure 2, provides sufficient parking based on the zoning bylaw.

4.2.2 Spillover Parking

Not applicable; exempted during screening and scoping.

4.3 Boundary Street Design

The planned development is bound by Mishawashkode Street to the North, Cartographe Street to the East, Old Montreal Road to the South, and Famille-Laporte Avenue to the West, with access to Famille-Laporte Avenue.

Famille-Laporte Avenue was recently constructed in support of the Cardinal Creek subdivision. The roadway is approximately 11 metres in width, provides on-street parking, and provides two travel lanes (one lane per direction).

4.3.1 Design Concept

The City of Ottawa issued the Designing Neighbourhood Collector Streets guideline in 2019. The guidelines recommend that neighbourhood collector streets should include dedicated parking bays, through the use of bulbout parking. The parking bulbouts result in a narrowing of the collector roadway

and traffic calming of the neighbourhood. This can be used to coordinate speed and traffic management design with other design elements, such as bus stop locations, planned pedestrian crossings, streetscaping, etc. The construction of the site driveways could include parking bulbouts to improve the streetscaping of Famille-Laporte Avenue.

The Multi-Modal Level of Service (MMLOS) was evaluated for Famille-Laporte Avenue to assist with developing a design concept that maximizes the achievement of the MMLOS objectives. **Table 10** provides the MMLOS targets based on a developing community.

Table 10: Minimum Desirable MMLOS Targets

Land Use Designation	Road Segment	Road Class	Pedestrian LOS (PLOS)	Bicycle LOS (BLOS)	Transit LOS (TLOS)	Truck LOS (TkLOS)	Vehicle LOS (VLOS)
Developing community	Famille-Laporte Avenue	Collector	C	D	D	No Target	D

Table 11 presents the MMLOS conditions for roadway segments for Famille-Laporte Avenue. Famille-Laporte Avenue is classified as a Collector road with a posted speed limit of 40 km/h. Vehicle levels of service are presented in **Table 12**, **Table 13**, **Table 14**, **Table 15** and **Table 16**. All movements along Famille-Laporte Avenue perform at a LOS A for vehicle traffic. The analysis shows that all MMLOS targets have been achieved.

Table 11: MMLOS Conditions – Segments

	Criteria	Target	Famille-Laporte Avenue
Pedestrian LOS	Sidewalk width	C	1.8m
	Boulevard width		0.5 to 2m
	AADT > 3000?		<=3000
	On-Street Parking		Yes
	Operating Speed		30-50km/h
	Level of Service		**B**
Cycling LOS	Type of facility	D	Mixed traffic
	Number of travel lanes		2
	Bike lane width		n/a
	Operating speed		<= 40 km/h
	Centreline (yes/no)		No
	Bike lane blockage frequency		Rare
	Level of Service		**B**
Transit LOS	Type of facility	D	Mixed traffic
	Parking/driveway friction		Limited / Low
	Level of Service		**D**
Truck LOS	Curb lane width (meters)	No target	<=3.5m
	Travel Lanes per Direction		1 lane/dir
	Level of Service		**C**

4.4 Access Intersections Design

4.4.1 Location and Design of Access

There are three locations where the adjacent roadway network will be connected to the planned development. Each driveway accesses Famille-Laporte Avenue and allows for full vehicle access.

For the purpose of conducting a conservative analysis, only the two accesses located across from Minoterie Ridge and Brouage Way have been analyzed. The third access is located between Minoterie Ridge and Old Montreal Road.

4.4.2 Intersection Control

The driveway access to Famille-Laporte Avenue should provide stop signs facing vehicles exiting the site, with Famille-Laporte Avenue operating with freeflow traffic.

4.4.3 Intersection Design

The sections that follow present the analysis of the driveway access intersection operations during the AM and PM peak hour for existing and future conditions.

4.4.3.1 Access Intersection Operations

Table 12 and **Table 13** summarize the Synchro results for the driveway access intersections during the weekday AM and PM peak hours for the 2023 and 2028 horizon years.

The analysis confirms that vehicles will operate with satisfactory conditions in 2023 and 2028 at both analyzed access intersections with each movement operating at LOS A or better based on the volume to capacity ratio.

Table 12: Future 2023 Traffic Operation Results AM (PM)

Famille-Laporte Avenue and Brouage Way				
Movement	**Delay (s)**	**LOS**	**V/C**	**Q95th (m)**
Eastbound Approach	8.7 (8.7)	A (A)	0.01 (0.01)	0.3 (0.1)
Westbound Approach	9.7 (10.2)	A (A)	0.00 (0.04)	0.0 (1.0)
Northbound Approach	0.4 (0.6)	A (A)	0.00 (0.01)	0.1 (0.2)
Southbound Approach	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)
Famille-Laporte Avenue and Minoterie Ridge				
Movement	**Delay (s)**	**LOS**	**V/C**	**Q95th (m)**
Eastbound Approach	8.8 (8.8)	A (A)	0.01 (0.01)	0.3 (0.1)

Famille-Laporte Avenue and Brouage Way				
Westbound Approach	10.2 (11.3)	A (A)	0.01 (0.11)	0.1 (3.0)
Northbound Approach	0.2 (0.5)	A (A)	0.00 (0.01)	0.1 (0.2)
Southbound Approach	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)

Table 13: Future 2028 Traffic Operation Results AM (PM)

Famille-Laporte Avenue and Brouage Way				
Movement	**Delay (s)**	**LOS**	**V/C**	**Q95th (m)**
Eastbound Approach	8.7 (8.7)	A (A)	0.01 (0.01)	0.3 (0.1)
Westbound Approach	9.7 (10.2)	A (A)	0.00 (0.04)	0.0 (1.0)
Northbound Approach	0.4 (0.6)	A (A)	0.00 (0.01)	0.1 (0.2)
Southbound Approach	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)
Famille-Laporte Avenue and Minoterie Ridge				
Movement	**Delay (s)**	**LOS**	**V/C**	**Q95th (m)**
Eastbound Approach	8.8 (8.8)	A (A)	0.01 (0.01)	0.3 (0.1)
Westbound Approach	10.2 (11.3)	A (A)	0.01 (0.11)	0.1 (3.0)
Northbound Approach	0.2 (0.5)	A (A)	0.00 (0.01)	0.1 (0.2)
Southbound Approach	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)

4.5 Transportation Demand Management

Transportation Demand Management (TDM) program measures can be adopted to complement the development's proposed design. These measure encourage sustainable transportation choices, benefit occupants and visitors, and increase marketability. **Appendix D** contains the complete TDM checklists which help identify relevant TDM measures to be adopted in the future.

From the TDM residential checklists, some recommendations are:

- Display local area maps with walking/cycling access routes and key destinations at major
- entrances
- Display relevant transit schedules and route maps in the two buildings
- Contract with provider to install on-site car share vehicles and promote their use by residents
- Provide a multimodal travel option information package to staff members.

From the TDM non-residential checklist, some recommendations are:

- Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress
- Display local area maps with walking/cycling access routes and key destinations at major
- entrances
- Display relevant transit schedules and route maps at entrances

- Provide online links to OC Transpo and STO information
- Subsidize or reimburse monthly transit pass purchases by employees
- Provide a multimodal travel option information package to new/relocating employees and students
- Provide on-site amenities/services to minimize mid-day or mid-commute errands.

4.6 Neighbourhood Traffic Management

The City of Ottawa TIA Guidelines identify a threshold of 300 vehicles during the peak hour, for collector roadways, to determine whether there may be an impact to adjacent neighborhoods. Vehicle volumes on Famille-Laporte Avenue are anticipated to exceed this threshold by 2028; however, the development driveways will remove the site traffic before it infiltrates the residential area to the north, therefore there will be a limited impact on adjacent residential uses.

4.7 Transit

Transit mode shares have been estimated based on mode shares provided in the TRANS O-D Survey Report. Overall, a 13% transit mode share is forecast for the AM peak period representing a total of 17 inbound and 1 outbound transit passenger trips. In the PM the 13% transit mode share generates 10 inbound and 17 outbound transit trips.

Transit facilities are currently provided along Old Montreal Road. This will allow the area to achieve target transit shares, listed in **Section 4.3.1**. Transit stops are already present along Famille-Laporte Avenue and at the intersection of Old Montreal Road and Famille-Laporte Avenue; therefore, all residents will be within 400 metres of transit.

The existing transit services that run along Old Montreal Road are sufficient to accommodate the future transit demand. Standard and articulated buses have seated capacities of 40 and 55 people respectively. In order to be conservative, the average seated capacity was approximated to be 45. To serve the additional passengers related to the Orleans LTC home development, no additional bus trips would be required during the peak hours.

4.8 Review of Network Concept

Not applicable; exempted during screening and scoping.

4.9 Intersection Design

This section addresses the potential impacts to area intersections beyond the driveway access intersections presented in **Section 4.4**. Three existing intersections were identified during the project Scoping that are to be assessed for impacts due to the additional site-generated vehicles as follows:

1. Old Montreal Road and Dairy Drive / Aveia Private
2. Old Montreal Road and Famille-Laporte Avenue
3. Old Montreal Road and Cardinal Creek Drive

Refer to **Figure 7** for lane configurations of the Study Area.

4.9.1 Intersection Control

See **Section 4.4.2**.

4.9.2 Intersection Design

The identified network intersections are all stop controlled. The planned widening of Old Montreal Road widening has not been included in this traffic impact assessment as the analysis includes conditions up to the year 2028 and reconstruction of Old Montreal Road is anticipated to be beyond the horizon year of this study.

4.9.2.1 Existing Network Intersection Operations

Table 14 summarizes the Synchro results for the existing network intersections during the AM and PM peak hours. The analysis confirms that vehicles currently operate with satisfactory conditions in 2023 and 2028 at the network intersections with each movement operating at LOS A or better based on the volume to capacity ratio.

Table 14: Existing 2022 Traffic Operation Results AM (PM)

Old Montreal Road and Dairy Drive / Aveia Private

Movement	Delay (s)	LOS	V/C	Q95th (m)
Eastbound Left	8.2 (7.8)	A (A)	0.02 (0.00)	0.4 (0.0)
Eastbound Through / Right	0.0 (0.0)	A (A)	0.14 (0.14)	0.0 (0.0)
Westbound Left	7.7 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)
Westbound Through / Right	0.0 (0.0)	A (A)	0.24 (0.16)	0.0 (0.0)
Northbound Approach	13.6 (12.8)	A (A)	0.05 (0.04)	1.2 (1.0)
Southbound Left	14.1 (19.2)	A (A)	0.04 (0.48)	1.0 (20.5)
Southbound Through / Right	10.2 (10.2)	A (A)	0.02 (0.08)	0.4 (2.0)

Old Montreal Road and Famille-Laporte Avenue

Movement	Delay (s)	LOS	V/C	Q95th (m)
Eastbound Left	8.1 (7.9)	A (A)	0.06 (0.09)	1.5 (2.4)
Eastbound Through / Right	0.0 (0.0)	A (A)	0.10 (0.20)	0.0 (0.0)
Westbound Approach	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)
Southbound Approach	10.9 (9.9)	A (A)	0.15 (0.11)	4.1 (3.0)

Old Montreal Road and Cardinal Creek Drive

Movement	Delay (s)	LOS	V/C	Q95th (m)
Eastbound Left / Through	1.4 (1.8)	A (A)	0.02 (0.05)	0.5 (1.2)
Westbound Through / Right	0.0 (0.0)	A (A)	0.14 (0.09)	0.0 (0.0)
Southbound Left / Right	10.0 (9.4)	A (A)	0.08 (0.05)	2.1 (1.3)

4.9.2.2 Future Network Intersection Operations

Table 15 summarizes the Synchro results for the future 2023 network intersections during the AM and PM peak hours. The analysis confirms that all intersections are anticipated to operate with satisfactory conditions in 2023 and 2028 at the network intersections with each movement operating at LOS A or better, with the exception of the southbound left turn at Old Montreal Road and Dairy Drive / Aveia Private.

It is noted that no site trips were added to the southbound left turn, and the failing v/c ratio is due entirely to high vehicle volumes attempting to exit at an unsignalized intersection, driven by background growth. It is anticipated that as congestion increases at the unsignalized intersection of Old Montreal Road and Dairy Drive / Aveia Private, vehicles will choose to exit Dairy Drive at Trim Road instead. The analysis of the roundabout at Trim Road / S Frontage and Taylor Creek Drive was not scoped as part of this TIA. It is recommend that future studies examine this in greater detail; however, it is likely that detouring traffic volumes will reduce the v/c ratio without the need for specific geometric and/or traffic signal mitigation measures.

Table 15: Future 2023 Traffic Operation Results AM (PM)

Old Montreal Road and Dairy Drive / Aveia Private				
Movement	**Delay (s)**	**LOS**	**V/C**	**Q95th (m)**
Eastbound Left	8.8 (8.3)	A (A)	0.05 (0.00)	1.2 (0.1)
Eastbound Through / Right	0.0 (0.0)	A (A)	0.23 (0.28)	0.0 (0.0)
Westbound Left	8.1 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)
Westbound Through / Right	0.0 (0.0)	A (A)	0.35 (0.29)	0.0 (0.0)
Northbound Approach	21.6 (22.4)	A (A)	0.09 (0.09)	2.3 (2.3)
Southbound Left	23.8 (109.4)	A (**F**)	0.09 (**1.02**)	2.5 (78.0)
Southbound Through / Right	11.8 (12.6)	A (A)	0.03 (0.16)	0.6 (4.5)
Old Montreal Road and Famille-Laporte Avenue				
Movement	**Delay (s)**	**LOS**	**V/C**	**Q95th (m)**
Eastbound Left	9.0 (8.4)	A (A)	0.16 (0.15)	4.4 (4.3)
Eastbound Through / Right	0.0 (0.0)	A (A)	0.14 (0.30)	0.0 (0.0)
Westbound Approach	0.0 (0.1)	A (A)	0.00 (0.00)	0.0 (0.1)
Southbound Approach	13.1 (13.1)	A (A)	0.20 (0.30)	6.1 (10.2)
Old Montreal Road and Cardinal Creek Drive				
Movement	**Delay (s)**	**LOS**	**V/C**	**Q95th (m)**
Eastbound Left / Through	1.3 (1.7)	A (A)	0.03 (0.06)	0.6 (1.4)
Westbound Through / Right	0.0 (0.0)	A (A)	0.24 (0.16)	0.0 (0.0)
Southbound Left / Right	11.4 (10.3)	A (A)	0.11 (0.06)	2.9 (1.7)

Table 16 summarizes the Synchro results for the future 2028 network intersections during the AM and PM peak hours. The analysis confirms that all intersections are anticipated to operate with satisfactory conditions in 2023 and 2028 at the network intersections with each movement operating at LOS A or better, with the exception of the southbound left turn at Old Montreal Road and Dairy Drive / Aveia Private.

Table 16: Future 2028 Traffic Operation Results AM (PM)

Old Montreal Road and Dairy Drive/Aveia Private				
Movement	**Delay (s)**	**LOS**	**V/C**	**Q95th (m)**
Eastbound Left	9.0 (8.4)	A (A)	0.05 (0.00)	1.2 (0.1)
Eastbound Through / Right	0.0 (0.0)	A (A)	0.25 (0.29)	0.0 (0.0)
Westbound Left	8.1 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)
Westbound Through / Right	0.0 (0.0)	A (A)	0.37 (0.31)	0.0 (0.0)
Northbound Approach	23.4 (24.7)	A (A)	0.11 (0.10)	2.8 (2.7)
Southbound Left	26.2 (181.1)	A (**F**)	0.11 (**1.23**)	2.9 (107.2)
Southbound Through / Right	12.1 (13.0)	A (A)	0.03 (0.18)	0.7 (5.0)

Old Montreal Road and Dairy Drive/Aveia Private

Old Montreal Road and Famille-Laporte Avenue

Movement	Delay (s)	LOS	V/C	Q95th (m)
Eastbound Left	9.1 (8.5)	A (A)	0.16 (0.15)	4.6 (4.4)
Eastbound Through / Right	0.0 (0.0)	A (A)	0.15 (0.33)	0.0 (0.0)
Westbound Approach	0.0 (0.1)	A (A)	0.00 (0.00)	0.0 (0.1)
Southbound Approach	13.6 (13.6)	A (A)	0.21 (0.31)	6.4 (10.8)

Old Montreal Road and Cardinal Creek Drive

Movement	Delay (s)	LOS	V/C	Q95th (m)
Eastbound Left / Through	1.2 (1.7)	A (A)	0.03 (0.06)	0.6 (1.5)
Westbound Through / Right	0.0 (0.0)	A (A)	0.26 (0.17)	0.0 (0.0)
Southbound Left / Right	11.7 (10.4)	A (A)	0.11 (0.07)	3.0 (1.7)

5.0 Conclusions

This Transportation Impact Assessment for 1161 Old Montreal Road was undertaken to identify potential pressures on the transportation network once the site is developed. The analysis addressed all modes of travel in and around the site with a MMLOS assessment Famille-Laporte Avenue.

No mitigation measures were identified in order to accommodate the transportation demand for the site; however, the southbound left turn at the intersection of Old Montreal Road and Dairy Drive / Aveia Private is anticipated to be over capacity by the year 2023 due to the background growth in the area.

No site trips were added to the southbound left turn, and the failing v/c ratio is due entirely to high vehicle volumes attempting to exit at an unsignalized intersection.

It is anticipated that as congestion increases at the unsignalized intersection of Old Montreal Road and Dairy Drive / Aveia Private, vehicles will choose to exit Dairy Drive at Trim Road instead. The analysis of the roundabout at Trim Road / S Frontage and Taylor Creek Drive was not scoped as part of this TIA. It is recommend that future studies examine this in greater detail; however, it is likely that detouring traffic volumes will reduce the v/c ratio without the need for specific geometric and/or traffic signal mitigation measures.

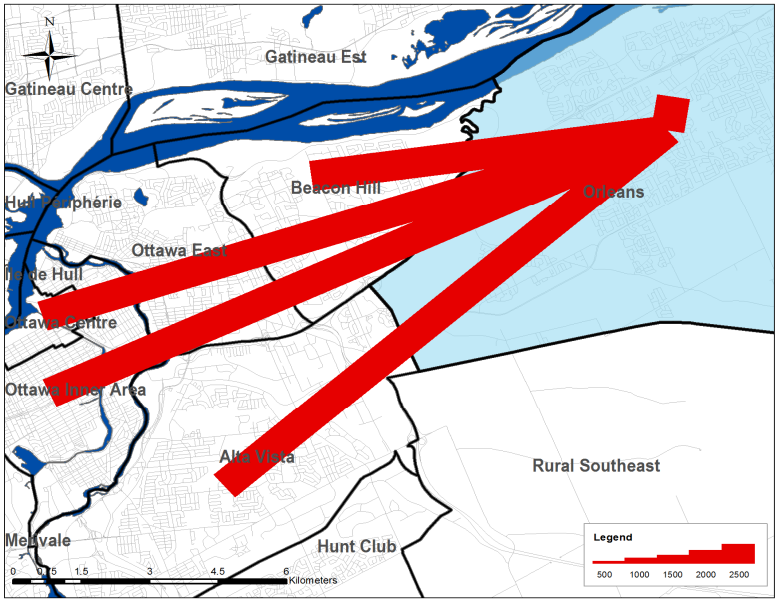
Appendix A

Trans OD Survey Report

Travel Patterns

Top Five Destinations of Trips from Orleans

AM Peak Period



Summary of Trips to and from Orleans

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

Trips by Trip Purpose

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

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

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

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

Trips by Primary Travel Mode

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

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

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

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

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

Appendix B

Trans Trip Generation Manual

Table 6: Residential Mode Share for Single-Detached Housing

District	Period	Mode				
		Auto Driver	Auto Pass.	Transit	Cycling	Walking
Ottawa Centre	AM	37%	13%	17%	9%	25%
	PM	36%	12%	13%	8%	30%
Ottawa Inner Area	AM	36%	13%	17%	9%	25%
	PM	35%	12%	13%	9%	30%
Île de Hull	AM	46%	13%	13%	0%	28%
	PM	53%	12%	11%	0%	24%
Ottawa East	AM	45%	15%	20%	9%	11%
	PM	48%	15%	17%	9%	12%
Beacon Hill	AM	51%	15%	20%	2%	12%
	PM	52%	21%	16%	4%	8%
Alta Vista	AM	49%	15%	21%	4%	11%
	PM	52%	18%	16%	3%	12%
Hunt Club	AM	48%	15%	29%	1%	7%
	PM	51%	19%	23%	1%	7%
Merivale	AM	52%	16%	21%	3%	8%
	PM	54%	18%	17%	3%	9%
Ottawa West	AM	43%	15%	19%	6%	16%
	PM	43%	13%	15%	6%	23%
Bayshore/Cedarview	AM	49%	15%	27%	2%	7%
	PM	52%	18%	21%	2%	7%
Hull Périphérie	AM	49%	17%	22%	4%	8%
	PM	51%	18%	18%	4%	9%
Orleans	AM	48%	14%	27%	1%	9%
	PM	54%	17%	22%	1%	6%
South Gloucester / Leitrim	AM	54%	24%	12%	1%	9%
	PM	55%	25%	9%	1%	10%
South Nepean	AM	51%	14%	25%	1%	9%
	PM	53%	19%	18%	1%	10%
Kanata - Stittsville	AM	52%	15%	20%	1%	12%
	PM	56%	19%	14%	1%	9%
Plateau	AM	47%	17%	24%	4%	7%
	PM	49%	19%	21%	3%	9%
Aylmer	AM	53%	17%	23%	2%	6%
	PM	55%	21%	17%	2%	5%
Pointe Gatineau	AM	55%	15%	22%	2%	7%
	PM	55%	17%	19%	2%	7%
Gatineau Est	AM	54%	16%	20%	0%	10%
	PM	60%	18%	14%	1%	7%
Masson-Angers	AM	62%	13%	13%	11%	1%
	PM	62%	18%	12%	8%	1%
Other Rural Districts	AM	60%	14%	24%	2%	0%
	PM	67%	17%	14%	2%	0%

Table 7: Residential Mode Share for Low-Rise Multifamily Housing

District	Period	Mode				
		Auto Driver	Auto Pass.	Transit	Cycling	Walking
Ottawa Centre	AM	27%	9%	25%	9%	30%
	PM	31%	10%	20%	9%	30%
Ottawa Inner Area	AM	27%	8%	26%	9%	30%
	PM	31%	9%	20%	9%	31%
Île de Hull	AM	27%	9%	25%	9%	30%
	PM	34%	22%	16%	5%	22%
Ottawa East	AM	36%	11%	38%	7%	8%
	PM	39%	16%	29%	5%	11%
Beacon Hill	AM	45%	9%	35%	1%	10%
	PM	48%	16%	24%	1%	11%
Alta Vista	AM	38%	15%	35%	1%	10%
	PM	38%	19%	31%	2%	10%
Hunt Club	AM	44%	11%	38%	1%	6%
	PM	47%	15%	29%	1%	8%
Merivale	AM	44%	11%	32%	6%	7%
	PM	44%	12%	29%	4%	11%
Ottawa West	AM	36%	12%	24%	10%	19%
	PM	35%	12%	16%	10%	27%
Bayshore/Cedarview	AM	43%	11%	31%	1%	13%
	PM	44%	14%	25%	1%	15%
Hull Périphérie	AM	46%	22%	22%	4%	6%
	PM	46%	17%	22%	3%	11%
Orleans	AM	47%	15%	29%	1%	9%
	PM	51%	19%	24%	1%	6%
South Gloucester / Leitrim	AM	59%	20%	16%	1%	4%
	PM	62%	18%	17%	1%	3%
South Nepean	AM	49%	13%	26%	2%	9%
	PM	49%	13%	24%	2%	12%
Kanata - Stittsville	AM	52%	14%	22%	0%	11%
	PM	58%	17%	17%	0%	8%
Plateau	AM	44%	18%	28%	4%	6%
	PM	47%	17%	26%	2%	8%
Aylmer	AM	52%	18%	23%	0%	7%
	PM	52%	16%	20%	1%	12%
Pointe Gatineau	AM	46%	17%	23%	0%	14%
	PM	52%	16%	19%	1%	12%
Gatineau Est	AM	54%	17%	20%	1%	8%
	PM	56%	21%	16%	0%	7%
Masson-Angers	AM	60%	15%	21%	4%	1%
	PM	63%	15%	17%	3%	1%
Other Rural Districts	AM	66%	13%	21%	1%	0%
	PM	62%	19%	16%	3%	0%

Table 12: Employment Generator Mode Share by District (AM Peak Period)

District	Mode				
	Auto Driver	Auto Pass.	Transit	Cycling	Walking
Ottawa Centre	24%	7%	54%	4%	11%
Ottawa Inner Area	45%	7%	29%	8%	11%
Île de Hull	40%	9%	40%	5%	6%
Ottawa East	66%	7%	20%	2%	5%
Beacon Hill	73%	6%	16%	2%	3%
Alta Vista	69%	7%	18%	3%	3%
Hunt Club	83%	5%	10%	1%	1%
Merivale	70%	7%	16%	3%	4%
Ottawa West	54%	8%	28%	5%	5%
Bayshore/Cedarview	77%	6%	10%	3%	4%
Hull Périphérie	75%	7%	12%	3%	3%
Orleans	71%	7%	13%	1%	8%
South Gloucester / Leitrim	89%	7%	2%	1%	1%
South Nepean	80%	10%	5%	1%	4%
Kanata - Stittsville	84%	4%	8%	1%	3%
Plateau	82%	6%	7%	1%	4%
Aylmer	83%	3%	5%	4%	5%
Pointe Gatineau	80%	9%	4%	2%	5%
Gatineau Est	88%	6%	4%	0%	2%

5 RESIDENTIAL DIRECTIONAL SPLITS

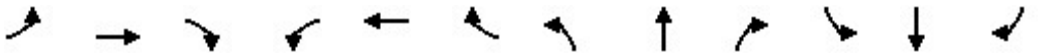
After calculating the total person trips generated by the development and applying the appropriate modal shares, directional factors can be applied to estimate the number of inbound and outbound trips by vehicle. The vehicle trip directional splits were developed for both the AM and PM peak periods[2]. The vehicle trip directional splits, as shown in **Table 9**, have been developed for the NCR based on a review of the local trip generator surveys as well as the latest published data in the ITE *Trip Generation Manual* (10th Edition).

Table 9: Recommended Vehicle Trip Directional Splits (Peak Period)

ITE Land Use Code	Dwelling Unit Type	Period	Inbound	Outbound
210	Single-detached	AM	30%	70%
		PM	62%	38%
220	Multi-Unit (Low-Rise)	AM	30%	70%
		PM	56%	44%
221 & 222	Multi-Unit (High-Rise)	AM	31%	69%
		PM	58%	42%

Appendix C

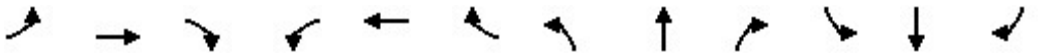
Synchro Output Reports



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	10	0	0	0	5	58	0	0	78	0
Future Volume (Veh/h)	0	0	10	0	0	0	5	58	0	0	78	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	11	0	0	0	5	63	0	0	85	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	158	158	85	169	158	63	85			63		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	158	158	85	169	158	63	85			63		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	100			100		
cM capacity (veh/h)	810	735	980	788	735	1007	1524			1553		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	0	68	85
Volume Left	0	0	5	0
Volume Right	11	0	0	0
cSH	980	1700	1524	1553
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (m)	0.3	0.0	0.1	0.0
Control Delay (s)	8.7	0.0	0.6	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.7	0.0	0.6	0.0
Approach LOS	A	A		

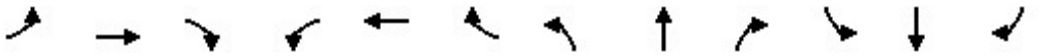
Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	17.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	10	0	0	0	5	63	0	0	88	0
Future Volume (Veh/h)	0	0	10	0	0	0	5	63	0	0	88	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	11	0	0	0	5	68	0	0	96	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	174	174	96	185	174	68	96			68		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	174	174	96	185	174	68	96			68		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	100			100		
cM capacity (veh/h)	791	721	966	769	721	1001	1510			1546		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	0	73	96
Volume Left	0	0	5	0
Volume Right	11	0	0	0
cSH	966	1700	1510	1546
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (m)	0.3	0.0	0.1	0.0
Control Delay (s)	8.8	0.0	0.5	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.8	0.0	0.5	0.0
Approach LOS	A	A		

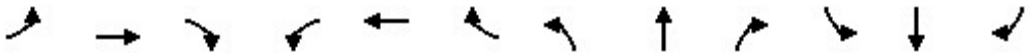
Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	17.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	157	0	0	274	1	0	0	0	2	0	96
Future Volume (Veh/h)	67	157	0	0	274	1	0	0	0	2	0	96
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	73	171	0	0	298	1	0	0	0	2	0	104
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	299			171			720	616	171	616	616	298
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	299			171			720	616	171	616	616	298
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	94			100			100	100	100	99	100	86
cM capacity (veh/h)	1218			1418			283	384	878	387	384	729

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	73	171	299	106
Volume Left	73	0	0	2
Volume Right	0	0	1	104
cSH	1218	1700	1418	717
Volume to Capacity	0.06	0.10	0.00	0.15
Queue Length 95th (m)	1.5	0.0	0.0	4.1
Control Delay (s)	8.1	0.0	0.0	10.9
Lane LOS	A			B
Approach Delay (s)	2.4		0.0	10.9
Approach LOS				B

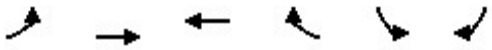
Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	40.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	208	7	1	166	203	11	8	0	16	1	9
Future Volume (Veh/h)	16	208	7	1	166	203	11	8	0	16	1	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	226	8	1	180	221	12	9	0	17	1	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	401			234			456	667	230	557	560	290
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	401			234			456	667	230	557	560	290
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	98			100			98	98	100	96	100	99
cM capacity (veh/h)	1131			1345			504	376	814	410	433	753

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	17	234	1	401	21	17	11
Volume Left	17	0	1	0	12	17	0
Volume Right	0	8	0	221	0	0	10
cSH	1131	1700	1345	1700	440	410	706
Volume to Capacity	0.02	0.14	0.00	0.24	0.05	0.04	0.02
Queue Length 95th (m)	0.4	0.0	0.0	0.0	1.2	1.0	0.4
Control Delay (s)	8.2	0.0	7.7	0.0	13.6	14.1	10.2
Lane LOS	A		A		B	B	B
Approach Delay (s)	0.6		0.0		13.6	12.6	
Approach LOS					B	B	

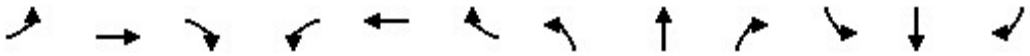
Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	36.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	134	218	1	3	56
Future Volume (Veh/h)	25	134	218	1	3	56
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	146	237	1	3	61
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	238				438	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	238				438	238
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				99	92
cM capacity (veh/h)	1341				568	806

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	173	238	64
Volume Left	27	0	3
Volume Right	0	1	61
cSH	1341	1700	791
Volume to Capacity	0.02	0.14	0.08
Queue Length 95th (m)	0.5	0.0	2.1
Control Delay (s)	1.4	0.0	10.0
Lane LOS	A		A
Approach Delay (s)	1.4	0.0	10.0
Approach LOS			A

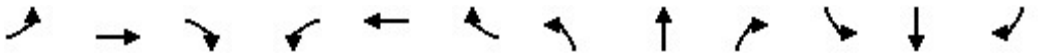
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	5	0	0	0	10	105	0	0	74	0
Future Volume (Veh/h)	0	0	5	0	0	0	10	105	0	0	74	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	5	0	0	0	11	114	0	0	80	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	216	216	80	221	216	114	80			114		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	216	216	80	221	216	114	80			114		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	99			100		
cM capacity (veh/h)	741	680	986	731	680	944	1531			1488		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	5	0	125	80
Volume Left	0	0	11	0
Volume Right	5	0	0	0
cSH	986	1700	1531	1488
Volume to Capacity	0.01	0.00	0.01	0.00
Queue Length 95th (m)	0.1	0.0	0.2	0.0
Control Delay (s)	8.7	0.0	0.7	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.7	0.0	0.7	0.0
Approach LOS	A	A		

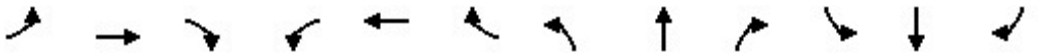
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	23.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	5	0	0	0	10	115	0	0	79	0
Future Volume (Veh/h)	0	0	5	0	0	0	10	115	0	0	79	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	5	0	0	0	11	125	0	0	86	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	233	233	86	238	233	125	86			125		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	233	233	86	238	233	125	86			125		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	99			100		
cM capacity (veh/h)	722	666	978	713	666	931	1523			1474		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	5	0	136	86
Volume Left	0	0	11	0
Volume Right	5	0	0	0
cSH	978	1700	1523	1474
Volume to Capacity	0.01	0.00	0.01	0.00
Queue Length 95th (m)	0.1	0.0	0.2	0.0
Control Delay (s)	8.7	0.0	0.6	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.7	0.0	0.6	0.0
Approach LOS	A	A		

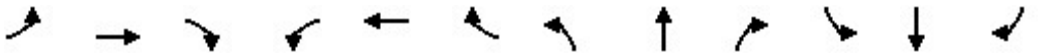
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	23.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	312	0	0	168	8	0	0	0	2	0	82
Future Volume (Veh/h)	117	312	0	0	168	8	0	0	0	2	0	82
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	127	339	0	0	183	9	0	0	0	2	0	89
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	192			339			870	785	339	780	780	188
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192			339			870	785	339	780	780	188
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			100			100	100	100	99	100	90
cM capacity (veh/h)	1370			1231			228	297	708	293	298	855

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	127	339	192	91
Volume Left	127	0	0	2
Volume Right	0	0	9	89
cSH	1370	1700	1231	820
Volume to Capacity	0.09	0.20	0.00	0.11
Queue Length 95th (m)	2.4	0.0	0.0	3.0
Control Delay (s)	7.9	0.0	0.0	9.9
Lane LOS	A			A
Approach Delay (s)	2.2		0.0	9.9
Approach LOS				A

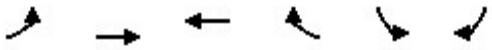
Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	42.7%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	213	8	0	218	32	11	4	4	212	4	50
Future Volume (Veh/h)	1	213	8	0	218	32	11	4	4	212	4	50
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	232	9	0	237	35	12	4	4	230	4	54
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	272			241			532	510	236	494	498	254
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	272			241			532	510	236	494	498	254
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	99	100	52	99	93
cM capacity (veh/h)	1303			1337			427	469	807	479	477	789

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	1	241	0	272	20	230	58
Volume Left	1	0	0	0	12	230	0
Volume Right	0	9	0	35	4	0	54
cSH	1303	1700	1700	1700	481	479	755
Volume to Capacity	0.00	0.14	0.00	0.16	0.04	0.48	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.0	20.5	2.0
Control Delay (s)	7.8	0.0	0.0	0.0	12.8	19.2	10.2
Lane LOS	A				B	C	B
Approach Delay (s)	0.0		0.0		12.8	17.4	
Approach LOS					B	C	

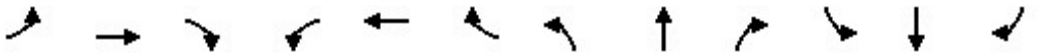
Intersection Summary				
Average Delay	6.4			
Intersection Capacity Utilization	39.9%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	252	138	3	2	38
Future Volume (Veh/h)	62	252	138	3	2	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	274	150	3	2	41
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	153				560	152
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	153				560	152
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				100	95
cM capacity (veh/h)	1440				470	900

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	341	153	43
Volume Left	67	0	2
Volume Right	0	3	41
cSH	1440	1700	863
Volume to Capacity	0.05	0.09	0.05
Queue Length 95th (m)	1.2	0.0	1.3
Control Delay (s)	1.8	0.0	9.4
Lane LOS	A		A
Approach Delay (s)	1.8	0.0	9.4
Approach LOS			A

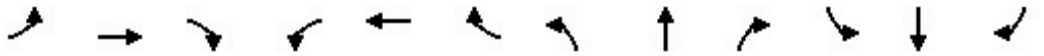
Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	10	1	0	0	5	59	26	0	80	0
Future Volume (Veh/h)	0	0	10	1	0	0	5	59	26	0	80	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	11	1	0	0	5	64	28	0	87	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	175	189	87	186	175	78	87			92		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	175	189	87	186	175	78	87			92		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	100			100		
cM capacity (veh/h)	790	707	977	768	720	988	1522			1515		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	1	97	87
Volume Left	0	1	5	0
Volume Right	11	0	28	0
cSH	977	768	1522	1515
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (m)	0.3	0.0	0.1	0.0
Control Delay (s)	8.7	9.7	0.4	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.7	9.7	0.4	0.0
Approach LOS	A	A		

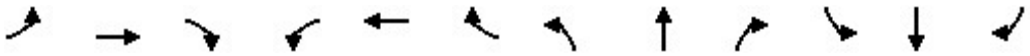
Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	19.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	10	4	0	0	5	90	65	0	92	0
Future Volume (Veh/h)	0	0	10	4	0	0	5	90	65	0	92	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	11	4	0	0	5	98	71	0	100	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	244	279	100	254	244	134	100			169		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	244	279	100	254	244	134	100			169		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	99	100	100	100			100		
cM capacity (veh/h)	713	630	961	693	660	921	1505			1421		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	4	174	100
Volume Left	0	4	5	0
Volume Right	11	0	71	0
cSH	961	693	1505	1421
Volume to Capacity	0.01	0.01	0.00	0.00
Queue Length 95th (m)	0.3	0.1	0.1	0.0
Control Delay (s)	8.8	10.2	0.2	0.0
Lane LOS	A	B	A	
Approach Delay (s)	8.8	10.2	0.2	0.0
Approach LOS	A	B		

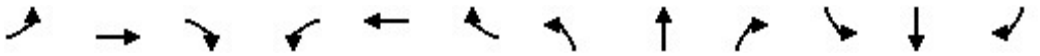
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	23.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	154	197	22	1	437	6	0	0	0	2	0	103
Future Volume (Veh/h)	154	197	22	1	437	6	0	0	0	2	0	103
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	167	214	24	1	475	7	0	0	0	2	0	112
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	482			238			1152	1044	226	1028	1052	478
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	482			238			1152	1044	226	1028	1052	478
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	84			100			100	100	100	99	100	81
cM capacity (veh/h)	1065			1341			125	195	818	188	192	577

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	167	238	483	114
Volume Left	167	0	1	2
Volume Right	0	24	7	112
cSH	1065	1700	1341	557
Volume to Capacity	0.16	0.14	0.00	0.20
Queue Length 95th (m)	4.4	0.0	0.0	6.1
Control Delay (s)	9.0	0.0	0.0	13.1
Lane LOS	A		A	B
Approach Delay (s)	3.7		0.0	13.1
Approach LOS				B

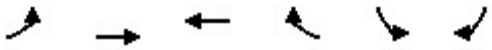
Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	53.9%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	357	7	1	331	210	11	8	0	18	1	12
Future Volume (Veh/h)	41	357	7	1	331	210	11	8	0	18	1	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	388	8	1	360	228	12	9	0	20	1	13
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	588			396			858	1072	392	958	962	474
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	588			396			858	1072	392	958	962	474
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			100			95	96	100	91	100	98
cM capacity (veh/h)	982			1174			263	212	661	211	246	595

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	45	396	1	588	21	20	14
Volume Left	45	0	1	0	12	20	0
Volume Right	0	8	0	228	0	0	13
cSH	982	1700	1174	1700	238	211	540
Volume to Capacity	0.05	0.23	0.00	0.35	0.09	0.09	0.03
Queue Length 95th (m)	1.2	0.0	0.0	0.0	2.3	2.5	0.6
Control Delay (s)	8.8	0.0	8.1	0.0	21.6	23.8	11.8
Lane LOS	A		A		C	C	B
Approach Delay (s)	0.9		0.0		21.6	18.9	
Approach LOS					C	C	

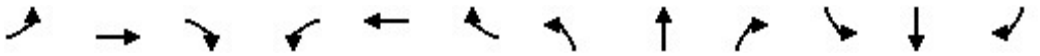
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	50.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	27	180	381	1	3	60
Future Volume (Veh/h)	27	180	381	1	3	60
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	196	414	1	3	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	415				668	414
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	415				668	414
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				99	90
cM capacity (veh/h)	1155				415	642

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	225	415	68
Volume Left	29	0	3
Volume Right	0	1	65
cSH	1155	1700	627
Volume to Capacity	0.03	0.24	0.11
Queue Length 95th (m)	0.6	0.0	2.9
Control Delay (s)	1.3	0.0	11.4
Lane LOS	A		B
Approach Delay (s)	1.3	0.0	11.4
Approach LOS			B

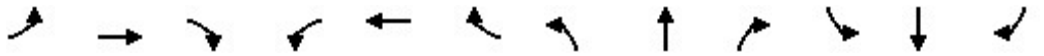
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	5	26	0	0	10	108	16	0	76	0
Future Volume (Veh/h)	0	0	5	26	0	0	10	108	16	0	76	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	5	28	0	0	11	117	17	0	83	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	230	239	83	236	230	126	83			134		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230	239	83	236	230	126	83			134		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	96	100	100	99			100		
cM capacity (veh/h)	725	661	982	716	668	930	1527			1463		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	5	28	145	83
Volume Left	0	28	11	0
Volume Right	5	0	17	0
cSH	982	716	1527	1463
Volume to Capacity	0.01	0.04	0.01	0.00
Queue Length 95th (m)	0.1	1.0	0.2	0.0
Control Delay (s)	8.7	10.2	0.6	0.0
Lane LOS	A	B	A	
Approach Delay (s)	8.7	10.2	0.6	0.0
Approach LOS	A	B		

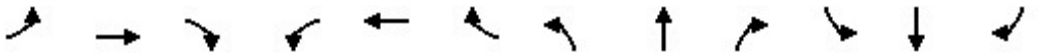
Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	29.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	5	65	0	0	10	133	40	0	106	0
Future Volume (Veh/h)	0	0	5	65	0	0	10	133	40	0	106	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	5	71	0	0	11	145	43	0	115	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	304	325	115	308	304	166	115			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	304	325	115	308	304	166	115			188		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	89	100	100	99			100		
cM capacity (veh/h)	649	592	943	641	608	883	1487			1398		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	5	71	199	115
Volume Left	0	71	11	0
Volume Right	5	0	43	0
cSH	943	641	1487	1398
Volume to Capacity	0.01	0.11	0.01	0.00
Queue Length 95th (m)	0.1	3.0	0.2	0.0
Control Delay (s)	8.8	11.3	0.5	0.0
Lane LOS	A	B	A	
Approach Delay (s)	8.8	11.3	0.5	0.0
Approach LOS	A	B		

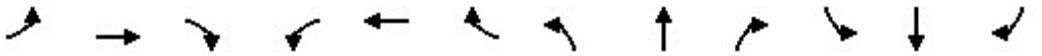
Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	34.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	173	417	60	3	281	11	0	0	0	7	0	170
Future Volume (Veh/h)	173	417	60	3	281	11	0	0	0	7	0	170
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	188	453	65	3	305	12	0	0	0	8	0	185
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	317			518			1364	1184	486	1146	1211	311
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	317			518			1364	1184	486	1146	1211	311
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	85			100			100	100	100	95	100	75
cM capacity (veh/h)	1237			1058			83	161	586	157	156	731

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	188	518	320	193
Volume Left	188	0	3	8
Volume Right	0	65	12	185
cSH	1237	1700	1058	635
Volume to Capacity	0.15	0.30	0.00	0.30
Queue Length 95th (m)	4.3	0.0	0.1	10.2
Control Delay (s)	8.4	0.0	0.1	13.1
Lane LOS	A		A	B
Approach Delay (s)	2.2		0.1	13.1
Approach LOS				B

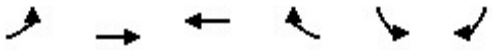
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	429	8	0	420	32	11	4	4	219	4	78
Future Volume (Veh/h)	4	429	8	0	420	32	11	4	4	219	4	78
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	466	9	0	457	35	12	4	4	238	4	85
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	492			475			1022	970	470	954	958	474
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	492			475			1022	970	470	954	958	474
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			93	98	99	0	98	86
cM capacity (veh/h)	1082			1098			182	254	597	233	259	594

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	4	475	0	492	20	238	89
Volume Left	4	0	0	0	12	238	0
Volume Right	0	9	0	35	4	0	85
cSH	1082	1700	1700	1700	227	233	561
Volume to Capacity	0.00	0.28	0.00	0.29	0.09	1.02	0.16
Queue Length 95th (m)	0.1	0.0	0.0	0.0	2.3	78.0	4.5
Control Delay (s)	8.3	0.0	0.0	0.0	22.4	109.4	12.6
Lane LOS	A				C	F	B
Approach Delay (s)	0.1		0.0		22.4	83.1	
Approach LOS					C	F	

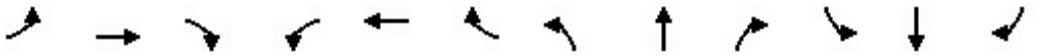
Intersection Summary				
Average Delay	21.0			
Intersection Capacity Utilization	51.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	67	362	253	4	2	41
Future Volume (Veh/h)	67	362	253	4	2	41
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	73	393	275	4	2	45
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	279				816	277
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	279				816	277
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				99	94
cM capacity (veh/h)	1295				330	767

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	466	279	47
Volume Left	73	0	2
Volume Right	0	4	45
cSH	1295	1700	726
Volume to Capacity	0.06	0.16	0.06
Queue Length 95th (m)	1.4	0.0	1.7
Control Delay (s)	1.7	0.0	10.3
Lane LOS	A		B
Approach Delay (s)	1.7	0.0	10.3
Approach LOS			B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	10	1	0	0	5	59	26	0	80	0
Future Volume (Veh/h)	0	0	10	1	0	0	5	59	26	0	80	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	11	1	0	0	5	64	28	0	87	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	175	189	87	186	175	78	87			92		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	175	189	87	186	175	78	87			92		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	100			100		
cM capacity (veh/h)	790	707	977	768	720	988	1522			1515		

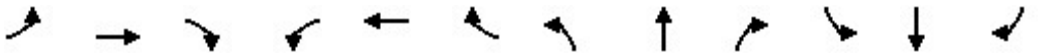
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	1	97	87
Volume Left	0	1	5	0
Volume Right	11	0	28	0
cSH	977	768	1522	1515
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (m)	0.3	0.0	0.1	0.0
Control Delay (s)	8.7	9.7	0.4	0.0
Lane LOS	A	A	A	
Approach Delay (s)	8.7	9.7	0.4	0.0
Approach LOS	A	A		

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	19.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	10	4	0	0	5	90	65	0	92	0
Future Volume (Veh/h)	0	0	10	4	0	0	5	90	65	0	92	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	11	4	0	0	5	98	71	0	100	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	244	279	100	254	244	134	100			169		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	244	279	100	254	244	134	100			169		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	99	100	100	100			100		
cM capacity (veh/h)	713	630	961	693	660	921	1505			1421		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	4	174	100
Volume Left	0	4	5	0
Volume Right	11	0	71	0
cSH	961	693	1505	1421
Volume to Capacity	0.01	0.01	0.00	0.00
Queue Length 95th (m)	0.3	0.1	0.1	0.0
Control Delay (s)	8.8	10.2	0.2	0.0
Lane LOS	A	B	A	
Approach Delay (s)	8.8	10.2	0.2	0.0
Approach LOS	A	B		

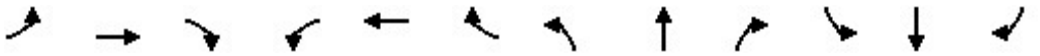
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	23.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	154	214	22	1	466	6	0	0	0	2	0	103
Future Volume (Veh/h)	154	214	22	1	466	6	0	0	0	2	0	103
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	167	233	24	1	507	7	0	0	0	2	0	112
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	514			257			1204	1095	245	1080	1104	510
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	514			257			1204	1095	245	1080	1104	510
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	84			100			100	100	100	99	100	80
cM capacity (veh/h)	1036			1320			114	181	799	173	179	553

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	167	257	515	114
Volume Left	167	0	1	2
Volume Right	0	24	7	112
cSH	1036	1700	1320	533
Volume to Capacity	0.16	0.15	0.00	0.21
Queue Length 95th (m)	4.6	0.0	0.0	6.4
Control Delay (s)	9.1	0.0	0.0	13.6
Lane LOS	A		A	B
Approach Delay (s)	3.6		0.0	13.6
Approach LOS				B

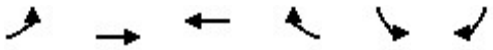
Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	56.5%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	379	8	1	348	231	12	9	0	19	1	13
Future Volume (Veh/h)	42	379	8	1	348	231	12	9	0	19	1	13
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	412	9	1	378	251	13	10	0	21	1	14
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	629			421			903	1140	416	1014	1018	504
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	629			421			903	1140	416	1014	1018	504
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			100			95	95	100	89	100	98
cM capacity (veh/h)	948			1149			244	193	641	190	227	572

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	46	421	1	629	23	21	15
Volume Left	46	0	1	0	13	21	0
Volume Right	0	9	0	251	0	0	14
cSH	948	1700	1149	1700	219	190	520
Volume to Capacity	0.05	0.25	0.00	0.37	0.11	0.11	0.03
Queue Length 95th (m)	1.2	0.0	0.0	0.0	2.8	2.9	0.7
Control Delay (s)	9.0	0.0	8.1	0.0	23.4	26.2	12.1
Lane LOS	A		A		C	D	B
Approach Delay (s)	0.9		0.0		23.4	20.4	
Approach LOS					C	C	

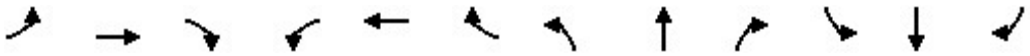
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	51.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	27	194	404	1	3	60
Future Volume (Veh/h)	27	194	404	1	3	60
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	211	439	1	3	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	440				708	440
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	440				708	440
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				99	90
cM capacity (veh/h)	1131				394	622

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	240	440	68
Volume Left	29	0	3
Volume Right	0	1	65
cSH	1131	1700	606
Volume to Capacity	0.03	0.26	0.11
Queue Length 95th (m)	0.6	0.0	3.0
Control Delay (s)	1.2	0.0	11.7
Lane LOS	A		B
Approach Delay (s)	1.2	0.0	11.7
Approach LOS			B

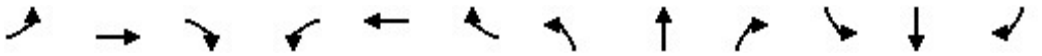
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	5	26	0	0	10	108	16	0	76	0
Future Volume (Veh/h)	0	0	5	26	0	0	10	108	16	0	76	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	5	28	0	0	11	117	17	0	83	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	230	239	83	236	230	126	83			134		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230	239	83	236	230	126	83			134		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	96	100	100	99			100		
cM capacity (veh/h)	725	661	982	716	668	930	1527			1463		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	5	28	145	83
Volume Left	0	28	11	0
Volume Right	5	0	17	0
cSH	982	716	1527	1463
Volume to Capacity	0.01	0.04	0.01	0.00
Queue Length 95th (m)	0.1	1.0	0.2	0.0
Control Delay (s)	8.7	10.2	0.6	0.0
Lane LOS	A	B	A	
Approach Delay (s)	8.7	10.2	0.6	0.0
Approach LOS	A	B		

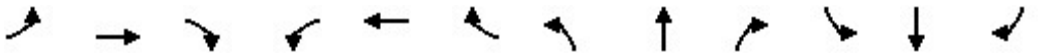
Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	29.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	5	65	0	0	10	133	40	0	106	0
Future Volume (Veh/h)	0	0	5	65	0	0	10	133	40	0	106	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	5	71	0	0	11	145	43	0	115	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	304	325	115	308	304	166	115			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	304	325	115	308	304	166	115			188		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	89	100	100	99			100		
cM capacity (veh/h)	649	592	943	641	608	883	1487			1398		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	5	71	199	115
Volume Left	0	71	11	0
Volume Right	5	0	43	0
cSH	943	641	1487	1398
Volume to Capacity	0.01	0.11	0.01	0.00
Queue Length 95th (m)	0.1	3.0	0.2	0.0
Control Delay (s)	8.8	11.3	0.5	0.0
Lane LOS	A	B	A	
Approach Delay (s)	8.8	11.3	0.5	0.0
Approach LOS	A	B		

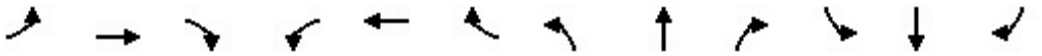
Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	34.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	173	450	60	3	298	11	0	0	0	7	0	170
Future Volume (Veh/h)	173	450	60	3	298	11	0	0	0	7	0	170
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	188	489	65	3	324	12	0	0	0	8	0	185
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	336			554			1418	1240	522	1201	1266	330
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	336			554			1418	1240	522	1201	1266	330
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	85			100			100	100	100	94	100	74
cM capacity (veh/h)	1218			1026			75	149	559	144	144	714

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	188	554	339	193
Volume Left	188	0	3	8
Volume Right	0	65	12	185
cSH	1218	1700	1026	613
Volume to Capacity	0.15	0.33	0.00	0.31
Queue Length 95th (m)	4.4	0.0	0.1	10.8
Control Delay (s)	8.5	0.0	0.1	13.6
Lane LOS	A		A	B
Approach Delay (s)	2.2		0.1	13.6
Approach LOS				B

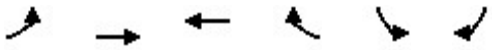
Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	67.8%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	452	9	0	443	36	12	4	4	242	4	84
Future Volume (Veh/h)	4	452	9	0	443	36	12	4	4	242	4	84
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	491	10	0	482	39	13	4	4	263	4	91
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	521			501			1079	1025	496	1006	1010	502
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	521			501			1079	1025	496	1006	1010	502
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			92	98	99	0	98	84
cM capacity (veh/h)	1056			1074			164	236	578	215	241	574

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	4	501	0	521	21	263	95
Volume Left	4	0	0	0	13	263	0
Volume Right	0	10	0	39	4	0	91
cSH	1056	1700	1700	1700	203	215	542
Volume to Capacity	0.00	0.29	0.00	0.31	0.10	1.23	0.18
Queue Length 95th (m)	0.1	0.0	0.0	0.0	2.7	107.2	5.0
Control Delay (s)	8.4	0.0	0.0	0.0	24.7	181.1	13.0
Lane LOS	A				C	F	B
Approach Delay (s)	0.1		0.0		24.7	136.5	
Approach LOS					C	F	

Intersection Summary				
Average Delay	35.2			
Intersection Capacity Utilization	54.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	67	388	267	4	2	41
Future Volume (Veh/h)	67	388	267	4	2	41
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	73	422	290	4	2	45
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	294				860	292
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	294				860	292
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				99	94
cM capacity (veh/h)	1279				310	752

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	495	294	47
Volume Left	73	0	2
Volume Right	0	4	45
cSH	1279	1700	709
Volume to Capacity	0.06	0.17	0.07
Queue Length 95th (m)	1.5	0.0	1.7
Control Delay (s)	1.7	0.0	10.4
Lane LOS	A		B
Approach Delay (s)	1.7	0.0	10.4
Approach LOS			B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D

TDM Checklists

Introduction

The City of Ottawa's *Transportation Impact Assessment (TIA) Guidelines* (specifically Module 4.3—Transportation Demand Management) requires proponents of qualifying developments to assess the context, need and opportunity for transportation demand management (TDM) measures at their development. The guidelines require that proponents complete the City's **TDM Measures Checklist**, at a minimum, to identify any TDM measures being proposed.

The remaining sections of this document are:

- Using the Checklist
- Glossary
- TDM Measures Checklist: Non-Residential Developments
- TDM Measures 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

The City's *TIA Guidelines* are designed so that *Module 3.1—Development-Generated Travel Demand*, *Module 4.1—Development Design*, and *Module 4.2—Parking* are complete before a proponent begins *Module 4.3—Transportation Demand Management*.

Within Module 4.3, *Element 4.3.1—Context for TDM* and *Element 4.3.2—Need and Opportunity* are intended to create an understanding of the need for any TDM measures, and of the results they are expected to achieve or support. Once those two elements are complete, proponents begin *Element 4.3.3—TDM Program* that requires proponents to identify proposed TDM measures using the **TDM Measures Checklist**, at a minimum. The *TIA Guidelines* note that the City may require additional analysis for large or complex development proposals, or those that represent a higher degree of performance risk; as well, proponents proposing TDM measures for a new development must also propose an implementation plan that addresses planning and coordination, funding and human resources, timelines for action, performance targets and monitoring requirements.

This **TDM Measures Checklist** document includes two actual checklists, one for non-residential developments (office, institutional, retail or industrial) and one for residential developments (multi-family, condominium or subdivision). 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 TDM measures being proposed and provides additional detail on them, including an implementation plan as required by the City's *TIA Guidelines*.

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

- 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.

Glossary

This glossary defines and describes the following measures that are identified in the **TDM Measures Checklist**:

TDM program management
- Program coordinator
- Travel surveys

Parking
- Priced parking

Walking & cycling
- Information on walking/cycling routes & destinations
- Bicycle skills training
- Valet bike parking

Transit
- Transit information
- Transit fare incentives
- Enhanced public transit service
- Private transit service

Ridesharing
- Ridematching service
- Carpool parking price incentives
- Vanpool service

Carsharing & bikesharing
- Bikeshare stations & memberships
- Carshare vehicles & memberships

TDM marketing & communications
- Multimodal travel information
- Personalized trip planning
- Promotions

Other incentives & amenities
- Emergency ride home
- Alternative work arrangements
- Local business travel options
- Commuter incentives
- On-site amenities

For further information on selecting and implementing TDM measures (particularly as they apply to non-residential developments, with a focus on workplaces), readers may find it helpful to consult Transport Canada's *Workplace Travel Plans: Guidance for Canadian Employers*, which can be downloaded in English and French from the ACT Canada website at www.actcanada.com/resources/act-resources.

▶ *TDM program management*

While some TDM measures can be implemented with a minimum of effort through routine channels (e.g. parking or human resources), more complex measures or a larger development site may warrant assigning responsibility for TDM program coordination to a designated person either inside or outside the implementing organization. Similarly, some TDM measures are more effective if they are targeted or customized for specific audiences, and would benefit from the collection of related information.

Program coordinator. This person is charged with day-to-day TDM program development and implementation. Only in very large employers with thousands of workers is this likely to be a full-time, dedicated position. Usually, it is added to an existing role in parking, real estate, human resources or environmental management. In practice, this role may be called TDM coordinator, commute trip reduction coordinator or employee transportation coordinator. The City of Ottawa can identify external resources (e.g. non-profit organizations or consultants) that could provide these services.

Travel surveys. Travel surveys are most commonly conducted at workplaces, but can be helpful in other settings. They identify how and why people travel the way they do, and what barriers and opportunities exist for different behaviours. They usually capture the following information:

- *Personal data* including home address or postal code, destination, job type or function, employment status (full-time, part-time and/or teleworker), gender, age and hours of work
- *Commute information* including distance or time for the trip between home and work, usual methods of commuting, and reasons for choosing them
- *Barriers and opportunities* including why other commuting methods are unattractive, willingness to consider other options, and what improvements to other options could make them more attractive

▶ *Parking*

Priced parking. Charging for parking is typically among the most effective ways of getting drivers to consider other travel options. While drivers may not support parking fees, they can be more accepting if the revenues are used to improve other travel options (e.g. new showers and change rooms, improved bicycle parking or subsidized transit passes). At workplaces or daytime destinations, parking discounts (e.g. early bird specials, daily passes that cost significantly less than the equivalent hourly charge, monthly passes that cost significantly less than the equivalent daily charge) encourage long-term parking and discourage the use of other travel options. For residential uses, unbundling parking costs from dwelling purchase, lease or rental costs provides an incentive for residents to own fewer cars, and can reduce car use and the costs of parking provision.

▶ *Walking & cycling*

Active transportation options like cycling and walking are particularly attractive for short trips (typically up to 5 km and 2 km, respectively). Other supportive factors include an active, health-conscious audience, and development proximity to high-quality walking and cycling networks. Common challenges to active transportation include rain, darkness, snowy or icy conditions, personal safety concerns, the potential for bicycle theft, and a lack of shower and change facilities for those making longer trips.

Information on walking/cycling routes & destinations. Ottawa, Gatineau and the National Capital Commission all publish maps to help people identify the most convenient and comfortable walking or cycling routes.

Bicycle skills training. Potential cyclists can be intimidated by the need to ride on roads shared with motor vehicles. This barrier can be reduced or eliminated by offering cycling skills training to interested cyclists (e.g. CAN-BIKE certification courses).

Valet bike parking. For large events, temporary “valet parking” areas can be easily set up to maximize convenience and security for cyclists. Experienced local non-profit groups can help.

▶ *Transit*

Transit information. Difficulty in finding or understanding basic information on transit fares, routes and schedules can prevent people from trying transit. Employers can help by providing online links to OC Transpo and STO websites. Transit users also appreciate visible maps and schedules of transit routes that serve the site; even better, a screen that shows real-time transit arrival information is particularly useful at sites with many transit users and an adjacent transit stop or station.

Transit fare incentives. Free or subsidized transit fares are an attractive incentive for non-transit riders to try transit. Many non-users are unsure of how to pay a fare, and providing tickets or a preloaded PRESTO card (or, for special events, pre-arranging with OC Transpo that transit fares are included with event tickets) overcome that barrier.

Enhanced public transit service. OC Transpo may adjust transit routes, stop locations, service hours or frequencies for an agreed fee under contract, or at no cost where warranted by the potential ridership increase. Information provided by a survey of people who travel to a given development can support these decisions.

Private transit service. At remote suburban or rural workplaces, a poor transit connection to the nearest rapid transit station can be an obstacle for potential transit users, and an employer in this situation could initiate a private shuttle service to make transit use more feasible or attractive. Other circumstances where a shuttle makes sense include large special events, or a residential development for people with limited independent mobility who still require regular access to shops and services.

▶ *Ridesharing*

Ridesharing's potential is greatest in situations where transit ridership is low, where parking costs are high, and/or where large numbers of car commuters (e.g. employees or full-time students) live reasonably far from the workplace.

Ridematching service. Potential carpoolers in Ottawa are served by www.OttawaRideMatch.com, an online service to help people find carpool partners. Employers can arrange for a dedicated portal where their employees can search for potential carpool partners only among their colleagues, if they desire. Some very large employers may establish internal ridematching services, to maximize employee uptake and corporate control. Ridematching service providers typically include a waiver to relieve employers of liability when their employees start carpooling through a ridematching service. Ridesharing with co-workers also tends to eliminate security concerns.

Carpool parking price incentives. Discounted parking fees for carpools can be an extra incentive to rideshare.

Vanpool service. Vanpools operate in the Toronto and Vancouver metropolitan areas, where vans that carry up to about ten occupants are driven by one of the vanpool members. Vanpools tend to operate on a cost-recovery basis, and are most practical for long-distance commutes where transit is not an option. Current legislation in Ontario does not permit third-party (i.e. private or non-profit) vanpool services, but does permit employers to operate internal vanpools.

▶ *Carsharing & bikesharing*

Bikeshare station & memberships. VeloGO Bike Share and Right Bike both operate bikesharing services in Ottawa. Developments that would benefit from having a bikeshare station installed at or near their development may negotiate directly with either service provider.

Carshare vehicles & memberships. VRTUCAR and Zipcar both operate carsharing services in Ottawa, for use by the general public or by businesses as an alternative to corporate fleets. Carsharing services offer 24-hour access, self-serve reservation systems, itemized monthly billings, and outsourcing of all financing, insurance, maintenance and administrative responsibilities.

▶ *TDM marketing & communications*

Multimodal travel information. Aside from mode-specific information discussed elsewhere in this document, multimodal information that identifies and explains the full range of travel options available to people can be very influential—especially when provided at times and locations where individuals are actively choosing among those options. Examples include: employees when their employer is relocating, or when they are joining a new employer; students when they are starting a program at a new institution; visitors or customers travelling to an unfamiliar destination, or when faced with new options (e.g. shuttle services or parking restrictions); and residents when they purchase or occupy a residence that is new to them.

Personalized trip planning. As an extension to the simple provision of information, this technique (also known as *individualized marketing*) is effective in helping people make more sustainable travel choices. The approach involves identifying who is most likely to change their travel choices (notably relocating employees, students or residents) giving them customized information, training and incentives to support them in making that change. It may be conducted with assistance from an external service provider with the necessary skills, and delivered in a variety of settings including workplaces and homes.

Promotions. Special events and incentives can raise awareness and encourage individuals to examine and try new travel options.

- *Special events* can help attract attention, build participation and celebrate successes. Events that have been held in Ottawa include Earth Day (in April) Bike to Work Month (in May), Environment Week (early June), International Car Free Day (September 22), and Canadian Ridesharing Week (October). At workplaces or educational institutions, similarly effective internal events could include workshops, lunch-and-learns, inter-departmental challenges, pancake breakfasts, and so on.
- *Incentives* can encourage trial of sustainable modes, and might include loyalty rewards for duration or consistency of activity (e.g. 1,000 km commuted by bicycle), participation prizes (e.g. for completing a survey or joining a special event), or personal recognition that highlights individual accomplishments.

▶ *Other incentives & amenities*

Emergency ride home. This measure assures non-driving commuters that they will be able to get home quickly and conveniently in case of family emergency (or in some workplaces, in case of unexpected overtime, severe weather conditions, or the early departure of a carpool driver) by offering a chit or reimbursement for taxi, carshare or rental car usage. Limits on annual usage or cost per employee may be set, although across North America the actual rates of usage are typically very low.

Alternative work arrangements. A number of alternatives to the standard 9-to-5, Monday-to-Friday workweek can support sustainable commuting (and work-life balance) at workplaces:

- *Flexible working hours* allow transit commuters to take advantage of the fastest and most convenient transit services, and allow potential carpoolers to include people who work slightly different schedules in their search for carpool partners. They also allow active commuters to travel at least one direction in daylight, either in the morning or the afternoon, during the winter.
- *Compressed workweeks* allow employees to work their required hours over fewer days (e.g. five days in four, or ten days in nine), eliminating the need to commute on certain days. For employees, this can promote work-life balance and gives flexibility for appointments. For employers, this can permit extended service hours as well as reduced parking demands if employees stagger their days off.
- *Telework* is a normal part of many workplaces. It helps reduce commuting activity, and can lead to significant cost savings through workspace sharing. Telework initiatives involve many stakeholders, and may face as much resistance as support within an organization. Consultation, education and training are helpful.

Local business travel options. A common obstacle for people who might prefer to not drive to work is that their employer requires them to bring a car to work so they can make business trips during the day. Giving employees convenient alternatives to private cars for local business travel during the workday makes walking, cycling, transit or carpooling in someone else's car more practical.

- *Walking and cycling*—Active transportation can be a convenient and enjoyable way to make short business trips. They can also reduce employer expenses, although they may require extra travel time. Providing a fleet of shared bikes, or reimbursing cyclists for the kilometres they ride, are inexpensive ways to validate their choice.
- *Public transit*—Transit can be convenient and inexpensive compared to driving. OC Transpo's PRESTO cards are transferable among employees and automatically reloadable, making them the perfect tool for enabling transit use during the day.
- *Ridesharin*g—When multiple employees attend the same off-site meeting or event, they can be reminded to carpool whenever possible.
- *Taxis or ride-hailing*—Taxis and ride-hailing can eliminate parking costs, save time and eliminate collision liability concerns. Taxi chits eliminate cash transactions and minimize paperwork.
    - *Fleet vehicles or carsharing*—Fleet vehicles can be cost-effective for high travel volumes, while carsharing is a great option for less frequent trips.
    - *Interoffice shuttles*—Employers with multiple worksites in the region could use a shuttle service to move people as well as mail or supplies.
    - *Videoconferencing*—New technologies mean that staying in the office to hold meetings electronically is more viable, affordable and productive than ever.

Commuter incentives. Financial incentives can help create a level playing field and support commuting by sustainable modes. A "commuting allowance" given to all employees as a taxable benefit is one such incentive; employees who choose to drive could then be charged for parking, while other employees could use the allowance for transit fares or cycling equipment, or for spending or saving. (Note that in the United States this practice is known as "parking cash-out," and is popular because commuting allowances are not taxable up to a certain limit). Alternatively, a monthly commuting allowance for non-driving employees would give drivers an incentive to choose a different commuting mode. Another practical incentive for active commuters or transit users is to offer them discounted "rainy day" parking passes for a small number of days each month.

On-site amenities. Developments that offer services to limit employees' need for a car during their commute (e.g. to drop off clothing at the dry cleaners) or during their workday (e.g. to buy lunch) can free employees to make the commuting decision that otherwise works best for them.

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

		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)*	☒ Routes and maps will be displayed inside buildings.
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐
	3.	**TRANSIT**	
	3.1	**Transit information**	
BASIC	3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☒ Routes and maps will be displayed inside the long term care and retirement homes
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	☐
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)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☒ Client will contract with provider to install on-site car share vehicles.
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)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☐
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☒ Information package will be provided to staff members.
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

TDM Measures Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

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: *Non-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	☒ Travel surveys will be undertaken annually.
	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	☒ Routes and maps will be displayed in workplaces
	2.2	**Bicycle skills training**	
		Commuter travel	
BETTER ★	2.2.1	Offer on-site cycling courses for commuters, or subsidize off-site courses	☐
	2.3	**Valet bike parking**	
		Visitor travel	
BETTER	2.3.1	Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	☐

			TDM measures: *Non-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	☒ Schedules will be displayed inside workplaces.
BASIC		3.1.2	Provide online links to OC Transpo and STO information	☒ Flyers will be available, pointing employees to links.
BETTER		3.1.3	Provide real-time arrival information display at entrances	☐
		3.2	**Transit fare incentives**	
			Commuter travel	
BETTER		3.2.1	Offer preloaded PRESTO cards to encourage commuters to use transit	☐
BETTER	★	3.2.2	Subsidize or reimburse monthly transit pass purchases by employees	☒ Transit ridership will be encouraged through subsidies.
			Visitor travel	
BETTER		3.2.3	Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	☐
		3.3	**Enhanced public transit service**	
			Commuter travel	
BETTER		3.3.1	Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.3.2	Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	☐
		3.4	**Private transit service**	
			Commuter travel	
BETTER		3.4.1	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.4.2	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		4.	**RIDESHARING**	
		4.1	**Ridematching service**	
			Commuter travel	
BASIC	★	4.1.1	Provide a dedicated ridematching portal at OttawaRideMatch.com	☐
		4.2	**Carpool parking price incentives**	
			Commuter travel	
BETTER		4.2.1	Provide discounts on parking costs for registered carpools	☐
		4.3	**Vanpool service**	
			Commuter travel	
BETTER		4.3.1	Provide a vanpooling service for long-distance commuters	☐
		5.	**CARSHARING & BIKESHARING**	
		5.1	**Bikeshare stations & memberships**	
BETTER		5.1.1	Contract with provider to install on-site bikeshare station for use by commuters and visitors	☒ Cycling mode share will be increased by providing a bikeshare station on-site
			Commuter travel	
BETTER		5.1.2	Provide employees with bikeshare memberships for local business travel	☒ Businesses can provide employees with memberships at a subsidized cost.
		5.2	**Carshare vehicles & memberships**	
			Commuter travel	
BETTER		5.2.1	Contract with provider to install on-site carshare vehicles and promote their use by tenants	☐
BETTER		5.2.2	Provide employees with carshare memberships for local business travel	☐
		6.	**PARKING**	
		6.1	**Priced parking**	
			Commuter travel	
BASIC	★	6.1.1	Charge for long-term parking (daily, weekly, monthly)	☐
BASIC		6.1.2	Unbundle parking cost from lease rates at multi-tenant sites	☒ This will encourage lower car ownership while not discouraging visitors.
			Visitor travel	
BETTER		6.1.3	Charge for short-term parking (hourly)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		7.	**TDM MARKETING & COMMUNICATIONS**	
		7.1	**Multimodal travel information**	
			Commuter travel	
BASIC	★	7.1.1	Provide a multimodal travel option information package to new/relocating employees and students	☒ Package to be provided to new employees.
			Visitor travel	
BETTER	★	7.1.2	Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	☐
		7.2	**Personalized trip planning**	
			Commuter travel	
BETTER	★	7.2.1	Offer personalized trip planning to new/relocating employees	☐
		7.3	**Promotions**	
			Commuter travel	
BETTER		7.3.1	Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	☐
		8.	**OTHER INCENTIVES & AMENITIES**	
		8.1	**Emergency ride home**	
			Commuter travel	
BETTER	★	8.1.1	Provide emergency ride home service to non-driving commuters	☐
		8.2	**Alternative work arrangements**	
			Commuter travel	
BASIC	★	8.2.1	Encourage flexible work hours	☐
BETTER		8.2.2	Encourage compressed workweeks	☐
BETTER	★	8.2.3	Encourage telework	☐
		8.3	**Local business travel options**	
			Commuter travel	
BASIC	★	8.3.1	Provide local business travel options that minimize the need for employees to bring a personal car to work	☐
		8.4	**Commuter incentives**	
			Commuter travel	
BETTER		8.4.1	Offer employees a taxable, mode-neutral commuting allowance	☐
		8.5	**On-site amenities**	
			Commuter travel	
BETTER		8.5.1	Provide on-site amenities/services to minimize mid-day or mid-commute errands	☒ On-site commercial facilities will be provided.