2780 Eagleson Road

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report

Prepared for:

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PN: 2020-22

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1 Screening

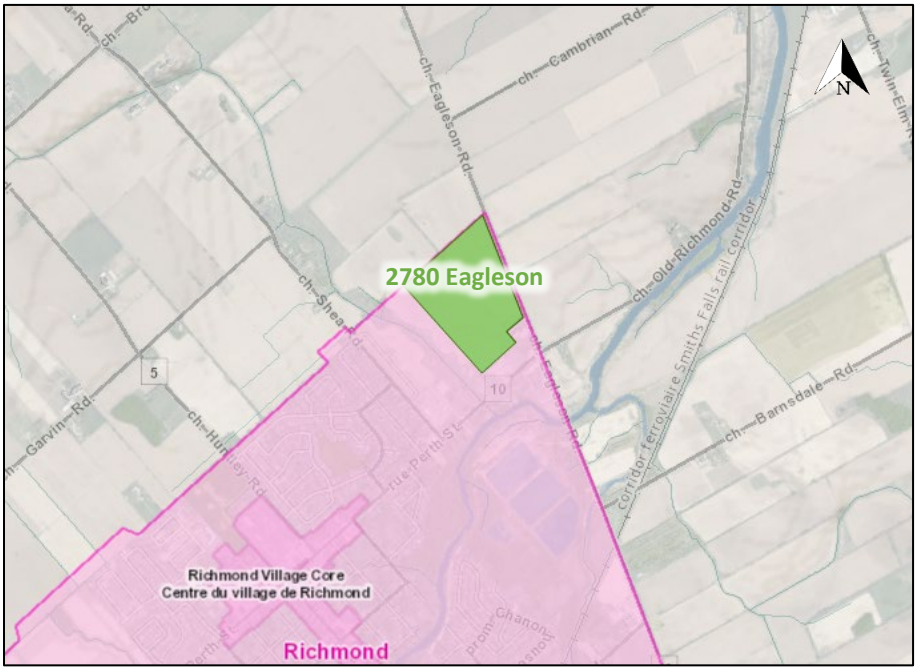
This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for TIA Study PM. As shown in the Screening Form, a TIA is required through the trip generation and safety triggers, including both the Design Review and the Network Impact Components. This TIA supports a zoning amendment and draft plan of subdivision application.

2 Existing and Planned Conditions

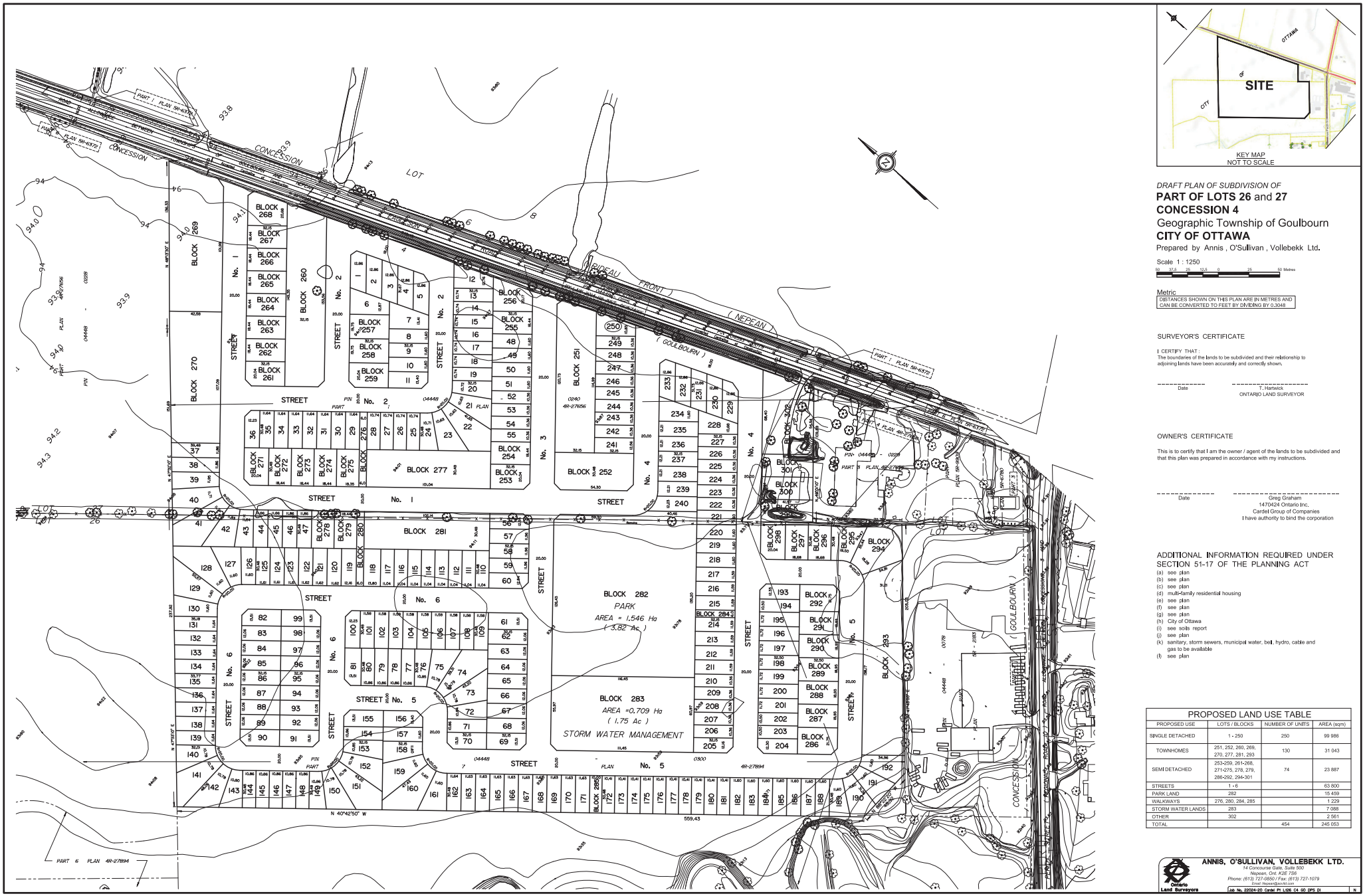
2.1 Proposed Development

The proposed development, located at 2780 Eagleson Road, is currently a greenfield property within the area treated by the Richmond CDP, and is zoned as Development Reserve (DR1). The proposed development would include 130 townhouses, 74 semi-detached dwellings, and 250 detached single-family dwellings to be built out by 2027 and include two new roads providing access to Eagleson Road. The proposed site is located within the Richmond Village CDP area. Figure 1 illustrates the Study Area Context and Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: April 26, 2020



KEY MAP
NOT TO SCALE

DRAFT PLAN OF SUBDIVISION OF

PART OF LOTS 26 and 27
CONCESSION 4
Geographic Township of Goulbourn
CITY OF OTTAWA

Prepared by Annis , O'Sullivan , Vollebekk Ltd.

Scale 1 : 1250

50 37.5 25 12.5 0 25 50 Metres

Metric
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :
The boundaries of the lands to be subdivided and their relationship to adjoining lands have been accurately and correctly shown.

Date

T. Hartwick
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

This is to certify that I am the owner / agent of the lands to be subdivided and that this plan was prepared in accordance with my instructions.

Date

Greg Graham
1470424 Ontario Inc.
Cardel Group of Companies
I have authority to bind the corporation

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 OF THE PLANNING ACT

(a) see plan
(b) see plan
(c) see plan
(d) multi-family residential housing
(e) see plan
(f) see plan
(g) see plan
(h) City of Ottawa
(i) see soils report
(j) see plan
(k) sanitary, storm sewers, municipal water, bell, hydro, cable and gas to be available
(l) see plan

PROPOSED LAND USE TABLE

PROPOSED USE	LOTS / BLOCKS	NUMBER OF UNITS	AREA (sqm)
SINGLE DETACHED	1 - 250	250	99 986
TOWNHOMES	251, 252, 260, 269, 270, 277, 281, 293	130	31 043
SEMI DETACHED	253-259, 261-268, 271-275, 278, 279, 286-292, 294-301	74	23 887
STREETS	1 - 6		63 600
PARK LAND	282		15 459
WALKWAYS	276, 280, 284, 285		1 229
STORM WATER LANDS	283		7 088
OTHER	302		2 561
TOTAL		454	245 053

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Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
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Ontario Land Surveyors

Job No. 22024-20 Cardel Ph 1 L26 C4 GO DPS DI

N

2.2 Existing Conditions

2.2.1 Area Road Network

Eagleson Road: Eagleson Road is a City of Ottawa arterial road with a two-lane rural cross-section. The posted speed limit is 80 km/h and the right of way within varies between 26.0 metres and 28.0 metres within the study area. Eagleson Road is a truck route.

Perth Street: Perth Street is a City of Ottawa arterial road with a two-lane rural cross-section east of Shea Road, and a four-lane urban cross-section west of Shea Road. East of Shea Road, paved shoulders are on both sides of the road and the posted speed limit is 60 km/h. West of Shea Road, sidewalks are on both sides of the road and the posted speed limit is 50 km/h. The Ottawa Official Plan reserves a 30.0 metre right of way between the village boundary to the west and Eagleson Road to the east. Perth Street is a truck route.

Old Richmond Road: Old Richmond Road is a City of Ottawa arterial road with a two-lane rural cross-section and paved shoulders on both sides of the road within the study area. The posted speed limit is 60 km/h west of a point 300 metres east of Eagleson Road, and 80 km/h to the east of this point. The City reserves a right of way of 37.5 metres in the study area. Old Richmond Road is a truck route.

2.2.2 Existing Intersections

The existing signalized area intersections within one kilometre of the site have been summarized below:

Eagleson Road & Perth Street/Old Richmond Road	The intersection of Eagleson Road and Perth Street/Old Richmond Road is a signalized intersection. The northbound approach and southbound approaches each consist of an auxiliary left-turn lane and a shared through/right-turn lane. The eastbound approach consists of an auxiliary left-turn lane and a shared through/right-turn lane, and the westbound approach consists of shared left-turn/through lane and an auxiliary right-turn lane. No turn restrictions are noted.

2.2.3 Existing Driveways

Driveways exist on the east side of Eagleson Road within 200 metres of proposed site accesses in the form of gravel accesses to farmers' fields. South of the site on the west side of Eagleson Road, two driveways for a commercial land use and one driveway to a gas station are present.

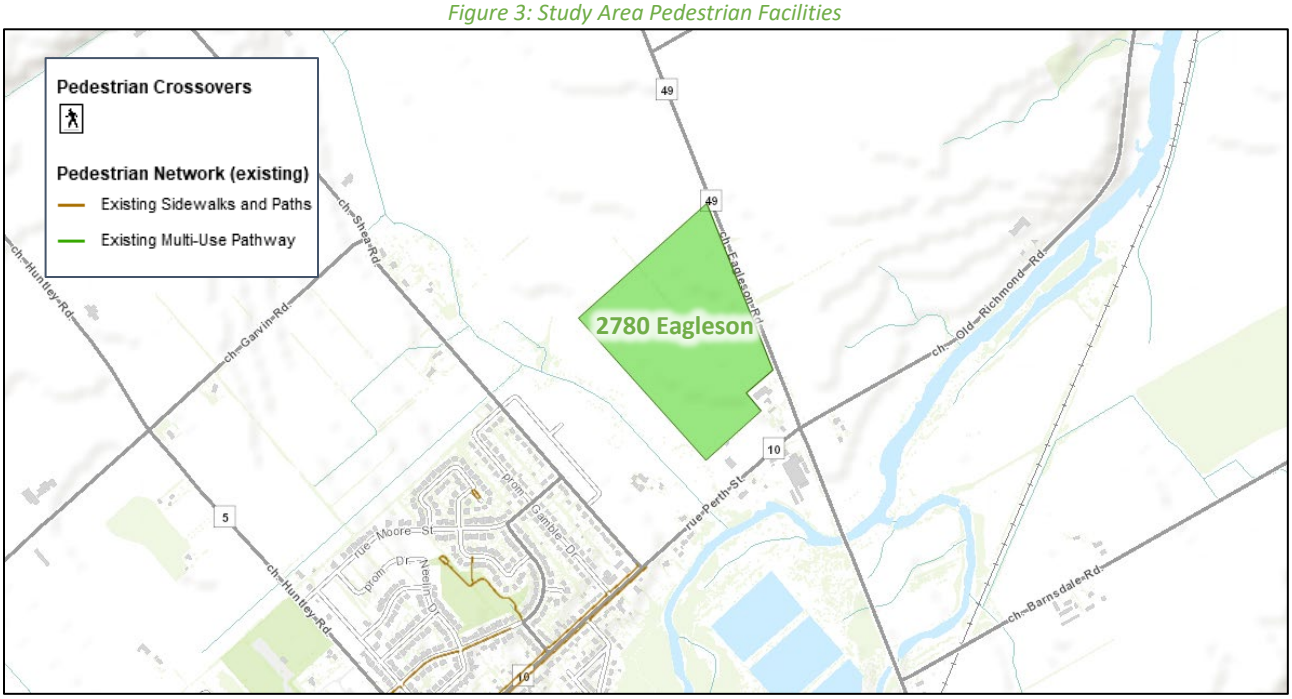
2.2.4 Cycling and Pedestrian Facilities

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

Sidewalks are provided along both sides of Perth Street to Shea Road with no additional pedestrian facilities existing within the study area. Cycling facilities include a paved shoulder along Perth Street/Old Richmond Road east of Shea Road, with Perth Street designated as a spine route. Shea Road, Musket Way, and Eagleson Road south of Perth Street are local routes.

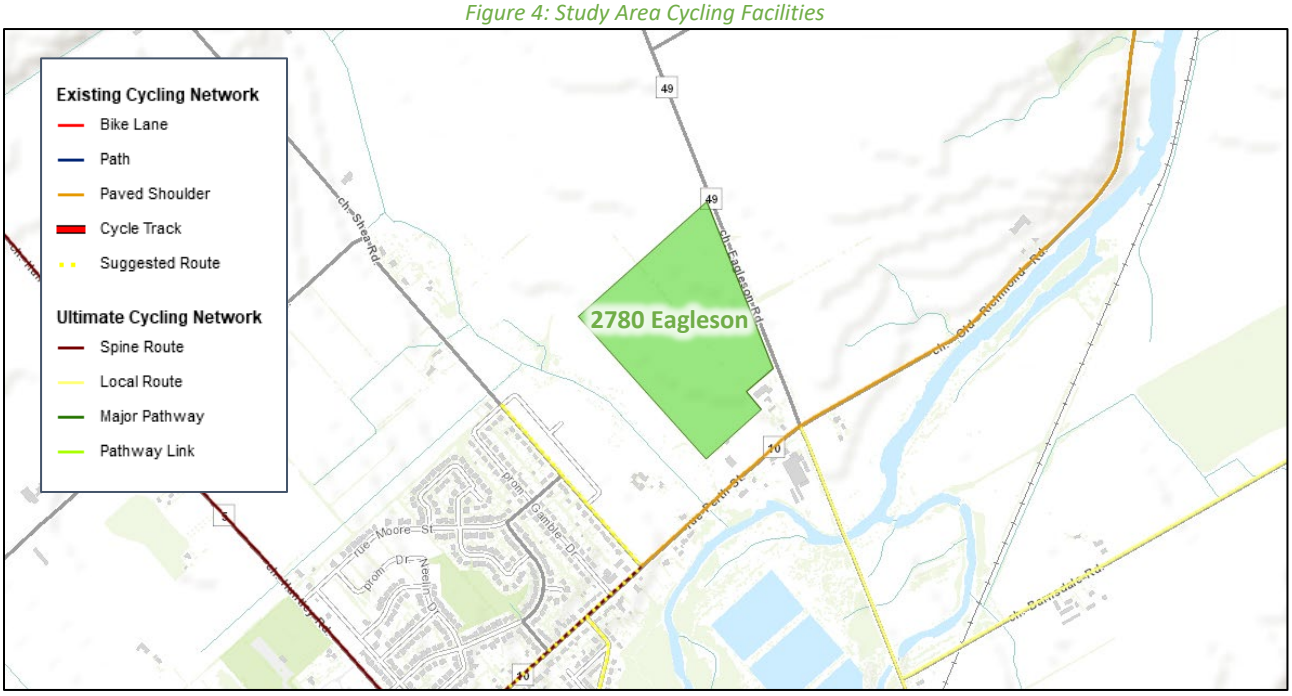
From the traffic counts, presented in Section 2.2.7, no pedestrian or cyclists were captured at the study area intersection during the AM and PM peak periods.

Figure 3: Study Area Pedestrian Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: April 26, 2020

Figure 4: Study Area Cycling Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: April 26, 2020

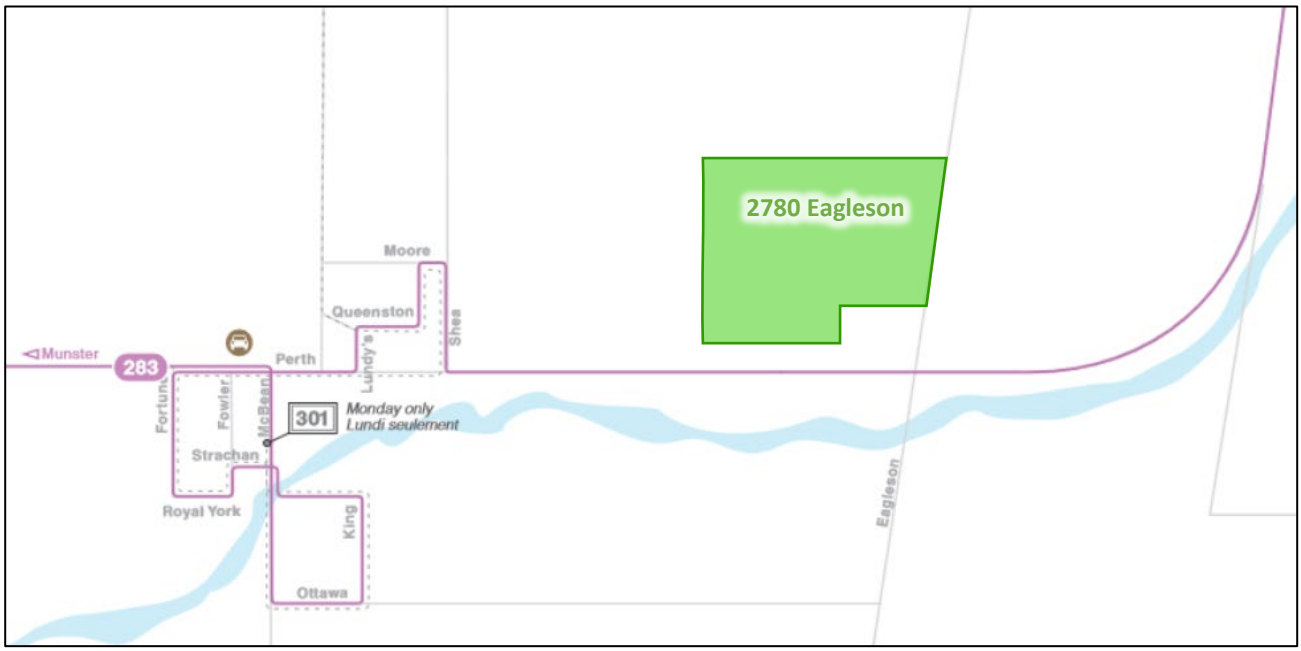
2.2.5 Existing Transit

Within the study area, the route #283 travel and #301 along Perth Street/Old Richmond Road. The frequency of these routes within proximity of the proposed site currently are:

- Route #283 – One AM bus to Tunney's Pasture and one PM return bus
- Route #301 – One AM bus to Carlingwood and one PM return bus – Mondays only

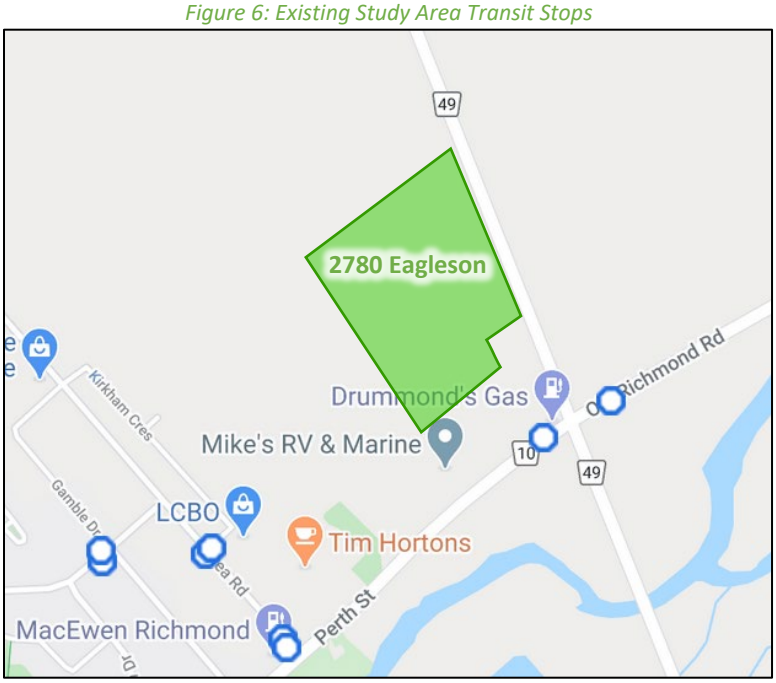
Figure 5 illustrates the transit system map in the study area and Figure 6 illustrates nearby transit stops.

Figure 5: Existing Study Area Transit Service



Source: http://www.octranspo.com/ Accessed: April 26, 2020

Figure 6: Existing Study Area Transit Stops



Source: http://www.octranspo.com/ Accessed: April 26, 2020

2.2.6 Existing Area Traffic Management Measures

There are no existing area traffic management measures within the Study Area.

2.2.7 Existing Peak Hour Travel Demand

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

Table 1: Intersection Count Date

Intersection	Count Date
Eagleson Road & Perth Street/Old Richmond Road	Wednesday, November 21, 2018 Wednesday, December 3, 2014

Comparing the 2018 counts at this intersection to those from 2014, the total growth shown was on par with the growth rate calculated from the TRANS models. Given that 2018 saw McBean Street temporarily closed for a bridge replacement, additional detour volumes will be included in the northbound left and eastbound right movement counts. To adjust for this discrepancy, the 2014 counts on those specific movements were grown at a rate of 2.5% to 2018 and were substituted for the 2018 counts for those movements. Further, as the intersection was counted two years prior to the study date, a 2.5% per annum compound growth rate has been applied to estimate the 2020 adjusted traffic counts. Figure 7 illustrates the 2020 adjusted traffic counts and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection. Detailed turning movement count data is included in Appendix B and the Synchro worksheets are provided in Appendix C.

Figure 7: Existing Traffic Counts (Adjusted)

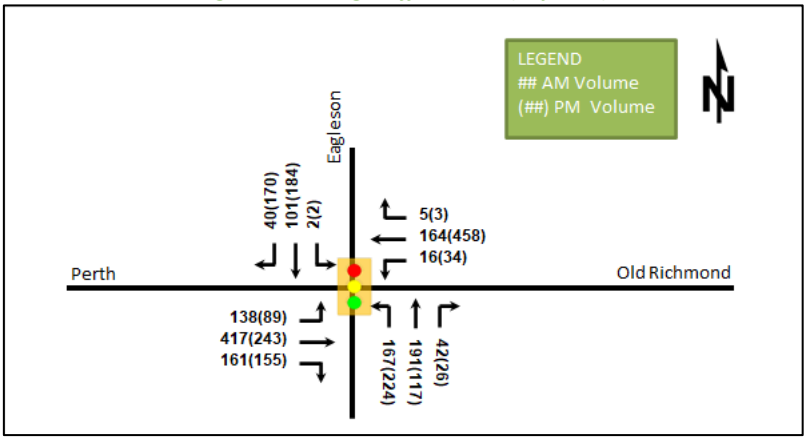


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road & Perth Street/Old Richmond Road *Signalized*	EBL	A	0.29	11.3	21.8	A	0.41	26.1	30.9
	EBT/R	C	0.70	17.1	79.0	A	0.55	21.4	83.0
	WBL/T	A	0.21	10.0	20.4	B	0.69	27.8	117.9
	WBR	A	0.01	0.0	0.1	A	0.00	0.0	0.0
	NBL	A	0.53	23.4	36.6	C	0.75	35.8	75.5
	NBT/R	A	0.50	19.2	44.0	A	0.22	14.7	32.1
	SBL	A	0.01	15.0	1.5	A	0.00	15.0	1.7
	SBT/R	A	0.30	15.0	25.1	A	0.54	17.9	79.5
	Overall	**C**	**0.72**	**16.6**	-	**D**	**0.88**	**23.9**	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 0.90
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

During both the AM and PM peak hours, the study area intersection operates well. No capacity issues are noted.

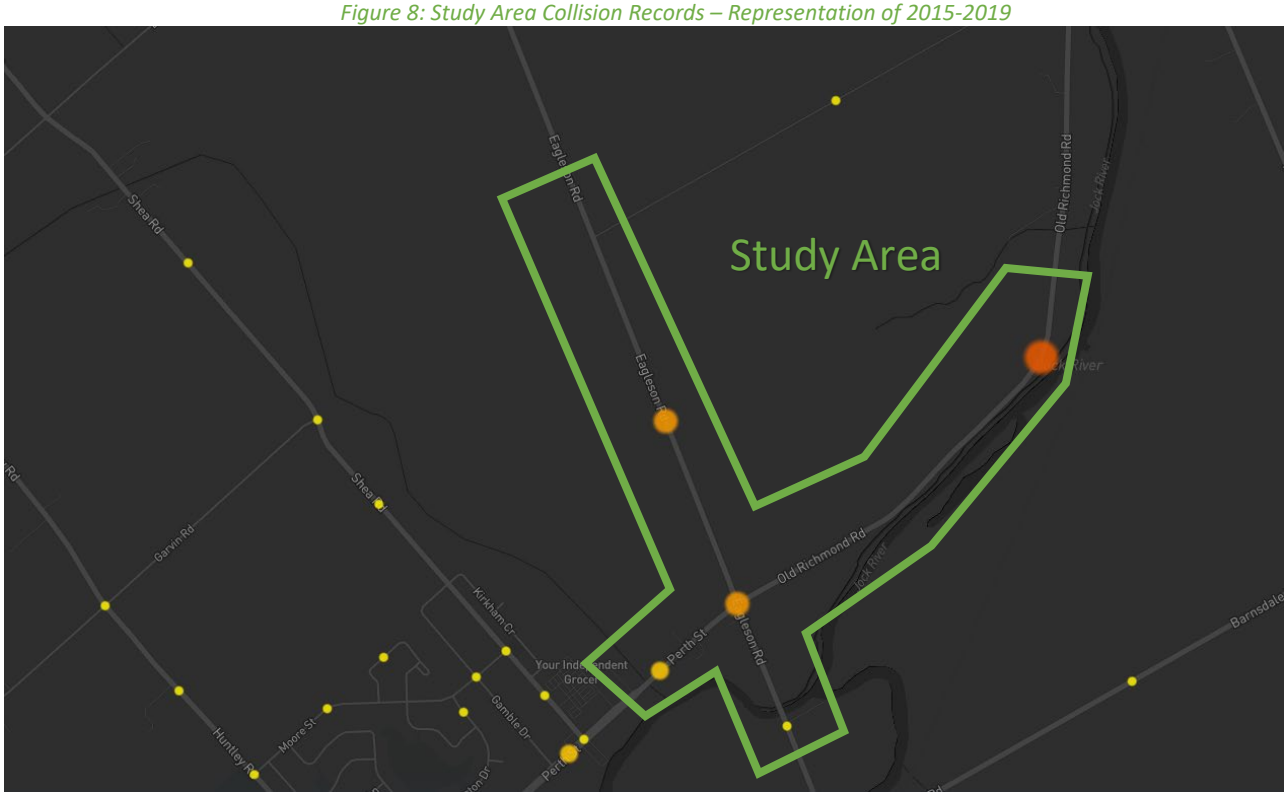
2.2.8 Collision Analysis

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 collisions types and conditions in the study area, Figure 8 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, 2015-2019

		Number	%
Total Collisions		**47**	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	13	28%
	Property Damage Only	34	72%
Initial Impact Type	**Angled**	2	4%
	Rear end	2	4%
	Sideswipe	10	21%
	Turning Movement	1	2%
	SMV Unattended	2	4%
	SMV Other	1	2%
	Other	28	60%
Road Surface Condition	**Dry**	24	51%
	Wet	12	26%
	Loose Snow	4	9%
	Slush	2	4%
	Packed Snow	1	2%
	Ice	4	9%
	Unknown	0	0%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

Figure 8: Study Area Collision Records – Representation of 2015-2019



Source: https://maps.bikeottawa.ca/collisions/ Accessed: December 8, 2021

Table 4: Summary of Collision Locations, 2015-2019

	Number	%
Intersections / Segments	**47**	**100%**
Eagleson Rd @ Perth St/Old Richmond Rd	9	19%
Eagleson Rd btwn Cambrian Rd & Perth St	10	21%
Eagleson Rd btwn Perth St & Barnsdale Rd	2	4%
Perth St btwn Shea Rd & Eagleson Rd	8	17%
Old Richmond Rd btwn Perth St & Cambrian Rd	18	38%

Within the study area, the segment of Eagleson Road between Cambrian Road and Perth Street, and Old Richmond Road between Perth Street and Cambrian Road are noted to have experienced higher collisions than other intersections. Table 5 and Table 6 summarize the collision types and conditions for each of these segments.

Table 5: Eagleson Road between Cambrian Road & Perth Street Collision Summary

		Number	%
Total Collisions		**10**	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	2	20%
	Property Damage Only	8	80%
Initial Impact Type	**Approaching**	1	10%
	Rear end	1	10%
	SMV Unattended	1	10%
	SMV Other	7	70%
Road Surface Condition	**Dry**	4	40%
	Wet	1	10%
	Loose Snow	1	10%
	Packed Snow	1	10%
	Ice	3	30%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The Eagleson Road between Cambrian Road & Perth Street intersection had a total of 10 collisions during the 2015-2019 time period, with eight involving property damage only and the remaining two having non-fatal injuries. The collision types are most represented by single motor vehicle (other) with seven collisions, and approaching, rear end and single motor vehicle unattended each with one collision. Single motor vehicle (other) collisions are typical of rural road segments. Weather conditions may affect collisions on this road segment, as they relate to the single motor vehicle collisions.

Table 6: Old Richmond Road between Perth Street and Cambrian Road Collision Summary

		Number	%
Total Collisions		**18**	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	6	33%
	Property Damage Only	12	67%
Initial Impact Type	**Rear end**	1	6%
	Approaching	1	6%
	SMV Other	15	83%
	Other	1	6%
Road Surface Condition	**Dry**	7	39%
	Wet	8	44%
	Loose Snow	2	11%
	Ice	1	6%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The segment of Old Richmond Road between Perth Street and Cambrian Road had a total of 18 collisions during the 2015-2019 time period, with 12 involving property damage only and the remaining six having non-fatal injuries. The collision types are most represented by single motor vehicle (other) at 15 collisions, with the remainder split between rear end, approaching, and other. This segment has a number of sweeping horizontal curves and a posted speed limit of 80 km/h, which likely operates 10-20 km/h over this limit given recent City speed surveys along Perth Street. Additionally, given that 61% of the collisions happened under inclement road surface conditions, weather also has an effect on collisions along this segment of Old Richmond Road. An examination of the use of paving materials suited to wet conditions may be warranted on this segment during the

next resurfacing project and additional warning signs may be required to caution drivers during the wet or snowy conditions.

2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

Within the Transportation Master Plan, the Road Network's Network Concept diagram shows the segment of Perth Street between Shea Road and Eagleson Road as a widened arterial, however it is not included in the Affordable Network.

2.3.2 Other Study Area Developments

3315 Shea Road

The proposed development application includes a zoning amendment to allow the construction of 54 new freehold detached residential lots on a new public street. No TIA is available for this development.

3244 Shea Road

This application includes a plan of subdivision to permit the development of eight new detached residential lots. No TIA is available for this development.

3152 Shea Road

This application includes zoning bylaw amendment to prohibit future residential development on its subject lands to protect the agricultural resource.

Fox Run Phase 1 – Caivan

The first Phase of the Fox Run development is currently under construction. In total, the subdivision will include a total of 214 single family homes. A new intersection on Perth Street will be provided at Meynell Road.

Fox Run Phase 2 – Caivan

The second Phases of Fox Run have been termed Phase 2 North and South and include 386 residential units split on the north side of Perth Street and on the west side of the Phase 1 lands. Servicing is underway and it is expected that this phase will be completed by 2024.

Fox Run Phase 4/5 – Caivan

The final two phases of the Fox Run development are planned but have not been initiated with planning applications to the City of Ottawa. It is envisioned that a total of 205 single family homes will be included within the remaining Fox Run lands and is located north of the Phase 2 lands.

6038 Ottawa Street – Tamarack

A zoning by-law amendment and plan of subdivision application has been submitted for the construction of 1,129 residential units anticipated to be built-out by 2032. This development is anticipated to be built-out at or shortly after the horizons examined within this TIA.

6240-6431 Ottawa Street – Mattamy Richmond Subdivision

A plan of subdivision application has been submitted for a new residential subdivision along Ottawa Street with 848 single family homes and 252 townhomes. Originally assumed to be under construction already, the file is progressing, and it is estimated to be built-out by 2029 with approximately 100-150 units per year. The proposed site will extend Meynell Road, connect to Ottawa Street, and include additional future connections to Royal York Street and Burke Street.

6295, 6363-6409 Perth Street, 6305 Ottawa Street – Caivan

A zoning by-law amendment and draft plan of subdivision application has been submitted for the construction of 577 residential units. Given the rezoning, subsequent planning submissions and servicing capacity within Richmond, it is anticipated that construction may be initiated by 2026 and completed by 2031. The proposed sites will have connections to Perth Street through existing collectors.

Samara Square

Phase 2 of the Hyde Park Senior Development will include two buildings with 35 rental apartments, 124 senior retirement apartments, and supporting commercial/retail. While not currently included in the development planning, Phase 3 will include an additional 122 apartment units in eight buildings.

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersection of Eagleson Road and Perth Street/Old Richmond Road, and the intersection of site accesses and Eagleson Road.

The only boundary road is Eagleson Road and no screenlines are present within proximity to the site.

3.2 Time Periods

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

3.3 Horizon Years

The anticipated build-out year of 2027 is assumed for the subject site. As a result, the full build-out plus five years horizon year is 2032.

4 Exemption Review

Table 7 summarizes the exemptions for this TIA.

Table 7: 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	Exempt
	4.2.3 New Street Networks	Only required for plans of subdivision	Required
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Exempt
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
Network Impact Component			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	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	Exempt

Module	Element	Explanation	Exempt/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	Required

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 Ottawa Inner Area have been summarized in Table 8.

Table 8: TRANS Trip Generation Manual Recommended Mode Shares – Rural Districts Including Southwest

Travel Mode	Single-Detached		Multi-Unit (Low-Rise)	
	AM	PM	AM	PM
Auto Driver	60%	67%	66%	62%
Auto Passenger	14%	17%	13%	19%
Transit	24%	14%	21%	16%
Bicycle	2%	2%	1%	3%
Walk	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**

OC Transpo has indicated through other development applications in Richmond Village that no intent to increase the number or diversity of bus routes is currently planned by area development build-out horizons. As there are no inbound transit routes to village in the AM peak period and no outbound transit routes from the village in the PM peak period, the off-peak directional transit mode shares will be reassigned to the auto mode shares. Table 9 summarizes the directional mode share targets to be applied to the subject development by peak hour.

Table 9: Proposed Site Mode Shares – Rural Districts Including Southwest

Travel Mode	Single-Detached				Multi-Unit (Low-Rise)			
	AM in	AM out	PM in	PM out	AM in	AM out	PM in	PM out
Auto Driver	84%	60%	67%	81%	87%	66%	62%	78%
Auto Passenger	14%	14%	17%	17%	13%	13%	19%	19%
Transit	0%	24%	14%	0%	0%	21%	16%	0%
Bicycle	2%	2%	2%	2%	1%	1%	3%	3%
Walk	0%	0%	0%	0%	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**	**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. Table 10 summarizes the person trip rates for the proposed residential land uses for each peak period.

Table 10: Trip Generation Person Trip Rates by Peak Period

Land Use	Land Use Code	Peak Period	Person Trip Rates
Single-Detached	210 (TRANS)	AM	2.05
		PM	2.48
Multi-Unit (Low-Rise)	220 (TRANS)	AM	1.35
		PM	1.58

Using the above person trip rates, the total person trip generation has been estimated. Table 11 summarizes the total person trip generation for the residential land uses.

Table 11: Total Person Trip Generation

Land Use	Units/ sq ft	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Detached	250	154	359	513	384	236	620
Multi-Unit (Low-Rise)	204	83	193	275	180	142	322

Using the above mode share targets and the person trip rates, the person trips by mode have been projected. Table 12 summarizes the trip generation by mode and peak hour using the residential peak hour adjustment factor.

Table 12: Residential Trip Generation by Mode

Travel Mode		AM Peak Hour				PM Peak Hour			
		Mode Share	In	Out	Total	Mode Share	In	Out	Total
Single-Detached	Auto Driver	**84%/60%**	62	103	165	**67%/81%**	113	84	197
	Auto Passenger	**14%**	11	24	35	**17%**	29	18	46
	Transit	**0%/24%**	0	47	47	**14%/0%**	25	0	25
	Cycling	**2%**	2	4	6	**2%**	4	2	6
	Walking	**0%**	0	0	0	**0%**	0	0	0
	Total	**100%**	**77**	**180**	**257**	**100%**	**169**	**104**	**273**
Multi-Unit (Low-Rise)	Auto Driver	**87%/66%**	35	61	96	**62%/78%**	49	49	98
	Auto Passenger	**13%**	5	12	17	**19%**	15	12	27
	Transit	**0%/21%**	0	23	23	**16%/0%**	14	0	14
	Cycling	**1%**	1	1	2	**3%**	2	2	5
	Walking	**0%**	0	0	0	**0%**	0	0	0
	Total	**100%**	**42**	**97**	**138**	**100%**	**79**	**62**	**142**
Total	Auto Driver	-	97	164	261	-	162	133	295
	Auto Passenger	-	16	36	52	-	44	30	73
	Transit	-	0	70	70	-	39	0	39
	Cycling	-	3	5	8	-	6	4	11
	Walking	-	0	0	0	-	0	0	0
	Total	-	**119**	**277**	**395**	-	**248**	**166**	**415**

As shown above, a total of 261 new AM and 295 new PM 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 travel for the residential development and these patterns were applied based on the build-out of Rural Southwest. Table 13 below summarizes the distributions.

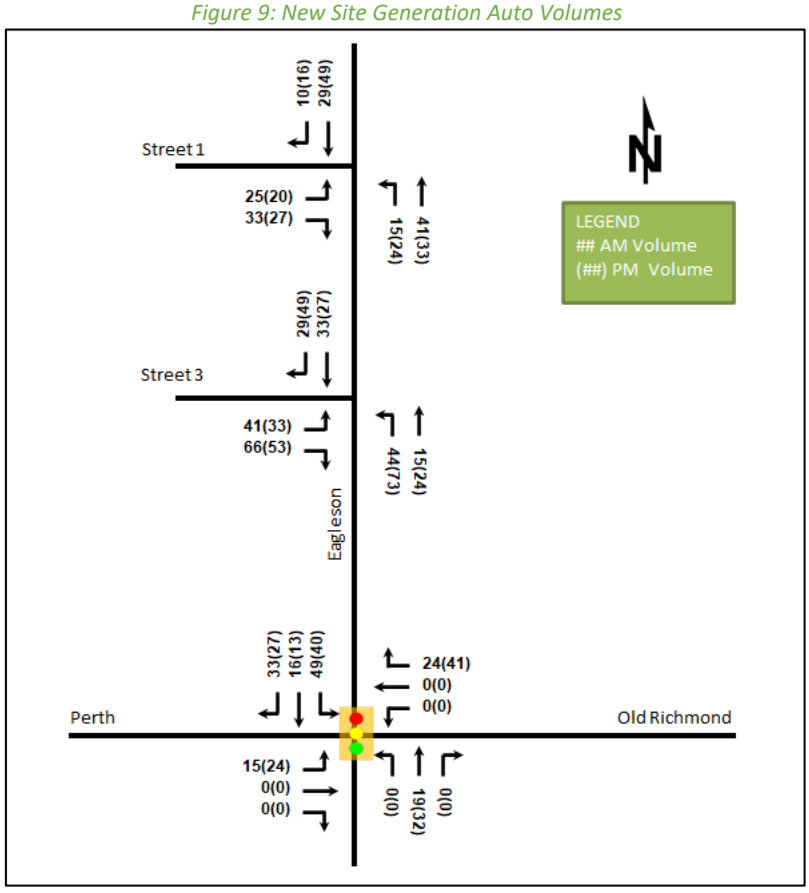
Table 13: OD Survey Existing Mode Share – Rural Southwest

To/From	% of Trips	Outbound Via	Inbound Via
North	40%	35% Eagleson Rd N, 5% Old Richmond Rd	35% Eagleson Rd N, 5% Old Richmond Rd
South	5%	Eagleson Rd S	Eagleson Rd S
East	25%	Old Richmond Rd	20% Old Richmond Rd, 5% Eagleson Rd S
West	30%	20% Perth St 5% Eagleson Rd N, 5% Eagleson Rd S	15% Perth St, 5% Eagleson Rd N, 10% Eagleson Rd S
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 9 illustrates the new site generated volumes.

Figure 9: New Site Generation Auto Volumes



6 Background Network Travel Demand

6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3 and no changes are anticipated within the horizons of this TIA.

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 14 summarizes the results of the model and the projections are provided in Appendix E.

Table 14: 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
Perth St/Old Richmond Rd	2.02%	0.78%	2.03%	-3.16%
	Northbound	**Southbound**	**Northbound**	**Southbound**
Eagleson Rd	0.38%	2.44%	-6.25%	2.93%

Forecasted growth in the study area has evidently been achieved in the off-peak directions and generally not yet achieved in the peak directions. In the case of Eagleson Road whose traffic volumes have been impacted by construction, the corrections applied to the counts outlined in Section 2.2.7 result in a remaining growth rate that is commensurate with growth approximated by different means of overcoming these impacts in the 6038 Ottawa Street TIA. Growth rates from existing will be rounded to the nearest 0.25% and will be peak-directionally applied to the mainline volumes on the appropriate links. Negative growth rates will be taken as zero growth.

6.3 Other Developments

The other area developments (Section 2.3.2) explicitly considered in the background conditions include:

- Fox Run Phase 1 – Caivan
- Fox Run Phase 2/3 – Caivan
- Fox Run Phase 4/5 – Caivan
- 6240-6431 Ottawa Street – Mattamy Richmond Subdivision
- 6295, 6363-6409 Perth Street, 6305 Ottawa Street – Caivan
- Samara Square
- 6038 Ottawa Street

Where appropriate, the traffic associated with the area developments have been reassigned using the area road network.

The City has updated its preferred methodology for forecasting trips generated by developments, as outlined in TRANS Trip Generation Manual (2020). Given the high proportion of forecasted volumes expected to add onto existing traffic on the study area road network, a comparison of the trips rates was completed to generate a conversion factor to be applied to previously forecasted traffic volumes.

The conversion factors were determined by comparing the unit trip generation by land use from the Trip Generation Study Report (2009) and the TRANS Trip Generation Manual (2020). In general, the result is a reduction of person trips when trip generation is updated to the 2020 methodology. The background development TIAs were inspected for unit breakdowns and averaged conversion rates were applied to their traffic. The unit conversion factors are summarized in Table 15.

Table 15: TRANS Trip Generation Report Method Conversion Factors, 2009 to 2020

Land Use	Peak Hour Auto Trip Conversion Factor	
	AM	PM
Single Detached Dwellings	0.67	0.79
Townhouses	0.59	0.63
Low Rise Apartments	0.87	0.55

Land Use	Peak Hour Auto Trip Conversion Factor	
	AM	PM
Mid Rise Apartments	0.62	0.40
High Rise Apartments	0.62	0.42
Retail Area	1.02	1.07
Office Area	1.00	1.13

As only peak direction bus service was available, the derived factors were only applied to the background development traffic volumes in the peak directions.

Figure 10 and Figure 11 illustrate the 2027 and 2032 horizons total background development volumes for the study area, respectively, adjusted for the use of the local road network and trip generation refinement.

Figure 10: 2027 Background Development Total Volumes

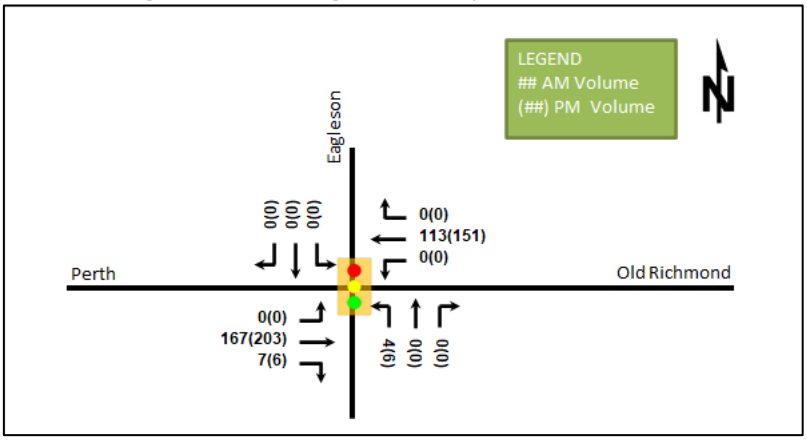
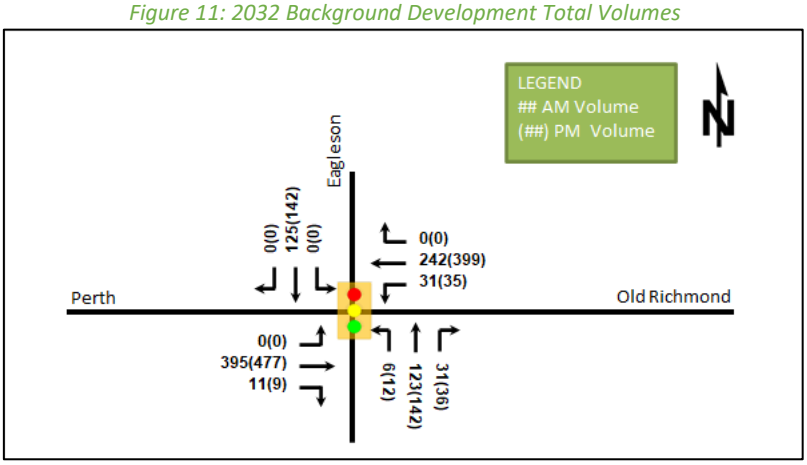


Figure 11: 2032 Background Development Total Volumes



7 Demand Rationalization

7.1 2027 Future Background Intersection Operations

Figure 12 illustrates the 2027 background volumes and Table 16 summarizes the background intersection operations for Eagleson Road and Perth Street/Old Richmond Road. The level of service is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. The signal timing was optimized for the 2027 background horizon. The synchro worksheets for the 2027 are provided in Appendix F.

Figure 12: 2027 Future Background Volumes

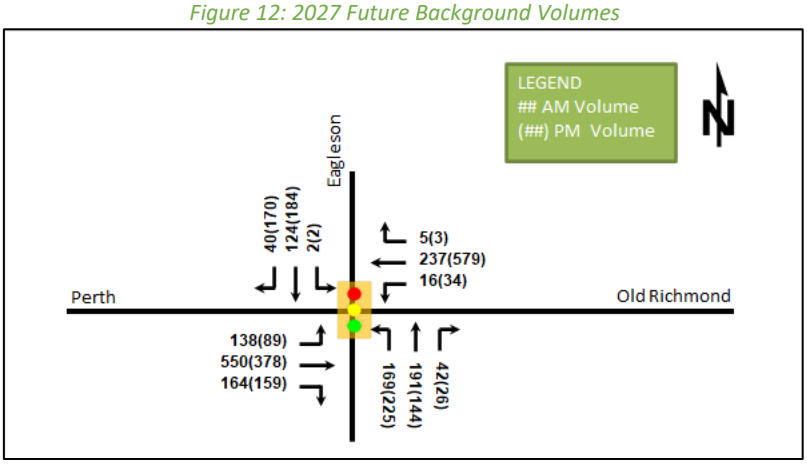


Table 16: 2027 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road & Perth Street/Old Richmond Road ***Signalized***	EBL	A	0.25	10.0	22.3	A	0.47	28.1	28.6
	EBT/R	C	0.79	19.7	135.7	B	0.69	24.2	122.7
	WBL/T	A	0.29	9.7	36.1	D	0.82	32.2	159.0
	WBR	A	0.01	0.0	0.0	A	0.00	0.0	0.0
	NBL	A	0.56	32.6	49.2	C	0.76	43.6	**#83.3**
	NBT/R	A	0.51	27.1	59.3	A	0.26	20.3	40.9
	SBL	A	0.01	23.5	2.0	A	0.00	20.5	2.0
	SBT/R	A	0.36	23.9	41.1	A	0.54	22.8	83.3
	Overall	**B**	**0.70**	**20.1**	**-**	**C**	**0.78**	**28.4**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

During both the AM and PM peak hours, the 2027 future background intersection operates well, and similarly to the existing conditions. The northbound left movement may exhibit extended queues at this horizon.

7.2 2032 Future Background Intersection Operations

Figure 13 illustrates the 2032 background volumes and Table 17 summarizes the background intersection operations for Eagleson Road and Perth Street/Old Richmond Road. The level of service is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. The signal timing was optimized for the 2032 background horizon. The synchro worksheets for the 2032 horizons are provided in Appendix G.

Figure 13: 2032 Future Background Volumes

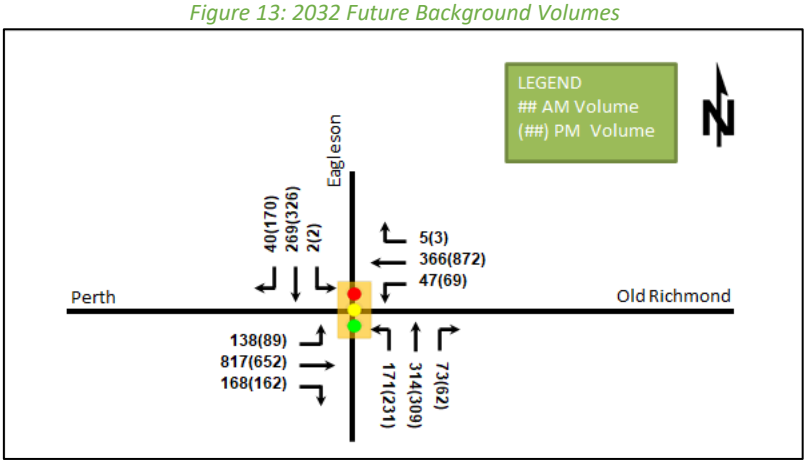


Table 17: 2032 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road & Perth Street/Old Richmond Road *Signalized*	EBL	A	0.28	10.7	22.2	**F**	**1.56**	**348.2**	**#49.9**
	EBT/R	E	0.94	36.2	**#264.4**	E	0.91	41.1	**#251.4**
	WBL/T	C	0.78	26.4	102.6	**F**	**2.33**	**628.4**	**#347.8**
	WBR	A	0.01	0.0	0.0	A	0.00	0.0	0.0
	NBL	E	0.94	**96.1**	**#88.4**	**F**	**1.47**	**273.8**	**#123.7**
	NBT/R	D	0.82	53.9	**#146.6**	A	0.58	33.6	98.6
	SBL	A	0.02	35.0	2.6	A	0.01	24.0	2.1
	SBT/R	B	0.65	44.2	**#100.2**	C	0.78	41.8	141.1
	Overall	**D**	**0.94**	**41.1**	-	**F**	**1.98**	**165.8**	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The 2032 future background intersection operates poorly during the PM peak hour with a forecasted overall v/c ratio of 1.98. During the AM peak hour, the eastbound through/right, northbound left, and northbound through/right movements may exhibit extended queues, and the northbound left may subject to high delays. During the PM peak hour, the eastbound through/right may exhibit extended queues, and the eastbound left, westbound left/through, and northbound left movements are all forecasted to be over theoretical capacity and may be subject to high delays and extended queues.

7.3 Demand Rationalization

7.3.1 Network Improvements

The warrants for the turn lanes at the intersection of Eagleson Road at Perth Street/Old Richmond Road are provided in Appendix H. As shown, the left-turn warrants are met on the northbound, eastbound, and westbound approaches at this intersection at the existing horizon. The existing configuration includes left-turn lanes on all but the westbound approach, where the roadway alignment through the intersection results in a shared left-turn/through lane.

Storage length requirements for all turning movements at the intersection were calculated for the furthest study horizon of 2032 in the background conditions based upon both upon the equation 9.14.1 from Chapter 9 of the Geometric Design Guide for Canadian Roads manual (TAC, 2017) and from the TIA guidelines. A cycle length of 90 seconds was assumed in both the AM and PM peak hours. The calculated storage lengths and are summarized in Table 18, where the resultant length applicable to traffic modeling is additionally presented.

Table 18: Turn Lane Storage Lengths – Future Background 2032

Movement	AM Peak Hour		PM Peak Hour		Modeled Length (m)
	Length Per TIA Guidelines (m)	Length Per TAC Manual (m)	Length Per TIA Guidelines (m)	Length Per TAC Manual (m)	
NBL	44.9	39.9	60.6	53.9	65
NBR	19.2	17.0	16.3	14.5	-
SBL	0.5	0.5	0.5	0.5	38
SBR	10.5	9.3	44.6	39.7	45
EBL	36.2	32.2	23.4	20.8	40
EBR	44.1	39.2	42.5	37.8	-
WBL	12.3	11.0	18.1	16.1	38
WBR	1.3	1.2	0.8	0.7	-

The intersection improvements for the Eagleson Road & Perth Street/Old Richmond Road intersection would be completed in conjunction with the City's Perth Street widening project from the Transportation Master Plan. In addition to the left-turn lanes warrants and storage length requirements, a southbound right-turn lane would also be required. The southbound right-turn movement comprises approximately 34% of the advancing volumes (170 PM turning vehicles in total). The eastbound right-turn is within the range of a potential right-turn lane being required (approximately 18% of the advancing volumes or 168 AM turning vehicles and 162 PM turning vehicles) and can be explored by the City once they initiate the design process for the Perth Street and intersection improvements.

Table 19 summarizes the intersection operations for the 2032 background horizon with the above-described left-turn and southbound right-turn lane modifications. The level of service is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. Given the proposed geometric changes, and changes to the proportions of volumes on the intersection approaches, signal optimization has been performed and includes the addition of protected turn phases, and an increase in the all-red clearance interval given the widened geometry. The synchro worksheets for the mitigated 2032 horizon are provided in Appendix I.

Table 19: 2032 Future Background Intersection Operations with Perth Street Widening

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road & Perth Street/Old Richmond Road ***Signalized***	EBL	A	0.34	15.6	22.6	A	0.49	25.1	17.5
	EBT/R	D	0.83	30.0	103.2	D	0.81	33.5	86.6
	WBL	A	0.23	14.7	9.4	A	0.35	19.9	14.3
	WBT/R	A	0.35	21.2	34.5	D	0.86	37.5	**#99.7**
	NBL	A	0.58	29.3	**#37.8**	B	0.69	30.8	**#45.7**
	NBT/R	A	0.59	24.9	82.1	A	0.50	20.9	70.2
	SBL	A	0.01	27.5	2.1	A	0.01	27.0	2.0
	SBT	C	0.72	42.5	**#70.6**	D	0.83	50.6	**#94.3**
	SBR	A	0.09	0.3	0.0	A	0.35	5.3	11.1
	Overall	**D**	**0.81**	**27.6**	**-**	**D**	**0.82**	**32.6**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The study area intersection is forecasted to operate well at the 2032 future background horizon with the intersection improvements. Extended queueing may be observed on the northbound left and southbound through movements during the AM peak hour and westbound shard through/right, northbound left and southbound through movements during the PM peak hour.

While addressing the operational and lane deficiencies, the isolated improvement of the intersection would require the City to undertake a larger study and design for the widening of Perth Street from Eagleson Road to Shea Road to address property, access, and utility constraints.

7.3.2 Modal Share Sensitivity

The mode shares employed within this report represent the recommended Rural Southwest shares from the TRANS Trip Generation Report, modified in the off-peak direction based upon the lack of existing off-peak transit service in the Village. Given that the population of Richmond Village is expected to more than double from its 2011 value by 2032, a higher transit mode share could be realized if the City provided additional transit service for the expanded potential ridership base.

7.3.3 Demand Rationalization Conclusions

The village context coupled with the limited existing and planned transit service do not permit the reduction of auto trips beyond the recommended rates from the subject or background Richmond Village developments.

Site traffic is anticipated to comprise almost all of the future traffic on the westbound right and southbound left movements, given their low existing and forecasted background volumes. Site traffic is anticipated to comprise 21% or less of traffic on the eastbound left movement (15 AM and 24 PM vehicles), 9% or less on the northbound through movement (19 AM and 32 PM vehicles), 6% or less of traffic on the southbound through movement 16 AM and 13 PM vehicles), and 45% or less of traffic on the southbound right movement (33 AM and 27 PM vehicles) in the 2032 future total conditions. With the exception of the eastbound left movement during the PM peak hour, site these site-impacted movements each have residual capacity.

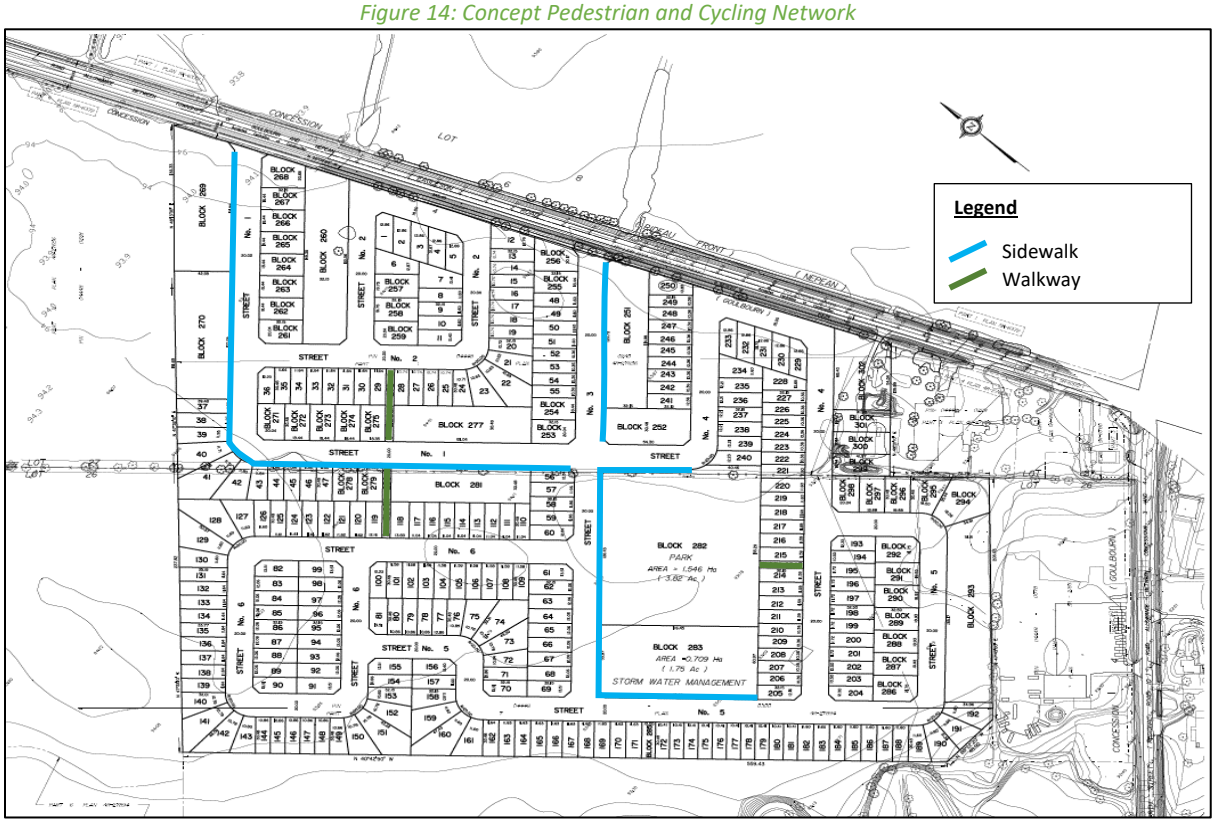
The City's planned Perth Street widening could potentially reduce the v/c of the intersection of Eagleson Road at Perth Street/Old Richmond Road to 0.82 or less and on individual movements to 0.86 or less during both peak hours.

8 Development Design

8.1 Design for Sustainable Modes

The proposed development is a residential subdivision where each dwelling will include a driveway and garage. Bicycle parking is assumed to be within the individual units. Figure 14 illustrates the planning context of the pedestrian and cycling network.

Figure 14: Concept Pedestrian and Cycling Network



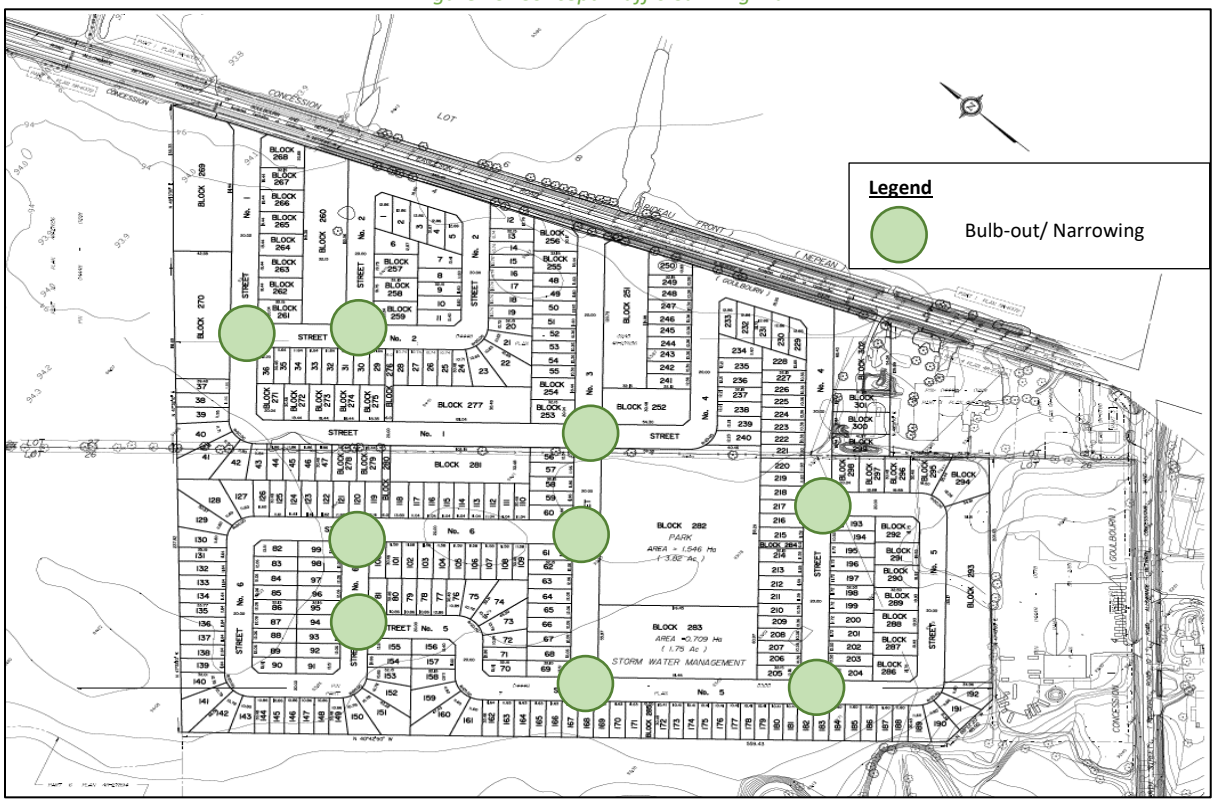
8.2 New Street Networks

The planned street network will include 20.0-metre local roadways with 18.0-metre window streets. The local roads are proposed to be posted as 30 km/h.

To support the pedestrian and cycling connectivity within the subdivision, Figure 17 illustrates the concept traffic calming plan. Traffic calming elements are recommended at the internal intersections, including bulb-outs to narrow each approach to the intersection (e.g. reduced crossing distance).

The internal road intersections are recommended to be stop-controlled on the minor approaches of all intersections.

Figure 15: Concept Traffic Calming Plan



9 Boundary Street Design

Table 20 summarizes the MMLOS analysis for the boundary streets of Eagleson Road. The existing and future conditions for the street will be the same and are considered in one row. The boundary street analysis is based on the policy area of Village. The MMLOS worksheets have been provided in Appendix J.

Table 20: Boundary Street MMLOS Analysis

Segment	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target
Eagleson Road	F	C	F	D	-	-	D	D

Eagleson Road does not meet the pedestrian and bicycle LOS targets. To meet the pedestrian LOS target, at least a two-metre-wide sidewalk with a greater than two-metre-wide boulevard would be required. To meet the bicycle LOS target, physically separated facilities or the reduction of operating speed to less or equal to 40 km/h would be required.

10 Access Intersections Design

10.1 Location and Design of Access

The internal road network will connect to the adjacent arterial road network via two local road connections (Street 1 and Street 3) to Eagleson Road. Within the subdivision, no turn lanes are proposed for the internal intersections which will be controlled by minor stop control.

Turn-lane warrants for the northbound left movements at both access intersections are provided in Appendix K. The volumes at both access intersections were found to warrant a northbound left-turn lane as of the 2027

conditions, with only the volumes at the intersection of Eagleson Road at Street 1 not meeting warrants during the AM peak hour at the 2027 horizon. Consequently, it is recommended that the intersection operations be analyzed to determine whether a necessary improvement in level of service is achieved for the given intersection volumes by providing an auxiliary northbound left turn lane. Based upon equation 9.14.1 in the TAC Geometric Design Guide (2017), the modeled conditions will include a storage length of 8 metres given the highest forecasted turning volume of 24 vehicles in the PM peak hour for the Street 1 intersection and a storage length of 15 metres given the highest forecasted turning volume of 73 vehicles in the PM peak hour at the Street 3 intersection.

10.2 Intersection Control

As the intersections of Eagleson Road at Street 1 and Eagleson Road at Street 3 do not warrant signalization, the site accesses are proposed as having stop-control on the minor approaches, with Eagleson Road operating under free-flow conditions. Signal warrants are provided in Appendix L.

10.3 Access Intersection Design

10.3.1 2027 Future Total Access Intersection Operations

The 2027 future total intersection volumes are illustrated in Figure 16 and the access intersection operations without the inclusion of a northbound left-turn lanes are summarized below in Table 21. Synchro 11 has been used to model the unsignalized intersections and HCM 2010 methodology was used for unsignalized intersection operations. The synchro worksheets have been provided in Appendix M.

Figure 16: 2027 Future Total Volumes

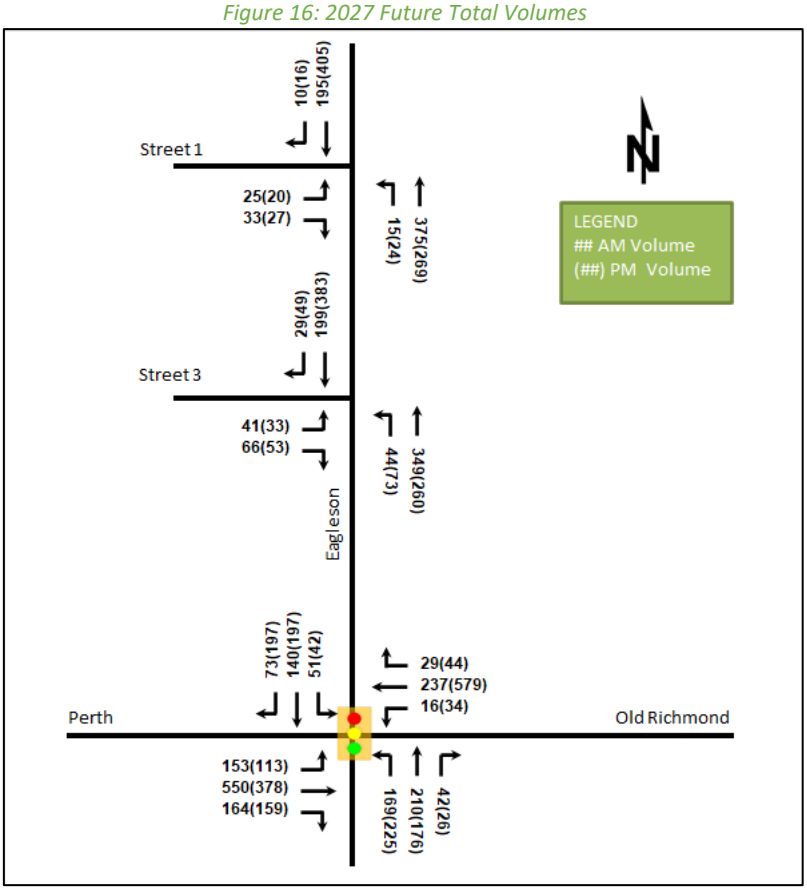


Table 21: 2027 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road at Street 1 ***Unsignalized***	EB	B	0.09	11.5	2.3	B	0.10	13.0	2.3
	NB	A	0.01	7.7	0.0	A	0.02	8.2	0.8
	SB	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**1.2**	**-**	**A**	**-**	**1.1**	**-**
Eagleson Road at Street 3 ***Unsignalized***	EB	B	0.18	12.3	4.5	B	0.19	14.5	5.3
	NB	A	0.03	7.8	0.8	A	0.07	8.4	1.5
	SB	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**2.3**	**-**	**A**	**-**	**2.2**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The 2027 future total access intersections operate well without the inclusion of the northbound left-turn lanes. The northbound lane at each intersection is anticipated to operate with a level of service A.

To determine the effect of the inclusion of the warranted northbound left-turn lanes, a sensitivity analysis will be performed. The 2027 future total access intersection operations with the inclusion of a northbound left-turn lane at each access intersection are summarized below in Table 22. The synchro worksheets have been provided in Appendix M.

Table 22: 2027 Future Total Access Intersection Operations with NB LTL

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road at Street 1 ***Unsignalized***	EB	B	0.09	11.4	2.3	B	0.10	13.0	2.3
	NBL	A	0.01	7.7	0.0	A	0.02	8.2	0.8
	NBT	-	-	-	-	-	-	-	-
	SB	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**1.2**	**-**	**A**	**-**	**1.1**	**-**
Eagleson Road at Street 3 ***Unsignalized***	EB	B	0.18	12.3	4.5	B	0.18	14.4	5.3
	NBL	A	0.03	7.8	0.8	A	0.07	8.4	1.5
	NBT	-	-	-	-	-	-	-	-
	SB	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**2.3**	**-**	**A**	**-**	**2.2**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The 2027 future total access intersections operate similarly to with the inclusion of a northbound left-turn lane at each access intersection as without the lanes. As would be expected, the low delay and queue has shifted to the left-turn lane, with the northbound through movement operating under a free-flow condition.

10.3.2 2032 Future Total Access Intersection Operations

The 2032 future total intersection volumes are illustrated in Figure 17 and the access intersection operations without the inclusion of a northbound left-turn lane at either access intersection are summarized below in Table 23. Synchro 11 has been used to model the unsignalized intersections and HCM 2010 methodology was used for unsignalized intersection operations. The synchro worksheets have been provided in Appendix N.

Figure 17: 2032 Future Total Volumes

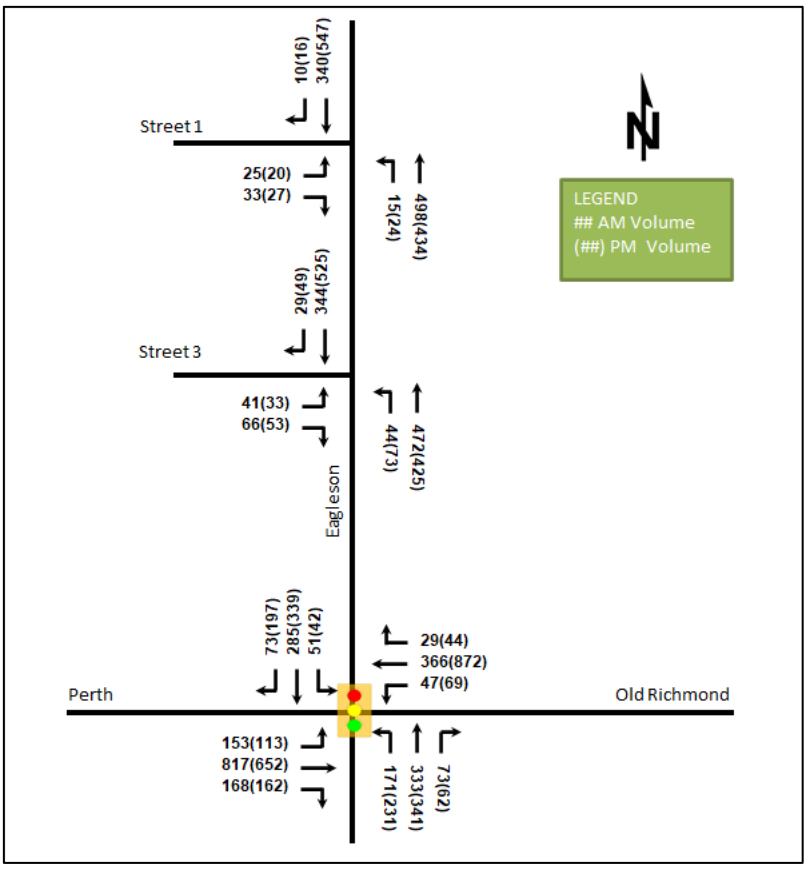


Table 23: 2032 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road at Street 1 ***Unsignalized***	EB	B	0.13	14.0	3.0	C	0.13	16.6	3.8
	NB	A	0.01	8.0	0.0	A	0.02	8.7	0.8
	SB	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**1.0**	**-**	**A**	**-**	**0.9**	**-**
Eagleson Road at Street 3 ***Unsignalized***	EB	B	0.22	14.3	6.0	C	0.20	17.9	5.3
	NB	A	0.04	8.2	0.8	A	0.07	8.9	1.5
	SB	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**2.0**	**-**	**A**	**-**	**2.0**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The 2032 future total access intersections operate well without the inclusion of a northbound left-turn lane at either access intersection. The northbound lanes are anticipated to continue to operate with a level of service A.

As in the 2027 conditions, an operational sensitivity analysis will be performed based upon the inclusion of the warranted northbound left-turn lanes. The 2032 future total access intersection operations with the inclusion of a northbound left-turn lane at each access intersection are summarized below in Table 22. The synchro worksheets have been provided in Appendix N.

Table 24: 2032 Future Total Access Intersection Operations with NB LTL

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road at Street 1 ***Unsignalized***	EB	B	0.13	14.0	3.0	B	0.10	13.0	2.3
	NBL	A	0.01	8.0	0.0	A	0.02	8.2	0.8
	NBT	-	-	-	-	-	-	-	-
	SB	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**1.2**	**-**	**A**	**-**	**1.1**	**-**
Eagleson Road at Street 3 ***Unsignalized***	EB	C	0.24	15.5	6.8	C	0.26	19.3	7.5
	NBL	A	0.04	8.2	0.8	A	0.07	8.9	1.5
	NBT	-	-	-	-	-	-	-	-
	SB	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**2.0**	**-**	**A**	**-**	**2.0**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

As with the 2027 access intersection operations, the 2032 future total access intersections operate similarly to the conditions without the northbound left-turn lane at each access intersection. Again, the low impacts of the development turning movements are shifted to the left-turn lanes, with the through lanes operating under free-flow conditions. Minor impacts to average delay of less than two seconds are noted on the eastbound approach at the Street 3 access intersection whose impacts are contained within the development.

10.3.3 Access Intersection MMLOS

The access intersection is unsignalized, and therefore no access intersection MMLOS analysis is required.

10.3.4 Recommended Design Elements

The design elements for the site access intersections are typical for access to rural arterial roads.

As summarized, the northbound Eagleson Road operates well without the inclusion of the northbound left-turn lanes. Although warranted, these lanes are not required to support the site operations. This effect is further supported by the similarity of the operations between the two site accesses at the 2027 horizon during the AM peak hour where the warrant outcomes differ. Despite the Street 3 access being subject to higher turning movements, the operations for the northbound approaches at the two site accesses during this hour amount to a maximum difference of 0.02 in v/c ratio, 0.1 seconds in average delay, and 0.8m in 95th percentile queue where one left-turn lane is warranted by volumes and one is not.

To further understand the queuing conditions without the left-turn lane, SimTraffic was used to perform a queuing/delay analysis during the critical PM peak hour at the 2032 total horizon for the intersection of Eagleson Road at Street 3. The 95th percentile queue on a shared northbound left-turn/through movement was found to be 3.5 car lengths in the PM peak hour at the 2032 future total horizon. The average queue was found to be 1.3 car-lengths during this analysis period. As such, while queues may be slightly longer that represented within the Synchro analysis, they do represent a significant impact to Eagleson Road. The SimTraffic report is provided in Appendix O.

Given the foregoing, it is recommended that no northbound left-turn lanes be planned or implemented as part of the design of the intersection of Eagleson Road and Street 1 and of Eagleson Road and Street 3.

11 Transportation Demand Management

11.1 Context for TDM

The mode shares used within the TIA represent the unmodified district mode shares in the peak direction with no transit trips in the off-peak directions. Overall, these modal shares are likely to be achieved, however, given the stated intention of not expanding bus service in the Village, limited opportunity to provide supporting TDM measures exists to encourage shifts towards sustainable modes.

The subject site is within the Richmond Village CDP area. The total bedroom count within the development is subject to the final unit count and layout selections by purchasers. No age restrictions are noted.

11.2 Need and Opportunity

The subject site has been assumed to rely predominantly on auto travel, and assumptions have been carried through the analysis. Given the high auto mode share, there is no risk of not meeting the applied modal shares.

11.3 TDM Program

The "suite of post occupancy TDM measures" has been summarized in the TDM checklist. The checklist is provided in Appendix P. Given the transit limitations previously discussed, the only TDM measure recommended is the provision of a multimodal travel option information package to new residents.

12 Transit

12.1 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 25 summarizes the transit trip generation.

Table 25: Trip Generation by Transit Mode

Travel Mode	Mode Share	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Transit	varies	0	70	70	39	0	39

The proposed development is anticipated to generate 70 outbound AM peak hour transit trips and 39 inbound PM peak hour transit trips.

It is assumed that as Richmond Village builds out, routing for the current single Connexion route will be modified to service new development areas. The required increase in service along the frontage of the site to accommodate the new riders generated by the site is anticipated to be on the order of an additional two standard buses per peak hour.

12.2 Transit Priority

At both future horizons, assuming the intersection improvements are employed at the 2032 horizon, the site traffic is anticipated to increase average delay on existing transit movements by no more than 2 seconds. No transit mitigation is required for this development.

13 Network Concept

The subject development is in line with the intended context set by the Development Reserve zoning for the subject parcel. No future network changes are required to support the subject development.

14 Network Intersection Design

14.1 Network Intersection Control

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

14.2 Network Intersection Design

14.2.1 2027 Future Total Network Intersection Operations

The 2027 future total network intersection operations are summarized below in Table 26. 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 signal timing has been optimized for the 2027 future total horizon. The synchro worksheets have been provided in Appendix M.

Table 26: 2027 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)
Eagleson Road & Perth Street/Old Richmond Road *Signalized*	EBL	A	0.29	10.4	22.7	B	0.62	36.0	**#39.3**
	EBT/R	D	0.82	20.9	123.6	C	0.71	23.1	104.0
	WBL/T	A	0.30	9.8	32.9	D	0.85	33.1	**#150.3**
	WBR	A	0.04	2.4	2.6	A	0.06	5.7	6.0
	NBL	A	0.57	31.4	45.0	D	0.82	48.6	**#71.6**
	NBT/R	A	0.54	25.6	57.2	A	0.31	17.7	37.2
	SBL	A	0.19	23.0	15.7	A	0.10	16.9	10.7
	SBT/R	A	0.45	22.0	45.6	A	0.60	20.1	69.6
	Overall	**C**	**0.72**	**20.0**	-	**D**	**0.83**	**27.7**	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The network intersection at the 2027 future total horizon is forecasted to operate similarly to the 2027 background conditions. With the addition of site traffic, the eastbound left and westbound through/left movements may exhibit extended queues during the PM peak hour at the intersection.

14.2.2 2032 Future Total Network Intersection Operations

The 2032 future total network intersection operations are summarized below in Table 27, based upon the existing intersection geometry. 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 signal timing has been optimized for the 2032 future total horizon. The synchro worksheets have been provided in Appendix N.

Table 27: 2032 Future Total Network Intersection Operations with Existing Geometry

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road & Perth Street/Old Richmond Road *Signalized*	EBL	A	0.33	12.3	25.0	**F**	**1.79**	**436.5**	**#59.2**
	EBT/R	E	0.99	47.7	**#249.3**	D	0.90	38.4	**#233.2**
	WBL/T	E	0.91	45.4	**#121.9**	**F**	**2.20**	**569.5**	**#313.3**
	WBR	A	0.03	2.2	2.6	A	0.06	6.0	6.4
	NBL	**F**	**1.01**	**106.4**	**#69.3**	**F**	**1.94**	**477.0**	**#101.0**
	NBT/R	D	0.82	44.5	**#110.2**	B	0.65	34.4	103.1
	SBL	A	0.38	35.5	18.3	A	0.20	27.3	15.0
	SBT/R	C	0.72	37.6	**#86.0**	D	0.87	47.5	**#162.3**
	Overall	**E**	**1.00**	**46.5**	-	**F**	**2.09**	**245.6**	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The network intersection at the 2032 future total horizon is forecasted to operate similarly to the 2032 background conditions, with the existing geometry. Primarily through the addition of southbound through volumes, the northbound left-turn movement is forecasted to be over theoretical capacity during the AM peak hour and be subject to an increase in average delay during the PM peak hour. Extended queues may be exhibited on the westbound left/through movement during the AM peak hour and on the southbound through/right-turn movement during the PM peak hour.

The 2032 future total network intersection operations assuming the inclusion of intersection improvements associated with the City's planned Perth Street widening are summarized below in Table 28. Protected left-turn phases have been included in the phasing and the signal timing has been optimized for the 2032 future total horizon. The synchro worksheets have been provided in Appendix Q.

Table 28: 2032 Future Total Network Intersection Operations with Perth Street Improvements

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Eagleson Road & Perth Street/Old Richmond Road ***Signalized***	EBL	A	0.39	16.9	26.1	A	0.60	30.5	**#24.0**
	EBT/R	D	0.82	30.9	**#114.9**	C	0.76	30.6	84.5
	WBL	A	0.26	17.1	9.9	A	0.34	19.2	14.0
	WBT/R	A	0.48	26.6	40.1	D	0.86	37.3	**#109.4**
	NBL	A	0.56	26.4	34.7	C	0.75	36.4	**#51.7**
	NBT/R	A	0.60	24.5	83.7	A	0.56	23.0	79.9
	SBL	A	0.26	32.3	17.3	A	0.20	31.2	14.7
	SBT	C	0.77	45.7	**#78.9**	D	0.85	54.0	**#101.8**
	SBR	A	0.16	0.7	0.0	A	0.40	7.4	16.4
	Overall	**D**	**0.84**	**28.6**	-	**D**	**0.85**	**32.8**	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The network intersection at the 2032 future total horizon is forecasted to operate similarly to the 2032 background conditions including the widening of Perth Street and the modifications proposed.

With the additional site traffic, the eastbound left-turn movement may exhibit extended queues during PM peak hour. Additionally, with the optimization of signal timing for the changes in volumes at the intersection, extended queueing is forecasted to be exhibited on the eastbound through/right movement, but not on the northbound left movement during the PM peak hour at this horizon. None of the forecasted queue lengths extends to adjacent intersections or past the available storage modeled at the total conditions or assumed within the background conditions.

14.2.3 Network Intersection MMLOS

Table 29 summarizes the MMLOS analysis for the network intersections of Eagleson Road and Perth Street/Old Richmond Road. It is assumed that the intersection of Eagleson Road & Perth Street/Old Richmond Road will have pedestrian and cyclist facilities in future conditions as part of the City's Perth Street widening, including standard transverse crosswalk markings, pocket bike lanes, and bike boxes on all approaches. The intersection analysis is based on the policy area of Village. The MMLOS worksheets has been provided in Appendix I.

Table 29: 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
Eagleson Road & Perth Street/Old Richmond Road (Existing)	F	C	F	B	N/A	N/A	C	D	D	D
Eagleson Road & Perth Street/Old Richmond Road (Future)	F	C	B	B	N/A	N/A	C	D	D	D

The pedestrian LOS will not be met at Eagleson Road and Perth Street/Old Richmond Road intersection in both existing and future conditions. To meet the pedestrian targets, the maximum crossing distance on all pedestrian crossings would need to be reduced to three lane-widths.

The bicycle LOS will not be met at Eagleson Road and Perth Street/Old Richmond Road intersection in existing conditions due to the mixed traffic approaches and will be met in future conditions under the assumed conditions.

14.2.4 Recommended Design Elements

With respect to the increases in volumes due to site traffic, the geometric recommendations will be once again examined. The calculated values for the storage lengths for auxiliary lanes at the study area intersection for the 2032 total conditions are summarized in Table 30. 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 from the TIA guidelines assuming a 90-second cycle length in both peak hours. The lengths modeled for the 2032 future total operational analysis are included in the final row of the table.

Table 30: Turn Lane Storage Lengths

Movement	AM Peak Hour		PM Peak Hour		Modeled Length (m)
	Length Per TIA Guidelines (m)	Length Per TAC Manual (m)	Length Per TIA Guidelines (m)	Length Per TAC Manual (m)	
NBL	44.9	39.9	60.6	53.9	65
NBR	19.2	17.0	16.3	14.5	-
SBL	13.4	11.9	11.0	9.8	38
SBR	19.2	17.0	51.7	46.0	55
EBL	40.2	35.7	29.7	26.4	45
EBR	44.1	39.2	42.5	37.8	-
WBL	12.3	11.0	18.1	16.1	38
WBR	7.6	6.8	11.6	10.3	-

The calculated storage length requirements increased primarily for the southbound left-turn lane and the westbound right movement, each having previously been subject to low volumes. An increase in calculated storage for the southbound right-turn lane of 7.1 metres in the PM peak hour resulted in an increase in the modeled length of ten metres to become 55 metres. It is noted that the 95th percentile queue on the movement is anticipated to be a maximum of 11.1 metres in the background conditions and 16.4 metres in the total conditions. An increase in the calculated storage for the eastbound left-turn lane was noted in the AM peak hour of 4.0 metres which resulted in an increase of the modeled length of five metres to become 45 metres. It is noted that the 95th percentile queue on the movement is anticipated to be a maximum of 22.6 metres in the background conditions and 26.1 metres in the total conditions.

It is recommended that the calculated and modeled lengths presented in Table 30 be considered within the City's functional design of the intersection for the widening of Perth Street between Shea Road and Eagleson Road.

15 Summary of Improvements Indicated and Modifications Options

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

Proposed Site and Screening

- The proposed site includes 130 townhouses, 74 semi-detached dwellings, and 250 detached single-family dwellings units
- Accesses are proposed onto Eagleson Road via two full-movements accesses
- The development is proposed to be completed by 2027
- The trip generation and safety triggers were met for the TIA Screening

Existing Conditions

- Eagleson Road, Perth Street, and Old Richmond Road are arterial roads in the study area
- Sidewalks are provided along both sides of Perth Street to Shea Road
- Paved shoulder is provided along Perth Street/Old Richmond Road east of Shea Road
- Perth Street is spine route and Shea Road, Musket Way, and Eagleson Road south of Perth Street are local routes
- The high volumes roadways have produced a high number of collisions at the segment of Old Richmond Road between Perth Street and Cambrian Road, which has 38% of the collisions within the study area with weather having a large effect on collisions at this location
- During both the AM and PM peak hours, the study area intersection operates well in existing condition

Development Generated Travel Demand

- The proposed development is forecasted produce 395 two-way people trips during the AM peak hour and 415 two-way people trips during the PM peak hour
- Of the forecasted people trips, 261 two-way trips will be vehicle trips during the AM peak hour and 295 two-way trips will be vehicle trips during the PM peak hour, based upon no bus service in the off-peak directions
- Of the forecasted trips, 40% are anticipated to travel north, 5% to the south, 25% to the east, and 30% to both the west

Background Conditions

- The background growth rates derived from the 2011 and 2031 TRANS model horizons and to the appropriate roadway's mainline volumes and to the appropriate major turning movements at the intersections
- The traffic associated with the area developments have been reassigned using the area road network, and an overall peak-direction reduction in forecasted trips has been applied to the subject developments based upon updated trip generation methodology
- The City's TMP project of the widening of Perth Street is recommended for implementation by the 2032 future background horizon as the capacity constraints are forecasted to be present to a high degree at the study area intersection

- The intersection of Eagleson Road at Perth Street/Old Richmond Road warrants auxiliary left-turn lanes on all approaches, an auxiliary right-turn lane on the southbound approach, and potentially an auxiliary right-turn lane on the eastbound approach during the existing and background conditions
- The future conditions at the network intersection have been analyzed with the warranted turn lanes and with the addition of through lanes on the eastbound and westbound approaches as part of the TMP widening
- The study area intersection is anticipated to operate well at the 2032 background horizon assuming these improvements are implemented
- OC Transpo has indicated no additional routes will be added for Richmond Village by the buildout horizon, and no transit will be assumed in the off-peak direction

Development Design

- The bike and auto parking areas are to be located at each dwelling unit
- Pedestrian connections are recommended to be provided to connect residents to the park and storm water management pond
- Traffic calming elements including bulb-outs at internal road intersections are recommended to be included in the design

Boundary Street Design

- The boundary streets will not meet the pedestrian and bicycle LOS, which require at least a two-metre-wide sidewalk, larger than two-meter boulevard width, or operating speed to less or equal to 40 km/h
- No mitigation is required for the subject development and the City is responsible for improvements along arterial roadways

Access Intersections Design

- The internal road network will connect to the adjacent arterial road network of Eagleson Road via two local road connections (Street 1 and Street 3)
- The site accesses are proposed to be stop-controlled on the minor approaches
- The 2027 and 2032 future total access intersections operate well
- Northbound left-turn lane volume warrants are met for both intersections at both study horizons with the exception of the 2027 AM horizon for the Street 1 intersection
- No operational improvements are noted by the implementation of these turn lanes
- The northbound left-turn lanes are not recommended along Eagleson Road at the site access intersections

TDM

- Limited opportunity for employing TDM measures exists given no addition of transit routes is planned
- Supportive TDM measures to be included within the proposed development should consist of the provision a multimodal travel option information package to new residents

Transit

- 70 outbound AM transit trips and 39 inbound PM transit trips are anticipated for the development
- The forecasted new transit trips would result in the approximately two standard capacity buses
- Delays on existing transit movements are anticipated to be two seconds or less assuming intersection improvements are implemented

Network Concept

- The subject development is in line with the intended context set by the Development Reserve zoning for the subject parcel
- No network concept changes are required to support this development

Network Intersection Design

- Generally, the network intersections at the 2027 future total horizon will operate similarly to the 2027 background conditions
- Under the existing conditions, operations at the 2032 horizon are anticipated to further degrade in the PM peak hour with the addition of site traffic
- Assuming the City implements the Perth Street widening project, the operations are the intersection is forecasted to operate well where the addition of site traffic may result in an increase in queueing on the eastbound approach during the PM peak hour
- The pedestrian LOS will not be met at the Eagleson Road and Perth Street/Old Richmond Road intersection in both existing and future conditions, which require crossing distances to be equal or less than three-lane widths
- The bicycle LOS will not be met at the Eagleson Road and Perth Street/Old Richmond Road intersection in existing condition, but will be met in future condition under the assumed conditions
- The storage lengths identified as being required within this study for the City's future design of the auxiliary turn lanes at the intersection of the Eagleson Road and Perth Street/Old Richmond Road are:
    - NBL: 65 metres
    - SBL: 38 metres
    - SBR: 55 metres
    - EBL: 45 metres
    - WBL: 38 metres

16 Conclusion

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

Prepared By:

John Kingsley, EIT
Transportation Engineering-Intern

Reviewed By:

Andrew Harte, P.Eng.
Senior Transportation Engineer

Appendix A

TIA Screening Form and Certification Form

13 Markham Avenue
Ottawa ON K2G 3Z1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 21-Apr-20
Project Number: 2020-22
Project Reference: Cardel Creekside 2

1.1 Description of Proposed Development	
Municipal Address	2770 Eagleson Road
Description of Location	Composite of 11.1 ha trapezoid fronting Eagleson Rd and 13.8 ha rectangle ~100m north of Perth St
Land Use Classification	Development Reserve (DR1)
Development Size	163 singles and 159 townhomes (422 units)
Accesses	2 all-movement accesses onto Eagleson Rd
Phase of Development	One Phase
Buildout Year	2025
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Single-family homes	
Development Size	422	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
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	No
Location Trigger	No

1.4. Safety Triggers	
Are posted speed limits on a boundary street 80 km/hr or greater?	Yes
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
Is the proposed driveway within auxiliary lanes of an intersection?	No
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?	No
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.

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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)
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Appendix B

Turning Movement Count Data

CGH TRANSPORTATION

Transportation Services - Traffic Services

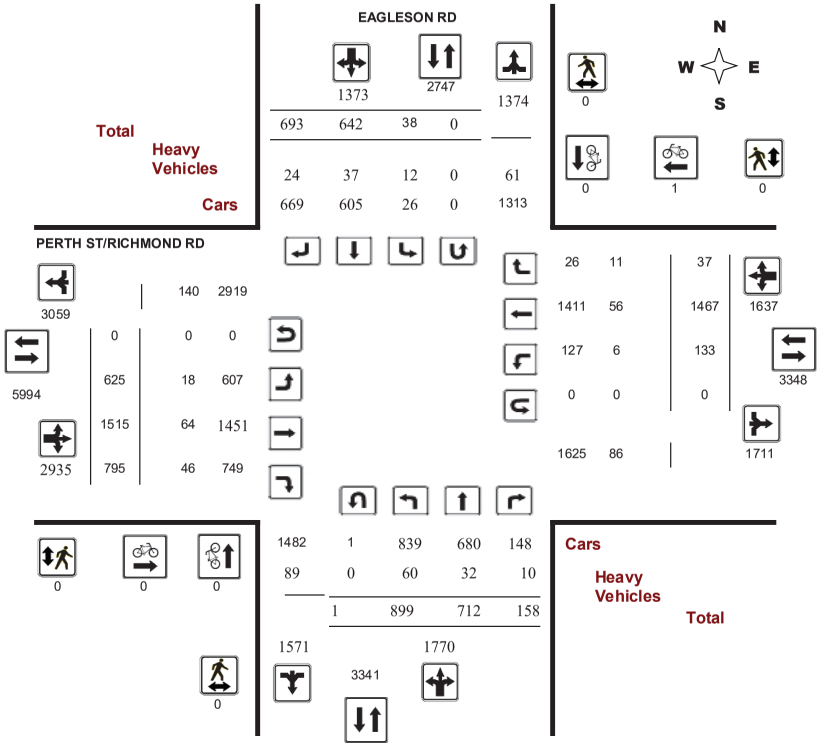
Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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

Full Study Diagram



Transportation Services - Traffic Services

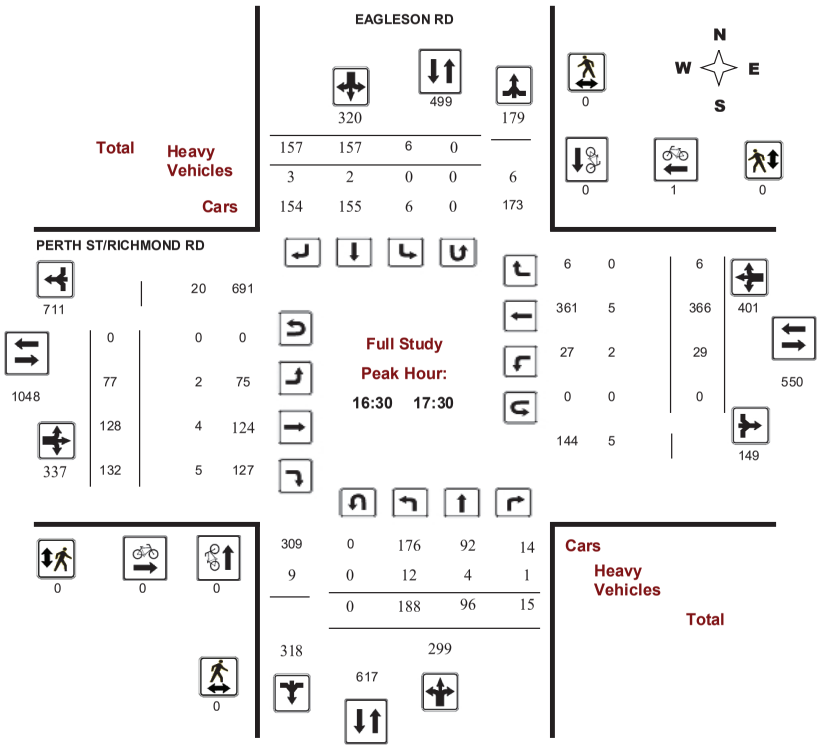
Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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

Full Study Peak Hour Diagram



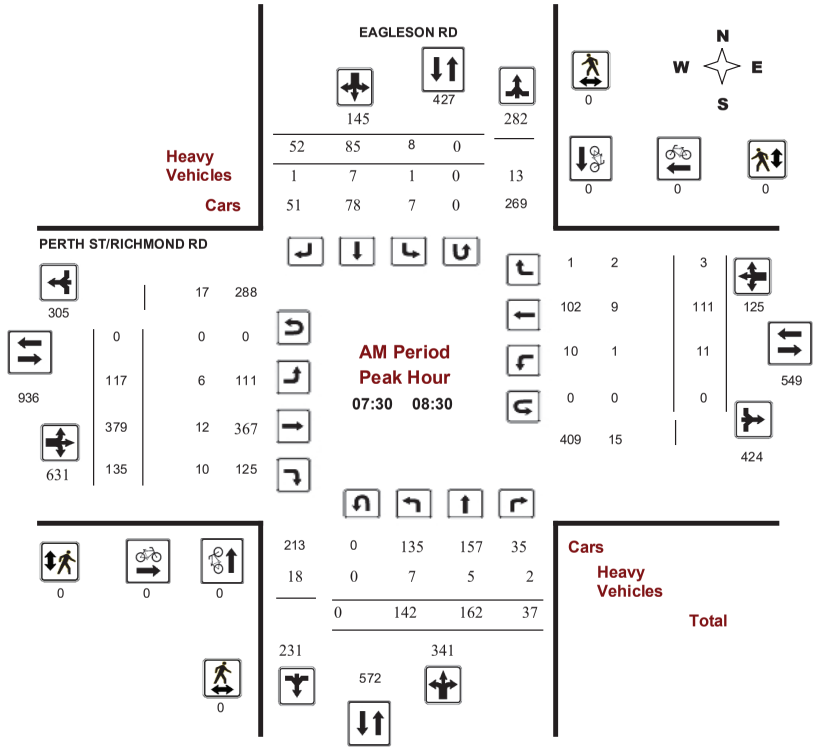
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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



Comments

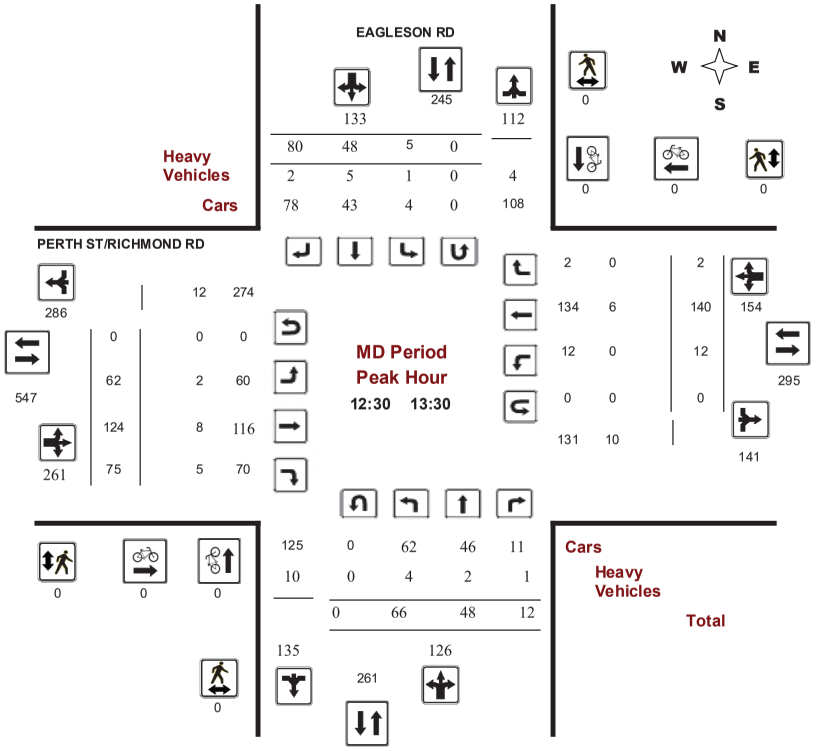
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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



Comments

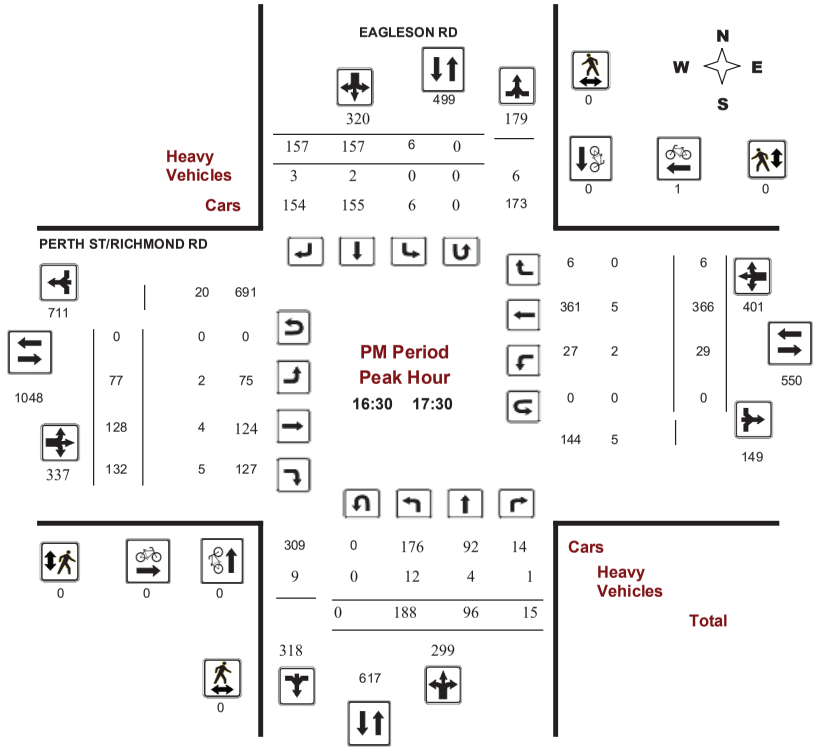
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, December 03, 2014

Total Observed U-Turns

Northbound: 1 Southbound: 0

Eastbound: 0 Westbound: 0

AADT Factor 1.00

	EAGLESON RD								PERTH ST/RICHMOND 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	117	141	32	**290**	4	76	37	**117**	**407**	103	400	116	**619**	14	92	5	**111**	**730**	**1137**
08:00 09:00	116	148	35	**299**	10	65	52	**127**	**426**	105	295	119	**519**	7	111	3	**121**	**640**	**1066**
09:00 10:00	91	77	23	**191**	4	49	40	**93**	**284**	91	196	80	**367**	8	80	5	**93**	**460**	**744**
11:30 12:30	77	56	11	**144**	2	37	73	**112**	**256**	57	129	64	**250**	9	98	5	**112**	**362**	**618**
12:30 13:30	66	48	12	**126**	5	48	80	**133**	**259**	62	124	75	**261**	12	140	2	**154**	**415**	**674**
15:00 16:00	102	67	17	**186**	4	88	123	**215**	**401**	61	129	90	**280**	23	264	8	**295**	**575**	**976**
16:00 17:00	182	94	19	**295**	7	146	160	**313**	**608**	70	127	143	**340**	37	363	3	**403**	**743**	**1351**
17:00 18:00	148	81	9	**238**	2	133	128	**263**	**501**	76	115	108	**299**	23	319	6	**348**	**647**	**1148**
Sub Total	899	712	158	**1769**	38	642	693	**1373**	**3142**	625	1515	795	**2935**	133	1467	37	**1637**	**4572**	**7714**
U Turns				**1**				**0**	**1**				**0**				**0**	**0**	**1**
Total	899	712	158	**1770**	38	642	693	**1373**	**3143**	625	1515	795	**2935**	133	1467	37	**1637**	**4572**	**7715**
EQ 12Hr	1250	990	220	**2460**	53	892	963	**1908**	**4369**	869	2106	1105	**4080**	185	2039	51	**2275**	**6355**	**10724**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	1178	933	207	**2319**	50	841	908	**1799**	**4369**	819	1985	1041	**3845**	174	1922	48	**2144**	**6355**	**10724**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**1**					
AVG 24Hr	1543	1222	271	**3037**	65	1102	1189	**2356**	**5393**	1073	2600	1364	**5037**	228	2518	63	**2809**	**7846**	**13239**
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

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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

Full Study 15 Minute Increments

		EAGLESON RD									PERTH ST/RICHMOND 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	16	33	7	56	1	12	4	17	5	22	101	21	144	2	19	3	24	5	241
07:15	07:30	26	19	6	51	1	15	5	21	3	17	86	30	133	4	23	1	28	3	233
07:30	07:45	30	49	11	90	1	31	13	45	7	29	106	35	170	4	30	0	34	7	339
07:45	08:00	45	40	8	93	1	18	15	34	4	35	107	30	172	4	20	1	25	4	324
08:00	08:15	30	28	13	71	3	26	12	41	7	30	101	36	167	3	35	1	39	7	318
08:15	08:30	37	45	5	87	3	10	12	25	5	23	65	34	122	0	26	1	27	5	261
08:30	08:45	29	50	8	88	2	17	13	32	9	33	77	22	132	2	22	0	24	9	276
08:45	09:00	20	25	9	54	2	12	15	29	11	19	52	27	98	2	28	1	31	11	212
09:00	09:15	24	23	11	58	2	15	6	23	8	22	43	26	91	2	27	2	31	8	203
09:15	09:30	25	24	4	53	1	9	10	20	12	26	66	15	107	2	19	1	22	12	202
09:30	09:45	17	21	5	43	1	13	11	25	5	21	47	22	90	3	15	0	18	5	176
09:45	10:00	25	9	3	37	0	12	13	25	3	22	40	17	79	1	19	2	22	3	163
11:30	11:45	23	24	1	48	0	8	17	25	7	12	38	13	63	2	16	3	21	7	157
11:45	12:00	19	14	0	33	1	12	15	28	6	22	24	20	66	1	26	1	28	6	155
12:00	12:15	21	12	4	37	1	6	25	32	4	9	31	19	59	6	34	1	41	4	169
12:15	12:30	14	6	6	26	0	11	16	27	4	14	36	12	62	0	22	0	22	4	137
12:30	12:45	21	16	3	40	0	10	27	37	6	27	30	12	69	7	30	0	37	6	183
12:45	13:00	10	11	3	24	1	15	15	31	3	7	35	23	65	0	50	0	50	3	170
13:00	13:15	13	13	0	26	1	9	22	32	3	17	34	13	64	1	28	2	31	3	153
13:15	13:30	22	8	6	36	3	14	16	33	3	11	25	27	63	4	32	0	36	3	168
15:00	15:15	24	13	8	45	1	15	28	44	7	19	23	15	57	4	47	0	51	7	197
15:15	15:30	24	17	4	45	0	21	29	50	5	17	33	26	76	2	59	4	65	5	236
15:30	15:45	29	17	3	49	1	31	35	67	4	11	37	25	73	5	74	2	81	4	270
15:45	16:00	25	20	2	47	2	21	31	54	4	14	36	24	74	12	84	2	98	4	273
16:00	16:15	49	20	4	73	1	30	31	62	8	15	34	33	82	8	97	0	105	8	322
16:15	16:30	41	24	5	70	2	32	36	70	8	19	32	34	85	11	76	0	87	8	312
16:30	16:45	51	29	6	86	1	44	47	92	11	17	37	39	93	11	100	1	112	11	383
16:45	17:00	41	21	4	66	3	40	46	89	3	19	24	37	80	7	90	2	99	3	334
17:00	17:15	46	21	1	68	0	40	34	74	7	22	36	33	91	4	82	2	88	7	321
17:15	17:30	50	25	4	79	2	33	30	65	1	19	31	23	73	7	94	1	102	1	319
17:30	17:45	20	16	2	38	0	31	32	63	0	23	28	25	76	6	76	3	85	0	262
17:45	18:00	32	19	2	53	0	29	32	61	2	12	20	27	59	6	67	0	73	2	246
Total:		899	712	158	1770	38	642	693	1373	175	625	1515	795	2935	133	1467	37	1637	175	7,715

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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

Full Study Cyclist Volume

		EAGLESON RD			PERTH ST/RICHMOND 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	0	0	0
08:45	09:00	0	0	0	0	0	0	0
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	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	0	0	0	0
Total		0	0	**0**	0	1	1	1

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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

Full Study Pedestrian Volume

	EAGLESON RD			PERTH ST/RICHMOND 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	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	0	**0**	**0**
08:45 09:00	0	0	**0**	0	0	**0**	**0**
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	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	0	**0**	**0**
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**	0	0	**0**	**0**
Total	0	0	**0**	0	0	**0**	**0**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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

Full Study Heavy Vehicles

		EAGLESON RD									PERTH ST/RICHMOND 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	3	0	**3**	0	2	0	**2**	**5**	0	3	3	**6**	0	2	0	**2**	**8**	**13**
07:15	07:30	1	1	1	**3**	0	0	0	**0**	**3**	0	2	3	**5**	0	1	0	**1**	**6**	**9**
07:30	07:45	2	2	1	**5**	0	2	0	**2**	**7**	1	5	2	**8**	0	3	0	**3**	**11**	**18**
07:45	08:00	3	1	0	**4**	0	0	0	**0**	**4**	3	2	3	**8**	1	2	1	**4**	**12**	**16**
08:00	08:15	1	0	1	**2**	0	4	1	**5**	**7**	0	2	2	**4**	0	2	1	**3**	**7**	**14**
08:15	08:30	1	2	0	**3**	1	1	0	**2**	**5**	2	3	3	**8**	0	2	0	**2**	**10**	**15**
08:30	08:45	4	1	0	**5**	1	3	0	**4**	**9**	1	3	1	**5**	1	1	0	**2**	**7**	**16**
08:45	09:00	3	3	0	**6**	2	2	1	**5**	**11**	1	2	1	**4**	0	3	1	**4**	**8**	**19**
09:00	09:15	4	1	0	**5**	2	1	0	**3**	**8**	1	1	0	**2**	0	1	1	**2**	**4**	**12**
09:15	09:30	3	4	0	**7**	1	1	3	**5**	**12**	0	4	0	**4**	0	4	1	**5**	**9**	**21**
09:30	09:45	1	1	0	**2**	1	2	0	**3**	**5**	0	4	0	**4**	0	2	0	**2**	**6**	**11**
09:45	10:00	2	0	1	**3**	0	0	0	**0**	**3**	0	2	2	**4**	0	3	1	**4**	**8**	**11**
11:30	11:45	3	1	0	**4**	0	1	2	**3**	**7**	2	3	0	**5**	0	1	2	**3**	**8**	**15**
11:45	12:00	2	0	0	**2**	1	2	1	**4**	**6**	0	0	4	**4**	0	5	0	**5**	**9**	**15**
12:00	12:15	2	0	0	**2**	0	0	2	**2**	**4**	0	2	1	**3**	0	0	0	**0**	**3**	**7**
12:15	12:30	2	0	0	**2**	0	1	1	**2**	**4**	0	3	1	**4**	0	0	0	**0**	**4**	**8**
12:30	12:45	4	0	0	**4**	0	2	0	**2**	**6**	1	3	0	**4**	0	0	0	**0**	**4**	**10**
12:45	13:00	0	0	0	**0**	0	2	1	**3**	**3**	1	1	2	**4**	0	6	0	**6**	**10**	**13**
13:00	13:15	0	2	0	**2**	1	0	0	**1**	**3**	0	1	1	**2**	0	0	0	**0**	**2**	**5**
13:15	13:30	0	0	1	**1**	0	1	1	**2**	**3**	0	3	2	**5**	0	0	0	**0**	**5**	**8**
15:00	15:15	1	2	1	**4**	0	2	1	**3**	**7**	0	1	0	**1**	0	1	0	**1**	**2**	**9**
15:15	15:30	1	1	0	**2**	0	2	1	**3**	**5**	2	2	0	**4**	0	3	2	**5**	**9**	**14**
15:30	15:45	2	0	0	**2**	1	0	1	**2**	**4**	1	1	0	**2**	0	3	1	**4**	**6**	**10**
15:45	16:00	1	0	1	**2**	1	0	1	**2**	**4**	0	0	3	**3**	0	1	0	**1**	**4**	**8**
16:00	16:15	1	2	0	**3**	0	3	2	**5**	**8**	0	1	1	**2**	1	2	0	**3**	**5**	**13**
16:15	16:30	3	1	2	**6**	0	0	2	**2**	**8**	0	3	3	**6**	1	1	0	**2**	**8**	**16**
16:30	16:45	7	2	1	**10**	0	0	1	**1**	**11**	0	1	2	**3**	2	2	0	**4**	**7**	**18**
16:45	17:00	1	0	0	**1**	0	1	1	**2**	**3**	1	1	1	**3**	0	2	0	**2**	**5**	**8**
17:00	17:15	4	1	0	**5**	0	1	1	**2**	**7**	1	1	2	**4**	0	1	0	**1**	**5**	**12**
17:15	17:30	0	1	0	**1**	0	0	0	**0**	**1**	0	1	0	**1**	0	0	0	**0**	**1**	**2**
17:30	17:45	0	0	0	**0**	0	0	0	**0**	**0**	0	2	2	**4**	0	1	0	**1**	**5**	**5**
17:45	18:00	1	0	0	**1**	0	1	0	**1**	**2**	0	1	1	**2**	0	1	0	**1**	**3**	**5**
Total:	None	60	32	10	**102**	12	37	24	**73**	**175**	18	64	46	**128**	6	56	11	**73**	**201**	**376**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, December 03, 2014 **WO No:** 34040

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

Full Study 15 Minute U-Turn Total

Time Period		EAGLESON RD Northbound U-Turn Total	EAGLESON RD Southbound U-Turn Total	PERTH ST/RICHMOND RD Eastbound U-Turn Total	PERTH ST/RICHMOND RD Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
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	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	1	0	0	0	1
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	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	0	0	0
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	0	0	0
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	0	0	1

Transportation Services - Traffic Services

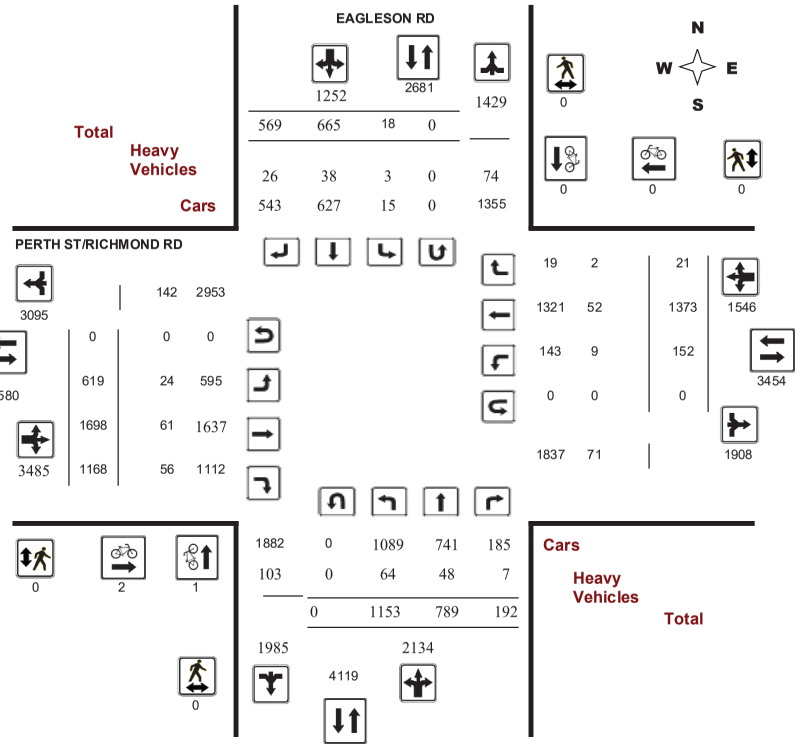
Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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

Full Study Diagram



Transportation Services - Traffic Services

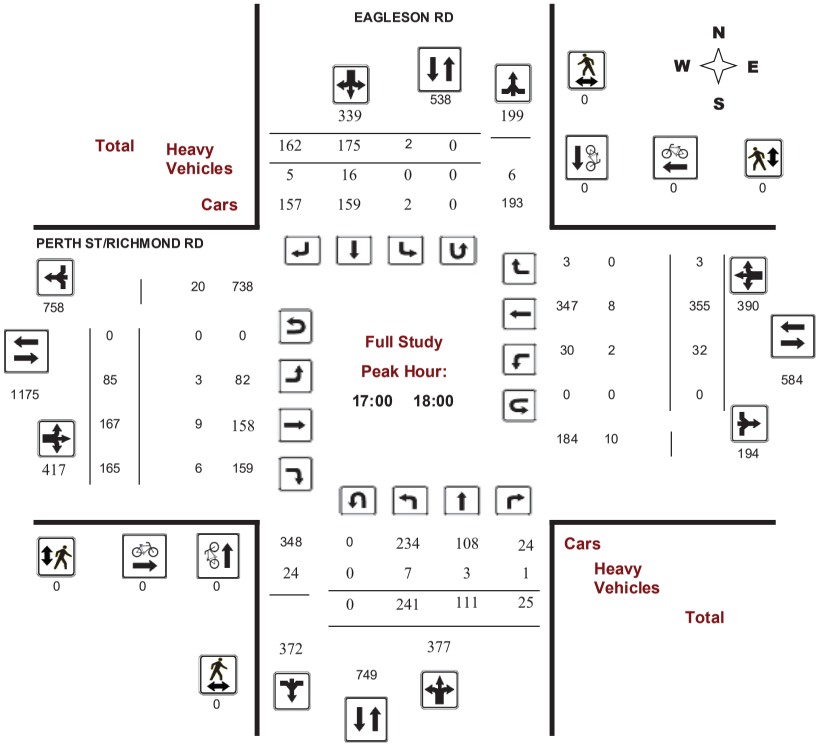
Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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

Full Study Peak Hour Diagram



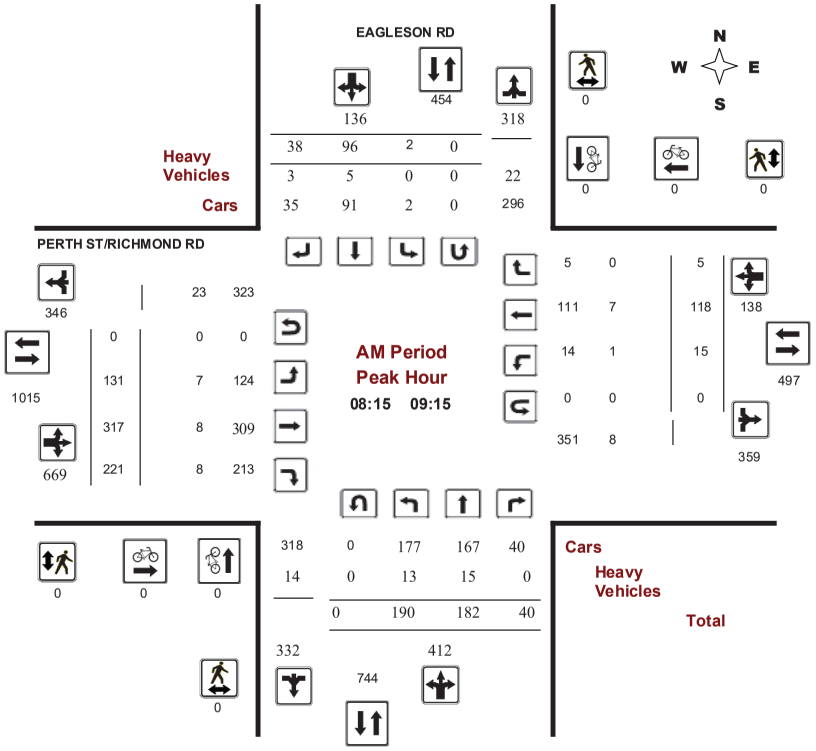
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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



Comments

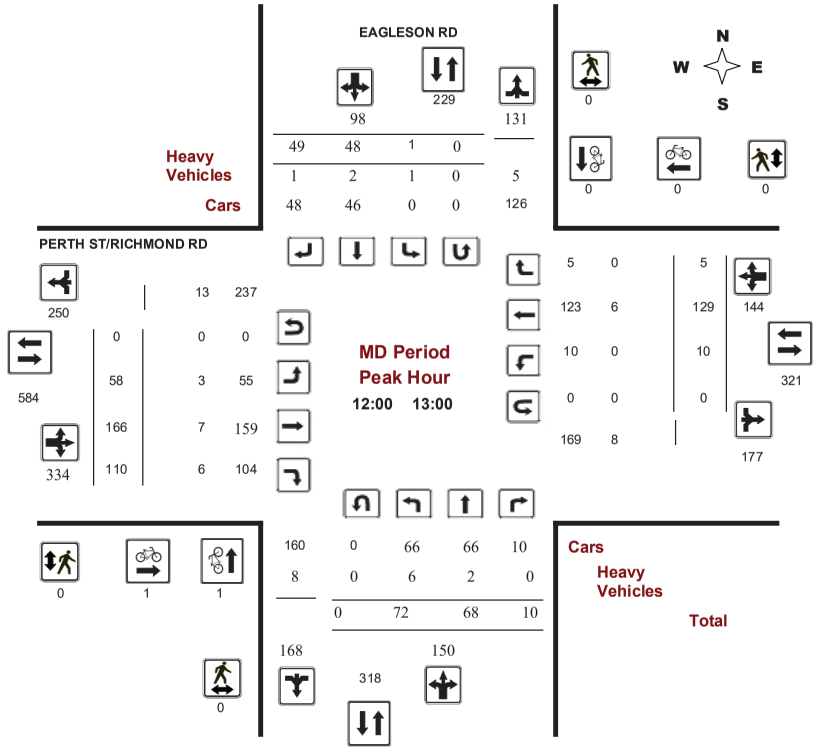
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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



Comments

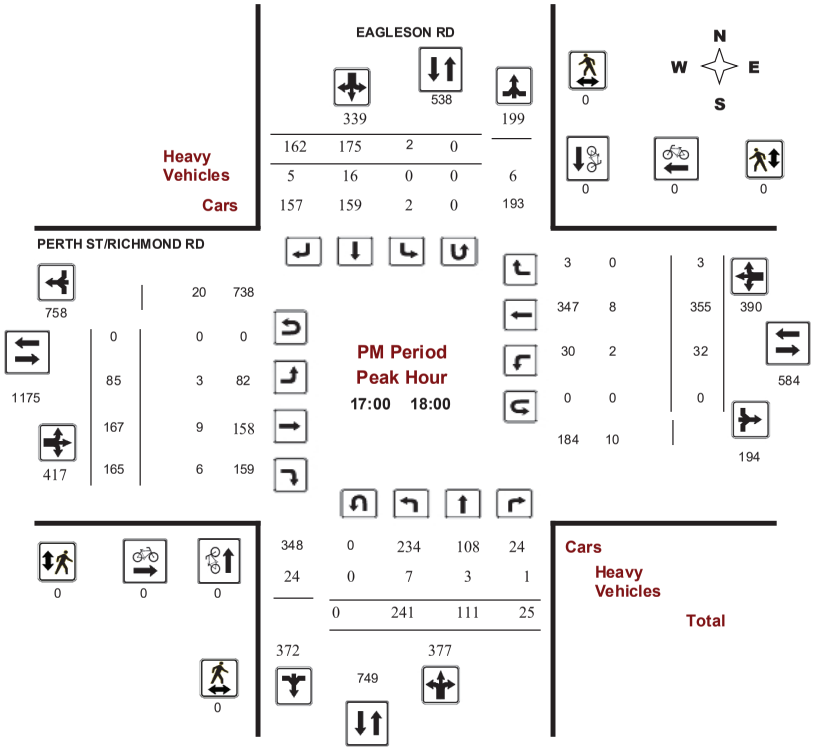
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, November 21, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

AADT Factor

.90

	EAGLESON RD									PERTH ST/RICHMOND 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	89	95	31	**215**	1	32	27	**60**	**275**	67	372	148	**587**	3	57	0	**60**	**647**	**922**
08:00 09:00	186	161	35	**382**	2	84	34	**120**	**502**	127	356	222	**705**	16	125	3	**144**	**849**	**1351**
09:00 10:00	155	148	31	**334**	5	88	59	**152**	**486**	110	235	156	**501**	18	134	3	**155**	**656**	**1142**
11:30 12:30	99	70	21	**190**	1	43	34	**78**	**268**	52	161	85	**298**	11	120	0	**131**	**429**	**697**
12:30 13:30	72	54	17	**143**	0	45	58	**103**	**246**	55	172	98	**325**	15	126	6	**147**	**472**	**718**
15:00 16:00	125	68	24	**217**	6	70	74	**150**	**367**	47	113	135	**295**	23	178	2	**203**	**498**	**865**
16:00 17:00	186	82	8	**276**	1	128	121	**250**	**526**	76	122	159	**357**	34	278	4	**316**	**673**	**1199**
17:00 18:00	241	111	25	**377**	2	175	162	**339**	**716**	85	167	165	**417**	32	355	3	**390**	**807**	**1523**
Sub Total	1153	789	192	**2134**	18	665	569	**1252**	**3386**	619	1698	1168	**3485**	152	1373	21	**1546**	**5031**	**8417**
U Turns				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	1153	789	192	**2134**	18	665	569	**1252**	**3386**	619	1698	1168	**3485**	152	1373	21	**1546**	**5031**	**8417**
EQ 12Hr	1603	1097	267	**2966**	25	924	791	**1740**	**4707**	860	2360	1624	**4844**	211	1908	29	**2149**	**6993**	**11700**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	1359	930	226	**2516**	21	784	671	**1476**	**4236**	730	2002	1377	**4109**	179	1619	25	**1823**	**6294**	**10530**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**0.9**					
AVG 24Hr	1781	1219	297	**3296**	28	1027	879	**1934**	**5230**	956	2623	1804	**5383**	235	2121	32	**2388**	**7771**	**13001**
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

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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

Full Study 15 Minute Increments

		EAGLESON RD										PERTH ST/RICHMOND 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	8	14	14	36	0	1	4	5	2		11	78	32	121	1	2	0	3	2		165
07:15	07:30	18	23	10	51	1	9	6	16	5		16	102	35	153	0	13	0	13	5		233
07:30	07:45	30	31	3	64	0	11	7	18	3		21	95	41	157	0	15	0	15	3		254
07:45	08:00	33	27	4	64	0	11	10	21	8		19	97	40	156	2	27	0	29	8		270
08:00	08:15	39	27	7	73	0	17	3	20	4		27	106	50	183	5	35	0	40	4		316
08:15	08:30	43	30	10	83	1	25	9	35	6		29	92	52	173	4	32	1	37	6		328
08:30	08:45	56	45	8	109	0	22	8	30	9		37	84	49	170	3	31	0	34	9		343
08:45	09:00	48	59	10	117	1	20	14	35	8		34	74	71	179	4	27	2	33	8		364
09:00	09:15	43	48	12	103	0	29	7	36	13		31	67	49	147	4	28	2	34	13		320
09:15	09:30	40	31	8	79	2	25	15	42	8		24	62	44	130	10	33	0	43	8		294
09:30	09:45	40	41	6	87	1	19	18	38	8		29	54	34	117	1	39	0	40	8		282
09:45	10:00	32	28	5	65	2	15	19	36	6		26	52	29	107	3	34	1	38	6		246
11:30	11:45	20	20	12	52	0	8	4	12	4		10	50	19	79	2	21	0	23	4		166
11:45	12:00	37	11	4	52	0	10	9	19	4		11	32	15	58	3	38	0	41	4		170
12:00	12:15	24	13	2	39	0	11	8	19	4		13	48	25	86	3	33	0	36	4		180
12:15	12:30	18	26	3	47	1	14	13	28	5		18	31	26	75	3	28	0	31	5		181
12:30	12:45	16	11	3	30	0	13	14	27	3		16	52	26	94	4	34	1	39	3		190
12:45	13:00	14	18	2	34	0	10	14	24	0		11	35	33	79	0	34	4	38	0		175
13:00	13:15	18	17	8	43	0	14	14	28	4		8	43	19	70	3	22	1	26	4		167
13:15	13:30	24	8	4	36	0	8	16	24	3		20	42	20	82	8	36	0	44	3		186
15:00	15:15	23	15	7	45	4	11	12	27	4		12	37	41	90	7	40	1	48	4		210
15:15	15:30	42	24	8	74	0	14	20	34	6		15	27	24	66	8	44	1	53	6		227
15:30	15:45	28	13	5	46	2	13	23	38	5		8	19	32	59	7	39	0	46	5		189
15:45	16:00	32	16	4	52	0	32	19	51	4		12	30	38	80	1	55	0	56	4		239
16:00	16:15	30	15	3	48	0	24	27	51	4		20	34	37	91	10	51	0	61	4		251
16:15	16:30	53	18	3	74	0	33	32	65	8		19	30	39	88	3	71	1	75	8		302
16:30	16:45	57	25	0	82	0	29	29	58	8		18	22	41	81	9	69	1	79	8		300
16:45	17:00	46	24	2	72	1	42	33	76	8		19	36	42	97	12	87	2	101	8		346
17:00	17:15	59	26	6	91	0	37	35	72	10		23	37	40	100	7	85	2	94	10		357
17:15	17:30	61	31	6	98	1	54	51	106	8		21	46	49	116	10	100	0	110	8		430
17:30	17:45	47	26	10	83	1	45	43	89	6		27	47	43	117	7	90	1	98	6		387
17:45	18:00	74	28	3	105	0	39	33	72	8		14	37	33	84	8	80	0	88	8		349
Total:		1153	789	192	2134	18	665	569	1252	186		619	1698	1168	3485	152	1373	21	1546	186		8,417

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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

Full Study Cyclist Volume

Time Period		EAGLESON RD			PERTH ST/RICHMOND RD			
		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	0	0	0
08:45	09:00	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0
12:30	12:45	0	0	0	0	0	0	0
12:45	13:00	1	0	1	1	0	1	2
13:00	13:15	0	0	0	0	0	0	0
13:15	13:30	0	0	0	1	0	1	1
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	0	0	0
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	0	0	0	0
Total		1	0	1	2	0	2	3

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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

Full Study Pedestrian Volume

Time Period	EAGLESON RD			PERTH ST/RICHMOND RD			
	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	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	0	**0**	**0**
08:45 09:00	0	0	**0**	0	0	**0**	**0**
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	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	0	**0**	**0**
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**	0	0	**0**	**0**
Total	0	0	**0**	0	0	**0**	**0**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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

Full Study Heavy Vehicles

		EAGLESON RD									PERTH ST/RICHMOND 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	1	0	**1**	0	0	1	**1**	**2**	0	2	2	**4**	0	0	0	**0**	**4**	**6**
07:15	07:30	1	2	0	**3**	0	1	1	**2**	**5**	0	4	2	**6**	0	0	0	**0**	**6**	**11**
07:30	07:45	2	0	0	**2**	0	1	0	**1**	**3**	0	0	1	**1**	0	0	0	**0**	**1**	**4**
07:45	08:00	5	2	0	**7**	0	1	0	**1**	**8**	0	1	1	**2**	1	1	0	**2**	**4**	**12**
08:00	08:15	3	0	0	**3**	0	0	1	**1**	**4**	2	3	2	**7**	1	4	0	**5**	**12**	**16**
08:15	08:30	4	0	0	**4**	0	1	1	**2**	**6**	0	2	1	**3**	0	2	0	**2**	**5**	**11**
08:30	08:45	2	7	0	**9**	0	0	0	**0**	**9**	2	3	1	**6**	0	4	0	**4**	**10**	**19**
08:45	09:00	2	5	0	**7**	0	1	0	**1**	**8**	3	1	2	**6**	0	0	0	**0**	**6**	**14**
09:00	09:15	5	3	0	**8**	0	3	2	**5**	**13**	2	2	4	**8**	1	1	0	**2**	**10**	**23**
09:15	09:30	4	1	1	**6**	0	1	1	**2**	**8**	2	0	1	**3**	1	0	0	**1**	**4**	**12**
09:30	09:45	2	3	0	**5**	0	1	2	**3**	**8**	2	2	0	**4**	0	5	0	**5**	**9**	**17**
09:45	10:00	2	0	1	**3**	1	0	2	**3**	**6**	0	2	2	**4**	1	3	1	**5**	**9**	**15**
11:30	11:45	1	1	1	**3**	0	1	0	**1**	**4**	0	3	0	**3**	0	1	0	**1**	**4**	**8**
11:45	12:00	2	1	1	**4**	0	0	0	**0**	**4**	0	1	0	**1**	0	4	0	**4**	**5**	**9**
12:00	12:15	2	1	0	**3**	0	1	0	**1**	**4**	1	2	2	**5**	0	0	0	**0**	**5**	**9**
12:15	12:30	3	1	0	**4**	1	0	0	**1**	**5**	0	0	0	**0**	0	2	0	**2**	**2**	**7**
12:30	12:45	1	0	0	**1**	0	1	1	**2**	**3**	0	4	4	**8**	0	3	0	**3**	**11**	**14**
12:45	13:00	0	0	0	**0**	0	0	0	**0**	**0**	2	1	0	**3**	0	1	0	**1**	**4**	**4**
13:00	13:15	2	2	0	**4**	0	0	0	**0**	**4**	0	1	0	**1**	0	1	0	**1**	**2**	**6**
13:15	13:30	2	1	0	**3**	0	0	0	**0**	**3**	2	3	2	**7**	0	1	0	**1**	**8**	**11**
15:00	15:15	0	0	0	**0**	1	2	1	**4**	**4**	1	2	4	**7**	2	0	0	**2**	**9**	**13**
15:15	15:30	0	4	1	**5**	0	0	1	**1**	**6**	0	3	4	**7**	0	2	0	**2**	**9**	**15**
15:30	15:45	1	1	0	**2**	0	2	1	**3**	**5**	1	1	0	**2**	0	2	0	**2**	**4**	**9**
15:45	16:00	0	1	1	**2**	0	1	1	**2**	**4**	1	2	3	**6**	0	1	0	**1**	**7**	**11**
16:00	16:15	4	0	0	**4**	0	0	0	**0**	**4**	0	3	4	**7**	0	1	0	**1**	**8**	**12**
16:15	16:30	3	2	0	**5**	0	2	1	**3**	**8**	0	1	2	**3**	0	4	0	**4**	**7**	**15**
16:30	16:45	3	3	0	**6**	0	1	1	**2**	**8**	0	1	2	**3**	0	1	0	**1**	**4**	**12**
16:45	17:00	1	3	0	**4**	0	1	3	**4**	**8**	0	2	4	**6**	0	0	1	**1**	**7**	**15**
17:00	17:15	1	0	0	**1**	0	5	4	**9**	**10**	1	4	0	**5**	0	2	0	**2**	**7**	**17**
17:15	17:30	2	3	1	**6**	0	2	0	**2**	**8**	1	2	1	**4**	2	4	0	**6**	**10**	**18**
17:30	17:45	0	0	0	**0**	0	5	1	**6**	**6**	1	2	4	**7**	0	2	0	**2**	**9**	**15**
17:45	18:00	4	0	0	**4**	0	4	0	**4**	**8**	0	1	1	**2**	0	0	0	**0**	**2**	**10**
Total:	None	64	48	7	**119**	3	38	26	**67**	**186**	24	61	56	**141**	9	52	2	**63**	**204**	**390**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

EAGLESON RD @ PERTH ST/RICHMOND RD

Survey Date: Wednesday, November 21, 2018 **WO No:** 38146

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

Full Study 15 Minute U-Turn Total

		EAGLESON RD		PERTH ST/RICHMOND RD		
Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
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	0	0
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	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	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	0	0	0
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	0	0	0
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		0	0	0	0	0

Appendix C

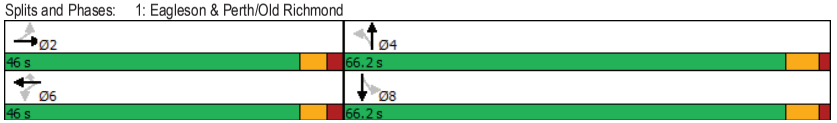
Synchro Intersection Worksheets – Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	333	157	16	124	5	165	191	42	2	101	40
Future Volume (vph)	138	333	157	16	124	5	165	191	42	2	101	40
Satd. Flow (prot)	1658	1661	0	0	1735	1483	1658	1698	0	1658	1672	0
Flt Permitted	0.658				0.922		0.658			0.599		
Satd. Flow (perm)	1148	1661	0	0	1609	1483	1148	1698	0	1045	1672	0
Satd. Flow (RTOR)		23				31		15			27	
Lane Group Flow (vph)	153	544	0	0	156	6	183	259	0	2	156	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	40.0	40.0		40.0	40.0	40.0	26.2	26.2		26.2	26.2	
Total Split (s)	46.0	46.0		46.0	46.0	46.0	66.2	66.2		66.2	66.2	
Total Split (%)	41.0%	41.0%		41.0%	41.0%	41.0%	59.0%	59.0%		59.0%	59.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	24.2	24.2			24.2	24.2	15.9	15.9		15.9	15.9	
Actuated g/C Ratio	0.46	0.46			0.46	0.46	0.30	0.30		0.30	0.30	
v/c Ratio	0.29	0.70			0.21	0.01	0.53	0.50		0.01	0.30	
Control Delay	11.3	17.1			10.0	0.0	23.4	19.2		15.0	15.0	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	11.3	17.1			10.0	0.0	23.4	19.2		15.0	15.0	
LOS	B	B			A	A	C	B		B	B	
Approach Delay		15.9			9.6			21.0			15.0	
Approach LOS		B			A			C			B	
Queue Length 50th (m)	8.2	35.6			8.1	0.0	14.1	18.5		0.2	9.1	
Queue Length 95th (m)	21.8	79.0			20.4	0.1	36.6	44.0		1.5	25.1	
Internal Link Dist (m)		324.2			497.1			697.5			911.0	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	896	1301			1255	1164	1114	1648		1014	1623	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.17	0.42			0.12	0.01	0.16	0.16		0.00	0.10	

Intersection Summary
Cycle Length: 112.2
Actuated Cycle Length: 52.9
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.70

Intersection Signal Delay: 16.6 Intersection LOS: B
Intersection Capacity Utilization 78.9% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Eagleson & Perth/Old Richmond

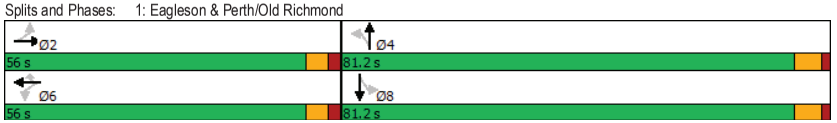


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	175	153	34	373	3	219	117	26	2	184	170
Future Volume (vph)	89	175	153	34	373	3	219	117	26	2	184	170
Satd. Flow (prot)	1658	1623	0	0	1738	1483	1658	1698	0	1658	1619	0
Flt Permitted	0.351				0.944		0.438			0.656		
Satd. Flow (perm)	613	1623	0	0	1647	1483	764	1698	0	1145	1619	0
Satd. Flow (RTOR)		36				25		13			54	
Lane Group Flow (vph)	99	364	0	0	452	3	243	159	0	2	393	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	30.0	26.2	26.2		26.2	26.2	
Total Split (s)	56.0	56.0		56.0	56.0	56.0	81.2	81.2		81.2	81.2	
Total Split (%)	40.8%	40.8%		40.8%	40.8%	40.8%	59.2%	59.2%		59.2%	59.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	30.7	30.7			30.7	30.7	33.2	33.2		33.2	33.2	
Actuated g/C Ratio	0.40	0.40			0.40	0.40	0.43	0.43		0.43	0.43	
v/c Ratio	0.41	0.55			0.69	0.00	0.75	0.22		0.00	0.54	
Control Delay	26.1	21.4			27.8	0.0	35.8	14.7		15.0	17.9	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	26.1	21.4			27.8	0.0	35.8	14.7		15.0	17.9	
LOS	C	C			C	A	D	B		B	B	
Approach Delay		22.4			27.6			27.4			17.9	
Approach LOS		C			C			C			B	
Queue Length 50th (m)	9.8	34.6			51.8	0.0	26.6	11.9		0.2	32.5	
Queue Length 95th (m)	30.9	83.0			117.9	0.0	75.5	32.1		1.7	79.5	
Internal Link Dist (m)		324.2			497.1			697.5			911.0	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	426	1141			1146	1040	680	1512		1019	1447	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.23	0.32			0.39	0.00	0.36	0.11		0.00	0.27	

Intersection Summary
Cycle Length: 137.2
Actuated Cycle Length: 77.6
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.75

Intersection Signal Delay: 23.9 Intersection LOS: C
Intersection Capacity Utilization 96.6% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: Eagleson & Perth/Old Richmond



Appendix D

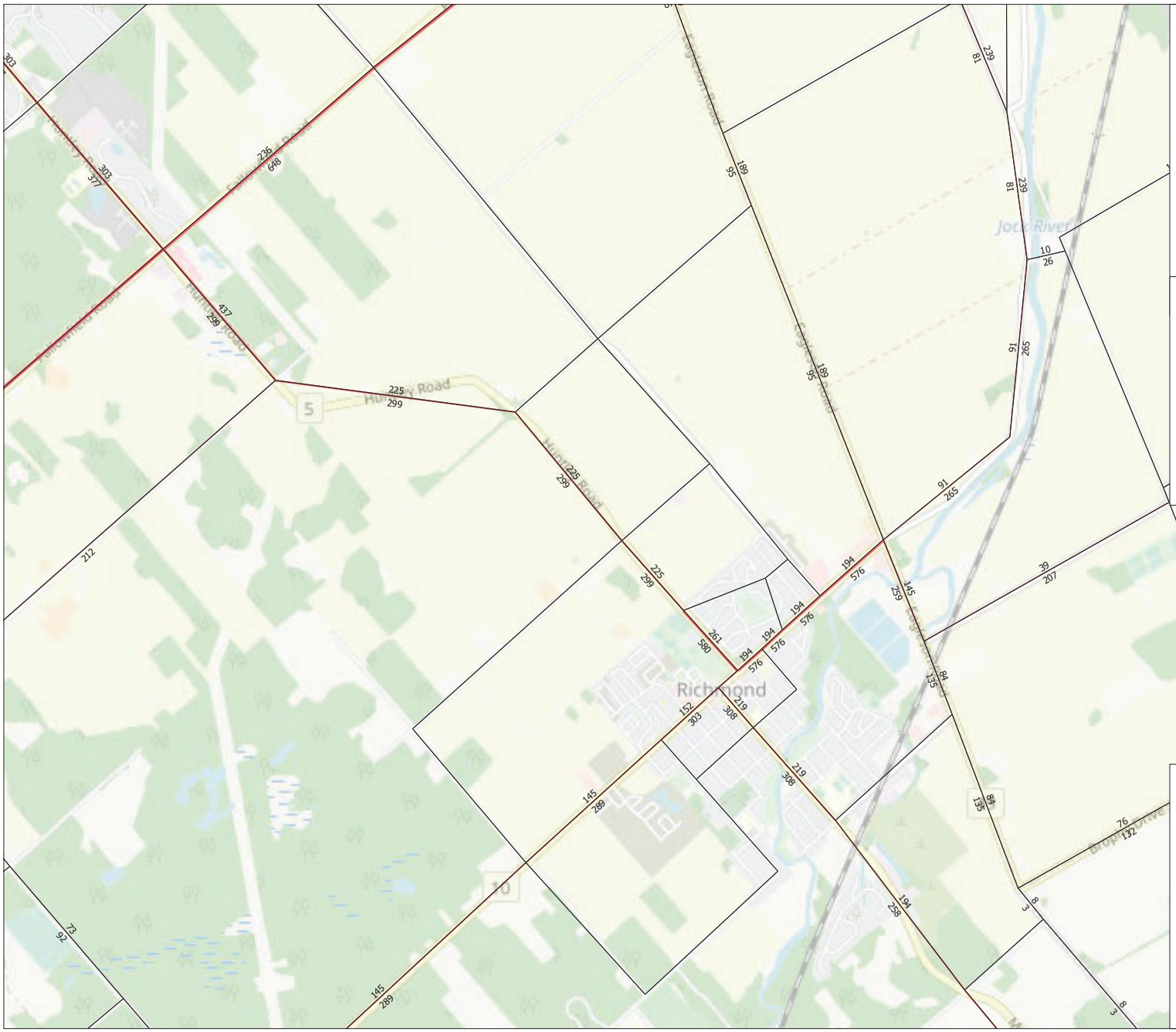
Collision Data

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
2014-01-30	2014	8:59	EAGLESON RD @ PERTH ST/RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2014-03-09	2014	8:16	EAGLESON RD @ PERTH ST/RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	02 - Angle	01 - Dry
2014-05-31	2014	16:30	EAGLESON RD @ PERTH ST/RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	07 - SMV other	01 - Dry
2015-09-03	2015	7:14	EAGLESON RD @ PERTH ST/RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-02-06	2016	1:59	EAGLESON RD @ PERTH ST/RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	07 - SMV other	01 - Dry
2016-12-07	2016	6:48	EAGLESON RD @ PERTH ST/RICHMOND RD	03 - Snow	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2017-01-07	2017	12:34	EAGLESON RD @ PERTH ST/RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2017-11-10	2017	16:13	EAGLESON RD @ PERTH ST/RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	02 - Angle	01 - Dry
2017-11-28	2017	5:58	EAGLESON RD @ PERTH ST/RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-11-15	2018	14:10	EAGLESON RD @ PERTH ST/RICHMOND RD (0009376)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2014-01-04	2014	17:52	EAGLESON RD btwn CAMBRIAN RD & PERTH ST	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2015-10-08	2015	22:57	EAGLESON RD btwn CAMBRIAN RD & PERTH ST	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2016-03-01	2016	16:06	EAGLESON RD btwn CAMBRIAN RD & PERTH ST	06 - Strong wind	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	06 - Ice
2018-01-12	2018	22:30	EAGLESON RD btwn CAMBRIAN RD & PERTH ST (__3ZA4YC)	03 - Snow	07 - Dark	10 - No control		03 - P.D. only	01 - Approaching	05 - Packed snow
2018-03-15	2018	22:46	EAGLESON RD btwn CAMBRIAN RD & PERTH ST (__3ZA4YC)	01 - Clear	07 - Dark	10 - No control		02 - Non-fatal injury	07 - SMV other	06 - Ice
2018-05-11	2018	16:53	EAGLESON RD btwn CAMBRIAN RD & PERTH ST (__3ZA4YC)	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	03 - Rear end	01 - Dry
2014-08-21	2014	15:33	EAGLESON RD btwn PERTH ST & BARNSDALE RD	02 - Rain	01 - Daylight	10 - No control		02 - Non-fatal injury	03 - Rear end	02 - Wet
2014-10-01	2014	20:14	EAGLESON RD btwn PERTH ST & BARNSDALE RD	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2016-12-15	2016	10:00	EAGLESON RD btwn PERTH ST & BARNSDALE RD	03 - Snow	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	04 - Slush
2018-10-30	2018	7:05	EAGLESON RD btwn PERTH ST & BARNSDALE RD (__3ZA4YA)	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	02 - Wet
2014-05-16	2014	14:57	PERTH ST btwn SHEA RD & EAGLESON RD	02 - Rain	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	02 - Wet
2014-06-11	2014	17:15	PERTH ST btwn SHEA RD & EAGLESON RD	02 - Rain	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	02 - Wet
2016-12-30	2016	3:45	PERTH ST btwn SHEA RD & EAGLESON RD	03 - Snow	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	04 - Slush
2017-02-24	2017	19:29	PERTH ST btwn SHEA RD & EAGLESON RD	02 - Rain	07 - Dark	10 - No control		03 - P.D. only	03 - Rear end	02 - Wet
2017-03-21	2017	3:39	PERTH ST btwn SHEA RD & EAGLESON RD	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2018-10-14	2018	19:08	PERTH ST btwn SHEA RD & EAGLESON RD (__3ZA4YB)	01 - Clear	07 - Dark	10 - No control		02 - Non-fatal injury	07 - SMV other	01 - Dry
2018-10-30	2018	6:54	PERTH ST btwn SHEA RD & EAGLESON RD (__3ZA4YB)	01 - Clear	03 - Dawn	10 - No control		02 - Non-fatal injury	03 - Rear end	01 - Dry
2014-01-26	2014	8:13	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	05 - Packed snow
2014-05-02	2014	3:04	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	01 - Clear	07 - Dark	10 - No control		02 - Non-fatal injury	07 - SMV other	01 - Dry
2014-11-18	2014	15:15	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	05 - Drifting Snow	01 - Daylight	10 - No control		03 - P.D. only	99 - Other	06 - Ice
2014-11-23	2014	18:37	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2014-11-30	2014	23:30	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	02 - Rain	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	02 - Wet
2015-06-12	2015	12:02	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	02 - Rain	01 - Daylight	10 - No control		03 - P.D. only	03 - Rear end	02 - Wet
2015-09-28	2015	17:45	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	02 - Rain	01 - Daylight	10 - No control		02 - Non-fatal injury	07 - SMV other	02 - Wet
2015-10-19	2015	18:45	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2016-02-11	2016	8:51	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	03 - Snow	01 - Daylight	10 - No control		02 - Non-fatal injury	07 - SMV other	03 - Loose snow
2016-10-30	2016	9:58	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2017-10-14	2017	7:45	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	02 - Wet
2017-11-03	2017	8:09	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	02 - Rain	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	02 - Wet
2017-11-28	2017	9:29	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	07 - SMV other	01 - Dry
2017-12-15	2017	15:31	RICHMOND RD btwn PERTH ST & CAMBRIAN RD	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	01 - Approaching	02 - Wet
2018-02-07	2018	8:11	RICHMOND RD btwn PERTH ST & CAMBRIAN RD (__3ZAB98)	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	02 - Wet
2018-02-07	2018	19:30	RICHMOND RD btwn PERTH ST & CAMBRIAN RD (__3ZAB98)	03 - Snow	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	03 - Loose snow
2018-05-04	2018	16:06	RICHMOND RD btwn PERTH ST & CAMBRIAN RD (__3ZAB98)	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry

Appendix E

TRANS Model Plots



TRANS Regional Model

Version 2.13 - Assigned December 11, 2019

AM Peak Hour Total Traffic Volume

Richmond Area

2011 Model - Base Scenario

No Modifications from Base Version

User Initials: MM
Plot Prepared: April 21, 2020
EMME Scenario: 21311

TRANS

Legend

AM Peak Hour Total Traffic Volume

2000 4000 6000 8000 10000

N

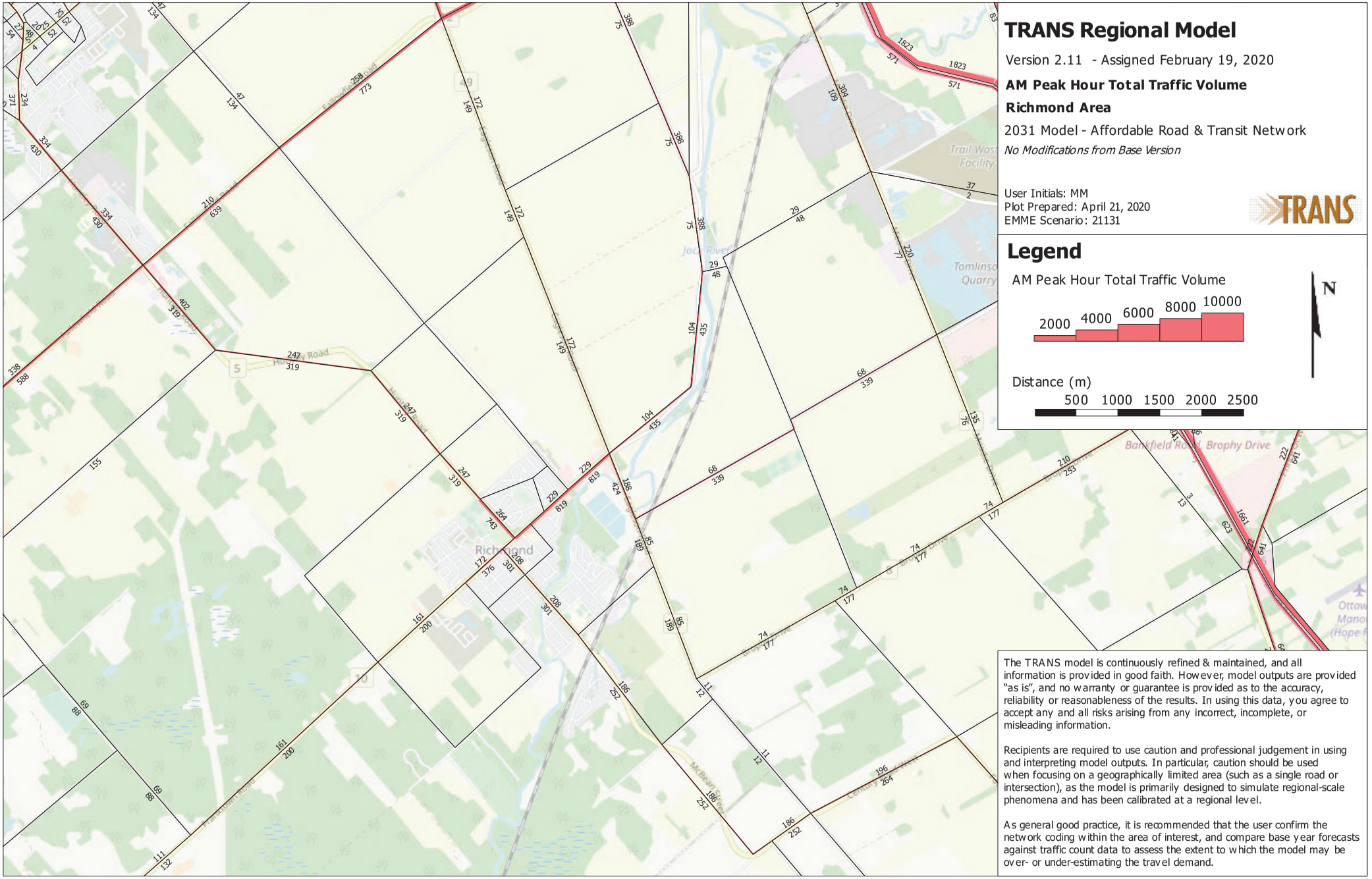
Distance (m)

500 1000 1500 2000

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.



TRANS Regional Model

Version 2.11 - Assigned February 19, 2020

AM Peak Hour Total Traffic Volume

Richmond Area

2031 Model - Affordable Road & Transit Network

No Modifications from Base Version

User Initials: MM
Plot Prepared: April 21, 2020
EMME Scenario: 21131

Legend

AM Peak Hour Total Traffic Volume

2000 4000 6000 8000 10000

N

Distance (m)

500 1000 1500 2000 2500

Appendix F

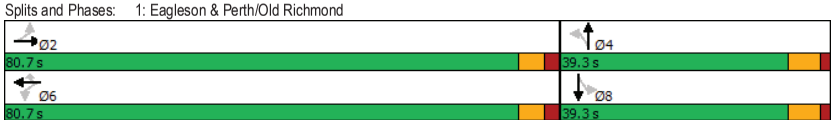
Synchro Intersection Worksheets – 2027 Future Background Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	550	164	16	237	5	169	191	42	2	124	40
Future Volume (vph)	138	550	164	16	237	5	169	191	42	2	124	40
Satd. Flow (prot)	1658	1686	0	0	1740	1483	1658	1698	0	1658	1681	0
Flt Permitted	0.602				0.948		0.653			0.585		
Satd. Flow (perm)	1051	1686	0	0	1654	1483	1140	1698	0	1021	1681	0
Satd. Flow (RTOR)		24				29		9			13	
Lane Group Flow (vph)	138	714	0	0	253	5	169	233	0	2	164	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	26.0	26.0		26.0	26.0	26.0	26.2	26.2		26.2	26.2	
Total Split (s)	80.7	80.7		80.7	80.7	80.7	39.3	39.3		39.3	39.3	
Total Split (%)	67.3%	67.3%		67.3%	67.3%	67.3%	32.8%	32.8%		32.8%	32.8%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	35.0	35.0			35.0	35.0	17.6	17.6		17.6	17.6	
Actuated g/C Ratio	0.53	0.53			0.53	0.53	0.27	0.27		0.27	0.27	
v/c Ratio	0.25	0.79			0.29	0.01	0.56	0.51		0.01	0.36	
Control Delay	10.0	19.7			9.7	0.0	32.6	27.1		23.5	23.9	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	10.0	19.7			9.7	0.0	32.6	27.1		23.5	23.9	
LOS	B	B			A	A	C	C		C	C	
Approach Delay		18.1			9.5			29.4			23.8	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	7.5	55.6			14.0	0.0	16.4	21.3		0.2	13.7	
Queue Length 95th (m)	22.3	135.7			36.1	0.0	49.2	59.3		2.0	41.1	
Internal Link Dist (m)		324.2			497.1			697.5			911.0	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	988	1586			1555	1396	635	951		569	943	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.14	0.45			0.16	0.00	0.27	0.25		0.00	0.17	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 66.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.79

Intersection Signal Delay: 20.1 — Intersection LOS: C
Intersection Capacity Utilization 97.2% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: Eagleson & Perth/Old Richmond

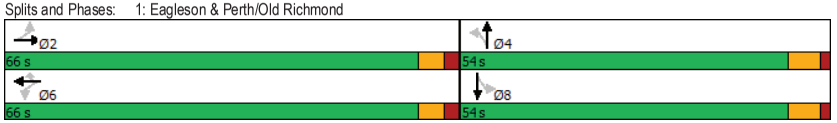


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	378	159	34	579	3	225	144	26	2	184	170
Future Volume (vph)	89	378	159	34	579	3	225	144	26	2	184	170
Satd. Flow (prot)	1658	1668	0	0	1740	1483	1658	1705	0	1658	1619	0
Flt Permitted	0.240				0.935		0.443			0.650		
Satd. Flow (perm)	419	1668	0	0	1632	1483	773	1705	0	1134	1619	0
Satd. Flow (RTOR)		25				29		9			46	
Lane Group Flow (vph)	89	537	0	0	613	3	225	170	0	2	354	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	30.0	26.2	26.2		26.2	26.2	
Total Split (s)	66.0	66.0		66.0	66.0	66.0	54.0	54.0		54.0	54.0	
Total Split (%)	55.0%	55.0%		55.0%	55.0%	55.0%	45.0%	45.0%		45.0%	45.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	39.5	39.5			39.5	39.5	33.4	33.4		33.4	33.4	
Actuated g/C Ratio	0.46	0.46			0.46	0.46	0.39	0.39		0.39	0.39	
v/c Ratio	0.47	0.69			0.82	0.00	0.76	0.26		0.00	0.54	
Control Delay	28.1	24.2			32.2	0.0	43.6	20.3		20.5	22.8	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	28.1	24.2			32.2	0.0	43.6	20.3		20.5	22.8	
LOS	C	C			C	A	D	C		C	C	
Approach Delay		24.7			32.1			33.6			22.8	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	9.6	64.1			83.8	0.0	30.9	17.4		0.2	37.7	
Queue Length 95th (m)	28.6	122.7			159.0	0.0	#83.3	40.9		2.0	83.3	
Internal Link Dist (m)		324.2			497.1			697.5			911.0	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	303	1216			1184	1083	478	1058		701	1019	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.29	0.44			0.52	0.00	0.47	0.16		0.00	0.35	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 86.6
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82

Intersection Signal Delay: 28.4 — Intersection LOS: C
Intersection Capacity Utilization 120.1% — ICU Level of Service H
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Eagleson & Perth/Old Richmond



Appendix G

Synchro Intersection Worksheets – 2032 Future Background Conditions

CGH TRANSPORTATION

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	817	168	47	366	5	171	314	73	2	269	40
Future Volume (vph)	138	817	168	47	366	5	171	314	73	2	269	40
Satd. Flow (prot)	1658	1700	0	0	1735	1483	1658	1696	0	1658	1712	0
Flt Permitted	0.469				0.501		0.380			0.261		
Satd. Flow (perm)	818	1700	0	0	874	1483	663	1696	0	455	1712	0
Satd. Flow (RTOR)		18				29		9			6	
Lane Group Flow (vph)	138	985	0	0	413	5	171	387	0	2	309	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	26.0	26.0		26.0	26.0	26.0	26.2	26.2		26.2	26.2	
Total Split (s)	85.0	85.0		85.0	85.0	85.0	35.0	35.0		35.0	35.0	
Total Split (%)	70.8%	70.8%		70.8%	70.8%	70.8%	29.2%	29.2%		29.2%	29.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	65.1	65.1			65.1	65.1	29.3	29.3		29.3	29.3	
Actuated g/C Ratio	0.61	0.61			0.61	0.61	0.27	0.27		0.27	0.27	
v/c Ratio	0.28	0.94			0.78	0.01	0.94	0.82		0.02	0.65	
Control Delay	10.7	36.2			26.4	0.0	96.1	53.9		35.0	44.2	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	10.7	36.2			26.4	0.0	96.1	53.9		35.0	44.2	
LOS	B	D			C	A	F	D		C	D	
Approach Delay		33.1			26.1			66.8			44.1	
Approach LOS		C			C			E			D	
Queue Length 50th (m)	12.3	169.7			58.0	0.0	36.9	78.3		0.3	59.1	
Queue Length 95th (m)	22.2	#264.4			102.6	0.0	#88.4	#146.6		2.6	#100.2	
Internal Link Dist (m)		324.2			497.1			697.5			911.0	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	615	1283			657	1123	182	471		124	474	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.22	0.77			0.63	0.00	0.94	0.82		0.02	0.65	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 106.8
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94

Intersection Signal Delay: 41.1 Intersection LOS: D
Intersection Capacity Utilization 130.0% ICU Level of Service H
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Eagleson & Perth/Old Richmond

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	652	162	69	872	3	231	309	62	2	326	170
Future Volume (vph)	89	652	162	69	872	3	231	309	62	2	326	170
Satd. Flow (prot)	1658	1693	0	0	1738	1483	1658	1701	0	1658	1656	0
Flt Permitted	0.063				0.440		0.241			0.380		
Satd. Flow (perm)	110	1693	0	0	768	1483	421	1701	0	663	1656	0
Satd. Flow (RTOR)		16				29		10			25	
Lane Group Flow (vph)	89	814	0	0	941	3	231	371	0	2	496	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	30.0	26.2	26.2		26.2	26.2	
Total Split (s)	69.0	69.0		69.0	69.0	69.0	51.0	51.0		51.0	51.0	
Total Split (%)	57.5%	57.5%		57.5%	57.5%	57.5%	42.5%	42.5%		42.5%	42.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	63.0	63.0			63.0	63.0	44.8	44.8		44.8	44.8	
Actuated g/C Ratio	0.52	0.52			0.52	0.52	0.37	0.37		0.37	0.37	
v/c Ratio	1.56	0.91			2.33	0.00	1.47	0.58		0.01	0.78	
Control Delay	348.2	41.1			628.4	0.0	273.8	33.6		24.0	41.8	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	348.2	41.1			628.4	0.0	273.8	33.6		24.0	41.8	
LOS	F	D			F	A	F	C		C	D	
Approach Delay		71.3			626.4			125.8			41.7	
Approach LOS		E			F			F			D	
Queue Length 50th (m)	~29.5	165.2			~271.0	0.0	~74.7	67.3		0.3	97.9	
Queue Length 95th (m)	#49.9	#251.4			#347.8	0.0	#123.7	98.6		2.1	141.1	
Internal Link Dist (m)		324.2			497.1			697.5			911.0	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	57	896			403	792	157	641		247	633	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	1.56	0.91			2.33	0.00	1.47	0.58		0.01	0.78	

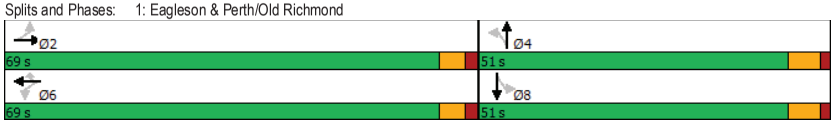
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.33

Intersection Signal Delay: 255.2 Intersection LOS: F
Intersection Capacity Utilization 162.0% ICU Level of Service H
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: Eagleson & Perth/Old Richmond

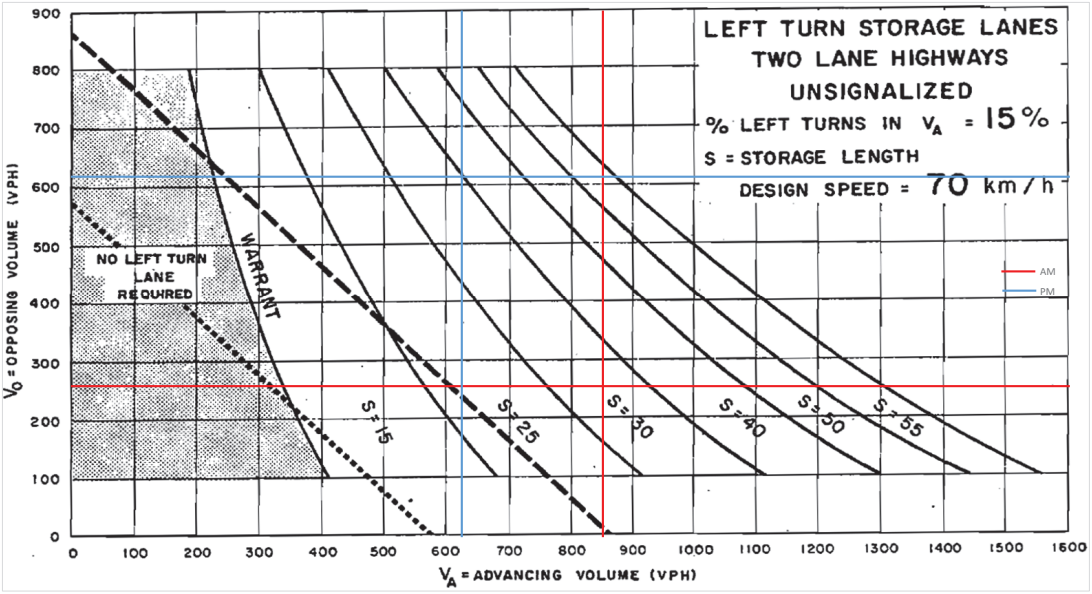


Appendix H

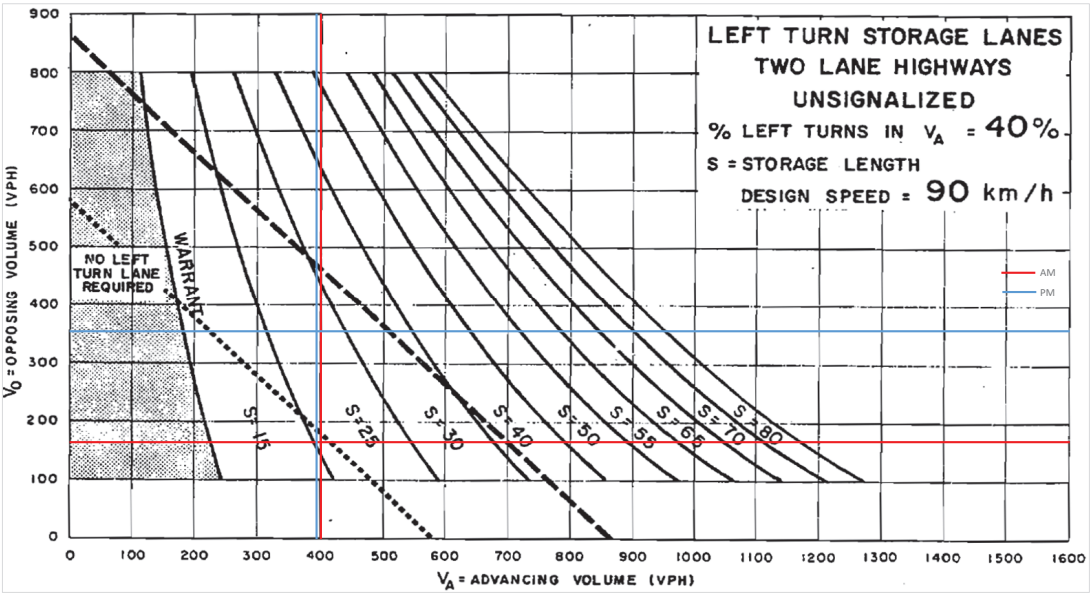
Eagleson Road at Perth Street/Old Richmond Road Turn Lane Warrants

CGH TRANSPORTATION

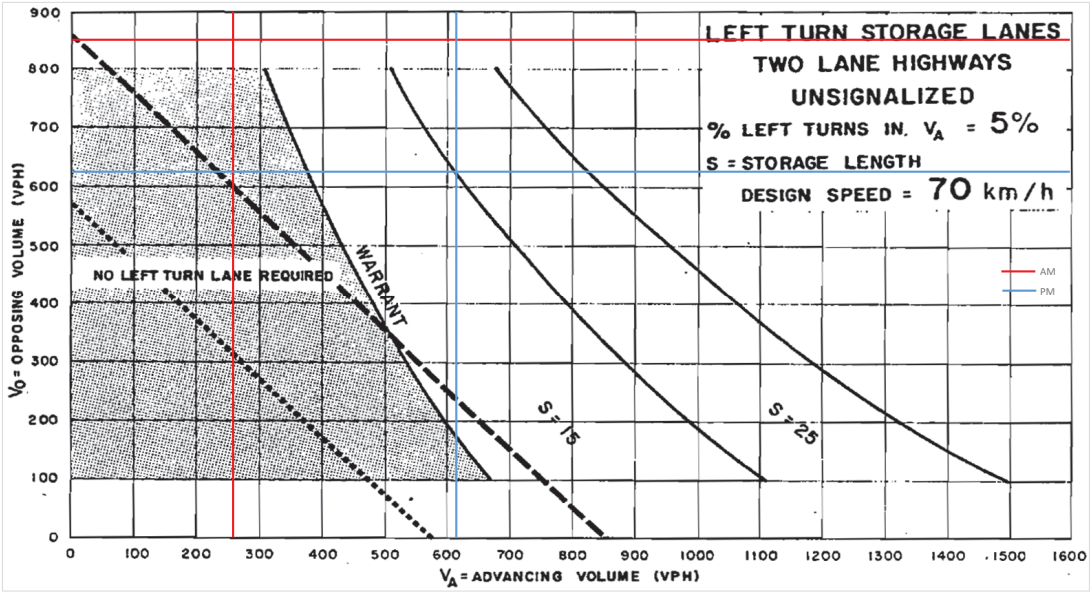
Eastbound Left-Turn Warrants - Eagleson Road at Perth Street/Old Richmond Road



Northbound Left-Turn Warrants - Eagleson Road at Perth Street/Old Richmond Road



Westbound Left-Turn Warrants - Eagleson Road at Perth Street/Old Richmond Road



Appendix I

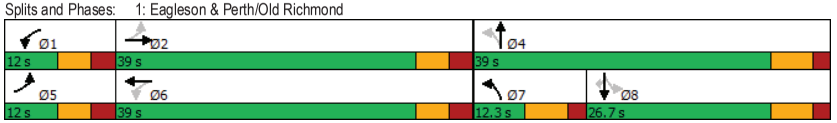
Synchro Intersection Worksheets – 2032 Future Background Conditions with Mitigations

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	817	168	47	366	5	171	314	73	2	269	40
Future Volume (vph)	138	817	168	47	366	5	171	314	73	2	269	40
Satd. Flow (prot)	1658	3229	0	1658	3309	0	1658	1696	0	1658	1745	1483
Flt Permitted	0.502			0.152			0.314			0.533		
Satd. Flow (perm)	876	3229	0	265	3309	0	548	1696	0	930	1745	1483
Satd. Flow (RTOR)		30			2			15				196
Lane Group Flow (vph)	138	985	0	47	371	0	171	387	0	2	269	40
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		10.0	10.0	10.0
Minimum Split (s)	12.0	26.3		11.3	26.3		11.6	26.6		26.6	26.6	26.6
Total Split (s)	12.0	39.0		12.0	39.0		12.3	39.0		26.7	26.7	26.7
Total Split (%)	13.3%	43.3%		13.3%	43.3%		13.7%	43.3%		29.7%	29.7%	29.7%
Yellow Time (s)	3.7	3.7		3.7	3.7		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.6	2.6		2.6	2.6		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	30.7	27.8		29.1	24.8		29.3	29.3		16.4	16.4	16.4
Actuated g/C Ratio	0.40	0.36		0.38	0.32		0.38	0.38		0.21	0.21	0.21
v/c Ratio	0.34	0.83		0.23	0.35		0.58	0.59		0.01	0.72	0.09
Control Delay	15.6	30.0		14.7	21.2		29.3	24.9		27.5	42.5	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	15.6	30.0		14.7	21.2		29.3	24.9		27.5	42.5	0.3
LOS	B	C		B	C		C	C		C	D	A
Approach Delay		28.2			20.5			26.3			37.0	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	12.1	76.1		3.9	23.0		20.8	52.3		0.3	42.9	0.0
Queue Length 95th (m)	22.6	103.2		9.4	34.5		#37.8	82.1		2.1	#70.6	0.0
Internal Link Dist (m)		324.2			497.1			697.5			911.0	
Turn Bay Length (m)	40.0			38.0			65.0			38.0		45.0
Base Capacity (vph)	411	1462		209	1482		295	760		255	480	550
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.34	0.67		0.22	0.25		0.58	0.51		0.01	0.56	0.07

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 76.8
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83

Intersection Signal Delay: 27.6 — Intersection LOS: C
Intersection Capacity Utilization 85.6% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Eagleson & Perth/Old Richmond



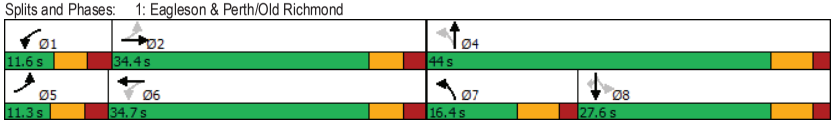
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	652	162	69	872	3	231	309	62	2	326	170
Future Volume (vph)	89	652	162	69	872	3	231	309	62	2	326	170
Satd. Flow (prot)	1658	3216	0	1658	3312	0	1658	1701	0	1658	1745	1483
Flt Permitted	0.158			0.179			0.245			0.541		
Satd. Flow (perm)	276	3216	0	312	3312	0	428	1701	0	944	1745	1483
Satd. Flow (RTOR)		35						14				196
Lane Group Flow (vph)	89	814	0	69	875	0	231	371	0	2	326	170
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.3	30.0		11.3	30.0		11.6	26.6		26.6	26.6	26.6
Total Split (s)	11.3	34.4		11.6	34.7		16.4	44.0		27.6	27.6	27.6
Total Split (%)	12.6%	38.2%		12.9%	38.6%		18.2%	48.9%		30.7%	30.7%	30.7%
Yellow Time (s)	3.7	3.7		3.7	3.7		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.6	2.6		2.6	2.6		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	29.0	25.3		29.4	25.5		35.6	35.6		18.8	18.8	18.8
Actuated g/C Ratio	0.35	0.31		0.36	0.31		0.43	0.43		0.23	0.23	0.23
v/c Ratio	0.49	0.81		0.35	0.86		0.69	0.50		0.01	0.83	0.35
Control Delay	25.1	33.5		19.9	37.5		30.8	20.9		27.0	50.6	5.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	25.1	33.5		19.9	37.5		30.8	20.9		27.0	50.6	5.3
LOS	C	C		B	D		C	C		C	D	A
Approach Delay		32.7			36.3			24.7			35.0	
Approach LOS		C			D			C			D	
Queue Length 50th (m)	8.8	64.4		6.7	73.5		26.4	44.7		0.3	53.3	0.0
Queue Length 95th (m)	17.5	86.6		14.3	#99.7		#45.7	70.2		2.0	#94.3	11.1
Internal Link Dist (m)		324.2			497.1			697.5			911.0	
Turn Bay Length (m)	40.0			38.0			65.0			38.0		45.0
Base Capacity (vph)	182	1146		199	1169		333	798		246	455	532
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.49	0.71		0.35	0.75		0.69	0.46		0.01	0.72	0.32

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 82.8
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86

Intersection Signal Delay: 32.6	Intersection LOS: C
Intersection Capacity Utilization 83.9%	ICU Level of Service E
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Eagleson & Perth/Old Richmond



Appendix J

MMLOS Analysis

CGH TRANSPORTATION

Multi-Modal Level of Service - Segments Form

Consultant	**CGH Transportation Inc.**	**Project**	**2020-22**
Scenario	**Existing/Future**	**Date**	**2021-12-03**
Comments			

SEGMENTS			Eagleson Rd		Section
			1	2	3
Pedestrian	Sidewalk Width Boulevard Width	-	no sidewalk n/a		
	Avg Daily Curb Lane Traffic Volume		> 3000		
	Operating Speed On-Street Parking		> 60 km/h no		
	Exposure to Traffic PLoS		**F**	-	-
	Effective Sidewalk Width				
	Pedestrian Volume				
	Crowding PLoS		-	-	-
	Level of Service		**-**	**-**	**-**
Bicycle	Type of Cycling Facility	**F**	Mixed Traffic		
	Number of Travel Lanes		2-3 lanes total		
	Operating Speed		≥ 60 km/h		
	# of Lanes & Operating Speed LoS		**F**	-	-
	Bike Lane (+ Parking Lane) Width				
	Bike Lane Width LoS		-	-	-
	Bike Lane Blockages				
	Blockage LoS		-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge		
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes		
	Sidestreet Operating Speed		≤ 40 km/h		
	Unsignalized Crossing - Lowest LoS		**A**	-	-
	Level of Service		**F**	**-**	**-**
Transit	Facility Type	-			
	Friction or Ratio Transit:Posted Speed				
	Level of Service		**-**	**-**	**-**
Truck	Truck Lane Width	**D**	≤ 3.3 m		
	Travel Lanes per Direction		1		
	Level of Service		**D**	**-**	**-**

Multi-Modal Level of Service - Intersections Form

Consultant	**CGH Transportation Inc.**	**Project**	**2020-22**
Scenario	**Existing/Future**	**Date**	**2021-12-23**
Comments			

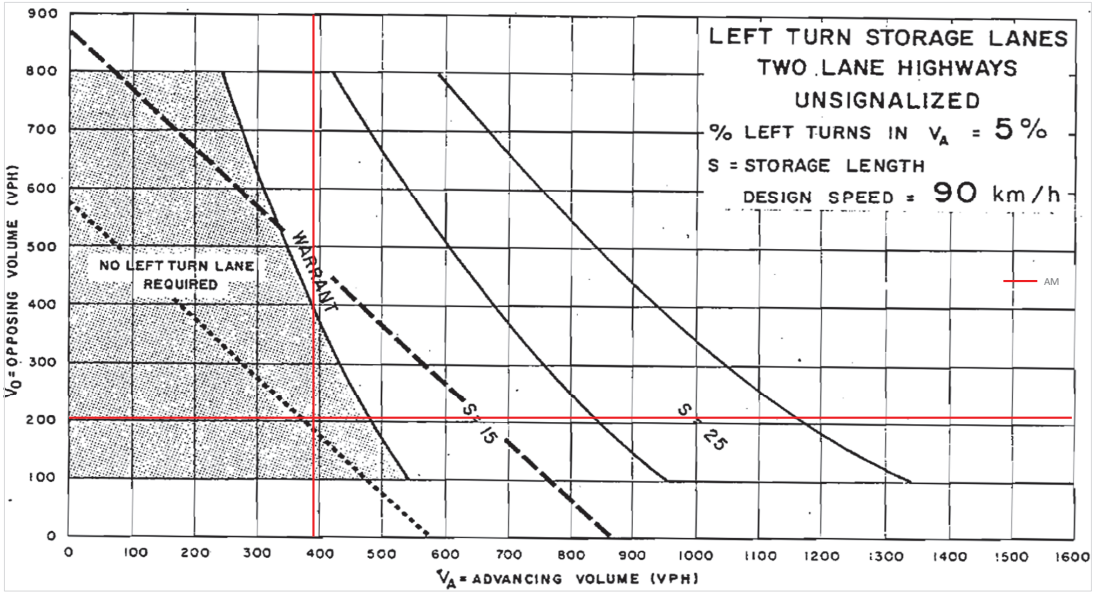
	INTERSECTIONS	Eagleson Road & Perth Street/Old Richmond Road (Existing)				Eagleson Road & Perth Street/Old Richmond Road (Future)			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	4	5	3	4	5	5	5	6
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive	Protected	Permissive	Protected/ 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
	Right Turns on Red (RToR) ?	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
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	15-25m	15-25m	10-15m	5-10m	15-25m	15-25m	10-15m
	Crosswalk Type					Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score					**46**	**35**	**35**	**20**
	Ped. Exposure to Traffic LoS	-	-	-	-	**D**	**E**	**E**	**F**
	Cycle Length	120	120	120	120	90	90	90	90
	Effective Walk Time	47	47	27	27	7	18	21	34
	Average Pedestrian Delay	**22**	**22**	**36**	**36**	**38**	**29**	**26**	**17**
	Pedestrian Delay LoS	**C**	**C**	**D**	**D**	**D**	**C**	**C**	**B**
	Level of Service	**C**	**C**	**D**	**D**	**D**	**E**	**E**	**F**
		D				**F**			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane
	Right Turn Lane Configuration			≤ 50 m			> 50 m Introduced right turn lane		
	Right Turning Speed			≤ 25 km/h			≤ 25 km/h		
	Cyclist relative to RT motorists	-	-	D	-	-	D	-	-
	Separated or Mixed Traffic	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Separated**	**Separated**
	Left Turn Approach	One lane crossed	One lane crossed	No lane crossed	One lane crossed	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box
	Operating Speed	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	F	F	C	F	A	A	A	A
	Level of Service	**F**	**F**	**D**	**-**	**A**	**D**	**A**	**A**
		F				**D**			
Transit	Average Signal Delay			≤ 30 sec	≤ 20 sec			≤ 40 sec	≤ 40 sec
	Level of Service	**-**	**-**	**D**	**C**	**-**	**-**	**E**	**E**
		D				**E**			
Truck	Effective Corner Radius	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1	≥ 2	≥ 2	1	1
	Level of Service	**C**	**C**	**C**	**C**	**A**	**A**	**C**	**C**
		C				**C**			
Auto	Volume to Capacity Ratio	0.81 - 0.90				0.81 - 0.90			
	Level of Service	**D**				**D**			

Appendix K

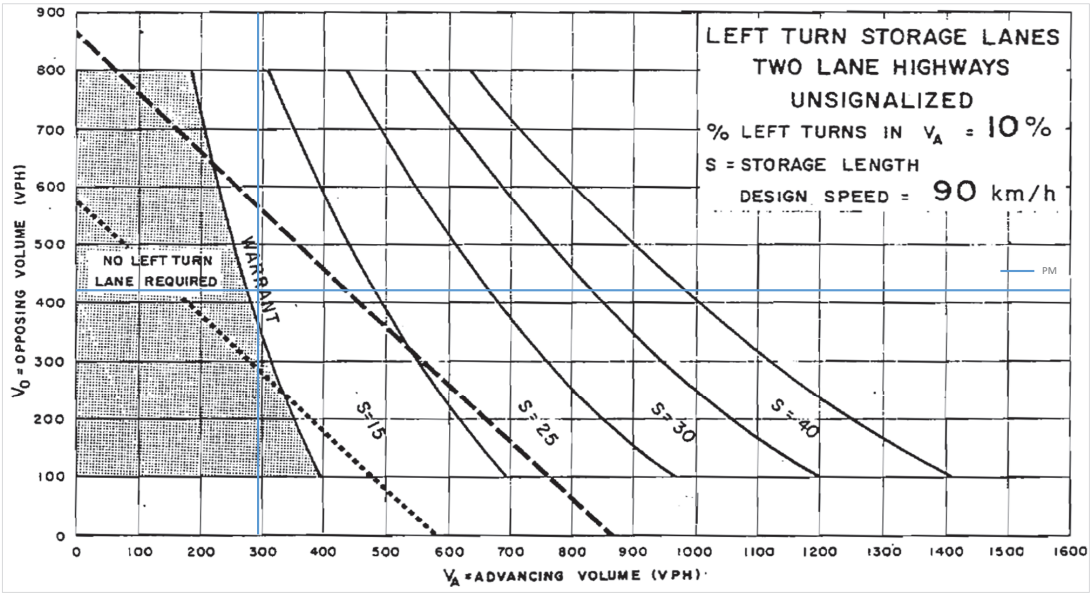
Site Access Turn Lane Warrants

CGH TRANSPORTATION

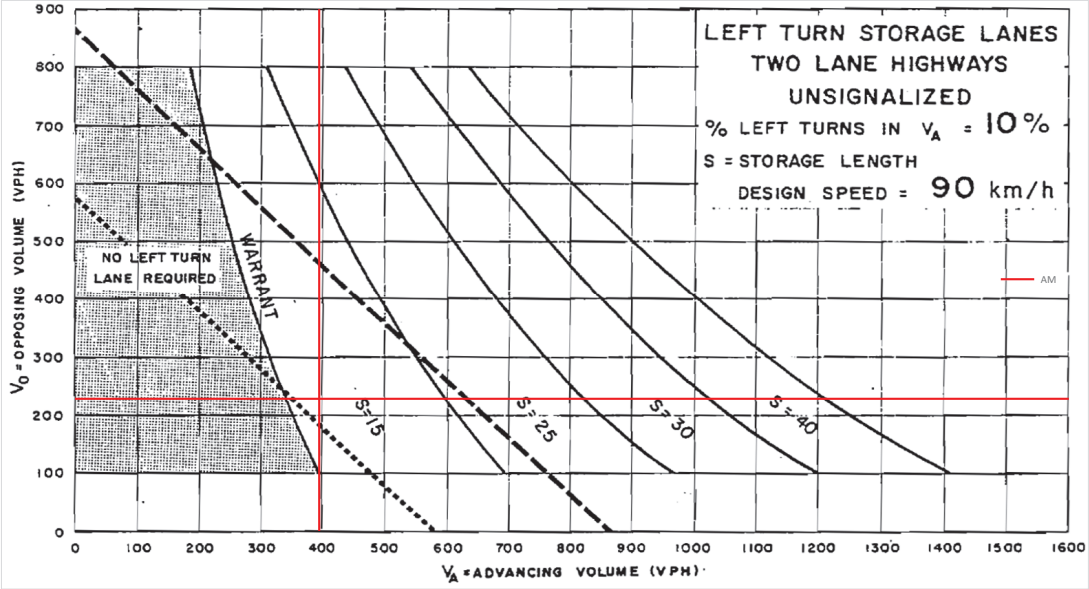
Northbound Left - Eagleson Road at Street 1 - FT 2027



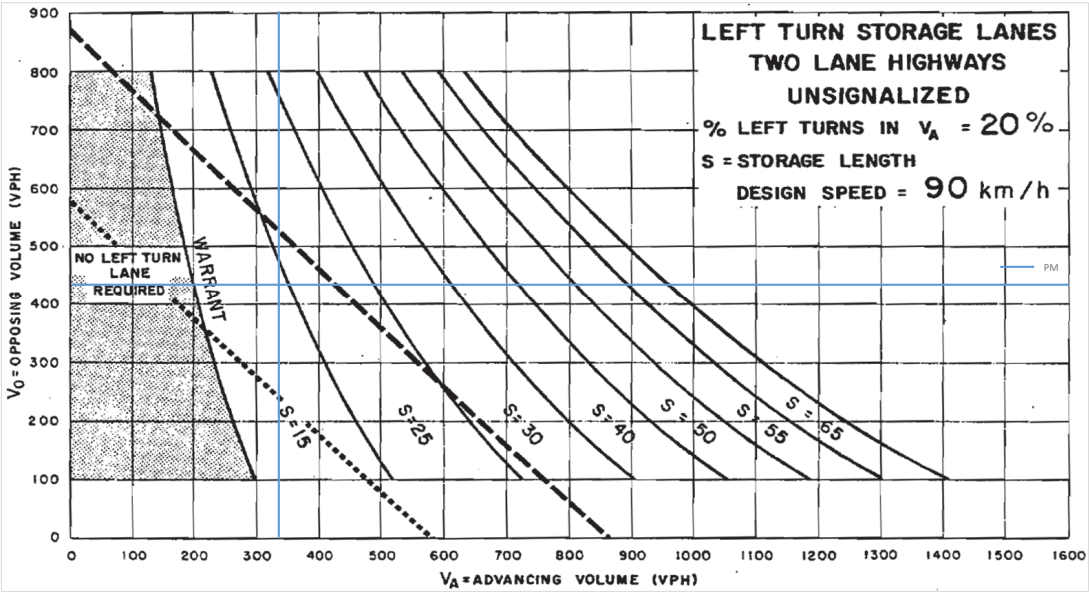
Northbound Left - Eagleson Road at Street 1 - FT 2027



Northbound Left - Eagleson Road at Street 3 - FT 2027



Northbound Left - Eagleson Road at Street 3 - FT 2027



Appendix L

Site Access Signal Warrants

CGH TRANSPORTATION

Eagleson Road @ Street 3
FT2032

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	539	112%	60%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	72	60%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	490	102%	37%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	19	37%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Appendix M

Synchro Intersection Worksheets – 2027 Future Total Conditions

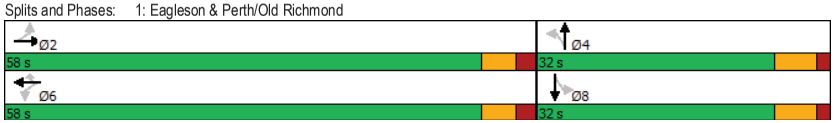
CGH TRANSPORTATION

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	550	164	16	237	29	169	210	42	51	140	73
Future Volume (vph)	153	550	164	16	237	29	169	210	42	51	140	73
Satd. Flow (prot)	1658	1686	0	0	1740	1483	1658	1701	0	1658	1656	0
Flt Permitted	0.602				0.948		0.625			0.571		
Satd. Flow (perm)	1051	1686	0	0	1654	1483	1091	1701	0	996	1656	0
Satd. Flow (RTOR)		28				39		11			29	
Lane Group Flow (vph)	153	714	0	0	253	29	169	252	0	51	213	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	30.0	26.2	26.2		26.2	26.2	
Total Split (s)	58.0	58.0		58.0	58.0	58.0	32.0	32.0		32.0	32.0	
Total Split (%)	64.4%	64.4%		64.4%	64.4%	64.4%	35.6%	35.6%		35.6%	35.6%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	31.4	31.4			31.4	31.4	16.7	16.7		16.7	16.7	
Actuated g/C Ratio	0.51	0.51			0.51	0.51	0.27	0.27		0.27	0.27	
v/c Ratio	0.29	0.82			0.30	0.04	0.57	0.54		0.19	0.45	
Control Delay	10.4	20.9			9.8	2.4	31.4	25.6		23.0	22.0	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	10.4	20.9			9.8	2.4	31.4	25.6		23.0	22.0	
LOS	B	C			A	A	C	C		C	C	
Approach Delay		19.0			9.0			27.9			22.2	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	8.3	54.5			13.8	0.0	15.5	21.7		4.2	16.0	
Queue Length 95th (m)	22.7	123.6			32.9	2.6	45.0	57.2		15.7	45.6	
Internal Link Dist (m)		324.2			497.1			697.5			253.9	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	876	1409			1378	1242	503	790		459	779	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.17	0.51			0.18	0.02	0.34	0.32		0.11	0.27	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 61.6
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82

Intersection Signal Delay: 20.0 — Intersection LOS: B
Intersection Capacity Utilization 98.2% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: Eagleson & Perth/Old Richmond



Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	33	15	375	195	10
Future Vol, veh/h	25	33	15	375	195	10
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	25	33	15	375	195	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	605	200	205	0	-	0
Stage 1	200	-	-	-	-	-
Stage 2	405	-	-	-	-	-
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	461	841	1366	-	-	-
Stage 1	834	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	455	841	1366	-	-	-
Mov Cap-2 Maneuver	455	-	-	-	-	-
Stage 1	822	-	-	-	-	-
Stage 2	673	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1366	-	616	-	-
HCM Lane V/C Ratio	0.011	-	0.094	-	-
HCM Control Delay (s)	7.7	-	11.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	66	44	349	199	29
Future Vol, veh/h	41	66	44	349	199	29
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	41	66	44	349	199	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	651	214	228	0	-	0
Stage 1	214	-	-	-	-	-
Stage 2	437	-	-	-	-	-
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	433	826	1340	-	-	-
Stage 1	822	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	415	826	1340	-	-	-
Mov Cap-2 Maneuver	415	-	-	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	651	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.3	0.9	0
HCM LOS	B		

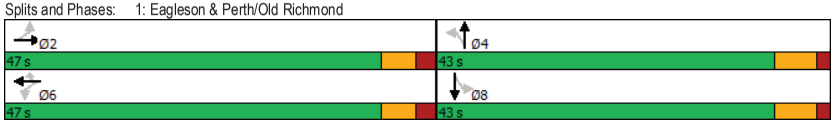
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1340	-	599	-	-
HCM Lane V/C Ratio	0.033	-	0.179	-	-
HCM Control Delay (s)	7.8	0	12.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	378	159	34	579	44	225	176	26	42	197	197
Future Volume (vph)	113	378	159	34	579	44	225	176	26	42	197	197
Satd. Flow (prot)	1658	1668	0	0	1740	1483	1658	1712	0	1658	1614	0
Flt Permitted	0.236				0.932		0.409			0.631		
Satd. Flow (perm)	412	1668	0	0	1626	1483	714	1712	0	1101	1614	0
Satd. Flow (RTOR)		31				39		10			68	
Lane Group Flow (vph)	113	537	0	0	613	44	225	202	0	42	394	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	30.0	26.2	26.2		26.2	26.2	
Total Split (s)	47.0	47.0		47.0	47.0	47.0	43.0	43.0		43.0	43.0	
Total Split (%)	52.2%	52.2%		52.2%	52.2%	52.2%	47.8%	47.8%		47.8%	47.8%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	33.1	33.1			33.1	33.1	28.7	28.7		28.7	28.7	
Actuated g/C Ratio	0.44	0.44			0.44	0.44	0.38	0.38		0.38	0.38	
v/c Ratio	0.62	0.71			0.85	0.06	0.82	0.31		0.10	0.60	
Control Delay	36.0	23.1			33.1	5.7	48.6	17.7		16.9	20.1	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	36.0	23.1			33.1	5.7	48.6	17.7		16.9	20.1	
LOS	D	C			C	A	D	B		B	C	
Approach Delay		25.3			31.3			34.0			19.8	
Approach LOS		C			C			C			B	
Queue Length 50th (m)	13.3	63.0			83.8	0.4	31.2	20.5		4.2	39.8	
Queue Length 95th (m)	#39.3	104.0			#150.3	6.0	#71.6	37.2		10.7	69.6	
Internal Link Dist (m)		324.2			497.1			697.5			254.0	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	241	991			954	886	376	906		580	882	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.47	0.54			0.64	0.05	0.60	0.22		0.07	0.45	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 74.9
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85

Intersection Signal Delay: 27.7 Intersection LOS: C
Intersection Capacity Utilization 122.5% ICU Level of Service H
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Eagleson & Perth/Old Richmond



Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	27	24	269	405	16
Future Vol, veh/h	20	27	24	269	405	16
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	20	27	24	269	405	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	730	413	421	0	-	0
Stage 1	413	-	-	-	-	-
Stage 2	317	-	-	-	-	-
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	389	639	1138	-	-	-
Stage 1	668	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	379	639	1138	-	-	-
Mov Cap-2 Maneuver	379	-	-	-	-	-
Stage 1	651	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1138	-	495	-	-
HCM Lane V/C Ratio	0.021	-	0.095	-	-
HCM Control Delay (s)	8.2	-	13	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	33	53	73	260	383	49
Future Vol, veh/h	33	53	73	260	383	49
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	33	53	73	260	383	49

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	814	408	432	0	-	0
Stage 1	408	-	-	-	-	-
Stage 2	406	-	-	-	-	-
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	347	643	1128	-	-	-
Stage 1	671	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	321	643	1128	-	-	-
Mov Cap-2 Maneuver	321	-	-	-	-	-
Stage 1	620	-	-	-	-	-
Stage 2	673	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.5	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1128	-	464	-	-
HCM Lane V/C Ratio	0.065	-	0.185	-	-
HCM Control Delay (s)	8.4	0	14.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-

Intersection						
Int Delay, s/veh	1.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	33	15	375	195	10
Future Vol, veh/h	25	33	15	375	195	10
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	-	8	-	-	-
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	25	33	15	375	195	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	605	200	205	0	-	0
Stage 1	200	-	-	-	-	-
Stage 2	405	-	-	-	-	-
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	461	841	1366	-	-	-
Stage 1	834	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	456	841	1366	-	-	-
Mov Cap-2 Maneuver	456	-	-	-	-	-
Stage 1	825	-	-	-	-	-
Stage 2	673	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1366	-	617	-	-
HCM Lane V/C Ratio	0.011	-	0.094	-	-
HCM Control Delay (s)	7.7	-	11.4	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection						
Int Delay, s/veh	2.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	66	44	349	199	29
Future Vol, veh/h	41	66	44	349	199	29
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	-	37.5	-	-	-
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	41	66	44	349	199	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	651	214	228	0	-	0
Stage 1	214	-	-	-	-	-
Stage 2	437	-	-	-	-	-
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	433	826	1340	-	-	-
Stage 1	822	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	419	826	1340	-	-	-
Mov Cap-2 Maneuver	419	-	-	-	-	-
Stage 1	795	-	-	-	-	-
Stage 2	651	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.3	0.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1340	-	602	-	-
HCM Lane V/C Ratio	0.033	-	0.178	-	-
HCM Control Delay (s)	7.8	-	12.3	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	27	24	269	405	16
Future Vol, veh/h	20	27	24	269	405	16
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	-	8	-	-	-
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	20	27	24	269	405	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	730	413	421	0	-	0
Stage 1	413	-	-	-	-	-
Stage 2	317	-	-	-	-	-
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	389	639	1138	-	-	-
Stage 1	668	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	381	639	1138	-	-	-
Mov Cap-2 Maneuver	381	-	-	-	-	-
Stage 1	654	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1138	-	496	-	-
HCM Lane V/C Ratio	0.021	-	0.095	-	-
HCM Control Delay (s)	8.2	-	13	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	33	53	73	260	383	49
Future Vol, veh/h	33	53	73	260	383	49
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	-	37.5	-	-	-
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	33	53	73	260	383	49

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	814	408	432	0	-	0
Stage 1	408	-	-	-	-	-
Stage 2	406	-	-	-	-	-
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	347	643	1128	-	-	-
Stage 1	671	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	324	643	1128	-	-	-
Mov Cap-2 Maneuver	324	-	-	-	-	-
Stage 1	627	-	-	-	-	-
Stage 2	673	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.4	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1128	-	467	-	-
HCM Lane V/C Ratio	0.065	-	0.184	-	-
HCM Control Delay (s)	8.4	-	14.4	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-

Appendix N

Synchro Intersection Worksheets – 2032 Future Total Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	817	168	47	366	29	171	333	73	51	285	73
Future Volume (vph)	153	817	168	47	366	29	171	333	73	51	285	73
Satd. Flow (prot)	1658	1700	0	0	1735	1483	1658	1698	0	1658	1691	0
Flt Permitted	0.467				0.449		0.341			0.270		
Satd. Flow (perm)	815	1700	0	0	784	1483	595	1698	0	471	1691	0
Satd. Flow (RTOR)		19				39		12			14	
Lane Group Flow (vph)	153	985	0	0	413	29	171	406	0	51	358	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	30.0	26.2	26.2		26.2	26.2	
Total Split (s)	58.0	58.0		58.0	58.0	58.0	32.0	32.0		32.0	32.0	
Total Split (%)	64.4%	64.4%		64.4%	64.4%	64.4%	35.6%	35.6%		35.6%	35.6%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	52.0	52.0			52.0	52.0	25.8	25.8		25.8	25.8	
Actuated g/C Ratio	0.58	0.58			0.58	0.58	0.29	0.29		0.29	0.29	
v/c Ratio	0.33	0.99			0.91	0.03	1.01	0.82		0.38	0.72	
Control Delay	12.3	47.7			45.4	2.2	106.4	44.5		35.5	37.6	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	12.3	47.7			45.4	2.2	106.4	44.5		35.5	37.6	
LOS	B	D			D	A	F	D		D	D	
Approach Delay		43.0			42.6			62.8			37.3	
Approach LOS		D			D			E			D	
Queue Length 50th (m)	12.7	155.0			59.1	0.0	~29.6	63.5		7.0	53.4	
Queue Length 95th (m)	25.0	#249.3			#121.9	2.6	#69.3	#110.2		18.3	#86.0	
Internal Link Dist (m)		324.2			497.1			697.5			253.9	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	470	990			452	873	170	495		135	494	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.33	0.99			0.91	0.03	1.01	0.82		0.38	0.72	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.01

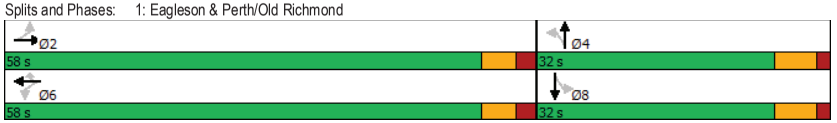
Lanes, Volumes, Timings
1: Eagleson & Perth/Old Richmond
2032 Future Total- New Method
AM Peak Hour

Intersection Signal Delay: 46.5 Intersection LOS: D
Intersection Capacity Utilization 131.1% ICU Level of Service H
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: Eagleson & Perth/Old Richmond



Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	33	15	498	340	10
Future Vol, veh/h	25	33	15	498	340	10
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	25	33	15	498	340	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	873	345	350	0	-	0
Stage 1	345	-	-	-	-	-
Stage 2	528	-	-	-	-	-
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	321	698	1209	-	-	-
Stage 1	717	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	316	698	1209	-	-	-
Mov Cap-2 Maneuver	316	-	-	-	-	-
Stage 1	705	-	-	-	-	-
Stage 2	592	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1209	-	459	-	-
HCM Lane V/C Ratio	0.012	-	0.126	-	-
HCM Control Delay (s)	8	-	14	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	66	44	472	344	29
Future Vol, veh/h	41	66	44	472	344	29
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	41	66	44	472	344	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	919	359	373	0	-	0
Stage 1	359	-	-	-	-	-
Stage 2	560	-	-	-	-	-
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	301	685	1185	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	572	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	286	685	1185	-	-	-
Mov Cap-2 Maneuver	286	-	-	-	-	-
Stage 1	672	-	-	-	-	-
Stage 2	572	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.6	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1185	-	446	-	-
HCM Lane V/C Ratio	0.037	-	0.24	-	-
HCM Control Delay (s)	8.2	-	15.6	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	652	162	69	872	44	231	341	62	42	339	197
Future Volume (vph)	113	652	162	69	872	44	231	341	62	42	339	197
Satd. Flow (prot)	1658	1693	0	0	1738	1483	1658	1705	0	1658	1649	0
Flt Permitted	0.069				0.464		0.189			0.340		
Satd. Flow (perm)	120	1693	0	0	810	1483	330	1705	0	593	1649	0
Satd. Flow (RTOR)		17				32		9			30	
Lane Group Flow (vph)	113	814	0	0	941	44	231	403	0	42	536	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	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	10.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	30.0	26.2	26.2		26.2	26.2	
Total Split (s)	64.0	64.0		64.0	64.0	64.0	46.0	46.0		46.0	46.0	
Total Split (%)	58.2%	58.2%		58.2%	58.2%	58.2%	41.8%	41.8%		41.8%	41.8%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	4.6	4.6		4.6	4.6	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Act Effct Green (s)	58.0	58.0			58.0	58.0	39.8	39.8		39.8	39.8	
Actuated g/C Ratio	0.53	0.53			0.53	0.53	0.36	0.36		0.36	0.36	
v/c Ratio	1.79	0.90			2.20	0.06	1.94	0.65		0.20	0.87	
Control Delay	436.5	38.4			569.5	6.0	477.0	34.4		27.3	47.5	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	436.5	38.4			569.5	6.0	477.0	34.4		27.3	47.5	
LOS	F	D			F	A	F	C		C	D	
Approach Delay		86.9			544.3			195.7			46.0	
Approach LOS		F			F			F			D	
Queue Length 50th (m)	~36.4	148.8			~237.6	1.2	~76.7	69.8		6.1	101.2	
Queue Length 95th (m)	#59.2	#233.2			#313.3	6.4	#101.0	103.1		15.0	#162.3	
Internal Link Dist (m)		324.2			497.1			697.5			254.0	
Turn Bay Length (m)	35.0					35.0	50.0			40.0		
Base Capacity (vph)	63	900			427	797	119	622		214	615	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	1.79	0.90			2.20	0.06	1.94	0.65		0.20	0.87	

Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.20

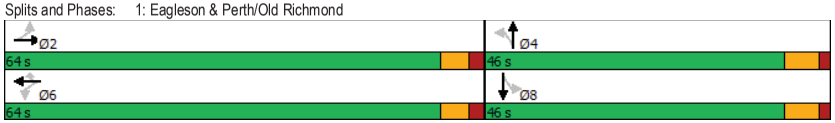
Lanes, Volumes, Timings
1: Eagleson & Perth/Old Richmond
2032 Future Total- New Method
PM Peak Hour

Intersection Signal Delay: 245.6 Intersection LOS: F
Intersection Capacity Utilization 164.4% ICU Level of Service H
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: Eagleson & Perth/Old Richmond



Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	27	24	434	547	16
Future Vol, veh/h	20	27	24	434	547	16
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	20	27	24	434	547	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1037	555	563	0	-	0
Stage 1	555	-	-	-	-	-
Stage 2	482	-	-	-	-	-
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	256	531	1008	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	621	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	248	531	1008	-	-	-
Mov Cap-2 Maneuver	248	-	-	-	-	-
Stage 1	557	-	-	-	-	-
Stage 2	621	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.6	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1008	-	357	-	-
HCM Lane V/C Ratio	0.024	-	0.132	-	-
HCM Control Delay (s)	8.7	-	16.6	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	33	53	73	425	525	49
Future Vol, veh/h	33	53	73	425	525	49
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	33	53	73	425	525	49

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1121	550	574	0	-	0
Stage 1	550	-	-	-	-	-
Stage 2	571	-	-	-	-	-
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	228	535	999	-	-	-
Stage 1	578	-	-	-	-	-
Stage 2	565	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	206	535	999	-	-	-
Mov Cap-2 Maneuver	206	-	-	-	-	-
Stage 1	523	-	-	-	-	-
Stage 2	565	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.6	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	999	-	332	-	-
HCM Lane V/C Ratio	0.073	-	0.259	-	-
HCM Control Delay (s)	8.9	-	19.6	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	33	15	498	340	10
Future Vol, veh/h	25	33	15	498	340	10
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	-	8	-	-	-
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	25	33	15	498	340	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	873	345	350	0	-	0
Stage 1	345	-	-	-	-	-
Stage 2	528	-	-	-	-	-
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	321	698	1209	-	-	-
Stage 1	717	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	317	698	1209	-	-	-
Mov Cap-2 Maneuver	317	-	-	-	-	-
Stage 1	708	-	-	-	-	-
Stage 2	592	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1209	-	460	-	-
HCM Lane V/C Ratio	0.012	-	0.126	-	-
HCM Control Delay (s)	8	-	14	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	66	44	472	344	29
Future Vol, veh/h	41	66	44	472	344	29
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	-	37.5	-	-	-
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	41	66	44	472	344	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	919	359	373	0	-	0
Stage 1	359	-	-	-	-	-
Stage 2	560	-	-	-	-	-
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	301	685	1185	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	572	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	290	685	1185	-	-	-
Mov Cap-2 Maneuver	290	-	-	-	-	-
Stage 1	681	-	-	-	-	-
Stage 2	572	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.5	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1185	-	450	-	-
HCM Lane V/C Ratio	0.037	-	0.238	-	-
HCM Control Delay (s)	8.2	-	15.5	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	27	24	434	547	16
Future Vol, veh/h	20	27	24	434	547	16
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	-	8	-	-	-
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	20	27	24	434	547	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1037	555	563	0	-	0
Stage 1	555	-	-	-	-	-
Stage 2	482	-	-	-	-	-
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	256	531	1008	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	621	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	250	531	1008	-	-	-
Mov Cap-2 Maneuver	250	-	-	-	-	-
Stage 1	561	-	-	-	-	-
Stage 2	621	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.5	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1008	-	359	-	-
HCM Lane V/C Ratio	0.024	-	0.131	-	-
HCM Control Delay (s)	8.7	-	16.5	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	33	53	73	425	525	49
Future Vol, veh/h	33	53	73	425	525	49
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	-	37.5	-	-	-
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	33	53	73	425	525	49

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1121	550	574	0	-	0
Stage 1	550	-	-	-	-	-
Stage 2	571	-	-	-	-	-
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	228	535	999	-	-	-
Stage 1	578	-	-	-	-	-
Stage 2	565	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	211	535	999	-	-	-
Mov Cap-2 Maneuver	211	-	-	-	-	-
Stage 1	536	-	-	-	-	-
Stage 2	565	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.3	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	999	-	337	-	-
HCM Lane V/C Ratio	0.073	-	0.255	-	-
HCM Control Delay (s)	8.9	-	19.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1	-	-

Appendix O

SimTraffic Report – Eagleson Road at Street 3

SimTraffic Performance Report
2032 Future Total
01-28-2022

3: Eagleson & Street No.3 Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.2	0.1	0.2	0.7	0.3	0.0	1.4
Total Del/Veh (s)	18.2	6.6	7.8	6.3	2.0	0.5	4.5
Total Stops	31	48	39	20	0	0	138
Stop/Veh	1.00	0.98	0.53	0.05	0.00	0.00	0.12

Queuing and Blocking Report
2032 Future Total
01-28-2022

Intersection: 3: Eagleson & Street No.3

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	23.9	42.3	2.3
Average Queue (m)	11.5	9.7	0.1
95th Queue (m)	20.0	26.0	1.3
Link Distance (m)	242.6	231.5	202.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Appendix P

TDM Checklist

CGH TRANSPORTATION

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	☐

Appendix Q

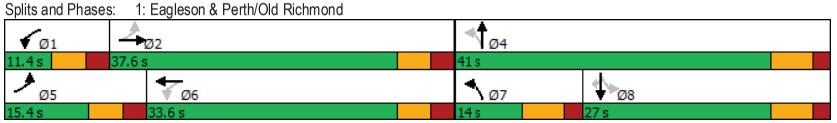
Synchro Intersection Worksheets – 2032 Future Total Conditions with Mitigations

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	817	168	47	366	29	171	333	73	51	285	73
Future Volume (vph)	153	817	168	47	366	29	171	333	73	51	285	73
Satd. Flow (prot)	1658	3229	0	1658	3279	0	1658	1698	0	1658	1745	1483
Flt Permitted	0.386			0.174			0.284			0.524		
Satd. Flow (perm)	674	3229	0	304	3279	0	496	1698	0	914	1745	1483
Satd. Flow (RTOR)		29			9			14				196
Lane Group Flow (vph)	153	985	0	47	395	0	171	406	0	51	285	73
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.3	30.0		11.3	30.0		11.6	26.6		26.6	26.6	26.6
Total Split (s)	15.4	37.6		11.4	33.6		14.0	41.0		27.0	27.0	27.0
Total Split (%)	17.1%	41.8%		12.7%	37.3%		15.6%	45.6%		30.0%	30.0%	30.0%
Yellow Time (s)	3.7	3.7		3.7	3.7		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.6	2.6		2.6	2.6		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	34.0	29.1		25.2	20.0		31.4	31.4		17.1	17.1	17.1
Actuated g/C Ratio	0.43	0.36		0.32	0.25		0.39	0.39		0.21	0.21	0.21
v/c Ratio	0.39	0.82		0.26	0.48		0.56	0.60		0.26	0.77	0.16
Control Delay	16.9	30.9		17.1	26.6		26.4	24.5		32.3	45.7	0.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	16.9	30.9		17.1	26.6		26.4	24.5		32.3	45.7	0.7
LOS	B	C		B	C		C	C		C	D	A
Approach Delay		29.0			25.6			25.0			36.0	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	14.5	79.4		4.2	27.3		20.0	53.8		7.3	45.8	0.0
Queue Length 95th (m)	26.1	#114.9		9.9	40.1		34.7	83.7		17.3	#78.9	0.0
Internal Link Dist (m)		324.2			497.1			697.5			238.3	
Turn Bay Length (m)	45.0			38.0			65.0			38.0		55.0
Base Capacity (vph)	401	1316		184	1156		305	758		239	457	533
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.38	0.75		0.26	0.34		0.56	0.54		0.21	0.62	0.14

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 79.9
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82

Intersection Signal Delay: 28.6 — Intersection LOS: C
Intersection Capacity Utilization 86.7% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Eagleson & Perth/Old Richmond



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	652	162	69	872	44	231	341	62	42	339	197
Future Volume (vph)	113	652	162	69	872	44	231	341	62	42	339	197
Satd. Flow (prot)	1658	3216	0	1658	3292	0	1658	1705	0	1658	1745	1483
Flt Permitted	0.145			0.196			0.226			0.525		
Satd. Flow (perm)	253	3216	0	342	3292	0	394	1705	0	916	1745	1483
Satd. Flow (RTOR)		36			6			12				196
Lane Group Flow (vph)	113	814	0	69	916	0	231	403	0	42	339	197
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.1	30.0		11.3	30.0		11.6	26.6		26.6	26.6	26.6
Total Split (s)	11.6	35.7		11.3	35.4		16.0	43.0		27.0	27.0	27.0
Total Split (%)	12.9%	39.7%		12.6%	39.3%		17.8%	47.8%		30.0%	30.0%	30.0%
Yellow Time (s)	3.5	3.7		3.7	3.7		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.6	2.6		2.6	2.6		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	31.9	27.6		31.1	27.3		35.7	35.7		19.4	19.4	19.4
Actuated g/C Ratio	0.38	0.33		0.37	0.32		0.42	0.42		0.23	0.23	0.23
v/c Ratio	0.60	0.76		0.34	0.86		0.75	0.56		0.20	0.85	0.40
Control Delay	30.5	30.6		19.2	37.3		36.4	23.0		31.2	54.0	7.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	30.5	30.6		19.2	37.3		36.4	23.0		31.2	54.0	7.4
LOS	C	C		B	D		D	C		C	D	A
Approach Delay		30.6			36.0			27.9			36.4	
Approach LOS		C			D			C			D	
Queue Length 50th (m)	11.0	62.9		6.6	76.8		27.0	51.3		5.9	56.5	0.1
Queue Length 95th (m)	#24.0	84.5		14.0	#109.4		#51.7	79.9		14.7	#101.8	16.4
Internal Link Dist (m)		324.2			497.1			697.5			226.2	
Turn Bay Length (m)	45.0			38.0			65.0			38.0		55.0
Base Capacity (vph)	187	1154		203	1150		307	749		223	426	510
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.60	0.71		0.34	0.80		0.75	0.54		0.19	0.80	0.39

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 84.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86

Intersection Signal Delay: 32.8 Intersection LOS: C
Intersection Capacity Utilization 87.2% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Eagleson & Perth/Old Richmond