1649 Montreal Road & 741 Blair Road

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report

(Revised)

Prepared for:

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April 2023

PN: 2021-003

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1 Screening

This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for the TIA Study PM. As shown in the Screening Form, a TIA is required including the Network Impact Component and the Design Review Component. This report accompanies a site plan application.

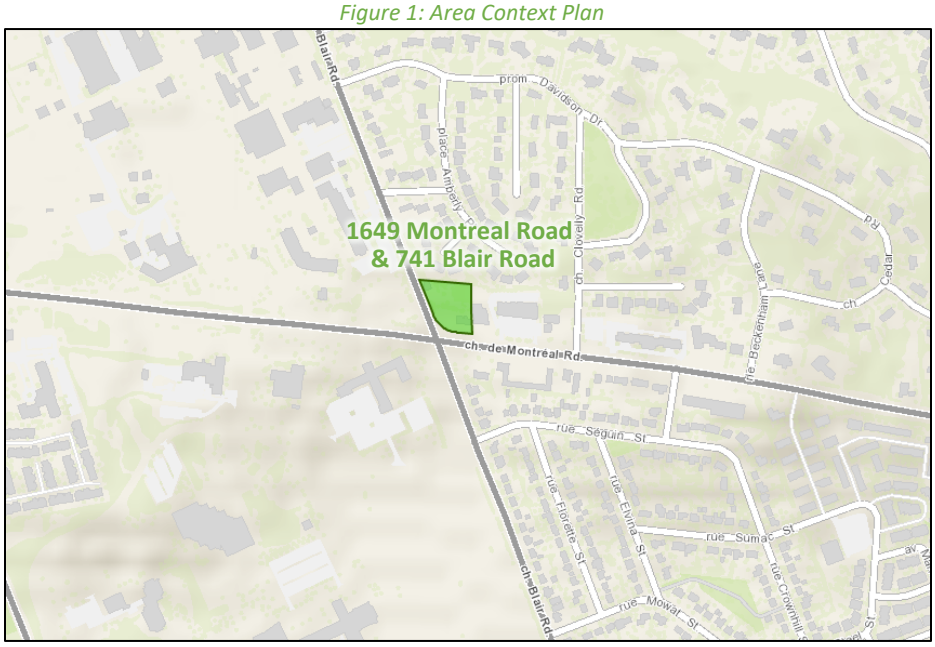
2 Existing and Planned Conditions

2.1 Proposed Development

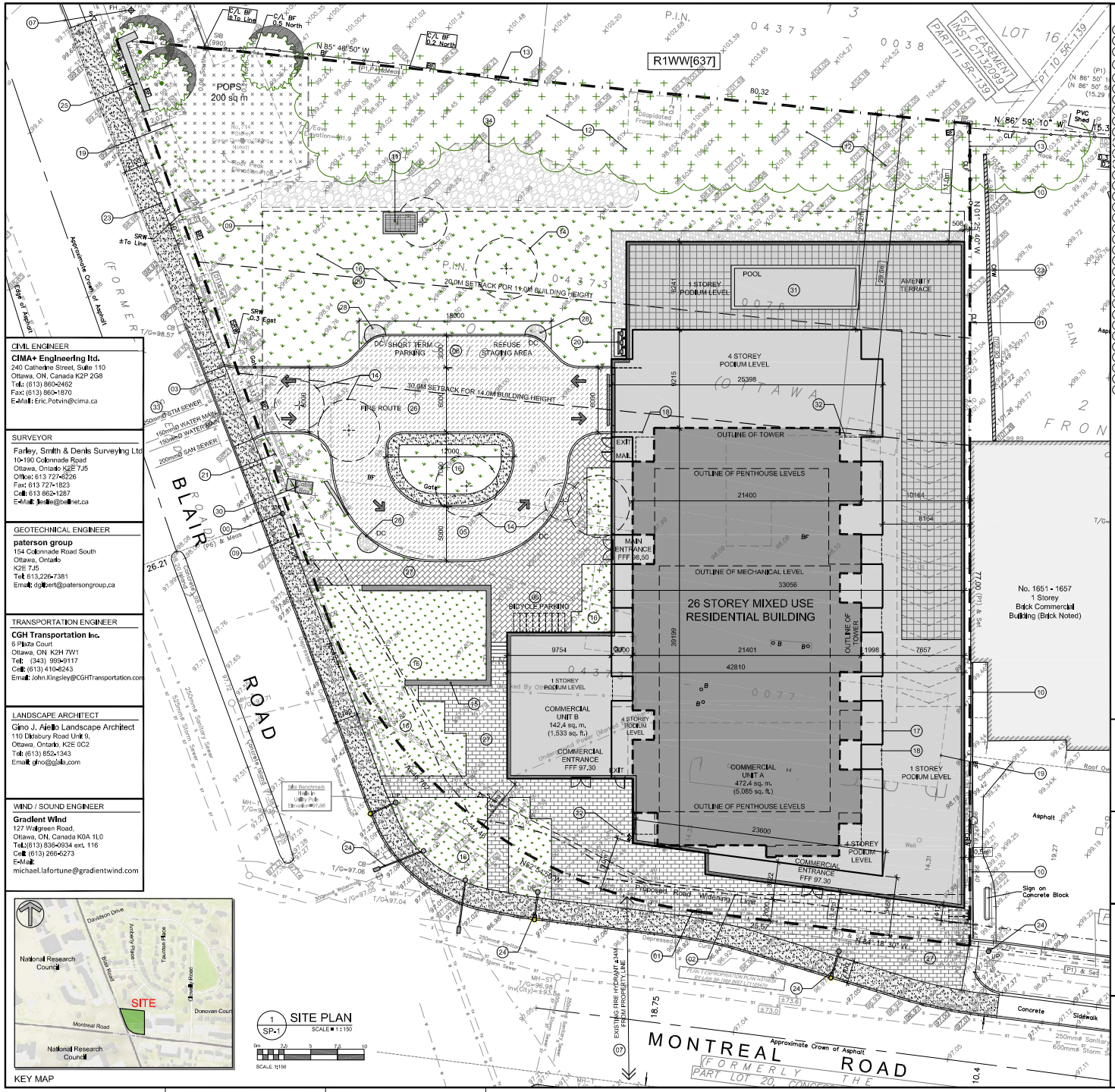
The subject site, currently zoned as Arterial Mainstreet (AM10[2199]) for the 1649 Montreal Road parcel and Residential Third Density (R3K[1631]) for the 741 Blair Road parcel, intersects the Montreal Arterial Mainstreet Design Priority Area and currently consists of a mostly treed residential lot with a single detached dwelling, and an auto garage with surface parking lot. The subject development proposes the construction of a 26-storey mixed-use building on a four-storey podium, massed mostly on the 1649 Montreal Road parcel, comprising 254 residential dwelling units and 6,618 ft^2 of ground floor commercial use. The site access is proposed as being a full-movement access onto Blair Road. Vehicle parking is proposed via nine surface spaces and 280 underground spaces across three levels, and the development is anticipated to be built-out in a single phase by 2024.

Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: February 10, 2021



1 SITE PLAN
SP-1
SCALE = 1:150

SCALE 1:150

KEY MAP

DRAWING NOTES

1. PROPERTY LINE
2. PROPOSED ROAD WIDENING
3. DEPRESSED CURB / SIDEWALK AT DRIVEWAY
4. REPLACE EXISTING DEPRESSED CURB & SIDEWALK WITH NEW 2.1M WIDE SIDEWALK TO CITY STANDARDS
5. ASPHALT DRIVE WAY WITH 150 BARRIER CURBS
6. BICYCLE PARKING SPACE
7. EXISTING FIRE HYDRANT
8. SHORT TERM LAY-BY PARKING
9. OUTLINE OF UNDERGROUND PARKING LEVEL
10. EXISTING RETAINING WALL
11. ABM HVAC / EXHAUST GRILL
12. EXISTING TREED AREA TO REMAIN
13. EXISTING FENCE CHAIN LINK / BOARD
14. EXISTING TREE TO BE REMOVED
15. CONCRETE RETAINING WALL
16. SOFT LANDSCAPING
17. OUTLINE OF BUILDING ABOVE
18. BALCONY ABOVE
19. EXISTING BUILDING TO BE REMOVED
20. NATURAL GAS EQUIPMENT
21. STORM WATER TANK - SEE CIVIL PLAN
22. SIAMESE CONNECTION
23. EXISTING CHAIN LINK FENCE TO BE REMOVED
24. EXISTING UTILITY STREET LIGHT / TRAFFIC POLE
25. EXISTING STONE WALL TO BE REFURBISHED
26. 6.0 METRE WIDE FIRE ROUTE
27. HARD SURFACE WALKWAY
28. RIVER STONE SPILLWAY
29. SEASONAL SNOW STORAGE
30. EXISTING UTILITY EQUIPMENT TO BE REMOVED
31. PODIUM LEVEL EXTERIOR AMENITY AREA
32. INTERIOR GARBAGE ROOM
33. PROPOSED BUILDING SERVICES, SEE CIVIL
34. RIVER ROCK SWALE, SEE CIVIL

SITE PLAN SYMBOLS

- CONCRETE UNIT PAVERS SURFACE
- CONCRETE WALK
- ASPHALT DRIVEWAY
- SOFT LANDSCAPING
- BIKE RACK
- TWO WAY VEHICLE CIRCULATION
- MAIN ENTRANCE
- COMMERCIAL DOOR / FIRE EXIT
- PROPERTY LINE
- CITY STREET LIGHTING

PROJECT INFORMATION

ZONING
Zoning By-Law 2008-250 R3-K[1631] AM10[2199]

SITE AREA	4,881.7 sq.m. (52,548 sq.ft.)
BUILDING HEIGHT - AM10	89.0 m
BUILDING HEIGHT - RSK	16.0 m
YARD SETBACK (ALL) - AM10	0.0 m
FRONT YARD SETBACK - RSK	6.0 m
INTERIOR YARD SETBACK - RSK - NORTH SIDE	3.0 m
INTERIOR YARD SETBACK - RSK - SOUTH SIDE	1.4 m
REAR YARD SETBACK - RSK	6.0 m
PARKING AREA 'C'	1/2 per unit
VISITOR PARKING AREA 'C'	0.2 per unit
COMMERCIAL PARKING - RESTAURANT	10 per 100m² of GFA
BICYCLE PARKING	0.5 per unit
BICYCLE PARKING - COMMERCIAL	1 per 250m² of GFA
AMENITY SPACE	6.0 m² per unit

PROJECT STATISTICS

BUILDING HEIGHT	89.0 m
BUILDING HEIGHT - STOREYS	26
AVERAGE MEAN GRADE (GEO. ELEV.)	99.00
FRONT YARD SETBACK	3.4 m
CORNER SIDE YARD SETBACK	4.8 m
INTERIOR YARD SETBACK	1.4 m
REAR YARD SETBACK	11.0 m

GROSS BUILDING - AREAS
(LOT OF OTTAWA CONCEPT AREA)

PARKING LEVEL		0.0 sq.m. (0.0 sq.ft.)
GROUND FLOOR		614.8 sq.m. (6,618 sq.ft.)
2nd to 4th FLOOR	3 x 685.2 sq.m. = 3 x 10,044 sq.ft.	2,055.6 sq.m. (31,032 sq.ft.)
5th to 22nd FLOOR	18 x 629.65 sq.m. = 18 x 6,778 sq.ft.	11,327.6 sq.m. (121,990 sq.ft.)
23rd FLOOR		344.9 sq.m. (3,887 sq.ft.)
24th to 26th FLOOR	3 x 541.1 sq.m. = 3 x 5,826 sq.ft.	1,644.4 sq.m. (17,700 sq.ft.)
MECHANICAL LEVEL		0.0 sq.m. (0.0 sq.ft.)
TOTAL AREA		17,093.0 sq.m. (183,997 sq.ft.)
TOWER FOOTPRINT		765.48 sq.m. (8,241 sq.ft.)

UNIT STATISTICS

ONE BEDROOM UNIT	87
ONE BEDROOM + DEN UNIT	36
TWO BEDROOM UNIT	69
TWO BEDROOM + DEN UNIT	62
TOTAL	254

CAR PARKING

REQUIRED by ZONING BY-LAW

RESIDENCE	• 1.2 PER UNIT	305
VISITOR	• 0.2 PER UNIT	51
COMMERCIAL RESTAURANT	• 10 PER 100m² GFA	61
TOTAL		417

PROVIDED

RESIDENCE	• 0.7 PER UNIT	177
VISITOR	• 0.2 PER UNIT	51
COMMERCIAL RESTAURANT	• 10 PER 100m² GFA	61
TOTAL		289

BICYCLE PARKING

REQUIRED

RESIDENCE	• 0.5 PER UNIT	127
COMMERCIAL RESTAURANT	• 1 PER 250m² GFA	2
TOTAL		129

PROVIDED

PARKING LEVEL	• 1.0 PER UNIT	254
EXTERIOR AT GRADE		10
TOTAL		264

LOT COVERAGE

PAVED SURFACE =	466.3 sq.m.	9.6%
BUILDING FOOTPRINT =	2,086.7 sq.m.	42.8%
LANDSCAPED OPEN SPACE =	2,114.7 sq.m.	43.4%
POPS =	200.0 sq.m.	4.1%
TOTAL =	4,881.7 sq.m.	100.0%

AMENITY SPACE

EXTERIOR AT GRADE =	700.0 sq.m.
1st FLOOR AMENITY ROOM =	90.0 sq.m.
2nd FLOOR EXTERIOR TERRACE =	530.0 sq.m.
PRIVATE TERRACE (2nd FLOOR) =	74.0 sq.m.
PRIVATE TERRACE (4th FLOOR) =	100.0 sq.m.
PRIVATE TERRACE (22nd FLOOR) =	30.0 sq.m.
PRIVATE BALCONIES =	2,685.0 sq.m.
TOTAL =	3,809.0 sq.m.
TOTAL COMMUNAL =	1,310.0 sq.m.
REQUIRED • 6.0M² PER UNIT (254) =	1,524.0 sq.m.
REQUIRED COMMUNAL @ 50% =	762.0 sq.m.

SOLID WASTE

254 UNITS

GARBAGE	0.110 Y³ PER UNIT	28 Y³
RECYCLING • BIN	0.018 Y³ PER UNIT	5 Y³
RECYCLING • FIBRE	0.038 Y³ PER UNIT	10 Y³
ORGANICS	1 • 240 L BIN PER PUR 50 UNITS	5

NOTATION SYMBOLS:

- (W) INDICATES DRAWING NOTES - LISTED ON EACH SHEET.
- (A) INDICATES ASSEMBLIE TYPE: REFER TO TYPICAL ASSEMBLIES SCHEDULE.
- (W) INDICATES WINDOW TYPE: REFER TO WINDOW ELEVATIONS AND DETAILS ON A900 SERIES.
- (100) INDICATES DOOR TYPE: REFER TO DOOR SCHEDULE AND DETAILS ON A400 SERIES.
- DETAIL NUMBER
- TITLE
- SHEET
- DETAIL REFERENCE PAGE
- DETAIL CROSS REFERENCE PAGE

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT.

ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS.

DO NOT SCALE DRAWINGS.

No.	DESCRIPTION	DATE
1	REVISED UNIT COUNT	Feb. 14, 23
1	ISSUED FOR ROUND 1 SPC RESPONSE	Jan. 13, 23
1	ISSUED FOR SPC APPLICATION	Aug. 31, 22
1	ISSUED TO CONSULTANT	Aug. 22, 22
1	ISSUED FOR CONSULTANT REVIEW	Aug. 08, 22
1	ISSUED FOR REVIEW	July 27, 22
1	ISSUED FOR LCRP	Sept. 10, 21
1	ISSUED FOR ZONING AMENDMENT APP.	May. 10, 21

REVISIONS

ARCHITECT SEAL
ONTARIO ASSOCIATION OF ARCHITECTS — RODERICK LAHEY DREW — LICENCE 4375
SEAL DATE/STAMP DATE

NORTH ARROW

CLIENT
BERTONE

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t 613.724.9932 f 613.724.1209 rlaarchitecture.ca

PROJECT TITLE
741 BLAIR ROAD / 1649 MONTREAL ROAD
OTTAWA ONTARIO

SHEET TITLE
SITE PLAN
EXISTING CONDITIONS

DRAWN	CHECKED
R.V.	R.V.
SCALE	SHEET No.
1:150	SP-1
PROJECT No.	
2037	

D07-12-22-0132

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Email: gino@gjala.com

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michael.lafortune@gradientwind.com

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Vuze Construction
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Quebec, H#H #H#
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Email: mchenier@vuzeconstruction.com

LEGAL DESCRIPTION

TOPOGRAPHIC PLAN OF SURVEY OF

PART OF LOT 20
CONCESSION 1 (OTTAWA FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
CITY OF OTTAWA
Prepared by Farley, Smith & Denis Surveying Ltd

URBAN PLANNER

FoTenn Consultants Inc.
223 McLeod Street
Ottawa, ON Canada, K2P 0Z8
Tel.: (613) 730-5709
Fax: (613) 730-1136
E-Mail: tremblay@fotenn.com
E-Mail: freeman@fotenn.com

PAPER SIZE: ISO_B1_(707.00_x_1000.00_MM) | PLOT DATE: Tuesday, February 14, 2023 | PLOT SCALE: 1:1 | PEN STYLE: G-RLA-MASTER-100%.ctb | F:\2020\2037 – Blair & Montreal Road\01 Design Development\2037 741 Blair Site Plan 2023 01 10.dwg

Plan # 18876

2.2 Existing Conditions

2.2.1 Area Road Network

Montreal Road: Montreal Road is a City of Ottawa arterial road with a divided four-lane urban cross-section within the study area, with sidewalks on both sides of the road. The posted speed limit is 60 km/h and the Ottawa Official Plan reserves a 37.5-metre right of way within the study area. Montreal Road is a truck route.

Blair Road: Blair Road is a City of Ottawa arterial road south of Montreal Road, and a major collector road to the north, each with a two-lane cross-section. South of Nicol Street, Blair Road has a semi-urban cross-section curbed with a sidewalk and curbside bike lane on the east side of the road and with a paved shoulder on the west side of the road. North of Nicol Street, the cross-section is rural with paved shoulders on both sides of the road. The posted speed limit is 50 km/h, and the Ottawa Official Plan reserves a 30.0-metre right of way south of Montreal Road, where Blair Road is a truck route, and the measured right of way is 20.0 metres to the north.

Elwood Street: Elwood Street is a City of Ottawa local road with a two-lane urban cross-section. The posted speed limit is 40 km/h and the measured right of way is 20.0 metres.

2.2.2 Existing Intersections

The existing signalized area intersections within 400 metres of the site have been summarized below:

Montreal Road at Blair Road	The intersection of Montreal Road and Blair Road is a signalized intersection. The northbound approach consists of an auxiliary left-turn lane, a through lane, and an auxiliary right-turn lane and the southbound approach consists of an auxiliary left-turn lane, a shared through/channelized right-turn lane, and a bike lane. The eastbound approach consists of an auxiliary left-turn lane, two through lanes, and an auxiliary channelized right-turn lane and the westbound approach consists of an auxiliary left-turn lane, two through lanes, and a channelized auxiliary right-turn lane. No turn restrictions were noted.
Montreal Road at Elwood Street	The intersection of Montreal Road and Elwood Street is a signalized intersection. The northbound approach and the private southbound approach each consist of a shared all-movements. The eastbound and westbound approaches each consist of an auxiliary left-turn lane, a through lane, and a shared through/right-turn lane. No turn restrictions were noted.

2.2.3 Existing Driveways

Within 200 metres of the site access, on the east side of Blair Road, south of Montreal Street, there is a bank access, and three driveways to detached homes. Just beyond 200 metres south of the access is a driveway to a detached home. None of the driveways would provide access to significant traffic generators and would therefore have no impact on this TIA.

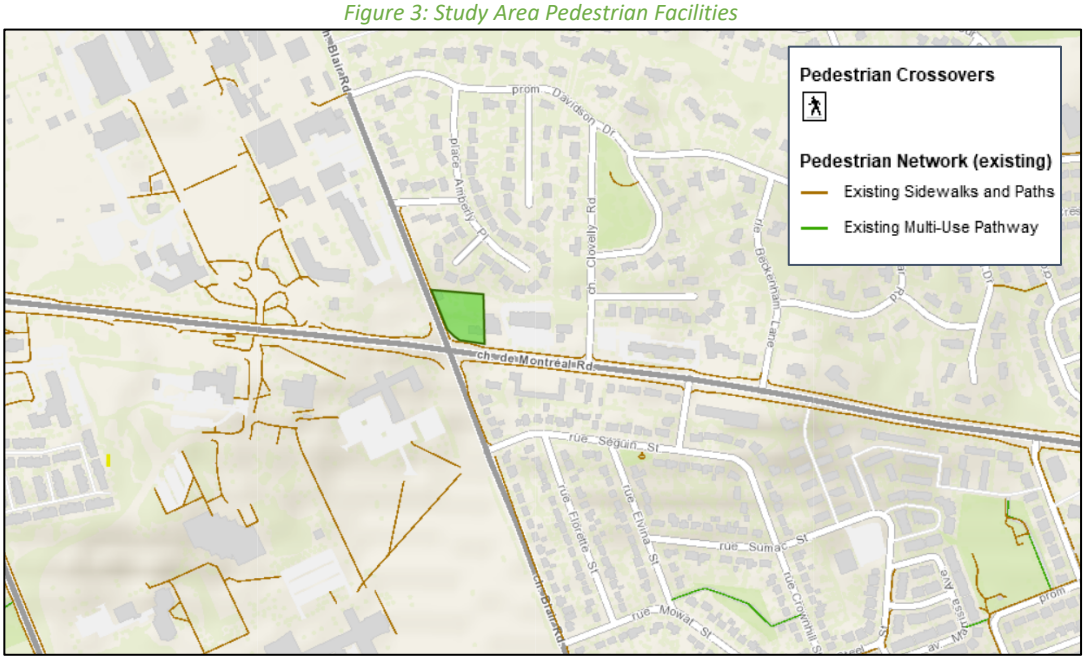
2.2.4 Cycling and Pedestrian Facilities

Figure 3 illustrates the pedestrian facilities in the study area and Figure 4 illustrates the cycling facilities.

Sidewalks are provided along both sides of Montreal Road and on the east side of Blair Road, and area cycling facilities include a bike lane on the east side of Blair Road and a paved shoulder on the west side of Blair Road

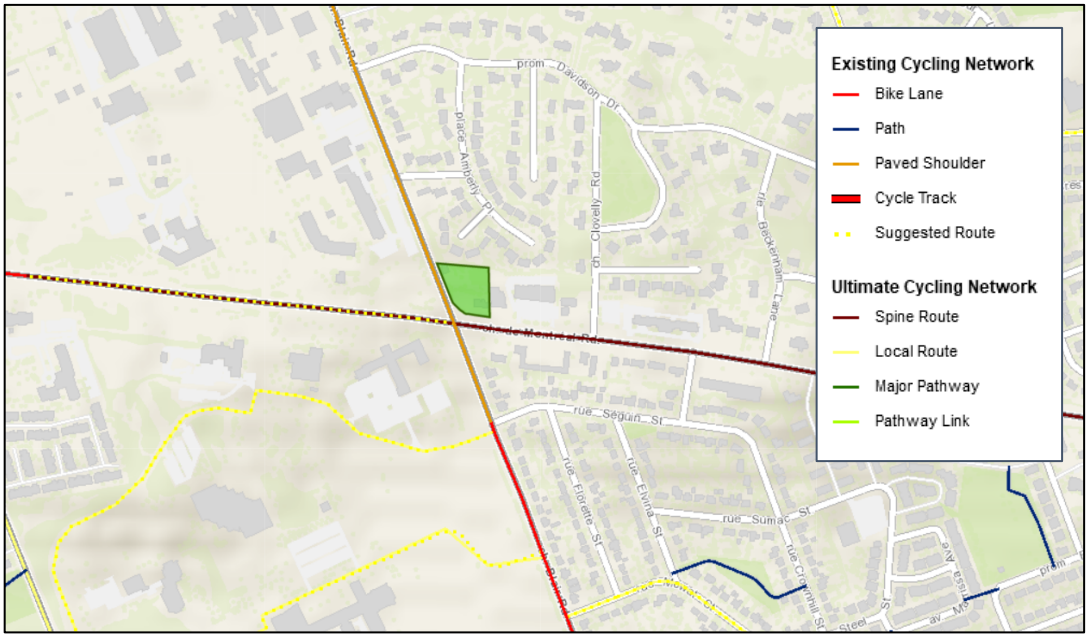
south of Nicol Street, and paved shoulders on both sides of Blair Road to the north. Montreal Road and Blair Road are spine cycling routes.

Figure 3: Study Area Pedestrian Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: July 27, 2022

Figure 4: Study Area Cycling Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: July 27, 2022

Pedestrian and cyclist volumes included in study area intersection counts, presented in Section 2.2.7 have been compiled and are illustrated in Figure 5 and Figure 6 respectively.

Figure 5: Existing Pedestrian Counts

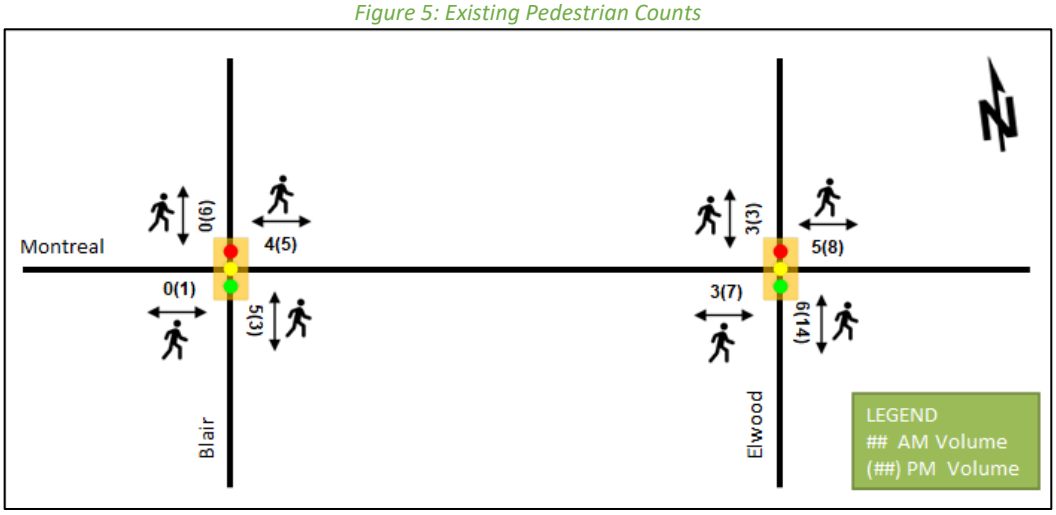
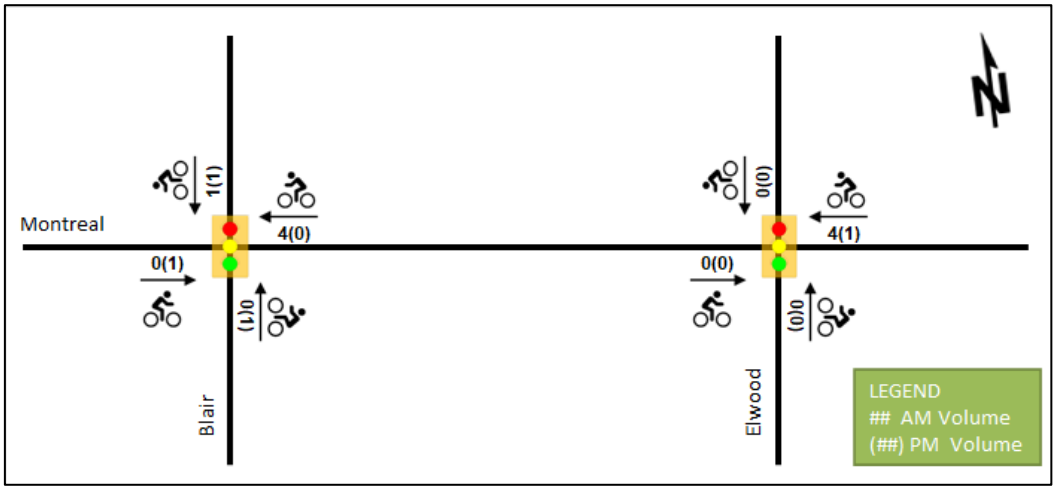


Figure 6: Existing Cyclist Counts



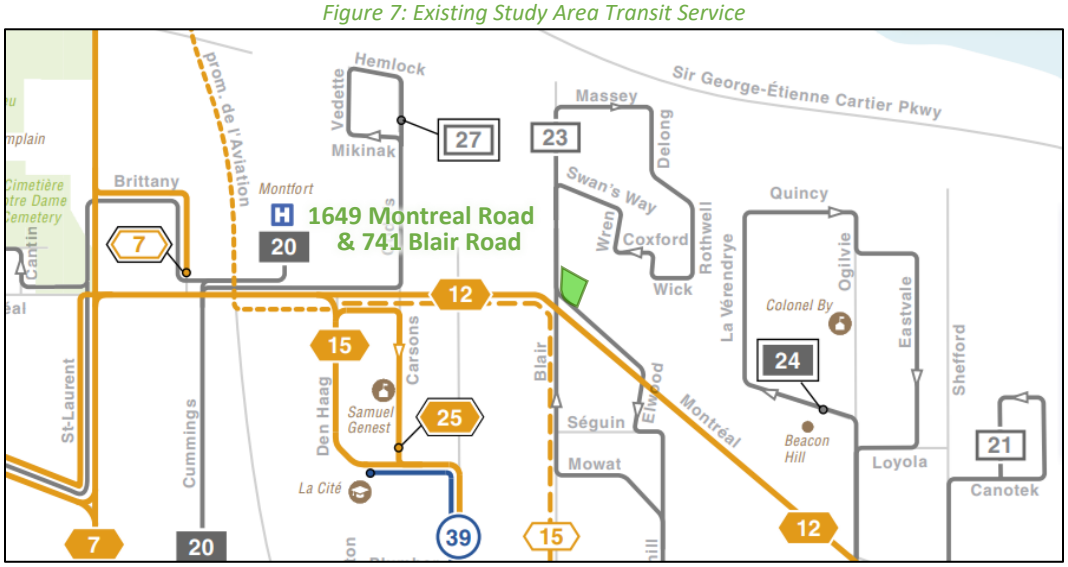
2.2.5 Existing Transit

Within the study area, the route #12, and currently the route #15, travel along Montreal Road with connections to Blair Station and Rideau Station, and route #23 loops through the neighbourhoods both north and south of Montreal Road, travelling along Blair Road to cross Montreal Road. The frequency of these routes within proximity of the proposed site currently are:

- Route # 12 – 15-minute service all day, 30-minute service early mornings and late nights
- Route # 15 – evening and weekend service within the study area during Montreal Road construction
- Route # 23 – 30-minute service at peak hours with two midday buses

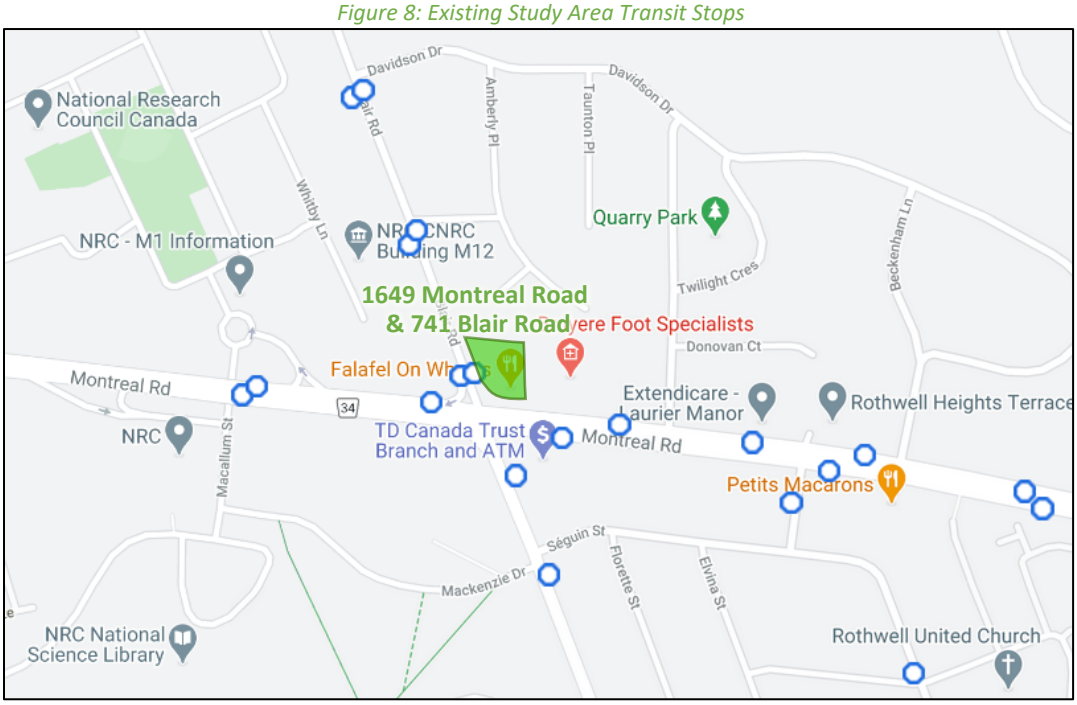
Figure 7 illustrates the transit system map in the study area and Figure 8 illustrates nearby transit stops.

Figure 7: Existing Study Area Transit Service



Source: http://www.octranspo.com/ Accessed: July 27, 2022

Figure 8: Existing Study Area Transit Stops



Source: http://www.octranspo.com/ Accessed: July 27, 2022

2.2.6 Existing Area Traffic Management Measures

There are no existing area traffic management measures within the study area other than on-road speed limit messaging on Blair Road south of Montreal Road.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from the City of Ottawa for the existing Study Area intersections. Table 1 summarizes the intersection count dates.

Table 1: Intersection Count Date

Intersection	Count Date
Montreal Road at Blair Road	Thursday, November 15, 2018
Montreal Road at Elwood Street	Thursday, November 15, 2018

Figure 9 illustrates the existing traffic counts, balanced along Montreal Road, and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on volume to capacity ratio (v/c) calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. Detailed turning movement count data is included in Appendix B and the Synchro worksheets are provided in Appendix C.

Figure 9: Existing Traffic Counts

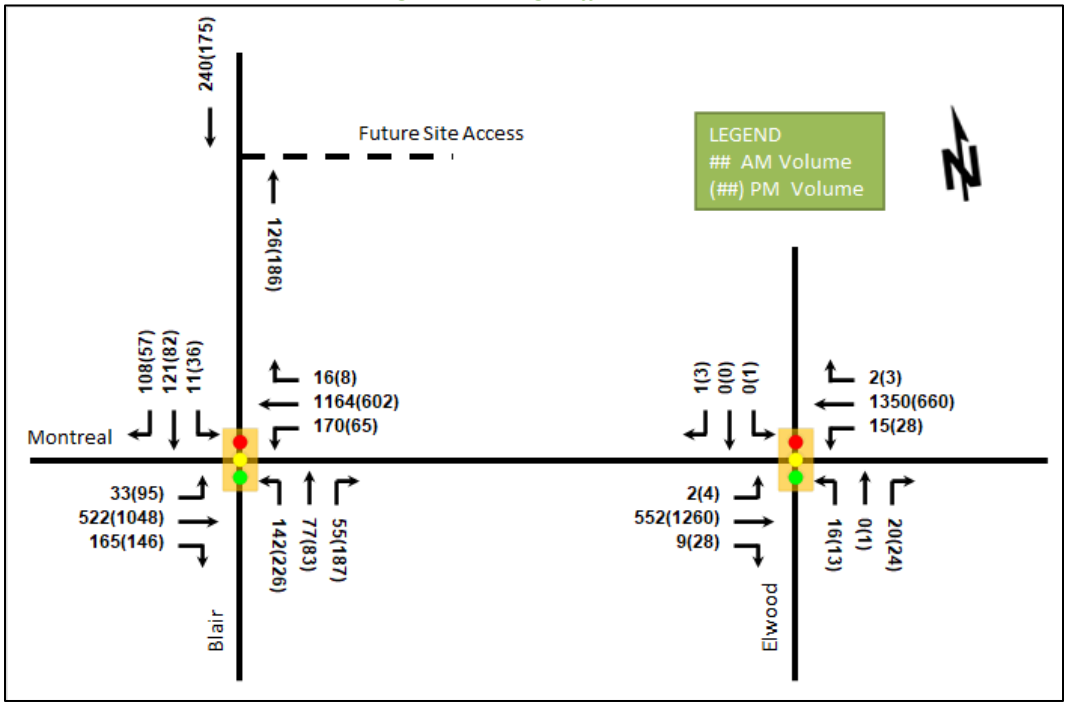


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Montreal Road at Blair Road ***Signalized***	EBL	A	0.23	17.9	13.4	A	0.30	17.1	27.0
	EBT	A	0.30	11.1	50.3	B	0.65	18.6	**#126.7**
	EBR	A	0.19	2.8	11.6	A	0.19	7.2	19.9
	WBL	A	0.42	14.8	28.2	A	0.43	33.0	**#27.4**
	WBT	B	0.66	14.3	**#151.1**	A	0.37	16.8	61.2
	WBR	A	0.02	3.0	m0.5	A	0.01	3.2	m0.8
	NBL	C	0.77	53.3	35.9	C	0.76	42.1	53.6
	NBT	A	0.21	24.8	17.3	A	0.18	21.5	18.3
	NBR	A	0.15	6.0	6.7	A	0.45	21.6	33.6
	SBL	A	0.05	20.4	4.3	A	0.13	20.3	9.9
	SBT/R	B	0.62	33.4	44.9	A	0.30	15.4	22.4
	Overall	**B**	**0.69**	**16.9**	-	**B**	**0.69**	**20.0**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Montreal Road at Elwood Street *Signalized*	EBL	A	0.01	10.0	m0.5	A	0.01	7.8	m0.5
	EBT/R	A	0.25	5.3	29.6	A	0.57	6.8	#160.4
	WBL	A	0.03	7.8	5.0	A	0.14	10.4	9.7
	WBT/R	A	0.58	9.9	#177.0	A	0.28	6.2	57.1
	NB	A	0.16	12.8	7.0	A	0.17	18.3	8.6
	SB	A	0.00	0.0	0.0	A	0.02	0.0	0.0
	Overall	**A**	**0.55**	**8.6**	-	**A**	**0.54**	**6.8**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 0.90
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

During both the AM and PM peak hours, the study area intersections operate well. No capacity issues are noted outside of queuing at the intersection of Montreal Road at Blair Road on the westbound through movement during the AM peak hour and on the eastbound through and westbound left movements during the PM peak hour, and at the intersection of Montreal Road at Elwood Street on the westbound through movement during the AM peak hour and on the eastbound through movement during the PM peak hour.

2.2.8 Collision Analysis

Collision data have been acquired from the City of Ottawa open data website (data.ottawa.ca) for five years prior to the commencement of this TIA for the surrounding study are road network. Table 3 summarizes the collision types and conditions in the study area, Figure 10 illustrates the intersections and segments analyzed, and Table 4 summarizes the total collisions for each of these locations. Collision data are included in Appendix D.

Table 3: Study Area Collision Summary, 2016-2020

		Number	%
Total Collisions		**43**	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	12	28%
	Property Damage Only	31	72%
Initial Impact Type	**Approaching**	1	2%
	Angle	6	14%
	Rear end	21	49%
	Sideswipe	1	2%
	Turning Movement	9	21%
	SMV Other	4	9%
	Other	1	2%
Road Surface Condition	**Dry**	27	63%
	Wet	10	23%
	Loose Snow	2	5%
	Ice	4	9%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

Figure 10: Study Area Collision Records

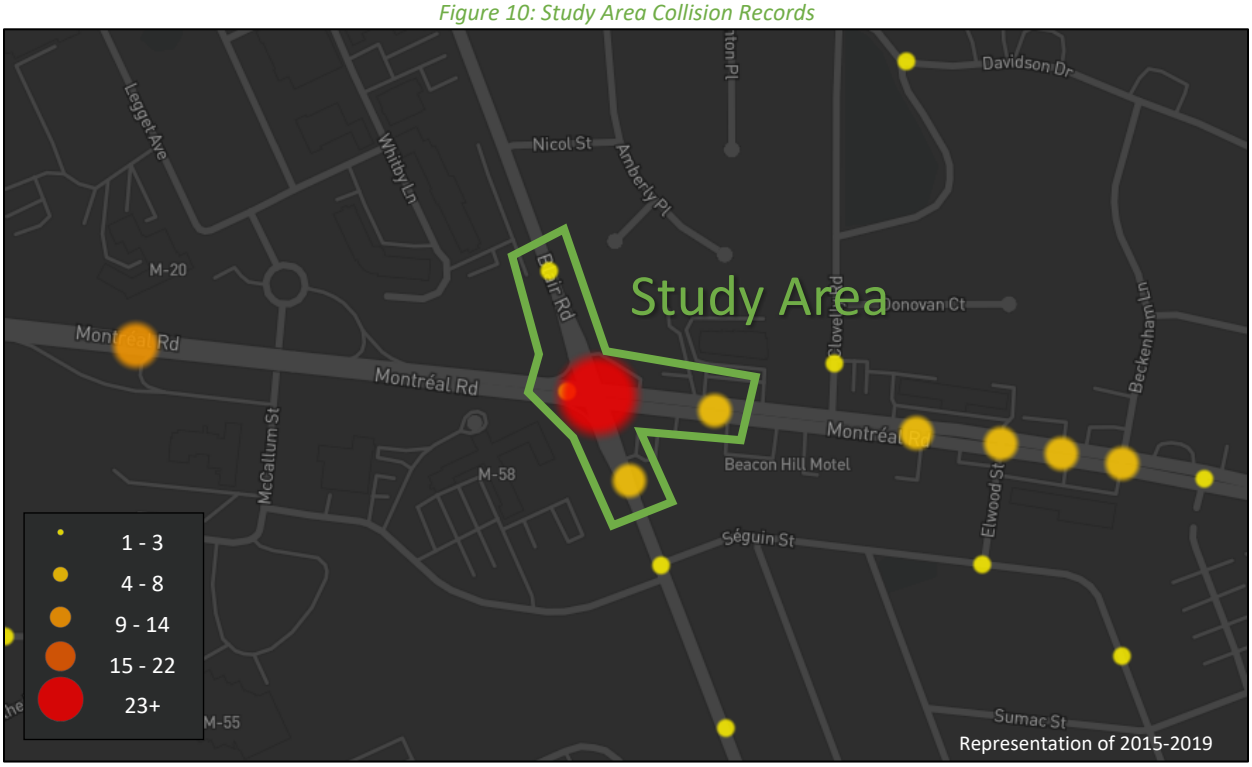


Table 4: Summary of Collision Locations, 2016-2020

	Number	%
Intersections / Segments	**43**	**100%**
Blair Road at Montreal Road	34	79%
Blair Road between Nicol Street and Montreal Road	2	5%
Blair Road between Montreal Road & Seguin Street	2	5%
Montreal Road between Blair Road & Clovelly Road	4	9%
Montreal Road between Montreal Road & Blair Road	1	2%

Within the study area, the intersection of Blair Road at Montreal Road is noted to have experienced higher collisions than other locations. Table 5 summarizes the collision types and conditions for the Blair Road at Montreal Road intersection.

Table 5: Montreal Road at Blair Road Collision Summary

		Number	%
Total Collisions		**34**	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	10	29%
	Property Damage Only	24	71%
Initial Impact Type	**Approaching**	0	0%
	Angle	4	12%
	Rear end	18	53%
	Sideswipe	1	3%
	Turning Movement	9	26%
	SMV Other	1	3%
	Other	1	3%

Road Surface Condition	**Dry**	19	56%
	Wet	10	29%
	Loose Snow	1	3%
	Ice	4	12%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The Montreal Road at Blair Road intersection had a total of 34 collisions during the 2016-2020 time period, with 24 involving property damage only and the remaining 10 having non-fatal injuries. The collision types are most represented by rear end with 18, followed by turning movement with nine, angle with four, and one each as sideswipe, SMV (other), and other. Rear end collisions are typically associated with congestion, and these collisions within the analysis period are clustered around the AM, PM, and mid-day peaks. The right-turn channels on the eastbound and southbound approaches may influence turning movement collisions and the City should consider their elimination or conversion to smart channels as part of the planned intersection redesign. Weather conditions may affect collisions at this location, particularly rear end collisions where half occurred with non-dry road surface conditions. The City may wish to investigate alternative paving treatments with the aim of reducing collisions at this intersection. No further collision review is required as part of this study.

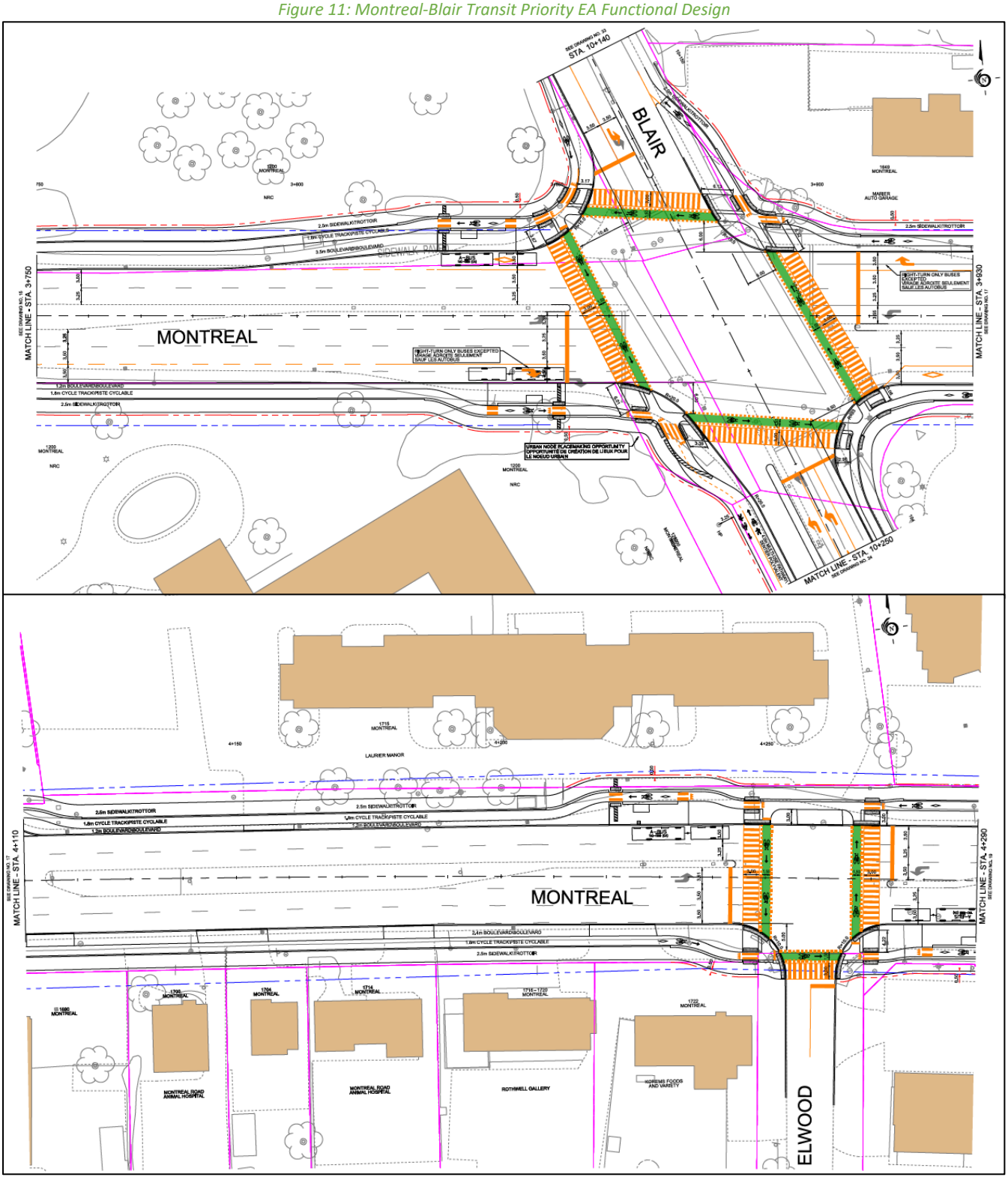
2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

Within the Transportation Master Plan (TMP), the Rapid Transit and Transit Priority Network (RTTP) Affordable Network diagram shows a transit priority corridor along Montreal Road through the study area and along Blair Road south of Montreal Road.

Montreal-Blair Road Transit Priority Corridor Planning and Environmental Assessment Study proposes transit priority measures from St. Laurent Boulevard to Shefford Road, to be coordinated with the Montreal Road Revitalization Project. The functional design, excerpted in Figure 11, includes a focus on isolated transit priority measures and the enhancement of the pedestrian and cycling facilities within the corridor. The EA was completed in 2022 and the improvements are assumed as being implemented after 2024. Signal timing for the new intersections was provided by the EA team and is provided in Appendix E.

Figure 11: Montreal-Blair Transit Priority EA Functional Design



2.3.2 Other Study Area Developments

971 Montreal Road

The development application includes a site plan for a nine-storey mid-rise building with 78 units. The development is anticipated to be built-out by 2025, and to generate negligible traffic. (CGH, 2021)

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersections of Montreal Road at Blair Road and Montreal Road at Elwood Street, and the intersection of site access and Blair Road.

The boundary roads will be Montreal Road and Blair Road and no screenlines are present within proximity to the site.

3.2 Time Periods

As the proposed development is composed primarily of residential units the AM and PM peak hours will be examined.

3.3 Horizon Years

The anticipated build-out year is 2024. As a result, the full build-out plus five years horizon year is 2029.

4 Exemption Review

Table 6 summarizes the exemptions for this TIA.

Table 6: Exemption Review

Module	Element	Explanation	Exempt/Required
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Required
	4.1.3 New Street Networks	Only required for plans of subdivision	Exempt
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Required
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Required
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	Required
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	Required
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of equivalent volume permitted by established zoning	Exempt

5 Development-Generated Travel Demand

5.1 Mode Shares

Examining the mode shares recommended in the TRANS Trip Generation Manual (2020) for the subject district, derived from the most recent National Capital Region Origin-Destination survey (OD Survey), the recommended district mode shares by land use for Beacon Hill have been summarized in Table 7.

Table 7: TRANS Trip Generation Manual Recommended Mode Shares – Beacon Hill

Travel Mode	Multi-Unit (High-Rise)		Commercial Generator	
	AM	PM	AM	PM
Auto Driver	48%	52%	67%	59%
Auto Passenger	9%	16%	12%	18%
Transit	30%	28%	8%	7%
Cycling	3%	0%	0%	1%
Walking	10%	4%	14%	13%
Total	**100%**	**100%**	**100%**	**100%**

5.2 Trip Generation

This TIA has been prepared using the vehicle and person trip rates for the residential dwellings using the TRANS Trip Generation Manual (2020) and the vehicle trip rates and derived person trip rates for the commercial component from the ITE Trip Generation Manual 11th Edition (2021) using the City-prescribed conversion factor of 1.28. Table 8 summarizes the person trip rates for the proposed residential land use for each peak period and the person trip rates for the commercial land use by peak hour.

Table 8: Trip Generation Person Trip Rates by Peak Period

Land Use	Land Use Code	Peak Period	Vehicle Trip Rate	Person Trip Rates
Multi-Unit High-Rise	221 & 222 (TRANS)	AM	-	0.80
		PM	-	0.90
Land Use	**Land Use Code**	**Peak Hour**	**Vehicle Trip Rate**	**Person Trip Rates**
Retail (< 40k sq. ft.)	822 (ITE)	AM	2.36	3.02
		PM	6.59	8.44

Using the above person trip rates, the total person trip generation has been estimated. Table 9 summarizes the total person trip generation for the residential land use by peak period and for the commercial land use by peak hour.

Table 9: Total Person Trip Generation by Peak Period

Land Use	Units	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Multi-Unit High-Rise	254	63	140	203	133	96	229
Land Use	**GFA (sq. ft.)**	**AM Peak Hour**			**PM Peak Hour**		
		In	**Out**	**Total**	**In**	**Out**	**Total**
Retail (< 40k sq. ft.)	6,618	12	8	20	28	28	56

Internal capture rates from the ITE Trip Generation Handbook 3rd Edition have been assigned to the development's retail component for mixed-use developments. The rates summarized in Table 10 represent the percentage of trips to/from the retail use based on the residential component.

Table 10: Internal Capture Rates

Land Use	AM		PM	
	In	Out	In	Out
Residential to/from Retail	17%	14%	10%	26%

Pass-by reductions applied to the retail trip generation at a rate of 40% have been included using the recommended value presented in the ITE Trip Generation Manual 11th Edition (2021) for the most similar land use with a recommended rate, "Retail (40k – 150k sq. ft.)".

Using the district mode share targets by land use and the person trip rates, the person trips by mode have been projected. Trip generation by peak hour has been forecasted using the prescribed peak period conversion factors presented in the TRANS Trip Generation Manual (2020) for the residential component. Table 11 summarizes the residential and commercial trip generation by mode and peak hour.

Table 11: Trip Generation by Mode

Travel Mode		AM Peak Hour				PM Peak Hour			
		Mode Share	In	Out	Total	Mode Share	In	Out	Total
Multi-Unit (High-Rise)	Auto Driver	**48%**	14	32	47	**52%**	30	22	52
	Auto Passenger	**9%**	3	6	9	**16%**	9	7	16
	Transit	**30%**	10	23	34	**28%**	17	13	30
	Cycling	**3%**	1	2	3	**0%**	0	0	0
	Walking	**10%**	3	8	12	**4%**	3	2	5
	Total	**100%**	**31**	**71**	**105**	**100%**	**59**	**44**	**103**
Retail (< 40k sq. ft.)	Auto Driver	**67%**	4	3	7	**59%**	9	8	17
	Auto Passenger	**12%**	1	0	1	**18%**	3	2	5
	Transit	**8%**	0	0	1	**7%**	1	1	2
	Cycling	**0%**	0	0	0	**1%**	0	0	0
	Walking	**14%**	1	1	1	**13%**	2	2	4
	Pass-by	*40%*	*-5*	*-3*	*-8*	*40%*	*-11*	*-11*	*-22*
	Internal Capture	*varies*	*-1*	*-1*	*-2*	*varies*	*-2*	*-4*	*-6*
	Total	**100%**	**6**	**4**	**10**	**100%**	**15**	**13**	**28**
Total	Auto Driver	-	18	35	54	-	39	30	69
	Auto Passenger	-	4	6	10	-	12	9	21
	Transit	-	10	23	35	-	18	14	32
	Cycling	-	1	2	3	-	0	0	0
	Walking	-	4	9	13	-	5	4	9
	Total	-	**37**	**75**	**115**	-	**74**	**57**	**131**

As shown above, a total of 54 AM and 69 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

5.3 Trip Distribution

To understand the travel patterns of the subject development, the OD Survey has been reviewed to determine the existing district travel and these patterns were applied based on the build-out of Beacon Hill. Table 12 below summarizes the distributions.

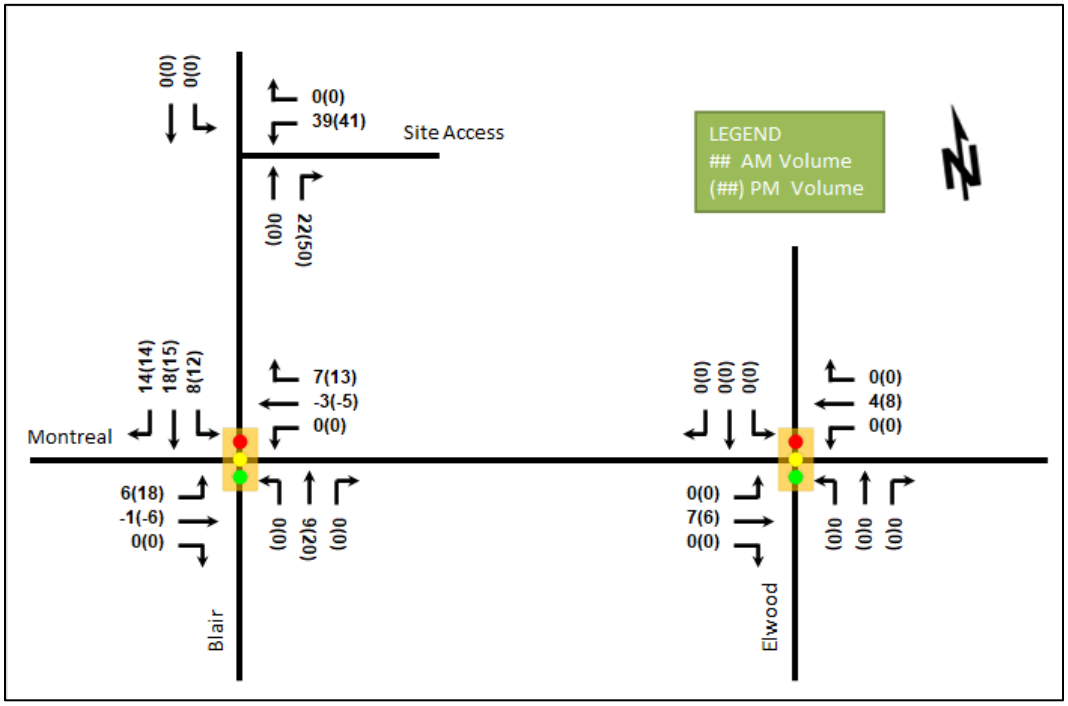
Table 12: OD Survey Distribution – Beacon Hill

To/From	% of Trips	Via
North	5%	Montreal Rd (W)
South	30%	Blair Rd
East	20%	Montreal Rd
West	45%	25% Montreal Rd, 20% Blair Rd
Total	100%	-

5.4 Trip Assignment

Using the distribution outlined above, turning movement splits, and access to major transportation infrastructure, the trips generated by the site have been assigned to the study area road network. Figure 12 illustrates the new site generated and pass-by volumes.

Figure 12: New Site-Generated and Pass-By Auto Volumes



6 Background Network Travel Demands

6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3. The Montreal-Blair Road Transit Priority Corridor is the only confirmed project within the study expected to impact traffic operations. This work is assumed to be planned for completion between the TIA study horizons and will be modelled in the 2029 horizon.

6.2 Background Growth

A review of the background projections from the City's TRANS Regional Model for the 2011 and 2031 horizons was completed to determine the background growth for each of the study area roadways. Table 13 summarizes the results of the model, and the projections are provided in Appendix F.

Table 13: TRANS Regional Model Projections – Study Area Growth Rates

Street	Direction Growth % from 2011 to 2031		Direction Growth % from Existing to 2031	
	Eastbound	Westbound	Eastbound	Westbound
Montreal Road	1.44%	0.36%	-0.81%	1.36%
	Northbound	**Southbound**	**Northbound**	**Southbound**
Blair Road	-1.52%	3.05%	-7.51%	4.83%

Volumes on the study area roadways are generally forecasted grow in the peak directions. When accounting for the existing volumes, it can be seen that the eastbound growth predicted during the AM peak hour on Montreal Road has been achieved. Growth rates from the existing volumes, rounded to the nearest 0.25%, have been applied to mainline volumes and major turning movements on Montreal Road and Blair Road and reversed in the PM peak hour, with negative growth rates taken as zero. Table 14 summarizes the applied growth rates.

Table 14: Applied Study Area Growth Rates

Street	AM Peak Hour		PM Peak Hour	
	Eastbound	Westbound	Eastbound	Westbound
Montreal Road	-	1.25%	1.25%	-
	Northbound	**Southbound**	**Northbound**	**Southbound**
Blair Road	-	4.75%	4.75%	-

6.3 Other Developments

As only a single development application anticipated to generate negligible traffic is present within the study area, all growth on the study area network is assumed to be captured by the background growth rates applied.

Traffic from the Wateridge Village development west of the site is understood to be captured within the 2031 horizon of the TRANS model. As background growth rates derived from these forecasted volumes have been applied to the future horizons, the Wateridge Village development is considered to be included the background conditions.

7 Demand Rationalization

7.1 2024 Future Background Operations

Figure 13 illustrates the 2024 background volumes and Table 15 summarizes the 2024 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. The synchro worksheets for the 2024 future background horizon are provided in Appendix G.

Figure 13: 2024 Future Background Volumes

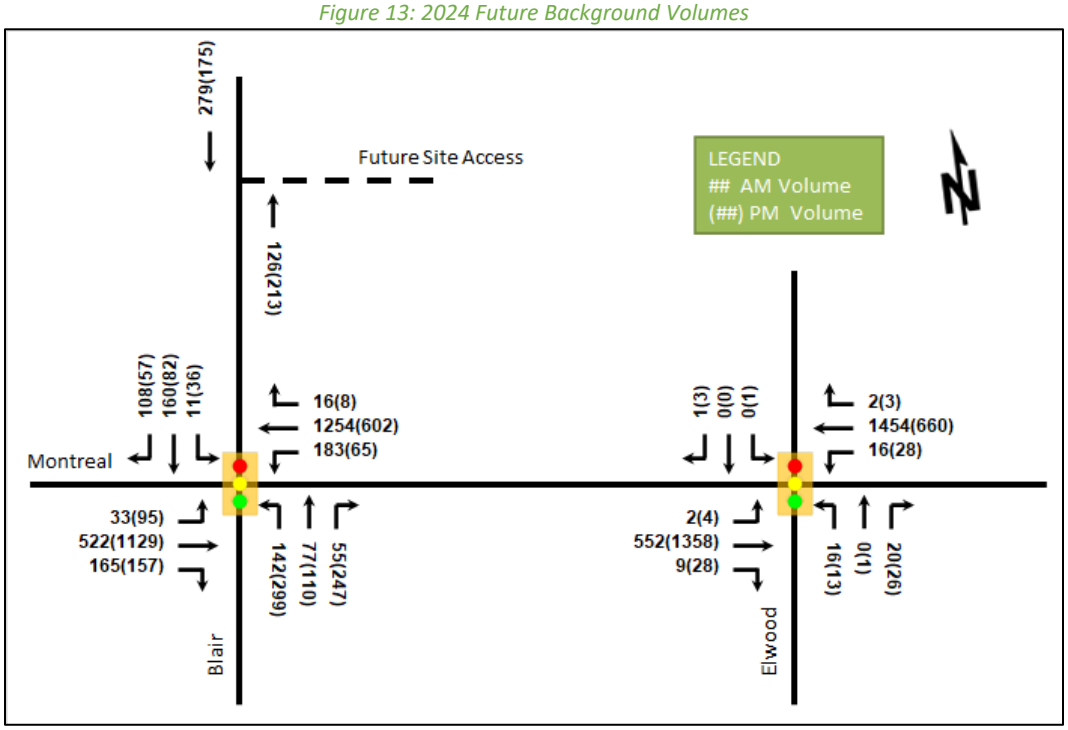


Table 15: 2024 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Montreal Road at Blair Road *Signalized*	EBL	A	0.19	16.2	11.7	A	0.27	17.7	23.7
	EBT	A	0.27	10.7	44.8	B	0.67	20.6	**#122.8**
	EBR	A	0.17	2.9	11.0	A	0.20	7.8	19.4
	WBL	A	0.38	13.9	27.5	A	0.42	34.3	**#24.2**
	WBT	B	0.64	13.8	**#143.4**	A	0.36	17.5	53.8
	WBR	A	0.02	2.6	m0.3	A	0.01	2.5	m0.6
	NBL	C	0.74	51.5	32.6	C	0.80	43.0	64.9
	NBT	A	0.19	24.6	15.8	A	0.20	20.2	20.8
	NBR	A	0.14	6.2	6.4	A	0.49	21.6	40.3
	SBL	A	0.04	20.5	4.1	A	0.11	18.3	9.0
	SBT/R	B	0.65	34.6	47.0	A	0.24	13.0	19.6
	Overall	**B**	**0.67**	**16.7**	-	**C**	**0.72**	**21.4**	-
Montreal Road at Elwood Street *Signalized*	EBL	A	0.01	8.0	m0.4	A	0.01	7.8	m0.5
	EBT/R	A	0.22	4.4	22.6	A	0.55	6.4	**#65.1**
	WBL	A	0.03	7.8	4.7	A	0.12	9.9	8.6
	WBT/R	A	0.56	9.6	**#168.0**	A	0.26	6.0	50.4
	NB	A	0.15	11.4	6.2	A	0.16	16.4	7.9
	SB	A	0.00	0.0	0.0	A	0.02	0.0	0.0
	Overall	**A**	**0.53**	**8.2**	-	**A**	**0.52**	**6.5**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

During both the AM and PM peak hours, the study area intersections operate well and similarly to the existing conditions. No new capacity issues are noted.

7.2 2029 Future Background Operations

Figure 14 illustrates the 2029 background volumes and Table 16 summarizes the 2029 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. The synchro worksheets for the 2029 future background horizon are provided in Appendix H.

Figure 14: 2029 Future Background Volumes

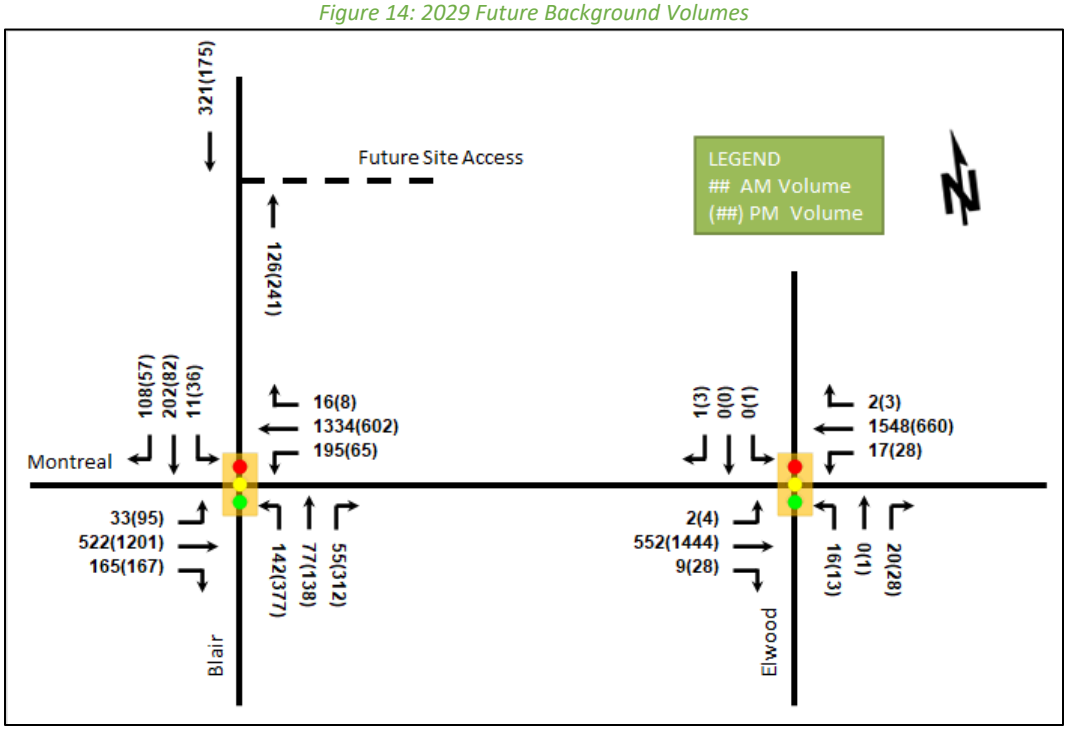


Table 16: 2029 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Montreal Road at Blair Road *Signalized*	EBL	A	0.30	55.5	16.5	B	0.70	76.0	**#44.2**
	EBT	A	0.47	29.6	60.9	**F**	**1.05**	**75.9**	**#221.0**
	EBR	A	0.32	28.5	43.2	A	0.32	31.1	49.7
	WBL	A	0.58	50.6	**#101.9**	A	0.52	63.3	27.5
	WBT	C	0.79	29.7	**#239.8**	A	0.56	34.1	80.3
	WBR	A	0.02	21.2	7.6	A	0.02	28.1	5.1
	NBL	C	0.78	66.0	47.2	D	0.90	58.9	**#136.2**
	NBT/R	A	0.35	35.3	35.9	C	0.79	42.5	**#140.7**
	SBL	A	0.05	26.8	5.3	A	0.20	26.7	13.8
	SBT/R	C	0.75	48.7	76.8	A	0.23	24.7	35.8
	Overall	**D**	**0.86**	**35.4**	-	**E**	**1.00**	**55.5**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Montreal Road at Elwood Street *Signalized*	EBL	A	0.01	8.0	1.3	A	0.01	7.2	1.9
	EBT/R	A	0.22	5.3	39.3	A	0.58	9.1	#165.7
	WBL	A	0.03	6.9	4.6	A	0.14	9.5	8.4
	WBT/R	A	0.59	9.3	#177.0	A	0.25	5.4	47.1
	NB	A	0.18	32.9	11.4	A	0.21	33.5	12.7
	SB	A	0.00	27.0	1.2	A	0.02	28.2	2.8
	Overall	**A**	**0.59**	**8.7**	-	**A**	**0.58**	**8.5**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

At the 2029 future background horizon, the intersection of Montreal Road at Blair Road is forecasted to see operations worsen with the proposed geometric changes associated with the Montreal-Blair Transit Priority EA.

At the intersection of Montreal Road at Blair Road, the westbound left-turn movement is anticipated to exhibit extended queues during the AM peak hour at this horizon. During the PM peak hour, the eastbound through movement is forecast to be over theoretical capacity, the eastbound left, northbound left, and northbound through/right movements are anticipated to exhibit extended queues, and the overall intersection is forecast to be over capacity.

It is noted that the signal timing employed within the EA does not include a fully protected northbound left-turn phase corresponding with the dual left turn lanes (one of which is transit only). Additionally, advance pedestrian walk time is considered extraneously to the overall required walk time and thus the operations shown are more conservative for the phasing shown. This timing will need to be revisited as part of future planning and it is recommended that given the advance walk and bus queue jumps employed, that lagging protected left-turn phases be investigated to permit concurrent through movements.

The intersection of Montreal Road at Elwood Street is anticipated to continue to operate well with extended queuing in the peak direction in each peak hour.

7.3 Demand Rationalization Conclusions

While capacity issues are noted in the PM peak hour at the intersection of Montreal Road at Blair Road, once the transit corridor is implemented, and Stage 2 LRT is fully operational, a modal shift of 2% from auto travel to transit, enough to relieve capacity issues modelled at this intersection, may occur. No rationalization for the site-generated travel demand is required.

8 Development Design

8.1 Design for Sustainable Modes

The proposed mixed-use development is a residential tower and podium above ground floor commercial space. Hard surface connections will be provided from all building entrances to the surrounding sidewalks on Blair Road and Montreal Road, and the drive aisle lane will support cyclists and vehicles.

Vehicle parking is proposed within a surface lot and across three underground parking levels. Bicycle parking is proposed via a surface rack and within open racks and a secure room within the underground parking levels.

Transit stops for all area routes described in Section 2.2.5 are located within 400 metres walking distance from the proposed site entrances.

8.2 Circulation and Access

Access to the site is proposed via a 6.0-metre-wide two-way connection to Blair Road. The ramp to underground parking is 6.0 metres wide and a one-way drop off loop is proposed on the south side of the site driveway. Space is provided on the north side of the drive aisle for a single short term parking space and as a refuse staging area.

Garbage collection and emergency services are able to access the two-way aisle and reverse out of the site with a 4.0-metre curb radius on the south side of the access.

9 Parking

9.1 Parking Supply

The site proposes bicycle parking of 264 spaces spread across three underground levels and a surface rack near the main entrance. Vehicle parking is proposed via 289 spaces; nine are proposed within a surface lot and the remaining 280 are proposed via three underground parking levels.

From Sections 101, 102, and 111 (Minimum Parking Space Rates, Minimum Visitor Parking Space Rates, and Bicycle Parking Space Rates and Provisions, respectively) of the zoning by-law, the minimum parking provision is 417 vehicle spaces and 129 bicycle spaces, conservatively assuming a commercial land use as a restaurant for the purposes of the parking calculations. Table 17 summarizes the minimum parking from the zoning by-law and the proposed site parking based upon the 254 residential units and 614.8 m^2 of commercial space.

Table 17: Proposed Parking Provision

Component	Zoning By-law Rates (Area C)	Zoning By-law Required Parking (Area C)	Proposed Rates	Proposed Parking	Difference
Resident	1.2 spaces/unit	305 spaces	0.7 spaces/unit	177 spaces	- 128 spaces
Visitor	0.2 spaces/unit	51 spaces	0.2 spaces/unit	51 spaces	-
Commercial	10 spaces/100 m^2	61 spaces	10 spaces/100 m^2	61 spaces	-
Residential Bike	0.5 spaces/unit	127 spaces	1.0 per unit	254 spaces	+ 127 spaces
Commercial Bike	1 space/250 m^2	2 spaces	-	10 spaces	+ 8 spaces

The minimum bicycle parking is proposed as being exceeded and the minimum visitor and commercial vehicle parking is proposed as being met by the development. A proposed deficit of 128 tenant vehicle parking spaces from the zoning by-law minimums (at a rate of 0.7 spaces per unit versus the required 1.2 spaces per unit) will require an exemption from the parking provision rates from the zoning by-law for Area C.

The site lies on the boundary between Area X (Inner Urban) and Area C (Suburban) on Schedule 1A used for the calculation of the parking requirements. Table 18 summarizes the minimum vehicle parking for both areas, where the minimum resident and visitor parking is calculated after the first 12 units in Area X.

Table 18: Area C and Area X Parking Comparison

Component	Zoning By-law Rates (Area C)	Zoning By-law Required Parking (Area C)	Zoning By-law Rates (Area X)	Zoning By-law Required Parking (Area X)	Difference
Resident	1.2 spaces/unit	305 spaces	0.5 spaces/unit	121 spaces	- 184 spaces
Visitor	0.2 spaces/unit	51 spaces	0.1 spaces/unit	24 spaces	- 27 spaces
Commercial	10 spaces/100 m^2	61 spaces	5 spaces/100 m^2	31 spaces	- 30 spaces

As shown in the table, crossing the boundary between Area X and Area C results in a significant difference for parking required for sites on opposite sides of Blair Road. A site on the west side requires a 0.5 spaces per resident

unit and a site on the east side requires 1.2 spaces per residential unit. This specific site would have a differential of 184 spaces depending on the side of the road it is placed.

Other parking areas on Schedule 1A use a transition area for these types of roadways, usually extending onto the parcels fronting the roadway. This condition recognizes that users and operations of these sites would have similar parking and transportation characteristics as they connect to the same roadway.

Given this consideration in other parking policy areas, the lack of transition between these specific areas, and lack of distinction between the characteristics of either side of the road, it is recommended that the site be considered more appropriately as an Area X site for parking provisions.

Under the Area X requirements, the site would satisfy the required parking bylaw minimum parking spaces.

9.2 Spillover Parking

9.2.1 Off-Site Spillover Parking Demand

The site proposes 289 vehicle parking spaces, 128 spaces below the value prescribed by the zoning by-law of 417 spaces. Notwithstanding that the development would meet the parking requirements for Area X, similar to sites on the opposite side of Blair Road, all visitor and commercial spaces required by the zoning by-law are being provided, and only the tenant parking is below prescribed values. The impacts of reduced tenant parking are potentially mitigable by the developer, however, through managing prospective tenant expectations with parking being unpaired from units and clauses/notice that no parking is provided or may be available in tenancy contracts.

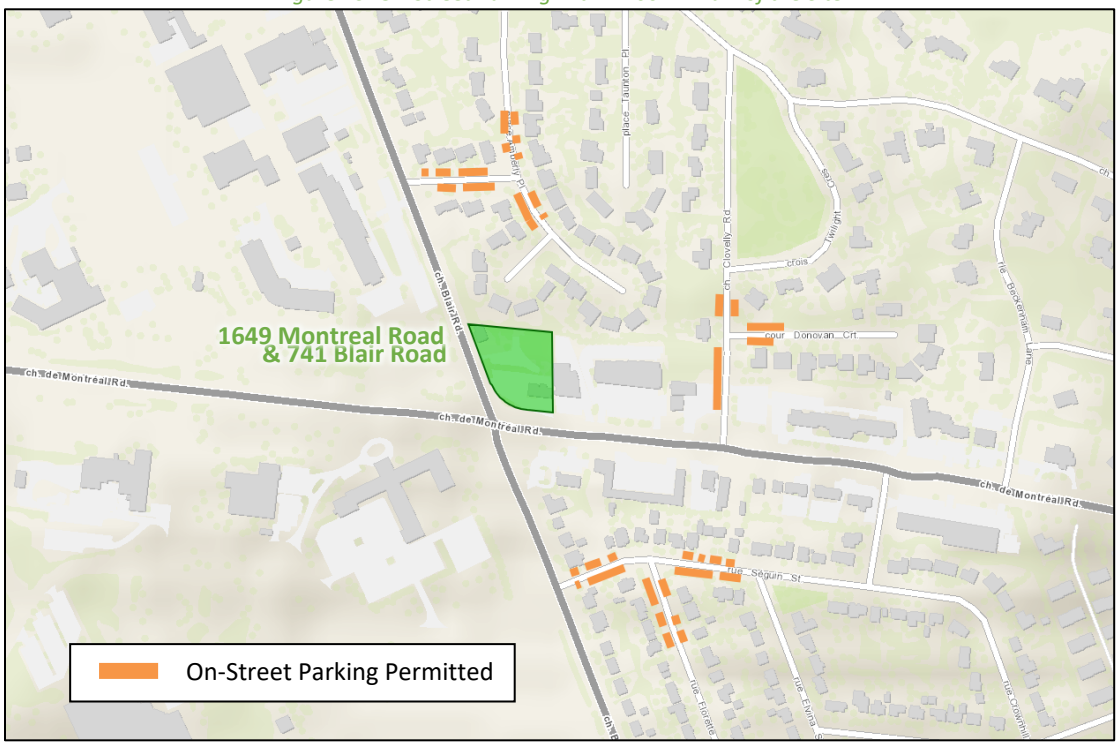
The context of being at the intersection of two transit priority corridors, connecting to LRT stations in three directions from the site, is anticipated mitigate tenant parking demand. Bicycle parking is proposed to be provided at over twice the rate required by the zoning by-law which, in concert with planned improvements in area cycling facilities and connectivity, as noted in Section 2.3.1, will enable shifts towards active modes and away from auto modes.

Ultimately, the proposed residential parking rate is 0.7 spaces per unit for the development and this value is higher than typical values in similar contexts throughout the City of 0.5 spaces per unit (the rate applicable across the street), supporting the conclusion following from the above mitigating factors that negligible spillover parking demand is anticipated from the site.

9.2.2 Off-Site Spillover Parking Supply

On-street parking is not permitted within 230 metres of the site entrance. Within 400 metres, or about a five-minute walk of the site, on-street parking is permitted on local roads within the neighbourhood to the north, south, and east of the site. Approximately 90 spaces or fewer (as calculated per the City's parallel parking space provisions in the zoning by-law) are present within this distance, which are illustrated in Figure 15. These areas are not conveniently located for the site and thus usage is likely to be minimal even in the event that spillover demand is realized.

Figure 15: On-Street Parking within 400 m Walk of the Site



While negligible impacts on are anticipated due to the factors discussed in Section 9.2.1. the community may work with the Councillor and City to petition parking restrictions or permits in the area to limit any perceived impacts. Any parking restrictions are outside the scope of this application and the site plan process.

10 Boundary Street Design

summarizes the MMLOS analysis for the boundary streets of Montreal Road and Parkdale Avenue, and Blair Road. The existing and future conditions are considered in separate rows. The boundary street analysis is based on the land use designation of "Arterial Main Street" for Montreal Road and of "Employment Area" for Blair Road. The MMLOS worksheets has been provided in Appendix I.

Table 19: Boundary Street MMLOS Analysis

Segment		Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS	
		PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target
Montreal Road	Ex.	F	C	F	C	D	C	A	D
	Fut.	B	C	A	C	B	C	A	D
Blair Road	Ex.	C	C	C	C	D	D	B	D
	Fut.	A	C	C	C	D	D	B	D

The pedestrian, bicycle, and transit MMLOS targets are not met on Montreal Road in the existing conditions. All MMLOS targets will be met in the planned conditions and no further analysis is required.

11 Access Intersections Design

11.1 Location and Design of Access

The development access consists of a 6.0-metre-wide two-way drive aisle to Blair Road, extending 33 metres to the proposed site building. The sidewalk is depressed across the access with a depressed curb, and a 4.0-metre

radius is required to facilitate garbage collection vehicles and emergency vehicles on the south side of the driveway.

The existing site access on Blair Road is to be removed and the associated curb and median cuts will be reinstated to full height as part of construction activities.

11.2 Intersection Control

The site access intersection is proposed as being minor stop controlled on the access approach.

11.3 Access Intersection Design

11.3.1 2024 Future Total Access Intersection Operations

The 2024 future total intersection volumes are illustrated in Figure 16 and the access intersection operations are summarized below in Table 20. The level of service is based average delay for individual lane movements and the overall intersection for unsignalized intersections. The synchro worksheets have been provided in Appendix J.

Figure 16: 2024 Future Total Volumes

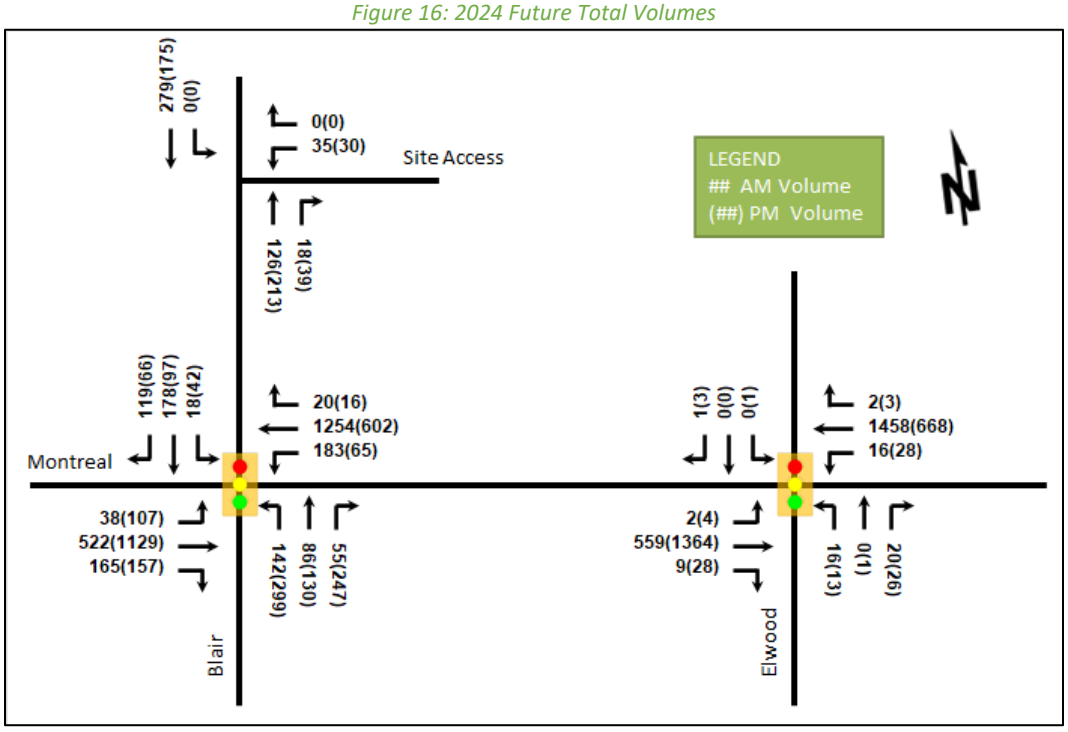


Table 20: 2024 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay(s)	Q (95th)	LOS	V/C	Delay(s)	Q (95th)
Site Access and Blair Road *Unsignalized*	WBL/R	B	0.06	11.4	1.5	B	0.05	11.3	1.5
	NBT/R	-	-	-	-	-	-	-	-
	SBL/T	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**0.9**	**-**	**A**	**-**	**0.7**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The 2024 future total access intersections operate well. No capacity issues are noted.

11.3.2 2029 Future Total Access Intersection Operations

The 2029 future total intersection volumes are illustrated in Figure 17 and the access intersection operations are summarized below in Table 21. The level of service is based average delay for individual lane movements and the overall intersection for unsignalized intersections. The synchro worksheets have been provided in Appendix K.

Figure 17: 2029 Future Total Volumes

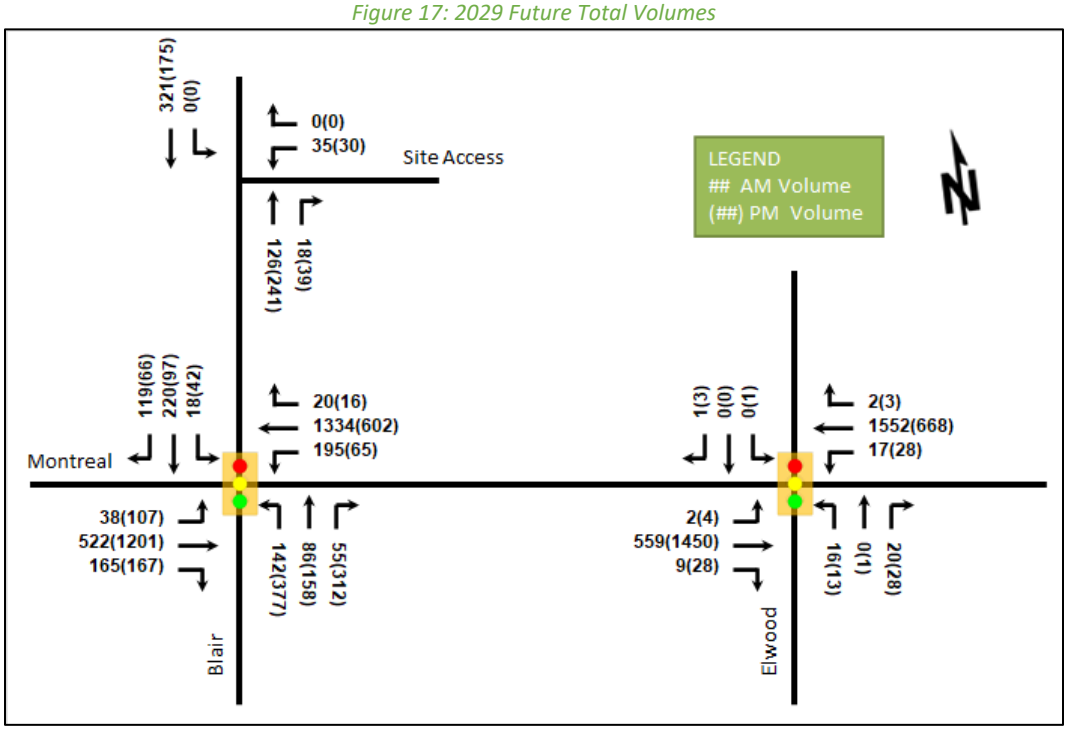


Table 21: 2029 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay(s)	Q (95th)	LOS	V/C	Delay(s)	Q (95th)
Site Access and Blair Road *Unsignalized*	WBL/R	B	0.06	11.8	1.5	B	0.05	11.6	1.5
	NBT/R	-	-	-	-	-	-	-	-
	SBL/T	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**0.8**	**-**	**A**	**-**	**0.7**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The 2029 future total access intersections operate well. No capacity issues are noted.

11.3.3 Access Intersection MMLOS

As the site accesses are not signalized, no MMLOS analysis is required.

11.3.4 Recommended Design Elements

No design elements are proposed for the site access outside of the typical private approach considerations.

A throat length of 25 metres is recommended in the Geometric Design Guide for Canadian Roads (TAC, 2017) in table 8.9.3 for residential developments of over 200 units. The single short term parking space is parallel to the aisle and will have limited conflict with outbound vehicles. The one-way loop allows vehicles to enter unimpeded from Blair Road and the two-way aisle, and the exit of the loop is located at the end of the required throat length.

Given the site constraints and the layout of the 33-metre-long drive aisle, the site plan is considered to provide adequate throat length.

12 Transportation Demand Management

12.1 Context for TDM

The mode shares used within the TIA represent the unmodified district modal shares. Given the plans for transit priority on the Montreal Road and Blair Road corridors, these transit mode shares are considered conservative moving beyond the construction of the transit priority measures. Supporting TDM measures should be provided to transition towards transit mode adoption within the development in advance of the implementation of the transit priority measures.

The subject site is within the Montreal Arterial Mainstreet Design Priority Area. The total bedroom count within the development is 385 with 123 one-bedroom units and 131 two-bedroom units, and no age restrictions are noted.

12.2 Need and Opportunity

The subject site has been assumed to rely predominantly on auto travel with no increase in transit ridership based upon the build-out horizon of the transit priority measures, and these assumptions have been carried through the analysis. The study area intersections are anticipated to have residual capacity, and as such, the risks from not achieving the 60% auto mode shares are low.

12.3 TDM Program

The “suite of post occupancy TDM measures” has been summarized in the TDM checklists for the residential land uses. The checklist is provided in Appendix L. The key TDM measures recommended include:

- Display local area pedestrian, cycling, and transit information at building entrances
- Provide a multimodal travel option information package
- Contract with provider to install on-site micromobility (e.g., scooter or bike share) station
- Inclusion of a 1-year Presto card for first time new townhome purchase and apartment rental, with a set time frame for this offer (e.g., 6-months) from the initial opening of the site
- Unbundle parking cost from purchase or rental costs

13 Neighbourhood Traffic Management

The proposed development will connect to the arterial road network at Montreal Road via Blair Road, which is a major collector road to the north of Montreal Road. Between the site access and Montreal Road, the two-way volumes at the 2029 future total horizon are forecasted as being 501 during the AM peak hour and 486 during the PM peak hour. These volumes are below the threshold of 600 vehicles during the peak hour from the TIA guidelines, and thus no further discussion is required.

14 Transit

14.1 Route Capacity

In Section 5.1 the trip generation by mode was estimated, including an estimate of the number of transit trips that will be generated by the proposed development. Table 22 summarizes the transit trip generation.

Table 22: Trip Generation by Transit Mode

Travel Mode	Residential Mode Share AM(PM)	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Transit	30%(28%)	9	20	30	16	12	28

The proposed development is anticipated to generate an additional 30 AM peak hour transit trips and 28 PM peak hour transit trips using the unmodified district modal shares. Of these trips, 20 outbound AM trips and 16 inbound PM trips are anticipated. Assuming all northbound and southbound trips first travel west via the route #12, the resultant increase in ridership would be five riders per peak direction bus in the AM peak hour and four riders per peak direction bus in the PM peak hour. This increase in ridership is less than a half standard bus load.

14.2 Transit Priority

The City is planning implementation of a transit priority solution within the study area. Site-generated traffic is not anticipated to impact transit LOS at the study area intersections, and Blair Road north of Montreal Road is not part of the transit priority corridor, thus no transit priority impacts will result from the site access.

15 Network Intersection Design

15.1 Network Intersection Control

No change to the existing signalized control is recommended for the network intersections.

15.2 Network Intersection Design

15.2.1 2024 Future Total Network Intersection Operations

The 2024 future total volumes are illustrated in Figure 16 and the network intersection operations are summarized below in Table 23. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. The synchro worksheets have been provided in Appendix J.

Table 23: 2024 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Montreal Road at Blair Road ***Signalized***	EBL	A	0.23	18.1	13.6	A	0.30	18.6	27.1
	EBT	A	0.27	11.2	44.8	B	0.68	21.0	**#122.8**
	EBR	A	0.17	2.9	11.0	A	0.20	7.9	19.4
	WBL	A	0.39	14.4	27.5	A	0.43	35.1	**#24.6**
	WBT	B	0.65	14.5	**#143.4**	A	0.36	17.8	54.2
	WBR	A	0.02	3.4	m0.8	A	0.02	6.0	2.9
	NBL	C	0.76	54.3	34.0	D	0.81	43.4	65.8
	NBT	A	0.20	24.1	17.3	A	0.38	20.2	34.8
	NBR	A	0.13	6.0	6.4	A	0.36	17.5	29.3
	SBL	A	0.07	20.9	5.6	A	0.14	18.7	10.2
	SBT/R	B	0.68	35.2	52.7	A	0.28	14.4	23.4
	Overall	**B**	**0.68**	**17.6**	-	**C**	**0.73**	**21.4**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Montreal Road at Elwood Street *Signalized*	EBL	A	0.01	8.0	m0.4	A	0.01	8.0	m0.6
	EBT/R	A	0.22	4.4	23.3	A	0.55	6.6	#66.3
	WBL	A	0.03	7.8	4.7	A	0.12	9.9	8.7
	WBT/R	A	0.56	9.6	#168.7	A	0.26	6.0	51.1
	NB	A	0.15	11.4	6.2	A	0.16	16.8	8.0
	SB	A	0.00	0.0	0.0	A	0.02	0.0	0.0
	Overall	**A**	**0.53**	**8.2**	-	**A**	**0.53**	**6.6**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The network intersection operations for the 2024 future total horizon operate similarly to the 2024 future background conditions. No new capacity issues are noted.

15.2.2 2029 Future Total Network Intersection Operations

The 2029 future total volumes are illustrated in Figure 17 and the network intersection operations are summarized below in Table 24. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. The synchro worksheets have been provided in Appendix K.

Table 24: 2029 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Montreal Road at Blair Road *Signalized*	EBL	A	0.35	57.9	18.6	C	0.79	86.5	#51.3
	EBT	A	0.48	30.8	65.6	F	1.06	82.0	#221.0
	EBR	A	0.34	30.1	46.6	A	0.33	31.5	49.7
	WBL	C	0.72	63.5	#107.9	A	0.52	63.3	27.5
	WBT	D	0.87	37.8	#239.8	A	0.59	35.8	80.3
	WBR	A	0.03	24.6	8.7	A	0.04	29.3	8.0
	NBL	D	0.81	68.1	#52.5	E	0.93	64.7	#138.1
	NBT	A	0.33	32.4	37.2	D	0.84	47.1	#151.2
	SBL	A	0.07	25.7	7.7	A	0.25	28.6	16.2
	SBT/R	C	0.73	44.7	89.4	A	0.27	25.1	41.5
	Overall	**E**	**0.92**	**39.9**	-	**F**	**1.02**	**59.5**	-
Montreal Road at Elwood Street *Signalized*	EBL	A	0.01	8.0	1.3	A	0.01	9.2	1.9
	EBT/R	A	0.22	5.3	39.9	B	0.61	11.8	#166.8
	WBL	A	0.03	6.9	4.6	A	0.15	12.2	8.7
	WBT/R	A	0.59	9.4	#177.7	A	0.27	7.2	47.7
	NB	A	0.18	32.9	11.4	A	0.16	28.4	12.7
	SB	A	0.00	27.0	1.2	A	0.01	24.0	2.8
	Overall	**A**	**0.59**	**8.7**	-	**A**	**0.58**	**10.8**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The network intersection operations for the 2029 future total horizon operate similarly to the 2029 future background conditions.

During the AM peak hour at the intersection of Montreal Road and Blair Road, the northbound left is anticipated to exhibit extended queues. During the PM peak hour, the intersection of Montreal Road at Blair Road is forecasted to experience an increase in delay on the eastbound through and eastbound left-turn movements

without any additional time allocated to the phase, and the overall intersection v/c has increased from 1.00 to 1.02 to score LOS F. As previously stated, given the advance walk and bus time, shifting the eastbound and westbound left-turns to lagging phases permitting concurrence with the through movement for part of the phase would allow for a shift of residual capacity from the westbound left and westbound through phases to the eastbound left and eastbound through phases, and thus the v/c would be anticipated to reduce to less than 1.00 for all movements and for the overall intersection. As noted in Section 7.3, an area shift in mode share from auto travel to transit may improve operations at this horizon.

15.2.3 Network Intersection MMLOS

Table 25 summarizes the MMLOS analysis for the network intersections of Montreal Road at Blair Road and Montreal Road at Elwood Street. Per the Montreal-Blair Road Transit Priority Corridor EA Study, the existing and future conditions for both intersections will differ and are considered in separate rows. The intersection analysis is based on the land use designation of "Employment Area" for the intersection of Montreal Road at Blair Road and of "Arterial Main Street" for the intersection of Montreal Road and Elwood Street. The MMLOS worksheets has been provided in Appendix I.

Table 25: Study Area Intersection MMLOS Analysis

Intersection	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target	ALOS	Target
Montreal Rd & Blair Rd (Ex.)	**F**	C	**F**	C	**D**	C	**C**	B	C	D
Montreal Rd & Blair Rd (Fut.)	**F**	C	A	C	**D**	C	**C**	B	**E**	D
Montreal Rd & Elwood St (Ex.)	**F**	C	**F**	C	B	C	-	-	A	D
Montreal Rd & Elwood St (Fut.)	**E**	C	B	C	C	C	-	-	A	D

The MMLOS targets will not be met under the existing conditions for the pedestrian and bicycle LOS at both network intersections and for transit and truck LOS at the intersection of Montreal Road at Blair Road. In the future conditions, pedestrian, transit, truck, and auto LOS targets are forecast to not be met at the intersection of Montreal Road and Blair Road.

The pedestrian level of service would require a maximum of three lanes at a crossing to meet a LOS C. Based on the nature of arterial roadways the pedestrian LOS cannot be met at this intersection.

The truck LOS would require two receiving lanes on the south leg of the intersection of Montreal Road at Blair Road. The truck LOS targets are also higher for its land use designation than for the overridden land use designation of "Arterial Main Street" whose targets would be met by the intersection geometry. Furthermore, the employment area has major accesses onto Montreal Road and Ogilvie Road, and therefore the high targets for the intersection with Blair Road may be unnecessarily high given this arrangement.

Delays limit the transit LOS where delays on all approaches would need to be less than 20 seconds to meet targets, and meeting auto targets would require a v/c ratio of 0.90 or below. Auto and Transit LOS may be improved with reductions in area traffic based on shifts to transit by the 2029 future horizon.

As the City recently completed a functional design as part of the EA study, it is assumed that these LOS scores meet the City's prioritized design objectives at both study area intersections.

15.2.4 Recommended Design Elements

A review of the turn lane storage lengths was requested by the City within this TIA. As such, the turn lane storage length considerations at the intersection of Montreal Road and Blair Road at the 2024 future total horizon are summarized in Table 26. The calculations are based both upon the equation 9.14.1 from Chapter 9 of the Geometric Design Guide for Canadian Roads manual (TAC, 2017) and the storage length calculation from the TIA guidelines assuming a 90 second cycle length.

Table 26: Turn Lane Storage Analysis

Movement	Existing Lane Length (m)	AM Peak Hour		PM Peak Hour	
		Length Per TIA Guidelines (m)	Length Per TAC Manual (m)	Length Per TIA Guidelines (m)	Length Per TAC Manual (m)
NBL	90	37.3	33.1	78.5	69.8
NBR	40	14.4	12.8	64.8	57.6
SBL	30	4.7	4.2	11.0	9.8
SBR	0	31.2	27.8	17.3	15.4
EBL	60	10.0	8.9	28.1	25.0
EBR	100	43.3	38.5	41.2	36.6
WBL	65	48.0	42.7	17.1	15.2
WBR	15	5.3	4.7	4.2	3.7

All minimum turn-lane storage lengths are met by the existing auxiliary lane lengths except for the northbound left-turn and northbound right-turn lane which site-generated traffic is not forecasted to rely upon. The northbound right-turn movement would be anticipated by 2024 to require a 65-metre storage length per the TIA guidelines, however the functional design from the EA does not include an auxiliary lane for this movement.

The functional design from the EA also does not include a southbound right-turn lane, and site-generated traffic is forecast to account for approximately 10% of the forecasted future total AM peak hour volumes on this movement. The inclusion of a southbound right-turn lane is not recommended or required to support the subject development.

16 Summary of Improvements Indicated and Modifications Options

The following summarizes the analysis and results presented in this TIA report:

Proposed Site and Screening

- The site is currently zoned as AM10 and R3K
- The proposed site includes 254 high-rise dwelling units and 6,618 ft^2 of ground floor commercial use
- Accesses is proposed on Blair Road via a full-moves access
- The development is proposed to be completed as a single phase by 2024
- The Trip Generation, Location, and Safety triggers were met for the TIA Screening
- This TIA accompanies a site plan application

Existing Conditions

- Montreal Road and Blair Road are arterial roads in the study area Where Blair Road is a major collector road north of Montreal Road

- Sidewalks are provided along both sides of Montreal Road and along the east side of Blair Road, and cycling facilities include paved shoulders on Blair Road, where Montreal Road and Blair Road are spine routes
- The high volumes roadways have produced a high number of collisions at the intersection of Montreal Road and Blair Road
- The collisions are predominantly rear end and turning collisions suggesting that they may be influenced by congestion and the turn channels
- Some queueing is noted on the peak directional through movements at both study area intersections during both peak hours

Development Generated Travel Demand

- The proposed development is forecasted to produce 115 two-way people trips during the AM peak hour and 131 two-way people trips during the PM peak hour
- Of the forecasted people trips, 54 two-way trips will be vehicle trips during the AM peak hour and 69 two-way trips will be vehicle trips during the PM peak hour based on a 48-52% residential auto mode share target
- Of the forecasted trips, 5% are anticipated to travel north, 30% to travel south, 20% to travel east, and 45% to travel west

Background Conditions

- No background developments were explicitly included in the background conditions, and a total background growth of 1.25% westbound on Montreal Road and 4.75% southbound on Blair Road in the AM peak hour were applied and to mainline volumes and major turning movements, reversed in the PM peak
- The Montreal-Blair Transit Priority EA proposes geometric changes to the study area intersections and road segments and includes accompanying signal timing adjustments
- The study area intersections at both horizons will operate similarly to the existing conditions at the 2024 horizon
- The intersection of Montreal Road and Blair Road is forecast to experience capacity issues during the PM peak hour at the 2029 future background horizon associated with the changes proposed by the EA
- Signal timing proposed as part of the EA may need review, and lagging turn phases are recommended for consideration
- Capacity issues at the intersection of Montreal Road at Blair Road may resolve with area mode shifts from auto travel to transit with the completion of Stage 2 LRT and the work proposed in the EA

Development Design

- Hard surface connections are proposed from building entrances to the surrounding sidewalks on Montreal Road and Blair Road
- Parking for vehicles and bicycles are proposed both on the surface and within underground parking levels
- The access is proposed as being 6.0 metres wide on Blair Road, the ramp to the parking is 6.0 metres wide
- Space is provided on the north side of the drive aisle for a short-term parking space and a refuse staging area, and a one-way drop-off loop is proposed on the south side of the aisle
- Garbage collection and emergency services are anticipated to access the drive aisle with a 4.0-metre curb radius on the south side

Parking

- The development is proposed as including 264 bicycle parking spaces and 289 vehicle parking spaces
- The zoning by-law requires 127 bicycle parking spaces and 417 vehicle parking spaces for the parking area into which the site falls, however the requirement across the street for the same development would be 176 spaces
- An exemption will be required for the deficit of 128 vehicle parking spaces from the Area C minimum and the site meets the Area X minimum, which may be considered more appropriate for the context
- The two transit priority corridors onto which the site fronts and the high quality active mode connections further enabled by a high bicycle parking provision are anticipated to reduce the site demand for vehicle parking
- Negligible spillover parking demand is anticipated, and potential areas for off-site spillover parking are not convenient and would likely see low utilization even in the presence of spillover parking demand

Boundary Street Design

- The boundary streets will meet all MMLOS targets in the future conditions with the improvements from the Montreal-Blair Transit Priority EA

Access Intersection Design

- The existing site access on Blair Road is to be removed and the curb and median cuts will be reinstated to full height as part of construction activities
- The site access intersections are forecast to operate well at both study horizons
- A clear throat length of 25 metres is recommended from the TAC Geometric Design Guide, and is functionally provided given the intended drive aisle operation

TDM

- Supportive TDM measures to be included within the proposed development should include:
  - Display local area pedestrian, cycling, and transit information at building entrances
  - Provide a multimodal travel option information package
  - Contract with provider to install on-site micromobility station
  - Inclusion of a 1-year Presto card for first time new townhome purchase and apartment rental, with a set time frame for this offer (e.g. 6-months) from the initial opening of the site
  - Unbundle parking cost from purchase or rental costs

NTM

- The major collector thresholds on Blair Road are not exceeded with the 2029 future total traffic

Transit

- Twenty outbound AM peak hour transit trips and 16 inbound PM peak hour transit trips are anticipated
- Transit demands are the equivalent of less than half of a standard bus load
- The City is implementing transit priority improvements within the study area, and the site is not anticipated to impact transit LOS
- No impacts on transit priority corridors will result from the site access as Blair Road is not a transit priority corridor north of Montreal Road

Network Intersection Design

- Generally, the network intersections will operate similarly to the background conditions at both horizons
- High delays are anticipated on the eastbound left-turn movement with increases from site traffic during the PM peak hour at the 2029 future total horizon, and the overall intersection is forecast to be over theoretical capacity
- Changing signal phasing may improve conditions as may area mode shifts that are possible with the area transit projects' completion
- Despite the planned improvements, the MMLOS targets will not be met for the pedestrian LOS at both network intersections and the truck, transit, and auto LOS at the intersection of Montreal Road at Blair Road
- The pedestrian crossings would be required to be reduced to three or fewer lanes to meet LOS targets, and the south leg of the intersection of Montreal Road and Blair Road would require two receiving lanes to meet truck LOS
- Delays and capacity issues limit transit and auto LOS but these may improve future shifts in area mode share
- A southbound right-turn lane has not been included within the transit priority EA study functional design and may be warranted under existing conditions, however is not recommended or required to support the development; and a northbound right-turn lane is not included within the functional design

17 Conclusion

It is recommended that, from a transportation perspective, the proposed development applications proceed.

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Appendix A

TIA Screening Form and PM Certification Form

CGH TRANSPORTATION

6 Plaza Court
Ottawa ON K2H 7W1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 16-Feb-20
Project Number: 2021-003
Project Reference: 1649 Montreal

1.1 Description of Proposed Development	
Municipal Address	1649 Montreal Road, 741 Blair Road
Description of Location	Northeast corner of Blair Road at Montreal Road
Land Use Classification	Arterial Mainstreet (AM10[2199]), Residential Third (R3K[1631])
Development Size	216 Units
Accesses	One all moves onto Blair Road, loading/garbage access onto Montreal Road, both at existing
Phase of Development	One phase
Buildout Year	2024
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Townhomes or apartments	
Development Size	216	Units
Trip Generation Trigger	Yes	

1.3 Location Triggers		
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?	No	Existing access onto Montreal Road / Blair Road Spine routes
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	Yes	Montreal Arterial Mainstreet DPA
Location Trigger	Yes	

1.4. Safety Triggers		
Are posted speed limits on a boundary street 80 km/hr or greater?	No	
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	No	
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)?	No	Existing driveway within proximity to Montreal Road at Blair Road
Is the proposed driveway within auxiliary lanes of an intersection?	No	Existing garbage/loading access proposed within the taper of the auxiliary WBR on Montreal Rd at Blair Rd
Does the proposed driveway make use of an existing median break that serves an existing site?	No	
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?	Yes	Montreal Rd at Blair Rd: 37 Collisions 2015-2019
Does the development include a drive-thru facility?	No	
Safety Trigger	Yes	

TIA Plan Reports

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 associated 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[2] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering √ or transportation planning □.

[1,2] **License of 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.**

City Of Ottawa
Infrastructure Services and Community Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d 'infrastructure et Viabilité des collectivités
Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at ___Ottawa_____ this __20__ day of _____September_____, 2018.
(City)

Name: _____Andrew Harte_____
(Please Print)

Professional Title: _____Professional Engineer_____

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

Office Contact Information (Please Print)
Address: 6 Plaza Court
City / Postal Code: Ottawa / K2H 7W1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com

Appendix B

Turning Movement Counts

CGH TRANSPORTATION

Transportation Services - Traffic Services

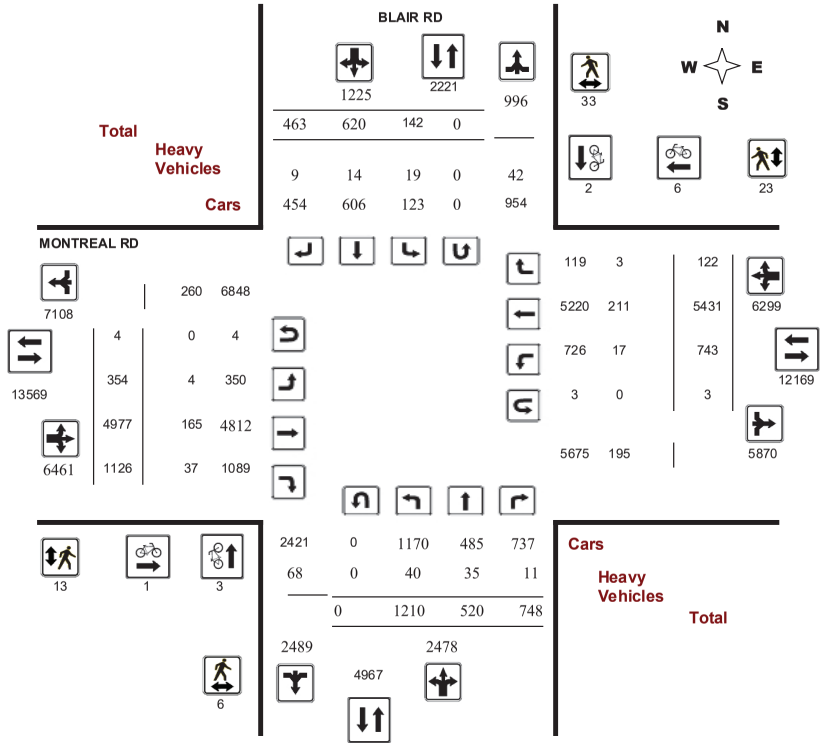
Turning Movement Count - Study Results

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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

Full Study Diagram



Transportation Services - Traffic Services

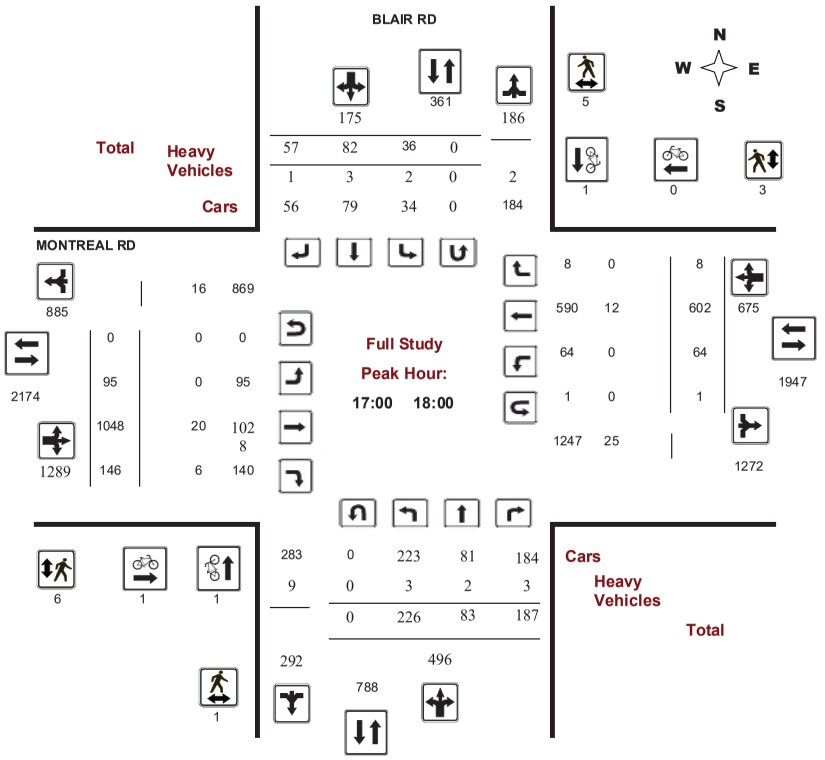
Turning Movement Count - Study Results

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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

Full Study Peak Hour Diagram



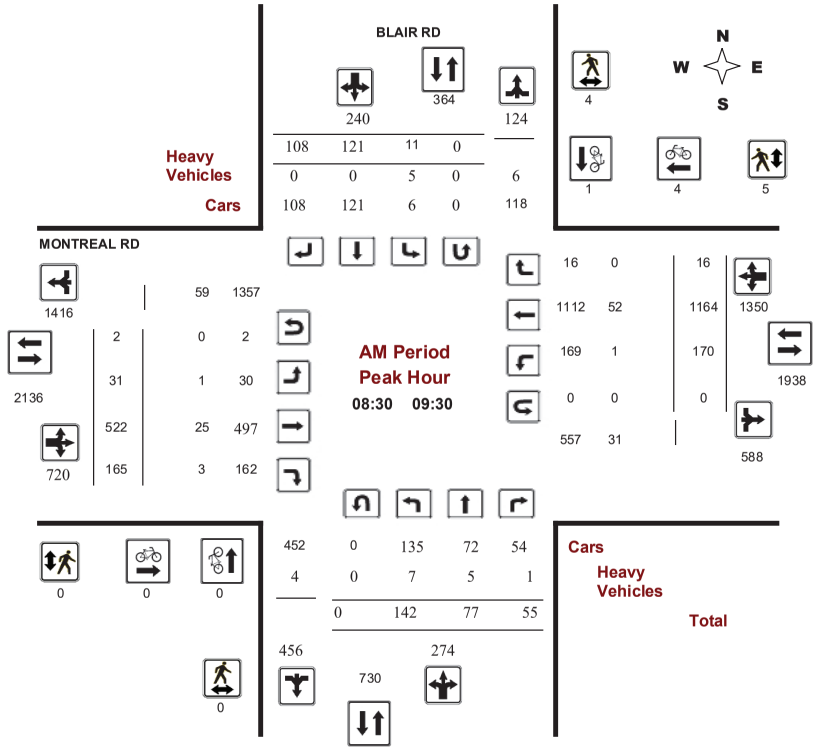
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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



Comments

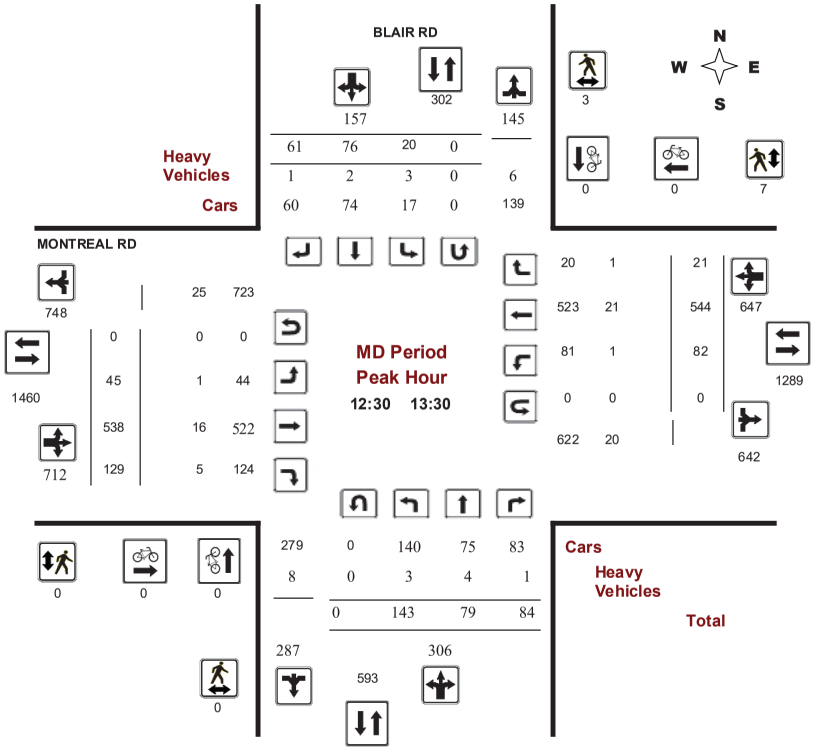
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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



Comments

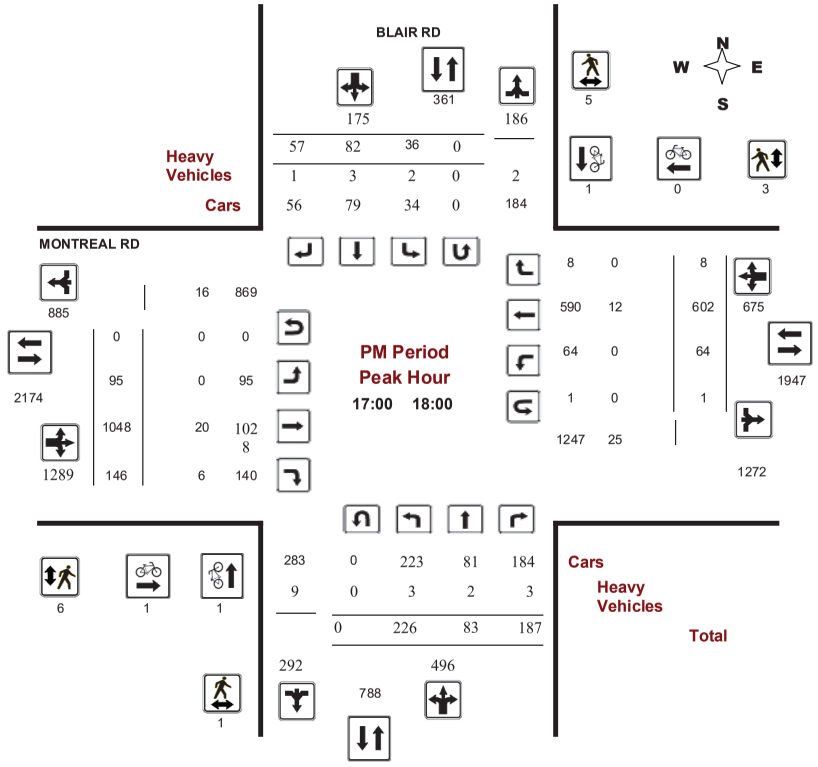
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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

Full Study Summary (8 HR Standard)

Survey Date: Thursday, November 15, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 4 Westbound: 3

AADT Factor .90

	BLAIR RD								MONTREAL RD									
	Northbound				Southbound				Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	79	41	26	**146**	2	30	25	**57**	**203**	14	228	113	**355**	51	465	10	**526**	**881**	**1084**
08:00 09:00	154	67	51	**272**	12	93	89	**194**	**466**	27	491	137	**655**	162	1086	24	**1272**	**1927**	**2393**
09:00 10:00	136	82	55	**273**	16	105	74	**195**	**468**	36	520	196	**752**	144	994	20	**1158**	**1910**	**2378**
11:30 12:30	100	48	65	**213**	14	91	47	**152**	**365**	32	544	128	**704**	70	526	12	**608**	**1312**	**1677**
12:30 13:30	143	79	84	**306**	20	76	61	**157**	**463**	45	538	129	**712**	82	544	21	**647**	**1359**	**1822**
15:00 16:00	128	64	96	**288**	15	64	49	**128**	**416**	41	720	145	**906**	93	572	14	**679**	**1585**	**2001**
16:00 17:00	244	56	184	**484**	27	79	61	**167**	**651**	64	888	132	**1084**	77	642	13	**732**	**1816**	**2467**
17:00 18:00	226	83	187	**496**	36	82	57	**175**	**671**	95	1048	146	**1289**	64	602	8	**674**	**1963**	**2634**
Sub Total	1210	520	748	**2478**	142	620	463	**1225**	**3703**	354	4977	1126	**6457**	743	5431	122	**6296**	**12753**	**16456**
U Turns	0			**0**	0			**0**	**0**	**4**			**4**	3			**3**	**7**	**7**
Total	1210	520	748	**2478**	142	620	463	**1225**	**3703**	358	4977	1126	**6461**	746	5431	122	**6299**	**12760**	**16463**
EQ 12Hr	1682	723	1040	**3445**	197	862	644	**1703**	**5148**	498	6918	1565	**8981**	1037	7549	170	**8756**	**17737**	**22885**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	1514	651	936	**3101**	177	776	580	**1533**	**4634**	448	6226	1408	**8082**	933	6794	153	**7880**	**15962**	**20596**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**.90**					
AVG 24Hr	1983	853	1226	**4062**	232	1017	760	**2009**	**6071**	587	8156	1844	**10587**	1222	8900	200	**10322**	**20909**	**26980**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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

Full Study 15 Minute Increments

		BLAIR RD									MONTREAL RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	9	4	6	19	0	1	1	2	**21**	1	32	21	54	8	52	1	61	**115**	**136**
07:15	07:30	15	10	13	38	0	7	3	10	**48**	4	56	13	73	12	110	1	123	**196**	**244**
07:30	07:45	31	9	3	43	1	11	10	22	**65**	3	73	35	111	12	127	2	141	**252**	**317**
07:45	08:00	24	18	4	46	1	11	11	23	**69**	6	67	44	117	21	176	6	203	**320**	**389**
08:00	08:15	39	13	4	56	4	14	18	36	**92**	8	90	30	128	35	218	11	264	**392**	**484**
08:15	08:30	39	18	14	71	2	18	9	29	**100**	4	115	34	153	34	264	5	303	**456**	**556**
08:30	08:45	42	16	15	73	3	29	22	54	**127**	7	129	35	171	43	287	2	332	**503**	**630**
08:45	09:00	34	20	18	72	3	32	40	75	**147**	9	157	38	204	50	317	6	373	**577**	**724**
09:00	09:15	29	17	9	55	2	28	24	54	**109**	10	96	44	150	34	303	3	340	**490**	**599**
09:15	09:30	37	24	13	74	3	32	22	57	**131**	7	140	48	195	43	257	5	305	**500**	**631**
09:30	09:45	32	24	13	69	7	21	14	42	**111**	11	150	48	209	39	209	5	253	**462**	**573**
09:45	10:00	38	17	20	75	4	24	14	42	**117**	9	134	56	199	28	225	7	260	**459**	**576**
11:30	11:45	16	6	10	32	4	34	15	53	**85**	6	131	39	176	21	130	7	158	**334**	**419**
11:45	12:00	33	17	13	63	5	19	12	36	**99**	10	135	28	173	13	136	1	150	**323**	**422**
12:00	12:15	28	14	19	61	4	17	12	33	**94**	8	139	31	178	15	132	1	148	**326**	**420**
12:15	12:30	23	11	23	57	1	21	8	30	**87**	9	139	30	178	21	128	3	152	**330**	**417**
12:30	12:45	32	20	13	65	5	22	14	41	**106**	7	122	37	166	22	124	5	151	**317**	**423**
12:45	13:00	40	18	11	69	6	19	13	38	**107**	11	147	26	184	18	123	5	146	**330**	**437**
13:00	13:15	40	23	32	95	4	23	18	45	**140**	16	140	36	192	21	136	3	160	**352**	**492**
13:15	13:30	31	18	28	77	5	12	16	33	**110**	11	129	30	170	21	161	8	190	**360**	**470**
15:00	15:15	28	23	23	74	2	18	9	29	**103**	9	179	32	220	16	113	3	132	**352**	**455**
15:15	15:30	30	10	29	69	5	14	16	35	**104**	9	153	27	189	24	118	4	146	**335**	**439**
15:30	15:45	35	15	17	67	3	14	13	30	**97**	11	193	44	248	29	171	4	204	**452**	**549**
15:45	16:00	35	16	27	78	5	18	11	34	**112**	12	195	42	249	24	170	3	197	**446**	**558**
16:00	16:15	72	12	44	128	3	17	15	35	**163**	16	239	37	292	31	167	1	199	**491**	**654**
16:15	16:30	63	13	40	116	11	17	16	44	**160**	10	211	29	250	17	155	2	174	**424**	**584**
16:30	16:45	45	15	54	114	7	19	14	40	**154**	16	223	39	278	16	153	4	173	**451**	**605**
16:45	17:00	64	16	46	126	6	26	16	48	**174**	23	215	27	265	13	167	6	186	**451**	**625**
17:00	17:15	59	9	52	120	11	28	16	55	**175**	16	292	45	353	13	139	0	152	**505**	**680**
17:15	17:30	54	22	48	124	9	22	15	46	**170**	23	262	37	322	12	160	2	174	**496**	**666**
17:30	17:45	55	26	50	131	8	9	13	30	**161**	23	256	29	308	19	144	3	166	**474**	**635**
17:45	18:00	58	26	37	121	8	23	13	44	**165**	33	238	35	306	21	159	3	183	**489**	**654**
Total:		1210	520	748	2478	142	620	463	1225	**3703**	358	4977	1126	6461	746	5431	122	6299	**3703**	**16,463**

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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

Full Study Cyclist Volume

		BLAIR RD			MONTREAL RD			
Time Period		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	0	0	**0**	0	0	**0**	**0**
07:15	07:30	0	0	**0**	0	0	**0**	**0**
07:30	07:45	0	0	**0**	0	0	**0**	**0**
07:45	08:00	0	0	**0**	0	0	**0**	**0**
08:00	08:15	0	0	**0**	0	0	**0**	**0**
08:15	08:30	0	0	**0**	0	0	**0**	**0**
08:30	08:45	0	0	**0**	0	2	**2**	**2**
08:45	09:00	0	1	**1**	0	2	**2**	**3**
09:00	09:15	0	0	**0**	0	0	**0**	**0**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	0	**0**	0	0	**0**	**0**
09:45	10:00	0	0	**0**	0	0	**0**	**0**
11:30	11:45	0	0	**0**	0	0	**0**	**0**
11:45	12:00	0	0	**0**	0	0	**0**	**0**
12:00	12:15	0	0	**0**	0	0	**0**	**0**
12:15	12:30	2	0	**2**	0	2	**2**	**4**
12:30	12:45	0	0	**0**	0	0	**0**	**0**
12:45	13:00	0	0	**0**	0	0	**0**	**0**
13:00	13:15	0	0	**0**	0	0	**0**	**0**
13:15	13:30	0	0	**0**	0	0	**0**	**0**
15:00	15:15	0	0	**0**	0	0	**0**	**0**
15:15	15:30	0	0	**0**	0	0	**0**	**0**
15:30	15:45	0	0	**0**	0	0	**0**	**0**
15:45	16:00	0	0	**0**	0	0	**0**	**0**
16:00	16:15	0	0	**0**	0	0	**0**	**0**
16:15	16:30	0	0	**0**	0	0	**0**	**0**
16:30	16:45	0	0	**0**	0	0	**0**	**0**
16:45	17:00	0	0	**0**	0	0	**0**	**0**
17:00	17:15	0	1	**1**	0	0	**0**	**1**
17:15	17:30	0	0	**0**	0	0	**0**	**0**
17:30	17:45	1	0	**1**	0	0	**0**	**1**
17:45	18:00	0	0	**0**	1	0	**1**	**1**
Total		3	2	**5**	1	6	**7**	**12**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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

Full Study Pedestrian Volume

		BLAIR RD			MONTREAL RD			
Time Period		NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00	07:15	0	0	**0**	0	0	**0**	**0**
07:15	07:30	1	0	**1**	1	0	**1**	**2**
07:30	07:45	0	1	**1**	0	0	**0**	**1**
07:45	08:00	0	1	**1**	0	1	**1**	**2**
08:00	08:15	0	1	**1**	0	0	**0**	**1**
08:15	08:30	0	1	**1**	0	1	**1**	**2**
08:30	08:45	0	0	**0**	0	0	**0**	**0**
08:45	09:00	0	2	**2**	0	2	**2**	**4**
09:00	09:15	0	1	**1**	0	1	**1**	**2**
09:15	09:30	0	1	**1**	0	2	**2**	**3**
09:30	09:45	1	2	**3**	2	0	**2**	**5**
09:45	10:00	0	2	**2**	1	2	**3**	**5**
11:30	11:45	0	1	**1**	0	0	**0**	**1**
11:45	12:00	0	0	**0**	0	0	**0**	**0**
12:00	12:15	0	3	**3**	0	0	**0**	**3**
12:15	12:30	0	0	**0**	0	1	**1**	**1**
12:30	12:45	0	2	**2**	0	3	**3**	**5**
12:45	13:00	0	0	**0**	0	1	**1**	**1**
13:00	13:15	0	1	**1**	0	1	**1**	**2**
13:15	13:30	0	0	**0**	0	2	**2**	**2**
15:00	15:15	0	3	**3**	1	0	**1**	**4**
15:15	15:30	1	0	**1**	0	0	**0**	**1**
15:30	15:45	0	0	**0**	0	1	**1**	**1**
15:45	16:00	0	0	**0**	0	0	**0**	**0**
16:00	16:15	0	1	**1**	0	0	**0**	**1**
16:15	16:30	0	1	**1**	1	0	**1**	**2**
16:30	16:45	1	1	**2**	1	0	**1**	**3**
16:45	17:00	1	3	**4**	0	2	**2**	**6**
17:00	17:15	0	3	**3**	3	1	**4**	**7**
17:15	17:30	0	0	**0**	0	0	**0**	**0**
17:30	17:45	1	1	**2**	2	1	**3**	**5**
17:45	18:00	0	1	**1**	1	1	**2**	**3**
Total	.....	6	33	**39**	13	23	**36**	**75**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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

Full Study Heavy Vehicles

		BLAIR RD									MONTREAL RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	1	0	1	**2**	0	0	0	**0**	**2**	0	1	1	**2**	1	3	0	**4**	**6**	**8**
07:15	07:30	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	2	0	**2**	**2**	**2**
07:30	07:45	0	2	0	**2**	1	0	0	**1**	**3**	0	4	0	**4**	0	2	1	**3**	**7**	**10**
07:45	08:00	1	0	0	**1**	0	0	0	**0**	**1**	0	0	0	**0**	0	3	0	**3**	**3**	**4**
08:00	08:15	3	3	0	**6**	1	0	0	**1**	**7**	0	3	1	**4**	2	8	0	**10**	**14**	**21**
08:15	08:30	3	2	0	**5**	2	1	0	**3**	**8**	0	2	1	**3**	1	13	0	**14**	**17**	**25**
08:30	08:45	1	1	1	**3**	1	0	0	**1**	**4**	0	5	1	**6**	0	13	0	**13**	**19**	**23**
08:45	09:00	3	2	0	**5**	2	0	0	**2**	**7**	0	8	1	**9**	0	13	0	**13**	**22**	**29**
09:00	09:15	0	2	0	**2**	1	0	0	**1**	**3**	1	3	0	**4**	0	13	0	**13**	**17**	**20**
09:15	09:30	3	0	0	**3**	1	0	0	**1**	**4**	0	9	1	**10**	1	13	0	**14**	**24**	**28**
09:30	09:45	0	2	0	**2**	2	0	1	**3**	**5**	0	9	0	**9**	1	9	0	**10**	**19**	**24**
09:45	10:00	2	1	0	**3**	1	0	0	**1**	**4**	0	6	2	**8**	1	10	0	**11**	**19**	**23**
11:30	11:45	1	0	2	**3**	0	2	0	**2**	**5**	0	4	0	**4**	0	3	0	**3**	**7**	**12**
11:45	12:00	5	4	0	**9**	0	1	0	**1**	**10**	0	5	1	**6**	0	4	0	**4**	**10**	**20**
12:00	12:15	2	2	0	**4**	0	2	0	**2**	**6**	0	8	1	**9**	0	3	0	**3**	**12**	**18**
12:15	12:30	0	0	0	**0**	0	0	0	**0**	**0**	0	8	1	**9**	0	7	1	**8**	**17**	**17**
12:30	12:45	0	0	0	**0**	1	2	1	**4**	**4**	0	7	1	**8**	1	6	0	**7**	**15**	**19**
12:45	13:00	3	1	0	**4**	1	0	0	**1**	**5**	0	1	1	**2**	0	6	0	**6**	**8**	**13**
13:00	13:15	0	1	0	**1**	0	0	0	**0**	**1**	1	2	2	**5**	0	5	0	**5**	**10**	**11**
13:15	13:30	0	2	1	**3**	1	0	0	**1**	**4**	0	6	1	**7**	0	4	1	**5**	**12**	**16**
15:00	15:15	4	1	0	**5**	0	0	0	**0**	**5**	1	9	1	**11**	3	7	0	**10**	**21**	**26**
15:15	15:30	0	1	1	**2**	0	0	0	**0**	**2**	0	4	1	**5**	2	6	0	**8**	**13**	**15**
15:30	15:45	0	1	0	**1**	0	1	2	**3**	**4**	0	11	3	**14**	1	10	0	**11**	**25**	**29**
15:45	16:00	0	1	0	**1**	0	2	2	**4**	**5**	0	7	2	**9**	0	11	0	**11**	**20**	**25**
16:00	16:15	2	0	1	**3**	0	0	1	**1**	**4**	0	5	2	**7**	3	9	0	**12**	**19**	**23**
16:15	16:30	1	2	0	**3**	1	0	0	**1**	**4**	0	6	2	**8**	0	6	0	**6**	**14**	**18**
16:30	16:45	0	2	0	**2**	0	0	1	**1**	**3**	0	8	2	**10**	0	7	0	**7**	**17**	**20**
16:45	17:00	2	0	1	**3**	1	0	0	**1**	**4**	1	4	2	**7**	0	3	0	**3**	**10**	**14**
17:00	17:15	1	0	2	**3**	0	1	1	**2**	**5**	0	7	3	**10**	0	4	0	**4**	**14**	**19**
17:15	17:30	2	1	1	**4**	1	0	0	**1**	**5**	0	4	1	**5**	0	3	0	**3**	**8**	**13**
17:30	17:45	0	0	0	**0**	0	0	0	**0**	**0**	0	6	2	**8**	0	4	0	**4**	**12**	**12**
17:45	18:00	0	1	0	**1**	1	2	0	**3**	**4**	0	3	0	**3**	0	1	0	**1**	**4**	**8**
Total:	None	40	35	11	**86**	19	14	9	**42**	**128**	4	165	37	**206**	17	211	3	**231**	**437**	**565**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

BLAIR RD @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38125

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

Full Study 15 Minute U-Turn Total

Time Period		BLAIR RD Northbound U-Turn Total	BLAIR RD Southbound U-Turn Total	MONTREAL RD Eastbound U-Turn Total	MONTREAL RD Westbound U-Turn Total	Total
07:00	07:15	0	0	0	1	**1**
07:15	07:30	0	0	0	0	**0**
07:30	07:45	0	0	0	0	**0**
07:45	08:00	0	0	0	1	**1**
08:00	08:15	0	0	0	0	**0**
08:15	08:30	0	0	0	0	**0**
08:30	08:45	0	0	0	0	**0**
08:45	09:00	0	0	1	0	**1**
09:00	09:15	0	0	1	0	**1**
09:15	09:30	0	0	0	0	**0**
09:30	09:45	0	0	0	0	**0**
09:45	10:00	0	0	0	0	**0**
11:30	11:45	0	0	0	0	**0**
11:45	12:00	0	0	0	0	**0**
12:00	12:15	0	0	0	0	**0**
12:15	12:30	0	0	1	0	**1**
12:30	12:45	0	0	0	0	**0**
12:45	13:00	0	0	0	0	**0**
13:00	13:15	0	0	0	0	**0**
13:15	13:30	0	0	0	0	**0**
15:00	15:15	0	0	0	0	**0**
15:15	15:30	0	0	0	0	**0**
15:30	15:45	0	0	0	0	**0**
15:45	16:00	0	0	0	0	**0**
16:00	16:15	0	0	0	0	**0**
16:15	16:30	0	0	0	0	**0**
16:30	16:45	0	0	1	0	**1**
16:45	17:00	0	0	0	0	**0**
17:00	17:15	0	0	0	0	**0**
17:15	17:30	0	0	0	0	**0**
17:30	17:45	0	0	0	1	**1**
17:45	18:00	0	0	0	0	**0**
Total		0	0	4	3	**7**

Transportation Services - Traffic Services

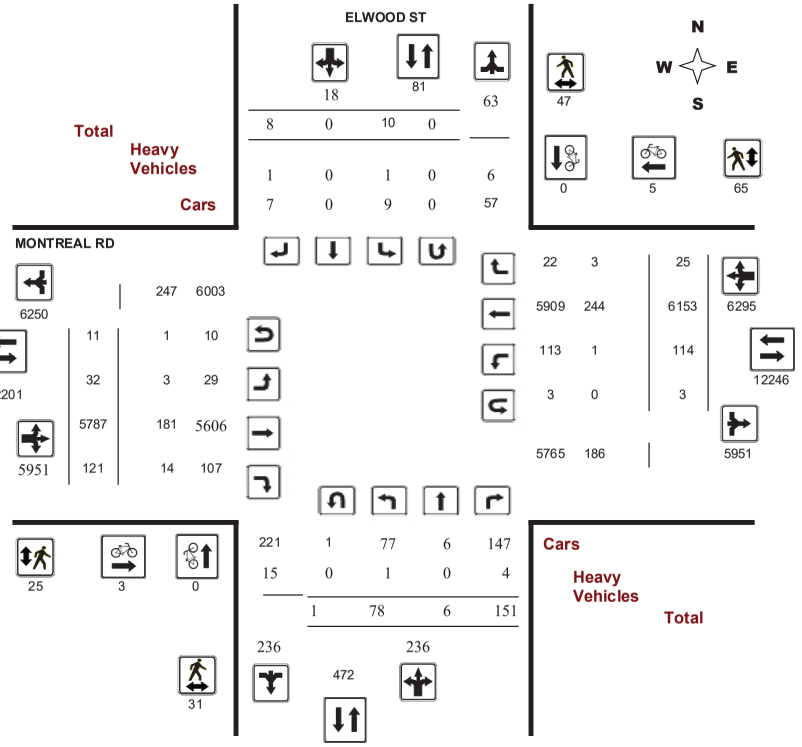
Turning Movement Count - Study Results

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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

Full Study Diagram



Transportation Services - Traffic Services

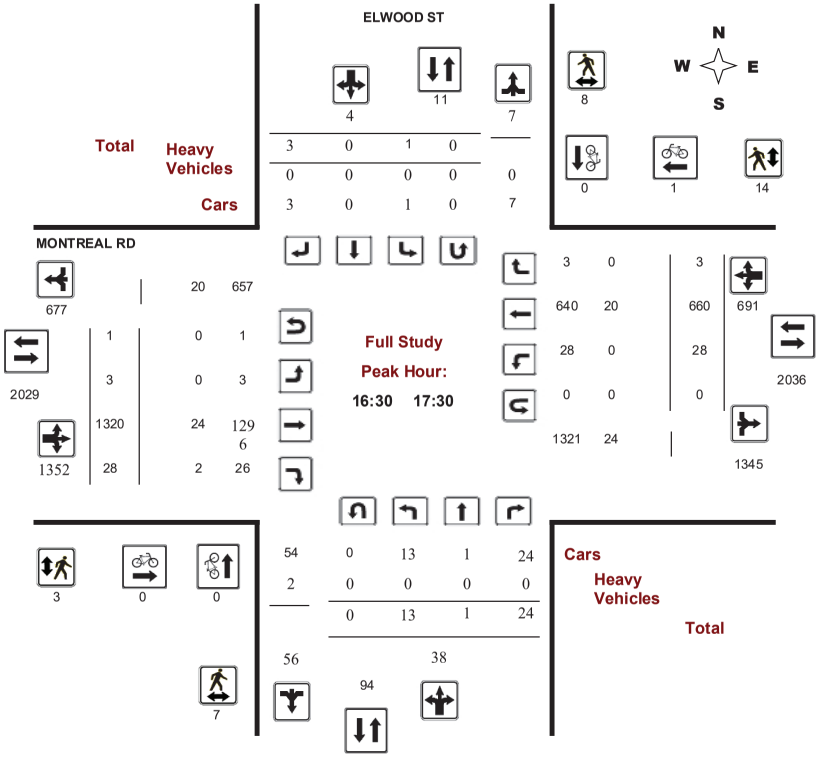
Turning Movement Count - Study Results

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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

Full Study Peak Hour Diagram



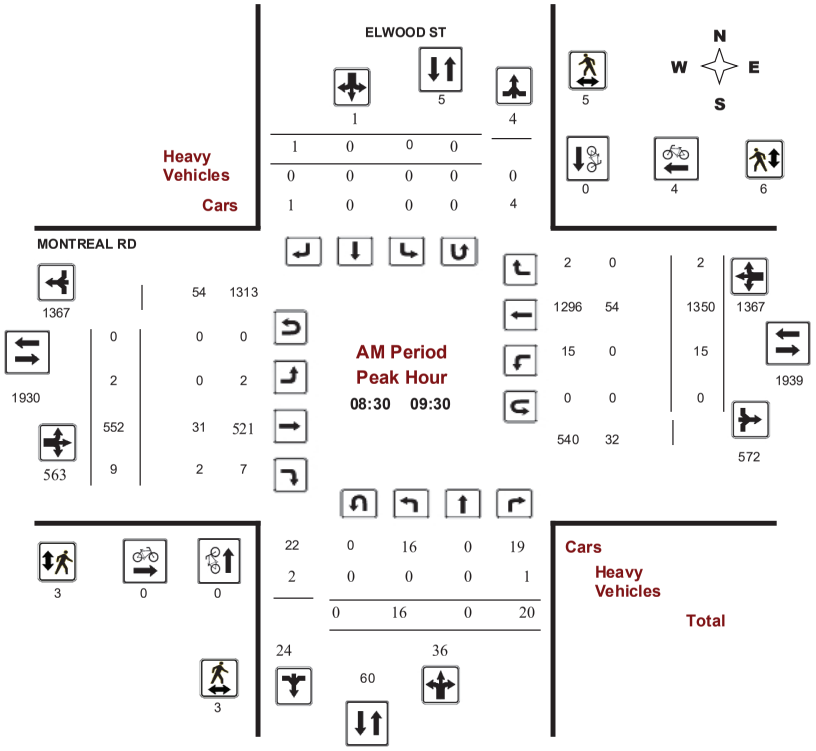
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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



Comments

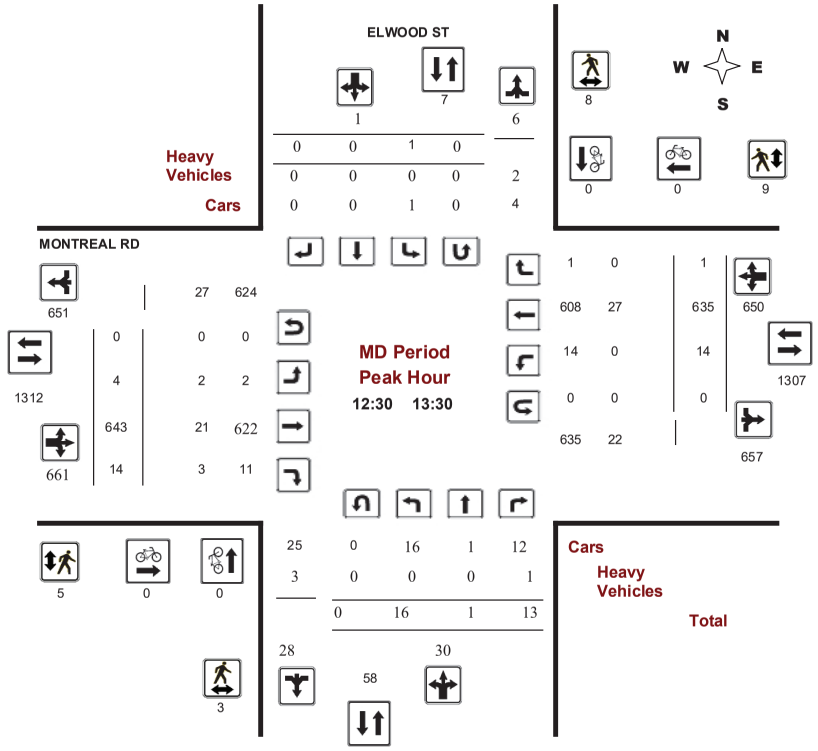
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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



Comments

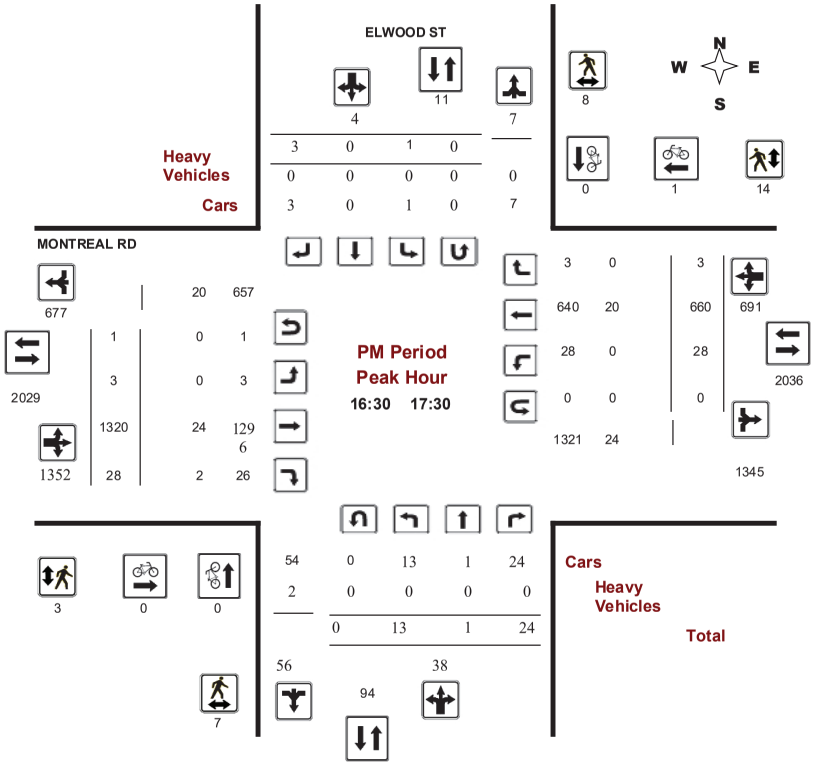
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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

Full Study Summary (8 HR Standard)

Survey Date: Thursday, November 15, 2018

Total Observed U-Turns

Northbound: 1 Southbound: 0

Eastbound: 11 Westbound: 3

AADT Factor .90

	ELWOOD ST								MONTREAL RD									
	Northbound				Southbound				Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	2	1	6	**9**	0	0	0	**0**	**9**	8	198	5	**211**	1	460	5	**466**	**677**	**686**
08:00 09:00	9	0	17	**26**	0	0	1	**1**	**27**	1	468	9	**478**	4	1265	2	**1271**	**1749**	**1776**
09:00 10:00	9	0	20	**29**	0	0	1	**1**	**30**	2	562	8	**572**	22	1188	1	**1211**	**1783**	**1813**
11:30 12:30	5	0	20	**25**	0	0	0	**0**	**25**	0	592	8	**600**	16	600	2	**618**	**1218**	**1243**
12:30 13:30	16	1	13	**30**	1	0	0	**1**	**31**	4	643	14	**661**	14	635	1	**650**	**1311**	**1342**
15:00 16:00	14	1	25	**40**	5	0	3	**8**	**48**	7	798	18	**823**	9	635	10	**654**	**1477**	**1525**
16:00 17:00	14	3	24	**41**	4	0	2	**6**	**47**	5	1259	21	**1285**	24	689	2	**715**	**2000**	**2047**
17:00 18:00	9	0	26	**35**	0	0	1	**1**	**36**	5	1267	38	**1310**	24	681	2	**707**	**2017**	**2053**
Sub Total	78	6	151	**235**	10	0	8	**18**	**253**	32	5787	121	**5940**	114	6153	25	**6292**	**12232**	**12485**
U Turns	1			**1**	0			**0**	**1**	**11**			**11**	3			**3**	**14**	**15**
Total	79	6	151	**236**	10	0	8	**18**	**254**	43	5787	121	**5951**	117	6153	25	**6295**	**12246**	**12500**
EQ 12Hr	110	8	210	**328**	14	0	11	**25**	**353**	60	8044	168	**8272**	163	8553	35	**8751**	**17023**	**17376**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	99	7	189	**295**	13	0	10	**23**	**318**	54	7240	151	**7445**	147	7698	32	**7877**	**15322**	**15640**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**.90**					
AVG 24Hr	130	9	248	**387**	17	0	13	**30**	**417**	71	9484	198	**9753**	193	10084	42	**10319**	**20072**	**20489**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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

Full Study 15 Minute Increments

		ELWOOD ST									MONTREAL RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	0	0	0	0	0	0	0	**0**	4	33	0	37	1	60	1	62	**99**	**99**
07:15	07:30	1	0	3	4	0	0	0	0	**4**	6	43	2	51	0	90	2	92	**143**	**147**
07:30	07:45	0	0	2	2	0	0	0	0	**2**	2	58	0	60	0	133	2	135	**195**	**197**
07:45	08:00	1	1	1	3	0	0	0	0	**3**	4	64	3	71	0	177	0	177	**248**	**251**
08:00	08:15	0	0	1	1	0	0	0	0	**1**	0	68	0	68	4	249	0	253	**321**	**322**
08:15	08:30	0	0	5	5	0	0	0	0	**5**	0	105	3	108	1	321	0	322	**430**	**435**
08:30	08:45	5	0	2	7	0	0	1	1	**8**	1	143	4	148	0	317	1	318	**466**	**474**
08:45	09:00	4	0	9	13	0	0	0	0	**13**	0	152	2	154	0	378	1	379	**533**	**546**
09:00	09:15	0	0	4	4	0	0	0	0	**4**	1	137	0	138	6	343	0	349	**487**	**491**
09:15	09:30	7	0	5	12	0	0	0	0	**12**	0	120	3	123	9	312	0	321	**444**	**456**
09:30	09:45	1	0	6	7	0	0	0	0	**7**	1	164	2	167	3	275	1	279	**446**	**453**
09:45	10:00	1	0	5	6	0	0	1	1	**7**	1	141	3	145	4	258	0	262	**407**	**414**
11:30	11:45	1	0	6	7	0	0	0	0	**7**	0	149	3	152	7	157	0	164	**316**	**323**
11:45	12:00	0	0	4	4	0	0	0	0	**4**	0	161	1	162	3	151	2	156	**318**	**322**
12:00	12:15	3	0	5	8	0	0	0	0	**8**	0	145	1	146	2	137	0	139	**285**	**293**
12:15	12:30	1	0	5	6	0	0	0	0	**6**	0	137	3	140	6	155	0	161	**301**	**307**
12:30	12:45	4	1	7	12	0	0	0	0	**12**	0	145	1	146	6	138	0	144	**290**	**302**
12:45	13:00	6	0	3	9	0	0	0	0	**9**	1	183	4	188	3	150	0	153	**341**	**350**
13:00	13:15	3	0	2	5	1	0	0	1	**6**	0	157	4	161	2	168	1	171	**332**	**338**
13:15	13:30	3	0	1	4	0	0	0	0	**4**	3	158	5	166	3	179	0	182	**348**	**352**
15:00	15:15	3	0	9	12	0	0	0	0	**12**	1	182	3	186	3	131	5	139	**325**	**337**
15:15	15:30	3	0	5	8	1	0	0	1	**9**	3	203	5	211	3	143	4	150	**361**	**370**
15:30	15:45	2	1	5	8	0	0	3	3	**11**	3	195	7	205	1	179	0	180	**385**	**396**
15:45	16:00	6	0	6	12	4	0	0	4	**16**	1	218	3	222	2	182	1	185	**407**	**423**
16:00	16:15	3	0	5	8	1	0	0	1	**9**	3	309	5	317	5	187	1	193	**510**	**519**
16:15	16:30	4	2	7	13	2	0	0	2	**15**	2	300	6	308	5	169	0	174	**482**	**497**
16:30	16:45	4	1	6	11	0	0	1	1	**12**	1	321	6	328	9	154	0	163	**491**	**503**
16:45	17:00	4	0	6	10	1	0	1	2	**12**	0	329	4	333	5	179	1	185	**518**	**530**
17:00	17:15	3	0	7	10	0	0	1	1	**11**	0	320	11	331	7	176	1	184	**515**	**526**
17:15	17:30	2	0	5	7	0	0	0	0	**7**	3	350	7	360	7	151	1	159	**519**	**526**
17:30	17:45	2	0	5	7	0	0	0	0	**7**	1	311	7	319	7	163	0	170	**489**	**496**
17:45	18:00	2	0	9	11	0	0	0	0	**11**	1	286	13	300	3	191	0	194	**494**	**505**
Total:		79	6	151	236	10	0	8	18	**254**	43	5787	121	5951	117	6153	25	6295	**254**	**12,500**

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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

Full Study Cyclist Volume

Time Period		ELWOOD ST Northbound	ELWOOD ST Southbound	ELWOOD ST Street Total	MONTREAL RD Eastbound	MONTREAL RD Westbound	MONTREAL RD Street Total	Grand Total
07:00	07:15	0	0	**0**	0	0	**0**	**0**
07:15	07:30	0	0	**0**	0	0	**0**	**0**
07:30	07:45	0	0	**0**	0	0	**0**	**0**
07:45	08:00	0	0	**0**	0	0	**0**	**0**
08:00	08:15	0	0	**0**	0	0	**0**	**0**
08:15	08:30	0	0	**0**	1	0	**1**	**1**
08:30	08:45	0	0	**0**	0	1	**1**	**1**
08:45	09:00	0	0	**0**	0	2	**2**	**2**
09:00	09:15	0	0	**0**	0	1	**1**	**1**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	0	**0**	0	0	**0**	**0**
09:45	10:00	0	0	**0**	0	0	**0**	**0**
11:30	11:45	0	0	**0**	0	0	**0**	**0**
11:45	12:00	0	0	**0**	0	0	**0**	**0**
12:00	12:15	0	0	**0**	0	0	**0**	**0**
12:15	12:30	0	0	**0**	0	0	**0**	**0**
12:30	12:45	0	0	**0**	0	0	**0**	**0**
12:45	13:00	0	0	**0**	0	0	**0**	**0**
13:00	13:15	0	0	**0**	0	0	**0**	**0**
13:15	13:30	0	0	**0**	0	0	**0**	**0**
15:00	15:15	0	0	**0**	0	0	**0**	**0**
15:15	15:30	0	0	**0**	0	0	**0**	**0**
15:30	15:45	0	0	**0**	0	0	**0**	**0**
15:45	16:00	0	0	**0**	0	0	**0**	**0**
16:00	16:15	0	0	**0**	0	0	**0**	**0**
16:15	16:30	0	0	**0**	0	0	**0**	**0**
16:30	16:45	0	0	**0**	0	0	**0**	**0**
16:45	17:00	0	0	**0**	0	0	**0**	**0**
17:00	17:15	0	0	**0**	0	1	**1**	**1**
17:15	17:30	0	0	**0**	0	0	**0**	**0**
17:30	17:45	0	0	**0**	0	0	**0**	**0**
17:45	18:00	0	0	**0**	2	0	**2**	**2**
Total		0	0	**0**	3	5	**8**	**8**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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

Full Study Pedestrian Volume

Time Period		ELWOOD ST NB Approach (E or W Crossing)	ELWOOD ST SB Approach (E or W Crossing)	ELWOOD ST Total	MONTREAL RD EB Approach (N or S Crossing)	MONTREAL RD WB Approach (N or S Crossing)	MONTREAL RD Total	Grand Total
07:00	07:15	0	2	**2**	0	1	**1**	**3**
07:15	07:30	1	4	**5**	2	1	**3**	**8**
07:30	07:45	0	1	**1**	1	0	**1**	**2**
07:45	08:00	1	2	**3**	1	2	**3**	**6**
08:00	08:15	1	0	**1**	0	1	**1**	**2**
08:15	08:30	0	0	**0**	1	0	**1**	**1**
08:30	08:45	1	1	**2**	3	1	**4**	**6**
08:45	09:00	0	1	**1**	0	3	**3**	**4**
09:00	09:15	0	2	**2**	0	0	**0**	**2**
09:15	09:30	2	1	**3**	0	2	**2**	**5**
09:30	09:45	1	1	**2**	1	0	**1**	**3**
09:45	10:00	1	2	**3**	1	1	**2**	**5**
11:30	11:45	0	2	**2**	1	1	**2**	**4**
11:45	12:00	1	1	**2**	0	2	**2**	**4**
12:00	12:15	0	0	**0**	0	0	**0**	**0**
12:15	12:30	1	3	**4**	1	3	**4**	**8**
12:30	12:45	0	3	**3**	3	0	**3**	**6**
12:45	13:00	0	0	**0**	0	1	**1**	**1**
13:00	13:15	1	3	**4**	0	5	**5**	**9**
13:15	13:30	2	2	**4**	2	3	**5**	**9**
15:00	15:15	1	0	**1**	1	3	**4**	**5**
15:15	15:30	1	1	**2**	1	2	**3**	**5**
15:30	15:45	1	0	**1**	1	0	**1**	**2**
15:45	16:00	0	1	**1**	0	2	**2**	**3**
16:00	16:15	4	2	**6**	2	6	**8**	**14**
16:15	16:30	2	1	**3**	0	7	**7**	**10**
16:30	16:45	5	2	**7**	3	3	**6**	**13**
16:45	17:00	0	5	**5**	0	0	**0**	**5**
17:00	17:15	1	0	**1**	0	6	**6**	**7**
17:15	17:30	1	1	**2**	0	5	**5**	**7**
17:30	17:45	2	1	**3**	0	1	**1**	**4**
17:45	18:00	0	2	**2**	0	3	**3**	**5**
Total	.....	31	47	**78**	25	65	**90**	**168**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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

Full Study Heavy Vehicles

Time Period		ELWOOD ST Northbound				ELWOOD ST Southbound					MONTREAL RD Eastbound				MONTREAL RD Westbound					
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	0	0	**0**	0	0	0	**0**	**0**	1	1	0	**2**	0	3	0	**3**	**5**	**6**
07:15	07:30	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	2	0	**2**	**2**	**2**
07:30	07:45	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	3	0	**3**	**5**	**5**
07:45	08:00	0	0	0	**0**	0	0	0	**0**	**0**	0	0	2	**2**	0	3	0	**3**	**5**	**5**
08:00	08:15	0	0	1	**1**	0	0	0	**0**	**1**	0	1	0	**1**	0	10	0	**10**	**11**	**12**
08:15	08:30	0	0	0	**0**	0	0	0	**0**	**0**	0	4	1	**5**	0	15	0	**15**	**20**	**20**
08:30	08:45	0	0	1	**1**	0	0	0	**0**	**1**	0	3	0	**3**	0	13	0	**13**	**16**	**17**
08:45	09:00	0	0	0	**0**	0	0	0	**0**	**0**	0	15	1	**16**	0	12	0	**12**	**28**	**28**
09:00	09:15	0	0	0	**0**	0	0	0	**0**	**0**	0	7	0	**7**	0	12	0	**12**	**19**	**19**
09:15	09:30	0	0	0	**0**	0	0	0	**0**	**0**	0	6	1	**7**	0	17	0	**17**	**24**	**24**
09:30	09:45	0	0	0	**0**	0	0	0	**0**	**0**	0	7	0	**7**	0	9	1	**10**	**17**	**17**
09:45	10:00	0	0	0	**0**	0	0	1	**1**	**1**	0	10	1	**11**	0	11	0	**11**	**22**	**23**
11:30	11:45	0	0	0	**0**	0	0	0	**0**	**0**	0	4	0	**4**	0	5	0	**5**	**9**	**9**
11:45	12:00	0	0	0	**0**	0	0	0	**0**	**0**	0	6	0	**6**	1	5	0	**6**	**12**	**12**
12:00	12:15	0	0	0	**0**	0	0	0	**0**	**0**	0	9	0	**9**	0	3	0	**3**	**12**	**12**
12:15	12:30	0	0	0	**0**	0	0	0	**0**	**0**	0	5	0	**5**	0	9	0	**9**	**14**	**14**
12:30	12:45	0	0	1	**1**	0	0	0	**0**	**1**	0	7	0	**7**	0	7	0	**7**	**14**	**15**
12:45	13:00	0	0	0	**0**	0	0	0	**0**	**0**	1	4	1	**6**	0	5	0	**5**	**11**	**11**
13:00	13:15	0	0	0	**0**	0	0	0	**0**	**0**	0	4	1	**5**	0	6	0	**6**	**11**	**11**
13:15	13:30	0	0	0	**0**	0	0	0	**0**	**0**	1	6	1	**8**	0	9	0	**9**	**17**	**17**
15:00	15:15	0	0	0	**0**	0	0	0	**0**	**0**	0	10	0	**10**	0	10	1	**11**	**21**	**21**
15:15	15:30	0	0	0	**0**	1	0	0	**1**	**1**	0	6	0	**6**	0	9	0	**9**	**15**	**16**
15:30	15:45	0	0	0	**0**	0	0	0	**0**	**0**	0	9	0	**9**	0	8	0	**8**	**17**	**17**
15:45	16:00	1	0	1	**2**	0	0	0	**0**	**2**	0	9	0	**9**	0	11	1	**12**	**21**	**23**
16:00	16:15	0	0	0	**0**	0	0	0	**0**	**0**	0	11	1	**12**	0	11	0	**11**	**23**	**23**
16:15	16:30	0	0	0	**0**	0	0	0	**0**	**0**	0	3	1	**4**	0	8	0	**8**	**12**	**12**
16:30	16:45	0	0	0	**0**	0	0	0	**0**	**0**	0	9	0	**9**	0	7	0	**7**	**16**	**16**
16:45	17:00	0	0	0	**0**	0	0	0	**0**	**0**	0	7	1	**8**	0	4	0	**4**	**12**	**12**
17:00	17:15	0	0	0	**0**	0	0	0	**0**	**0**	0	6	0	**6**	0	5	0	**5**	**11**	**11**
17:15	17:30	0	0	0	**0**	0	0	0	**0**	**0**	0	2	1	**3**	0	4	0	**4**	**7**	**7**
17:30	17:45	0	0	0	**0**	0	0	0	**0**	**0**	0	6	0	**6**	0	6	0	**6**	**12**	**12**
17:45	18:00	0	0	0	**0**	0	0	0	**0**	**0**	0	2	1	**3**	0	2	0	**2**	**5**	**5**
Total:	None	1	0	4	**5**	1	0	1	**2**	**7**	3	181	14	**198**	1	244	3	**248**	**446**	**454**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

ELWOOD ST @ MONTREAL RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38124

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

Full Study 15 Minute U-Turn Total

Time Period		ELWOOD ST Northbound U-Turn Total	ELWOOD ST Southbound U-Turn Total	MONTREAL RD Eastbound U-Turn Total	MONTREAL RD Westbound U-Turn Total	Total
07:00	07:15	0	0	1	0	**1**
07:15	07:30	0	0	4	0	**4**
07:30	07:45	0	0	1	0	**1**
07:45	08:00	0	0	2	0	**2**
08:00	08:15	0	0	0	1	**1**
08:15	08:30	0	0	0	0	**0**
08:30	08:45	0	0	0	0	**0**
08:45	09:00	0	0	0	0	**0**
09:00	09:15	0	0	0	0	**0**
09:15	09:30	0	0	0	0	**0**
09:30	09:45	0	0	1	0	**1**
09:45	10:00	0	0	0	0	**0**
11:30	11:45	0	0	0	0	**0**
11:45	12:00	0	0	0	0	**0**
12:00	12:15	0	0	0	0	**0**
12:15	12:30	0	0	0	2	**2**
12:30	12:45	0	0	0	0	**0**
12:45	13:00	0	0	0	0	**0**
13:00	13:15	0	0	0	0	**0**
13:15	13:30	0	0	0	0	**0**
15:00	15:15	0	0	0	0	**0**
15:15	15:30	0	0	0	0	**0**
15:30	15:45	0	0	1	0	**1**
15:45	16:00	0	0	0	0	**0**
16:00	16:15	1	0	0	0	**1**
16:15	16:30	0	0	0	0	**0**
16:30	16:45	0	0	1	0	**1**
16:45	17:00	0	0	0	0	**0**
17:00	17:15	0	0	0	0	**0**
17:15	17:30	0	0	0	0	**0**
17:30	17:45	0	0	0	0	**0**
17:45	18:00	0	0	0	0	**0**
Total		1	0	11	3	**15**

Appendix C

Synchro Intersection Worksheets – Existing Conditions

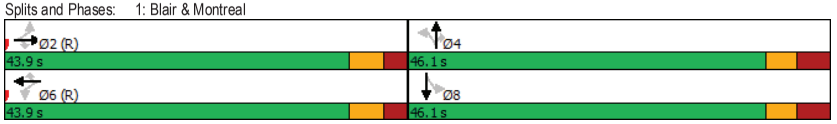
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	33	522	165	170	1164	16	142	77	55	11	121
Future Volume (vph)	33	522	165	170	1164	16	142	77	55	11	121
Lane Group Flow (vph)	37	580	183	189	1293	18	158	86	61	12	254
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		2			6			4			8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	2	2	2	6	6	6	4	4	4	8	8
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	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	33.4	33.4	46.1	46.1	46.1	46.1	46.1
Total Split (s)	43.9	43.9	43.9	43.9	43.9	43.9	46.1	46.1	46.1	46.1	46.1
Total Split (%)	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	51.2%	51.2%	51.2%	51.2%	51.2%
Maximum Green (s)	37.5	37.5	37.5	37.5	37.5	37.5	39.0	39.0	39.0	39.0	39.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	3.8	3.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	7.1	7.1	7.1	7.1	7.1
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	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Walk Time (s)	7.0	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	20.0	20.0	32.0	32.0	32.0	32.0	32.0
Pedestrian Calls (#/hr)	0	0	0	4	4	4	5	5	5	0	0
Act Effct Green (s)	54.3	54.3	54.3	54.3	54.3	54.3	22.2	22.2	22.2	22.2	22.2
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60	0.60	0.25	0.25	0.25	0.25	0.25
v/c Ratio	0.23	0.30	0.19	0.42	0.66	0.02	0.77	0.21	0.15	0.05	0.62
Control Delay	17.9	11.1	2.8	14.8	14.3	3.0	53.3	24.8	6.0	20.4	33.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	11.1	2.8	14.8	14.3	3.0	53.3	24.8	6.0	20.4	33.4
LOS	B	B	A	B	B	A	D	C	A	C	C
Approach Delay		9.5			14.3			35.8			32.8
Approach LOS		A			B			D			C
Queue Length 50th (m)	2.5	21.6	0.0	8.7	31.3	0.0	26.3	12.2	0.0	1.6	38.1
Queue Length 95th (m)	13.4	50.3	11.6	28.2	#151.1	m0.5	35.9	17.3	6.7	4.3	44.9
Internal Link Dist (m)		757.9			347.8			602.6			757.9
Turn Bay Length (m)	60.0		30.0	65.0		15.0	25.0		30.0	25.0	
Base Capacity (vph)	160	1944	967	448	1962	888	361	727	667	456	707
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.30	0.19	0.42	0.66	0.02	0.44	0.12	0.09	0.03	0.36

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 14 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 16.9 — Intersection LOS: B
Intersection Capacity Utilization 86.8% — 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: Blair & Montreal



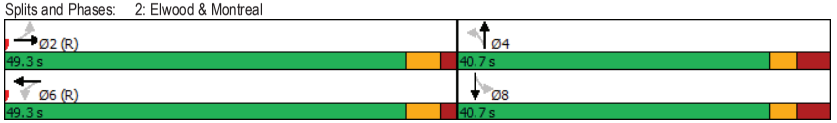
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	2	552	15	1350	16	0	0
Future Volume (vph)	2	552	15	1350	16	0	0
Lane Group Flow (vph)	2	623	17	1502	0	40	1
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases		2		6		4	8
Permitted Phases	2		6		4		
Detector Phase	2	2	6	6	4	4	8
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.6	22.6	39.6	39.6	40.7	40.7	40.7
Total Split (s)	49.3	49.3	49.3	49.3	40.7	40.7	40.7
Total Split (%)	54.8%	54.8%	54.8%	54.8%	45.2%	45.2%	45.2%
Maximum Green (s)	43.7	43.7	43.7	43.7	34.0	34.0	34.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	3.7	3.7	3.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.6	5.6	5.6	5.6		6.7	6.7
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	10.0	10.0	10.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0
Pedestrian Calls (#/hr)	3	3	5	5	6	6	3
Act Effct Green (s)	71.8	71.8	71.8	71.8		14.8	14.8
Actuated g/C Ratio	0.80	0.80	0.80	0.80		0.16	0.16
v/c Ratio	0.01	0.25	0.03	0.58		0.16	0.00
Control Delay	10.0	5.3	7.8	9.9		12.8	0.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	10.0	5.3	7.8	9.9		12.8	0.0
LOS	A	A	A	A		B	A
Approach Delay		5.3		9.9		12.8	
Approach LOS		A		A		B	
Queue Length 50th (m)	0.1	13.7	0.6	50.6		1.3	0.0
Queue Length 95th (m)	m0.5	29.6	5.0	#177.0		7.0	0.0
Internal Link Dist (m)		347.8		504.7		77.8	0.1
Turn Bay Length (m)	35.0		15.0				
Base Capacity (vph)	196	2534	577	2595		528	582
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	0.01	0.25	0.03	0.58		0.08	0.00

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 7 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 8.6 — Intersection LOS: A
Intersection Capacity Utilization 62.4% — ICU Level of Service B
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: Elwood & Montreal



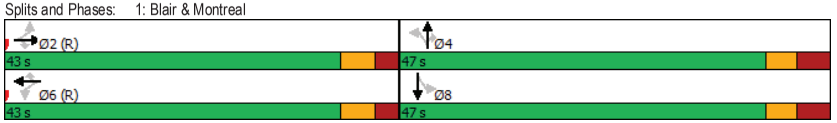
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	95	1048	146	65	602	8	226	83	187	36	82
Future Volume (vph)	95	1048	146	65	602	8	226	83	187	36	82
Lane Group Flow (vph)	106	1164	162	72	669	9	251	92	208	40	154
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		2			6			4			8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	2	2	2	6	6	6	4	4	4	8	8
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	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	33.4	33.4	46.1	46.1	46.1	46.1	46.1
Total Split (s)	43.0	43.0	43.0	43.0	43.0	43.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%	52.2%	52.2%	52.2%	52.2%	52.2%
Maximum Green (s)	36.6	36.6	36.6	36.6	36.6	36.6	39.9	39.9	39.9	39.9	39.9
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	3.8	3.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	7.1	7.1	7.1	7.1	7.1
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	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Walk Time (s)	7.0	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	20.0	20.0	32.0	32.0	32.0	32.0	32.0
Pedestrian Calls (#/hr)	1	1	1	5	5	5	3	3	3	6	6
Act Effct Green (s)	49.7	49.7	49.7	49.7	49.7	49.7	26.8	26.8	26.8	26.8	26.8
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55	0.55	0.30	0.30	0.30	0.30	0.30
v/c Ratio	0.30	0.65	0.19	0.43	0.37	0.01	0.76	0.18	0.45	0.13	0.30
Control Delay	17.1	18.6	7.2	33.0	16.8	3.2	42.1	21.5	21.6	20.3	15.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.1	18.6	7.2	33.0	16.8	3.2	42.1	21.5	21.6	20.3	15.4
LOS	B	B	A	C	B	A	D	C	C	C	B
Approach Delay		17.2			18.2			30.9			16.4
Approach LOS		B			B			C			B
Queue Length 50th (m)	9.1	68.4	5.6	5.5	26.8	0.0	39.5	11.9	23.1	5.1	13.5
Queue Length 95th (m)	27.0	#126.7	19.9	#27.4	61.2	m0.8	53.6	18.3	33.6	9.9	22.4
Internal Link Dist (m)		757.9			347.8			602.6			757.9
Turn Bay Length (m)	60.0		30.0	65.0		15.0	25.0		30.0	25.0	
Base Capacity (vph)	352	1778	840	166	1795	818	493	744	670	465	749
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.65	0.19	0.43	0.37	0.01	0.51	0.12	0.31	0.09	0.21

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 1 (1%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 20.0 — Intersection LOS: B
Intersection Capacity Utilization 87.5% — 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: Blair & Montreal



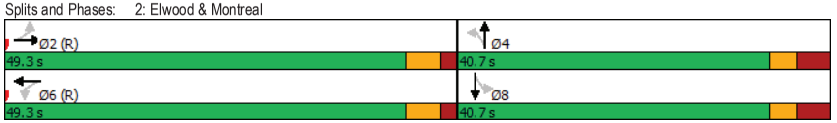
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	4	1260	28	660	13	1	1	0
Future Volume (vph)	4	1260	28	660	13	1	1	0
Lane Group Flow (vph)	4	1431	31	736	0	42	0	4
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.6	22.6	39.6	39.6	40.7	40.7	40.7	40.7
Total Split (s)	49.3	49.3	49.3	49.3	40.7	40.7	40.7	40.7
Total Split (%)	54.8%	54.8%	54.8%	54.8%	45.2%	45.2%	45.2%	45.2%
Maximum Green (s)	43.7	43.7	43.7	43.7	34.0	34.0	34.0	34.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	3.7	3.7	3.7	3.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.6	5.6	5.6	5.6		6.7		6.7
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Pedestrian Calls (#/hr)	3	3	5	5	6	6	3	3
Act Effct Green (s)	71.8	71.8	71.8	71.8		14.8		14.8
Actuated g/C Ratio	0.80	0.80	0.80	0.80		0.16		0.16
v/c Ratio	0.01	0.57	0.14	0.28		0.17		0.02
Control Delay	7.8	6.8	10.4	6.2		18.3		0.0
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	7.8	6.8	10.4	6.2		18.3		0.0
LOS	A	A	B	A		B		A
Approach Delay		6.8		6.4		18.3		
Approach LOS		A		A		B		
Queue Length 50th (m)	0.1	29.2	1.2	17.2		3.3		0.0
Queue Length 95th (m)	m0.5	#160.4	9.7	57.1		8.6		0.0
Internal Link Dist (m)		347.8		504.7		77.8		0.1
Turn Bay Length (m)	35.0		15.0					
Base Capacity (vph)	509	2528	215	2592		530		564
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	0.01	0.57	0.14	0.28		0.08		0.01

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 8 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 6.8 — Intersection LOS: A
Intersection Capacity Utilization 63.8% — ICU Level of Service B
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: Elwood & Montreal



Appendix D

Collision Data

CGH TRANSPORTATION

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition	# Vehicles	# Motorcycles	# Bicycles	# Pedestrians
2016-11-11	2016	20:44	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	02 - Angle	01 - Dry	2	0	0	0
2016-02-25	2016	18:13	BLAIR RD @ MONTREAL RD (0009277)	03 - Snow	05 - Dusk	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	06 - Ice	3	0	0	0
2016-02-25	2016	18:28	BLAIR RD @ MONTREAL RD (0009277)	06 - Strong wind	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	06 - Ice	2	0	0	0
2016-02-26	2016	12:06	BLAIR RD @ MONTREAL RD (0009277)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	06 - Ice	2	0	0	0
2016-03-02	2016	14:29	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
2016-04-19	2016	8:27	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2016-08-26	2016	8:28	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2017-10-14	2017	8:50	BLAIR RD @ MONTREAL RD (0009277)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	07 - SMV other	02 - Wet	1	0	0	0
2017-10-23	2017	15:30	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	99 - Other	01 - Dry	2	0	0	0
2017-11-21	2017	16:57	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	05 - Turning movement	01 - Dry	2	0	0	0
2017-12-05	2017	16:40	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	05 - Dusk	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
2017-12-05	2017	16:54	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	05 - Dusk	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
2017-02-01	2017	11:30	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2017-03-08	2017	13:30	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2017-03-31	2017	14:56	BLAIR RD @ MONTREAL RD (0009277)	03 - Snow	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	03 - Loose snow	2	0	0	0
2017-07-30	2017	16:28	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2017-08-27	2017	16:00	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2017-09-28	2017	16:21	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2018-09-30	2018	19:38	BLAIR RD @ MONTREAL RD (0009277)	02 - Rain	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	02 - Angle	02 - Wet	2	0	0	0
2018-11-02	2018	11:52	BLAIR RD @ MONTREAL RD (0009277)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	02 - Wet	2	0	0	0
2018-11-05	2018	17:30	BLAIR RD @ MONTREAL RD (0009277)	02 - Rain	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	02 - Wet	2	0	0	0
2018-03-26	2018	15:38	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	00 - Unknown	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2018-04-08	2018	13:52	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2018-09-20	2018	15:35	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	05 - Turning movement	01 - Dry	2	0	0	0
2019-08-19	2019	16:25	BLAIR RD @ MONTREAL RD (0009277)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	02 - Wet	2	0	0	0
2019-08-21	2019	9:30	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2019-10-17	2019	9:40	BLAIR RD @ MONTREAL RD (0009277)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
2019-10-10	2019	12:52	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
2019-01-22	2019	8:20	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	06 - Ice	2	0	0	0
2019-02-24	2019	7:16	BLAIR RD @ MONTREAL RD (0009277)	02 - Rain	03 - Dawn	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	02 - Wet	2	0	0	0
2019-05-24	2019	8:30	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
2019-08-16	2019	20:29	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	05 - Turning movement	01 - Dry	2	0	0	0
2020-07-24	2020	11:30	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2020-10-08	2020	11:09	BLAIR RD @ MONTREAL RD (0009277)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2016-09-16	2016	16:22	BLAIR RD btwn NICOL ST & MONTREAL RD (__3ZA7Y8)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	1	0	0
2020-10-14	2020	13:56	BLAIR RD btwn NICOL ST & MONTREAL RD (__3ZA7Y8)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	01 - Approaching	01 - Dry	2	0	0	0
2016-10-06	2016	14:52	MONTREAL RD btwn BLAIR RD & CLOVELLY RD (__3ZA2D1)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2017-08-31	2017	18:35	MONTREAL RD btwn BLAIR RD & CLOVELLY RD (__3ZA2D1)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2018-04-03	2018	17:20	MONTREAL RD btwn BLAIR RD & CLOVELLY RD (__3ZA2D1)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2018-08-28	2018	16:05	MONTREAL RD btwn BLAIR RD & CLOVELLY RD (__3ZA2D1)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	0
2016-03-09	2016	16:30	MONTREAL RD btwn MONTREAL RD & BLAIR RD (__3ZA2D3)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2016-12-17	2016	16:03	BLAIR RD btwn MONTREAL RD & SEGUIN ST (__3ZA2E2)	03 - Snow	05 - Dusk	10 - No control	0	03 - P.D. only	07 - SMV other	03 - Loose snow	1	0	0	0
2017-10-21	2017	13:50	BLAIR RD btwn MONTREAL RD & SEGUIN ST (__3ZA2E2)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0

Appendix E

Montreal-Blair Transit Priority EA – Study Area Signal Timing

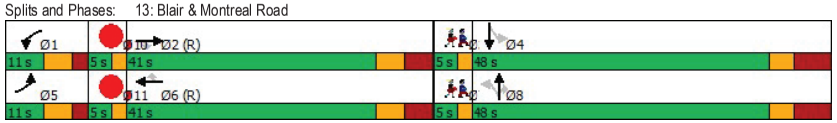
CGH TRANSPORTATION

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	Ø3
Lane Configurations												
Traffic Volume (vph)	31	522	165	170	1467	16	142	77	55	11	121	
Future Volume (vph)	31	522	165	170	1467	16	142	77	55	11	121	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	3
Permitted Phases			2			6	8		8	4		
Detector Phase	5	2	2	1	6	6	8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0
Minimum Split (s)	10.9	34.7	34.7	10.9	34.7	34.7	47.3	47.3	47.3	47.3	47.3	5.0
Total Split (s)	11.0	41.0	41.0	11.0	41.0	41.0	48.0	48.0	48.0	48.0	48.0	5.0
Total Split (%)	10.0%	37.3%	37.3%	10.0%	37.3%	37.3%	43.6%	43.6%	43.6%	43.6%	43.6%	5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	2.0
All-Red Time (s)	2.2	4.0	4.0	2.2	4.0	4.0	5.0	5.0	5.0	5.0	5.0	0.0
Lost Time Adjust (s)	1.8	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.7	7.7	7.7	7.7	7.7	7.7	8.3	8.3	8.3	8.3	8.3	
Lead/Lag	Lead			Lead			Lag	Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes			Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 14 (13%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Splits and Phases: 13: Blair & Montreal Road



Lanes, Volumes, Timings
13: Blair & Montreal Road

TP with AT AM 2046 Volumes
08/29/2022

Lane Group	Ø7	Ø10	Ø11
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Turn Type			
Protected Phases	7	10	11
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	5%	5%	5%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Recall Mode	None	None	None

Intersection Summary

Parsons
2020-09-17

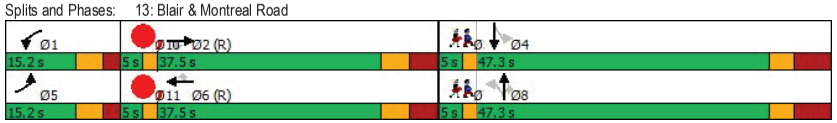
Synchro 10 Report

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	Ø3
Lane Configurations												
Traffic Volume (vph)	95	1320	146	64	602	8	226	83	187	36	82	
Future Volume (vph)	95	1320	146	64	602	8	226	83	187	36	82	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	3
Permitted Phases			2			6	8		8	4		
Detector Phase	5	2	2	1	6	6	8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0
Minimum Split (s)	10.9	34.7	34.7	10.9	34.7	34.7	47.3	47.3	47.3	47.3	47.3	5.0
Total Split (s)	15.2	37.5	37.5	15.2	37.5	37.5	47.3	47.3	47.3	47.3	47.3	5.0
Total Split (%)	13.8%	34.1%	34.1%	13.8%	34.1%	34.1%	43.0%	43.0%	43.0%	43.0%	43.0%	5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	2.0
All-Red Time (s)	2.2	4.0	4.0	2.2	4.0	4.0	5.0	5.0	5.0	5.0	5.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	7.7	7.7	5.9	7.7	7.7	8.3	8.3	8.3	8.3	8.3	
Lead/Lag	Lead			Lead			Lag	Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes			Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 1 (1%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Splits and Phases: 13: Blair & Montreal Road



Lanes, Volumes, Timings
13: Blair & Montreal Road

TP with AT PM 2046 Volumes
08/29/2022

Lane Group	Ø7	Ø10	Ø11
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Turn Type			
Protected Phases	7	10	11
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	5%	5%	5%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Recall Mode	None	None	None

Intersection Summary

Parsons
2020-09-17

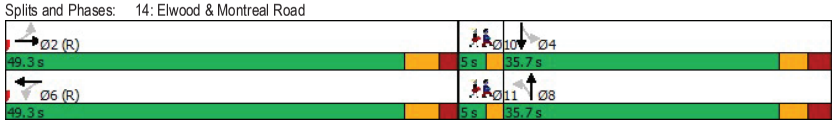
Synchro 10 Report

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	Ø10	Ø11
Lane Configurations									
Traffic Volume (vph)	2	552	15	1701	16	0	0		
Future Volume (vph)	2	552	15	1701	16	0	0		
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA		
Protected Phases		2		6		8	4	10	11
Permitted Phases	2		6		8				
Detector Phase	2	2	6	6	8	8	4		
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	22.9	22.9	22.9	22.9	35.7	35.7	35.7	5.0	5.0
Total Split (s)	49.3	49.3	49.3	49.3	35.7	35.7	35.7	5.0	5.0
Total Split (%)	54.8%	54.8%	54.8%	54.8%	39.7%	39.7%	39.7%	6%	6%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	2.0	2.0
All-Red Time (s)	2.2	2.2	2.2	2.2	2.7	2.7	2.7	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		
Total Lost Time (s)	5.9	5.9	5.9	5.9		5.7	5.7		
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 7 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 14: Elwood & Montreal Road

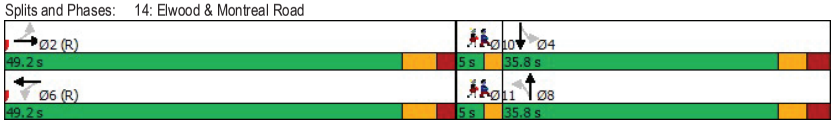


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø10	Ø11
Lane Configurations										
Traffic Volume (vph)	3	1663	28	660	13	1	1	0		
Future Volume (vph)	3	1663	28	660	13	1	1	0		
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases		2		6		8		4	10	11
Permitted Phases	2		6		8		4			
Detector Phase	2	2	6	6	8	8	4	4		
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	22.9	22.9	22.9	22.9	35.7	35.7	35.7	35.7	5.0	5.0
Total Split (s)	49.2	49.2	49.2	49.2	35.8	35.8	35.8	35.8	5.0	5.0
Total Split (%)	54.7%	54.7%	54.7%	54.7%	39.8%	39.8%	39.8%	39.8%	6%	6%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	2.0	2.0
All-Red Time (s)	2.2	2.2	2.2	2.2	2.7	2.7	2.7	2.7	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0		
Total Lost Time (s)	5.9	5.9	5.9	5.9		5.7		5.7		
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None	None

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 8 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

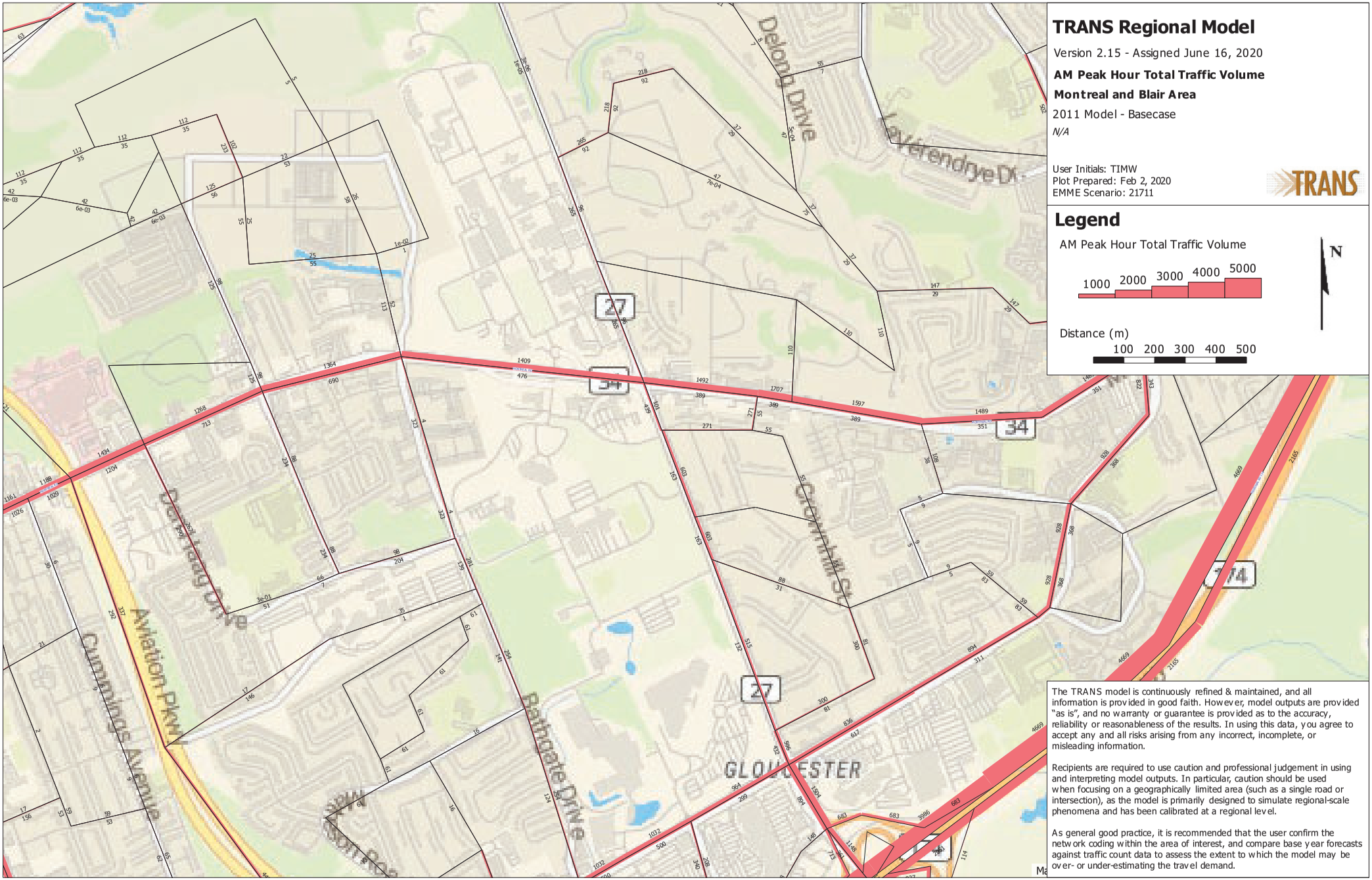
Splits and Phases: 14: Elwood & Montreal Road



Appendix F

TRANS Model Plots

CGH TRANSPORTATION



TRANS Regional Model

Version 2.15 - Assigned June 16, 2020

AM Peak Hour Total Traffic Volume

Montreal and Blair Area

2011 Model - Basecase

N/A

User Initials: TIMW
Plot Prepared: Feb 2, 2020
EMME Scenario: 21711

TRANS

Legend

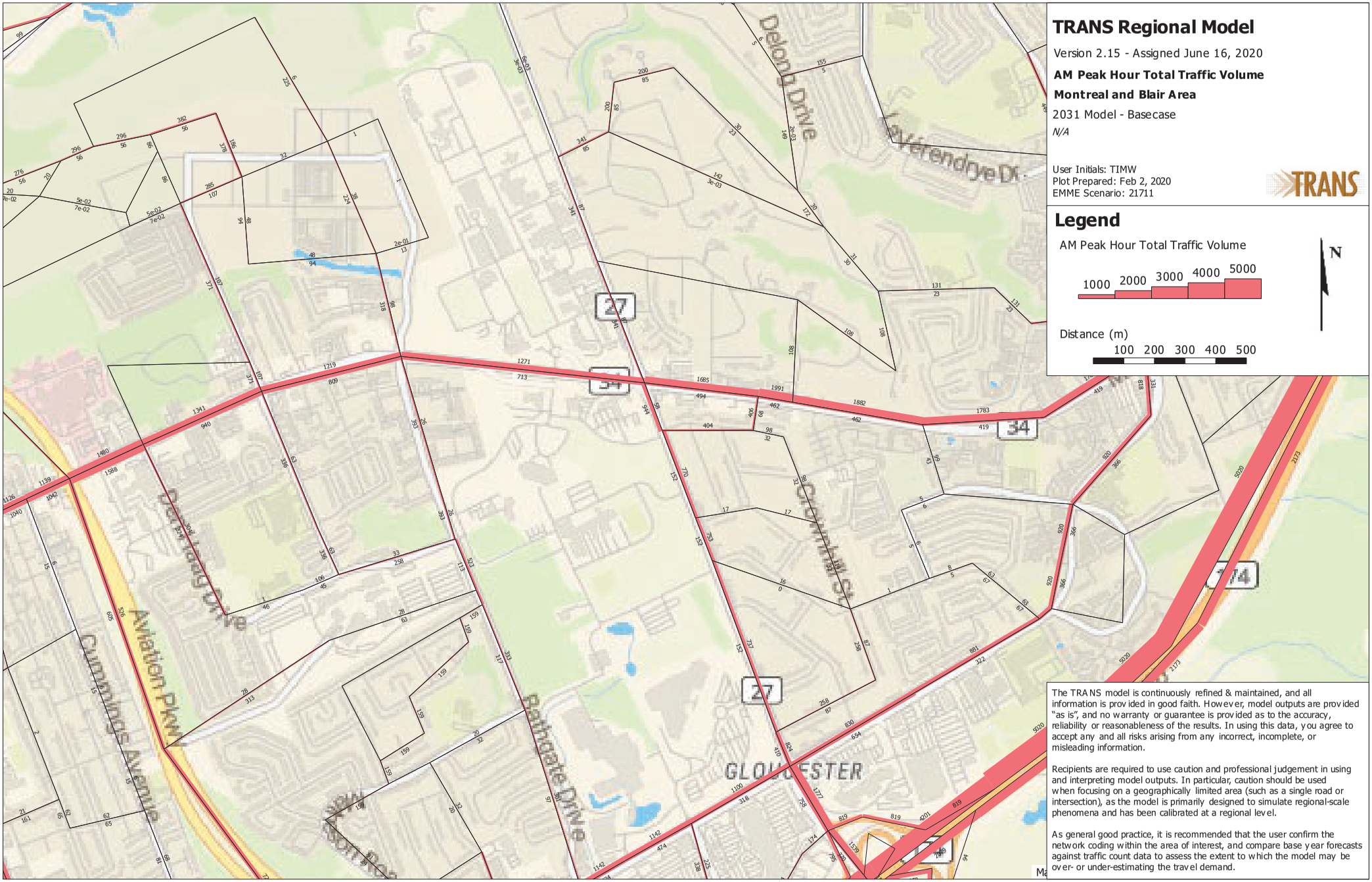
AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

N

Distance (m)

100 200 300 400 500



TRANS Regional Model

Version 2.15 - Assigned June 16, 2020

AM Peak Hour Total Traffic Volume

Montreal and Blair Area

2031 Model - Basecase

N/A

User Initials: TIMW
Plot Prepared: Feb 2, 2020
EMME Scenario: 21711

TRANS

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

N

Distance (m)

100 200 300 400 500

The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

Recipients are required to use caution and professional judgement in using and interpreting model outputs. In particular, caution should be used when focusing on a geographically limited area (such as a single road or intersection), as the model is primarily designed to simulate regional-scale phenomena and has been calibrated at a regional level.

As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.

Appendix G

Synchro Intersection Worksheets – 2024 Future Background Conditions

CGH TRANSPORTATION

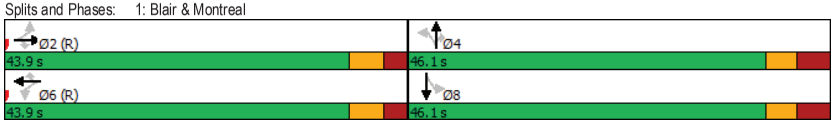
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	33	522	165	183	1254	16	142	77	55	11	160
Future Volume (vph)	33	522	165	183	1254	16	142	77	55	11	160
Lane Group Flow (vph)	33	522	165	183	1254	16	142	77	55	11	268
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		2			6			4			8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	2	2	2	6	6	6	4	4	4	8	8
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	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	33.4	33.4	46.1	46.1	46.1	46.1	46.1
Total Split (s)	43.9	43.9	43.9	43.9	43.9	43.9	46.1	46.1	46.1	46.1	46.1
Total Split (%)	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	51.2%	51.2%	51.2%	51.2%	51.2%
Maximum Green (s)	37.5	37.5	37.5	37.5	37.5	37.5	39.0	39.0	39.0	39.0	39.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	3.8	3.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	7.1	7.1	7.1	7.1	7.1
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	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Walk Time (s)	7.0	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	20.0	20.0	32.0	32.0	32.0	32.0	32.0
Pedestrian Calls (#/hr)	0	0	0	4	4	4	5	5	5	0	0
Act Effct Green (s)	54.5	54.5	54.5	54.5	54.5	54.5	22.0	22.0	22.0	22.0	22.0
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.61	0.61	0.24	0.24	0.24	0.24	0.24
v/c Ratio	0.19	0.27	0.17	0.38	0.64	0.02	0.74	0.19	0.14	0.04	0.65
Control Delay	16.2	10.7	2.9	13.9	13.8	2.6	51.5	24.6	6.2	20.5	34.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	10.7	2.9	13.9	13.8	2.6	51.5	24.6	6.2	20.5	34.6
LOS	B	B	A	B	B	A	D	C	A	C	C
Approach Delay		9.1			13.7			34.9			34.0
Approach LOS		A			B			C			C
Queue Length 50th (m)	2.1	18.8	0.0	8.4	30.3	0.0	23.5	11.0	0.0	1.5	40.5
Queue Length 95th (m)	11.7	44.8	11.0	27.5	#143.4	m0.3	32.6	15.8	6.4	4.1	47.0
Internal Link Dist (m)		757.9			347.8			602.6			757.9
Turn Bay Length (m)	60.0		30.0	65.0		15.0	25.0		30.0	25.0	
Base Capacity (vph)	172	1950	963	485	1969	891	341	727	664	460	716
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.27	0.17	0.38	0.64	0.02	0.42	0.11	0.08	0.02	0.37

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 14 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 16.7 — Intersection LOS: B
Intersection Capacity Utilization 91.6% — 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: Blair & Montreal



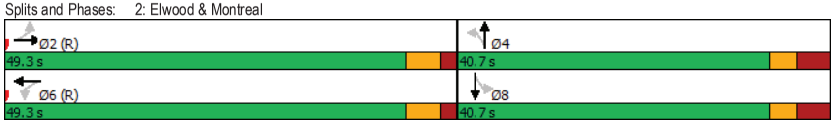
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	2	552	16	1454	16	0	0
Future Volume (vph)	2	552	16	1454	16	0	0
Lane Group Flow (vph)	2	561	16	1456	0	36	1
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases		2		6		4	8
Permitted Phases	2		6		4		
Detector Phase	2	2	6	6	4	4	8
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.6	22.6	39.6	39.6	40.7	40.7	40.7
Total Split (s)	49.3	49.3	49.3	49.3	40.7	40.7	40.7
Total Split (%)	54.8%	54.8%	54.8%	54.8%	45.2%	45.2%	45.2%
Maximum Green (s)	43.7	43.7	43.7	43.7	34.0	34.0	34.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	3.7	3.7	3.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.6	5.6	5.6	5.6		6.7	6.7
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	10.0	10.0	10.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0
Pedestrian Calls (#/hr)	3	3	5	5	6	6	3
Act Effct Green (s)	71.8	71.8	71.8	71.8		14.8	14.8
Actuated g/C Ratio	0.80	0.80	0.80	0.80		0.16	0.16
v/c Ratio	0.01	0.22	0.03	0.56		0.15	0.00
Control Delay	8.0	4.4	7.8	9.6		11.4	0.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	8.0	4.4	7.8	9.6		11.4	0.0
LOS	A	A	A	A		B	A
Approach Delay		4.4		9.6		11.4	
Approach LOS		A		A		B	
Queue Length 50th (m)	0.1	12.0	0.6	47.7		0.6	0.0
Queue Length 95th (m)	m0.4	22.6	4.7	#168.0		6.2	0.0
Internal Link Dist (m)		347.8		504.7		77.8	0.1
Turn Bay Length (m)	35.0		15.0				
Base Capacity (vph)	209	2534	613	2595		528	582
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	0.01	0.22	0.03	0.56		0.07	0.00

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 7 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 8.2 Intersection LOS: A
Intersection Capacity Utilization 65.5% ICU Level of Service C
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: Elwood & Montreal



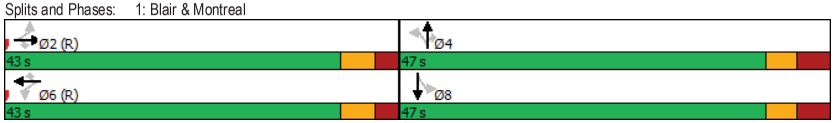
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	95	1129	157	65	602	8	299	110	247	36	82
Future Volume (vph)	95	1129	157	65	602	8	299	110	247	36	82
Lane Group Flow (vph)	95	1129	157	65	602	8	299	110	247	36	139
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		2			6			4			8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	2	2	2	6	6	6	4	4	4	8	8
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	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	33.4	33.4	46.1	46.1	46.1	46.1	46.1
Total Split (s)	43.0	43.0	43.0	43.0	43.0	43.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%	52.2%	52.2%	52.2%	52.2%	52.2%
Maximum Green (s)	36.6	36.6	36.6	36.6	36.6	36.6	39.9	39.9	39.9	39.9	39.9
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	3.8	3.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	7.1	7.1	7.1	7.1	7.1
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	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Walk Time (s)	7.0	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	20.0	20.0	32.0	32.0	32.0	32.0	32.0
Pedestrian Calls (#/hr)	1	1	1	5	5	5	3	3	3	6	6
Act Effct Green (s)	46.8	46.8	46.8	46.8	46.8	46.8	29.7	29.7	29.7	29.7	29.7
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52	0.52	0.33	0.33	0.33	0.33	0.33
v/c Ratio	0.27	0.67	0.20	0.42	0.36	0.01	0.80	0.20	0.49	0.11	0.24
Control Delay	17.7	20.6	7.8	34.3	17.5	2.5	43.0	20.2	21.6	18.3	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	20.6	7.8	34.3	17.5	2.5	43.0	20.2	21.6	18.3	13.0
LOS	B	C	A	C	B	A	D	C	C	B	B
Approach Delay		18.9			18.9			31.1			14.1
Approach LOS		B			B			C			B
Queue Length 50th (m)	8.7	72.4	5.7	5.1	24.7	0.0	46.4	13.5	27.6	4.3	10.8
Queue Length 95th (m)	23.7	#122.8	19.4	#24.2	53.8	m0.6	64.9	20.8	40.3	9.0	19.6
Internal Link Dist (m)		757.9			347.8			602.6			757.9
Turn Bay Length (m)	60.0		30.0	65.0		15.0	25.0		30.0	25.0	
Base Capacity (vph)	357	1675	796	156	1691	774	500	744	670	457	748
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.67	0.20	0.42	0.36	0.01	0.60	0.15	0.37	0.08	0.19

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 1 (1%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 21.4 — Intersection LOS: C
Intersection Capacity Utilization 94.1% — 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: Blair & Montreal



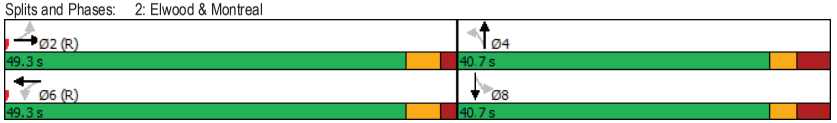
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	4	1358	28	660	13	1	1	0
Future Volume (vph)	4	1358	28	660	13	1	1	0
Lane Group Flow (vph)	4	1386	28	663	0	40	0	4
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.6	22.6	39.6	39.6	40.7	40.7	40.7	40.7
Total Split (s)	49.3	49.3	49.3	49.3	40.7	40.7	40.7	40.7
Total Split (%)	54.8%	54.8%	54.8%	54.8%	45.2%	45.2%	45.2%	45.2%
Maximum Green (s)	43.7	43.7	43.7	43.7	34.0	34.0	34.0	34.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	3.7	3.7	3.7	3.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.6	5.6	5.6	5.6		6.7		6.7
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Pedestrian Calls (#/hr)	3	3	5	5	6	6	3	3
Act Effct Green (s)	71.8	71.8	71.8	71.8		14.8		14.8
Actuated g/C Ratio	0.80	0.80	0.80	0.80		0.16		0.16
v/c Ratio	0.01	0.55	0.12	0.26		0.16		0.02
Control Delay	7.8	6.4	9.9	6.0		16.4		0.0
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	7.8	6.4	9.9	6.0		16.4		0.0
LOS	A	A	A	A		B		A
Approach Delay		6.4		6.2		16.4		
Approach LOS		A		A		B		
Queue Length 50th (m)	0.1	29.5	1.1	15.1		2.5		0.0
Queue Length 95th (m)	m0.5	#65.1	8.6	50.4		7.9		0.0
Internal Link Dist (m)		347.8		504.7		77.8		0.1
Turn Bay Length (m)	35.0		15.0					
Base Capacity (vph)	553	2529	229	2592		534		564
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	0.01	0.55	0.12	0.26		0.07		0.01

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 8 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 6.5 Intersection LOS: A
Intersection Capacity Utilization 66.6% ICU Level of Service C
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: Elwood & Montreal



Appendix H

Synchro Intersection Worksheets – 2029 Future Background Conditions

CGH TRANSPORTATION

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	Ø1	Ø3
Lane Configurations												
Traffic Volume (vph)	33	522	165	195	1334	16	142	77	11	202		
Future Volume (vph)	33	522	165	195	1334	16	142	77	11	202		
Lane Group Flow (vph)	33	522	165	195	1334	16	142	132	11	310		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA		
Protected Phases	13	2		9	6			4		8	1	3
Permitted Phases			2			6	4		8			
Detector Phase	13	2	2	9	6	6	4	4	8	8		
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	10.9	34.7	34.7	10.9	34.7	34.7	42.3	42.3	42.3	42.3	5.0	5.0
Total Split (s)	11.0	41.0	41.0	11.0	41.0	41.0	48.0	48.0	48.0	48.0	5.0	5.0
Total Split (%)	10.0%	37.3%	37.3%	10.0%	37.3%	37.3%	43.6%	43.6%	43.6%	43.6%	5%	5%
Maximum Green (s)	5.1	33.3	33.3	5.1	33.3	33.3	39.7	39.7	39.7	39.7	3.0	3.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	2.0	2.0
All-Red Time (s)	2.2	4.0	4.0	2.2	4.0	4.0	5.0	5.0	5.0	5.0	0.0	0.0
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)	5.9	7.7	7.7	5.9	7.7	7.7	8.3	8.3	8.3	8.3		
Lead/Lag	Lead			Lead							Lag	
Lead-Lag Optimize?	Yes			Yes							Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None
Walk Time (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0	32.0	32.0	32.0	32.0	0.0	0.0
Pedestrian Calls (#/hr)		0	0		4	4	5	5	0	0	0	5
Act Effct Green (s)	7.4	38.3	38.3	22.2	56.9	56.9	26.6	26.6	27.6	27.6		
Actuated g/C Ratio	0.07	0.35	0.35	0.20	0.52	0.52	0.24	0.24	0.25	0.25		
v/c Ratio	0.30	0.47	0.32	0.58	0.79	0.02	0.78	0.35	0.05	0.75		
Control Delay	55.5	29.6	28.5	50.6	29.7	21.2	66.0	35.3	26.8	48.7		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	55.5	29.6	28.5	50.6	29.7	21.2	66.0	35.3	26.8	48.7		
LOS	E	C	C	D	C	C	E	D	C	D		
Approach Delay		30.5			32.2			51.2		48.0		
Approach LOS		C			C			D		D		
Queue Length 50th (m)	6.9	45.4	25.8	37.6	125.4	1.7	28.6	23.6	1.8	62.6		
Queue Length 95th (m)	16.5	60.9	43.2	#101.9	#239.8	7.6	47.2	35.9	5.3	76.8		
Internal Link Dist (m)		757.9			347.8			602.6		757.9		
Turn Bay Length (m)	60.0		100.0	65.0		15.0	90.0		30.0			
Base Capacity (vph)	110	1121	516	335	1682	742	272	572	334	598		
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	0.30	0.47	0.32	0.58	0.79	0.02	0.52	0.23	0.03	0.52		

Intersection Summary

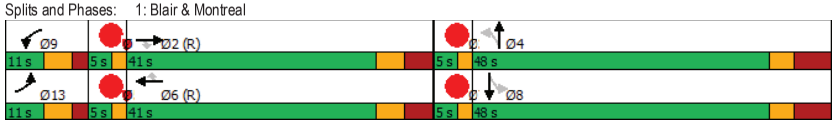
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 120

Lane Group	Ø5	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	5%	5%
Maximum Green (s)	3.0	3.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)	3.0	3.0
Flash Dont Walk (s)	0.0	0.0
Pedestrian Calls (#/hr)	4	0
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 35.4 Intersection LOS: D
Intersection Capacity Utilization 94.8% 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.

Splits and Phases: 1: Blair & Montreal

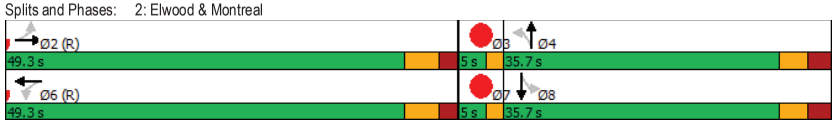


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	Ø3	Ø7
Lane Configurations									
Traffic Volume (vph)	2	552	17	1548	16	0	0		
Future Volume (vph)	2	552	17	1548	16	0	0		
Lane Group Flow (vph)	2	561	17	1550	0	36	1		
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA		
Protected Phases		2		6		4	8	3	7
Permitted Phases	2		6		4				
Detector Phase	2	2	6	6	4	4	8		
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	24.9	24.9	24.9	24.9	32.7	32.7	32.7	5.0	5.0
Total Split (s)	49.3	49.3	49.3	49.3	35.7	35.7	35.7	5.0	5.0
Total Split (%)	54.8%	54.8%	54.8%	54.8%	39.7%	39.7%	39.7%	6%	6%
Maximum Green (s)	43.4	43.4	43.4	43.4	30.0	30.0	30.0	3.0	3.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	2.0	2.0
All-Red Time (s)	2.2	2.2	2.2	2.2	2.7	2.7	2.7	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		
Total Lost Time (s)	5.9	5.9	5.9	5.9		5.7	5.7		
Lead/Lag					Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	2.0	2.0	2.0	3.0	3.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	25.0	25.0	25.0	0.0	0.0
Pedestrian Calls (#/hr)	5	5	5	5	7	7	4	5	4
Act Effct Green (s)	72.6	72.6	72.6	72.6		13.4	13.4		
Actuated g/C Ratio	0.81	0.81	0.81	0.81		0.15	0.15		
v/c Ratio	0.01	0.22	0.03	0.59		0.18	0.00		
Control Delay	8.0	5.3	6.9	9.3		32.9	27.0		
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		
Total Delay	8.0	5.3	6.9	9.3		32.9	27.0		
LOS	A	A	A	A		C	C		
Approach Delay		5.3		9.3		32.9	27.0		
Approach LOS		A		A		C	C		
Queue Length 50th (m)	0.1	11.8	0.6	51.4		5.8	0.2		
Queue Length 95th (m)	1.3	39.3	4.6	#177.0		11.4	1.2		
Internal Link Dist (m)		347.8		504.7		77.8	0.1		
Turn Bay Length (m)	35.0		15.0						
Base Capacity (vph)	185	2562	620	2624		449	495		
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	0.01	0.22	0.03	0.59		0.08	0.00		

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 7 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 8.7 Intersection LOS: A
Intersection Capacity Utilization 66.6% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Elwood & Montreal



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	Ø3	Ø7
Lane Configurations												
Traffic Volume (vph)	95	1201	167	65	602	8	377	138	36	82		
Future Volume (vph)	95	1201	167	65	602	8	377	138	36	82		
Lane Group Flow (vph)	95	1201	167	65	602	8	377	450	36	139		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA		
Protected Phases	5	2		1	6			4		8	3	7
Permitted Phases			2			6	4		8			
Detector Phase	5	2	2	1	6	6	4	4	8	8		
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	10.9	34.7	34.7	10.9	34.7	34.7	42.3	42.3	42.3	42.3	5.0	5.0
Total Split (s)	15.2	37.5	37.5	15.2	37.5	37.5	47.3	47.3	47.3	47.3	5.0	5.0
Total Split (%)	13.8%	34.1%	34.1%	13.8%	34.1%	34.1%	43.0%	43.0%	43.0%	43.0%	5%	5%
Maximum Green (s)	9.3	29.8	29.8	9.3	29.8	29.8	39.0	39.0	39.0	39.0	3.0	3.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	2.0	2.0
All-Red Time (s)	2.2	4.0	4.0	2.2	4.0	4.0	5.0	5.0	5.0	5.0	0.0	0.0
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)	5.9	7.7	7.7	5.9	7.7	7.7	8.3	8.3	8.3	8.3		
Lead/Lag	Lead			Lead			Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes			Yes			Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None
Walk Time (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0	32.0	32.0	32.0	32.0	0.0	0.0
Pedestrian Calls (#/hr)		1	1		5	5	3	3	6	6	3	6
Act Effct Green (s)	9.1	39.2	39.2	8.4	36.1	36.1	40.8	40.8	40.8	40.8		
Actuated g/C Ratio	0.08	0.36	0.36	0.08	0.33	0.33	0.37	0.37	0.37	0.37		
v/c Ratio	0.70	1.05	0.32	0.52	0.56	0.02	0.90	0.79	0.20	0.23		
Control Delay	76.0	75.9	31.1	63.3	34.1	28.1	58.9	42.5	26.7	24.7		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	76.0	75.9	31.1	63.3	34.1	28.1	58.9	42.5	26.7	24.7		
LOS	E	E	C	E	C	C	E	D	C	C		
Approach Delay		70.8			36.8			50.0		25.1		
Approach LOS		E			D			D		C		
Queue Length 50th (m)	20.2	~162.9	27.6	13.6	56.8	1.2	71.8	80.8	4.9	19.3		
Queue Length 95th (m)	#44.2	#221.0	49.7	27.5	80.3	5.1	#136.2	#140.7	13.8	35.8		
Internal Link Dist (m)		757.9			347.8			602.6		757.9		
Turn Bay Length (m)	60.0		100.0	65.0		15.0	90.0		30.0			
Base Capacity (vph)	141	1149	516	140	1067	472	427	579	183	616		
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	0.67	1.05	0.32	0.46	0.56	0.02	0.88	0.78	0.20	0.23		

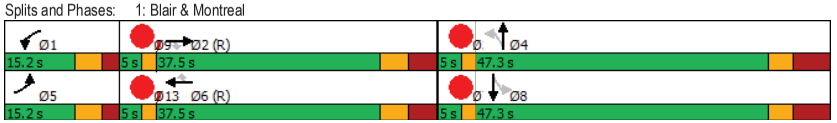
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 100.5 (91%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 130

Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	5%	5%
Maximum Green (s)	3.0	3.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)	3.0	3.0
Flash Dont Walk (s)	0.0	0.0
Pedestrian Calls (#/hr)	1	5
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 55.5 Intersection LOS: E
Intersection Capacity Utilization 100.9% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Blair & Montreal



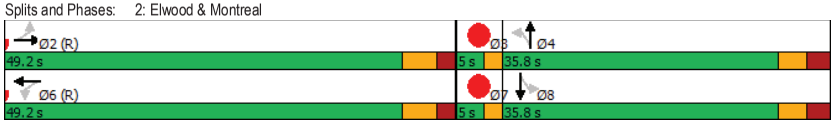
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø7
Lane Configurations										
Traffic Volume (vph)	4	1444	28	660	13	1	1	0		
Future Volume (vph)	4	1444	28	660	13	1	1	0		
Lane Group Flow (vph)	4	1472	28	663	0	42	0	4		
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases		2		6		4		8	3	7
Permitted Phases	2		6		4		8			
Detector Phase	2	2	6	6	4	4	8	8		
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	24.9	24.9	24.9	24.9	32.7	32.7	32.7	32.7	5.0	5.0
Total Split (s)	49.2	49.2	49.2	49.2	35.8	35.8	35.8	35.8	5.0	5.0
Total Split (%)	54.7%	54.7%	54.7%	54.7%	39.8%	39.8%	39.8%	39.8%	6%	6%
Maximum Green (s)	43.3	43.3	43.3	43.3	30.1	30.1	30.1	30.1	3.0	3.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	2.0	2.0
All-Red Time (s)	2.2	2.2	2.2	2.2	2.7	2.7	2.7	2.7	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0		
Total Lost Time (s)	5.9	5.9	5.9	5.9		5.7		5.7		
Lead/Lag					Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
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	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	2.0	2.0	2.0	2.0	3.0	3.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	25.0	25.0	25.0	25.0	0.0	0.0
Pedestrian Calls (#/hr)	3	3	5	5	6	6	3	3	6	3
Act Effct Green (s)	72.6	72.6	72.6	72.6		13.4		13.4		
Actuated g/C Ratio	0.81	0.81	0.81	0.81		0.15		0.15		
v/c Ratio	0.01	0.58	0.14	0.25		0.21		0.02		
Control Delay	7.2	9.1	9.5	5.4		33.5		28.2		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		
Total Delay	7.2	9.1	9.5	5.4		33.5		28.2		
LOS	A	A	A	A		C		C		
Approach Delay		9.1		5.6		33.5		28.3		
Approach LOS		A		A		C		C		
Queue Length 50th (m)	0.1	47.6	1.0	14.4		6.8		0.6		
Queue Length 95th (m)	1.9	#165.7	8.4	47.1		12.7		2.8		
Internal Link Dist (m)		347.8		504.7		77.8		0.1		
Turn Bay Length (m)	35.0		15.0							
Base Capacity (vph)	560	2558	205	2621		460		481		
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	0.01	0.58	0.14	0.25		0.09		0.01		

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 8 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 8.5 — Intersection LOS: A
Intersection Capacity Utilization 66.4% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Elwood & Montreal



Appendix I

MMLOS Analysis

CGH TRANSPORTATION

Multi-Modal Level of Service - Segments Form

Consultant	**CGH Transportation Inc**	**Project**	**2021-003**
Scenario	**Existing/Future**	**Date**	**2022-07-27**
Comments			

SEGMENTS			Montreal Existing	Blair Existing	Montreal Future	Blair Future
Pedestrian	Sidewalk Width Boulevard Width	-	1.8 m < 0.5 m	1.5 m 0.5 - 2 m	≥ 2 m > 2 m	≥ 2 m 0.5 - 2 m
	Avg Daily Curb Lane Traffic Volume		> 3000	≤ 3000	≤ 3000	≤ 3000
	Operating Speed On-Street Parking		> 60 km/h no	> 50 to 60 km/h no	> 60 km/h no	> 50 to 60 km/h no
	Exposure to Traffic PLoS		**F**	**C**	**B**	**A**
	Effective Sidewalk Width					
	Pedestrian Volume					
	Crowding PLoS		-	-	-	-
	Level of Service		**-**	**-**	**-**	**-**
Bicycle	Type of Cycling Facility	**F**	Mixed Traffic	Curbside Bike Lane	Physically Separated	Curbside Bike Lane
	Number of Travel Lanes		4-5 lanes total	≤ 1 each direction	~~≤ 2 (no centreline)~~	≤ 1 each direction
	Operating Speed		≥ 60 km/h	>50 to 70 km/h	~~≥ 60 km/h~~	>50 to 70 km/h
	# of Lanes & Operating Speed LoS		**F**	**C**	**A**	**C**
	Bike Lane (+ Parking Lane) Width			≥1.5 to <1.8 m		≥1.5 to <1.8 m
	Bike Lane Width LoS		**-**	**B**	**-**	**B**
	Bike Lane Blockages			Rare		Rare
	Blockage LoS		**-**	**A**	**-**	**A**
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge		< 1.8 m refuge
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes		≤ 3 lanes
	Sidestreet Operating Speed		≤ 40 km/h	≤ 40 km/h		≤ 40 km/h
	Unsignalized Crossing - Lowest LoS		**A**	**A**	**A**	**A**
	Level of Service		**F**	**C**	**A**	**C**
Transit	Facility Type	**D**	Mixed Traffic	Mixed Traffic	Bus lane	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Cf ≤ 60	Vt/Vp ≥ 0.8
	Level of Service		**D**	**D**	**B**	**D**
Truck	Truck Lane Width	**B**	> 3.7 m	> 3.7 m	≤ 3.5 m	> 3.7 m
	Travel Lanes per Direction		> 1	1	> 1	1
	Level of Service		**A**	**B**	**A**	**B**

Multi-Modal Level of Service - Intersections Form

Consultant	**CGH Transportation Inc.**	**Project**	**2021-003 1649 Montreal**
Scenario	**Existing/Future**	**Date**	**2021-08-30**
Comments			

Unlocked Rows for Replicating

INTERSECTIONS		Montreal Rd & Blair Rd (Existing)				Montreal Rd & Elwood St (Existing)				Montreal Rd & Blair Rd (Future)				Montreal Rd & Elwood St (Future)			
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	6	8	10+	8	0 - 2	3	8	7	6	8	9	8	0 - 2	3	5	5
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	Right Turn Channel	No Channel	Conv'tl without Receiving Lane	No Channel	Conv'tl without Receiving Lane	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	15-25m	10-15m	15-25m	0-3m	5-10m	5-10m	0-3m	10-15m	15-25m	10-15m	10-15m	0-3m	10-15m	10-15m	0-3m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse 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	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	**20**	**-10**	**-45**	**-10**	**88**	**71**	**-11**	**7**	**23**	**-11**	**-26**	**-9**	**91**	**73**	**40**	**43**
	Ped. Exposure to Traffic LoS	**F**	**F**	**#N/A**	**F**	**B**	**C**	**F**	**F**	**F**	**F**	**#N/A**	**F**	**A**	**C**	**E**	**E**
	Cycle Length																
	Effective Walk Time																
	Average Pedestrian Delay																
	Pedestrian Delay LoS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Level of Service	**F**	**F**	**#N/A**	**F**	**B**	**C**	**F**	**F**	**F**	**F**	**#N/A**	**F**	**A**	**C**	**E**	**E**
		#N/A				**F**				**#N/A**				**E**			
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	≤ 50 m Introduced right turn lane	≤ 50 m	≤ 50 m	≤ 50 m					Not Applicable	Not Applicable	Not Applicable	Not Applicable			Not Applicable	Not Applicable
	Right Turning Speed	>25 to 30 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h					Not Applicable	Not Applicable	Not Applicable	Not Applicable			Not Applicable	Not Applicable
	Cyclist relative to RT motorists	**C**	**D**	**D**	**D**	-	-	-	-	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	-	-	**Not Applicable**	**Not Applicable**
	Separated or Mixed Traffic	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**
	Left Turn Approach	1 lane crossed	One lane crossed	One lane crossed	One lane crossed	No lane crossed	No lane crossed	One lane crossed	One lane crossed	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box	No lane crossed	No lane crossed	2-stage, LT box	2-stage, LT box
	Operating Speed	> 50 to < 60 km/h	> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**D**	**E**	**F**	**F**	**B**	**B**	**F**	**F**	**A**	**A**	**A**	**A**	**B**	**B**	**A**	**A**
	Level of Service	**D**	**E**	**F**	**F**	**B**	**B**	**F**	**F**	**A**	**A**	**A**	**A**	**B**	**B**	**A**	**A**
		F				**F**				**A**				**B**			
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	≤ 20 sec	≤ 20 sec			≤ 10 sec	≤ 10 sec	≤ 30 sec	≤ 20 sec	≤ 30 sec	≤ 30 sec			≤ 10 sec	≤ 20 sec
	Level of Service	**D**	**D**	**C**	**C**	**-**	**-**	**B**	**B**	**D**	**C**	**D**	**D**	**-**	**-**	**B**	**C**
		D				**B**				**D**				**C**			
Truck	Effective Corner Radius		10 - 15 m		> 15 m						> 15 m		> 15 m				
	Number of Receiving Lanes on Departure from Intersection		≥ 2		1						≥ 2		1				
	Level of Service	**-**	**B**	**-**	**C**	**-**	**-**	**-**	**-**	**-**	**A**	**-**	**C**	**-**	**-**	**-**	**-**
		C				**-**				**C**				**-**			
Auto	Volume to Capacity Ratio	0.61 - 0.70				0.0 - 0.60				> 1.00				0.0 - 0.60			
	Level of Service	**B**				**A**				**F**				**A**			

Appendix J

Synchro Intersection Worksheets – 2024 Future Total Conditions

CGH TRANSPORTATION

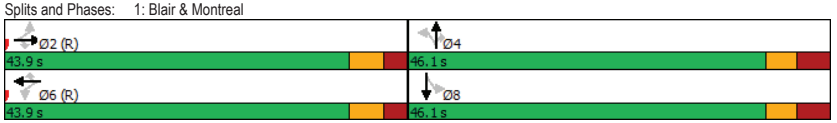
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	38	522	165	183	1254	20	142	86	55	18	178
Future Volume (vph)	38	522	165	183	1254	20	142	86	55	18	178
Lane Group Flow (vph)	38	522	165	183	1254	20	142	86	55	18	297
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		2			6			4			8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	2	2	2	6	6	6	4	4	4	8	8
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	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	33.4	33.4	46.1	46.1	46.1	46.1	46.1
Total Split (s)	43.9	43.9	43.9	43.9	43.9	43.9	46.1	46.1	46.1	46.1	46.1
Total Split (%)	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	51.2%	51.2%	51.2%	51.2%	51.2%
Maximum Green (s)	37.5	37.5	37.5	37.5	37.5	37.5	39.0	39.0	39.0	39.0	39.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	3.8	3.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	7.1	7.1	7.1	7.1	7.1
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	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Walk Time (s)	7.0	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	20.0	20.0	32.0	32.0	32.0	32.0	32.0
Pedestrian Calls (#/hr)	0	0	0	4	4	4	5	5	5	0	0
Act Effct Green (s)	53.3	53.3	53.3	53.3	53.3	53.3	23.2	23.2	23.2	23.2	23.2
Actuated g/C Ratio	0.59	0.59	0.59	0.59	0.59	0.59	0.26	0.26	0.26	0.26	0.26
v/c Ratio	0.23	0.27	0.17	0.39	0.65	0.02	0.76	0.20	0.13	0.07	0.68
Control Delay	18.1	11.2	2.9	14.4	14.5	3.4	54.3	24.1	6.0	20.9	35.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	11.2	2.9	14.4	14.5	3.4	54.3	24.1	6.0	20.9	35.2
LOS	B	B	A	B	B	A	D	C	A	C	D
Approach Delay		9.7			14.3			35.7			34.4
Approach LOS		A			B			D			C
Queue Length 50th (m)	2.7	20.0	0.0	8.4	30.3	0.0	23.4	12.0	0.0	2.4	45.1
Queue Length 95th (m)	13.6	44.8	11.0	27.5	#143.4	m0.8	34.0	17.3	6.4	5.6	52.7
Internal Link Dist (m)		757.9			347.8			602.6			42.3
Turn Bay Length (m)	60.0		30.0	65.0		15.0	25.0		30.0	25.0	
Base Capacity (vph)	163	1906	944	472	1924	871	312	727	664	456	716
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.27	0.17	0.39	0.65	0.02	0.46	0.12	0.08	0.04	0.41

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 14 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 17.6 — Intersection LOS: B
Intersection Capacity Utilization 93.3% — 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: Blair & Montreal



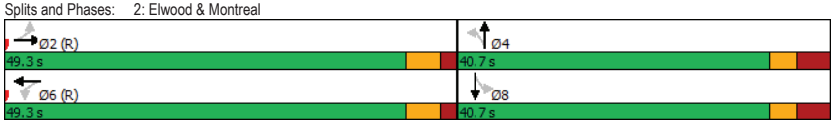
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	2	559	16	1458	16	0	0
Future Volume (vph)	2	559	16	1458	16	0	0
Lane Group Flow (vph)	2	568	16	1460	0	36	1
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases		2		6		4	8
Permitted Phases	2		6		4		
Detector Phase	2	2	6	6	4	4	8
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.6	22.6	39.6	39.6	40.7	40.7	40.7
Total Split (s)	49.3	49.3	49.3	49.3	40.7	40.7	40.7
Total Split (%)	54.8%	54.8%	54.8%	54.8%	45.2%	45.2%	45.2%
Maximum Green (s)	43.7	43.7	43.7	43.7	34.0	34.0	34.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	3.7	3.7	3.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.6	5.6	5.6	5.6		6.7	6.7
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	10.0	10.0	10.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0
Pedestrian Calls (#/hr)	3	3	5	5	6	6	3
Act Effct Green (s)	71.8	71.8	71.8	71.8		14.8	14.8
Actuated g/C Ratio	0.80	0.80	0.80	0.80		0.16	0.16
v/c Ratio	0.01	0.22	0.03	0.56		0.15	0.00
Control Delay	8.0	4.4	7.8	9.6		11.4	0.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	8.0	4.4	7.8	9.6		11.4	0.0
LOS	A	A	A	A		B	A
Approach Delay		4.4		9.6		11.4	
Approach LOS		A		A		B	
Queue Length 50th (m)	0.1	12.0	0.6	48.1		0.6	0.0
Queue Length 95th (m)	m0.4	23.3	4.7	#168.7		6.2	0.0
Internal Link Dist (m)		347.8		504.7		77.8	0.1
Turn Bay Length (m)	35.0		15.0				
Base Capacity (vph)	207	2534	609	2595		528	582
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	0.01	0.22	0.03	0.56		0.07	0.00

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 7 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 8.2 — Intersection LOS: A
Intersection Capacity Utilization 65.6% — ICU Level of Service C
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: Elwood & Montreal



Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	0	126	18	0	279
Future Vol, veh/h	35	0	126	18	0	279
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	35	0	126	18	0	279

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	414	135	0	0	144	0
Stage 1	135	-	-	-	-	-
Stage 2	279	-	-	-	-	-
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	595	914	-	-	1438	-
Stage 1	891	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	595	914	-	-	1438	-
Mov Cap-2 Maneuver	595	-	-	-	-	-
Stage 1	891	-	-	-	-	-
Stage 2	768	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.4	0	0
HCM LOS	B		

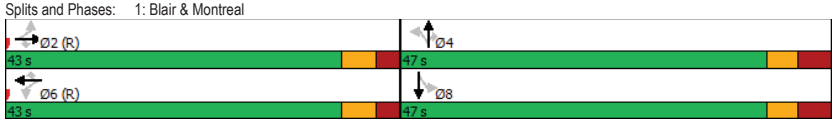
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 595	1438	-
HCM Lane V/C Ratio	-	- 0.059	-	-
HCM Control Delay (s)	-	- 11.4	0	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q(veh)	-	- 0.2	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	107	1129	157	65	602	16	299	130	247	42	97
Future Volume (vph)	107	1129	157	65	602	16	299	130	247	42	97
Lane Group Flow (vph)	107	1129	157	65	602	16	299	199	178	42	163
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		2			6			4			8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	2	2	2	6	6	6	4	4	4	8	8
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	10.0
Minimum Split (s)	33.4	33.4	33.4	33.4	33.4	33.4	46.1	46.1	46.1	46.1	46.1
Total Split (s)	43.0	43.0	43.0	43.0	43.0	43.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%	52.2%	52.2%	52.2%	52.2%	52.2%
Maximum Green (s)	36.6	36.6	36.6	36.6	36.6	36.6	39.9	39.9	39.9	39.9	39.9
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	3.8	3.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	7.1	7.1	7.1	7.1	7.1
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	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Walk Time (s)	7.0	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	20.0	20.0	32.0	32.0	32.0	32.0	32.0
Pedestrian Calls (#/hr)	1	1	1	5	5	5	3	3	3	6	6
Act Effct Green (s)	46.4	46.4	46.4	46.4	46.4	46.4	30.1	30.1	30.1	30.1	30.1
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52	0.52	0.33	0.33	0.33	0.33	0.33
v/c Ratio	0.30	0.68	0.20	0.43	0.36	0.02	0.81	0.38	0.36	0.14	0.28
Control Delay	18.6	21.0	7.9	35.1	17.8	6.0	43.4	20.2	17.5	18.7	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	21.0	7.9	35.1	17.8	6.0	43.4	20.2	17.5	18.7	14.4
LOS	B	C	A	D	B	A	D	C	B	B	B
Approach Delay		19.3			19.1			29.7			15.3
Approach LOS		B			B			C			B
Queue Length 50th (m)	10.3	74.5	5.9	5.1	24.8	0.0	45.8	23.1	17.8	4.9	13.7
Queue Length 95th (m)	27.1	#122.8	19.4	#24.6	54.2	2.9	65.8	34.8	29.3	10.2	23.4
Internal Link Dist (m)		757.9			347.8			602.6			42.3
Turn Bay Length (m)	60.0		30.0	65.0		15.0	25.0		30.0	25.0	
Base Capacity (vph)	353	1659	789	152	1675	767	489	690	638	407	749
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.68	0.20	0.43	0.36	0.02	0.61	0.29	0.28	0.10	0.22

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 1 (1%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 21.4 — Intersection LOS: C
Intersection Capacity Utilization 95.3% — 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.

Splits and Phases: 1: Blair & Montreal

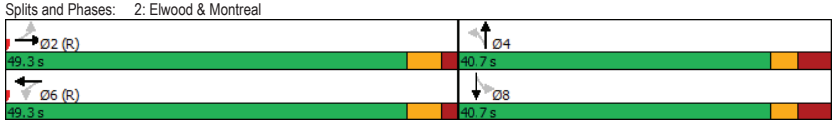


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	4	1364	28	668	13	1	1	0
Future Volume (vph)	4	1364	28	668	13	1	1	0
Lane Group Flow (vph)	4	1392	28	671	0	40	0	4
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.6	22.6	39.6	39.6	40.7	40.7	40.7	40.7
Total Split (s)	49.3	49.3	49.3	49.3	40.7	40.7	40.7	40.7
Total Split (%)	54.8%	54.8%	54.8%	54.8%	45.2%	45.2%	45.2%	45.2%
Maximum Green (s)	43.7	43.7	43.7	43.7	34.0	34.0	34.0	34.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	1.9	1.9	1.9	1.9	3.7	3.7	3.7	3.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.6	5.6	5.6	5.6		6.7		6.7
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Pedestrian Calls (#/hr)	3	3	5	5	6	6	3	3
Act Effct Green (s)	71.8	71.8	71.8	71.8		14.8		14.8
Actuated g/C Ratio	0.80	0.80	0.80	0.80		0.16		0.16
v/c Ratio	0.01	0.55	0.12	0.26		0.16		0.02
Control Delay	8.0	6.6	9.9	6.0		16.8		0.0
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	8.0	6.6	9.9	6.0		16.8		0.0
LOS	A	A	A	A		B		A
Approach Delay		6.6		6.2		16.8		
Approach LOS		A		A		B		
Queue Length 50th (m)	0.1	29.4	1.1	15.3		2.7		0.0
Queue Length 95th (m)	m0.6	#66.3	8.7	51.1		8.0		0.0
Internal Link Dist (m)		347.8		504.7		77.8		0.1
Turn Bay Length (m)	35.0		15.0					
Base Capacity (vph)	547	2529	228	2592		533		564
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	0.01	0.55	0.12	0.26		0.08		0.01

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 8 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 6.6 Intersection LOS: A
Intersection Capacity Utilization 66.8% ICU Level of Service C
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: Elwood & Montreal



Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	0	213	39	0	175
Future Vol, veh/h	30	0	213	39	0	175
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	30	0	213	39	0	175

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	408	233	0	0	252	0
Stage 1	233	-	-	-	-	-
Stage 2	175	-	-	-	-	-
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	599	806	-	-	1313	-
Stage 1	806	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	599	806	-	-	1313	-
Mov Cap-2 Maneuver	599	-	-	-	-	-
Stage 1	806	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	599	1313	-
HCM Lane V/C Ratio	-	-	0.05	-	-
HCM Control Delay (s)	-	-	11.3	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Appendix K

Synchro Intersection Worksheets – 2029 Future Total Conditions

CGH TRANSPORTATION

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	Ø1	Ø3
Lane Configurations												
Traffic Volume (vph)	38	522	165	195	1334	20	142	86	18	220		
Future Volume (vph)	38	522	165	195	1334	20	142	86	18	220		
Lane Group Flow (vph)	38	522	165	195	1334	20	142	141	18	339		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA		
Protected Phases	13	2		9	6			4		8	1	3
Permitted Phases			2			6	4		8			
Detector Phase	13	2	2	9	6	6	4	4	8	8		
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	10.9	34.7	34.7	10.9	34.7	34.7	42.3	42.3	42.3	42.3	5.0	5.0
Total Split (s)	11.0	41.0	41.0	11.0	41.0	41.0	48.0	48.0	48.0	48.0	5.0	5.0
Total Split (%)	10.0%	37.3%	37.3%	10.0%	37.3%	37.3%	43.6%	43.6%	43.6%	43.6%	5%	5%
Maximum Green (s)	5.1	33.3	33.3	5.1	33.3	33.3	39.7	39.7	39.7	39.7	3.0	3.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	2.0	2.0
All-Red Time (s)	2.2	4.0	4.0	2.2	4.0	4.0	5.0	5.0	5.0	5.0	0.0	0.0
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)	5.9	7.7	7.7	5.9	7.7	7.7	8.3	8.3	8.3	8.3		
Lead/Lag	Lead			Lead							Lag	
Lead-Lag Optimize?	Yes			Yes							Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None
Walk Time (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0	32.0	32.0	32.0	32.0	0.0	0.0
Pedestrian Calls (#/hr)		2	2		13	13	23	23	2	2	2	23
Act Effct Green (s)	7.3	37.3	37.3	17.9	51.7	51.7	29.9	29.9	30.9	30.9		
Actuated g/C Ratio	0.07	0.34	0.34	0.16	0.47	0.47	0.27	0.27	0.28	0.28		
v/c Ratio	0.35	0.48	0.34	0.72	0.87	0.03	0.81	0.33	0.07	0.73		
Control Delay	57.9	30.8	30.1	63.5	37.8	24.6	68.1	32.4	25.7	44.7		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	57.9	30.8	30.1	63.5	37.8	24.6	68.1	32.4	25.7	44.7		
LOS	E	C	C	E	D	C	E	C	C	D		
Approach Delay		32.1			40.8			50.3		43.8		
Approach LOS		C			D			D		D		
Queue Length 50th (m)	7.9	45.4	25.8	41.2	145.6	2.5	26.9	22.9	2.7	63.2		
Queue Length 95th (m)	18.6	65.6	46.6	#107.9	#239.8	8.7	#52.5	37.2	7.7	89.4		
Internal Link Dist (m)		757.9			347.8			602.6		42.3		
Turn Bay Length (m)	60.0		100.0	65.0		15.0	90.0		30.0			
Base Capacity (vph)	109	1092	491	269	1528	661	234	571	349	593		
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	0.35	0.48	0.34	0.72	0.87	0.03	0.61	0.25	0.05	0.57		

Intersection Summary

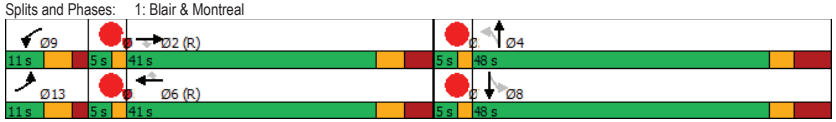
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 120

Lane Group	Ø5	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	5%	5%
Maximum Green (s)	3.0	3.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)	3.0	3.0
Flash Dont Walk (s)	0.0	0.0
Pedestrian Calls (#/hr)	13	2
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 39.9 Intersection LOS: D
Intersection Capacity Utilization 97.1% 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.

Splits and Phases: 1: Blair & Montreal

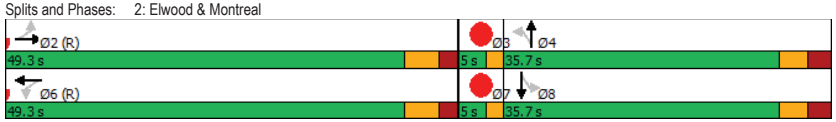


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	Ø3	Ø7
Lane Configurations									
Traffic Volume (vph)	2	559	17	1552	16	0	0		
Future Volume (vph)	2	559	17	1552	16	0	0		
Lane Group Flow (vph)	2	568	17	1554	0	36	1		
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA		
Protected Phases		2		6		4	8	3	7
Permitted Phases	2		6		4				
Detector Phase	2	2	6	6	4	4	8		
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	24.9	24.9	24.9	24.9	32.7	32.7	32.7	5.0	5.0
Total Split (s)	49.3	49.3	49.3	49.3	35.7	35.7	35.7	5.0	5.0
Total Split (%)	54.8%	54.8%	54.8%	54.8%	39.7%	39.7%	39.7%	6%	6%
Maximum Green (s)	43.4	43.4	43.4	43.4	30.0	30.0	30.0	3.0	3.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	2.0	2.0
All-Red Time (s)	2.2	2.2	2.2	2.2	2.7	2.7	2.7	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		
Total Lost Time (s)	5.9	5.9	5.9	5.9		5.7	5.7		
Lead/Lag					Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	2.0	2.0	2.0	3.0	3.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	25.0	25.0	25.0	0.0	0.0
Pedestrian Calls (#/hr)	5	5	5	5	7	7	4	5	4
Act Effct Green (s)	72.6	72.6	72.6	72.6		13.4	13.4		
Actuated g/C Ratio	0.81	0.81	0.81	0.81		0.15	0.15		
v/c Ratio	0.01	0.22	0.03	0.59		0.18	0.00		
Control Delay	8.0	5.3	6.9	9.4		32.9	27.0		
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		
Total Delay	8.0	5.3	6.9	9.4		32.9	27.0		
LOS	A	A	A	A		C	C		
Approach Delay		5.3		9.3		32.9	27.0		
Approach LOS		A		A		C	C		
Queue Length 50th (m)	0.1	12.0	0.6	51.7		5.8	0.2		
Queue Length 95th (m)	1.3	39.9	4.6	#177.7		11.4	1.2		
Internal Link Dist (m)		347.8		504.7		77.8	0.1		
Turn Bay Length (m)	35.0		15.0						
Base Capacity (vph)	183	2562	615	2624		448	495		
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	0.01	0.22	0.03	0.59		0.08	0.00		

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 7 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 8.7 Intersection LOS: A
Intersection Capacity Utilization 67.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Elwood & Montreal



Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	0	126	18	0	321
Future Vol, veh/h	35	0	126	18	0	321
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	35	0	126	18	0	321

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	456	135	0	0	144	0
Stage 1	135	-	-	-	-	-
Stage 2	321	-	-	-	-	-
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	562	914	-	-	1438	-
Stage 1	891	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	562	914	-	-	1438	-
Mov Cap-2 Maneuver	562	-	-	-	-	-
Stage 1	891	-	-	-	-	-
Stage 2	735	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	562	1438	-
HCM Lane V/C Ratio	-	-	0.062	-	-
HCM Control Delay (s)	-	-	11.8	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	Ø3	Ø7
Lane Configurations												
Traffic Volume (vph)	107	1201	167	65	602	16	377	158	42	97		
Future Volume (vph)	107	1201	167	65	602	16	377	158	42	97		
Lane Group Flow (vph)	107	1201	167	65	602	16	377	470	42	163		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA		
Protected Phases	5	2		1	6			4		8	3	7
Permitted Phases			2			6	4		8			
Detector Phase	5	2	2	1	6	6	4	4	8	8		
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	10.9	34.7	34.7	10.9	34.7	34.7	42.3	42.3	42.3	42.3	5.0	5.0
Total Split (s)	15.2	37.5	37.5	15.2	37.5	37.5	47.3	47.3	47.3	47.3	5.0	5.0
Total Split (%)	13.8%	34.1%	34.1%	13.8%	34.1%	34.1%	43.0%	43.0%	43.0%	43.0%	5%	5%
Maximum Green (s)	9.3	29.8	29.8	9.3	29.8	29.8	39.0	39.0	39.0	39.0	3.0	3.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	2.0	2.0
All-Red Time (s)	2.2	4.0	4.0	2.2	4.0	4.0	5.0	5.0	5.0	5.0	0.0	0.0
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)	5.9	7.7	7.7	5.9	7.7	7.7	8.3	8.3	8.3	8.3		
Lead/Lag	Lead			Lead			Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes			Yes			Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None
Walk Time (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0	32.0	32.0	32.0	32.0	0.0	0.0
Pedestrian Calls (#/hr)		2	2		13	13	18	18	7	7	18	7
Act Effct Green (s)	9.1	38.6	38.6	8.4	34.4	34.4	40.5	40.5	41.5	41.5		
Actuated g/C Ratio	0.08	0.35	0.35	0.08	0.31	0.31	0.37	0.37	0.38	0.38		
v/c Ratio	0.79	1.06	0.33	0.52	0.59	0.04	0.93	0.84	0.25	0.27		
Control Delay	86.5	82.0	31.5	63.3	35.8	29.3	64.7	47.1	28.6	25.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	86.5	82.0	31.5	63.3	35.8	29.3	64.7	47.1	28.6	25.1		
LOS	F	F	C	E	D	C	E	D	C	C		
Approach Delay		76.6			38.2			54.9		25.8		
Approach LOS		E			D			D		C		
Queue Length 50th (m)	22.9	~162.9	27.6	13.6	56.8	2.4	72.5	86.2	5.9	22.9		
Queue Length 95th (m)	#51.3	#221.0	49.7	27.5	80.3	8.0	#138.1	#151.2	16.2	41.5		
Internal Link Dist (m)		757.9			347.8			602.6		42.3		
Turn Bay Length (m)	60.0		100.0	65.0		15.0	90.0		30.0			
Base Capacity (vph)	138	1129	506	140	1017	443	411	566	168	620		
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	0.78	1.06	0.33	0.46	0.59	0.04	0.92	0.83	0.25	0.26		

Intersection Summary

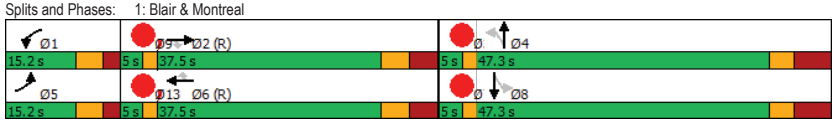
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 100.5 (91%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 140

Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	5%	5%
Maximum Green (s)	3.0	3.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)	3.0	3.0
Flash Dont Walk (s)	0.0	0.0
Pedestrian Calls (#/hr)	2	13
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 59.5 Intersection LOS: E
Intersection Capacity Utilization 102.9% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Blair & Montreal

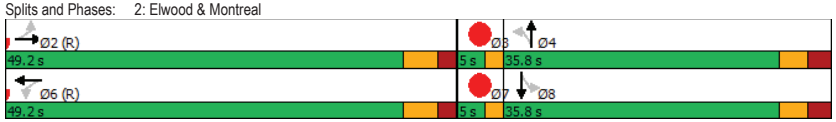


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø7
Lane Configurations										
Traffic Volume (vph)	4	1450	28	668	13	1	1	0		
Future Volume (vph)	4	1450	28	668	13	1	1	0		
Lane Group Flow (vph)	4	1478	28	671	0	42	0	4		
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases		2		6		4		8	3	7
Permitted Phases	2		6		4		8			
Detector Phase	2	2	6	6	4	4	8	8		
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	24.9	24.9	24.9	24.9	32.7	32.7	32.7	32.7	5.0	5.0
Total Split (s)	49.2	49.2	49.2	49.2	35.8	35.8	35.8	35.8	5.0	5.0
Total Split (%)	54.7%	54.7%	54.7%	54.7%	39.8%	39.8%	39.8%	39.8%	6%	6%
Maximum Green (s)	43.3	43.3	43.3	43.3	30.1	30.1	30.1	30.1	3.0	3.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0	2.0	2.0
All-Red Time (s)	2.2	2.2	2.2	2.2	2.7	2.7	2.7	2.7	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0		
Total Lost Time (s)	5.9	5.9	5.9	5.9		5.7		5.7		
Lead/Lag					Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
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	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	2.0	2.0	2.0	2.0	3.0	3.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	25.0	25.0	25.0	25.0	0.0	0.0
Pedestrian Calls (#/hr)	8	8	9	9	14	14	3	3	14	3
Act Effct Green (s)	69.2	69.2	69.2	69.2		16.8		16.8		
Actuated g/C Ratio	0.77	0.77	0.77	0.77		0.19		0.19		
v/c Ratio	0.01	0.61	0.15	0.27		0.16		0.01		
Control Delay	9.2	11.8	12.2	7.2		28.4		24.0		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		
Total Delay	9.2	11.8	12.2	7.2		28.4		24.0		
LOS	A	B	B	A		C		C		
Approach Delay		11.8		7.4		28.4		24.0		
Approach LOS		B		A		C		C		
Queue Length 50th (m)	0.1	48.0	1.1	14.7		6.8		0.6		
Queue Length 95th (m)	1.9	#166.8	8.7	47.7		12.7		2.8		
Internal Link Dist (m)		347.8		504.7		77.8		0.1		
Turn Bay Length (m)	35.0		15.0							
Base Capacity (vph)	522	2439	182	2498		468		490		
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	0.01	0.61	0.15	0.27		0.09		0.01		

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 8 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 10.8 Intersection LOS: B
Intersection Capacity Utilization 66.5% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Elwood & Montreal



Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	0	241	39	0	175
Future Vol, veh/h	30	0	241	39	0	175
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	30	0	241	39	0	175

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	436	261	0	0	280	0
Stage 1	261	-	-	-	-	-
Stage 2	175	-	-	-	-	-
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	578	778	-	-	1283	-
Stage 1	783	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	578	778	-	-	1283	-
Mov Cap-2 Maneuver	578	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	855	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	578	1283	-
HCM Lane V/C Ratio	-	-	0.052	-	-
HCM Control Delay (s)	-	-	11.6	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Appendix L

TDM Checklist

CGH TRANSPORTATION

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

Legend

- BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users
- BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance
- ★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		1. TDM PROGRAM MANAGEMENT	
		1.1 Program coordinator	
BASIC	★	1.1.1 Designate an internal coordinator, or contract with an external coordinator	☑
		1.2 Travel surveys	
BETTER		1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
		2. WALKING AND CYCLING	
		2.1 Information on walking/cycling routes & destinations	
BASIC		2.1.1 Display local area maps with walking/cycling access routes and key destinations at major entrances	☑
		2.2 Bicycle skills training	
		Commuter travel	
BETTER	★	2.2.1 Offer on-site cycling courses for commuters, or subsidize off-site courses	☐
		2.3 Valet bike parking	
		Visitor travel	
BETTER		2.3.1 Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	☐

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		3. TRANSIT	
		3.1 Transit information	
BASIC		3.1.1 Display relevant transit schedules and route maps at entrances	☑
BASIC		3.1.2 Provide online links to OC Transpo and STO information	☑
BETTER		3.1.3 Provide real-time arrival information display at entrances	☐
		3.2 Transit fare incentives	
		Commuter travel	
BETTER		3.2.1 Offer preloaded PRESTO cards to encourage commuters to use transit	☐
BETTER	★	3.2.2 Subsidize or reimburse monthly transit pass purchases by employees	☐
		Visitor travel	
BETTER		3.2.3 Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	☐
		3.3 Enhanced public transit service	
		Commuter travel	
BETTER		3.3.1 Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	☐
		Visitor travel	
BETTER		3.3.2 Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	☐
		3.4 Private transit service	
		Commuter travel	
BETTER		3.4.1 Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	☐
		Visitor travel	
BETTER		3.4.2 Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		4.	**RIDESHARING**	
		4.1	**Ridematching service**	
			Commuter travel	
BASIC	★	4.1.1	Provide a dedicated ridematching portal at OttawaRideMatch.com	☐
		4.2	**Carpool parking price incentives**	
			Commuter travel	
BETTER		4.2.1	Provide discounts on parking costs for registered carpools	☐
		4.3	**Vanpool service**	
			Commuter travel	
BETTER		4.3.1	Provide a vanpooling service for long-distance commuters	☐
		5.	**CARSHARING & BIKESHARING**	
		5.1	**Bikeshare stations & memberships**	
BETTER		5.1.1	Contract with provider to install on-site bikeshare station for use by commuters and visitors	☐
			Commuter travel	
BETTER		5.1.2	Provide employees with bikeshare memberships for local business travel	☐
		5.2	**Carshare vehicles & memberships**	
			Commuter travel	
BETTER		5.2.1	Contract with provider to install on-site carshare vehicles and promote their use by tenants	☐
BETTER		5.2.2	Provide employees with carshare memberships for local business travel	☐
		6.	**PARKING**	
		6.1	**Priced parking**	
			Commuter travel	
BASIC	★	6.1.1	Charge for long-term parking (daily, weekly, monthly)	☑
BASIC		6.1.2	Unbundle parking cost from lease rates at multi-tenant sites	☑
			Visitor travel	
BETTER		6.1.3	Charge for short-term parking (hourly)	☐

TDM Measures Checklist
Version 1.0 (30 June 2017)
City of Ottawa

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

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

Legend

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

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

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

		TDM measures: *Residential developments*	Check if proposed & add descriptions
		1. TDM PROGRAM MANAGEMENT	
		1.1 Program coordinator	
BASIC	★ 1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
		1.2 Travel surveys	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
		2. WALKING AND CYCLING	
		2.1 Information on walking/cycling routes & destinations	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☑
		2.2 Bicycle skills training	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

		TDM measures: *Residential developments*	Check if proposed & add descriptions
		3. TRANSIT	
		3.1 Transit information	
BASIC	3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☑
BETTER	3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
		3.2 Transit fare incentives	
BASIC	★ 3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☑
BETTER	3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3 Enhanced public transit service	
BETTER	★ 3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4 Private transit service	
BETTER	3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐
		4. CARSHARING & BIKESHARING	
		4.1 Bikeshare stations & memberships	
BETTER	4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☑
BETTER	4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2 Carshare vehicles & memberships	
BETTER	4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐
BETTER	4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5. PARKING	
		5.1 Priced parking	
BASIC	★ 5.1.1	Unbundle parking cost from purchase price *(condominium)*	☑
BASIC	★ 5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☑

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☑
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

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)*	☑
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)*	☐
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	☐

TDM-Supportive Development Design and Infrastructure Checklist **City of Ottawa**
Version 1.0 (30 June 2017)

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

Legend

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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑
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)*	☑
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: *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: *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 resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☑
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
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	☐

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