Transportation Impact Assessment

4836 Bank Street

Prepared for Leitrim Home Hardware
by IBI Group
April 12, 2019

TIA Plan Reports - Certification

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

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

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

CERTIFICATION

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

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

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

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

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

Dated at Ottawa this 12th day of April, 2019.
(City)

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1 Introduction

IBI Group (IBI) was retained by Leitrim Home Hardware to undertake a Transportation Impact Assessment (TIA) in support of the zoning bylaw amendment application for 4836 Bank Street, Ottawa.

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

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

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

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

2 TIA Screening

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

- **Trip Generation**: Based on the magnitude of the proposed development, the site is expected to generate traffic in the order of 59 and 79 net new auto trips during the weekday peak morning and afternoon peak hours, respectively. With consideration of the proposed land use and the documented modal share for the local area, the proposed development is expected to exceed the 60 person trip threshold during the weekday peak hours and therefore the Trip Generation trigger is satisfied.
- **Location**: The proposed development will not be located in a Design Priority Area or Transit Oriented Development; however, it will be accessed from a boundary street that is a Spine Bicycle route. The Location trigger is therefore satisfied.
- **Safety**: Boundary street conditions were reviewed to determine if there is an elevated potential for safety concerns adjacent the site. As the proposed development will access Bank Street, an arterial roadway with a posted speed limit of 80 km/h, there may be potential for safety concerns and therefore the Safety trigger is satisfied.

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

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

3 Project Scoping

3.1 Description of Proposed Development

3.1.1 Site Location

The proposed development is located at 4836 Bank Street within the Leitrim Community, approximately 450 metres south of Blais Road. The property is approximately 2.5 hectares in size, and is bounded by Bank Street to the east, a new east-west collector road to the north (Dun Skipper Drive), and undeveloped greenfield lands to the west and south.

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

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4836 Bank Street
Transportation Impact Assessment

Exhibit 1:
Site Location

Project No. 119351
Date: March 2019
Scale: 0m 40m 80m

3.1.2 Land Use Details

The proposed development is indicated in **Exhibit 2**. The land is currently the location of the Leitrim Home Hardware, and is zoned as Rural Commercial within the Official Plan Amendment (OPA) 8a. The proposed development will consist of hotel, hardware and commercial land uses, as shown in **Table 1**.

Table 1 – Land Use Statistics

LAND USE	BUILDING	UNITS/ GROSS FLOOR AREA (GFA)
Hardware Store (incl. Drive-Thru Shed)	Building 'A'	2,997 m^2
Hotel	Building 'B'	Approx. 125 Suites
Restaurant (incl. Drive-Thru Facility)	Building 'C'	502 m^2
Commercial	Building 'D'	987 m^2

The Home Hardware is expected to be built and occupied by 2021, while the remainder of the site is expected to be built and occupied by 2023.

3.1.3 Site Layout

The proposed development will provide a total of 280 surface parking stalls including 11 accessible spaces and 14 oversized spaces.

The development will be served by two private approaches: an all-movements access proposed off of Dun Skipper Drive along the northern limits of the property, as well as a right-in/ right-out access proposed off of Bank Street along the eastern limits of the property.

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

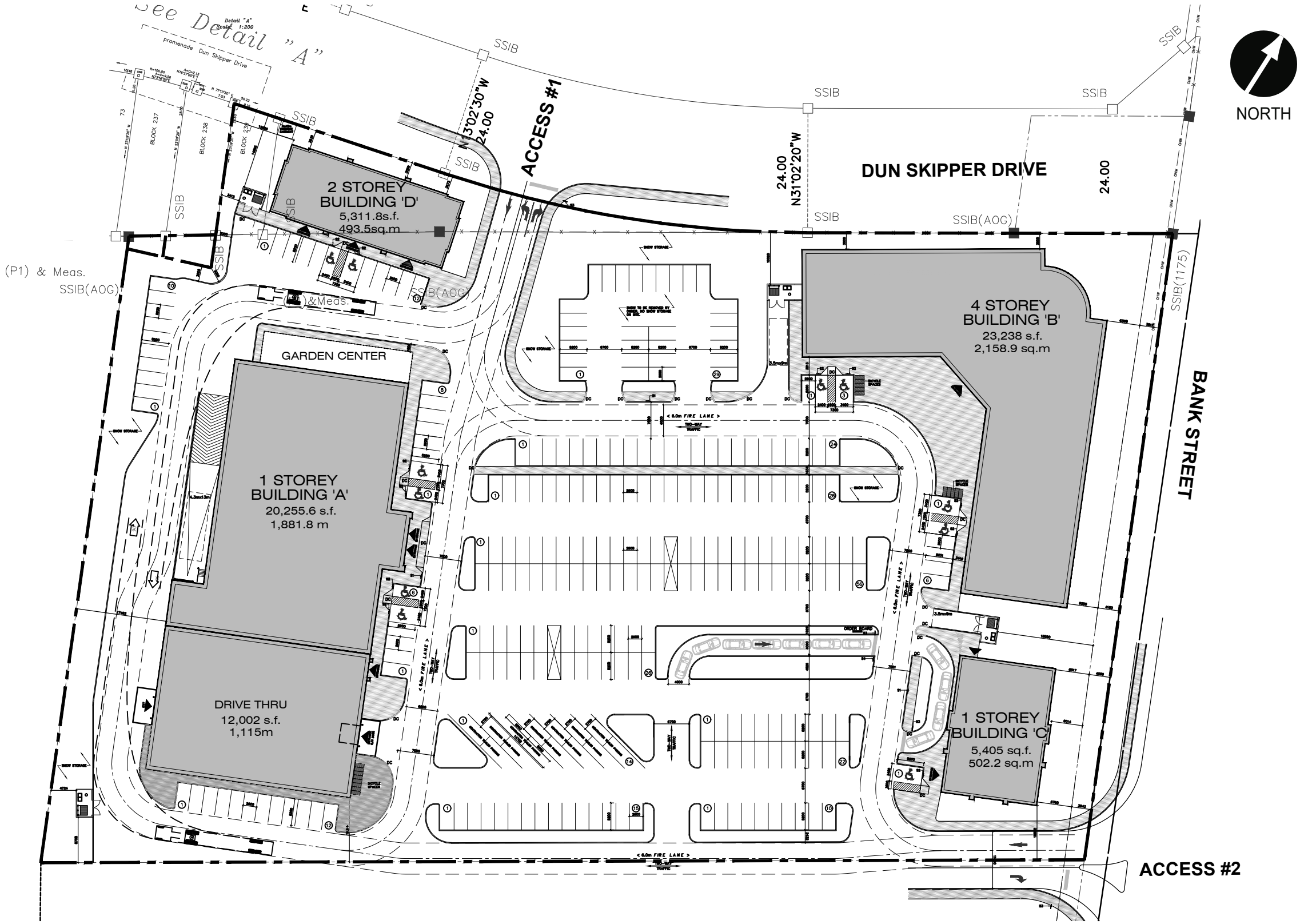

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Exhibit 2: Proposed Development

Project No. 119351
Date: April 2019
Scale:

0m 20m 60m

3.2 Existing Conditions

3.2.1 Existing Road Network

3.2.1.1 Roadways

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

- **Bank Street** is an arterial road under the jurisdiction of the City of Ottawa that extends from Wellington Street in Ottawa's Central Business District (CBD) in the north to Ottawa City limits in the south, where it turns into Highway 31. Within the vicinity of the subject site, Bank Street has a two-lane undivided cross-section, a posted speed limit of 80 km/h and a ROW protection of 44.5 m; Bank Street is divided north of Findlay Creek Centre Access and undivided south of Findlay Creek Centre Access.

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

- **Blais Road** is a two-lane rural collector road under the jurisdiction of the City of Ottawa that presently extends from Bank Street in the west to Hawthorne Road in the east. Within the vicinity of the subject site, Blais Road has a 26m ROW protection and a 50km/h posted speed limit.

3.2.1.2 Intersections

The following existing intersection has the greatest potential to be impacted by the proposed development:

- Bank Street and Blais Road

The existing intersection control and lane configurations for the above noted intersection are shown in **Exhibit 3**.

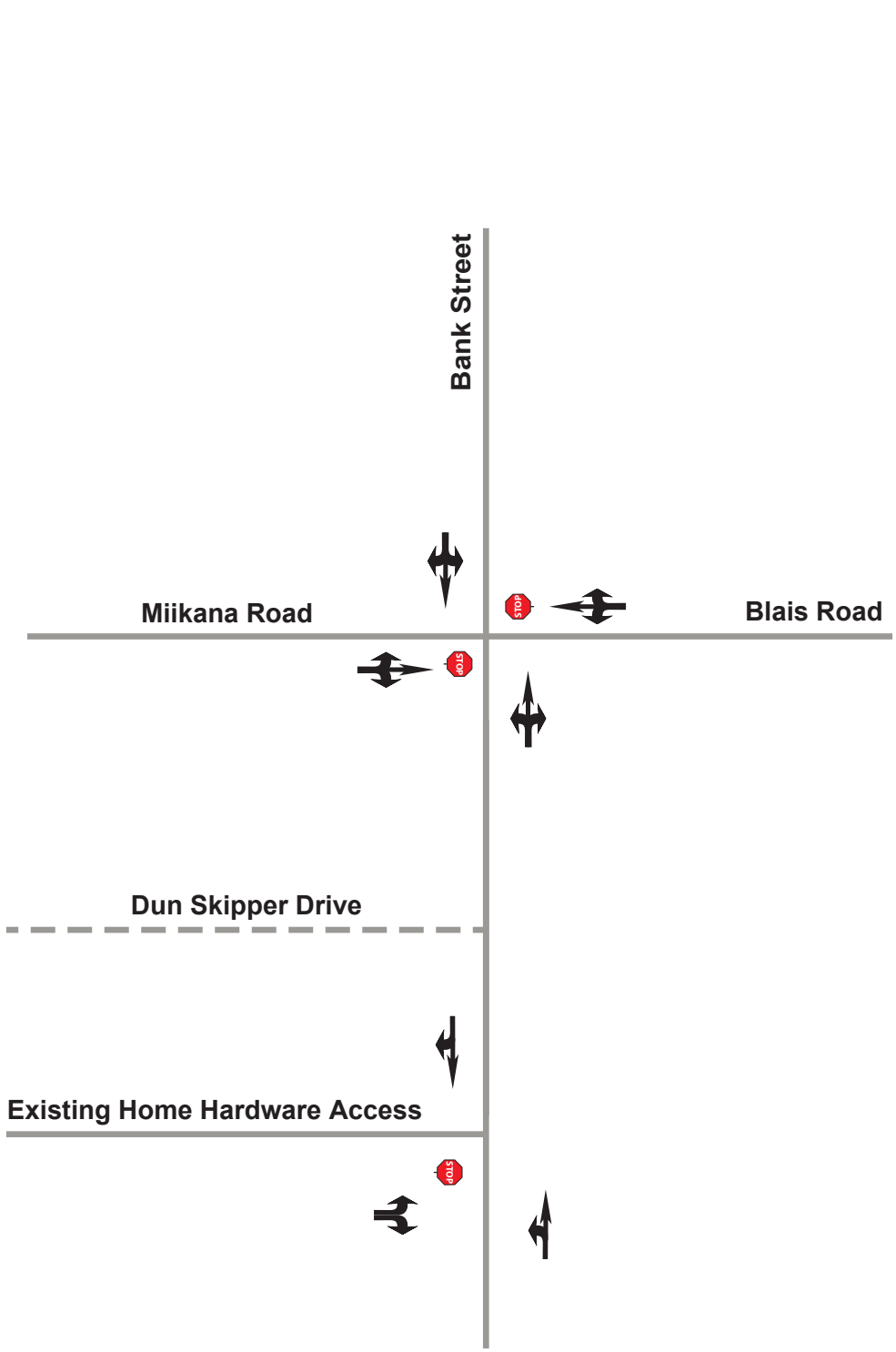
Other notable existing intersections or private approaches within 200 metres of the site that may impact traffic operations in the vicinity of the proposed access driveways are as follows:

- An all-movements private approach at 4835 Bank Street, approximately 60m north of the proposed development's Bank Street access services the Hindu Temple. This access is located on the east side of Bank Street, and contributes negligible traffic volumes to the adjacent road network during the weekday AM and PM peak hours.
- There are private approaches on the east side of Bank Street providing access to two single-family homes located approximately 60m and 85m south of the proposed development's Bank Street access.
- All-movements private approaches for a used car dealership and auto repair shop exist 180m and 200m south of the proposed development, respectively.

None of the existing private approaches noted above are expected to be negatively impacted by traffic generated from the proposed development.

3.2.1.3 Traffic Management Measures

There are currently no existing traffic management or traffic calming measures on the boundary streets within the vicinity of the proposed development.



LEGEND

- Travel Lanes and Permitted Movements
- Stop Control
- Existing Road
- New Road

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Exhibit 3:
Exsiting Lane Configurations and Intersection Control

Project No. 119351
Date: April 2019
Scale: N.T.S.

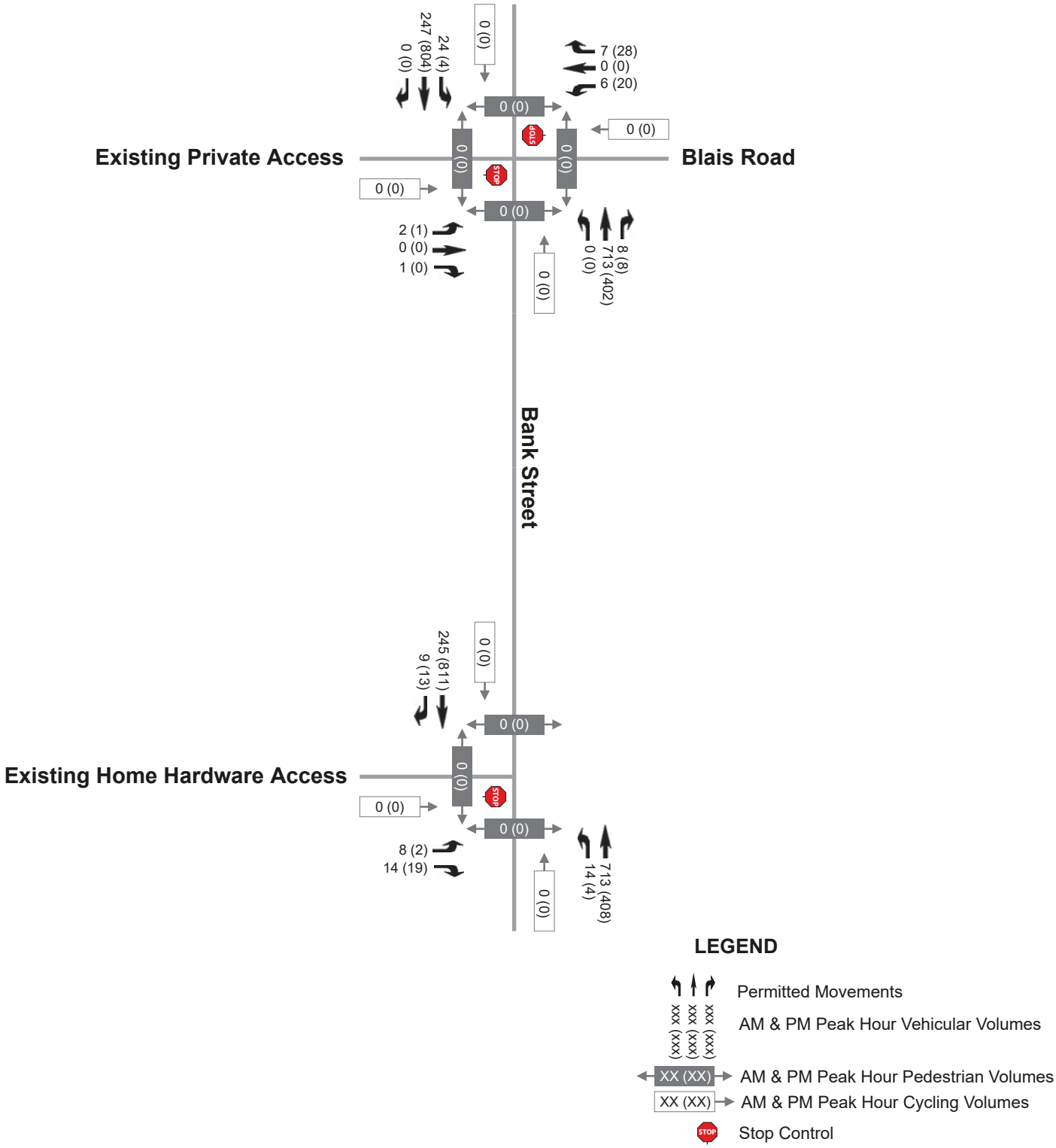
3.2.1.4 Existing Traffic Volumes

Weekday morning and afternoon peak hour turning movement counts were therefore obtained from the City of Ottawa at the following intersections within close proximity to the site, and supplemented with field counts where necessary:

- Bank Street and Blais Road (IBI Group – Wednesday, January 27, 2016)
- Bank Street and Home Hardware Access (IBI Group – Tuesday, December 11, 2018)

A growth rate was applied to the above noted turning movement count data where appropriate to approximate existing (2019) traffic volumes. Justification of background growth rates is discussed further in the Forecasting section of this report.

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



4836 Bank Street
Transportation Impact Assessment

Exhibit 4:
Existing (2019) Traffic

PROJECT No. 119351
DATE: April 2019
N.T.S.

3.2.2 Existing Bicycle and Pedestrian Facilities

Paved shoulders are provided along both sides of Bank Street within the broader study area in lieu of formal pedestrian or cycling facilities.

3.2.3 Existing Transit Facilities and Service

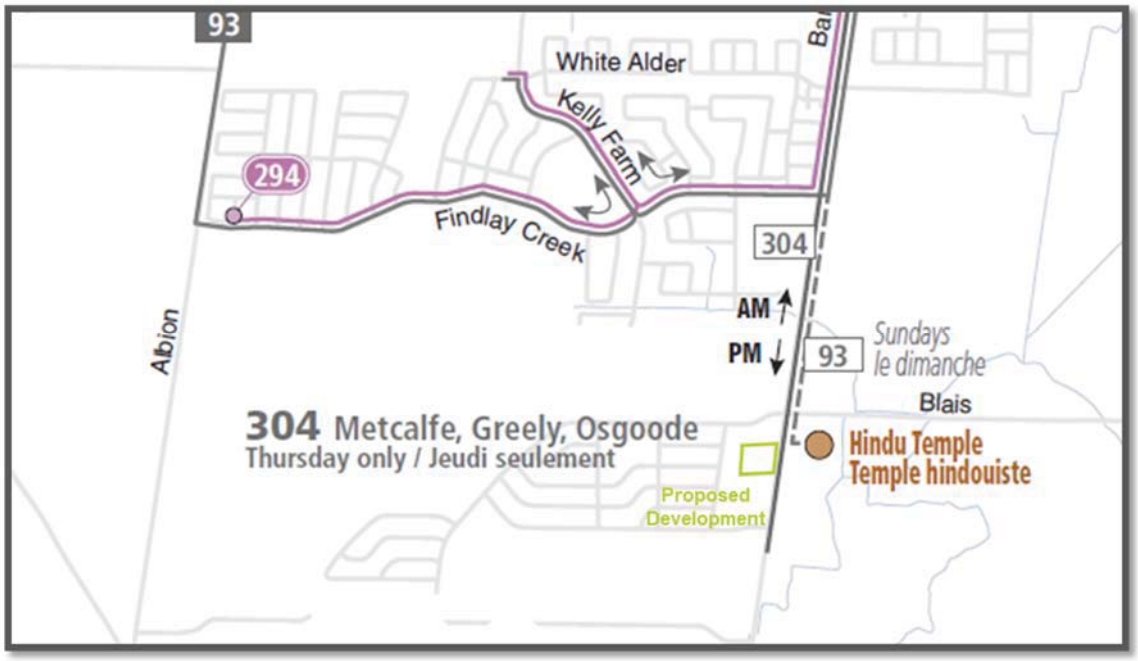
The following transit routes, operated by OC Transpo, exist within the vicinity of the site:

- **Route 93** Leitrim/ Greenboro is a regular/all-day service route with 20-minute headways during afternoon peak hours and 30 minute headways during off-peak hours. The bus service is provided from Greenboro Station to Leitrim Station via South Keys Station, Bridge Path Drive, Queensdale Avenue, Conroy Road, Bank Street, and Kelly Farm Drive. Points of interest along this route include South Keys Shopping Centre, Fred G. Barrett Arena and Gloucester South Community Centre. On Sundays, service is extended south of Findlay Creek Drive to coincide with the peak hour of worship for the existing Hindu Temple of Ottawa Carleton.
- **Route 304** South Keys/ Greely Metcalfe is a rural shopper's bus that operates once a week on Thursdays to provide the rural communities of Osgoode, Metcalfe and Greely access to major shopping centres located at Billings Bridge and South Keys. Service to these shopping districts within the Leitrim Community is provided at approximately 9:40am, with a return bus scheduled for 2:50pm.

The nearest bus stop is presently located approximately 60m south of the proposed site access location, which services both of the above noted transit routes.

The existing transit network within the vicinity of the proposed development is illustrated in **Figure 1**. Transit service maps for the individual routes above are provided in **Appendix D**.

Figure 1 – Existing Transit Service



3.2.4 Collision History

A review of historical collision data has been reviewed for the road network surrounding the proposed development. The TIA Guidelines require a safety review if at least six collisions for any

one movement or of a discernible pattern, over a five year period have occurred. **Table 2** summarizes all reported collisions between January 1, 2013 and January 1, 2018.

Table 2 – Reported Collisions within Vicinity of Proposed Development

LOCATION	# OF REPORTED COLLISIONS	RE-OCCURING EVENTS
Bank and Blais	5	• Southbound Rear End Collision: 4 similar events
Bank – Blais to 1km south	10	• Northbound Rear End Collision: 2 similar events • Southbound Rear End Collision: 6 similar events

Based on the collision history noted above, the segment of Bank Street between Blais Road to one kilometre south warrants further analysis which will be reviewed in subsequent sections of this report.

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

3.3 Planned Conditions

3.3.1 Transportation Network

3.3.1.1 Future Road Network Projects

The 2013 Transportation Master Plan (TMP) has established a Road Network Concept Plan for Ottawa which includes future road infrastructure projects that will be required to support the City's growth projections and travel behaviour targets by 2031.

The TMP has also identified an Affordable Network, as shown in **Figure 2**, which is a made up of a subset of projects in the Network Concept Plan that can be realistically constructed by 2031, given restrictions of funds that are expected during this period.

Figure 2 - Future Road Network Projects

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

According to the TMP, Phase 2 involves widening Bank Street from 2 lanes to 4 lanes from Leitrim Road to Blais Road/ Urban Boundary and Phase 3 will widen Bank Street from 2 lanes to 4 lanes further south to Rideau Road. The Bank Street Widening aims to provide capacity for future travel and address pedestrian and cycling facilities. Accommodations for pedestrians will be in the form of sidewalks and for cyclists, a set of multi-use pathways within the Greenbelt and paved shoulder that will be separate from the travel lane by use of a rumble strip within the rural area.

The Bank Street Widening Class Environmental Assessment Study (Bank Street EA) triggered an update to the staging of recommended modifications in the TMP. These changes have been summarized in **Table 3**.

Table 3 – Staging of Recommended Modifications in the Bank Street EA

Road/ PHASING	Project Details
Phase 2: 2020–2025	
Bank Street	Widen Bank Street from 2 to 4 lanes from Leitrim Road to Findlay Creek Drive including widening Leitrim Road to 4-lanes through the intersection.
Phase 3: 2026–2031	
Bank Street	Widen Bank Street from Findlay Creek Drive to south of Blais Road/ the Urban Boundary from 2 to 4 lanes.
Beyond 2031	
Bank Street	Widen Bank Street from south of the Urban Boundary to Rideau Road from 2 to 4 lanes, including a two-way left turn lane within the rural area. Widen Bank Street to 6 lanes through the Leitrim Road intersection.

The 2014 Development Charge Bylaw identified funds would be available in 2020–2021 for the widening of Bank Street between Leitrim Road and south of Findlay Creek Drive. However, the City has since indicated that based on their latest budgetary forecast, these funds will not be available until 2025. Therefore, it will be assumed in this study that the Phase 2 will be postponed until Phase 3 (2026 to 2031), as defined in the TMP.

It should be noted that the detailed design for the Bank Street Widening indicate changes to the limits for Phase 3 (Findlay Creek Drive changed to Findlay Creek Centre Access) from what was previously stated in the Bank Street EA. **Table 4** includes the updated Bank Street Widening Stages based on discussions with City staff.

Table 4 - Staging of Recommended Modifications Based on Discussion with City Staff

PHASING	PROJECT DETAILS
Phase 1: 2019	
Bank Street	• Bank Street and Leitrim Road intersection upgrades will be targeted for completion based on the Leitrim MTS recommendations. Leitrim will be widened from 2 lanes to 4 lanes at the intersection, with double left-turn lanes. Bank Street will receive a dedicated right turn lane in the northbound direction and paved shoulders on both sides. • Interim intersection designs will be constructed along Bank Street at Findlay Creek, Findlay Creek Centre, Miikana/Blais and Dun Skipper.
Phase 3: 2026–2031	
Bank Street	• Widening Bank Street from 2 to 4 lanes from Leitrim Road to Findlay Creek Centre Access. • Widening Bank Street from Findlay Creek Centre Access to south of Blais Road/ Urban Boundary from 2 to 4 lanes. Widen Bank Street to 6 lanes through the intersection of Bank Street and Leitrim Road.
Beyond 2031	
Bank Street	• Widen Bank Street from south of the Urban Boundary to Rideau Road from 2 to 4 lanes, including a two-way left turn lane within the rural area. Widen Bank Street to 6 lanes through the Leitrim Road intersection.

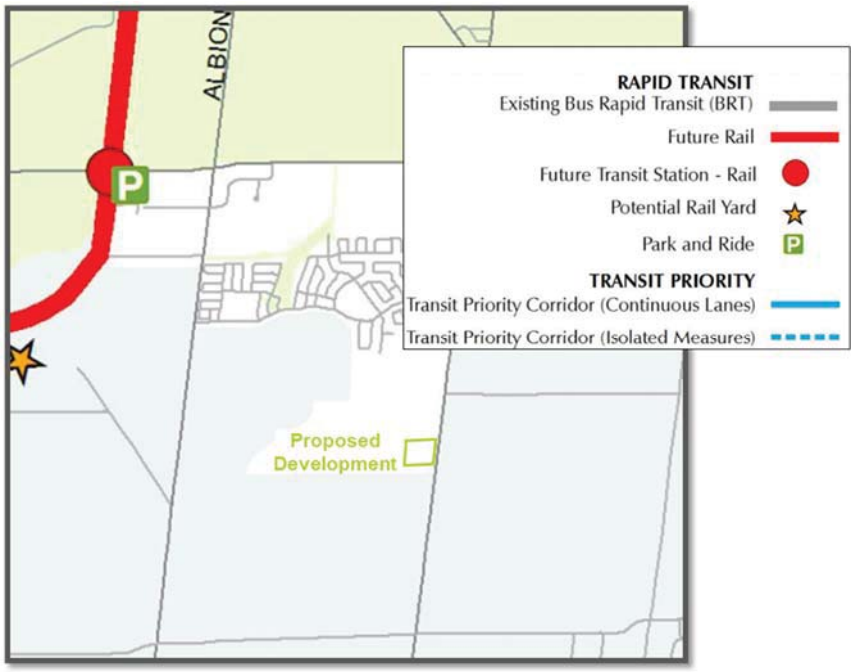
3.3.1.2 Future Transit Facilities and Services

As indicated in the TMP's 2031 Affordable Network there are no transit facilities proposed within the vicinity of the subject property.

It is expected that existing transit routes will be extended south along Bank Street to serve both Miikana and Dun Skipper. Both roads will include the typical 24 m ROW protection that is minimum requirement for OC Transpo transit service. The details of OC Transpo transit service shall be developed in consultation with OC Transpo staff during the approvals process for the adjacent subdivision developments.

Figure 3 shows the transit infrastructure projects in the vicinity of the proposed development that are part of the 2031 Affordable Network.

Figure 3 - Future 'Affordable RTTP Network Projects'



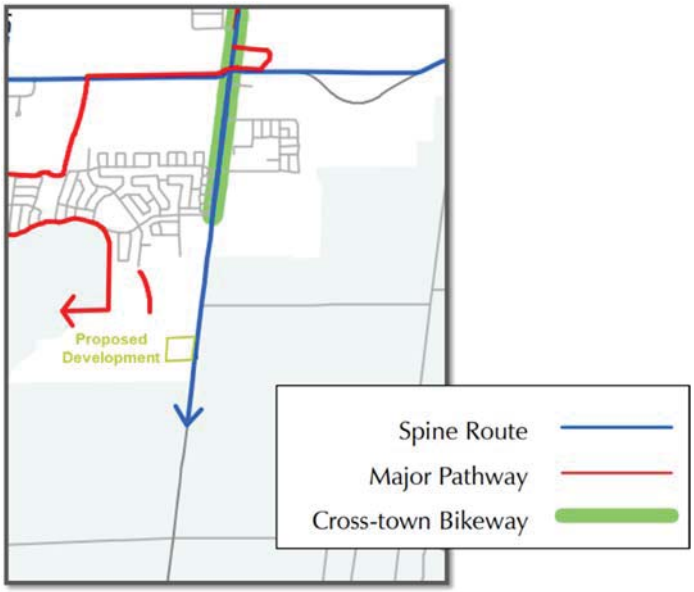
Source: 2013 Transportation Master Plan – Map 5 '2031 Affordable Network'

3.3.1.3 Future Cycling and Pedestrian Facilities

The Bank Street EA addresses active transportation needs through the implementation of formal cycling and pedestrian facilities. Accommodations for pedestrians will be in the form of sidewalks. For cyclists, paved shoulders along Bank Street will be implemented as part of the interim design and grade-separated cycle tracks are planned as part of the ultimate redesign of Bank Street.

Figure 4 shows the future cycling connections within the vicinity of the subject site.

Figure 4 – Cycling Connections



Source: 2013 Transportation Master Plan – Map 1 'Primary Urban'

3.3.2 Future Adjacent Developments

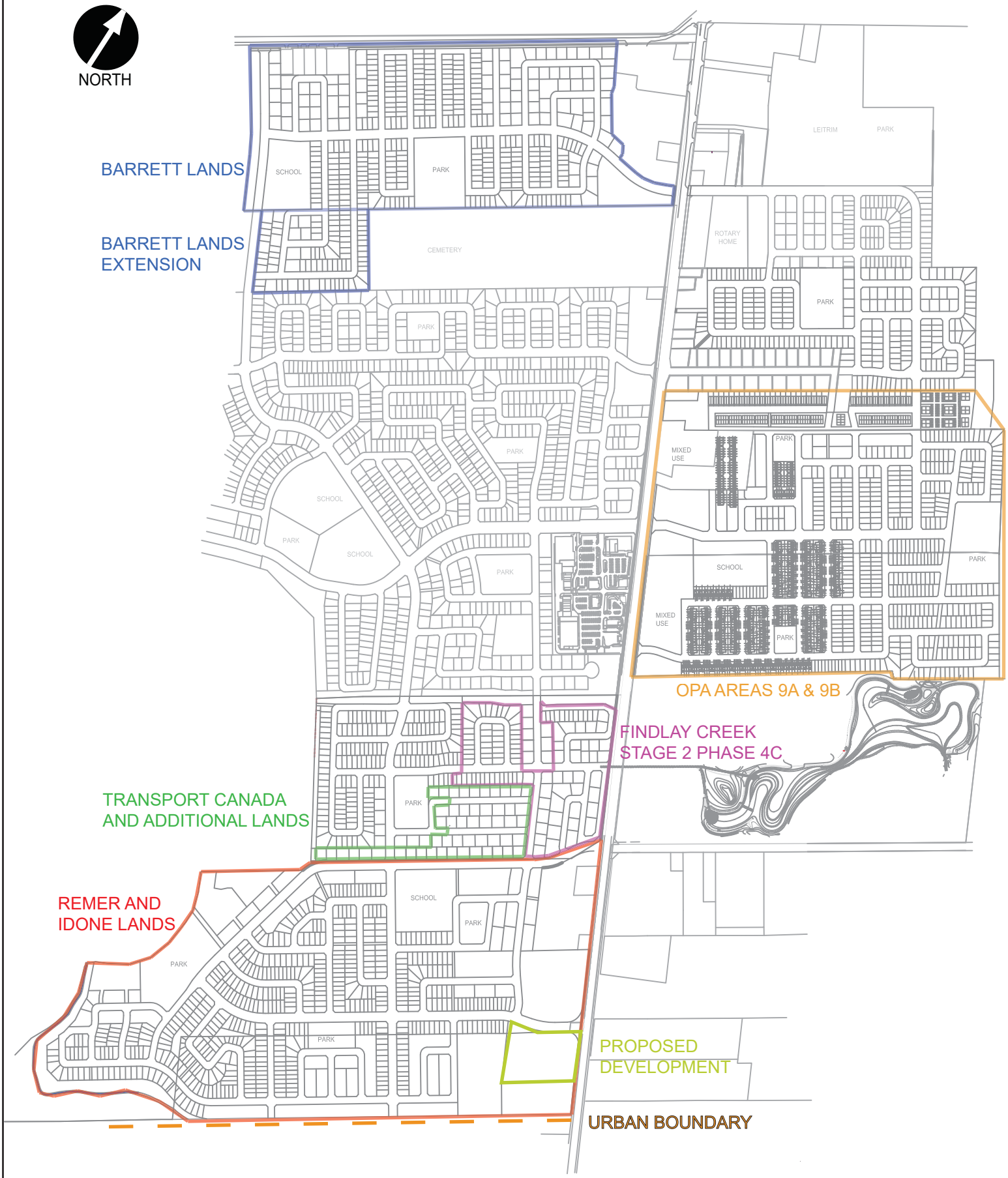
The City of Ottawa Transportation Impact Assessment (TIA) Guidelines specify that all significant developments proposed within the surrounding area which are likely to occur within the study's horizon year must be identified and taken into consideration in the development of future background traffic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

In 2017, a Master Transportation Study was undertaken by IBI Group for the Leitrim Community (Leitrim MTS), which considered the cumulative impact of all development lands within the Bank Street corridor.

Future adjacent developments included in the Leitrim MTS are shown in **Exhibit 5** and are described in **Table 5**. The buildout dates have been adjusted to reflect development that has occurred since the completion of the MTS.

Table 5 – Adjacent Developments

DEVELOPMENT NAME	LAND USE	GLA/ DWELLING UNITS	EXPECTED BUILD-OUT/ OCCUPANCY DATE
Remaining Findlay Creek	Residential	152	2025
Remaining Lemay and Sundance	Residential	158	mid-2019
Transport Canada	Residential	231	2029
Findlay Creek Stage 2 Phase 4C	Residential	240	mid-2019
Remer and Idone	Residential	1,155	2029
	Commercial	24,188 m^2	2022
Barrett Lands	Residential	797	2029
Barrett Lands Extension	Residential	150	2022
OPA 76 Area 9a and 9b	Residential	1,319	2029
	Commercial	15,450 m^2	2022



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4836 Bank Street
Transportation Impact Assessment

Exhibit 5:
Adjacent Developments

Project No. 119351
Date: April 2019
Scale: -100m 0 200m

3.3.3 Network Concept Screenline

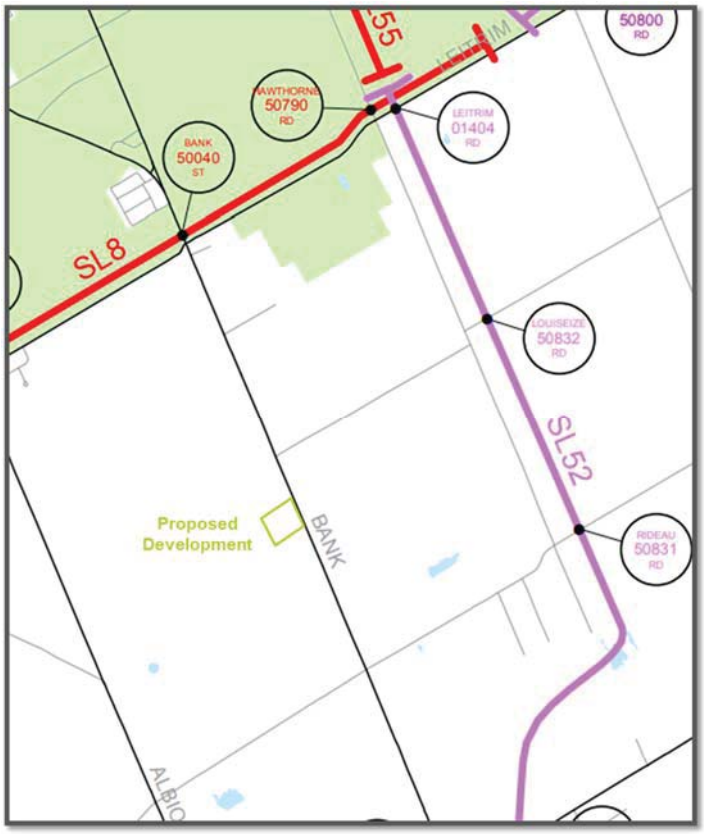
A screenline is a predetermined boundary between areas of major traffic generation that captures all significant points of entry from one area to another to compare crossing demand with the available roadway capacity. Screenlines are typically located along geographical barriers such as rivers, rail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

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

- **SL8 – Leitrim** – This is the nearest east/west screenline to the north of the study area. It is located just north of Leitrim Road and runs from east of Hawthorne Road to just east of Limebank Road, transitioning to a north/south screenline travelling east of Limebank Road before terminating at the intersection of Limebank and River Road. This screenline has three crossing points immediately north of Leitrim Road at Hawthorne Road, Bank Street and Albion Road, as well as an additional crossing point at River Road where Limebank Road transitions to Riverside Drive.
- **SL52 – Hawthorne (South)** – This is the nearest north/south screenline to the study area, and it is located east, parallel along Hawthorne Road from just north of Leitrim Road to just south of Mitch Owens. It has four crossing points: Leitrim Road, Louiseize Road, Rideau Road and Mitch Owens Road.

SL8 and SL52 are shown in **Figure 5**, as determined from the City of Ottawa's Road Network Development Report (2013), a supporting document to the 2013 Transportation Master Plan (TMP).

Figure 5 – Screenlines



3.4 Study Area

Based on a review of the information presented thus far, a study area bound by Blais Road to the north, Bank Street to the east and the southern limit of the proposed development will provide a sufficient assessment of the development's impact on the adjacent transportation network.

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

- Bank Street and Blais Road
- Bank Street and Dun Skipper Drive (future intersection)

Multi-modal Level of Service will be conducted for all signalized intersections within the study area, as well as Bank Street between Blais Road and the southern limit of the development and Dun Skipper Drive fronting the proposed development.

It is expected that the traffic generated by the proposed development will have only a marginal impact on the traffic volumes on the adjacent road network. This TIA will therefore consider a condensed study area and focus on site specific impacts, integration with boundary streets, a functional review of site access geometry and a review of parking/ loading requirements.

3.5 Time Periods

Although the proposed development is commercial, Bank Street is a commuter route therefore traffic generated during the morning peak hour and afternoon peak hour is expected to result in the most significant impact to traffic operations on the adjacent network in terms of development-generated and background traffic. These two analysis periods will be used for operational analysis in the TIA consistent with the Leitrim MTS and other traffic studies completed within broader study area.

3.6 Horizon Years

The following future horizons will be assessed in this study:

- Year 2023 – Full Build-out/ Occupancy of the Proposed Development
- Year 2028 – Full Build-out/ Occupancy plus 5 years

3.7 Exemptions Review

The TIA Guidelines provide exemption considerations for elements of the Design Review and Network Impact components. **Table 6** summarizes the TIA modules that are not applicable to this study.

Table 6 - Exemptions Review

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

4 Forecasting

4.1 Development Generated Traffic

4.1.1 Trip Generation Methodology

Trip generated by Buildings 'A', 'C' and 'D' were estimated using local blended trip generation rates developed through the collection of traffic count data for similar land uses. Traffic counts were conducted at the Leitrim Home Hardware on December 11, 2018 and Findlay Creek Commercial Centre January 21, 2014 to capture traffic volumes at all access locations during weekday morning and afternoon peak hours.

The Leitrim Home Hardware trip generation rate was scaled proportionally to account for the increased footprint of the new hardware store (Building 'A'). The Findlay Creek Commercial Centre trip generation rate was used to represent the local commercial rate, as it includes inherent trip characteristics for a variety of retail, specialty retail and service outlets with drive-through facilities. The commercial rate was applied to Buildings 'C' and 'D' for the subject site.

Base peak hour trip generation for the proposed hotel (Building 'B') was calculated utilizing the weekday peak hour morning and afternoon rates published in the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 10th Edition for the Hotel land use (ITE Code 310).

Appendix F contains local trip generation survey results and relevant ITE extracts utilized for this study.

4.1.2 Base Trip Generation Results

Based on the methodology outlined in the previous section, base vehicular trip generation results for the proposed development are provided in **Table 7**.

Table 7 – Base Trip Generation

LAND USE	BUILDING	SIZE (GLA/ UNITS)	PEAK HOUR	VEHICULAR TRIPS (VPH)		
				IN	OUT	TOTAL
Hardware Store (incl. Drive-Thru Shed)	Building 'A'	2,997 m^2	AM	46	46	92
			PM	34	41	75
Hotel (ITE Code: 310)	Building 'B'	Approx. 125 Rooms	AM	35	24	59
			PM	38	37	75
Commercial	Buildings 'C' & 'D'	1,489 m^2	AM	31	22	53
			PM	49	53	102

Notes: GLA = gross leasable area, vph = Vehicles Per Hour

4.1.3 Mode Share

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

The existing mode share targets for the South Gloucester/ Leitrim TAZ for each of the analysis horizons are outlined in **Table 8**. Of the available data, a blended mode share rate consisting of the weekday 'Within District' and 'To District' shares was determined to be the most appropriate.

No adjustments were made to other sustainable modes of transportation such as transit, walking or cycling for future planning horizons. This approach should be considered conservative.

Table 8 – Existing Mode Share

TRAVEL MODE	EXISTING BLENDED MODE SHARE WITHIN THE TAZ
Auto Driver	56%
Transit	4%
Auto Passenger	20%
Cycling	0%
Walking	11%
Other	9%

4.1.4 Person-Trips

The City TIA Guidelines require trip generation to be expressed in terms of 'person-trips' rather than automobile trips in order to identify the multi-modal demands of a development on the adjacent transportation network.

Trip generation rates published by ITE are typically based on historical data from suburban areas across North America with little to no access to transit. The City of Ottawa suggests the use of a 1.28 conversion factor calculated under the assumption that a 1.15 auto occupancy rate is inherent to this data and that roughly 10% of trips are by non-auto modes and thus not captured in the rates. Local trip generation rates were converted to person-trips based on the existing mode share presented in **Table 8** above.

The results after applying this conversion factor have been summarized in **Table 9**.

Table 9 - Person-Trip Results

LAND USE	BUILDING	PEAK HOUR	PERSON TRIPS		
			IN	OUT	TOTAL
Hardware Store (incl. Drive-Thru Shed)	Building 'A'	AM	82	82	165
		PM	61	75	136
Hotel (ITE Code: 310)	Building 'B'	AM	44	31	75
		PM	49	47	96
Commercial	Buildings 'C' & 'D'	AM	51	37	88
		PM	80	87	167
TOTAL AM			**178**	**150**	**328**
TOTAL PM			**190**	**209**	**399**

4.1.5 Trip Reduction Factors

4.1.5.1 Deduction of Existing Development Trips

The site is currently occupied by a Home Hardware retail store that is slated for demolition to make way for the proposed development. The redevelopment of the site will impact the net traffic volumes generated by the site in the future. Field observations indicate that the site presently generates approximately 46 and 38 two-way vehicular trips during the weekday morning and afternoon peak hours, respectively.

4.1.5.2 Pass-by Traffic

Commercial pass-by trips are generated by a particular land use from auto trips that are already en-route to their ultimate destination. The Leitrim MTS assumed a pass-by proportion of 80%; however, this assumed full buildout of the entire Leitrim Community.

Based on the ITE pass-by data for the Shopping Centre land use for commercial buildings of similar size and assumptions for the recently-completed Cowan's Grove TIA (IBI 2018), a 60% pass-by trip proportion was utilized for Buildings 'C' and 'D'.

A pass-by rate of 26% was applied to trip generation associated with the Hardware Store land use (i.e. Building 'A' including the drive-thru) consistent with the average rate published by ITE.

The hotel land use is not expected to generate pass-by traffic.

Relevant extracts from the ITE Trip Generation Manual are provided in **Appendix F**.

4.1.5.3 Synergy/ Internalization

Synergy or internalization is applied to developments with two or more land uses to prevent double-counting trips that have multiple intermediate destinations within the same site. As the local trip generation rates utilized in this study were obtained from similar commercial plazas, internalization is inherent in this data, therefore no further adjustments are necessary.

4.1.5.4 Trip Generation Summary

Table 10 summarizes the net number of person-trips the proposed development is expected to generate during the weekday morning and afternoon peak hours of adjacent traffic, respectively.

Table 10 – Net Trip Generation

MODE	AM PEAK			PM PEAK		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Person-Trips (100%)	178	150	328	190	209	399
Auto Driver (56%)	100	84	184	107	117	223
Transit (4%)	7	6	13	8	8	16
Auto Passenger (20%)	36	30	66	38	42	80
Cycling (0%)	0	0	0	0	0	0
Walking (11%)	20	17	36	21	23	44

Other (9%)	16	14	30	17	19	36
Total Auto Trips	**100**	**84**	**184**	**107**	**117**	**223**
Pass-by Auto Trips [1]	-27	-27	-53	-37	-39	-76
New Auto Trips	**73**	**57**	**130**	**70**	**78**	**148**
Existing Auto Trips [2]	-23	-23	-46	-17	-21	-38
Net New Auto Trips	**50**	**34**	**84**	**53**	**57**	**110**

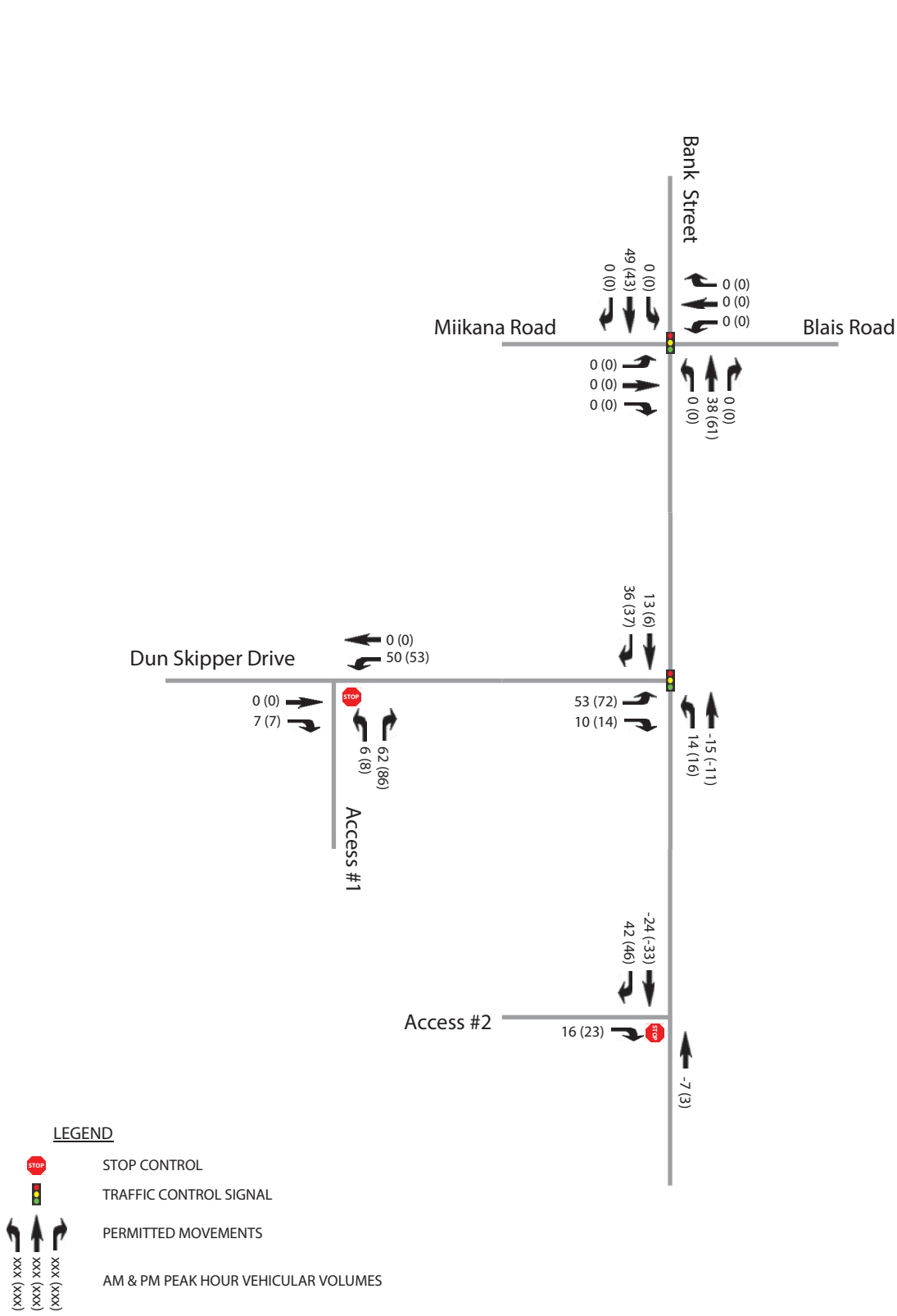
Notes:
1 – Pass-by volumes were derived by applying a 26% Home Hardware land use and a 60% pass-by rates to Commercial land uses (i.e. Buildings 'C' and 'D').
2 – Trip values were reduced by the observed number of vehicular trips entering and exiting the site during weekday peak hours.

4.1.6 Trip Distribution and Assignment

Based on the location of the site with respect to the core of the local community, the following trip distribution has been assumed:

- 90% to/from the North
  - 80% via Bank Street
  - 10% via Kelly Farm Drive
- 10% to/from the South
  - 10% via Bank Street

Utilizing the estimated number of new auto trips and applying the above distribution, future site-generated traffic volumes at each of the study area intersections are illustrated in **Exhibit 6**.



IBI

4836 Bank Street
Transportation Impact Assessment

Exhibit 6:
Net Site-Generated Traffic

PROJECT No. 119351
DATE: April 2019
SCALE: N.T.S.

4.2 Background Network Traffic

4.2.1 Changes to the Background Transportation Network

To properly assess future traffic conditions, planned modifications to the transportation network that may impact travel patterns or demand within the study area must be considered. These changes are then reflected in the future background demand volumes to develop an appropriate foundation for the TIA.

The interim design of Bank Street, which is targeted for completion by mid-2019, includes the following works:

- Upgrades to the Blais Road intersection to a four-legged protected intersection configuration with the addition of a west leg, auxiliary lanes on all approaches and signalization.
- Construction of a three-legged, signalized protected intersection approximately 450m south of Blais/ Miikana, with the connection of Dun Skipper Drive to Bank Street.

In addition, the extension of Kelly Farm Drive from the Urban Boundary to Leitrim Road is expected to be completed in 2019 in conjunction with the Remer Lands and Barrett subdivisions, providing an alternative north-south parallel route to Bank Street.

As previously indicated in the Scoping section of this report, the four-lane widening of Bank Street through the study area has been postponed until Phase 3 (2026 - 2031) of the TMP.

4.2.2 General Background Growth Rates

The background growth rate is intended to represent regional growth from outside the study area expected to utilize the adjacent road network. Future travel demand in 2028 was based on the Leitrim MTS, which accounted for all adjacent developments separately and applied a 1.0% growth rate for regional traffic passing through the Leitrim Community.

A general background growth rate has not been applied to local/collector roads within the study area, as traffic generation relating to all known future developments has been accounted for separately in the analysis.

4.2.3 Other Area Development

All current adjacent development applications and future potential developments within the study area were previously identified in **Table 5**. Target completion dates for each adjacent development were reviewed and adjusted to reflect construction progress since the completion of the Leitrim MTS, however the assumed absorption rate of 300 units per annum was maintained through to the 2028 horizon year of this study.

All of the adjacent developments have been accounted for in the development of future background volume projections. The developments represent specific areas of growth within the study area and are therefore considered in addition to the general background growth rate discussed previously.

4.3 Demand Rationalization

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

4.3.1 Description of Capacity Issues

As shown in **Exhibit 4**, weekday morning and afternoon peak hour volumes along Bank Street are presently in the order of 700 to 800 vehicles per hour in the peak direction, which is within the capacity limitations for a single lane of an arterial road. As build-out of adjacent development occurs within the Leitrim Community, it is expected that volumes along the Bank Street corridor will exceed the capacity limitations of the existing two-lane facility. The widening of Bank Street to four lanes, which is slated for completion within the timeframe of this study, is expected to address these capacity issues based on the intersection capacity analysis results of the Leitrim MTS.

Site-generated traffic volumes presented previously indicate that the proposed development is expected to contribute a net increase of approximately 106 and 133 two-way trips to the adjacent road network during the weekday morning and afternoon peak hours, respectively.

The detailed capacity analysis presented in the Analysis section of this study will identify if there are any localized capacity issues at any of the study area intersections under both background and total traffic conditions.

4.3.2 Adjustment to Development Generated Demands

Site generated traffic volumes were stratified by mode share, based on the 2011 Origin-Destination (OD) Survey for the South Gloucester/ Leitrim Traffic Assessment Zone (TAZ). Although enhanced cycling facilities will be provided in conjunction with the ultimate (4-lane) configuration of Bank Street, no adjustments were made to any sustainable modes of transportation such as walking, cycling or transit as the relative impacts to the results of this study would be negligible.

4.3.3 Adjustment to Background Network Demands

Consistent with the Leitrim MTS, transit mode shares for adjacent developments in this study were linearly interpolated between the observed mode share of roughly 10% and the TMP target of 16% in 2031.

4.4 Traffic Volume Summary

4.4.1 Future Background Traffic Volumes

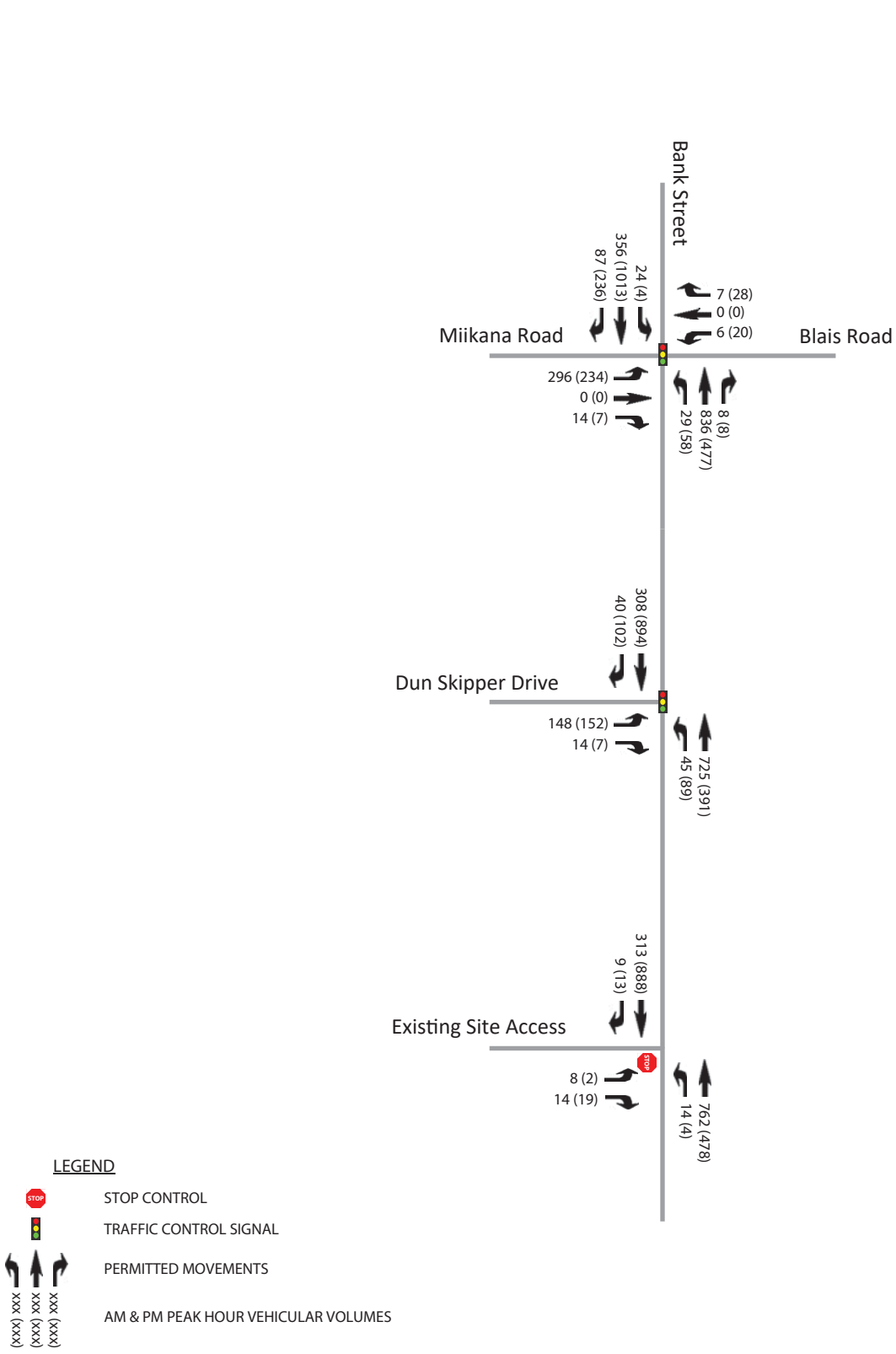
Future background traffic volumes have been developed by combining the adjacent development traffic and background traffic derived through the application of a growth rate as discussed previously.

Exhibit 7 and **Exhibit 8** present the future background traffic volumes anticipated for the 2023 build-out year and 2028 study horizon, respectively.

4.4.2 Future Total Traffic Volumes

Future total volumes have been derived by combining the site-generated traffic in **Exhibit 6** with the future background volumes in **Exhibit 7** and **Exhibit 8**.

Exhibit 9 and **Exhibit 10** present the future total traffic volumes anticipated for 2023 and 2028, respectively.

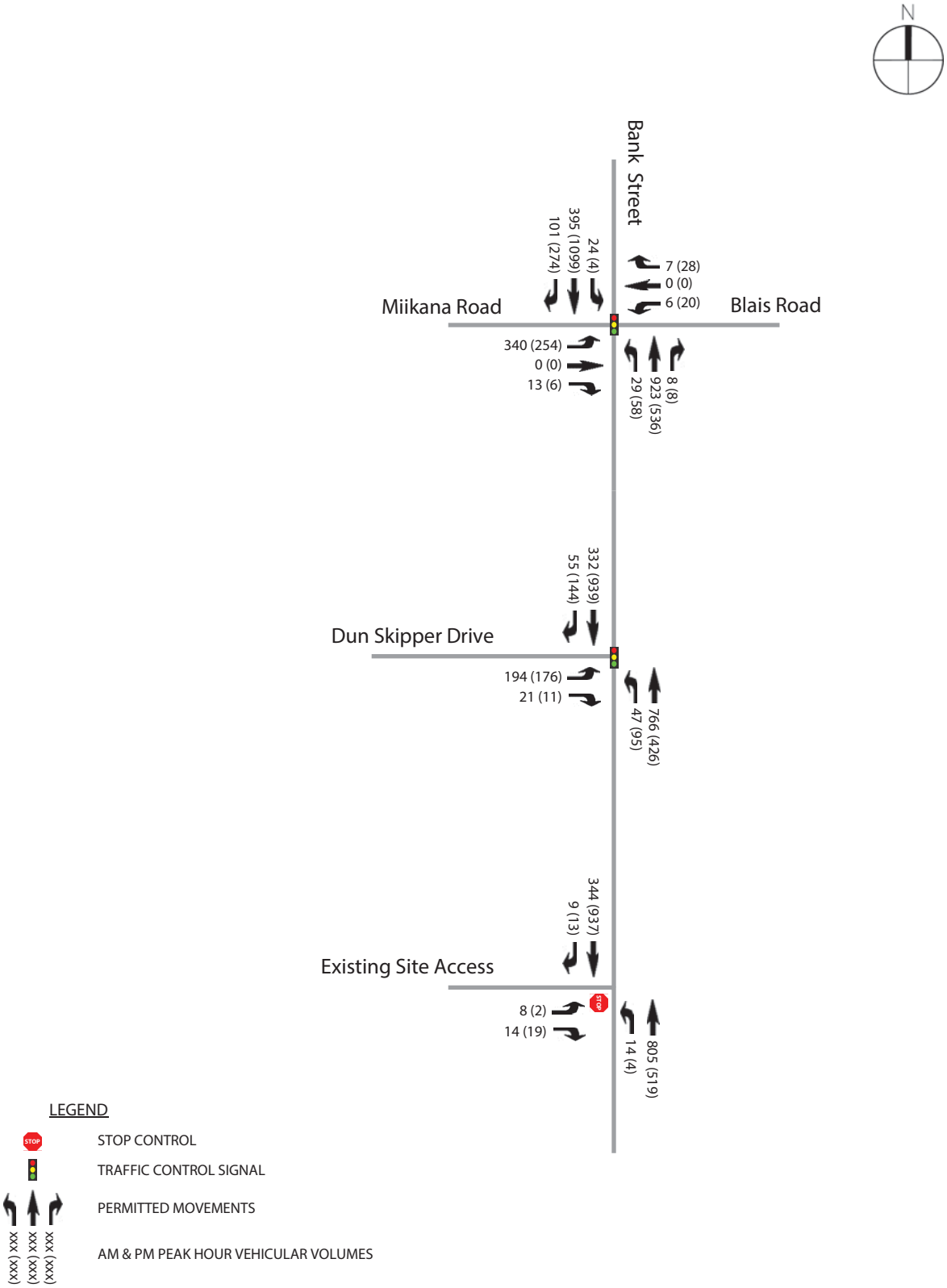


IBI

4836 Bank Street
Transportation Impact Assessment

Exhibit 7:
Future (2023) Background Traffic

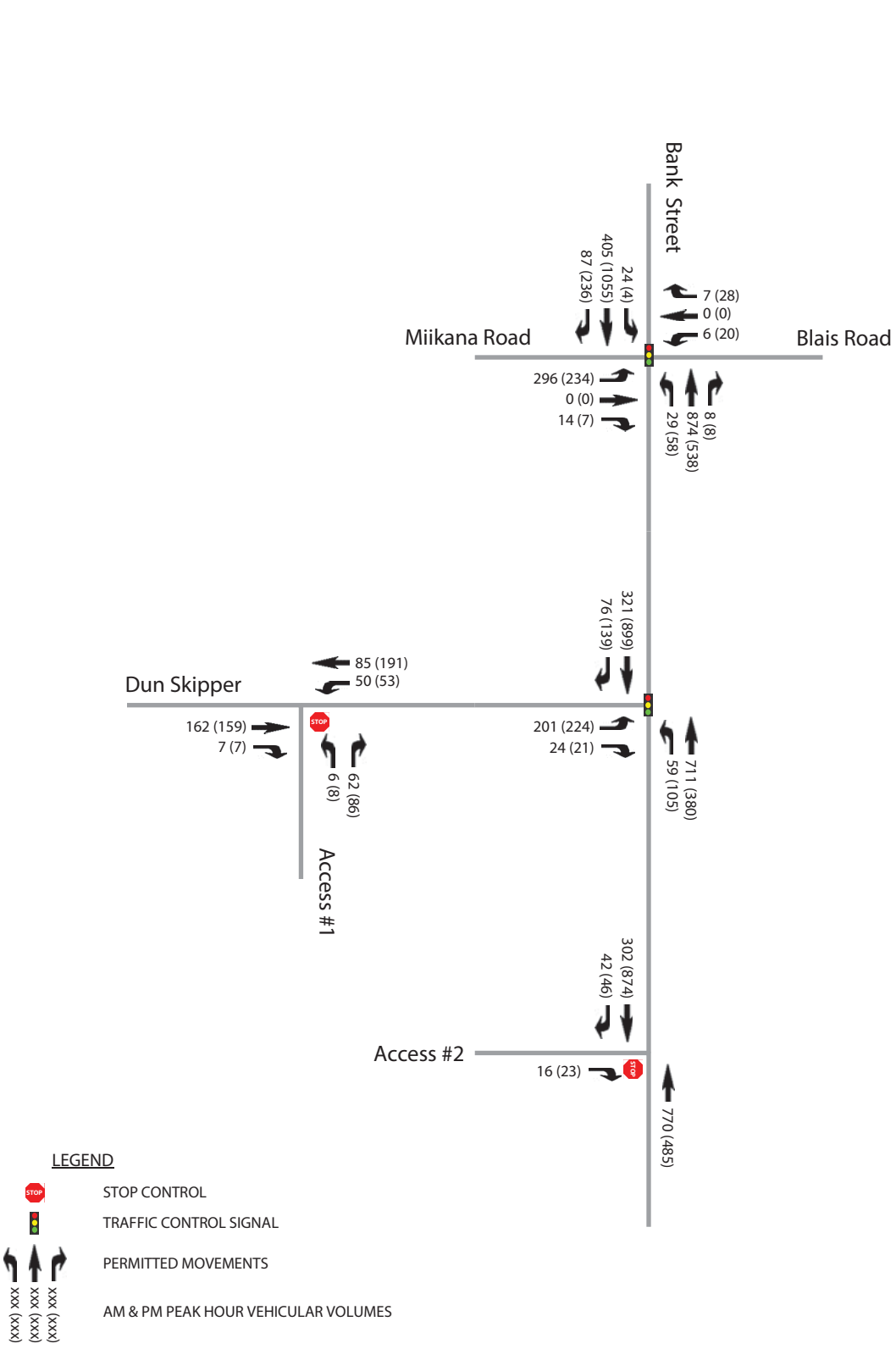
PROJECT No. 119351
DATE: April 2019
SCALE: N.T.S.



4836 Bank Street
Transportation Impact Assessment

Exhibit 8:
Future (2028) Background Traffic

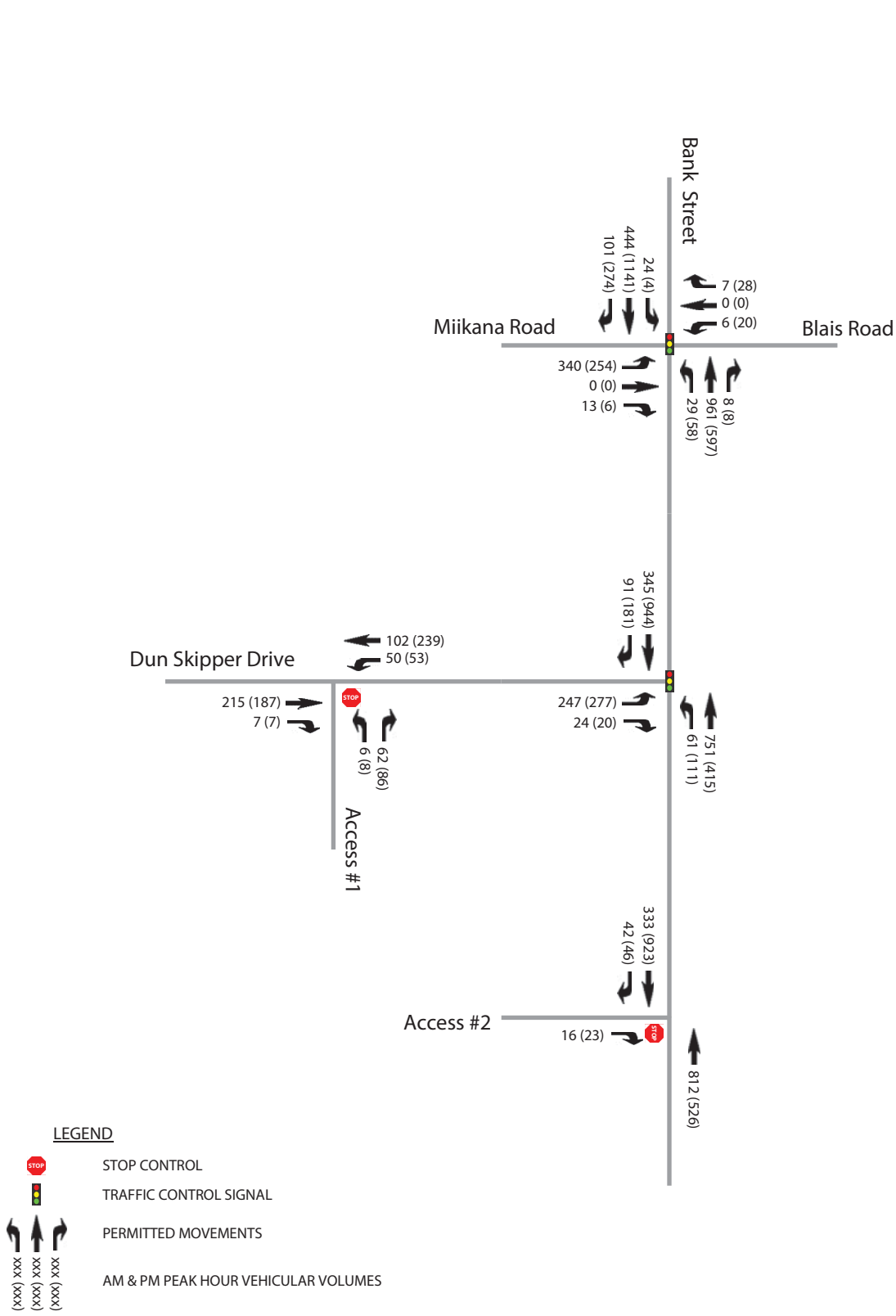
PROJECT No. 119351
DATE: April 2019
SCALE: N.T.S.



4836 Bank Street
Transportation Impact Assessment

Exhibit 9:
Future (2023) Total Traffic

PROJECT No. 119351
DATE: April 2019
SCALE: N.T.S.



4836 Bank Street
Transportation Impact Assessment

Exhibit 10:
Future (2028) Total Traffic

PROJECT No. 119351
DATE: April 2019
SCALE: N.T.S.

5 Analysis

5.1 Development Design

5.1.1 Design for Sustainable Modes

For consistency with the City of Ottawa's Urban Design Guidelines and transportation policies, new developments shall provide safe and efficient access for all users while creating an environment that encourages walking, cycling and transit use.

In addition to being located within the rapidly-growing Leitrim Community, the site integrates well with the adjacent road network by providing convenient access to planned active transportation facilities. Further, transit service is planned along Dun Skipper Drive within a 400 metre walking distance of the site.

Concrete sidewalks are proposed within the site limits to facilitate safe and convenient access between buildings. Bicycle stalls are located near the entrance of each building to further encourage non-auto modes of travel. Paved shoulders will be implemented for cyclists as part of the interim Bank Street design, and converted to grade-separated cycle tracks per the ultimate Bank Street design.

Vehicular loading operations and waste collection have been positioned to the rear or sides of the buildings within the proposed development to minimize potential conflicts with pedestrians and cyclists.

The TDM-Supportive Development Design and Infrastructure Checklist was completed and is provided in **Appendix G**. This checklist identifies measures that have been considered in the development's design to minimize vehicular demands of the site and encourage alternative modes of transportation.

5.1.2 Circulation and Access

An all-movements access will be provided on Dun Skipper Drive and will serve as the primary access. A right-in/right-out access will be provided on Bank Street for secondary access to the site.

A geometric analysis of the proposed site plan was undertaken utilizing truck templates for the following three design vehicles: Waste Collection, Fire Truck, WB-20 tractor trailer and combination trailer. The templates confirm the ability of each of these vehicles to access/ egress the site.

Access to the site by Fire Truck is expected to be rare while access by Waste Collection and Delivery Trucks will be infrequent and occur only a few times per week. Based on the wide turning radii of the WB-20 and combination tractor trailers, these vehicles shall be restricted to entering the site via the right-in/right-out access on Bank Street and egressing the site via the all-movements access on Dun Skipper Drive.

The vehicle swept path analysis confirms that the site layout and access configuration is sufficient to accommodate each of the design vehicles listed above, including the curb requirements for designated Fire Route. No off-site roadway modifications are required to accommodate the design vehicles.

The vehicle turning templates described above have been provided in **Appendix H**.

5.1.3 New Street Networks

Not applicable. As the proposed development is not a part of a plan of subdivision, this section was excluded from this report.

5.2 Parking

5.2.1 Parking Supply

Vehicular Parking

The proposed development will include a total of 280 surface parking spaces, meeting the minimum Zoning By-law 2008-250 Consolidation parking requirements for all land uses proposed. As the proposed supply of on-site parking meets or exceeds the By-law requirement, no further review of vehicular parking is required.

Bicycle Parking

The proposed development will include a total of 18 bicycle parking spaces, meeting the minimum Zoning By-law 2008-250 Consolidation parking requirements for all land uses in the Draft Plan.

5.2.2 Spillover Parking

Not Applicable. As the proposed supply of on-site parking is greater than the requirement outlined in the Zoning By-law 2008-250 Consolidation, no further review of parking is required beyond what has been described above.

5.3 Boundary Streets

5.3.1 Mobility

At the time of this study, there were no plans to construct any of the boundary streets within the study area as Complete Streets. Segment Multi-Modal Level of Service (MMLOS) analysis was therefore undertaken, as specified in the TIA Guidelines, to identify gaps or deficiencies in the City's pedestrian and cycling network.

Segment-based MMLOS was completed along both boundary streets to the proposed development: Bank Street to the east and Dun Skipper Drive.

The results of the Segment MMLOS for Existing (2019) conditions are shown in **Table 11**. Detailed results are provided in **Appendix I**.

Table 11 - Segment MMLOS - Existing (2019) Conditions

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
TARGET	C	C	D	D
SEGMENTS				
Bank Street – Blais Road to proposed Access #2	F	F	E	B

The results of the Segment MMLOS for Future (2023) conditions are shown in **Table 12** with the assumed implementation of the Bank Street interim design. Based on the Segment MMLOS methodology, PLOS and BLOS results are shown to be well below the City's targets with the

interim design of Bank Street in place, however this is only a temporary condition and is expected to be significantly improved prior to the horizon year of this study.

Table 12 - Segment MMLOS – Future (2023) Conditions – Bank Street Interim Design

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
TARGET	C	C	D	D
SEGMENTS				
Bank – Blais to Dun Skipper	F	E	D	C
Bank – Dun Skipper to Access #2	F	E	D	C
Dun Skipper – Bank to proposed Access #1	C	D	D	C

Ultimately, Bank Street will be urbanized and widened to a four-lane cross-section through the study area, which will include the implementation of grade-separated cycle tracks and concrete sidewalks. These elements are expected to significantly improve comfort and safety for pedestrians and cyclists along the Bank Street corridor, as indicated by MMLOS results shown in **Table 13** below:

Table 13 - Segment MMLOS – Future (2028) Conditions – Bank Street Ultimate Design

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
TARGET	C	C	D	D
SEGMENTS				
Bank – Blais to Dun Skipper	D	A	D	C
Bank – Dun Skipper to Access #2	D	A	D	C
Dun Skipper – Bank to proposed Access #1	C	D	D	C

As shown above, the segment MMLOS targets will be met, with the exception of the segment PLOS and BLOS targets, which will be marginally exceeded along select roadway segments within the study area.

5.3.2 Road Safety

A summary of all reported collisions within the study period over the past 5 years was presented in the Scoping section of this report. The City requires a safety review if at least six collisions for any one movement or a discernible pattern, over a five year period have occurred. Based on a review of re-occurring events identified in the Scoping section of this report, the following collisions require further review:

<u>Rear End Collisions: 6 Similar Events</u>

- Surface Conditions: Wet/ Loose Snow (3 of 6)

- Vehicle Manoeuvre: Southbound Left-Turn and Southbound Going Ahead (4 of 6)
- Time of Day: Peak Hour (4 of 6)

Based on the collision data, the majority of rear end collisions involve the southbound left-turn movement during peak periods. Poor surface conditions experienced during inclement weather are also a likely contributor to this collision pattern.

The widening of Bank Street from a two-lane undivided cross-section to a four-lane divided cross-section is expected to help mitigate the number of rear-end collisions caused by southbound left-turning vehicles by restricting the frequency of left-turns through the corridor.

5.4 Access Intersections

5.4.1 Location and Design of Access

Access to the proposed development is expected to be in conformance with the City of Ottawa Private Approach By-law 2003-447. Key items from the By-law are referenced as follows:

- Width: The width of any two-way private approaches must be between 6.7 and 9.0 metres.
  - Access #1 is proposed as a two-way private approach with a width of 9.0 metres at the throat. ✓
  - Access #2 is proposed as a two-way private approach with a width of 11.0 metres. The Private Approach Bylaw provides exception for access to loading areas. The private approaches have been designed to meet the minimum functional requirements of the design vehicle described previously. ✓
- Distance from Intersecting Road: For a commercial development with 200-299 parking spaces, the proposed private approach must be at least 60 metres from the nearest intersecting street line and 60 metres from any other approach.
  - The nearest private approach to the intersection of Bank Street/ Dun Skipper Drive, Access #1 is spaced more than 60 metres from the street line. ✓
- Quantity and Spacing of Private Approaches: For sites with frontage between 46 and 150 metres, one (1) two-way and two (2) one-way private approaches are permitted or two two-way private approaches. Any two private approaches must be separated by at least 9.0m and can be reduced to 2.0 m in the case of two one-way driveways.
  - Access #1 and Access #2 are provided along separate property frontages. ✓
- Distance from Property Line: Private approaches must be at least 3.0 m from the abutting property line, however this requirement can be reduced to 0.3 m provided that the access is a safe distance from the access serving the adjacent property, sight lines are adequate and that it does not create a traffic hazard.
  - Access #1 is setback more than 3 metres from the property line. ✓
  - Access #2 straddles the southern property limit and will be utilized as a shared access with the future development to the south. ✓

5.4.2 Intersection Control

5.4.2.1 Traffic Signal Warrants

Signals are not warranted at either site access location under 2028 total traffic conditions.
The results of the traffic signal warrants analyses are provided in **Appendix J**.

5.4.2.2 Roundabout Analysis

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

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

Access #1 and Access #2 satisfy the first condition, as 'new City intersections', however the results of the Roundabout Feasibility Screening Tool indicate that a roundabout may be problematic at these locations due to the proximity to the proposed signalized intersection at Bank/ Dun Skipper. Furthermore, none of the suitability factors are satisfied for either access location, providing further justification for dismissing roundabouts as a feasible form of traffic control at either of these intersections.

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

Based on the results of the traffic signal warrant and roundabout screening analyses, stop control on the private approach will be sufficient to accommodate traffic volumes at either location. Traffic operational results for each study area intersection are presented in Section 5.9.

5.4.3 Intersection Design (MMLOS)

Not Applicable: Intersection MMLOS is not applicable to the proposed site access intersections, Access #1 or Access #2, as this methodology only applies to signalized intersections.

Refer to Section 4.9 for Intersection Multi-Modal Level of Service (MMLOS) and Synchro analysis results for all study area intersections.

5.5 Transportation Demand Management (TDM)

The City of Ottawa is committed to implementing Transportation Demand Management (TDM) measures on a City-wide basis in an effort to reduce automobile dependency of Ottawa residents, particularly during the weekday peak travel periods. TDM initiatives are aimed at encouraging individuals to use non-auto modes of travel during the peak periods.

As described in the Forecasting section of this report, mode shares used to estimate future development traffic were based on the 2011 TRANS Origin-Destination Survey for the South Gloucester/Leitrim Traffic Assessment Zone (TAZ). The active transportation mode shares were assumed to remain unchanged within the timeframe of this study, as the relative impact of any reasonable adjustments would be insignificant across all modes.

The purpose of this module is to identify post-occupancy TDM program measures that complement the proposed design and infrastructure elements to reduce reliance on automobile transportation. The development of a post-occupancy TDM program is not applicable for this development, as it is not expected to exceed the City's threshold of 60 employees/students at any given time.

5.5.1 Context for TDM

Not applicable.

5.5.2 Need and Opportunity

Not applicable.

5.5.3 TDM Program

Not applicable.

5.6 Neighbourhood Traffic Management

5.6.1 Adjacent Neighbourhoods

The TIA Guidelines provide peak hour vehicular volume thresholds for local and collector roads that are located along significant access routes/ egress routes for the proposed development, these thresholds were established by the City based on 'liveability' and are not indicative of roadway capacity. The subject site relies on Dun Skipper Drive for access to the overall transportation network. Although direct access to Bank Street will be provided, the primary access will be via Dun Skipper. This analysis has reviewed the anticipated volumes of traffic that is expected to travel through the community via Dun Skipper Drive immediately west of Site Access #1.

The peak direction volumes along Dun Skipper Drive are shown in **Table 14**.

Table 14 - Road Capacity

STREET	CLASSIFICATION	CAPACITY (PER LANE)	PEAK HOUR DEMAND IN PEAK DIRECTION (VPHPL)	
			AM	PM
Dun Skipper	Collector Road	300	264	292

Notes: vphpl = vehicle per hour per lane

The results from **Table 14** indicate that the segment of Dun Skipper Drive within the study area is expected to accommodate tolerable peak hour traffic volumes within the timeframe of this study.

5.7 Transit

5.7.1 Route Capacity

The estimated future 2028 total transit passenger demand within the study area was provided in Section 3.1.2.4: Trip Generation by Mode. The results have been summarized in **Table 15**.

Table 15 - 2028 Development-Generated Transit Demand

PERIOD	PEAK PERIOD DEMAND	
	IN	OUT
AM	7	6
PM	8	8

Based on these projections, the proposed development is expected to generate up to 16 two-way transit trips during the weekday peak hours and therefore will not significantly impact the capacity of nearby transit routes.

As the Remer and Idone Lands subdivisions are built out to the west of the subject site, there will be opportunities for OC Transpo to provide transit service along Dun Skipper Drive to better serve the proposed development.

5.7.2 Transit Priority

As identified in **Table 15** above, the proposed development will have a marginal impact on the capacity of nearby transit routes. Additional capacity and service improvements via transit priority measures are not necessary nor are they included as part of the 2031 TMP Affordable Network within the Leitrim Community.

5.8 Review of Network Concept

Section 3.3.3 Network Concept Screenline outlined the nearby screenlines to the subject site, SL8 – Leitrim; and SL52 – Hawthorne (South). A summary comparison of the City 2031 Network Concept demand and capacity has been provided in **Table 16**.

Table 16 – 2031 Network Concept

SCREENLINE	AM 2031 PREFERRED INBOUND		
	DEMAND	CAPACITY	V/C RATIO
SL8 - Leitrim	5,884	7,000	0.84
SL52 – Hawthorne (South)	892	3,400	0.26

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

The proposed development is expected to contribute approximately 100 new auto trips in the AM peak direction and therefore will not trigger any capacity deficiencies along nearby screenlines in the 2031 total traffic scenario.

5.9 Intersection Design

The following sections summarize the methodology and results of the multi-modal intersection capacity analysis conducted within the study area.

5.9.1 Intersection Control

5.9.1.1 Traffic Signal Warrants

Both Bank and Blais/ Miikana as well as the intersection of Bank and Dun Skipper are slated for signalization in 2019. The results of the traffic signal warrant analysis indicate both intersections are expected to meet the signal warrants by 2023.

The results of the traffic signal warrant analyses are provided in **Appendix J**.

5.9.1.2 Roundabout Analysis

No roundabout analysis is required for the intersections of Bank and Miikana/ Blais or Bank and Dun Skipper. Both intersections have been designed as protected, signalized intersections, based on consultation with City technical staff regarding the interim and ultimate configurations.

The interim configuration of Bank Street is expected to be constructed by the end of 2019.

5.9.2 Intersection Analysis Criteria (Automobiles)

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

5.9.2.1 Signalized Intersections

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

The City of Ottawa has developed criteria as part of the Transportation Impact Assessment Guidelines, which directly relate the volume to capacity (v/c) ratio of a signalized intersection to a LOS designation. These criteria are as follows:

Table 17 - LOS Criteria for Signalized Intersections

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

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

The Level of Service calculation is based on locally-specific parameters described in the TIA Guidelines. The analysis of future conditions considers the use of a Peak Hour Factor (PHF) of 1.0 to recognize peak spreading beyond a 15-minute period in congested conditions.

5.9.2.2 Unsignalized Intersections

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

The Highway Capacity Manual 2010 (HCM), prepared by the Transportation Research Board, includes the following Levels of Service criteria for un-signalized intersections, related to average movement delays at the intersection, as indicated in **Table 18**.

Table 18 - LOS Criteria for Unsignalized Intersections

LOS	DELAY (seconds)
A	<10
B	>10 and <15
C	>15 and <25
D	>25 and <35
E	>35 and <50
F	>50

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

5.9.3 Intersection Design (Vehicles)

Using the established intersection capacity analysis criteria described above, the existing and future conditions are analyzed during the weekday peak hour traffic volumes derived in the previous sections of this report.

The following section presents the results of the intersection capacity analysis. All tables summarize study area intersection LOS results during the morning and afternoon peak hour periods. The Synchro output files have been provided in **Appendix K**.

5.9.3.1 Existing (2019) Traffic Results

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

Table 19 - Intersection Capacity Analysis: Existing (2019) Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Bank & Blais	Unsignalized	**C** (20.7s)	EB (20.7s)	**E** (36.1s)	EB (36.1s)
Existing Home Hardware Access	Unsignalized	**B** (14.2s)	EB (14.2s)	**C** (17.9s)	EB (17.9s)

5.9.3.2 2023 Background Traffic Results

An intersection capacity analysis has been undertaken using the Future (2023) Background Traffic volumes presented in **Exhibit 7**, yielding the following results:

Table 20 - Intersection Capacity Analysis: Future (2023) Background Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Bank & Blais	Signalized	**D** (0.87)	EBL (0.87)	**D** (0.88)	EBL (0.88)
Bank & Dun Skipper	Signalized	**B** (0.66)	EBL (0.66)	**B** (0.67)	EBL & SBT (0.67)

5.9.3.3 2028 Background traffic Results

An intersection capacity analysis has been undertaken using the Future (2028) Background Traffic volumes presented in **Exhibit 8**, yielding the following results:

Table 21 - Intersection Capacity Analysis: Future (2028) Background Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Bank & Blais	Signalized	**E** (0.91)	EBL (0.91)	**E** (0.92)	SBT (0.92)
> Bank & Blais [1]	Signalized	**D** (0.83)	EBL (0.83)	**D** (0.82)	EBL (0.82)
Bank & Dun Skipper	Signalized	**C** (0.73)	EBL (0.73)	**C** (0.71)	EBL & SBT (0.71)
> Bank & Dun Skipper [1]	Signalized	**C** (0.71)	EBL (0.71)	**B** (0.70)	EBL (0.70)

Notes: [1] - Bank Street widened to 4-lanes through the study area

As indicated by the intersection capacity analyses in **Table 21**, the Bank Street and Blais Road intersection is expected to experience capacity issues as a direct result of background travel demand. The planned widening of Bank Street to four lanes is shown to increase capacity sufficiently.

5.9.3.4 2023 Total Traffic Results

An intersection capacity analysis has been undertaken using the Future (2023) Total Traffic volumes presented in **Exhibit 9**, yielding the following results:

Table 22 - Intersection Capacity Analysis: Future (2023) Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Bank & Blais	Signalized	**D** (0.87)	EBL (0.87)	**D** (0.89)	EBL (0.89)
Bank & Dun Skipper	Signalized	**C** (0.73)	EBL (0.73)	**C** (0.79)	EBL (0.79)
Dun Skipper & Proposed Access #1	Unsignalized	**A** (9.7s)	NB (9.7s)	**A** (9.9s)	NB (9.9s)
Bank & Proposed Access #2	Unsignalized	**A** (9.9s)	EB (9.9s)	**C** (16.4s)	EB (16.4s)

5.9.3.5 2028 Total Traffic Results

An intersection capacity analysis has been undertaken using the Future (2028) Total Traffic volumes presented in **Exhibit 10**, yielding the following results:

Table 23 - Intersection Capacity Analysis: Future (2028) Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Bank & Blais	Signalized	**E** (0.92)	EBL (0.92)	**E** (0.95)	SBT (0.95)
> Bank & Blais [1]	Signalized	**D** (0.83)	EBL (0.83)	**D** (0.85)	EBL (0.85)
Bank & Dun Skipper	Signalized	**C** (0.77)	EBL (0.77)	**C** (0.79)	EBL (0.79)
> Bank & Dun Skipper [1]	Signalized	**C** (0.75)	EBL (0.75)	**C** (0.77)	EBL (0.77)
Dun Skipper & Proposed Access #1	Unsignalized	**B** (10.0s)	NB (10.0s)	**B** (10.4s)	NB (10.4s)
Bank & Proposed Access #2	Unsignalized	**A** (9.4s)	EB (9.4s)	**B** (12.8s)	EB (12.8s)

Notes: [1] - Bank Street widened to 4-lanes through the study area

All intersections within the study area are expected to operate at acceptable levels of service (LOS 'D' or better) by the 2028 horizon year.

5.9.4 Intersection Design (MMLOS)

Analysis of signalized intersections for each analysis year has been conducted based on the methodology prescribed in the City of Ottawa Multi-Modal Level of Service (MMLOS) Guidelines (approved by City Council in October 2015 and amended in October 2016). Note that since there are no existing signalized intersections within the study area, only future scenarios were analysed using the MMLOS methodology.

As indicated previously, signals are not warranted or required operationally at either Access #1 or Access #2.

Appendix I provides detailed results broken down by each approach for all intersections. The MMLOS results in all future background and total traffic scenarios have been summarized in **Table 24**.

Table 24 - Intersection MMLOS – Future (2023 & 2028) Total Traffic Scenarios

LOCATION	LEVEL OF SERVICE BY MODE							
	2023				2028			
	PLOS	BLOS	TLOS	TkLOS	PLOS	BLOS	TLOS	TKLOS
TARGET	C	C	D	D	C	C	D	D
Bank & Blais	E	F	F	E	F	F	F	E
Bank & Dun Skipper	E	F	F	E	E	F	F	E

5.9.4.1 Intersection Pedestrian Level of Service (PLOS)

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

The results of the analysis indicate that the Bank/Blais and Bank/ Dun Skipper intersections are each expected to experience a PLOS of ‘E’ under Future (2023) traffic conditions, primarily due to the number of lanes that pedestrians must cross at each approach and the delay experience prior to crossing. With the four-lane widening of Bank Street, the number of lane crossings will increase along with the curb radii along the southeast corner of the Bank/ Blais, yielding a PLOS result of ‘F’ at this intersection.

The poor PLOS results remain in all future traffic scenarios. No reasonable modifications can be implemented to improve the PLOS to ‘D’ or better. Features such as raised crosswalks would have no impact on the overall PLOS reported. It should be noted however that both intersections will be protected intersections and include fully-segregated pedestrian and cycling facilities.

5.9.4.2 Intersection Bicycle Level of Service (BLOS)

The BLOS at intersections is dependent on the number of lanes that the cyclist is required to cross to make a left-turn or on the presence of a dedicated right-turn lane on the approach, as well as the operating speed of each approach. The City target for BLOS is ‘C’.

The results of the analysis indicate that the both the Bank/Blais and Bank/Dun Skipper intersections are expected to experience a BLOS ‘F’ under all future scenarios, due to the high

operating speeds along both roadways (i.e. 60 km/h or greater), as well as the number of lanes that cyclists must cross to make a left-turn.

No reasonable modifications can be implemented to improve the BLOS to 'E' or better. The most effective measure for improving BLOS is implementing two-stage left-turn bike boxes at each approach, however this is not a feasible option given the high posted speed limit of 80km/h along this section of Bank Street. It is important to note, however, that this intersection is being designed with the inclusion of cross-rides to facilitate the safe and convenient movement of cyclists through the intersection.

5.9.4.3 Intersection Transit Level of Service (TLOS)

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

The results of the analysis indicate that the both the Bank/ Blais and Bank/ Dun Skipper intersections are expected to experience a TLOS 'F' under all future scenarios. The results of the analysis indicate that the most severe delays will occur on the side street at both Dun Skipper and Miikana. There may be opportunities to adjust the signal timing plans for either intersection to improve delays to transit vehicles making the eastbound left-turn movement from the side street. It should be not as well that these are only potential transit routes and based on vehicular delays expected on Bank Street in the study horizon year, the TLOS would satisfy the City's target at both intersections.

5.9.4.4 Intersection Truck Level of Service (TKLOS)

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

Bank/ Miikana and Bank/ Dun Skipper marginally exceed the City's target, operating with a TLOS of 'E', which is attributed to the tighter turning radii and single-receiving lanes on the collector roads, Miikana and Dun Skipper. As the proposed development has its primary access on Dun Skipper and will generate heavy vehicle trips, it is acknowledged that that these vehicles will need to enter the site via Access #2 on Bank Street.

5.10 Geometric Review

The following section reviews all geometric requirements for the study area intersections. All relevant excerpts from referenced technical standards have been provided in **Appendix L**.

5.10.1 Sight Distance and Corner Clearances

Access #1 will provide an all-movements connection to Dun Skipper, and is not anticipated to pose any safety issues due to the lower operating speeds anticipated along this collector road. Furthermore, it was confirmed previously in Section 5.4 that his access conforms to the spacing requirements in the Private Approach Bylaw.

Access #2 provides the only direct connection to Bank Street, however this access will be restricted to right-in/ right-out movements. The access is proposed along a straight section of Bank Street with no significant horizontal and vertical deflection, therefore sight distance and corner clearances are not expected to be a concern.

5.10.2 Auxiliary Lane Analysis

Auxiliary turning lane lengths for all intersections within the study area have been reviewed.

5.10.2.1 Unsignalized Auxiliary Left-Turn Lane Requirements

An auxiliary left-turn lane analysis for all applicable unsignalized intersections within the study area was completed under the 2028 total traffic conditions. The proposed intersection of Access #2 and Bank Street will be restricted to right-in/right-out movements, therefore no left-turn warrant analyses was completed for this intersection.

The MTO Geometric Design Standards for Ontario Highways left-turn warrant was applied to main street approaches using the highest left-turn volume from either the morning or afternoon peak hour. The results have been summarized below in **Table 25**.

Table 25 - Auxiliary Left-Turn Lane Analysis at Unsignalized Intersections

INTERSECTION	MVMT	POSTED SPEED (KM/H)	DESIGN SPEED (KM/H)	LEFT-TURN VOLUME (VPH)	APPROACH VOLUME (VPH)	OPPO-SING VOLUME (VPH)	LEFT-TURN STORAGE REQUIRED (m)
Dun Skipper & Proposed Access #1	WBL	50	60	53	292	194	Not Warranted

Note: Recommended storage lengths do not account for deceleration lane and taper lane lengths.

Based on the above analysis, left-turn lanes are not warranted at any of the unsignalized study area intersections.

5.10.2.2 Signalized Auxiliary Left-Turn Requirements

A review of auxiliary left-turn lane storage requirements was completed at all signalized intersections within the study area under 2028 total traffic conditions. The review compared the projected 95th percentile queue lengths from Synchro operational results, and the standard queue length calculation based on the following equation:

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

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

The proposed storage lengths were obtained from the latest detailed design configurations for either intersection at the time of preparing this report. The results of the auxiliary left-turn lane analysis are summarized below in **Table 26**.

Table 26 - Recommended Auxiliary Left-Turn Storage Lengths at Signalized Intersections

INTERSECTION	APPROACH	95TH %ILE QUEUE LENGTH (M)	CALCULATED QUEUE LENGTH (M)	PROPOSED STORAGE LENGTH (M)	STORAGE DEFICIENCY (m)
Bank & Blais	NB	15	20	100	Proposed Storage Adequate
	SB	<10	<10	80	Proposed Storage Adequate

INTERSECTION	APPROACH	95TH %ILE QUEUE LENGTH (M)	CALCULATED QUEUE LENGTH (M)	PROPOSED STORAGE LENGTH (M)	STORAGE DEFICIENCY (m)
	EB	90	120	150	Proposed Storage Adequate
	WB	<10	<10	30	Proposed Storage Adequate
Bank & Dun Skipper	NB	30	35	115	Proposed Storage Adequate
	EB	80	90	90	Proposed Storage Adequate

Recommended storage lengths do not include deceleration lane and taper lengths. Units rounded to nearest 5m.
- Synchro extrapolated queue length at congested intersections. From Synchro 9 User Guide "In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bays."

As shown in **Table 26** above, the proposed storage bays at Bank/ Blais and Bank/ Dun Skipper were shown to be of sufficient length to accommodate projected queue lengths from both the Synchro analysis and the queue length calculation described above.

5.10.2.3 Unsignalized Auxiliary Right-Turn Lane Requirements

The Transportation Association of Canada (TAC) suggests that auxiliary right-turn lanes be considered "when the volume of decelerating or accelerating vehicles compared with through vehicles causes undue hazard." Consideration for auxiliary right-turn lanes is typically given when the right-turning traffic exceeds 10% of the through volume and is at least 60 vehicles per hour.

As this condition is not expected to at Site Access #2, no auxiliary right-turn lane is necessary. Further, the results of the intersection capacity analysis indicate that both Access #1/ Dun Skipper and Access #2/ Bank operate at acceptable levels of service under 2028 total traffic conditions with shared through-right turn lanes on all approaches.

5.10.2.4 Signalized Auxiliary Right-Turn Lane Requirements

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

Right-turn lane requirements were reviewed for main street approaches using the highest right-turn volume from either the morning or afternoon peak hour under 2028 total traffic conditions.

The results of the auxiliary right-turn lane analysis are summarized below in **Table 27**.

Table 27 – Auxiliary Right-Turn Lane Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	RIGHT TURN VOLUME	APPROACH VEHICLES TURNING RIGHT (%)	95TH %ILE QUEUE LENGTH (m)	PROPOSED STORAGE LENGTH (m)	STORAGE DEFICIENCY (m)[1]
Bank & Blais	NB	8	1%	<10	105	Proposed Storage Adequate
	SB	274	19%	15	220	Proposed Storage Adequate
Bank & Dun Skipper	SB	181	16%	<10	175	Proposed Storage Adequate

Note 1 - Recommended storage lengths do not include deceleration lane and taper lengths. Units rounded to nearest 5m.

Based on the results of **Table 27** above, and confirmed through intersection capacity analyses, no modifications to the proposed storage lengths are required as a result of right-turning traffic at the Bank and Blais or Bank and Dun Skipper intersections.

5.11 Summary of Improvements Indicated and Modification Options

Based on the foregoing, this section summarizes off-site improvements recommended for the adjacent road network that will be required to accommodate multi-modal demands of the proposed development.

The recommended off-site roadway modifications for the 2028 total traffic scenario are shown in **Exhibit 11**.

The results of the analyses are contingent upon the implementation of the Bank Street four-lane widening through the study area prior to 2028, which is considered feasible based on discussions with City staff.

5.11.1 Bank Street & Miikana/ Blais Road

The results of the analysis indicate that the proposed Bank and Miikana/Blais intersection is expected to operate at acceptable levels of service beyond the 2028 total traffic scenario as a signalized, protected intersection with the ultimate four-lane design of Bank Street in place.

Queue length analyses indicates that there are no storage deficiencies anticipated at this intersection, based on traffic volume projections under the 2028 total traffic conditions, and that the proposed auxiliary lanes recommended as part of the Bank Street design are sufficient to accommodate right and left-turning volumes on every approach.

MMLOS analyses indicates that this intersection is expected to perform poorly for other modes of travel, and that no reasonable modifications can be implemented to provide a noticeable impact to these modes without further degrading the vehicular LOS.

5.11.2 Bank Street & Dun Skipper Drive

The results of the analysis indicate that the proposed Bank and Dun Skipper intersection is expected to operate at acceptable levels of service beyond the 2028 total traffic scenario as a signalized, protected intersection.

Queue length analyses indicates that there are no storage deficiencies anticipated at this intersection, based on traffic volume projections under the 2028 total traffic conditions, and that the proposed auxiliary lanes recommended as part of the Bank Street design are sufficient to accommodate right and left-turning volumes on every approach.

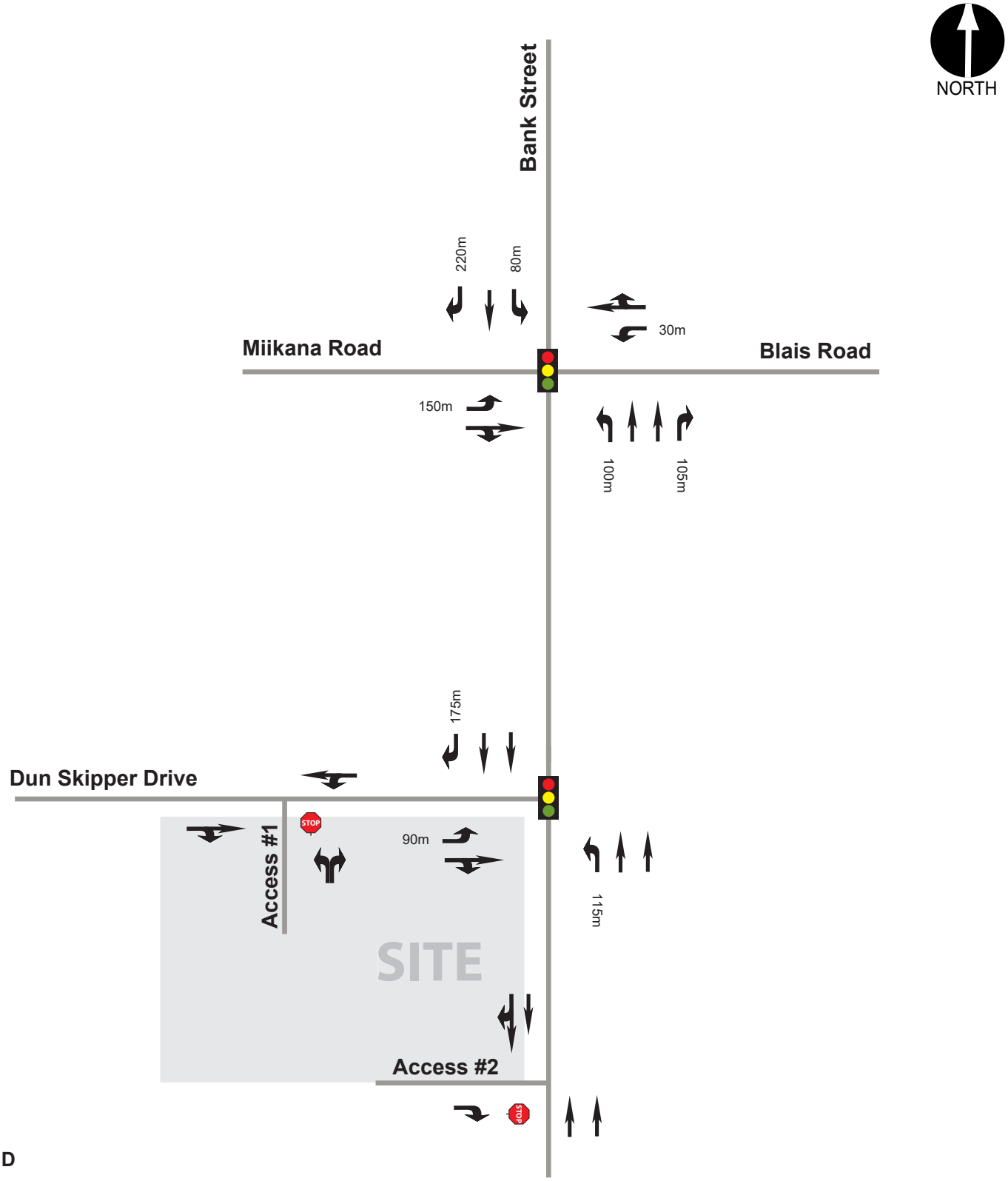
It has also been noted that the intersection is expected to perform poorly for other modes of travel, and that no reasonable modifications can be implemented to provide a noticeable impact to these modes without further degrading the vehicular LOS.

5.11.3 Dun Skipper Drive & Access #1

The results of the analysis indicate that the Dun Skipper and Access #1 intersection, which will function as an all-movements access, is expected to operate at acceptable levels of service beyond the 2028 total traffic scenario with a stop-controlled northbound approach and a shared lanes on all approaches.

5.11.4 Bank Street & Access #2

The results of the analysis indicate that the Bank and Access #2 intersection, which will function as a right-in/right-out access, is expected to operate at acceptable levels of service beyond the 2028 total traffic scenario with a stop-controlled eastbound approach and a shared lanes on all approaches.



LEGEND

Travel Lanes and Permitted Movements

Signalized Control

Stop Control

XXm — Auxiliary Storage Length (in metres)
Does not include Taper Length

IBI

4836 Bank Street
Transportation Impact Assessment

EXHIBIT 11:
Ultimate Lane Configurations

Project No. 119351
Date: Apirl 2019
Scale: N.T.S.

6 Conclusion

The proposed residential development at 4836 Bank Street is expected to generate approximately 84 and 110 net new auto trips, which translates to a moderate increase in vehicular traffic during the morning and afternoon weekday afternoon peak hours, respectively. All study area intersections are expected to operate at acceptable level of service (LOS 'D' or better) beyond the horizon year of this study. As such, a post-occupancy Monitoring Plan is not required as part of this TIA.

Overall, the proposed development is expected to integrate well with adjacent road network. As the transportation network in the Leitrim Community is built to its ultimate configuration with the four-lane widening of Bank Street, including enhanced facilities for pedestrians and cyclists, this corridor is expected to have sufficient capacity to accommodate multi-modal travel demands associated with both background and site-generated traffic. In the interim, the results of the planned improvements indicate that the two-lane configuration of Bank Street (to be completed in 2019) provides sufficient vehicular capacity for full build-out of the subject site. It shall be noted that a continued increase in background travel demand will trigger the need for additional vehicular capacity, hence the planned widening of Bank Street prior to the study horizon.

An analysis of the access configuration concludes that there are no operational issues to be expected and that no off-site improvements to the adjacent transportation network will be required to accommodate the multi-modal demands of the proposed development. As such, the TIA will not include an RMA component.

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

Appendix A – City Technical Comments

Steps 1 & 2 (Screening & Scoping) – Circulation Comments & Response

Report Submitted: February 14, 2019
Comments Received: February 19, 2019
Transportation Project Manager: Mike Giampa

1) Please include the TDM component and move forward to forecasting.

- The projected number of employees on-site is not expected to exceed 60 person at any given time, therefore the TDM module (Module 4.5) is not applicable for this TIA.

  A breakdown of the employees per shift expected for the proposed development is provided below:

  Building 'A' (Home Hardware) - 10 employees per shift
  Building 'B' (Hotel) - 19 employees per shift
  Building 'C' (Restaurant) - 10 employees per shift
  Building 'D' (Commercial) - 8 employees per shift

  Based on the above, it is expected that there will be no more than 50 employees on site at any given time.

Step 3 (Forecasting) – Circulation Comments & Response

Report Submitted: March 4, 2019
Comments Received: March 29, 2019

1. Building 'D' size mentioned in Tables 1 and 7 does not appear to be consistent with what is shown in Exhibit 2. Also, in Exhibit 2 as well, the Building 'A' square-meter size does not correspond with its square-foot size.
    - The building footprints have been adjusted to reflect changes to the site plan since the Forecasting submission. Adjustments to the building footprints have been updated throughout the report and are reflected in the trip generation.
    - Building ‘D’ is proposed as a two-storey structure, therefore the overall GLA is twice that shown on the site plan.
    - The footprint of Building ‘A’ has been corrected so that the square-metre size corresponds with its square-foot size.
2. Exhibit 5 is mistakenly labelled as "Potential Transit Routes".
    - The title of Exhibit 5 has been updated to ‘Adjacent Developments’
3. The OD-Survey's "Within District" mode shares do not appear to have been considered. The mode shares used in the report should be a blend between the "To District" and "Within District" shares. In addition, there does not seem to be any regular transit schedule in that area. This should be reflected in the new proposed mode shares. The local traffic counts should have considered all applicable modes, not just the auto drivers.
    - The mode shares in Table 9 have been updated to reflect the use of a blended rate of trips ‘To District’ and ‘Within District’ with a weighted average applied to each horizon year, based on the number of
    - A person-trip conversion rate was utilized to convert auto-trips to person-trips for the local, based on the blended vehicular mode share obtained from the 2011 OD Survey, which should be sufficient to consider any additional trips by non-vehicular modes.
4. Specifically, indicate the type of restaurant and commercial land uses (Buildings ‘C' and 'D') that will generate the 60% pass-by trips mentioned in the report.
    - Building ‘C’ will most likely be a fast-food restaurant or coffee shop.
    - Building ‘D’ will most likely be a retail or office space.
5. Provide clarity on how the 26% pass-by trips for the Hardware Store and the 60% pass-by trips for Buildings ‘C’ and ‘D’ were incorporated into Table 10 (i.e. how were the net pass-by auto trips calculated based on these percentages).
    - The trip generation for each of the land uses was calculated separately. Pass-by Auto Trips were calculated as a percentage of the trip generation for each of these land uses (26% pass-by rate for Hardware Store and 60% for Buildings ‘C’ and ‘D’).
6. Exhibit 6 does not appear to correspond with Table 10.
    - Exhibit 6 has been updated to correspond with Table 10.

Appendix B – Screening Form

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	4836 Bank Street
Description of Location	Leitrim Community – West of Bank Street and approx. 450m south of Blais Road
Land Use Classification	Commercial
Development Size (units or m^2)	Building 'A' – 2,650 m^2 (Hardware Store) Building 'B' – Approx. 125 units (Hotel) Building 'C' – 584 m^2 (Restaurant) Building 'D' – 1032 m^2 (Commercial)
Development Lot Size (m^2)	4836 Bank Street - 22,800 m^2
Number of Accesses and Locations	One right-in/right-out access proposed off of Bank Street One all movements access off of Dun Skipper Drive
Phase of Development	Home Hardware is expected to be built out by 2021, while the remaining buildings are expected to be built out by 2023
Buildout Year	2023

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

2. Trip Generation Trigger

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

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

Gas station or convenience market	75 m^2

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

The proposed development exceeds the development levels from Table 2, therefore the Trip Generation Trigger was satisfied.

3. Location Triggers

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

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

Based on the results above, the Location Trigger was satisfied.

4. Safety Triggers

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

Based on the results above, the Safety Trigger was satisfied.

5. Summary

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

One or more of the triggers was satisfied. Therefore, the TIA Study must continue into the next stage (Scoping).

Appendix C – Traffic Data

Geospace Research Associates

Urban and Regional Geographers 491 Edgeworth Avenue, Ottawa, Ontario. K2B5L2

VEHICLE VOLUME FIELD SHEET
COMBINED VOLUMES AND
PEAK/OFF PEAK HOURS

Street 1: Bank Street **Street 2:** Blais Road **Street 3:** Access to 4806 Bank Street

Road Conditions dry **Date** 27/1/16 **Day Name** Wednesday

Start Time 0700

Number of Hours 8

TIME	NORTHBOUND APPROACH ON BANK STREET			SOUTHBOUND APPROACH ON BANK STREET			EASTBOUND APPROACH ON 4806 BANK STREET			WESTBOUND APPROACH ON BLAIS ROAD		
	LT	ST	RT	LT	ST	RT	LT	ST	RT	LT	ST	RT
0700-0800	0	692	8	24	240	0	2	0	1	6	0	7
0800-0900	0	500	7	11	262	0	2	0	0	4	0	14
0900-1000	0	471	1	17	284	0	2	0	0	6	0	11
SUB TOTAL	**0**	**1663**	**16**	**52**	**786**	**0**	**6**	**0**	**1**	**16**	**0**	**32**
1130-1230	0	463	0	14	327	1	0	0	1	3	0	12
1230-1330	1	406	4	15	449	1	2	0	0	3	0	16
SUB TOTAL	**1**	**869**	**4**	**29**	**776**	**2**	**2**	**0**	**1**	**6**	**0**	**28**
1500-1600	0	297	4	6	608	0	2	0	1	3	0	5
1600-1700	0	397	5	3	805	0	1	0	0	14	0	24
1700-1800	0	331	6	8	642	0	0	0	0	16	0	19
SUB TOTAL	**0**	**1025**	**15**	**17**	**2055**	**0**	**3**	**0**	**1**	33	0	48
TOTAL	**1**	**3557**	**35**	**98**	**3617**	**2**	**11**	**0**	**3**	**55**	**0**	**108**
GRAND TOTAL	**3593**			**3717**			**14**			**163**		

Geospace Research Associates

Urban and Regional Geographers 491 Edgeworth Avenue, Ottawa, Ontario. K2B5L2

VEHICLE VOLUME FIELD SHEET
COMBINED VOLUMES AND
PEAK/OFF PEAK HOURS

Date **Day Name**

TIME	NORTHBOUND APPROACH ON BANK STREET			SOUTHBOUND APPROACH ON BANK STREET			EASTBOUND APPROACH ON 4806 BANK STREET			WESTBOUND APPROACH ON BLAIS ROAD		
	LT	ST	RT	LT	ST	RT	LT	ST	RT	LT	ST	RT
AM PEAK	0	692	8	24	240	0	2	0	1	6	0	7
0700-0800												
TOTAL	**700**			**264**			**3**			**13**		
OFF PEAK	1	470	2	18	450	0	1	0	0	1	0	17
1200-1300												
TOTAL	**473**			**468**			**1**			**18**		
PM PEAK	0	390	8	4	781	0	1	0	0	20	0	28
1615-1715												
TOTAL	**398**			**785**			**1**			**48**		

Survey Date: Tuesday December 11 2018
Weather: Snowy

NB (South Leg) Street Name: Bank Street
SB (North Leg) Street Name: Bank Street

EB (West Leg) Street Name: Home Hardware Access
WB (East Leg) Street Name:

Start Time (AM Peak): 7:00
End Time (AM Peak): 10:00

The AM Peak Hour is from 8:45 AM to 9:45 AM

AADT Factor: 1.3

Turning Movement Count - 15 Minute Vehicle Summary Report (AM Peak)

Time Period	Bank Street Northbound					Bank Street Southbound					N/S STREET TOTAL	Home Hardware Access Eastbound					0 Westbound					E/W STREET TOTAL	Grand TOTAL	1 Hour Traffic Volumes (All Scenarios)
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL			
7:00 7:15	0				**0**			1		**1**	**1**	0	0	0		**0**					**0**	**0**	**1**	14
7:15 7:30	0				**0**			2		**2**	**2**	0	0	2		**2**					**0**	**2**	**4**	17
7:30 7:45	0				**0**			2		**2**	**2**	1	0	0		**1**					**0**	**1**	**3**	16
7:45 8:00	1				**1**			2		**2**	**3**	1	0	2		**3**					**0**	**3**	**6**	18
8:00 8:15	1				**1**			1		**1**	**2**	2	0	0		**2**					**0**	**2**	**4**	31
8:15 8:30	2				**2**			0		**0**	**2**	0	0	1		**1**					**0**	**1**	**3**	31
8:30 8:45	1				**1**			2		**2**	**3**	1	0	1		**2**					**0**	**2**	**5**	42
8:45 9:00	6				**6**			3		**3**	**9**	4	1	5		**10**					**0**	**10**	**19**	46
9:00 9:15	1				**1**			1		**1**	**2**	1	0	1		**2**					**0**	**2**	**4**	41
9:15 9:30	5				**5**			4		**4**	**9**	2	0	3		**5**					**0**	**5**	**14**	
9:30 9:45	2				**2**			1		**1**	**3**	1	0	5		**6**					**0**	**6**	**9**	
9:45 10:00	3				**3**			5		**5**	**8**	3	0	3		**6**					**0**	**6**	**14**	
TOTAL:	22	0	0	0	**22**	0	0	24	0	**24**	**46**	16	1	23	0	**40**	0	0	0	0	**0**	**40**	**86**	
TOTAL PK HR:	14	0	0	0	14	0	0	9	0	9	23	8	1	14	0	23	0	0	0	0	0	23	46	

Start Time (PM Peak): 15:00
End Time (PM Peak): 18:00

The PM Peak Hour is from 3:00 PM to 4:00 PM

Turning Movement Count - 15 Minute Vehicle Summary Report (PM Peak)

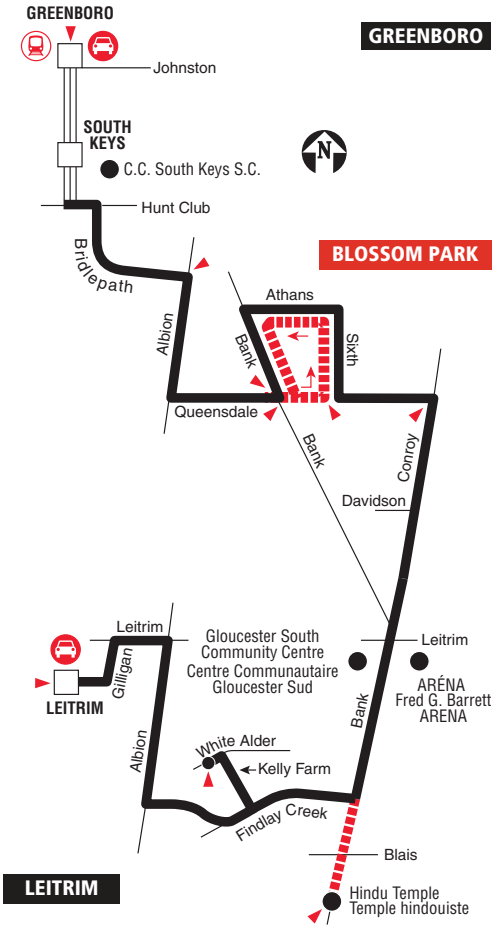
Time Period	Bank Street Northbound					Bank Street Southbound					N/S STR TOTAL	Home Hardware Access Eastbound					0 Westbound					E/W STR TOTAL	Grand TOTAL	1 Hour Traffic Volumes (All Scenarios)
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL			
15:00 15:15	1				**1**			2		**2**	**3**	0	0	5		**5**					**0**	**5**	**8**	38
15:15 15:30	2				**2**			2		**2**	**4**	1	0	4		**5**					**0**	**5**	**9**	36
15:30 15:45	1				**1**			5		**5**	**6**	0	0	3		**3**					**0**	**3**	**9**	38
15:45 16:00	0				**0**			4		**4**	**4**	1	0	7		**8**					**0**	**8**	**12**	29
16:00 16:15	1				**1**			3		**3**	**4**	1	0	1		**2**					**0**	**2**	**6**	23
16:15 16:30	2				**2**			2		**2**	**4**	1	0	6		**7**					**0**	**7**	**11**	22
16:30 16:45	0				**0**			0		**0**	**0**	0	0	0		**0**					**0**	**0**	**0**	22
16:45 17:00	1				**1**			3		**3**	**4**	1	0	1		**2**					**0**	**2**	**6**	26
17:00 17:15	1				**1**			2		**2**	**3**	1	0	1		**2**					**0**	**2**	**5**	26
17:15 17:30	1				**1**			4		**4**	**5**	4	0	2		**6**					**0**	**6**	**11**	
17:30 17:45	0				**0**			2		**2**	**2**	0	0	2		**2**					**0**	**2**	**4**	
17:45 18:00	1				**1**			3		**3**	**4**	1	0	1		**2**					**0**	**2**	**6**	
TOTAL:	11	0	0	0	**11**	0	0	32	0	**32**	**43**	11	0	33	0	**44**	0	0	0	0	**0**	**44**	**87**	
TOTAL PK HR:	4	0	0	0	4	0	0	13	0	13	17	2	0	19	0	21	0	0	0	0	0	21	38	

Appendix D – OC Transpo Routes

93 GREENBORO BLOSSOM PARK LEITRIM

Local

7 days a week / 7 jours par semaine
All day service
Service toute la journée



Legend • *Légende*

- Transitway & Station
- Some Sunday trips / *Quelques trajets le dimanche*
- Line 2 – O-Train Trillium Line / *Ligne 2 - O-Train LigneTrillium*
- Park & Ride / *Parc-o-Bus*
- Timepoint / *Heures de passage*

2017.12

Schedule / Horaire.....613-560-1000
Text / Texto 560560
plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres

Customer Relations
Service à la clientèle **613-842-3600**
Lost and Found / Objets perdus..... **613-563-4011**
Security / Sécurité..... **613-741-2478**

Effective December 24, 2017
En vigueur 24 décembre 2017

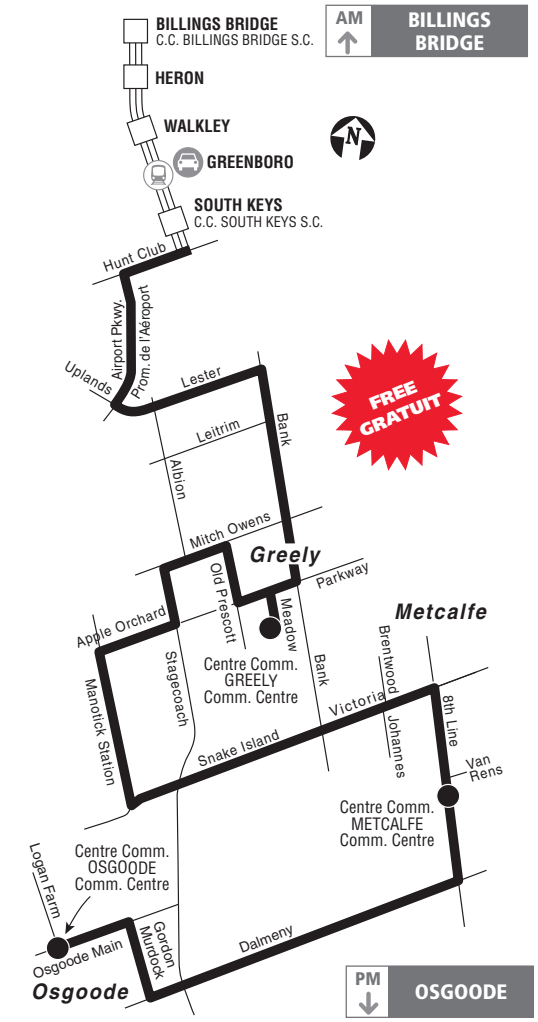
OC Transpo
INFO 613-741-4390
octranspo.com

FORMER / ANCIEN 204

304 BILLINGS BRIDGE METCALFE, GREELY OSGOODE

Thursday only / Jeudi seulement

Selected time periods
Périodes sélectionnées



Legend • *Légende*

Transitway & Stations

Line 2 – O-Train Trillium Line
Ligne 2 - O-Train LigneTrillium

Park & Ride / *Parc-o-bus*

2016.12

Information / Renseignement **613-741-4390**

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

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

Transecure..... **613-741-2478**

Schedule / Horaire..... **613-560-1000**

Text / Texto **560560**
plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres

Effective December 25, 2016
En vigueur 25 décembre 2016

OC Transpo **octranspo.com**

Appendix E – Collision Data

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2013 **To:** December 31, 2017

Location: BANK ST @ RIDEAU RD

Traffic Control: Traffic signal **Total Collisions:** 34

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2013-Jan-07, Mon,14:00	Clear	Rear end	P.D. only	Wet	South	Changing lanes	Pick-up truck	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Apr-23, Tue,06:34	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Oct-04, Fri,11:28	Rain	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Truck - open	Other motor vehicle	
2013-Sep-27, Fri,18:33	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2013-Dec-02, Mon,09:04	Clear	Rear end	P.D. only	Wet	North	Going ahead	Passenger van	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2013-Dec-18, Wed,15:20	Snow	Rear end	P.D. only	Wet	South	Slowing or stopping	Pick-up truck	Other motor vehicle	

					South	Stopped	Automobile, station wagon	Other motor vehicle
2013-Dec-24, Tue,13:10	Snow	Rear end	P.D. only	Loose snow	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Passenger van	Other motor vehicle
2014-May-13, Tue,20:30	Rain	Turning movement	Non-fatal injury	Wet	South	Going ahead	Passenger van	Other motor vehicle
					North	Turning left	Automobile, station wagon	Other motor vehicle
					North	Stopped	Truck - dump	Other motor vehicle
2014-Aug-01, Fri,07:03	Clear	Angle	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Pick-up truck	Other motor vehicle
2015-Jan-09, Fri,08:08	Clear	Rear end	P.D. only	Slush	North	Turning right	Automobile, station wagon	Other motor vehicle
					North	Turning right	Pick-up truck	Other motor vehicle
2015-Jun-17, Wed,16:33	Clear	Turning movement	P.D. only	Dry	East	Turning right	Truck and trailer	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Feb-10, Tue,16:36	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle

2015-Aug-05, Wed,06:23	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Slowing or stopping	Pick-up truck	Other motor vehicle
2015-Jun-01, Mon,03:40	Clear	SMV other	P.D. only	Dry	West	Turning left	Automobile, station wagon	Pole (utility, power)
2015-Apr-17, Fri,12:39	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2015-Apr-17, Fri,15:20	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Truck - dump	Other motor vehicle
2015-Sep-11, Fri,07:41	Clear	Other	P.D. only	Dry	East	Reversing	Truck - closed	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2015-Nov-16, Mon,15:38	Clear	Rear end	P.D. only	Dry	West	Overtaking	Truck-other	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2015-Nov-05, Thu,10:40	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2016-Mar-07, Mon,21:45	Clear	Turning movement	Non-fatal injury	Wet	North	Turning left	Passenger van	Other motor vehicle

					South	Going ahead	Pick-up truck	Other motor vehicle
2016-Jan-22, Fri,13:39	Clear	Rear end	P.D. only	Dry	North	Turning left	Unknown	Other motor vehicle
					North	Turning left	Pick-up truck	Other motor vehicle
2016-Jun-16, Thu,15:05	Clear	Angle	Non-fatal injury	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Motorcycle	Other motor vehicle
2016-May-02, Mon,16:26	Clear	Angle	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
2016-Dec-19, Mon,16:44	Clear	Turning movement	P.D. only	Wet	East	Turning left	Pick-up truck	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
2016-Nov-22, Tue,09:22	Snow	Rear end	P.D. only	Wet	South	Going ahead	Tow truck	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
2017-Jul-05, Wed,19:47	Clear	Turning movement	Fatal injury	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Motorcycle	Other motor vehicle
2017-Aug-29, Tue,12:53	Clear	Rear end	Non-fatal injury	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle

					South	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Mar-02, Thu,13:25	Clear	Turning movement	P.D. only	Dry	West	Turning left	Truck and trailer	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Mar-15, Wed,16:20	Snow	Rear end	Non-fatal injury	Ice	South	Slowing or stopping	Pick-up truck	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2017-Apr-03, Mon,12:07	Clear	Sideswipe	P.D. only	Dry	West	Overtaking	Automobile, station wagon	Other motor vehicle
					West	Pulling onto shoulder or toward curb	Automobile, station wagon	Other motor vehicle
2017-Mar-26, Sun,15:52	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2017-May-19, Fri,10:20	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2017-Jul-17, Mon,14:35	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2017-Dec-25, Mon,22:57	Snow	SMV other	P.D. only	Packed snow	North	Going ahead	Snow plow	Pole (utility, power)

Location: BANK ST btwn BLAIS RD & RIDEAU RD

Traffic Control: No control

Total Collisions: 23

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2013-Sep-03, Tue,16:26	Clear	Rear end	Non-fatal injury	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
					South	Turning left	Automobile, station wagon	Other motor vehicle	
2013-Dec-10, Tue,15:24	Clear	SMV other	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Pole (sign, parking meter)	
2013-Dec-06, Fri,15:15	Clear	Rear end	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Jan-15, Wed,07:52	Snow	Rear end	Non-fatal injury	Dry	South	Going ahead	Truck and trailer	Other motor vehicle	
					South	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Aug-30, Sat,13:35	Clear	SMV other	P.D. only	Dry	South	Turning right	Pick-up truck	Ran off road	
2014-Aug-13, Wed,14:00	Clear	Turning movement	P.D. only	Dry	North	Pulling away from shoulder or curb	Pick-up truck	Other motor vehicle	
					North	Turning right	Pick-up truck	Other motor vehicle	
2014-Dec-06, Sat,03:01	Clear	SMV other	P.D. only	Ice	South	Going ahead	Pick-up truck	Ran off road	
2015-Jan-15, Thu,08:49	Clear	Rear end	P.D. only	Wet	South	Slowing or stopping	Automobile, station wagon	Skidding/sliding	

					South	Slowing or stopping	School bus	Other motor vehicle
2015-Jun-18, Thu,17:57	Clear	Rear end	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2015-Jun-17, Wed,16:45	Clear	Angle	P.D. only	Dry	East	Turning left	Pick-up truck	Other motor vehicle
					South	Turning left	Passenger van	Other motor vehicle
2015-Oct-04, Sun,12:41	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Passenger van	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Oct-05, Mon,16:38	Clear	Angle	P.D. only	Dry	North	Going ahead	Truck - closed	Other motor vehicle
					East	Going ahead	Pick-up truck	Other motor vehicle
2016-Mar-08, Tue,12:37	Clear	Rear end	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Turning left	Pick-up truck	Other motor vehicle
2016-Feb-29, Mon,17:36	Clear	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Turning left	Pick-up truck	Other motor vehicle

2016-Jun-28, Tue,14:00	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Apr-27, Wed,12:20	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2016-Jul-20, Wed,12:33	Clear	Angle	Non-fatal injury	Dry	East	Turning left	Pick-up truck	Other motor vehicle
					South	Going ahead	Motorcycle	Other motor vehicle
2016-Jul-20, Wed,18:12	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2016-Jun-13, Mon,12:10	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Turning left	School bus	Other motor vehicle
2016-Dec-11, Sun,15:59	Clear	Sideswipe	P.D. only	Dry	South	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Unknown	Other motor vehicle
2017-Jun-14, Wed,17:14	Clear	Turning movement	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle

2017-Jul-08, Sat,12:45	Clear	Rear end	Non-fatal injury	Dry	South	Slowing or stopping	Pick-up truck	Other motor vehicle	
					South	Turning left	Passenger van	Other motor vehicle	
2017-Dec-14, Thu,10:03	Clear	Rear end	Non-fatal injury	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Turning left	Automobile, station wagon	Other motor vehicle	

Location: BLAIS RD @ BANK ST

Traffic Control: Stop sign

Total Collisions: 5

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Feb-17, Tue,17:03	Clear	Rear end	P.D. only	Dry	South	Going ahead	Passenger van	Other motor vehicle	
					South	Slowing or stopping	Pick-up truck	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Feb-09, Tue,09:00	Snow	Approaching	P.D. only	Ice	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Jan-07, Thu,06:35	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	
2016-Oct-02, Sun,15:56	Clear	Rear end	Non-fatal injury	Wet	South	Going ahead	Pick-up truck	Other motor vehicle	
					South	Turning left	Automobile, station wagon	Other motor vehicle	

2017-May-14, Sun,21:45	Clear	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Pick-up truck	Other motor vehicle

Appendix F – Trip Generation Data

Local Rate Developed from Existing Leitrim Home Hardware conducted on December 11, 2018

	(m2)	(ft2)
Size of Store HomeHardware :	1500	16146
AM Peak	46	
PM Peak	38	
Rate	veh/1000m2	veh/1000ft2
AM	30.667	2.849
PM	25.333	2.354
	in	out
AM	23	23
PM	17	21
Split	In	out
AM	50%	50%
PM	45%	55%

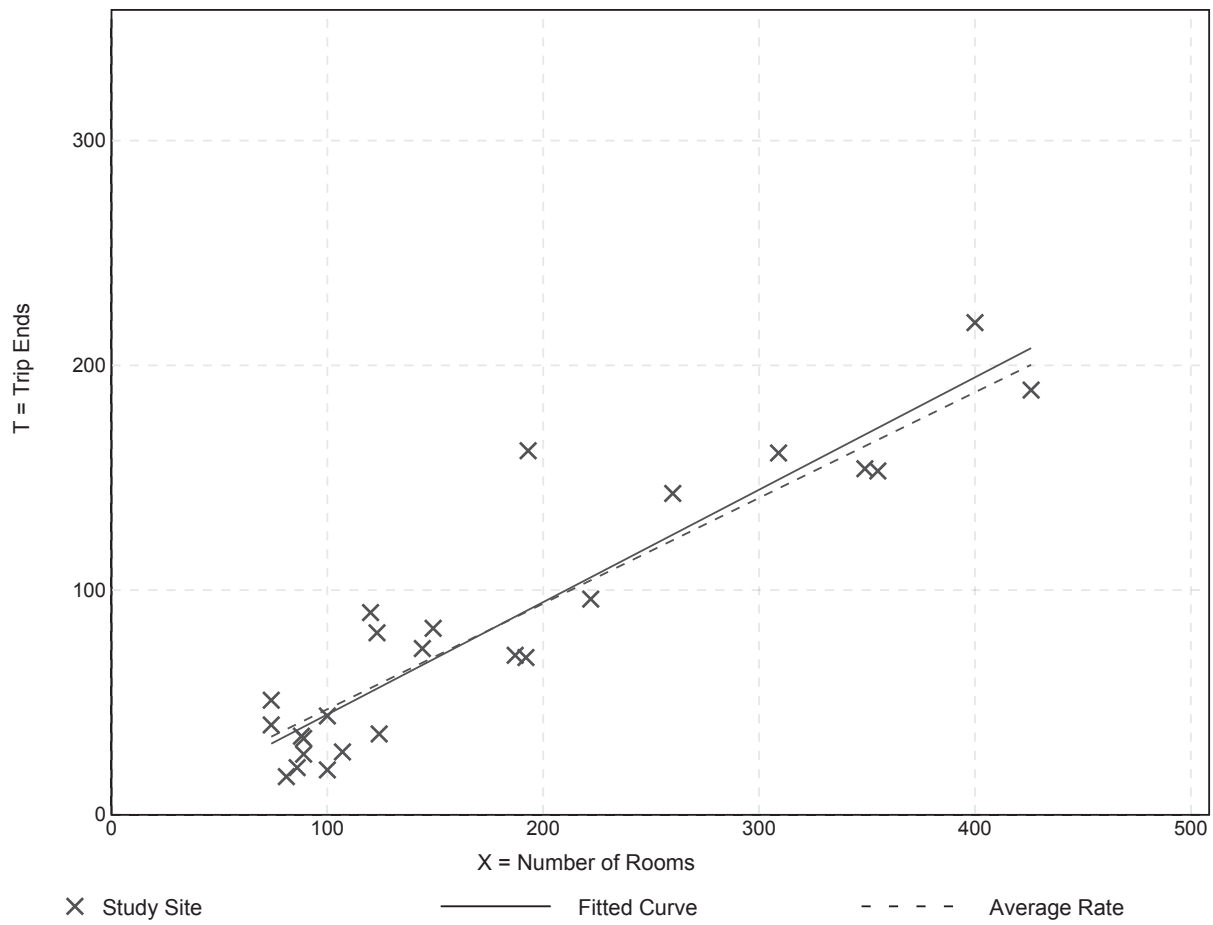
Hotel
(310)

Vehicle Trip Ends vs:	Rooms
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	25
Avg. Num. of Rooms:	178
Directional Distribution:	59% entering, 41% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.47	0.20 - 0.84	0.14

Data Plot and Equation



Fitted Curve Equation: T = 0.50(X) - 5.34

R^2= 0.85

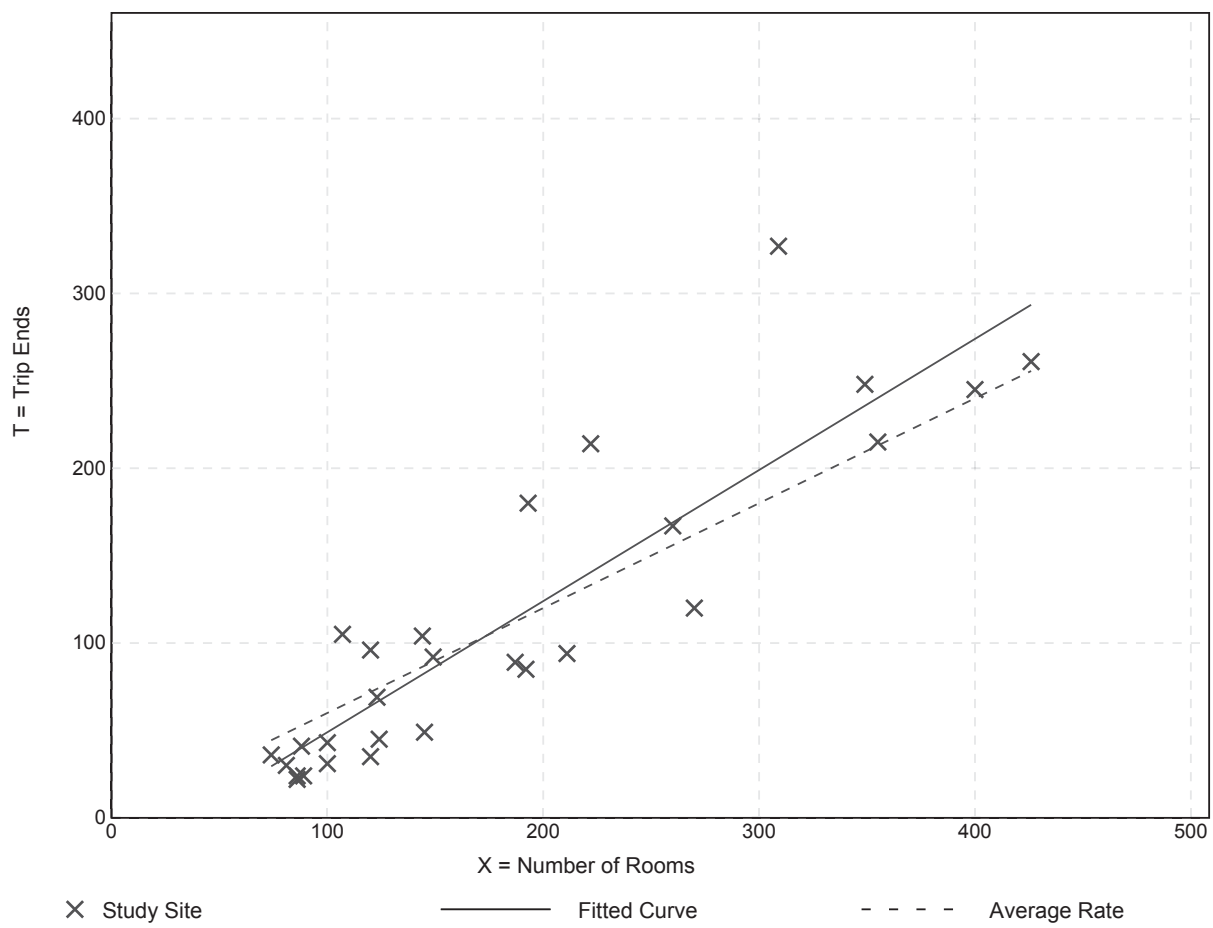
Hotel
(310)

Vehicle Trip Ends vs:	Rooms
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	28
Avg. Num. of Rooms:	183
Directional Distribution:	51% entering, 49% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.60	0.26 - 1.06	0.22

Data Plot and Equation



Fitted Curve Equation: T = 0.75(X) - 26.02

R^2= 0.80

FINDLAY CREEK CENTRE TRIP GENERATION SURVEY RESULTS
21-Jan-14

TIME	Signalized Int @ Bank ST		TIME	RIRO @ Bank ST		TIME	Findlay Creek Access		
	IN	OUT		IN	OUT		IN	OUT	
0630-0645	23	17	0630-0645	12	0	0630-0645	15	23	
0645-0700	37	10	0645-0700	7	1	0645-0700	23	41	
0700-0715	25	11	0700-0715	14	0	0700-0715	24	43	
0715-0730	21	17	0715-0730	8	0	0715-0730	26	41	439
0730-0745	23	7	0730-0745	12	0	0730-0745	21	28	440
0745-0800	22	17	0745-0800	11	1	0745-0800	30	27	429
0800-0815	30	15	0800-0815	8	3	0800-0815	29	38	435
0815-0830	34	20	0815-0830	9	1	0815-0830	40	39	465
TOTAL	215	114	TOTAL	81	6	TOTAL	208	280	
1600-1615	25	40	1600-1615	18	21	1600-1615	85	49	
1615-1630	22	31	1615-1630	10	22	1615-1630	47	71	
1630-1645	25	27	1630-1645	21	7	1630-1645	71	60	
1645-1700	23	38	1645-1700	13	22	1645-1700	67	62	877
1700-1715	33	36	1700-1715	15	12	1700-1715	65	66	866
1715-1730	25	30	1715-1730	15	10	1715-1730	72	60	875
1730-1745	14	35	1730-1745	19	12	1730-1745	61	77	882
1745-1800	9	29	1745-1800	8	12	1745-1800	60	50	825
TOTAL	176	266	TOTAL	119	118	TOTAL	528	495	

Site Uses	GFA
Canadian Tire	39,081
McDonalds	5,468
Gas Station	-
Day Care	3,120
Subway	1,690
Pet Store	1,375
Hair Salon	1,205
Cleaner	925
Dentist	1,830
Johnny Canucks	5,925
Tim Hortons	2,407
Restaurant	2,500
Shawarma	1,500
Optical	1,200
Unknown	1,500
Unknown	850
Unknown	1,505
Bulk Barn	5,010
LCBO	6,210
Freshco	32,532
Medical Centre	7,480
Shoppers	16,845
Scotiabank	4,972
CIBC	6,130
TOTAL	**151,260**
	658,395
	23% FAR

2-hr Site	IN	OUT
AM	**504**	**400**
PM	**823**	**879**

	IN	OUT	TOTAL	RATE
AM Peak	269	196	**465**	3.07
PM Peak	422	460	**882**	5.83

AM Peak	58%	42%
PM Peak	48%	52%

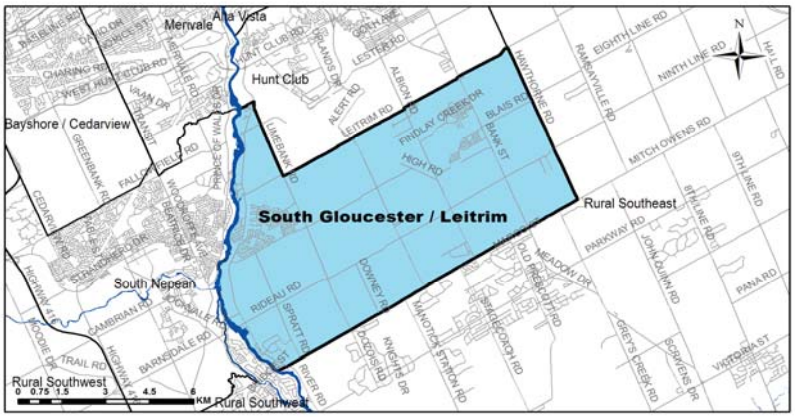
South Gloucester / Leitrim

Demographic Characteristics

Population	17,600	Actively Travelled	14,190
Employed Population	8,910	Number of Vehicles	11,080
Households	6,240	Area (km^2)	78.9

Occupation Status (age 5+)	Male	Female	Total
Full Time Employed	4,550	3,630	8,180
Part Time Employed	130	590	730
Student	2,160	2,130	4,290
Retiree	720	770	1,490
Unemployed	90	220	320
Homemaker	20	540	560
Other	80	120	200
Total:	7,750	8,010	15,760

Traveller Characteristics	Male	Female	Total
Transit Pass Holders	790	1,070	1,850
Licensed Drivers	5,790	5,940	11,730
Telecommuters	60	10	70
Trips made by residents	20,810	24,430	45,240

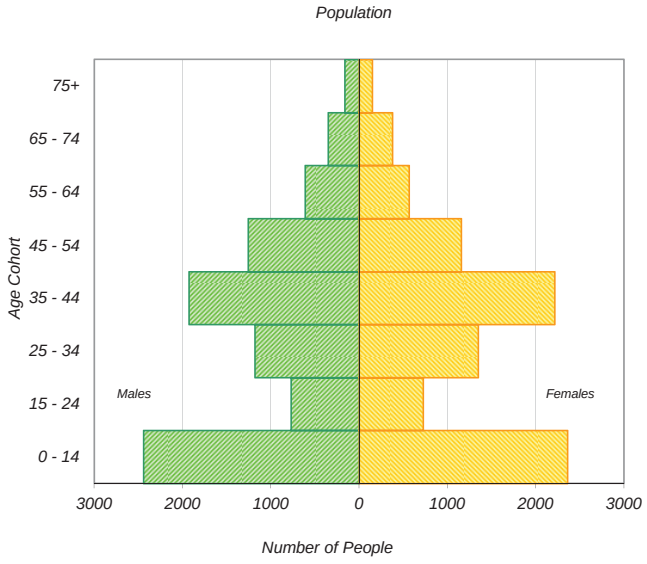


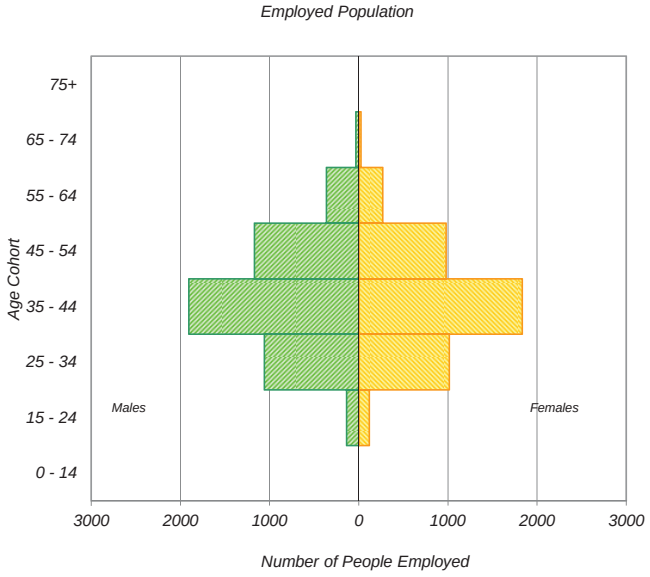
Household Size		
1 person	880	14%
2 persons	1,870	30%
3 persons	1,170	19%
4 persons	1,630	26%
5+ persons	690	11%
Total:	6,240	100%

Households by Vehicle Availability		
0 vehicles	40	1%
1 vehicle	2,080	33%
2 vehicles	3,510	56%
3 vehicles	510	8%
4+ vehicles	100	2%
Total:	6,240	100%

Selected Indicators	
Daily Trips per Person (age 5+)	2.87
Vehicles per Person	0.63
Number of Persons per Household	2.82
Daily Trips per Household	7.25
Vehicles per Household	1.78
Workers per Household	1.43
Population Density (Pop/km2)	220

Households by Dwelling Type		
Single-detached	3,300	53%
Semi-detached	770	12%
Townhouse	2,010	32%
Apartment/Condo	150	2%
Total:	6,240	100%



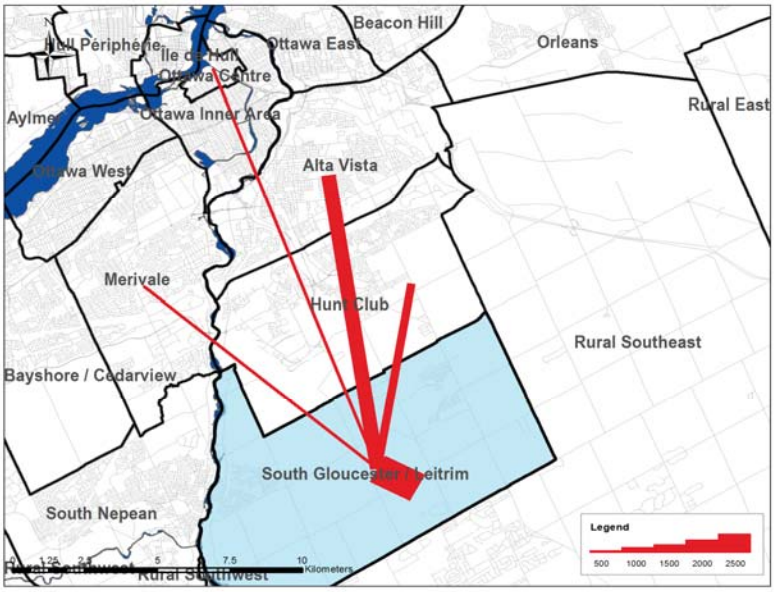


* In 2005 data was only collected for household members aged 11$^+$ therefore these results cannot be compared to the 2011 data.

Travel Patterns

Top Five Destinations of Trips from South Gloucester / Leitrim

AM Peak Period



Summary of Trips to and from South Gloucester / Leitrim

AM Peak Period (6:30 - 8:59) Districts	Destinations of Trips From District	% Total	Origins of Trips To District	% Total
Ottawa Centre	930	9%	0	0%
Ottawa Inner Area	530	5%	250	4%
Ottawa East	240	2%	40	1%
Beacon Hill	240	2%	30	0%
Alta Vista	1,970	18%	160	2%
Hunt Club	1,100	10%	870	13%
Merivale	770	7%	340	5%
Ottawa West	290	3%	0	0%
Bayshore / Cedarview	170	2%	70	1%
Orléans	50	0%	170	3%
Rural East	0	0%	10	0%
Rural Southeast	210	2%	570	8%
South Gloucester / Leitrim	3,680	34%	3,680	55%
South Nepean	310	3%	100	1%
Rural Southwest	120	1%	220	3%
Kanata / Stittsvile	140	1%	60	1%
Rural West	40	0%	60	1%
Île de Hull	90	1%	0	0%
Hull Périphérie	10	0%	20	0%
Plateau	0	0%	20	0%
Aylmer	0	0%	0	0%
Rural Northwest	20	0%	10	0%
Pointe Gatineau	10	0%	30	0%
Gatineau Est	0	0%	0	0%
Rural Northeast	20	0%	0	0%
Buckingham / Masson-Angers	0	0%	20	0%
Ontario Sub-Total:	10,790	99%	6,630	99%
Québec Sub-Total:	150	1%	100	1%
Total:	10,940	100%	6,730	100%

Trips by Trip Purpose

24 Hours	From District		To District		Within District	
Work or related	6,300	29%	3,270	15%	700	6%
School	1,640	8%	840	4%	1,930	16%
Shopping	1,830	8%	720	3%	700	6%
Leisure	2,730	13%	1,990	9%	660	6%
Medical	440	2%	120	1%	120	1%
Pick-up / drive passenger	1,610	7%	970	4%	1,720	14%
Return Home	6,020	28%	13,110	60%	5,320	44%
Other	1,160	5%	680	3%	850	7%
Total:	21,730	100%	21,700	100%	12,000	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Work or related	4,650	64%	1,740	57%	420	11%
School	1,310	18%	810	27%	1,580	43%
Shopping	60	1%	40	1%	10	0%
Leisure	140	2%	50	2%	0	0%
Medical	80	1%	0	0%	0	0%
Pick-up / drive passenger	780	11%	180	6%	900	25%
Return Home	100	1%	120	4%	330	9%
Other	150	2%	110	4%	430	12%
Total:	7,270	100%	3,050	100%	3,670	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Work or related	140	3%	150	2%	40	1%
School	30	1%	0	0%	80	2%
Shopping	270	6%	170	2%	210	6%
Leisure	840	19%	420	6%	140	4%
Medical	50	1%	0	0%	30	1%
Pick-up / drive passenger	310	7%	360	5%	400	12%
Return Home	2,400	54%	5,990	82%	2,350	69%
Other	400	9%	200	3%	150	4%
Total:	4,440	100%	7,290	100%	3,400	100%

Peak Period (%)	Total:	% of 24 Hours	Within District (%)
24 Hours	55,430		22%
AM Peak Period	13,990	25%	26%
PM Peak Period	15,130	27%	22%

Trips by Primary Travel Mode

24 Hours	From District		To District		Within District	
Auto Driver	14,990	69%	14,970	69%	5,210	43%
Auto Passenger	3,870	18%	3,650	17%	3,120	26%
Transit	1,630	8%	1,740	8%	200	2%
Bicycle	90	0%	100	0%	20	0%
Walk	40	0%	40	0%	2,680	22%
Other	1,110	5%	1,200	6%	770	6%
Total:	21,730	100%	21,700	100%	12,000	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Auto Driver	4,640	64%	2,070	68%	1,540	42%
Auto Passenger	1,260	17%	210	7%	1,140	31%
Transit	860	12%	100	3%	60	2%
Bicycle	70	1%	20	1%	10	0%
Walk	20	0%	0	0%	620	17%
Other	420	6%	640	21%	300	8%
Total:	7,270	100%	3,040	100%	3,670	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Auto Driver	3,100	70%	4,920	67%	1,510	44%
Auto Passenger	1,020	23%	1,120	15%	860	25%
Transit	150	3%	790	11%	50	1%
Bicycle	20	0%	80	1%	0	0%
Walk	10	0%	0	0%	850	25%
Other	130	3%	390	5%	130	4%
Total:	4,430	100%	7,300	100%	3,400	100%

Avg Vehicle Occupancy	From District	To District	Within District
24 Hours	1.26	1.24	1.60
AM Peak Period	1.27	1.10	1.74
PM Peak Period	1.33	1.23	1.57

Transit Modal Split	From District	To District	Within District
24 Hours	8%	9%	2%
AM Peak Period	13%	4%	2%
PM Peak Period	4%	12%	2%

Appendix G – TDM Measures

TDM-Supportive Development Design and Infrastructure Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☐ Not Applicable
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑

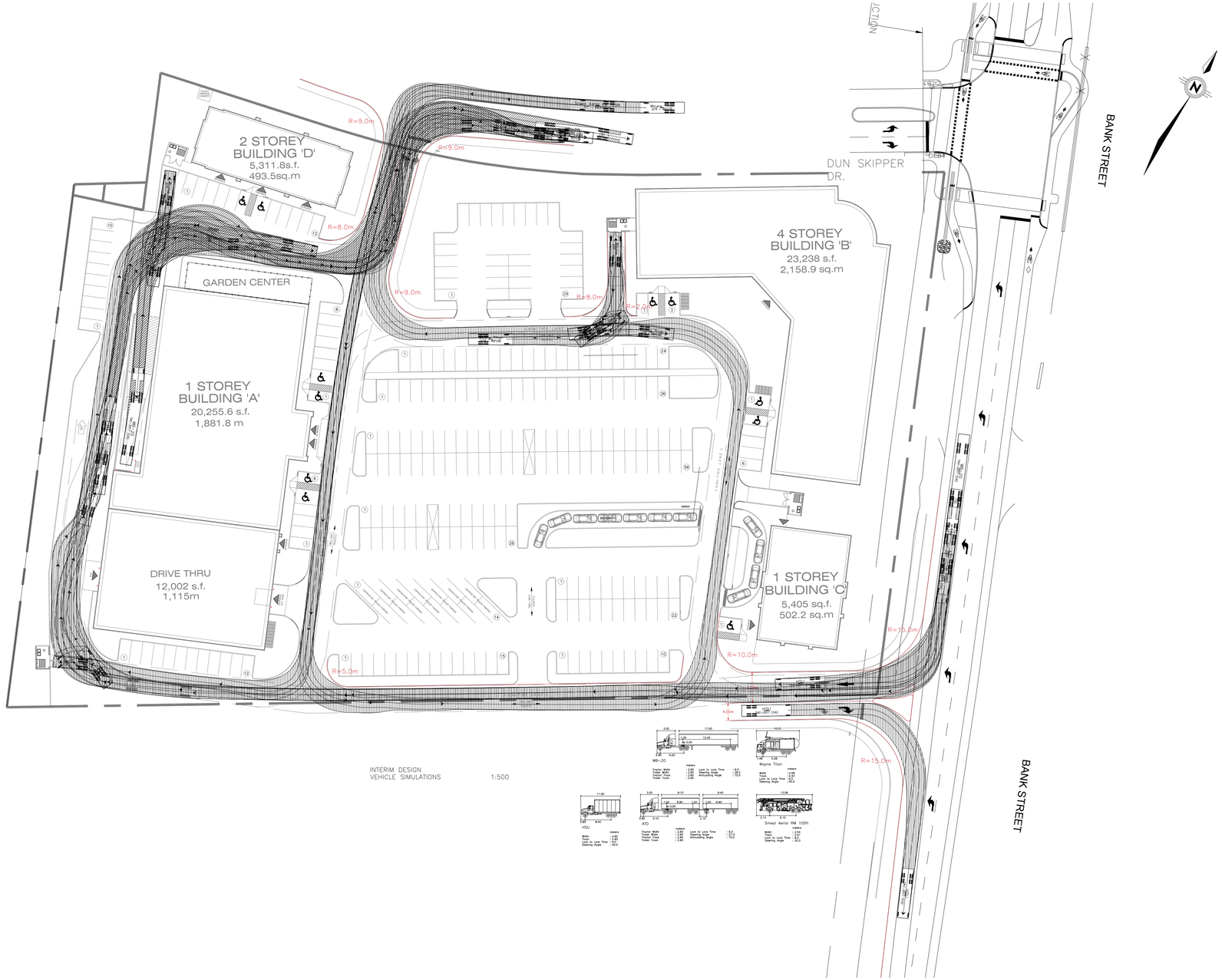
TDM-supportive design & infrastructure measures: *Non-residential developments*			Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian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

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☑
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	☐
BETTER	2.1.5	Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☐ Not Applicable 18 bicycle stalls are proposed on-site
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	☐
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	☐
BETTER	2.3.2	In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	☐
	2.4	**Bicycle repair station**	
BETTER	2.4.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐

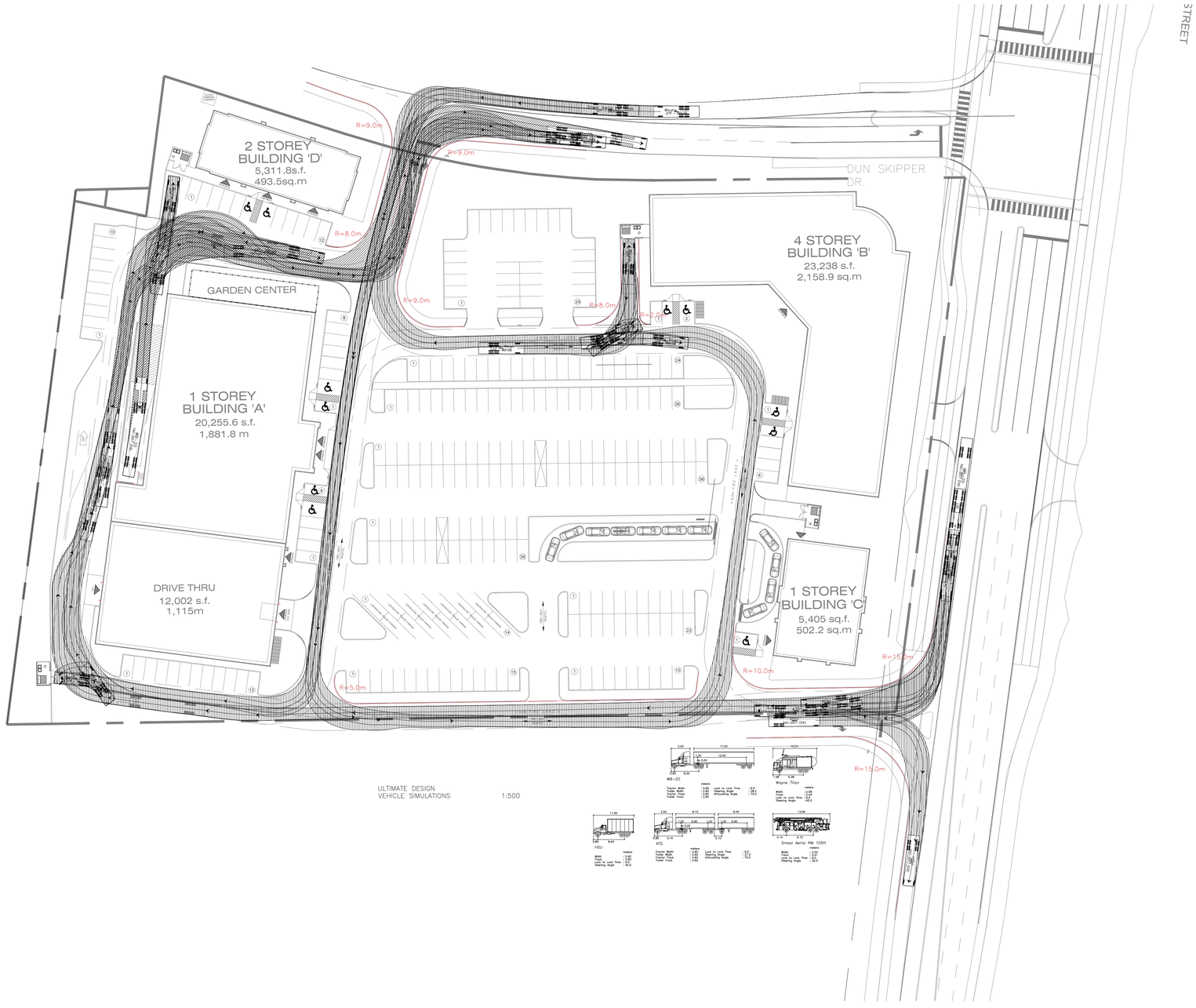
		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	4.2	**Carpool parking**	
BASIC	4.2.1	Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	☐
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	☐
	7.	**OTHER**	
	7.1	**On-site amenities to minimize off-site trips**	
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands	☐

Appendix H – Truck Templates



Bank Street - Interim Design (Two-Lane) Swept Path Analysis



Bank Street - Ultimate Design (Four-Lane) Swept Path Analysis

Appendix I – MMLOS Analysis

Multi-Modal Level of Service
4836 Bank Street (119351)
Scenario: Existing (2019)

March 18, 2019

IBI

INTERSECTIONS		Bank Street & Blais Road (unsignalized)				Bank Street & Home Hardware Access (unsignalized)			
		NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg
Pedestrian	Lanes (do NOT include lanes protected by bulb-outs)								
	Median								
	Island Refuge								
	Conflicting Left Turns (from street to right)								
	Conflicting Right Turns (from street to left)								
	RTOR? (from street to left)								
	Ped Leading Interval? (on cross street)								
	Corner Radius								
	Right Turn Channel								
	Crosswalk Type								
	LOS (PETSI)								
	Cycle Length (sec)								
	Pedestrian Walk Time (solid white symbol) (sec)								
	LOS (Delay,seconds)								
	Overall Level of Service								
Cyclist	Type of Bikeway								
	Turning Speed (based on corner radius & angle)								
	Right Turn Storage Length								
	Dual Right Turn?								
	Shared Through-Right?								
	Bike Box?								
	Number of Lanes Crossed for Left Turns								
	Operating Speed on Approach								
	Dual Left Turn Lanes?								
	Level of Service								
Transit	Average Signal Delay								
	Level of Service								
Truck	Turning Radius (Right Turn)								
	Number of Receiving Lanes								
Auto	Level of Service	(See Synchro Results)				(See Synchro Results)			

SEGMENTS		Bank Street & Blais Road (unsignalized)	Section 1	Section 2	Section 3	Bank Street & Proposed RIRO Access	Section 1	Section 2	Section 3
Pedestrian	Sidewalk Width		No Sidewalk	No Sidewalk	No Sidewalk				
	Boulevard Width		N/A	N/A	N/A				
	AADT		N/A	N/A	N/A				
	On-Street Parking		N/A	N/A	N/A				
	Operating Speed		61 km/h or more	61 km/h or more	61 km/h or more				
	Level of Service		F	F	F				
			F				#VALUE!		
Cyclist	Type of Bikeway		Mixed Traffic						
	Number of Travel Lanes (per direction)		1 Travel Lane Per Direction						
	Raised Median?		No						
	Bike Lane Width		≥1.8 m wide bike lane						
	Operating Speed		≥ 70 km/h						
	Bike Lane Blockages (Commercial Areas)		Frequent						
	Median Refuge		No Median Refuge						
	Number of Travel Lanes on Sidestreet		2 Lanes Crossed						
	Sidestreet Operating Speed		≤ 40 km/h						
	Level of Service		F						
Transit	Facility Type		Mixed Traffic						
	Friction		Moderate parking/driveway friction						
	Level of Service		E				#N/A		
Truck	Curb Lane Width		>3.7	>3.7	>3.7				
	Number of Travel Lanes		2	2	2				
			B	B	B				
			B				#VALUE!		

* Intersection MMLOS only applies to signalized intersections

Multi-Modal Level of Service
4836 Bank Street (119351)
Scenario: Future (2023) Background & Total Traffic Scenarios

March 18, 2019

IBI

INTERSECTIONS		Bank & RIRO Access [1] (unsignalized)				Bank & Dun Skipper (signalized)				Bank & Blais (signalized)				Dun Skipper & Proposed Access [1] (unsignalized)			
Pedestrian	Lanes (do NOT include lanes protected by bulb-outs)					3	3		3	4	3	3	3				
	Median					No Median	No Median		No Median	No Median	No Median	No Median	No Median				
	Island Refuge					0	0		0	0	0	0	0				
	Conflicting Left Turns (from street to right)					Permissive	No left turn/prohibited		Protected/permissive	Protected/permissive	Permissive	Protected/permissive	Protected/permissive				
	Conflicting Right Turns (from street to left)					No right turn	Permissive or yield control		Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control				
	RTOR? (from street to left)					RTOR prohibited	RTOR allowed		RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed				
	Ped Leading Interval? (on cross street)					No	No		No	No	No	No	No				
	Corner Radius					> 10m to 15m	No right turn		> 10m to 15m	> 10m to 15m	> 15m to 25m	> 10m to 15m	> 10m to 15m				
	Right Turn Channel					No right turn channel	No right turn		No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel				
	Crosswalk Type					Zebra stripe hi-vis markings	Zebra stripe hi-vis markings		Zebra stripe hi-vis markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings				
	LOS (PETSI)					81 B	91 A		73	53 D	68 C	70 C	70 C				
	Cycle Length (sec)					120	120		120	120	120	120	120				
	Pedestrian Walk Time (solid white symbol) (sec)					7	7		7	7	7	7	7				
	LOS (Delay,seconds)					54.3 E	54.3 E		54.3 E	54.3 E	54.3 E	54.3 E	54.3 E				
	Overall Level of Service					E				E							
Cyclist	Type of Bikeway					Mixed Traffic	Mixed Traffic		Mixed Traffic	Bike Lanes/Cycle Track	Bike Lanes/Cycle Track	Mixed Traffic	Mixed Traffic				
	Turning Speed (based on corner radius & angle)					0	0		0	≤ 40km/h	50km/h	≤ 40km/h	≤ 40km/h				
	Right Turn Storage Length					> 50m			> 50m	≤ 50m	≤ 50m	≤ 50m	> 50m				
	Dual Right Turn?					No	No		No	No	No	No	No				
	Shared Through-Right?					No	No		No	No	Yes	Yes	Yes				
	Bike Box?					No	No		No	No	No	No	No				
	Number of Lanes Crossed for Left Turns					2+ Lanes Crossed	1 Lane Crossed		1 Lane Crossed	2+ Lanes Crossed	1 Lane Crossed	1 Lane Crossed	1 Lane Crossed				
	Operating Speed on Approach					≥ 60km/h	≥ 60km/h		≥ 60km/h	≥ 60km/h	≥ 60km/h	50km/h	50km/h				
	Dual Left Turn Lanes?					No	No		No	No	No	No	No				
	Level of Service					E	E		D	F	F	F	F				
						E				F							
Transit	Average Signal Delay					≤10 sec	≤10 sec		>40 sec	≤20 sec	≤10 sec	≤20 sec	>40 sec				
	Level of Service					B	B	A	F	C	B	C	F				
						F				F							
Truck	Turning Radius (Right Turn)					10 to 15m			10 to 15m	10 to 15m	> 15m	10 to 15m	10 to 15m				
	Number of Receiving Lanes					1			1	1	1	1	1				
						E			E	E	C	E	E				
										E							
Auto	Level of Service	(See Synchro Results)				(See Synchro Results)				(See Synchro Results)				(See Synchro Results)			

SEGMENTS		Bank & Blais	Section 1	Section 2	Section 3	Bank & Dun Skipper	Section 1	Section 2	Section 3	Bank & Prop. Access	Section			Dun Skipper at Bank St	Section 1	Section 2	Section 3	Dun Skipper at Prop. All Mvmts Access
Pedestrian	Sidewalk Width		No Sidewalk	No Sidewalk	No Sidewalk		No Sidewalk	No Sidewalk	No Sidewalk						2.0 or more	2.0 or more	2.0 or more	
	Boulevard Width		0	0	0		0	0	0						0.5 to 2	0.5 to 2	0.5 to 2	
	AADT		> 3000	> 3000	> 3000		> 3000	> 3000	> 3000						> 3000	> 3000	> 3000	
	On-Street Parking		No	No	No		No	No	No						Yes	Yes	Yes	
	Operating Speed		61 km/h or more	61 km/h or more	61 km/h or more		61 km/h or more	61 km/h or more	61 km/h or more						51 to 60 km/h	51 to 60 km/h	51 to 60 km/h	
	Level of Service		F	F	F		F	F	F						C	C	C	
			F				F								C			
Cyclist	Type of Bikeway		Bike Lanes Not Adjacent Parking Lane				Bike Lanes Not Adjacent Parking Lane								Mixed Traffic			
	Number of Travel Lanes (per direction)		1 Travel Lane Per Direction				1 Travel Lane Per Direction								1 Travel Lane Per Direction			
	Raised Median?		Yes				Yes								No			
	Bike Lane Width		≥1.8 m wide bike lane				≥1.8 m wide bike lane								N/A			
	Operating Speed		≥ 70 km/h				≥ 70 km/h								50 km/h			
	Bike Lane Blockages (Commercial Areas)		Rare				Rare								Rare			
	Median Refuge		No Median Refuge				No Median Refuge								No Median Refuge			
	Number of Travel Lanes on Sidestreet		2 Lanes Crossed				3 Lanes Crossed								2 Lanes Crossed			
	Sidestreet Operating Speed		50 km/h				50 km/h								50 km/h			
	Level of Service		E				E								D			
Transit	Facility Type		Mixed Traffic				Mixed Traffic								Mixed Traffic			
	Friction		Limited parking/driveway friction				Limited parking/driveway friction								Limited parking/driveway friction			
	Level of Service		D				D								D			
Truck	Curb Lane Width		≤3.5	≤3.5	≤3.5		≤3.5	≤3.5	≤3.5						≤3.5	≤3.5	≤3.5	
	Number of Travel Lanes		2	2	2		2	2	2						2	2	2	
			C	C	C		C	C	C						C	C	C	
			C				C								C			

1. Intersection MMLOS is not applicable for unsignalized intersections.

Multi-Modal Level of Service
4836 Bank (119351)
Scenario: Future (2028) Background and Total Traffic Scenarios

March 18, 2019

IBI

INTERSECTIONS		Bank & Proposed Access (unsignalized) [1]				Bank & Dun Skipper (signalized)				Bank & Blais (signalized)				Bank & RIRO Access (unsignalized) [1]			
		NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg
Pedestrian	Lanes (do NOT include lanes protected by bulb-outs)					6	6		4	6	6	4	4				
	Median					No Median	No Median		No Median	No Median	No Median	No Median	No Median				
	Island Refuge					0	0		0	0	0	0	0				
	Conflicting Left Turns (from street to right)					Permissive	No left turn/prohibited		Protected/permissive	Protected/permissive	Permissive	Protected/permissive	Protected/permissive				
	Conflicting Right Turns (from street to left)					No right turn	Permissive or yield control		Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control				
	RTOR? (from street to left)					RTOR prohibited	RTOR allowed		RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed				
	Ped Leading Interval? (on cross street)					No	No		No	No	No	No	No				
	Corner Radius					> 10m to 15m	No right turn		> 10m to 15m	> 10m to 15m	> 15m to 25m	> 10m to 15m	> 10m to 15m				
	Right Turn Channel					No right turn channel	No right turn		No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel				
	Crosswalk Type					Zebra stripe hi-vis markings	Zebra stripe hi-vis markings		Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings				
	LOS (PETSI)					31 E	41 E		56	23 F	21 F	56 D	56 D				
	Cycle Length (sec)					120	120		120	120	120	120	120				
	Pedestrian Walk Time (solid white symbol) (sec)					7	7		7	7	7	7	7				
	LOS (Delay,seconds)					54.3 E	54.3 E		54.3 E	54.3 E	54.3 E	54.3 E	54.3 E				
	Overall Level of Service					E				F							
Cyclist	Type of Bikeway					Bike Lanes/Cycle Track	Bike Lanes/Cycle Track	0	Mixed Traffic	Bike Lanes/Cycle Track	Bike Lanes/Cycle Track	Mixed Traffic	Mixed Traffic				
	Turning Speed (based on corner radius & angle)					0	0	0	0	≤ 40km/h	50km/h	≤ 40km/h	≤ 40km/h				
	Right Turn Storage Length					> 50m		0	> 50m	≤ 50m	≤ 50m	≤ 50m	> 50m				
	Dual Right Turn?					No	No	0	No	No	No	No	No				
	Shared Through-Right?					No	No	0	No	No	No	Yes	Yes				
	Bike Box?					No	No	0	No	No	No	No	No				
	Number of Lanes Crossed for Left Turns					2+ Lanes Crossed	2+ Lanes Crossed	0	1 Lane Crossed	2+ Lanes Crossed	2+ Lanes Crossed	1 Lane Crossed	1 Lane Crossed				
	Operating Speed on Approach					≥ 60km/h	≥ 60km/h	0	50km/h	≥ 60km/h	≥ 60km/h	50km/h	50km/h				
	Dual Left Turn Lanes?					No	No	0	No	No	No	No	No				
	Level of Service					F	F		F	F	F	F	F				
						F				F							
Transit	Average Signal Delay					≤10 sec	≤10 sec	0	>40 sec	≤20 sec	≤20 sec	≤20 sec	>40 sec				
	Level of Service					B	B	A	F	C	C	C	F				
						F				F							
Truck	Turning Radius (Right Turn)					10 to 15m			10 to 15m	10 to 15m	> 15m	10 to 15m	10 to 15m				
	Number of Receiving Lanes					1		0	2+	1	1	2+	2+				
						E		#N/A	B	E	C	B	B				
										E							
Auto	Level of Service	(See Synchro Results)				(See Synchro Results)				(See Synchro Results)				(See Synchro Results)			

SEGMENTS		Bank & Blais	Section 1	Section 2	Section 3	Bank & Dun Skipper	Section 1	Section 2	Section 3	Bank & Prop. Access	Section			Bank at Dun Skipper	Section 1	Section 2	Section 3	Bank & Prop. Access
Pedestrian	Sidewalk Width		2.0 or more	2.0 or more	2.0 or more		2.0 or more	2.0 or more	2.0 or more						2.0 or more	2.0 or more	2.0 or more	
	Boulevard Width		> 2	> 2	> 2		> 2	> 2	> 2						0.5 to 2	0.5 to 2	0.5 to 2	
	AADT		> 3000	> 3000	> 3000		> 3000	> 3000	> 3000						> 3000	> 3000	> 3000	
	On-Street Parking		No	No	No		No	No	No						Yes	Yes	Yes	
	Operating Speed		61 km/h or more	61 km/h or more	61 km/h or more		61 km/h or more	61 km/h or more	61 km/h or more						51 to 60 km/h	51 to 60 km/h	51 to 60 km/h	
	Level of Service		D	D	D		D	D	D						C	C	C	
			D				D								C			
Cyclist	Type of Bikeway		Physically Separated Bikeway				Physically Separated Bikeway								Mixed Traffic			
	Number of Travel Lanes (per direction)														1 Travel Lane Per Direction			
	Raised Median?														No			
	Bike Lane Width														N/A			
	Operating Speed														50 km/h			
	Bike Lane Blockages (Commercial Areas)														Rare			
	Median Refuge														No Median Refuge			
	Number of Travel Lanes on Sidestreet														2 Lanes Crossed			
	Sidestreet Operating Speed														50 km/h			
	Level of Service		A				A								D			
Transit	Facility Type		Mixed Traffic				Mixed Traffic								Mixed Traffic			
	Friction		Limited parking/driveway friction				Limited parking/driveway friction								Limited parking/driveway friction			
	Level of Service		D				D								D			
Truck	Curb Lane Width		≤3.5	≤3.5	≤3.5		≤3.5	≤3.5	≤3.5						≤3.5	≤3.5	≤3.5	
	Number of Travel Lanes		2	2	2		2	2	2						2	2	2	
			C	C	C		C	C	C						C	C	C	
			C				C								C			

Appendix J – Intersection Control Warrants

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision

GO TO Justification:

What are the intersecting roadways? Bank & Blais/ Miikana

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

When was the data collected? Future (2023) Total AM & PM Scenarios

Justification 1 - 4: Volume Warrants

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

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

c.- How many approaches? 4

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

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

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	30	852	8	296	0	14	24	394	88	6	0	8	10
8:00	15	426	4	148	0	7	12	197	44	3	0	4	10
9:00	15	426	4	148	0	7	12	197	44	3	0	4	10
10:00	15	426	4	148	0	7	12	197	44	3	0	4	10
15:00	58	526	8	234	0	8	4	1,044	236	20	0	28	10
16:00	29	263	4	117	0	4	2	522	118	10	0	14	10
17:00	29	263	4	117	0	4	2	522	118	10	0	14	10
18:00	29	263	4	117	0	4	2	522	118	10	0	14	10
Total	**220**	**3,445**	**40**	**1,325**	**0**	**55**	**70**	**3,595**	**810**	**65**	**0**	**90**	**80**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	4
13-24	3
25-36	4

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

Justification 6: Pedestrian Volume

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

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Factored 8 hour pedestrian volume	120		15		7		0		
% Assigned to crossing rate	100%		50%		0%		0%		
Net 8 Hour Pedestrian Volume at Crossing									128
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

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

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	10	10	1	6	2	4	0	0	
Factored volume of total pedestrians	120		15		7		0		
Factored volume of delayed pedestrians	30		8		8		0		
% Assigned to Crossing Rate	100%		50%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									128
Net 8 Hour Volume of Delayed Pedestrians									34

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Bank & Blais/ Miikana

Count Date: Future (2023) Total AM & PM Scenarios

Justification 1: Minimum Vehicle Volumes

Free Flow Rural Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ☑	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00		
1A	480	720	600	900	1,720	860	860	860	2,166	1,083	1,083	1,083		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	324	162	162	162	290	145	145	145		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100

Free Flow Signal Justification 1:			
Both 1A and 1B 100% Fulfilled each of 8 hours	Yes ☑	No ☐
Lesser of 1A or 1B at least 80% fulfilled each of 8 hours	Yes ☑	No ☐

Justification 2: Delay to Cross Traffic

Free Flow Rural Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☑	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00		
2A	480	720	600	900	1,396	698	698	698	1,876	938	938	938		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	312	161	161	161	264	137	137	137		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100

Free Flow Signal Justification 2:		
Both 2A and 2B 100% fulfilled each of 8 hours	Yes ☑	No ☐
Lesser of 2A or 2B at least 80% fulfilled each of 8 hours	Yes ☑	No ☐

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicle Volume	YES ☑	NO ☐	YES ☑	NO ☐
Justification 2	Delay Cross Traffic	YES ☑	NO ☐	JUSTIFIED	

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main)	Heaviest Minor Approach	Required Value	Average % Compliance	Overall % Compliance
		X	Y (actual)	Y (warrant threshold)		
Justification 4	7:00	1,396	310	80	100 %	96 %
	15:00	1,876	242	80	100 %	
	16:00	938	121	132	92 %	
	17:00	938	121	132	92 %	

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Bank & Blais/ Miikana

Count Date: Future (2023) Total AM & PM Scenarios

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	80 %	73 %
	13-24	60 %	
	25-36	80 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440					
	1440 - 2600					
	2601 - 7000	Not Justified				
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200	Not Justified		
	200 - 300			
	> 300			

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Bank & Blais/ Miikana

Count Date: Future (2023) Total AM & PM Scenarios

Summary Results

Justification			Compliance	Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	100 %	☑	☐
	B	Crossing Volume	100 %		
2. Delay to Cross Traffic	A	Main Road	100 %	☑	☐
	B	Crossing Road	100 %		
3. Combination	A	Justificaton 1	100 %	☑	☐
	B	Justification 2	100 %		
4. 4-Hr Volume			96 %	☐	☑
5. Collision Experience			73 %	☐	☑
6. Pedestrians	A	Volume	Justification not met	☐	☑
	B	Delay	Justification not met		

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision

GO TO Justification:

What are the intersecting roadways? Bank & Dun Skipper

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

When was the data collected? Future (2023) Total AM & PM Scenarios

Justification 1 - 4: Volume Warrants

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

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

c.- How many approaches? 3

d.- What is the operating environment? Rural

Population < 10,000 AND Speed >= 70 km/hr

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

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	64	704	0	184	0	16	0	310	78	0	0	0	10
8:00	32	352	0	92	0	8	0	155	39	0	0	0	10
9:00	32	352	0	92	0	8	0	155	39	0	0	0	10
10:00	32	352	0	92	0	8	0	155	39	0	0	0	10
15:00	96	390	0	202	0	10	0	904	124	0	0	0	10
16:00	48	195	0	101	0	5	0	452	62	0	0	0	10
17:00	48	195	0	101	0	5	0	452	62	0	0	0	10
18:00	48	195	0	101	0	5	0	452	62	0	0	0	10
Total	**400**	**2,735**	**0**	**965**	**0**	**65**	**0**	**3,035**	**505**	**0**	**0**	**0**	**80**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	4
13-24	3
25-36	4

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

Justification 6: Pedestrian Volume

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

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Factored 8 hour pedestrian volume	120		15		7		0		
% Assigned to crossing rate	100%		50%		0%		0%		
Net 8 Hour Pedestrian Volume at Crossing									128
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

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

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	10	10	1	6	2	4	0	0	
Factored volume of total pedestrians	120		15		7		0		
Factored volume of delayed pedestrians	30		8		8		0		
% Assigned to Crossing Rate	100%		50%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									128
Net 8 Hour Volume of Delayed Pedestrians									34

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Bank & Dun Skipper

Count Date: Future (2023) Total AM & PM Scenarios

Justification 1: Minimum Vehicle Volumes

Free Flow Rural Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ☑	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00		
1A	480	720	600	900	1,356	678	678	678	1,726	863	863	863		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	180	255	180	255	200	100	100	100	212	106	106	106		
	COMPLIANCE %				100	56	56	56	100	59	59	59	543	68

Free Flow Signal Justification 1:	Both 1A and 1B 100% Fulfilled each of 8 hours	Yes ☐	No ☑
	Lesser of 1A or 1B at least 80% fulfilled each of 8 hours	Yes ☐	No ☑

Justification 2: Delay to Cross Traffic

Free Flow Rural Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☑	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00		
2A	480	720	600	900	1,156	578	578	578	1,514	757	757	757		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	194	102	102	102	212	111	111	111		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100

Free Flow Signal Justification 2:	Both 2A and 2B 100% fulfilled each of 8 hours	Yes ☑	No ☐
	Lesser of 2A or 2B at least 80% fulfilled each of 8 hours	Yes ☑	No ☐

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicle Volume	YES ☐	NO ☑	YES ☐	NO ☑
Justification 2	Delay Cross Traffic	YES ☑	NO ☐		NOT JUSTIFIED

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main)	Heaviest Minor Approach	Required Value	Average % Compliance	Overall % Compliance
		X	Y (actual)	Y (warrant threshold)		
Justification 4	7:00	1,156	200	87	100 %	78 %
	15:00	1,514	212	80	100 %	
	16:00	757	106	186	57 %	
	17:00	757	106	186	57 %	

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Bank & Dun Skipper

Count Date: Future (2023) Total AM & PM Scenarios

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	80 %	73 %
	13-24	60 %	
	25-36	80 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440					
	1440 - 2600					
	2601 - 7000	Not Justified				
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200	Not Justified		
	200 - 300			
	> 300			

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Bank & Dun Skipper

Count Date: Future (2023) Total AM & PM Scenarios

Summary Results

Justification			Compliance	Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	100 %	☐	☑
	B	Crossing Volume	68 %		
2. Delay to Cross Traffic	A	Main Road	100 %	☑	☐
	B	Crossing Road	100 %		
3. Combination	A	Justificaton 1	68 %	☐	☑
	B	Justification 2	100 %		
4. 4-Hr Volume			78 %	☐	☑
5. Collision Experience			73 %	☐	☑
6. Pedestrians	A	Volume	Justification not met	☐	☑
	B	Delay	Justification not met		

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision

GO TO Justification:

What are the intersecting roadways? Dun Skipper & Access 1

What is the direction of the Main Road street? East-West

When was the data collected? Future (2028) Total AM & PM Scenarios

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 2 or more

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

c.- How many approaches? 3

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

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

Hour Ending	Main Eastbound Approach			Minor Northbound Approach			Main Westbound Approach			Minor Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	6	0	40	0	216	6	0	333	92				10
8:00	3	0	20	0	108	3	0	167	46				10
9:00	3	0	20	0	108	3	0	167	46				10
10:00	3	0	20	0	108	3	0	167	46				10
15:00	6	0	54	0	188	6	0	948	166				10
16:00	3	0	27	0	94	3	0	474	83				10
17:00	3	0	27	0	94	3	0	474	83				10
18:00	3	0	27	0	94	3	0	474	83				10
Total	**30**	**0**	**235**	**0**	**1,010**	**30**	**0**	**3,203**	**645**	**0**	**0**	**0**	**80**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	4
13-24	3
25-36	4

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

Justification 6: Pedestrian Volume

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

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Factored 8 hour pedestrian volume	120		15		7		0		
% Assigned to crossing rate	100%		50%		0%		0%		
Net 8 Hour Pedestrian Volume at Crossing									128
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

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

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	10	10	1	6	2	4	0	0	
Factored volume of total pedestrians	120		15		7		0		
Factored volume of delayed pedestrians	30		8		8		0		
% Assigned to Crossing Rate	100%		50%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									128
Net 8 Hour Volume of Delayed Pedestrians									34

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Dun Skipper & Access 1

Count Date: Future (2028) Total AM & PM Scenarios

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00		
1A	480	720	600	900	693	347	347	347	1,368	684	684	684		
	COMPLIANCE %				77	39	39	39	100	76	76	76	521	65
1B	180	255	180	255	222	111	111	111	194	97	97	97		
	COMPLIANCE %				87	44	44	44	76	38	38	38	408	51

Restricted Flow Signal Justification 1:			
Both 1A and 1B 100% Fulfilled each of 8 hours	Yes ☐	No ☑
Lesser of 1A or 1B at least 80% fulfilled each of 8 hours	Yes ☐	No ☑

Justification 2: Delay to Cross Traffic

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00		
2A	480	720	600	900	471	236	236	236	1,174	587	587	587		
	COMPLIANCE %				52	26	26	26	100	65	65	65	427	53
2B	50	75	50	75	226	118	118	118	198	104	104	104		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100

Restricted Flow Signal Justification 2:		
Both 2A and 2B 100% fulfilled each of 8 hours	Yes ☐	No ☑
Lesser of 2A or 2B at least 80% fulfilled each of 8 hours	Yes ☐	No ☑

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicle Volume	YES ☐	NO ☑	YES ☐	NO ☑
Justification 2	Delay Cross Traffic	YES ☐	NO ☑		NOT JUSTIFIED

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main)	Heaviest Minor Approach	Required Value	Average % Compliance	Overall % Compliance
		X	Y (actual)	Y (warrant threshold)		
Justification 4	15:00	1,174	194	143	100 %	43 %
	16:00	587	97	394	25 %	
	17:00	587	97	394	25 %	
	18:00	587	97	394	25 %	

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Dun Skipper & Access 1

Count Date: Future (2028) Total AM & PM Scenarios

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	80 %	73 %
	13-24	60 %	
	25-36	80 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440					
	1440 - 2600					
	2601 - 7000	Not Justified				
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200	Not Justified		
	200 - 300			
	> 300			

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Dun Skipper & Access 1

Count Date: Future (2028) Total AM & PM Scenarios

Summary Results

Justification			Compliance	Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	65 %	☐	☑
	B	Crossing Volume	51 %		
2. Delay to Cross Traffic	A	Main Road	53 %	☐	☑
	B	Crossing Road	100 %		
3. Combination	A	Justificaton 1	51 %	☐	☑
	B	Justification 2	53 %		
4. 4-Hr Volume			43 %	☐	☑
5. Collision Experience			73 %	☐	☑
6. Pedestrians	A	Volume	Justification not met	☐	☑
	B	Delay	Justification not met		

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision

GO TO Justification:

What are the intersecting roadways? Bank & Access 2

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

When was the data collected? Future (2028) Total AM & PM Scenarios

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 2 or more

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

c.- How many approaches? 3

d.- What is the operating environment? Urban

Population >= 10,000 AND Speed < 70 km/hr

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

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	0	811	0	0	0	2	0	306	52	0	0	0	10
8:00	0	406	0	0	0	1	0	153	26	0	0	0	10
9:00	0	406	0	0	0	1	0	153	26	0	0	0	10
10:00	0	406	0	0	0	1	0	153	26	0	0	0	10
15:00	0	524	0	0	0	6	0	940	22	0	0	0	10
16:00	0	262	0	0	0	3	0	470	11	0	0	0	10
17:00	0	262	0	0	0	3	0	470	11	0	0	0	10
18:00	0	262	0	0	0	3	0	470	11	0	0	0	10
Total	**0**	**3,338**	**0**	**0**	**0**	**20**	**0**	**3,115**	**185**	**0**	**0**	**0**	**80**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	4
13-24	3
25-36	4

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

Justification 6: Pedestrian Volume

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

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Factored 8 hour pedestrian volume	120		15		7		0		
% Assigned to crossing rate	100%		50%		0%		0%		
Net 8 Hour Pedestrian Volume at Crossing									128
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

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

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	20	80	0	15	1	5	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	10	10	1	6	2	4	0	0	
Factored volume of total pedestrians	120		15		7		0		
Factored volume of delayed pedestrians	30		8		8		0		
% Assigned to Crossing Rate	100%		50%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									128
Net 8 Hour Volume of Delayed Pedestrians									34

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Bank & Access 2

Count Date: Future (2028) Total AM & PM Scenarios

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00		
1A	480	720	600	900	1,171	586	586	586	1,492	746	746	746		
	COMPLIANCE %				100	65	65	65	100	83	83	83	644	80
1B	180	255	180	255	2	1	1	1	6	3	3	3		
	COMPLIANCE %				1	0	0	0	2	1	1	1	8	1

Restricted Flow Signal Justification 1:			
	Both 1A and 1B 100% Fulfilled each of 8 hours	Yes ☐	No ☑
	Lesser of 1A or 1B at least 80% fulfilled each of 8 hours	Yes ☐	No ☑

Justification 2: Delay to Cross Traffic

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00		
2A	480	720	600	900	1,169	585	585	585	1,486	743	743	743		
	COMPLIANCE %				100	65	65	65	100	83	83	83	643	80
2B	50	75	50	75	10	10	10	10	10	10	10	10		
	COMPLIANCE %				13	13	13	13	13	13	13	13	107	13

Restricted Flow Signal Justification 2:			
	Both 2A and 2B 100% fulfilled each of 8 hours	Yes ☐	No ☑
	Lesser of 2A or 2B at least 80% fulfilled each of 8 hours	Yes ☐	No ☑

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicle Volume	YES ☐	NO ☑	YES ☐	NO ☑
Justification 2	Delay Cross Traffic	YES ☐	NO ☑		NOT JUSTIFIED

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main) X	Heaviest Minor Approach Y (actual)	Required Value Y (warrant threshold)	Average % Compliance	Overall % Compliance
Justification 4	7:00	1,169	2	144	1 %	2 %
	15:00	1,486	6	115	5 %	
	16:00	743	3	305	1 %	
	17:00	743	3	305	1 %	

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Bank & Access 2

Count Date: Future (2028) Total AM & PM Scenarios

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	80 %	73 %
	13-24	60 %	
	25-36	80 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440					
	1440 - 2600					
	2601 - 7000	Not Justified				
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200	Not Justified		
	200 - 300			
	> 300			

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Bank & Access 2

Count Date: Future (2028) Total AM & PM Scenarios

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	80	%	☐	☑
	B	Crossing Volume	1	%		
2. Delay to Cross Traffic	A	Main Road	80	%	☐	☑
	B	Crossing Road	13	%		
3. Combination	A	Justificaton 1	1	%	☐	☑
	B	Justification 2	13	%		
4. 4-Hr Volume			2	%	☐	☑
5. Collision Experience			73	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

City of Ottawa
Roundabout Initial Feasability Screening Tool

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

1	Project Name:	4836 Bank Street TIA
2	Intersection:	Access #1 & Dun Skipper
3	Location and Description of Intersection: Lane Configuration, total or approach AADT, distance to nearby intersection(s), etc. Attach or sketch a diagram and include existing and/or horizon-year turning movements. If an existing intersection then indicate type of control	Approx. 130m west of Bank & Dun Skipper
4	What traditional modifications are proposed? All-way stop control, traffic signals, auxiliary lanes, etc. Attach or sketch a diagram if necessary.	Northbound stop control for Access #1 and free-flow east-west along Dun Skipper
5	What size of roundabout is being considered? Describe, and attach a Roundabout Traffic Flow Worksheet	Single-lane roundabout
6	Why is a roundabout being considered?	This is a 'new City intersection'

7 Are there contra-indications for a roundabout?

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

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

8 Are there suitability factors for a roundabout?

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

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

9	Conclusions/recommendation whether to proceed with an Intersection Control Study:	The overall conclusion of the Roundabout Screening Tool is that a roundabout is not an appropriate form of traffic control at the proposed Access #1/ Bank. Contra-indications suggest that a roundabout may be problematic at this location due to closely spaced signalized intersections planned Bank and Dun Skipper. Furthermore, a roundabout is not technically feasible at this location, based on the suitability features.

*Access #1 is proposed approximately 130 metres west of proposed intersection of Bank and Dun Skipper, which is planned to be signalized upon its completion in 2019 as part of the interim road modifications along Bank Street within the study area.

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

1	Project Name:	4836 Bank Street TIA
2	Intersection:	Access #2 & Bank Street
3	Location and Description of Intersection: Lane Configuration, total or approach AADT, distance to nearby intersection(s), etc. Attach or sketch a diagram and include existing and/or horizon-year turning movements. If an existing intersection then indicate type of control	Approx. 580m south of Blais Road along Bank Street
4	What traditional modifications are proposed? All-way stop control, traffic signals, auxiliary lanes, etc. Attach or sketch a diagram if necessary.	Stop control for Access #2 and free-flow along Bank Street
5	What size of roundabout is being considered? Describe, and attach a Roundabout Traffic Flow Worksheet	Single-lane roundabout
6	Why is a roundabout being considered?	This is a 'new City intersection'

7 Are there contra-indications for a roundabout?

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

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

8 Are there suitability factors for a roundabout?

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

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

9	Conclusions/recommendation whether to proceed with an Intersection Control Study:	The overall conclusion of the Roundabout Screening Tool is that a roundabout is not an appropriate form of traffic control at proposed Access #2. Contra-indications suggest that a roundabout may be problematic at this location due to closely spaced signalized intersections planned to the north along Bank Street. Furthermore, a roundabout is not technically feasible at this location, based on the suitability features.

*Signal progression presently exists along Bank Street through the Leitrim Community, and it is reasonable to assume that this progression will be maintained and extended further south to include the reconstructed Blais intersection and the proposed Dun Skipper intersection.

**Access #2 is proposed approximately 120 metres south of Bank and Dun Skipper intersection, which is planned to be signalized in 2019 as part of the interim road modifications along Bank Street witin the study area.

Appendix K – Intersection Capacity Analysis

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	0	1	6	0	7	0	713	8	24	247	0
Future Vol, veh/h	2	0	1	6	0	7	0	713	8	24	247	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	0	1	7	0	8	0	792	9	27	274	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1129	1129	274	1125	1125	797	274	0	0	801	0	0
Stage 1	328	328	-	797	797	-	-	-	-	-	-	-
Stage 2	801	801	-	328	328	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	181	204	765	182	205	387	1289	-	-	822	-	-
Stage 1	685	647	-	380	399	-	-	-	-	-	-	-
Stage 2	378	397	-	685	647	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	172	196	765	176	197	387	1289	-	-	822	-	-
Mov Cap-2 Maneuver	172	196	-	176	197	-	-	-	-	-	-	-
Stage 1	685	622	-	380	399	-	-	-	-	-	-	-
Stage 2	370	397	-	657	622	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.7	20.3	0	0.8
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1289	-	-	232	249	822	-	-
HCM Lane V/C Ratio	-	-	-	0.014	0.058	0.032	-	-
HCM Control Delay (s)	0	-	-	20.7	20.3	9.5	0	-
HCM Lane LOS	A	-	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.2	0.1	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	14	14	713	245	9
Future Vol, veh/h	8	14	14	713	245	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	16	16	792	272	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1100	277	282	0	-	0
Stage 1	277	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	235	762	1280	-	-	-
Stage 1	770	-	-	-	-	-
Stage 2	431	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	230	762	1280	-	-	-
Mov Cap-2 Maneuver	230	-	-	-	-	-
Stage 1	770	-	-	-	-	-
Stage 2	422	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1280	-	414	-	-
HCM Lane V/C Ratio	0.012	-	0.059	-	-
HCM Control Delay (s)	7.8	0	14.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	0	0	20	0	28	0	402	8	4	804	0
Future Vol, veh/h	1	0	0	20	0	28	0	402	8	4	804	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	0	0	22	0	31	0	447	9	4	893	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1369	1358	893	1353	1353	451	893	0	0	456	0	0
Stage 1	902	902	-	451	451	-	-	-	-	-	-	-
Stage 2	467	456	-	902	902	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	124	149	340	127	150	608	759	-	-	1105	-	-
Stage 1	332	356	-	588	571	-	-	-	-	-	-	-
Stage 2	576	568	-	332	356	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	117	148	340	126	149	608	759	-	-	1105	-	-
Mov Cap-2 Maneuver	117	148	-	126	149	-	-	-	-	-	-	-
Stage 1	332	354	-	588	571	-	-	-	-	-	-	-
Stage 2	547	568	-	330	354	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	36.1	24.9	0	0
HCM LOS	E	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	759	-	-	117	234	1105	-	-
HCM Lane V/C Ratio	-	-	-	0.009	0.228	0.004	-	-
HCM Control Delay (s)	0	-	-	36.1	24.9	8.3	0	-
HCM Lane LOS	A	-	-	E	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.9	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	19	4	408	811	13
Future Vol, veh/h	2	19	4	408	811	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	21	4	453	901	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1370	908	916	0	-	0
Stage 1	908	-	-	-	-	-
Stage 2	462	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	161	334	745	-	-	-
Stage 1	393	-	-	-	-	-
Stage 2	634	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	160	334	745	-	-	-
Mov Cap-2 Maneuver	160	-	-	-	-	-
Stage 1	393	-	-	-	-	-
Stage 2	630	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.9	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	745	-	303	-	-
HCM Lane V/C Ratio	0.006	-	0.077	-	-
HCM Control Delay (s)	9.9	0	17.9	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

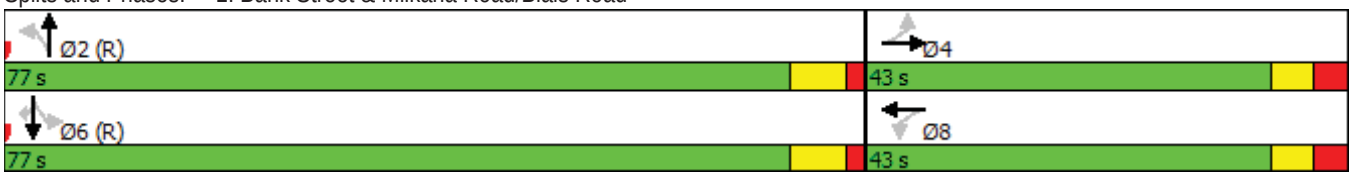
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	296	0	14	6	0	7	29	836	8	24	356	87
Future Volume (vph)	296	0	14	6	0	7	29	836	8	24	356	87
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		0.0	80.0		45.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1783	0	1695	1784	1517
Flt Permitted	0.753			0.748			0.519			0.201		
Satd. Flow (perm)	1344	1517	0	1335	1517	0	926	1783	0	359	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		499			167			1				87
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	296	0	14	6	0	7	29	836	8	24	356	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	14	0	6	7	0	29	844	0	24	356	87
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.9	28.9		28.9	28.9		27.8	27.8		27.8	27.8	27.8
Total Split (s)	43.0	43.0		43.0	43.0		77.0	77.0		77.0	77.0	77.0
Total Split (%)	35.8%	35.8%		35.8%	35.8%		64.2%	64.2%		64.2%	64.2%	64.2%
Maximum Green (s)	36.1	36.1		36.1	36.1		70.2	70.2		70.2	70.2	70.2
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	3.3	3.3		3.3	3.3		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9		6.9	6.9		6.8	6.8		6.8	6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effct Green (s)	30.4	30.4		30.4	30.4		75.9	75.9		75.9	75.9	75.9
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.63	0.63		0.63	0.63	0.63
v/c Ratio	0.87	0.02		0.02	0.01		0.05	0.75		0.11	0.32	0.09
Control Delay	67.2	0.1		30.3	0.0		8.5	16.3		12.0	12.0	2.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	67.2	0.1		30.3	0.0		8.5	16.3		12.0	12.0	2.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A		C	A		A	B		B	B	A
Approach Delay		64.2			14.0			16.1			10.2	
Approach LOS		E			B			B			B	
Queue Length 50th (m)	60.8	0.0		1.0	0.0		1.9	98.6		2.0	34.1	0.0
Queue Length 95th (m)	#88.7	0.0		3.9	0.0		m4.2	114.2		6.3	54.8	6.0
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0			80.0		45.0
Base Capacity (vph)	404	805		401	573		585	1127		227	1128	991
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.73	0.02		0.01	0.01		0.05	0.75		0.11	0.32	0.09

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 70 (58%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 23.4 Intersection LOS: C
Intersection Capacity Utilization 82.3% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	148	14	45	725	308	40
Future Volume (vph)	148	14	45	725	308	40
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	1784	1784	1517
Flt Permitted	0.950		0.573			
Satd. Flow (perm)	1695	1517	1022	1784	1784	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		14				40
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	148	14	45	725	308	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	148	14	45	725	308	40
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	28.8	28.8	28.8	28.8
Total Split (s)	35.0	35.0	85.0	85.0	85.0	85.0
Total Split (%)	29.2%	29.2%	70.8%	70.8%	70.8%	70.8%
Maximum Green (s)	28.2	28.2	78.2	78.2	78.2	78.2
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	3.2	3.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	17.0	17.0	15.0	15.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	15.8	15.8	90.6	90.6	90.6	90.6
Actuated g/C Ratio	0.13	0.13	0.76	0.76	0.76	0.76
v/c Ratio	0.66	0.07	0.06	0.54	0.23	0.03
Control Delay	63.4	19.4	4.8	8.5	1.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.4	19.4	4.8	8.5	1.2	0.1

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	A	A	A	A
Approach Delay	59.6			8.3	1.0	
Approach LOS	E			A	A	
Queue Length 50th (m)	31.0	0.0	2.1	55.6	0.8	0.0
Queue Length 95th (m)	48.3	5.3	6.0	97.0	2.4	0.1
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	398	367	771	1347	1347	1155
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.04	0.06	0.54	0.23	0.03

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 12.8 Intersection LOS: B
Intersection Capacity Utilization 60.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 2: Bank Street & Dun Skipper Drive

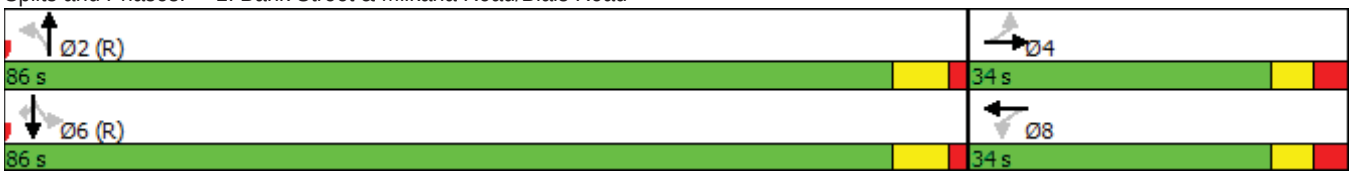
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	234	0	7	20	0	28	58	477	8	4	1013	236
Future Volume (vph)	234	0	7	20	0	28	58	477	8	4	1013	236
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		0.0	80.0		45.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1781	0	1695	1784	1517
Flt Permitted	0.739			0.753			0.145			0.444		
Satd. Flow (perm)	1319	1517	0	1344	1517	0	259	1781	0	792	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		145			430			1				153
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	234	0	7	20	0	28	58	477	8	4	1013	236
Shared Lane Traffic (%)												
Lane Group Flow (vph)	234	7	0	20	28	0	58	485	0	4	1013	236
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.9	28.9		28.9	28.9		27.8	27.8		27.8	27.8	27.8
Total Split (s)	34.0	34.0		34.0	34.0		86.0	86.0		86.0	86.0	86.0
Total Split (%)	28.3%	28.3%		28.3%	28.3%		71.7%	71.7%		71.7%	71.7%	71.7%
Maximum Green (s)	27.1	27.1		27.1	27.1		79.2	79.2		79.2	79.2	79.2
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	3.3	3.3		3.3	3.3		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9		6.9	6.9		6.8	6.8		6.8	6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effct Green (s)	24.2	24.2		24.2	24.2		82.1	82.1		82.1	82.1	82.1
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.68	0.68		0.68	0.68	0.68
v/c Ratio	0.88	0.02		0.07	0.04		0.33	0.40		0.01	0.83	0.22
Control Delay	78.2	0.1		37.8	0.1		11.6	7.3		7.0	22.4	3.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	78.2	0.1		37.8	0.1		11.6	7.3		7.0	22.4	3.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A		D	A		B	A		A	C	A
Approach Delay		76.0			15.8			7.7			18.7	
Approach LOS		E			B			A			B	
Queue Length 50th (m)	48.4	0.0		3.5	0.0		5.8	50.8		0.3	156.1	5.9
Queue Length 95th (m)	#84.0	0.0		9.5	0.0		8.1	39.9		1.4	230.3	14.2
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0			80.0		45.0
Base Capacity (vph)	297	454		303	675		177	1218		541	1220	1086
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.79	0.02		0.07	0.04		0.33	0.40		0.01	0.83	0.22

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 82 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 22.4 Intersection LOS: C
Intersection Capacity Utilization 88.0% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	152	7	89	391	894	102
Future Volume (vph)	152	7	89	391	894	102
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	1784	1784	1517
Flt Permitted	0.950		0.250			
Satd. Flow (perm)	1695	1517	446	1784	1784	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		7				102
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	152	7	89	391	894	102
Shared Lane Traffic (%)						
Lane Group Flow (vph)	152	7	89	391	894	102
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	28.8	28.8	28.8	28.8
Total Split (s)	31.0	31.0	89.0	89.0	89.0	89.0
Total Split (%)	25.8%	25.8%	74.2%	74.2%	74.2%	74.2%
Maximum Green (s)	24.2	24.2	82.2	82.2	82.2	82.2
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	3.2	3.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	17.0	17.0	15.0	15.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	16.0	16.0	90.4	90.4	90.4	90.4
Actuated g/C Ratio	0.13	0.13	0.75	0.75	0.75	0.75
v/c Ratio	0.67	0.03	0.27	0.29	0.67	0.09
Control Delay	63.5	23.6	7.8	5.8	3.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.5	23.6	7.8	5.8	3.5	0.2

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	C	A	A	A	A
Approach Delay	61.8			6.2	3.2	
Approach LOS	E			A	A	
Queue Length 50th (m)	31.8	0.0	5.1	23.0	22.9	0.1
Queue Length 95th (m)	49.3	3.8	14.0	41.4	1.5	m0.0
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	341	311	335	1343	1343	1167
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.02	0.27	0.29	0.67	0.09

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 9.7 Intersection LOS: A
Intersection Capacity Utilization 83.9% ICU Level of Service E
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Bank Street & Dun Skipper Drive

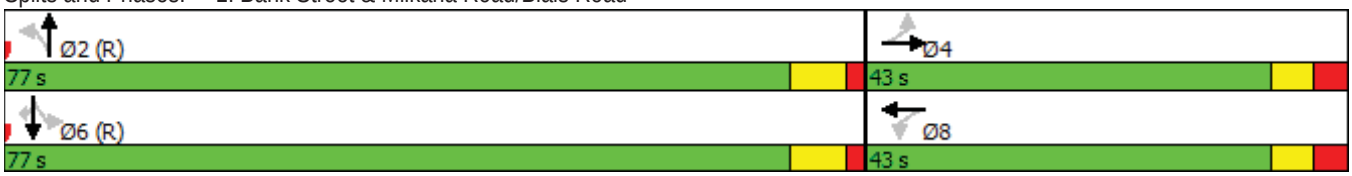
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	296	0	14	6	0	7	29	874	8	24	405	87
Future Volume (vph)	296	0	14	6	0	7	29	874	8	24	405	87
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		0.0	80.0		45.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1783	0	1695	1784	1517
Flt Permitted	0.753			0.748			0.482			0.178		
Satd. Flow (perm)	1344	1517	0	1335	1517	0	860	1783	0	318	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		447			153			1				87
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	296	0	14	6	0	7	29	874	8	24	405	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	14	0	6	7	0	29	882	0	24	405	87
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.9	28.9		28.9	28.9		27.8	27.8		27.8	27.8	27.8
Total Split (s)	43.0	43.0		43.0	43.0		77.0	77.0		77.0	77.0	77.0
Total Split (%)	35.8%	35.8%		35.8%	35.8%		64.2%	64.2%		64.2%	64.2%	64.2%
Maximum Green (s)	36.1	36.1		36.1	36.1		70.2	70.2		70.2	70.2	70.2
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	3.3	3.3		3.3	3.3		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9		6.9	6.9		6.8	6.8		6.8	6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effct Green (s)	30.6	30.6		30.6	30.6		75.7	75.7		75.7	75.7	75.7
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.63	0.63		0.63	0.63	0.63
v/c Ratio	0.87	0.02		0.02	0.01		0.05	0.78		0.12	0.36	0.09
Control Delay	66.6	0.1		30.3	0.0		8.8	18.5		12.5	12.6	2.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	66.6	0.1		30.3	0.0		8.8	18.5		12.5	12.6	2.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A		C	A		A	B		B	B	A
Approach Delay		63.5			14.0			18.2			10.9	
Approach LOS		E			B			B			B	
Queue Length 50th (m)	60.6	0.0		1.0	0.0		1.8	95.6		2.0	40.4	0.0
Queue Length 95th (m)	#88.7	0.0		3.9	0.0		m4.1	130.9		6.4	63.7	6.0
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0			80.0		45.0
Base Capacity (vph)	404	768		401	563		543	1125		200	1126	989
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.73	0.02		0.01	0.01		0.05	0.78		0.12	0.36	0.09

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 76 (63%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 24.0 Intersection LOS: C
Intersection Capacity Utilization 84.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	201	24	59	711	321	76
Future Volume (vph)	201	24	59	711	321	76
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	1784	1784	1517
Flt Permitted	0.950		0.564			
Satd. Flow (perm)	1695	1517	1006	1784	1784	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		24				76
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	201	24	59	711	321	76
Shared Lane Traffic (%)						
Lane Group Flow (vph)	201	24	59	711	321	76
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	28.8	28.8	30.8	30.8
Total Split (s)	36.0	36.0	84.0	84.0	84.0	84.0
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	29.2	29.2	77.2	77.2	77.2	77.2
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	3.2	3.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	17.0	17.0	15.0	15.0	17.0	17.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	19.5	19.5	86.9	86.9	86.9	86.9
Actuated g/C Ratio	0.16	0.16	0.72	0.72	0.72	0.72
v/c Ratio	0.73	0.09	0.08	0.55	0.25	0.07
Control Delay	62.8	14.8	6.2	10.4	1.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.8	14.8	6.2	10.4	1.6	0.2

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	A	B	A	A
Approach Delay	57.7			10.1	1.3	
Approach LOS	E			B	A	
Queue Length 50th (m)	41.9	0.0	3.3	62.4	2.7	0.2
Queue Length 95th (m)	61.1	6.5	8.6	108.8	2.3	0.1
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	412	387	728	1292	1292	1119
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.06	0.08	0.55	0.25	0.07

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 62.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 2: Bank Street & Dun Skipper Drive

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	162	7	50	85	6	62
Future Volume (vph)	162	7	50	85	6	62
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.994				0.877	
Flt Protected				0.982	0.996	
Satd. Flow (prot)	1774	0	0	1752	1559	0
Flt Permitted				0.982	0.996	
Satd. Flow (perm)	1774	0	0	1752	1559	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	262.7			133.8	115.9	
Travel Time (s)	18.9			9.6	8.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	162	7	50	85	6	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	169	0	0	135	68	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 31.5%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	16	0	770	302	42
Future Volume (vph)	0	16	0	770	302	42
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865				0.984	
Flt Protected						
Satd. Flow (prot)	1543	0	0	1784	1756	0
Flt Permitted						
Satd. Flow (perm)	1543	0	0	1784	1756	0
Link Speed (k/h)	48			80	80	
Link Distance (m)	110.4			372.6	129.9	
Travel Time (s)	8.3			16.8	5.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	16	0	770	302	42
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	0	0	770	344	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	162	7	50	85	6	62
Future Vol, veh/h	162	7	50	85	6	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	162	7	50	85	6	62

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	169	0	351	166
Stage 1	-	-	-	-	166	-
Stage 2	-	-	-	-	185	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1409	-	646	878
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	847	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1409	-	622	878
Mov Cap-2 Maneuver	-	-	-	-	622	-
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	816	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.8	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	847	-	-	1409	-
HCM Lane V/C Ratio	0.08	-	-	0.035	-
HCM Control Delay (s)	9.6	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	16	0	770	302	42
Future Vol, veh/h	0	16	0	770	302	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	16	0	770	302	42

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1093	323	344	0	-	0
Stage 1	323	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	237	718	1215	-	-	-
Stage 1	734	-	-	-	-	-
Stage 2	457	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	237	718	1215	-	-	-
Mov Cap-2 Maneuver	237	-	-	-	-	-
Stage 1	734	-	-	-	-	-
Stage 2	457	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1215	-	718	-	-
HCM Lane V/C Ratio	-	-	0.022	-	-
HCM Control Delay (s)	0	-	10.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

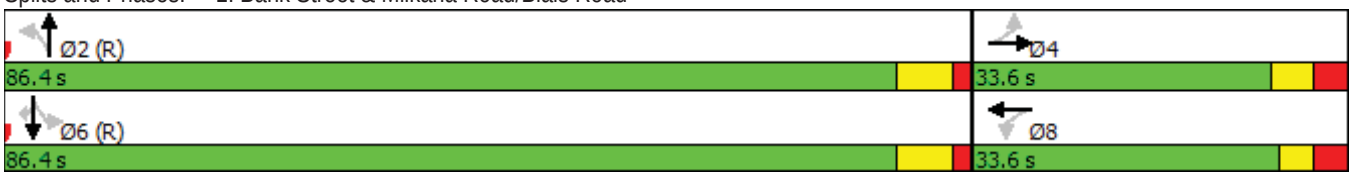
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	234	0	7	20	0	28	58	538	8	4	1055	236
Future Volume (vph)	234	0	7	20	0	28	58	538	8	4	1055	236
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		0.0	80.0		45.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1781	0	1695	1784	1517
Flt Permitted	0.739			0.753			0.121			0.405		
Satd. Flow (perm)	1319	1517	0	1344	1517	0	216	1781	0	723	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		134			383			1				148
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	234	0	7	20	0	28	58	538	8	4	1055	236
Shared Lane Traffic (%)												
Lane Group Flow (vph)	234	7	0	20	28	0	58	546	0	4	1055	236
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.9	28.9		28.3	28.3		27.8	27.8		27.8	27.8	27.8
Total Split (s)	33.6	33.6		33.6	33.6		86.4	86.4		86.4	86.4	86.4
Total Split (%)	28.0%	28.0%		28.0%	28.0%		72.0%	72.0%		72.0%	72.0%	72.0%
Maximum Green (s)	26.7	26.7		27.3	27.3		79.6	79.6		79.6	79.6	79.6
Yellow Time (s)	3.6	3.6		3.0	3.0		5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	3.3	3.3		3.3	3.3		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9		6.3	6.3		6.8	6.8		6.8	6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effct Green (s)	24.4	24.4		25.0	25.0		81.9	81.9		81.9	81.9	81.9
Actuated g/C Ratio	0.20	0.20		0.21	0.21		0.68	0.68		0.68	0.68	0.68
v/c Ratio	0.87	0.02		0.07	0.05		0.39	0.45		0.01	0.87	0.22
Control Delay	76.5	0.1		37.4	0.1		14.6	8.2		7.0	25.2	3.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	76.5	0.1		37.4	0.1		14.6	8.2		7.0	25.2	3.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A		D	A		B	A		A	C	A
Approach Delay		74.3			15.7			8.8			21.2	
Approach LOS		E			B			A			C	
Queue Length 50th (m)	47.9	0.0		3.4	0.0		6.4	59.2		0.3	176.1	6.4
Queue Length 95th (m)	#85.0	0.0		9.5	0.0		m6.4	37.7		1.4	#280.4	14.5
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0			80.0		45.0
Base Capacity (vph)	294	442		306	641		147	1217		493	1219	1083
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.80	0.02		0.07	0.04		0.39	0.45		0.01	0.87	0.22

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 90 (75%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 23.5 Intersection LOS: C
Intersection Capacity Utilization 90.4% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	224	21	105	380	899	139
Future Volume (vph)	224	21	105	380	899	139
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	1784	1784	1517
Flt Permitted	0.950		0.228			
Satd. Flow (perm)	1695	1517	407	1784	1784	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		21				139
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	224	21	105	380	899	139
Shared Lane Traffic (%)						
Lane Group Flow (vph)	224	21	105	380	899	139
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	28.8	28.8	28.8	28.8
Total Split (s)	31.0	31.0	89.0	89.0	89.0	89.0
Total Split (%)	25.8%	25.8%	74.2%	74.2%	74.2%	74.2%
Maximum Green (s)	24.2	24.2	82.2	82.2	82.2	82.2
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	3.2	3.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	17.0	17.0	15.0	15.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	20.2	20.2	86.2	86.2	86.2	86.2
Actuated g/C Ratio	0.17	0.17	0.72	0.72	0.72	0.72
v/c Ratio	0.79	0.08	0.36	0.30	0.70	0.12
Control Delay	67.0	15.7	11.5	7.2	6.4	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.0	15.7	11.5	7.2	6.4	0.4

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	B	A	A	A
Approach Delay	62.6			8.2	5.6	
Approach LOS	E			A	A	
Queue Length 50th (m)	46.7	0.0	7.9	26.9	45.4	0.1
Queue Length 95th (m)	69.7	6.3	19.4	43.0	m91.2	m0.8
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	341	322	292	1282	1282	1129
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.07	0.36	0.30	0.70	0.12

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 14.2 Intersection LOS: B
Intersection Capacity Utilization 88.4% ICU Level of Service E
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Bank Street & Dun Skipper Drive

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	159	7	53	191	8	86
Future Volume (vph)	159	7	53	191	8	86
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.994				0.876	
Flt Protected				0.989	0.996	
Satd. Flow (prot)	1774	0	0	1765	1557	0
Flt Permitted				0.989	0.996	
Satd. Flow (perm)	1774	0	0	1765	1557	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	262.7			133.8	115.9	
Travel Time (s)	18.9			9.6	8.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	159	7	53	191	8	86
Shared Lane Traffic (%)						
Lane Group Flow (vph)	166	0	0	244	94	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 39.1%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	23	0	485	874	46
Future Volume (vph)	0	23	0	485	874	46
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865				0.993	
Flt Protected						
Satd. Flow (prot)	1543	0	0	1784	1772	0
Flt Permitted						
Satd. Flow (perm)	1543	0	0	1784	1772	0
Link Speed (k/h)	48			80	80	
Link Distance (m)	110.4			372.6	129.9	
Travel Time (s)	8.3			16.8	5.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	23	0	485	874	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	23	0	0	485	920	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 61.5%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	159	7	53	191	8	86
Future Vol, veh/h	159	7	53	191	8	86
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	159	7	53	191	8	86

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	166	0	460	163
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	297	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1412	-	559	882
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	754	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1412	-	536	882
Mov Cap-2 Maneuver	-	-	-	-	536	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	722	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.7	9.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	836	-	-	1412	-
HCM Lane V/C Ratio	0.112	-	-	0.038	-
HCM Control Delay (s)	9.9	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	23	0	485	874	46
Future Vol, veh/h	0	23	0	485	874	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	23	0	485	874	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1382	897	920	0	-	0
Stage 1	897	-	-	-	-	-
Stage 2	485	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	159	339	742	-	-	-
Stage 1	398	-	-	-	-	-
Stage 2	619	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	159	339	742	-	-	-
Mov Cap-2 Maneuver	159	-	-	-	-	-
Stage 1	398	-	-	-	-	-
Stage 2	619	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.4	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	742	-	339	-	-
HCM Lane V/C Ratio	-	-	0.068	-	-
HCM Control Delay (s)	0	-	16.4	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

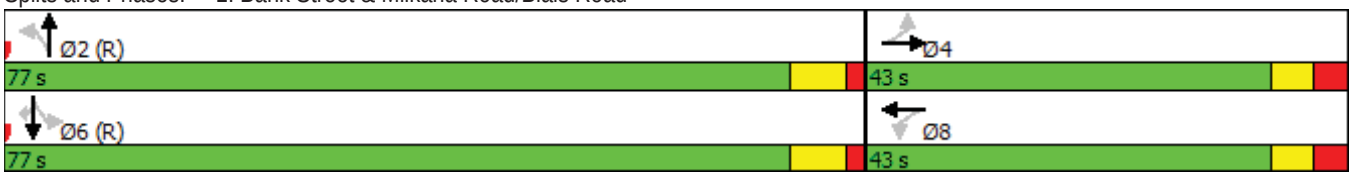
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	0	13	6	0	7	29	923	8	24	395	101
Future Volume (vph)	340	0	13	6	0	7	29	923	8	24	395	101
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		0.0	80.0		45.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1783	0	1695	1784	1517
Flt Permitted	0.753			0.749			0.482			0.130		
Satd. Flow (perm)	1344	1517	0	1336	1517	0	860	1783	0	232	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		457			136			1				101
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	340	0	13	6	0	7	29	923	8	24	395	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	340	13	0	6	7	0	29	931	0	24	395	101
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.9	28.9		28.9	28.9		27.8	27.8		27.8	27.8	27.8
Total Split (s)	43.0	43.0		43.0	43.0		77.0	77.0		77.0	77.0	77.0
Total Split (%)	35.8%	35.8%		35.8%	35.8%		64.2%	64.2%		64.2%	64.2%	64.2%
Maximum Green (s)	36.1	36.1		36.1	36.1		70.2	70.2		70.2	70.2	70.2
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	3.3	3.3		3.3	3.3		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9		6.9	6.9		6.8	6.8		6.8	6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effct Green (s)	33.3	33.3		33.3	33.3		73.0	73.0		73.0	73.0	73.0
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.61	0.61		0.61	0.61	0.61
v/c Ratio	0.91	0.02		0.02	0.01		0.06	0.86		0.17	0.36	0.10
Control Delay	71.1	0.1		29.8	0.0		11.0	25.3		15.2	13.6	2.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	71.1	0.1		29.8	0.0		11.0	25.3		15.2	13.6	2.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A		C	A		B	C		B	B	A
Approach Delay		68.5			13.8			24.9			11.5	
Approach LOS		E			B			C			B	
Queue Length 50th (m)	68.9	0.0		0.9	0.0		2.0	87.2		2.3	43.3	0.0
Queue Length 95th (m)	#114.1	0.0		3.9	0.0		m5.2	#250.8		7.1	62.1	6.4
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0			80.0		45.0
Base Capacity (vph)	404	775		401	551		523	1085		141	1085	962
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.84	0.02		0.01	0.01		0.06	0.86		0.17	0.36	0.10

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 70 (58%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 29.4 Intersection LOS: C
Intersection Capacity Utilization 89.8% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	194	21	47	766	332	55
Future Volume (vph)	194	21	47	766	332	55
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	1784	1784	1517
Flt Permitted	0.950		0.557			
Satd. Flow (perm)	1695	1517	994	1784	1784	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		21				55
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	194	21	47	766	332	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	194	21	47	766	332	55
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	28.8	28.8	28.8	28.8
Total Split (s)	35.0	35.0	85.0	85.0	85.0	85.0
Total Split (%)	29.2%	29.2%	70.8%	70.8%	70.8%	70.8%
Maximum Green (s)	28.2	28.2	78.2	78.2	78.2	78.2
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	3.2	3.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	17.0	17.0	15.0	15.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	19.0	19.0	87.4	87.4	87.4	87.4
Actuated g/C Ratio	0.16	0.16	0.73	0.73	0.73	0.73
v/c Ratio	0.73	0.08	0.06	0.59	0.26	0.05
Control Delay	63.1	15.6	6.0	10.9	1.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.1	15.6	6.0	10.9	1.8	0.3

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	A	B	A	A
Approach Delay	58.4			10.6	1.6	
Approach LOS	E			B	A	
Queue Length 50th (m)	40.5	0.0	2.6	69.5	6.1	0.1
Queue Length 95th (m)	59.4	6.2	7.0	121.5	1.7	0.0
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	398	372	724	1299	1299	1120
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.06	0.06	0.59	0.26	0.05

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 15.4 Intersection LOS: B
Intersection Capacity Utilization 65.2% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Bank Street & Dun Skipper Drive

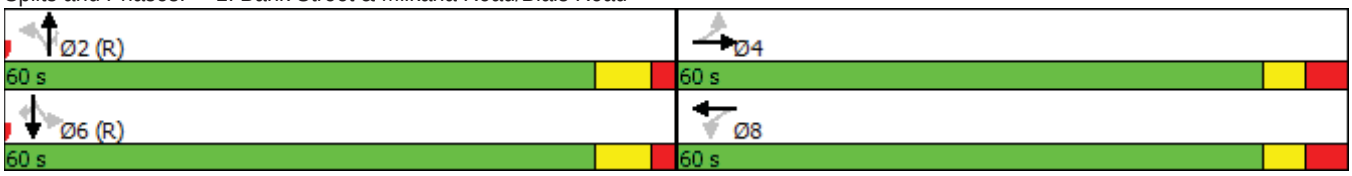
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	0	13	6	0	7	29	923	8	24	395	101
Future Volume (vph)	340	0	13	6	0	7	29	923	8	24	395	101
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		103.0	80.0		218.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.753			0.749			0.519			0.256		
Satd. Flow (perm)	1344	1517	0	1336	1517	0	926	3390	1517	457	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		340			66				42			101
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	340	0	13	6	0	7	29	923	8	24	395	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	340	13	0	6	7	0	29	923	8	24	395	101
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	39.6	39.6		39.6	39.6		34.3	34.3	34.3	34.3	34.3	34.3
Total Split (s)	60.0	60.0		60.0	60.0		60.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Maximum Green (s)	52.4	52.4		52.4	52.4		52.7	52.7	52.7	52.7	52.7	52.7
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	4.0	4.0		4.0	4.0		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6		7.6	7.6		7.3	7.3	7.3	7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0	20.0	20.0	20.0	20.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)	36.7	36.7		36.7	36.7		68.4	68.4	68.4	68.4	68.4	68.4
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.57	0.57	0.57	0.57	0.57	0.57
v/c Ratio	0.83	0.02		0.01	0.01		0.06	0.48	0.01	0.09	0.20	0.11
Control Delay	54.8	0.1		24.0	0.0		11.8	12.9	0.0	16.4	14.3	3.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	0.1		24.0	0.0		11.8	12.9	0.0	16.4	14.3	3.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A		C	A		B	B	A	B	B	A
Approach Delay		52.8			11.1			12.8			12.3	
Approach LOS		D			B			B			B	
Queue Length 50th (m)	68.3	0.0		0.9	0.0		2.1	38.7	0.0	2.3	20.9	0.0
Queue Length 95th (m)	87.8	0.0		3.3	0.0		6.4	64.1	m0.0	7.9	35.7	8.4
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0		103.0	80.0		218.0
Base Capacity (vph)	586	853		583	699		527	1931	882	260	1931	907
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.02		0.01	0.01		0.06	0.48	0.01	0.09	0.20	0.11

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 80 (67%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 20.3 Intersection LOS: C
Intersection Capacity Utilization 65.9% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



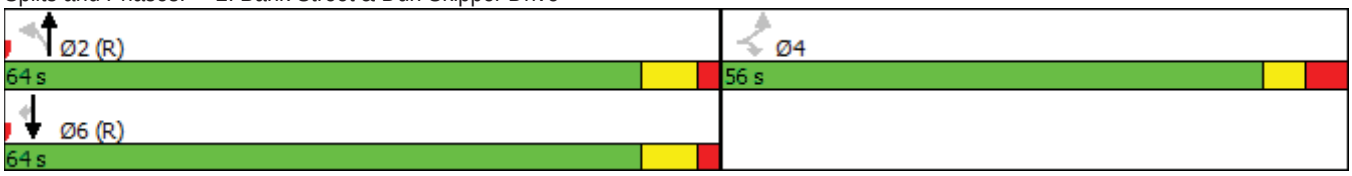
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	194	21	47	766	332	55
Future Volume (vph)	194	21	47	766	332	55
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	3390	3390	1517
Flt Permitted	0.950		0.551			
Satd. Flow (perm)	1695	1517	983	3390	3390	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		21				55
Link Speed (k/h)	50			80	80	
Link Distance (m)	313.5			129.9	449.4	
Travel Time (s)	22.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	194	21	47	766	332	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	194	21	47	766	332	55
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	44.6	44.6	32.3	32.3	32.3	32.3
Total Split (s)	56.0	56.0	64.0	64.0	64.0	64.0
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%
Maximum Green (s)	48.4	48.4	56.7	56.7	56.7	56.7
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	4.0	4.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	7.3	7.3	7.3	7.3
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	30.0	30.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	19.4	19.4	85.7	85.7	85.7	85.7
Actuated g/C Ratio	0.16	0.16	0.71	0.71	0.71	0.71
v/c Ratio	0.71	0.08	0.07	0.32	0.14	0.05
Control Delay	61.4	15.3	6.6	7.3	0.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.4	15.3	6.6	7.3	0.6	0.1

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	A	A	A	A
Approach Delay	56.9			7.2	0.5	
Approach LOS	E			A	A	
Queue Length 50th (m)	40.4	0.0	2.7	28.5	0.4	0.0
Queue Length 95th (m)	58.7	6.1	7.5	45.5	1.2	0.1
Internal Link Dist (m)	289.5			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	683	624	702	2422	2422	1099
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.03	0.07	0.32	0.14	0.05

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 12.9 Intersection LOS: B
Intersection Capacity Utilization 47.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Bank Street & Dun Skipper Drive



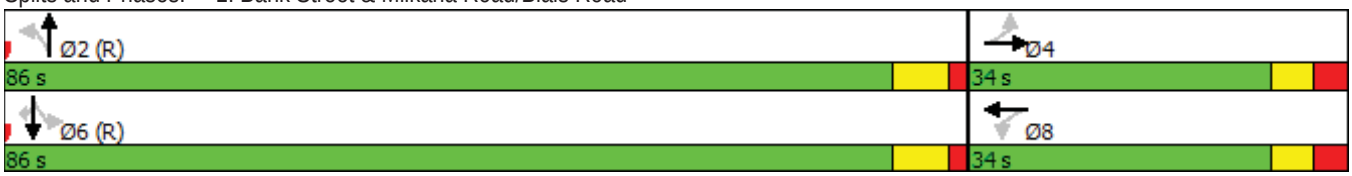
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	254	0	6	20	0	28	58	536	8	4	1099	274
Future Volume (vph)	254	0	6	20	0	28	58	536	8	4	1099	274
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		0.0	80.0		45.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1781	0	1695	1784	1517
Flt Permitted	0.739			0.754			0.091			0.404		
Satd. Flow (perm)	1319	1517	0	1345	1517	0	162	1781	0	721	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		121			382			1				163
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	254	0	6	20	0	28	58	536	8	4	1099	274
Shared Lane Traffic (%)												
Lane Group Flow (vph)	254	6	0	20	28	0	58	544	0	4	1099	274
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.9	28.9		28.9	28.9		27.8	27.8		27.8	27.8	27.8
Total Split (s)	34.0	34.0		34.0	34.0		86.0	86.0		86.0	86.0	86.0
Total Split (%)	28.3%	28.3%		28.3%	28.3%		71.7%	71.7%		71.7%	71.7%	71.7%
Maximum Green (s)	27.1	27.1		27.1	27.1		79.2	79.2		79.2	79.2	79.2
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	3.3	3.3		3.3	3.3		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9		6.9	6.9		6.8	6.8		6.8	6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effct Green (s)	25.2	25.2		25.2	25.2		81.1	81.1		81.1	81.1	81.1
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.68	0.68		0.68	0.68	0.68
v/c Ratio	0.92	0.01		0.07	0.05		0.53	0.45		0.01	0.91	0.25
Control Delay	83.4	0.0		37.5	0.1		30.1	8.3		7.0	30.2	3.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	83.4	0.0		37.5	0.1		30.1	8.3		7.0	30.2	3.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	A		D	A		C	A		A	C	A
Approach Delay		81.5			15.7			10.4			24.8	
Approach LOS		F			B			B			C	
Queue Length 50th (m)	53.2	0.0		3.4	0.0		5.3	55.1		0.3	193.9	8.1
Queue Length 95th (m)	#94.4	0.0		9.5	0.0		m#27.7	44.7		1.4	#302.1	17.2
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0			80.0		45.0
Base Capacity (vph)	297	436		303	638		109	1203		487	1205	1078
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.86	0.01		0.07	0.04		0.53	0.45		0.01	0.91	0.25

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 82 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 27.3 Intersection LOS: C
Intersection Capacity Utilization 94.0% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	176	11	95	426	939	144
Future Volume (vph)	176	11	95	426	939	144
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	1784	1784	1517
Flt Permitted	0.950		0.221			
Satd. Flow (perm)	1695	1517	394	1784	1784	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		11				144
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	176	11	95	426	939	144
Shared Lane Traffic (%)						
Lane Group Flow (vph)	176	11	95	426	939	144
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	28.8	28.8	28.8	28.8
Total Split (s)	31.0	31.0	89.0	89.0	89.0	89.0
Total Split (%)	25.8%	25.8%	74.2%	74.2%	74.2%	74.2%
Maximum Green (s)	24.2	24.2	82.2	82.2	82.2	82.2
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	3.2	3.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	17.0	17.0	15.0	15.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	17.6	17.6	88.8	88.8	88.8	88.8
Actuated g/C Ratio	0.15	0.15	0.74	0.74	0.74	0.74
v/c Ratio	0.71	0.05	0.33	0.32	0.71	0.12
Control Delay	63.6	20.0	10.0	6.7	7.5	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.6	20.0	10.0	6.7	7.5	0.6

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	B	A	A	A
Approach Delay	61.0			7.3	6.6	
Approach LOS	E			A	A	
Queue Length 50th (m)	36.8	0.0	6.2	27.5	36.1	0.1
Queue Length 95th (m)	55.2	4.6	17.4	49.0	m236.8	m2.2
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	341	314	291	1319	1319	1159
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.04	0.33	0.32	0.71	0.12

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 12.5 Intersection LOS: B
Intersection Capacity Utilization 87.8% ICU Level of Service E
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Bank Street & Dun Skipper Drive

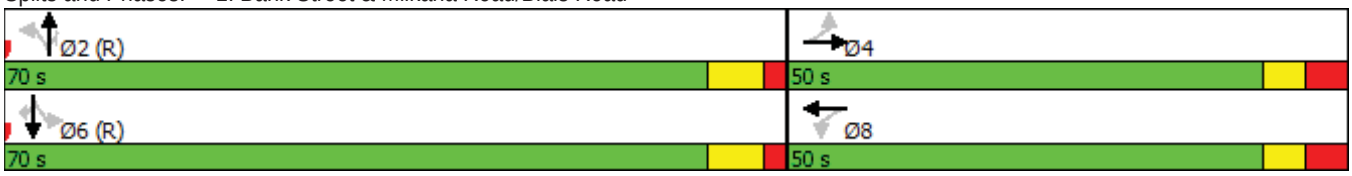
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	254	0	6	20	0	28	58	536	8	4	1099	274
Future Volume (vph)	254	0	6	20	0	28	58	536	8	4	1099	274
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		103.0	80.0		218.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.739			0.754			0.214			0.448		
Satd. Flow (perm)	1319	1517	0	1345	1517	0	382	3390	1517	799	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		66			288				42			274
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	254	0	6	20	0	28	58	536	8	4	1099	274
Shared Lane Traffic (%)												
Lane Group Flow (vph)	254	6	0	20	28	0	58	536	8	4	1099	274
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	39.6	39.6		39.6	39.6		34.3	34.3	34.3	34.3	34.3	34.3
Total Split (s)	50.0	50.0		50.0	50.0		70.0	70.0	70.0	70.0	70.0	70.0
Total Split (%)	41.7%	41.7%		41.7%	41.7%		58.3%	58.3%	58.3%	58.3%	58.3%	58.3%
Maximum Green (s)	42.4	42.4		42.4	42.4		62.7	62.7	62.7	62.7	62.7	62.7
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	4.0	4.0		4.0	4.0		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6		7.6	7.6		7.3	7.3	7.3	7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0	20.0	20.0	20.0	20.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)	28.7	28.7		28.7	28.7		76.4	76.4	76.4	76.4	76.4	76.4
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.64	0.64	0.64	0.64	0.64	0.64
v/c Ratio	0.81	0.01		0.06	0.05		0.24	0.25	0.01	0.01	0.51	0.26
Control Delay	61.5	0.0		31.9	0.1		10.9	7.3	0.0	11.0	13.8	2.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.5	0.0		31.9	0.1		10.9	7.3	0.0	11.0	13.8	2.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A		C	A		B	A	A	B	B	A
Approach Delay		60.1			13.4			7.5			11.5	
Approach LOS		E			B			A			B	
Queue Length 50th (m)	52.1	0.0		3.4	0.0		3.4	16.5	0.0	0.3	62.8	0.0
Queue Length 95th (m)	72.1	0.0		8.3	0.0		12.5	27.1	m0.1	1.9	97.2	10.7
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0		103.0	80.0		218.0
Base Capacity (vph)	466	578		475	722		243	2158	981	508	2158	1065
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.01		0.04	0.04		0.24	0.25	0.01	0.01	0.51	0.26

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 78 (65%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 80.4% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



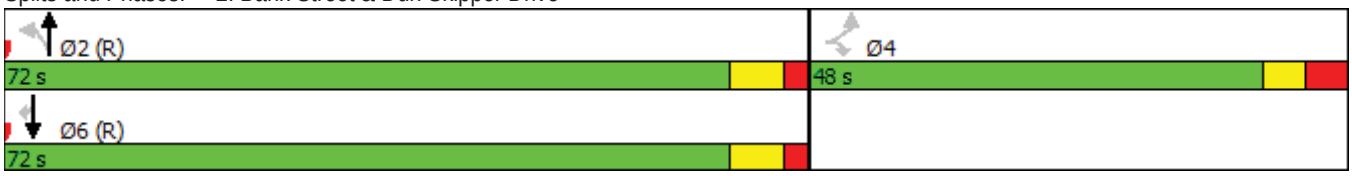
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	176	11	95	426	939	144
Future Volume (vph)	176	11	95	426	939	144
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	3390	3390	1517
Flt Permitted	0.950		0.287			
Satd. Flow (perm)	1695	1517	512	3390	3390	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		11				144
Link Speed (k/h)	50			80	80	
Link Distance (m)	313.5			129.9	449.4	
Travel Time (s)	22.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	176	11	95	426	939	144
Shared Lane Traffic (%)						
Lane Group Flow (vph)	176	11	95	426	939	144
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	44.6	44.6	32.3	32.3	32.3	32.3
Total Split (s)	48.0	48.0	72.0	72.0	72.0	72.0
Total Split (%)	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%
Maximum Green (s)	40.4	40.4	64.7	64.7	64.7	64.7
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	4.0	4.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	7.3	7.3	7.3	7.3
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	30.0	30.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	17.9	17.9	87.2	87.2	87.2	87.2
Actuated g/C Ratio	0.15	0.15	0.73	0.73	0.73	0.73
v/c Ratio	0.70	0.05	0.26	0.17	0.38	0.13
Control Delay	62.4	19.7	8.6	5.8	1.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.4	19.7	8.6	5.8	1.5	0.3

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	A	A	A	A
Approach Delay	59.9			6.3	1.4	
Approach LOS	E			A	A	
Queue Length 50th (m)	36.7	0.0	6.1	13.3	0.6	0.1
Queue Length 95th (m)	54.9	4.6	15.9	22.5	2.4	0.0
Internal Link Dist (m)	289.5			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	570	518	372	2462	2462	1141
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.02	0.26	0.17	0.38	0.13

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 8.9 Intersection LOS: A
Intersection Capacity Utilization 64.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Bank Street & Dun Skipper Drive



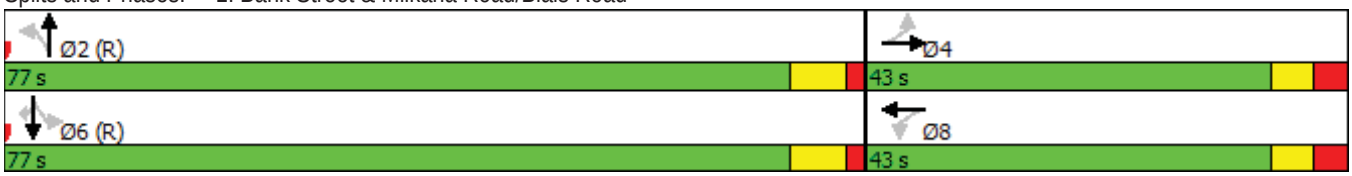
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	0	13	6	0	7	29	961	8	24	444	101
Future Volume (vph)	340	0	13	6	0	7	29	961	8	24	444	101
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		0.0	80.0		45.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1783	0	1695	1784	1517
Flt Permitted	0.753			0.749			0.446			0.106		
Satd. Flow (perm)	1344	1517	0	1336	1517	0	796	1783	0	189	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		410			125			1				101
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	340	0	13	6	0	7	29	961	8	24	444	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	340	13	0	6	7	0	29	969	0	24	444	101
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.9	28.9		28.9	28.9		27.8	27.8		27.8	27.8	27.8
Total Split (s)	43.0	43.0		43.0	43.0		77.0	77.0		77.0	77.0	77.0
Total Split (%)	35.8%	35.8%		35.8%	35.8%		64.2%	64.2%		64.2%	64.2%	64.2%
Maximum Green (s)	36.1	36.1		36.1	36.1		70.2	70.2		70.2	70.2	70.2
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	3.3	3.3		3.3	3.3		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9		6.9	6.9		6.8	6.8		6.8	6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effct Green (s)	33.3	33.3		33.3	33.3		73.0	73.0		73.0	73.0	73.0
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.61	0.61		0.61	0.61	0.61
v/c Ratio	0.91	0.02		0.02	0.01		0.06	0.89		0.21	0.41	0.10
Control Delay	71.2	0.1		29.8	0.0		11.0	28.6		17.5	14.3	2.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	71.2	0.1		29.8	0.0		11.0	28.6		17.5	14.3	2.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A		C	A		B	C		B	B	A
Approach Delay		68.6			13.8			28.1			12.3	
Approach LOS		E			B			C			B	
Queue Length 50th (m)	69.0	0.0		0.9	0.0		2.2	40.7		2.3	50.4	0.0
Queue Length 95th (m)	#114.1	0.0		3.9	0.0		m5.0	#269.2		7.7	71.6	6.4
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0			80.0		45.0
Base Capacity (vph)	404	743		401	543		484	1085		114	1085	962
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.84	0.02		0.01	0.01		0.06	0.89		0.21	0.41	0.10

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 76 (63%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 30.7 Intersection LOS: C
Intersection Capacity Utilization 91.9% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	247	31	61	751	345	91
Future Volume (vph)	247	31	61	751	345	91
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	1784	1784	1517
Flt Permitted	0.950		0.542			
Satd. Flow (perm)	1695	1517	967	1784	1784	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		31				91
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	247	31	61	751	345	91
Shared Lane Traffic (%)						
Lane Group Flow (vph)	247	31	61	751	345	91
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	28.8	28.8	30.8	30.8
Total Split (s)	36.0	36.0	84.0	84.0	84.0	84.0
Total Split (%)	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	29.2	29.2	77.2	77.2	77.2	77.2
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	3.2	3.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	17.0	17.0	15.0	15.0	17.0	17.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	22.6	22.6	83.8	83.8	83.8	83.8
Actuated g/C Ratio	0.19	0.19	0.70	0.70	0.70	0.70
v/c Ratio	0.77	0.10	0.09	0.60	0.28	0.08
Control Delay	62.0	12.6	7.5	13.0	3.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.0	12.6	7.5	13.0	3.0	0.4

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	A	B	A	A
Approach Delay	56.5			12.6	2.5	
Approach LOS	E			B	A	
Queue Length 50th (m)	51.3	0.0	3.8	76.5	9.0	0.1
Queue Length 95th (m)	72.0	7.1	9.9	132.6	27.1	2.0
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	415	394	676	1247	1247	1088
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.08	0.09	0.60	0.28	0.08

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 17.7 Intersection LOS: B
Intersection Capacity Utilization 67.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Bank Street & Dun Skipper Drive

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	215	7	50	102	6	62
Future Volume (vph)	215	7	50	102	6	62
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996				0.877	
Flt Protected				0.984	0.996	
Satd. Flow (prot)	1777	0	0	1756	1559	0
Flt Permitted				0.984	0.996	
Satd. Flow (perm)	1777	0	0	1756	1559	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	262.7			133.8	115.9	
Travel Time (s)	18.9			9.6	8.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	215	7	50	102	6	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	222	0	0	152	68	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 35.4%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	16	0	812	333	42
Future Volume (vph)	0	16	0	812	333	42
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865				0.985	
Flt Protected						
Satd. Flow (prot)	1543	0	0	1784	1758	0
Flt Permitted						
Satd. Flow (perm)	1543	0	0	1784	1758	0
Link Speed (k/h)	48			80	80	
Link Distance (m)	110.4			372.6	129.9	
Travel Time (s)	8.3			16.8	5.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	16	0	812	333	42
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	0	0	812	375	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.1%		ICU Level of Service B	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	215	7	50	102	6	62
Future Vol, veh/h	215	7	50	102	6	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	215	7	50	102	6	62

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	222	0	421	219
Stage 1	-	-	-	-	219	-
Stage 2	-	-	-	-	202	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1347	-	589	821
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	832	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1347	-	566	821
Mov Cap-2 Maneuver	-	-	-	-	566	-
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	800	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	790	-	-	1347	-
HCM Lane V/C Ratio	0.086	-	-	0.037	-
HCM Control Delay (s)	10	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	16	0	812	333	42
Future Vol, veh/h	0	16	0	812	333	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	16	0	812	333	42

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1166	354	375	0	-	0
Stage 1	354	-	-	-	-	-
Stage 2	812	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	214	690	1183	-	-	-
Stage 1	710	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	214	690	1183	-	-	-
Mov Cap-2 Maneuver	214	-	-	-	-	-
Stage 1	710	-	-	-	-	-
Stage 2	437	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1183	-	690	-	-
HCM Lane V/C Ratio	-	-	0.023	-	-
HCM Control Delay (s)	0	-	10.3	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

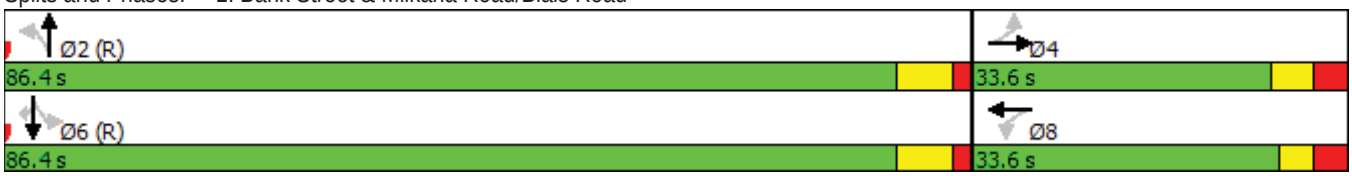
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	254	0	6	20	0	28	58	597	8	4	1141	274
Future Volume (vph)	254	0	6	20	0	28	58	597	8	4	1141	274
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		0.0	80.0		45.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.998				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1781	0	1695	1784	1517
Flt Permitted	0.739			0.754			0.065			0.366		
Satd. Flow (perm)	1319	1517	0	1345	1517	0	116	1781	0	653	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		112			340			1				159
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	254	0	6	20	0	28	58	597	8	4	1141	274
Shared Lane Traffic (%)												
Lane Group Flow (vph)	254	6	0	20	28	0	58	605	0	4	1141	274
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.9	28.9		28.3	28.3		27.8	27.8		27.8	27.8	27.8
Total Split (s)	33.6	33.6		33.6	33.6		86.4	86.4		86.4	86.4	86.4
Total Split (%)	28.0%	28.0%		28.0%	28.0%		72.0%	72.0%		72.0%	72.0%	72.0%
Maximum Green (s)	26.7	26.7		27.3	27.3		79.6	79.6		79.6	79.6	79.6
Yellow Time (s)	3.6	3.6		3.0	3.0		5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	3.3	3.3		3.3	3.3		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9		6.3	6.3		6.8	6.8		6.8	6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effct Green (s)	25.4	25.4		26.0	26.0		80.9	80.9		80.9	80.9	80.9
Actuated g/C Ratio	0.21	0.21		0.22	0.22		0.67	0.67		0.67	0.67	0.67
v/c Ratio	0.91	0.01		0.07	0.05		0.75	0.50		0.01	0.95	0.26
Control Delay	81.7	0.0		37.3	0.1		64.3	9.3		7.0	35.6	3.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	81.7	0.0		37.3	0.1		64.3	9.3		7.0	35.6	3.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	A		D	A		E	A		A	D	A
Approach Delay		79.8			15.6			14.1			29.4	
Approach LOS		E			B			B			C	
Queue Length 50th (m)	53.4	0.0		3.4	0.0		9.4	70.4		0.3	212.0	8.3
Queue Length 95th (m)	#95.4	0.0		9.5	0.0		m#28.7	42.3		1.4	#320.1	17.4
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0			80.0		45.0
Base Capacity (vph)	293	424		305	607		77	1200		440	1202	1074
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.87	0.01		0.07	0.05		0.75	0.50		0.01	0.95	0.26

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 90 (75%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 30.4 Intersection LOS: C
Intersection Capacity Utilization 96.3% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	248	25	111	415	944	181
Future Volume (vph)	248	25	111	415	944	181
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	1784	1784	1517
Flt Permitted	0.950		0.198			
Satd. Flow (perm)	1695	1517	353	1784	1784	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		25				181
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	248	25	111	415	944	181
Shared Lane Traffic (%)						
Lane Group Flow (vph)	248	25	111	415	944	181
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	28.8	28.8	28.8	28.8
Total Split (s)	31.0	31.0	89.0	89.0	89.0	89.0
Total Split (%)	25.8%	25.8%	74.2%	74.2%	74.2%	74.2%
Maximum Green (s)	24.2	24.2	82.2	82.2	82.2	82.2
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	3.2	3.2	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	17.0	17.0	15.0	15.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	21.6	21.6	84.8	84.8	84.8	84.8
Actuated g/C Ratio	0.18	0.18	0.71	0.71	0.71	0.71
v/c Ratio	0.81	0.09	0.45	0.33	0.75	0.16
Control Delay	67.6	14.6	15.4	8.0	7.2	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.6	14.6	15.4	8.0	7.2	0.4

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	B	A	A	A
Approach Delay	62.7			9.6	6.1	
Approach LOS	E			A	A	
Queue Length 50th (m)	51.5	0.0	9.6	32.1	42.9	0.6
Queue Length 95th (m)	#81.3	6.8	24.1	47.8	m70.1	m0.8
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	346	329	250	1265	1265	1128
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.08	0.44	0.33	0.75	0.16

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 15.1 Intersection LOS: B
Intersection Capacity Utilization 92.3% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Bank Street & Dun Skipper Drive

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	187	7	53	239	8	86
Future Volume (vph)	187	7	53	239	8	86
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.995				0.876	
Flt Protected				0.991	0.996	
Satd. Flow (prot)	1775	0	0	1768	1557	0
Flt Permitted				0.991	0.996	
Satd. Flow (perm)	1775	0	0	1768	1557	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	262.7			133.8	115.9	
Travel Time (s)	18.9			9.6	8.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	187	7	53	239	8	86
Shared Lane Traffic (%)						
Lane Group Flow (vph)	194	0	0	292	94	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.3%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	23	0	526	923	46
Future Volume (vph)	0	23	0	526	923	46
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865				0.994	
Flt Protected						
Satd. Flow (prot)	1543	0	0	1784	1774	0
Flt Permitted						
Satd. Flow (perm)	1543	0	0	1784	1774	0
Link Speed (k/h)	48			80	80	
Link Distance (m)	110.4			372.6	129.9	
Travel Time (s)	8.3			16.8	5.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	23	0	526	923	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	23	0	0	526	969	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 64.2%	ICU Level of Service C
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	187	7	53	239	8	86
Future Vol, veh/h	187	7	53	239	8	86
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	187	7	53	239	8	86

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	194	0	536	191
Stage 1	-	-	-	-	191	-
Stage 2	-	-	-	-	345	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1379	-	505	851
Stage 1	-	-	-	-	841	-
Stage 2	-	-	-	-	717	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1379	-	483	851
Mov Cap-2 Maneuver	-	-	-	-	483	-
Stage 1	-	-	-	-	841	-
Stage 2	-	-	-	-	685	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	799	-	-	1379	-
HCM Lane V/C Ratio	0.118	-	-	0.038	-
HCM Control Delay (s)	10.1	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	23	0	526	923	46
Future Vol, veh/h	0	23	0	526	923	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	23	0	526	923	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1472	946	969	0	-	0
Stage 1	946	-	-	-	-	-
Stage 2	526	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	140	317	711	-	-	-
Stage 1	377	-	-	-	-	-
Stage 2	593	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	140	317	711	-	-	-
Mov Cap-2 Maneuver	140	-	-	-	-	-
Stage 1	377	-	-	-	-	-
Stage 2	593	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	711	-	317	-	-
HCM Lane V/C Ratio	-	-	0.073	-	-
HCM Control Delay (s)	0	-	17.2	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

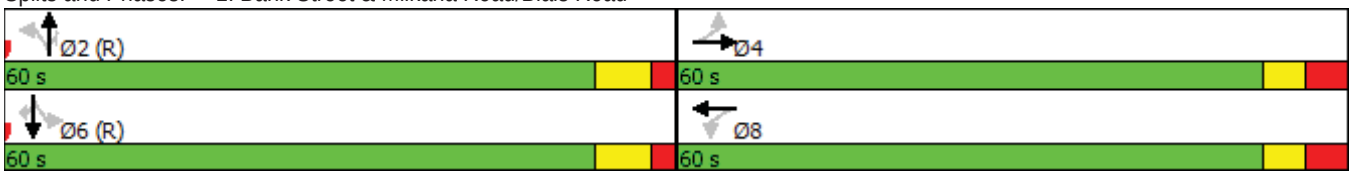
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	0	13	6	0	7	29	961	8	24	444	101
Future Volume (vph)	340	0	13	6	0	7	29	961	8	24	444	101
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		103.0	80.0		218.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.753			0.749			0.492			0.241		
Satd. Flow (perm)	1344	1517	0	1336	1517	0	878	3390	1517	430	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		293			58				42			101
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	340	0	13	6	0	7	29	961	8	24	444	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	340	13	0	6	7	0	29	961	8	24	444	101
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	34.6	34.6		34.6	34.6		39.3	39.3	39.3	39.3	39.3	39.3
Total Split (s)	60.0	60.0		60.0	60.0		60.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Maximum Green (s)	52.4	52.4		52.4	52.4		52.7	52.7	52.7	52.7	52.7	52.7
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	4.0	4.0		4.0	4.0		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6		7.6	7.6		7.3	7.3	7.3	7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		25.0	25.0	25.0	25.0	25.0	25.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)	36.9	36.9		36.9	36.9		68.2	68.2	68.2	68.2	68.2	68.2
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.57	0.57	0.57	0.57	0.57	0.57
v/c Ratio	0.83	0.02		0.01	0.01		0.06	0.50	0.01	0.10	0.23	0.11
Control Delay	54.4	0.1		24.0	0.0		11.2	12.5	0.0	16.7	14.6	3.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.4	0.1		24.0	0.0		11.2	12.5	0.0	16.7	14.6	3.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A		C	A		B	B	A	B	B	A
Approach Delay		52.4			11.1			12.4			12.7	
Approach LOS		D			B			B			B	
Queue Length 50th (m)	68.2	0.0		0.9	0.0		2.0	37.6	0.0	2.3	24.0	0.0
Queue Length 95th (m)	87.6	0.0		3.2	0.0		6.2	69.0	m0.0	7.9	40.3	8.4
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0		103.0	80.0		218.0
Base Capacity (vph)	586	827		583	695		499	1927	880	244	1927	906
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.02		0.01	0.01		0.06	0.50	0.01	0.10	0.23	0.11

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 80 (67%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 19.8 Intersection LOS: B
Intersection Capacity Utilization 67.0% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



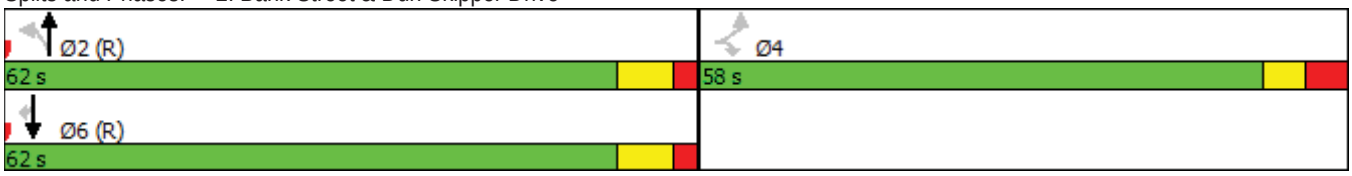
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	247	31	61	751	345	91
Future Volume (vph)	247	31	61	751	345	91
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	3390	3390	1517
Flt Permitted	0.950		0.545			
Satd. Flow (perm)	1695	1517	972	3390	3390	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		31				91
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	247	31	61	751	345	91
Shared Lane Traffic (%)						
Lane Group Flow (vph)	247	31	61	751	345	91
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	44.6	44.6	32.3	32.3	32.3	32.3
Total Split (s)	58.0	58.0	62.0	62.0	62.0	62.0
Total Split (%)	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Maximum Green (s)	50.4	50.4	54.7	54.7	54.7	54.7
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	4.0	4.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	7.3	7.3	7.3	7.3
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	30.0	30.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	23.3	23.3	81.8	81.8	81.8	81.8
Actuated g/C Ratio	0.19	0.19	0.68	0.68	0.68	0.68
v/c Ratio	0.75	0.10	0.09	0.33	0.15	0.09
Control Delay	59.2	12.2	8.3	9.0	0.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.2	12.2	8.3	9.0	0.8	0.2

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	A	A	A	A
Approach Delay	54.0			8.9	0.7	
Approach LOS	D			A	A	
Queue Length 50th (m)	51.0	0.0	4.1	31.7	0.5	0.0
Queue Length 95th (m)	70.8	6.9	10.6	50.5	1.2	0.1
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	711	655	662	2309	2309	1062
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.05	0.09	0.33	0.15	0.09

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 14.8 Intersection LOS: B
Intersection Capacity Utilization 51.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Bank Street & Dun Skipper Drive



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	215	7	50	102	6	62
Future Volume (vph)	215	7	50	102	6	62
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996				0.877	
Flt Protected				0.984	0.996	
Satd. Flow (prot)	1777	0	0	1756	1559	0
Flt Permitted				0.984	0.996	
Satd. Flow (perm)	1777	0	0	1756	1559	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	262.7			133.8	115.9	
Travel Time (s)	18.9			9.6	8.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	215	7	50	102	6	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	222	0	0	152	68	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 35.4%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	16	0	812	333	42
Future Volume (vph)	0	16	0	812	333	42
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.865			0.983	
Flt Protected						
Satd. Flow (prot)	0	1543	0	3390	3333	0
Flt Permitted						
Satd. Flow (perm)	0	1543	0	3390	3333	0
Link Speed (k/h)	48			80	80	
Link Distance (m)	110.4			372.6	129.9	
Travel Time (s)	8.3			16.8	5.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	16	0	812	333	42
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	16	0	812	375	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 27.0%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	215	7	50	102	6	62
Future Vol, veh/h	215	7	50	102	6	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	215	7	50	102	6	62

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	222	0	421	219
Stage 1	-	-	-	-	219	-
Stage 2	-	-	-	-	202	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1347	-	589	821
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	832	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1347	-	566	821
Mov Cap-2 Maneuver	-	-	-	-	566	-
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	800	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	790	-	-	1347	-
HCM Lane V/C Ratio	0.086	-	-	0.037	-
HCM Control Delay (s)	10	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	16	0	812	333	42
Future Vol, veh/h	0	16	0	812	333	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	16	0	812	333	42

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	188	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	822	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	822	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	822	-	-
HCM Lane V/C Ratio	-	0.019	-	-
HCM Control Delay (s)	-	9.5	-	-
HCM Lane LOS	-	A	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-

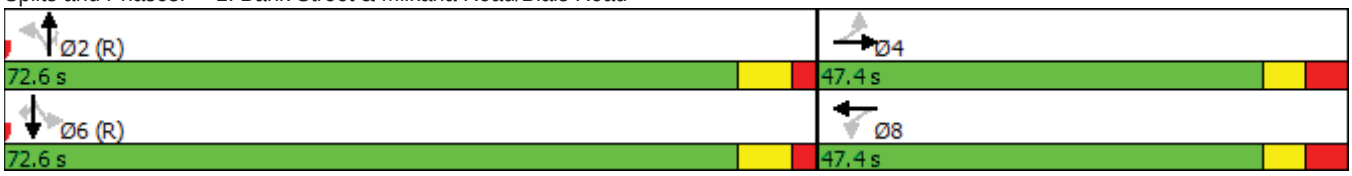
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	254	0	6	20	0	28	58	597	8	4	1141	274
Future Volume (vph)	254	0	6	20	0	28	58	597	8	4	1141	274
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	30.0		0.0	100.0		103.0	80.0		218.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	20.0			20.0			20.0			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.737			0.753			0.161			0.380		
Satd. Flow (perm)	1315	1517	0	1344	1517	0	287	3390	1517	678	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48			222				42			304
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		1126.6			1094.3			449.4			1450.4	
Travel Time (s)		81.1			78.8			20.2			65.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	282	0	7	22	0	31	64	663	9	4	1268	304
Shared Lane Traffic (%)												
Lane Group Flow (vph)	282	7	0	22	31	0	64	663	9	4	1268	304
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	39.6	39.6		39.6	39.6		34.3	34.3	34.3	34.3	34.3	34.3
Total Split (s)	47.4	47.4		47.4	47.4		72.6	72.6	72.6	72.6	72.6	72.6
Total Split (%)	39.5%	39.5%		39.5%	39.5%		60.5%	60.5%	60.5%	60.5%	60.5%	60.5%
Maximum Green (s)	39.8	39.8		39.8	39.8		65.3	65.3	65.3	65.3	65.3	65.3
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	4.0	4.0		4.0	4.0		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6		7.6	7.6		7.3	7.3	7.3	7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0	20.0	20.0	20.0	20.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)	30.8	30.8		30.8	30.8		74.3	74.3	74.3	74.3	74.3	74.3
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.62	0.62	0.62	0.62	0.62	0.62
v/c Ratio	0.84	0.02		0.06	0.06		0.36	0.32	0.01	0.01	0.60	0.29
Control Delay	62.8	0.0		30.6	0.2		16.4	7.1	0.0	11.8	16.6	2.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.8	0.0		30.6	0.2		16.4	7.1	0.0	11.8	16.6	2.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	A		C	A		B	A	A	B	B	A
Approach Delay		61.3			12.8			7.8			13.8	
Approach LOS		E			B			A			B	
Queue Length 50th (m)	57.8	0.0		3.6	0.0		3.6	19.5	0.0	0.3	83.2	0.0
Queue Length 95th (m)	80.1	0.0		8.7	0.0		m12.6	29.6	m0.0	2.0	123.3	11.3
Internal Link Dist (m)		1102.6			1070.3			425.4			1426.4	
Turn Bay Length (m)	150.0			30.0			100.0		103.0	80.0		218.0
Base Capacity (vph)	436	535		445	651		177	2100	955	419	2100	1055
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.01		0.05	0.05		0.36	0.32	0.01	0.01	0.60	0.29

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 78 (65%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 17.3 Intersection LOS: B
Intersection Capacity Utilization 81.6% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank Street & Miikana Road/Blais Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	248	25	111	415	944	181
Future Volume (vph)	248	25	111	415	944	181
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	80.0	0.0	115.0			75.0
Storage Lanes	1	1	1			1
Taper Length (m)	20.0		20.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1695	1517	1695	3390	3390	1517
Flt Permitted	0.950		0.238			
Satd. Flow (perm)	1695	1517	425	3390	3390	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		28				201
Link Speed (k/h)	50			80	80	
Link Distance (m)	133.8			129.9	449.4	
Travel Time (s)	9.6			5.8	20.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	276	28	123	461	1049	201
Shared Lane Traffic (%)						
Lane Group Flow (vph)	276	28	123	461	1049	201
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	44.6	44.6	32.3	32.3	32.3	32.3
Total Split (s)	44.6	44.6	75.4	75.4	75.4	75.4
Total Split (%)	37.2%	37.2%	62.8%	62.8%	62.8%	62.8%
Maximum Green (s)	37.0	37.0	68.1	68.1	68.1	68.1
Yellow Time (s)	3.6	3.6	5.0	5.0	5.0	5.0
All-Red Time (s)	4.0	4.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	7.3	7.3	7.3	7.3
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	30.0	30.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	24.9	24.9	80.2	80.2	80.2	80.2
Actuated g/C Ratio	0.21	0.21	0.67	0.67	0.67	0.67
v/c Ratio	0.78	0.08	0.43	0.20	0.46	0.19
Control Delay	60.2	12.1	17.0	8.6	4.1	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.2	12.1	17.0	8.6	4.1	1.0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	E	B	B	A	A	A
Approach Delay	55.8			10.4	3.6	
Approach LOS	E			B	A	
Queue Length 50th (m)	57.1	0.0	11.4	18.5	0.7	0.0
Queue Length 95th (m)	78.0	6.5	31.1	30.5	95.4	9.2
Internal Link Dist (m)	109.8			105.9	425.4	
Turn Bay Length (m)	80.0		115.0			75.0
Base Capacity (vph)	522	487	284	2264	2264	1080
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.06	0.43	0.20	0.46	0.19

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 12.9 Intersection LOS: B
Intersection Capacity Utilization 68.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Bank Street & Dun Skipper Drive

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	187	7	53	239	8	86
Future Volume (vph)	187	7	53	239	8	86
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.995				0.877	
Flt Protected				0.991	0.996	
Satd. Flow (prot)	1775	0	0	1768	1559	0
Flt Permitted				0.991	0.996	
Satd. Flow (perm)	1775	0	0	1768	1559	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	262.7			133.8	115.9	
Travel Time (s)	18.9			9.6	8.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	208	8	59	266	9	96
Shared Lane Traffic (%)						
Lane Group Flow (vph)	216	0	0	325	105	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.3%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	23	0	526	923	46
Future Volume (vph)	0	23	0	526	923	46
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.865			0.993	
Flt Protected						
Satd. Flow (prot)	0	1543	0	3390	3366	0
Flt Permitted						
Satd. Flow (perm)	0	1543	0	3390	3366	0
Link Speed (k/h)	48			80	80	
Link Distance (m)	110.4			372.6	129.9	
Travel Time (s)	8.3			16.8	5.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	26	0	584	1026	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	26	0	584	1077	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 38.5%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	187	7	53	239	8	86
Future Vol, veh/h	187	7	53	239	8	86
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	208	8	59	266	9	96

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	216	0	595	212
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	383	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1354	-	467	828
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	689	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1354	-	443	828
Mov Cap-2 Maneuver	-	-	-	-	443	-
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	654	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	10.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	771	-	-	1354	-
HCM Lane V/C Ratio	0.135	-	-	0.043	-
HCM Control Delay (s)	10.4	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	23	0	526	923	46
Future Vol, veh/h	0	23	0	526	923	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	26	0	584	1026	51

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	538	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	488	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	488	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

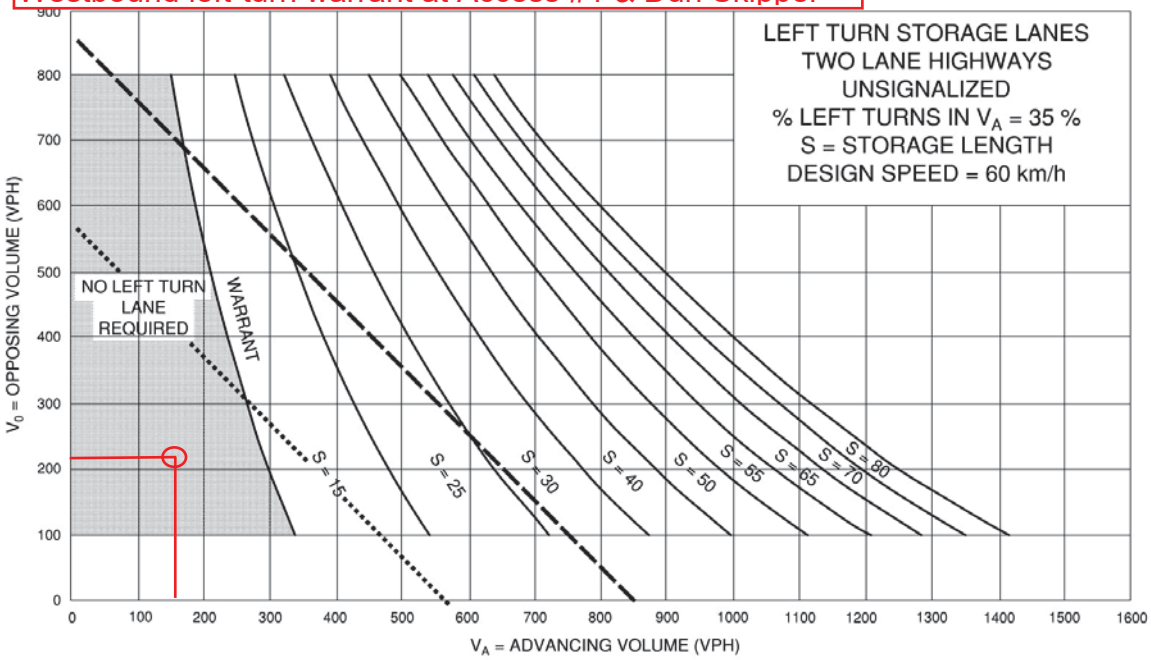
Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	488	-	-
HCM Lane V/C Ratio	-	0.052	-	-
HCM Control Delay (s)	-	12.8	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Appendix L – Auxiliary Lane Analysis

Future (2028) AM Total Traffic

Exhibit 9A-9

Westbound left-turn warrant at Access #1 & Dun Skipper



TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

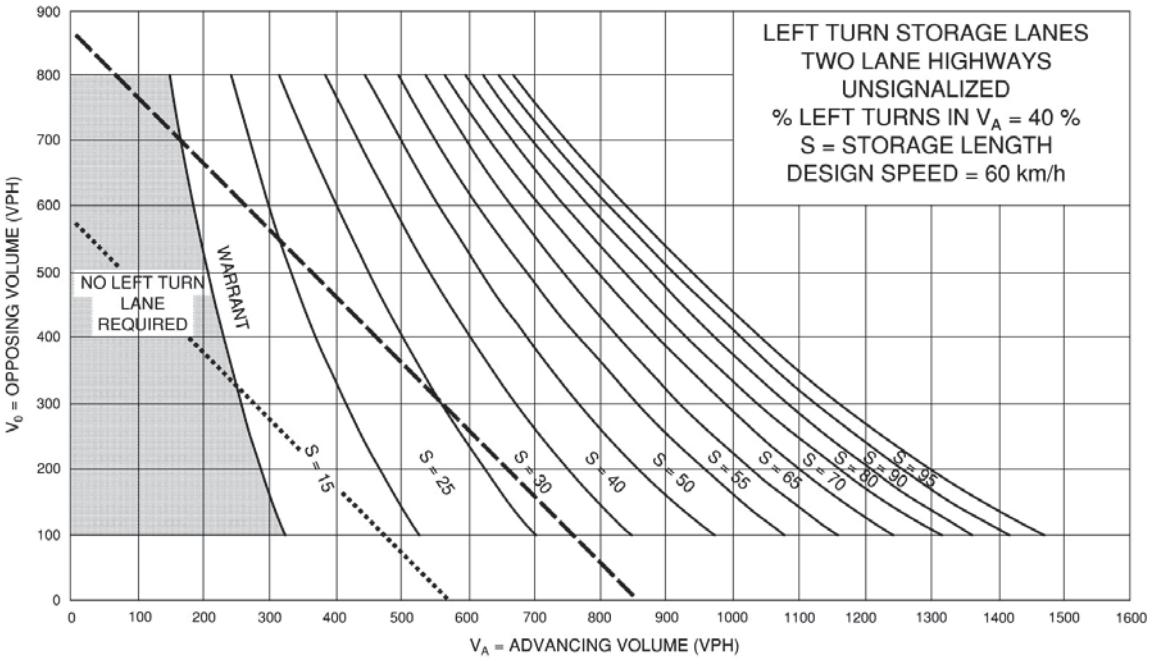
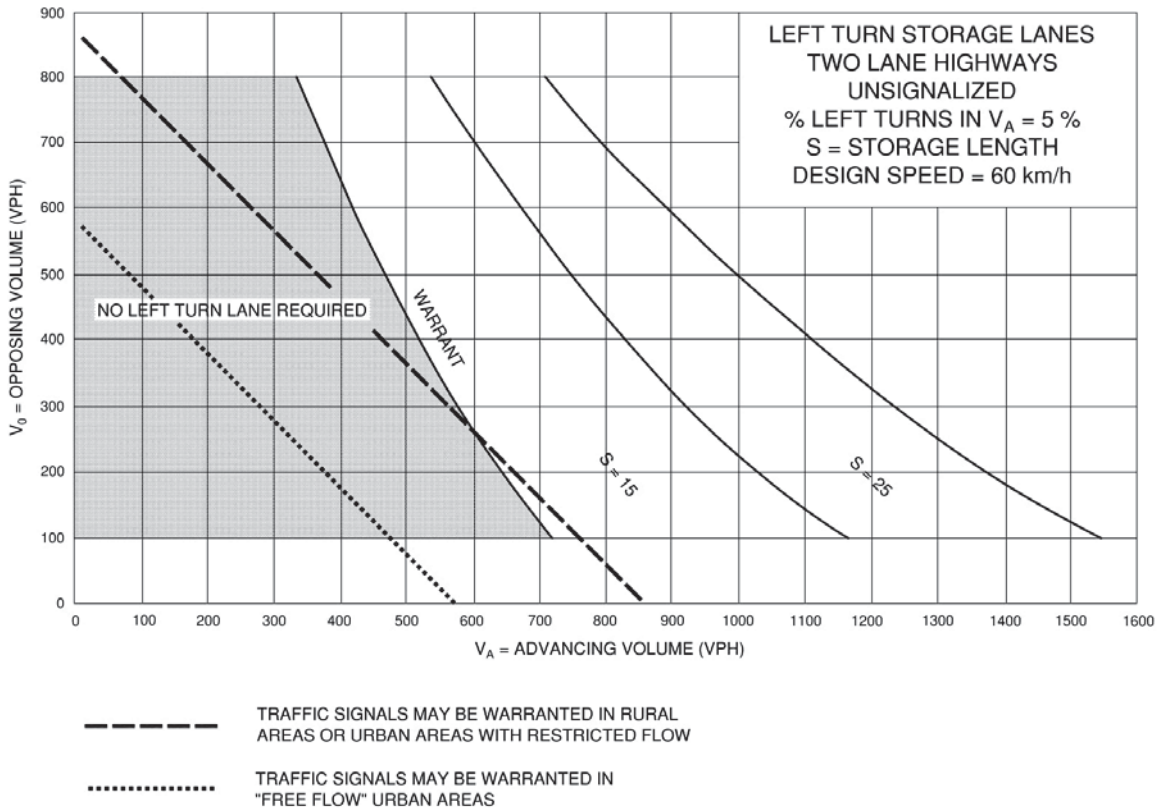
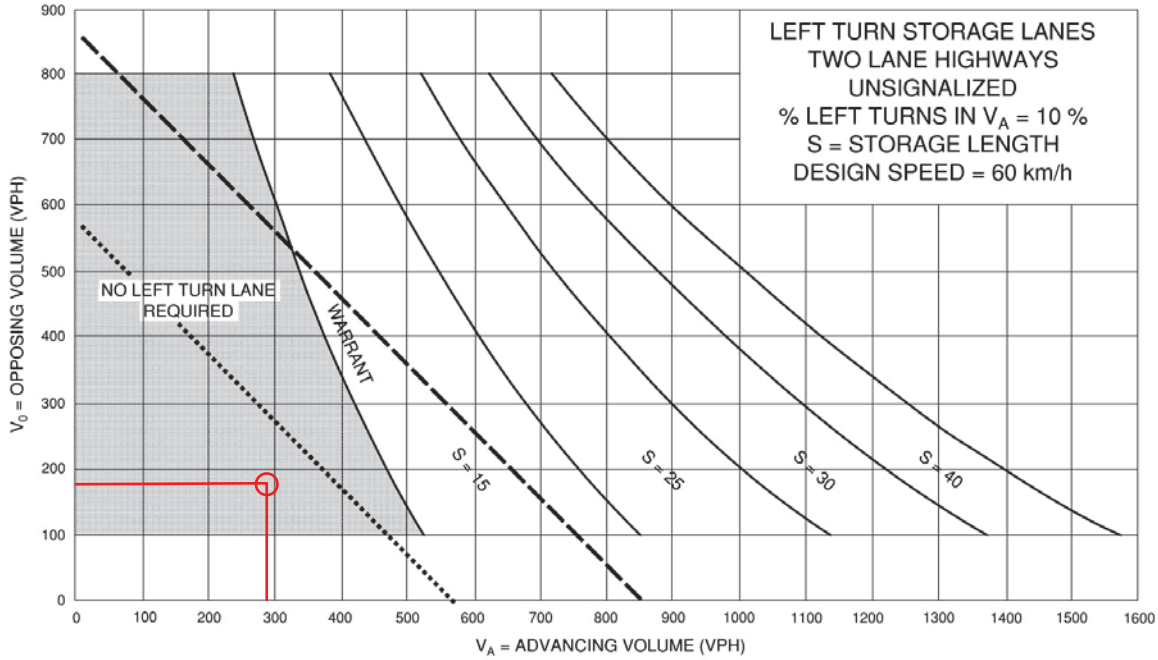


Exhibit 9A-6



Future (2028) PM Total Traffic

Westbound left-turn warrant at Access #1 & Dun Skipper