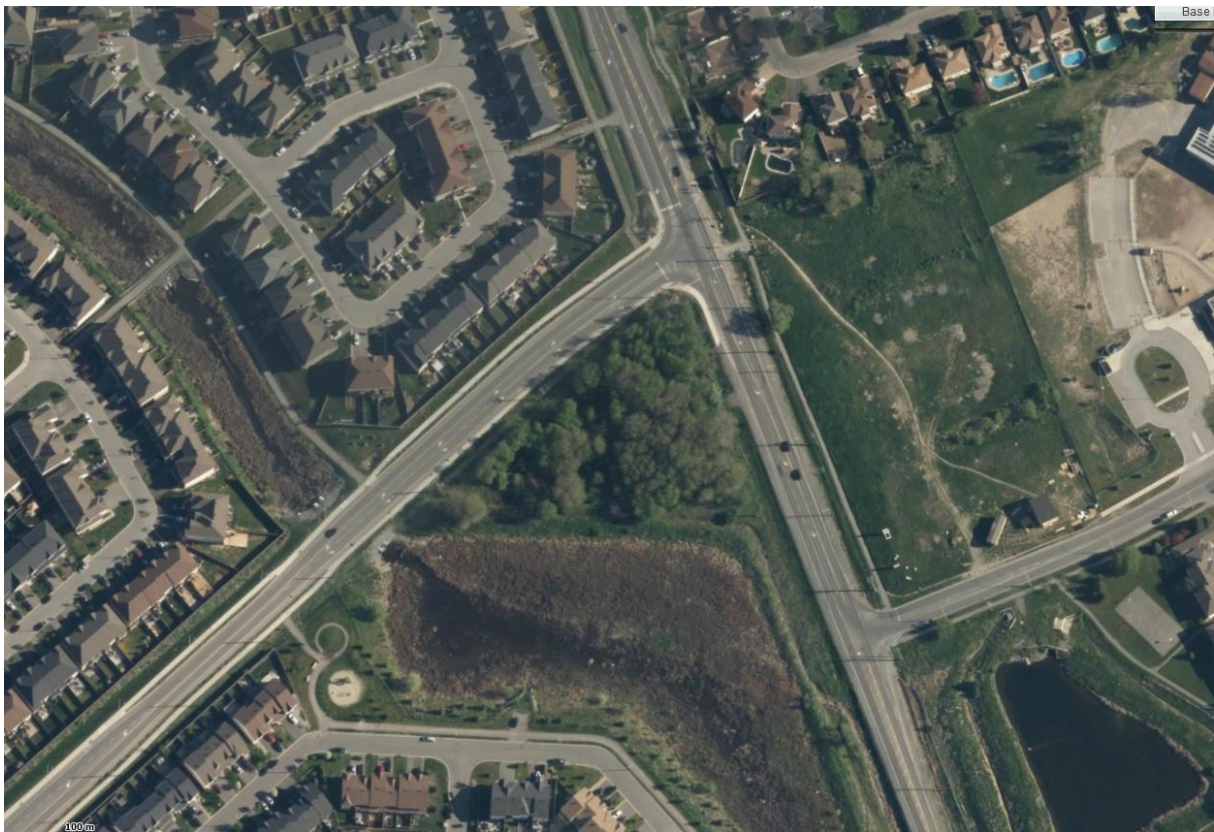


IRONCLAD DEVELOPMENTS INC

800 EAGLESON ROAD TRANSPORTATION IMPACT ASSESSMENT STRATEGY REPORT





800 EAGLESON ROAD TRANSPORTATION IMPACT ASSESSMENT DRAFT STRATEGY REPORT

IRONCLAD DEVELOPMENTS INC

PROJECT NO.: OUR REF. NO. 18M-00131-00

DATE: AUGUST 24, 2018

REVISED: NOVEMBER 26, 2018

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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 licensed¹ or registered² 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.**

Dated at Ottawa this 26 day of November, 2018.
(City)

Name: Sarah McDonald, P.Eng.
(Please Print)

Professional Title: Project Manager, Transportation Planning


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

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1 SCREENING FORM

The completed screening form and site plan (*current to November 23, 2018*) are provided in **Appendix A** and **Appendix B** respectively.

2 DESCRIPTION OF PROPOSED DEVELOPMENT

Ironclad Developments Inc. plans to develop the greenfield property in South Kanata at the southwest corner of the Eagleson Road and Fernbank Road intersection. The property is zoned as an Arterial Mainstreet [AM] which can accommodate a broad range of uses including retail, service commercial, offices, residential, and institutional.

The proposed development includes a 6-storey rental apartment building with 143 units. The expected unit distribution is:

- 49 One Bedroom (34%)
- 66 Two Bedroom (46%)
- 28 Three Bedroom (20%)

The draft site plan (**Appendix B**) includes 78 underground vehicle parking spaces and 66 surface parking spaces available for residents. An additional 29 visitor parking spaces will be provided in the near the main entrance including three accessible spaces. Interior bicycle storage will be provided for 82 bicycles (residents only). Additional space will be allocated for limited visitor bicycle storage.

The estimated date of occupancy is Fall 2019 with construction occurring as a single phase.

Three accesses will be provided as shown in the attached site plan:

- Fernbank Road, full movement, approximately 140m west of Eagleson Road (south side)
- Eagleson Road, one-way right-out approximately 40m south of Fernbank Road (west side)
- Eagleson Road, full movement, approximately 90m south of Fernbank Road (west side)

The full movement accesses are over 70m from an existing intersection which was a requirement noted by the City of Ottawa at the pre-consultation meeting (December 12, 2017).

3 EXISTING CONDITIONS

3.1 ROADWAYS AND PEDESTRIAN / CYCLING FACILITIES

The six existing roads that our Transportation Impact Assessment will consider are Eagleson Road, Fernbank Road, Cope Drive, Bridgestone Drive, Terry Fox Drive, and Templeford Avenue / Romina Street. These roads are all under the jurisdiction of the City of Ottawa and are further described below.

Eagleson Road is an urban arterial road (City of Ottawa Official Plan, 2003, Volume 1, Section 7, Annex 1 Road Classification and Rights-of-Way) that runs on a north-south alignment with a posted speed limit of 60 km/h. North of Bridgestone Drive it has two lanes of traffic in each direction; south of Bridgestone Drive it has a single lane of traffic in each direction. The Official Plan reserves a 44.5 metre Right-of-Way in the study area.

Fernbank Road is an urban arterial road that runs on an east-west alignment. It has two lanes of traffic in each direction with a posted speed of 60 km/h. The Official Plan reserves a 30.0 metre Right-of-Way in the study area.

Cope Drive is an urban collector road that runs on an east-west alignment. It has a single lane of traffic in each direction with a posted speed limit of 50 km/h. Cope Drive extends east of Eagleson Road as the urban collector Cadence Gate.

Bridgestone Drive is a major collector road that provides access through the Bridlewood-Emerald Meadows Neighbourhood. It has a single lane of traffic in each direction with a posted speed limit of 40 km/h.

Terry Fox Drive is an urban arterial road that runs on a north-south alignment. It has a single lane of traffic in each direction with a posted speed limit of 80 km/h.

Templeford Avenue / Romina Street are local roads that provide access through the residential portion of the Kanata South Business Park Neighbourhood. It is called Templeford Avenue north of Fernbank Road and Romina Street south of Fernbank Road. The speed limit is 40 km/h. Romina Street extends east of Eagleson Road as the urban collector Emerald Meadows Drive.

The existing pedestrian and cycling facilities in this area are shown in **Figure 2** and include:

Eagleson Road:

- Separated path on the east side from Bridgestone Drive north through study area
- Separated path on the west side from Fernbank Road and north by 240m to east-west path that ties into Carronbridge Circle
- Bike lane on the west side north of Cope Drive

Fernbank Road:

- Sidewalks on the north and south sides between Eagleson Road and Terry Fox Drive
- Bike lanes on the north and south side between Terry Fox Drive and Eagleson Road (**Figure 1**)

Templeford Avenue / Romina Street:

- Sidewalks on the east and west sides through study area

Terry Fox Drive:

- Separated path on the west side between Fernbank Road and Cope Drive

Cope Drive:

- Sidewalks on the north and south sides between Eagleson Road and Terry Fox Drive

Bridgestone Drive

- Separated path on the south side through study area



Figure 1. Fernbank Road Bike Lane

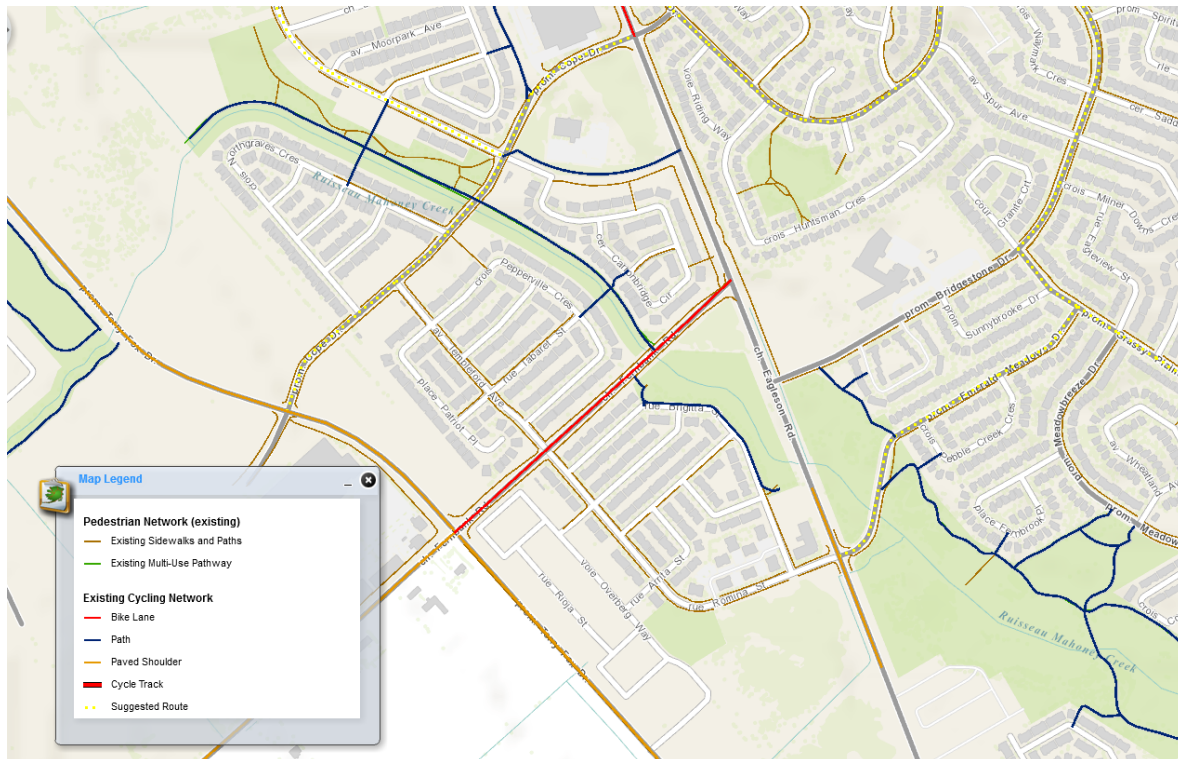


Figure 2. Existing Pedestrian and Cycling Facilities

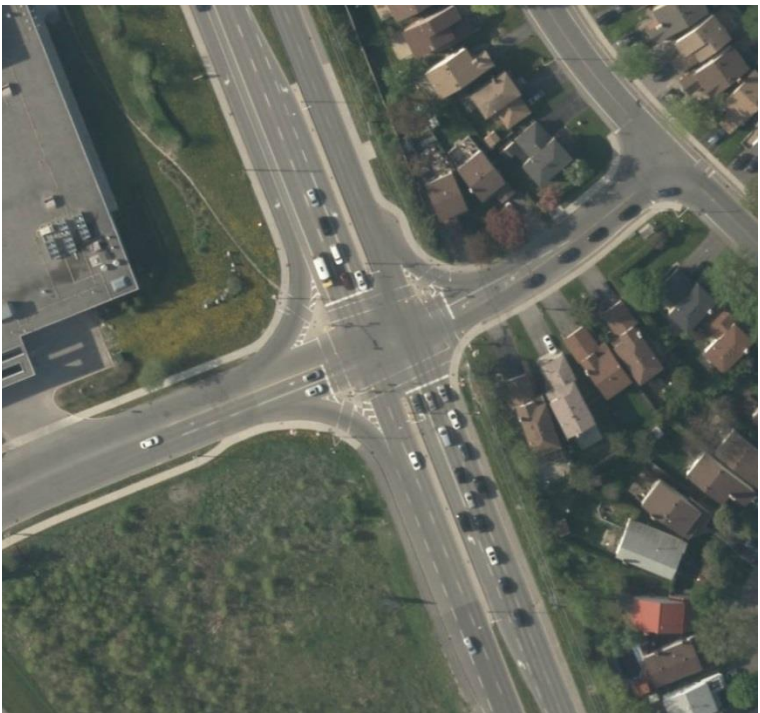
(Source: GeoOttawa)

3.2 INTERSECTIONS

We will consider five intersections in our Transportation Impact Assessment:

- Eagleson Road and Cope Drive
- Eagleson Road and Fernbank Road
- Eagleson Road and Bridgestone Drive
- Fernbank Road and Terry Fox Drive
- Fernbank Road and Templeford Avenue / Romina Street

Table 1. Study Area Intersections

INTERSECTION DESCRIPTION	LANE ARRANGEMENT
Eagleson Road and Cope Drive is a signalized intersection with no turning restrictions. Pedestrians crossing facilities are provided on all approaches. <u>Lane Arrangement</u> Northbound: left, through, shared through/right Westbound: left, shared through/right with a right channelization. Southbound: left, two through, right with a channelization Eastbound: left, shared through/right with a right channelization	
Eagleson Road and Fernbank Road is a signalized intersection with no turning restrictions. Pedestrians crossing facilities are provided on all approaches. <u>Lane Arrangement</u> Northbound: left, through Southbound: right, through Eastbound: left, right 800 Eagleson Drive is located at the south-west corner of this intersection.	

INTERSECTION DESCRIPTION

LANE ARRANGEMENT

Egleson Road and Bridgestone

Drive is a stop controlled intersection with no turning restrictions. The northbound and southbound traffic is free flowing through the intersection.

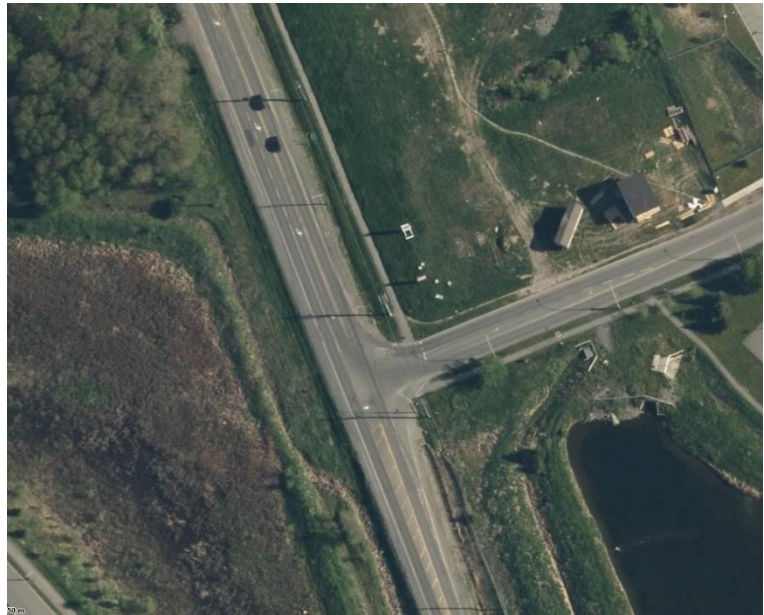
A north-south pedestrian crossing facility is provided on the east approach.

Lane Arrangement

Northbound: through, right

Westbound: left, right

Southbound: left, through



Fernbank Road and Terry Fox Drive

is a signalized intersection with no turning restrictions.

Pedestrians crossing facilities are provided on all approaches.

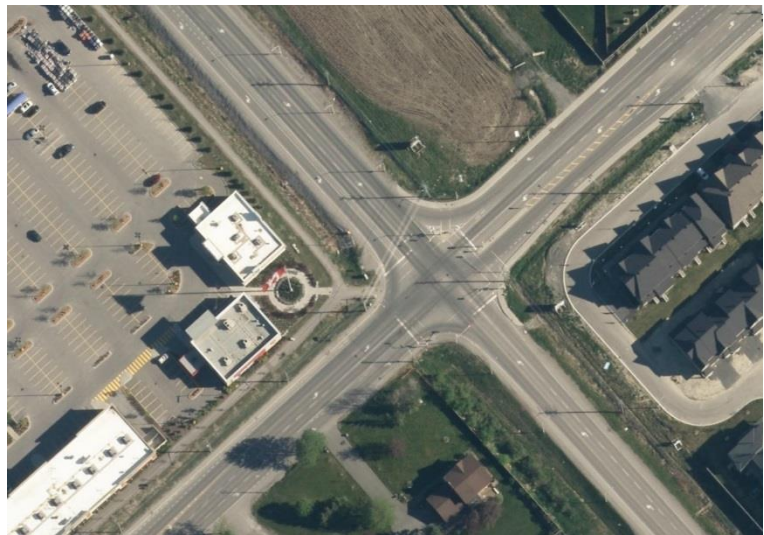
Lane Arrangement

Northbound: left, shared through/right

Westbound: left, through, right with channelization

Southbound: left, through, right

Eastbound: left, through, right



INTERSECTION DESCRIPTION

LANE ARRANGEMENT

Fernbank Road and Templeford Avenue / Romina Street is a two-way stop controlled intersection with no turning restrictions.

East-west pedestrian crossing facilities are provided on the north and south approaches.

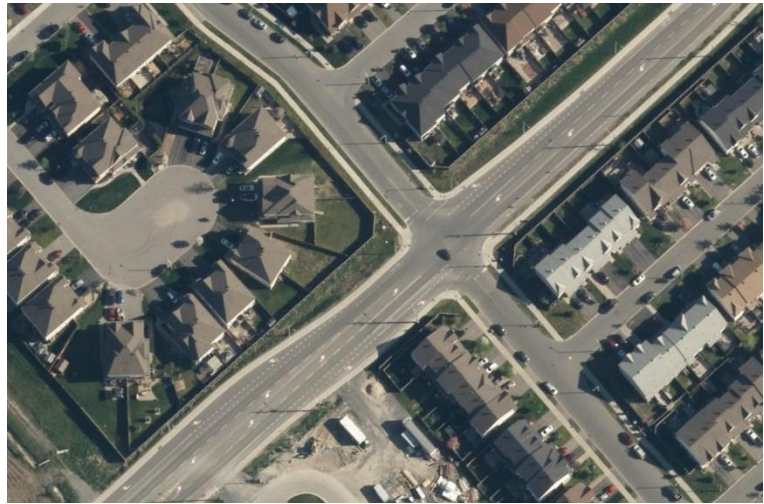
Lane Arrangement

Northbound: shared left, through, right

Westbound: left, through, right

Southbound: shared left, through, right

Eastbound: left, through, right



3.3 DRIVEWAYS

There are no private driveways in close proximity to either of the proposed accesses to the 800 Eagleson development. Access to all private residences are from local streets such as Templeford Avenue, Romina Street, and Bridgestone Avenue. Photos of the existing transportation network around the accesses are shown in the following figures.



Figure 3. Fernbank Road: east towards proposed driveway access



Figure 4. Fernbank Road: east from proposed driveway access



Figure 5. Eagleson Road: south from Fernbank



Figure 6. Eagleson Road: south towards proposed access



Figure 7. Fernbank Road: eastbound right/left turn lanes



Figure 8. Fernbank Road: west towards pathway



Figure 9. Mahoney Creek (Fernbank looking south)



Figure 10. Fernbank Road: Signage

3.4 TRANSIT

OC Transpo provides four transit stops in close proximity to 800 Eagleson Road:

- Southbound Transit Stop 9081 on Eagleson Road south of Fernbank Road (Route 168), Adjacent to property (50m from property)
- Westbound Transit Stop 1988 on Fernbank Road west of Eagleson (Route 168), Opposite side of Fernbank Road (75m from property)
- Eastbound Transit Stop 1936 on Fernbank Road east of Templeford / Romina (Route 168, 370m from property)
- Westbound Transit Stop 1934 on Fernbank Road west of Templeford / Romina (Route 161, 168, 681, 460m from property)

The existing OC Transpo routes in this area are shown in the following figure.

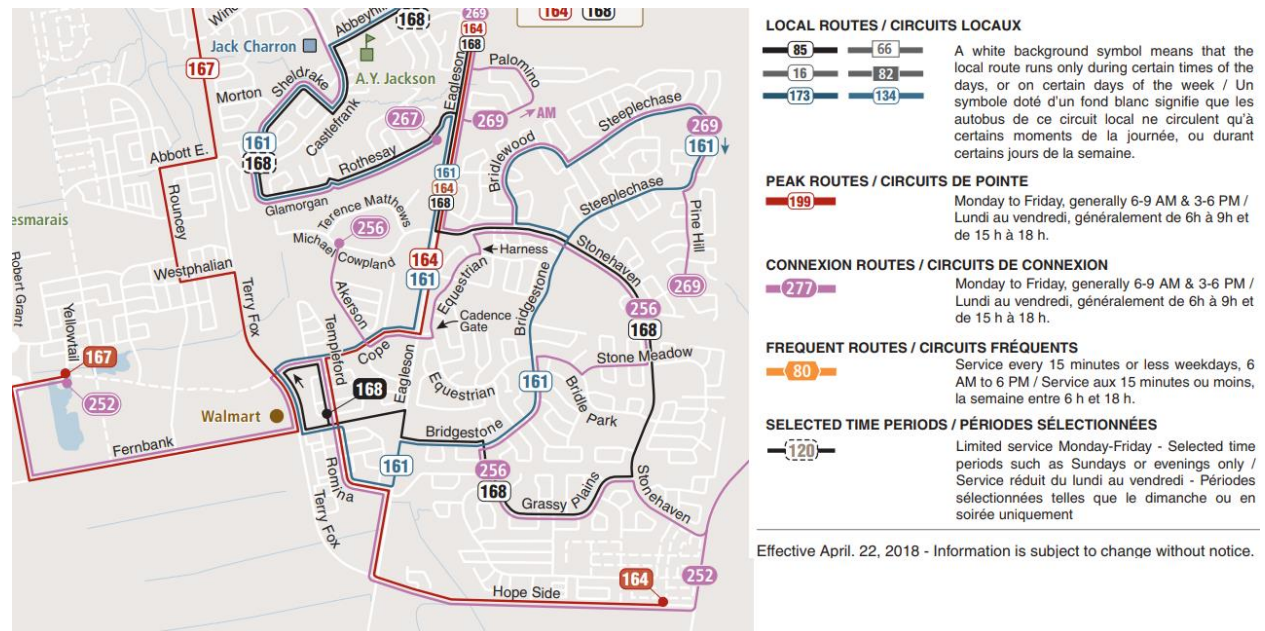


Figure 11. OC Transpo Routes

(Source: OC Transpo)

3.5 AREA TRAFFIC MANAGEMENT MEASURES

There are no existing area traffic management measures near either of the proposed vehicle accesses on Fernbank Road or Eagleson Road.

3.6 PEAK HOUR TRAVEL DEMAND

The TRANS Committee was established to co-ordinate transportation planning efforts among various planning agencies located within the National Capital Region. The most recent Origin-Destination (O-D) survey was completed by TRANS in the Fall of 2011. The proposed development is located in the Kanata / Stitsville TRANS District (800). The complete TRANS O-D results (including a map of the district area) is provided in **Appendix C**. The following table summarizes the TRANS trip data for this district..

Table 2. Peak Hour Travel Demand by Mode

MODE	AM PEAK (6:30AM – 9:00AM)			PM PEAK (3:30PM – 6:00PM)		
	From District	To District	Within District	From District	To District	Within District
Auto Driver	15,360	11,530	13,630	13,850	17,660	21,240
Auto Passenger	2,450	1,160	5,050	3,240	4,270	8,570
Transit	6,230	1,290	1,210	1,270	5,980	670
Bicycle	30	80	220	40	100	260
Walk	0	40	5,730	40	0	4,570
Other	1,900	1,560	4,510	520	910	2,160
Total Trips	25,970	15,660	30,350	18,960	28,920	37,470

Source: TRANS 2011 O-D Survey, District 800 Kanata / Stitsville

Based on the largely residential land uses in the general area, it is anticipated that most trips from the development will generally follow “from district” travel patterns during the AM Peak and “to district” travel patterns during the PM Peak. Considering this travel pattern, the primary travel mode is by vehicle with 75% of all travel being either as a driver or passenger). Transit accounts for 23% of existing trips, with active transportation modes (walking and cycling) accounting for less than 1% of all existing trips.

3.7 BOUNDARY STREET CRASH HISTORY

The boundary streets for the development are Eagleson Road and Fernbank Road. The City of Ottawa provided the most recent five years of crash history for review (January 1, 2012 through December 31, 2016). The complete crash data is provided in **Appendix D**. During the past five-year period there were three recorded crashes on Eagleson Road between Fernbank Road and Bridgestone Drive and five recorded crashes on Fernbank Road between Terry Fox Drive and Eagleson Road.

We reviewed the crash history at the five intersections in our study area. There were no trends identified at three of the intersections: Fernbank Road / Templeforld Avenue / Rominia Street; Eagleson Road / Cope Drive; or Eagleson Road / Bridgeston Drive.

At the intersection of Eagleson Road and Fernbank Road there were:

- Twenty-four recorded crashes in five years including a single fatality
- The single fatality occurred at 5:35pm on Sunday October 30, 2016 with dry pavement and clear visibility. It involved a southbound motorcycle and a northbound left turning automobile.
- Twelve (50%) of the crashes were rear end
- Five (20%) of the crashes involved personal injury and eighteen (75%) were property damage only

At the intersection of Fernbank Road and Terry Fox Drive there were:

- Thirty-four recorded crashes in five years with no fatalities
- Fourteen (41%) of the crashes were rear end
- Twenty-four (70%) were during clear visibility conditions and, primarily, dry pavement conditions
- Nine (26%) of the crashes involved personal injury while the remaining were property damage only

4 PLANNED CONDITIONS

4.1 CHANGES TO STUDY AREA TRANSPORTATION NETWORK

The City of Ottawa's Transportation Master Plan (2013) indicates that the widening of Eagleson Road through our study area is part of the Affordable Network Phase 2 (2020-2025). The TMP does not identify specific transit improvements within the immediate study area. Also, we have not identified planned local transit improvements within the study area.

4.2 OTHER AREA DEVELOPMENTS

Two developments are listed in the City of Ottawa's Development Application Search tool that are located in our study area and could impact our Transportation Impact Assessment:

- Cope Lands (DC2-02-15-0061) for 260 residential units between Terry Fox Dr. and Eagleson Rd.
- 10 Cope Drive (D-07-12-18-0074) for a 3,620 m² grocery store and 1,982 m² of commercial retail

5 STUDY AREA

The limits for the Transportation Impact Assessment (TIA) study area are shown in **Figure 12** and include:

- Fernbank Road between Terry Fox Drive and Eagleson Road
- Eagleson Road between Cope Drive and Bridgestone Drive
- The five intersections described in **Section 3.2**

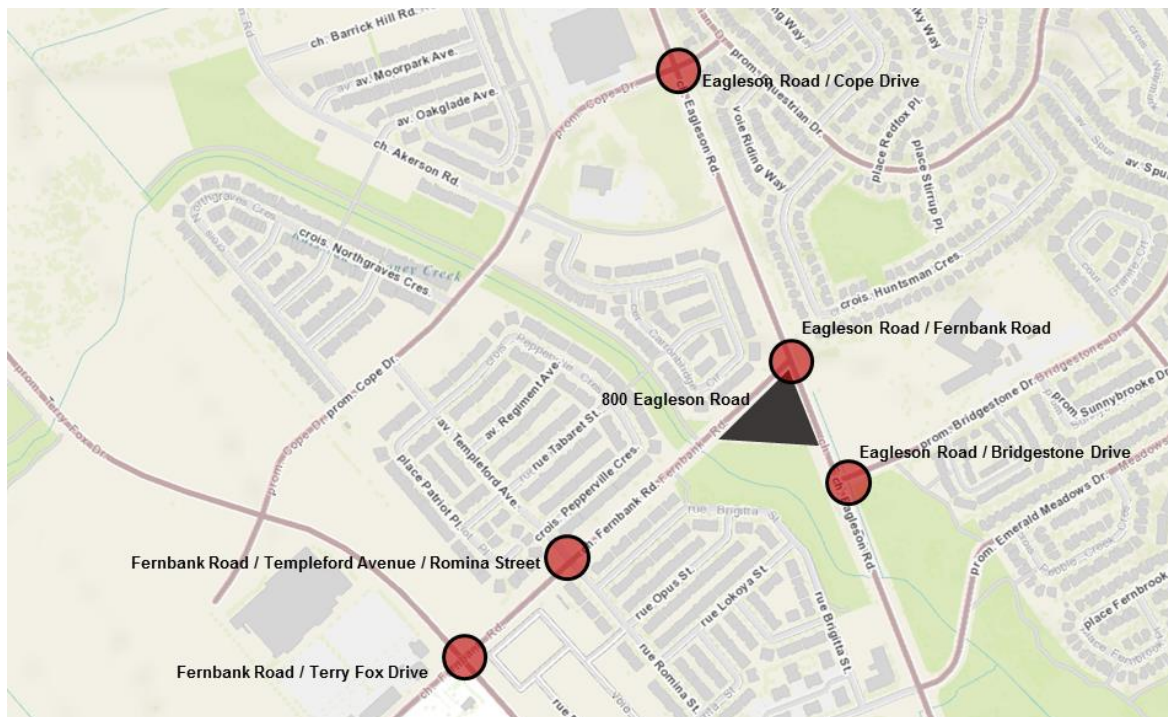


Figure 12. Study Area

6 TIME PERIODS

The time periods identified for the traffic analysis as part of the Transportation Impact Assessment are:

- AM Peak Hour: 8:00am to 9:00am
- PM Peak Hour: 4:30pm to 5:30pm

These are consistent with the AM and PM peak hours identified in the recent turning movement counts provided by the City of Ottawa at the intersection of Eagleson Road and Fernbank Road (April 2017).

7 HORIZON YEARS

The proposed development is expected to be completed within a single phase. The target year for occupancy is 2019. Our proposed horizon periods are:

- 2019: anticipated occupancy
- 2024: occupancy plus five years

8 EXEMPTIONS REVIEW

Based on our review of the development and network conditions, we have identified that the following elements qualify for an exemption from this Transportation Impact Assessment Study.

Table 3. Exemptions Summary

MODULE	ELEMENT	EXEMPTION
4.1 Development Design	4.1.2 Circulation and Access	Not Exempted. This element is required for site plans.
	4.1.3 New Street Networks	Exempted. This element is only required for plans of subdivision.
4.2 Parking	4.2.1 Parking Supply	Not Exempted. This element is required for site plans.
	4.2.2 Spillover Parking	Exempted. Adequate parking will be provided.
4.5 Transportation Demand Management	All elements	Not Exempted.
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Exempted. Access to this development is from urban arterial roads and not local or collector streets.
4.8 Network Concept		Exempted. This development is not expected to generate more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by the established zoning.

9 DEVELOPMENT GENERATED TRAFFIC

9.1 TRIP GENERATION

Base Trip Generation Rate. The TRANS Trip Generation Study (August 2009) is the City of Ottawa's preferred source for residential trip generation rates. Table 6.3 in the TRANS Study provides the following base trip generation rates for a Mid-Rise Apartment (3-10 floors) outside the greenbelt:

- AM Base Rate: 0.29 vehicle trips per unit
- PM Base Rate: 0.37 vehicle trips per unit

Total Development-Generated Person-Trips. Table 3.13 in the TRANS Study identifies a 44% auto mode share in both the AM and PM peak hour for apartments outside the greenbelt. The total development-generated person-trips (**Table 4**) was estimated using the projected auto trips (base rate multiplied by total units) and the auto mode share.

Table 4. Estimated Total Development-Generated Person-Trips

PEAK HOUR	UNITS	BASE AUTO RATE	PROJECTED AUTO TRIPS	AUTO MODE SHARE	TOTAL PERSON TRIPS
AM	143	0.29	41	44%	94
PM		0.37	53	44%	120

Existing Mode Share. The existing peak hour travel demand was identified from the most recent TRANS Origin-Destination Survey (Fall 2011) and presented in the **Section 3.6**. The existing mode share is based on those values and is shown in the following table.

Table 5. Existing Mode Share

PEAK HOUR	AUTO DRIVER	AUTO PASSENGER	TRANSIT	BICYCLE	WALK	OTHER
AM	59%	9%	24%	0%	0%	7%
PM	61%	15%	21%	0%	0%	3%

Future Mode Share Targets. The mode share targets for this development take into account the development's horizon year (2024), the available travel options (three arterial roads, three transit routes, existing pedestrian and cycling infrastructure).

Table 6. Future Mode Share Targets for the Development

TRAVEL MODE	MODE SHARE TARGET	RATIONALE
Transit	25%	This is a small increase from the existing 2011 transit mode share of 24%. Transit stops are available within 400m of the development that provide access to the Terry Fox and Eagleson Transit Stations.
Walking	5%	Sidewalk and pathway infrastructure is available for walking. However, this is a suburban area with a variety of walkable amenities within an 800m radius (examples: Supercentre @ 600m, Superstore @ 800m, Maurice-Lapointe Public Elementary School @ 400m).
Cycling	5%	This is an increase from the 2011 cycling mode share of 0%. Cycling amenities are being provided by the development (indoor bicycle storage) . However, gaps in the existing cycling network make commuter cycling in the peak periods less attractive (ie, inconsistent cycling facilities along Eagleson Road). There is an opportunity to improve the cycling network through the addition of a pathway along the southern boundary of the property connecting Eagleson Road with Fernbank Road.
Auto Passenger	10%	This is consistent with the reported 2011 TRANS Origin-Destination Survey mode shares for the area.
Auto Driver	50%	With the opportunities available for the walking and cycling modes, the 50% share represents a slight reduction in the auto driver mode share as reported in the 2011 TRANS Origin-Destination Survey.

Development Trips by Mode and Phase. The proposed development will be constructed in one phase. The development trips by mode are shown in the following table.

Table 7. Development Trips by Mode (Single Phase)

PEAK HOUR	AUTO DRIVER	AUTO PASSENGER	TRANSIT	BICYCLE	WALK
AM	47	14	24	5	5
PM	60	18	30	6	6

Trip Reduction Factors. This is a greenfield development, therefore there are no existing trips to deduct. As a residential development pass-by trips are not expected to be reflected in the trip composition.

9.2 TRIP DISTRIBUTION

There are two proposed vehicle accesses to the development; one on Eagleson Road and one on Fernbank Road. Vehicles will approach and depart from the development following existing travel patterns. The trip distribution for the proposed development is presented as follows:

- 15% of trips are to/from the east (AM and PM)
- 60% of trips are to the north / from the south (AM)
- 25% of trips are to the south / from the north (AM)
- 35% of trips are to the north / from the south (PM)
- 50% of trips are to the south / from the north (PM)

9.3 TRIP ASSIGNMENT

Trips were assigned to adjacent the transportation network and have been based upon a good understanding of existing travel patterns as identified from a review of intersection turning movement counts; including those at the following locations:

- Eagleson Road and Cope Drive, Thursday December 21, 2017 (City of Ottawa)
- Eagleson Road and Fernbank Road, Tuesday April 11, 2017 (City of Ottawa)
- Eagleson Road and Eagleson Road, Thursday February 22, 2018 (WSP)
- Fernbank Road and Romina Street / Templeford Avenue, Wednesday February 28, 2018 (WSP)
- Fernbank Road and Terry Fox Drive, Tuesday July 8, 2014 (City of Ottawa)

*(source of count)

The vehicle trip assignment for the peak hour vehicle trips are shown in the following figure.

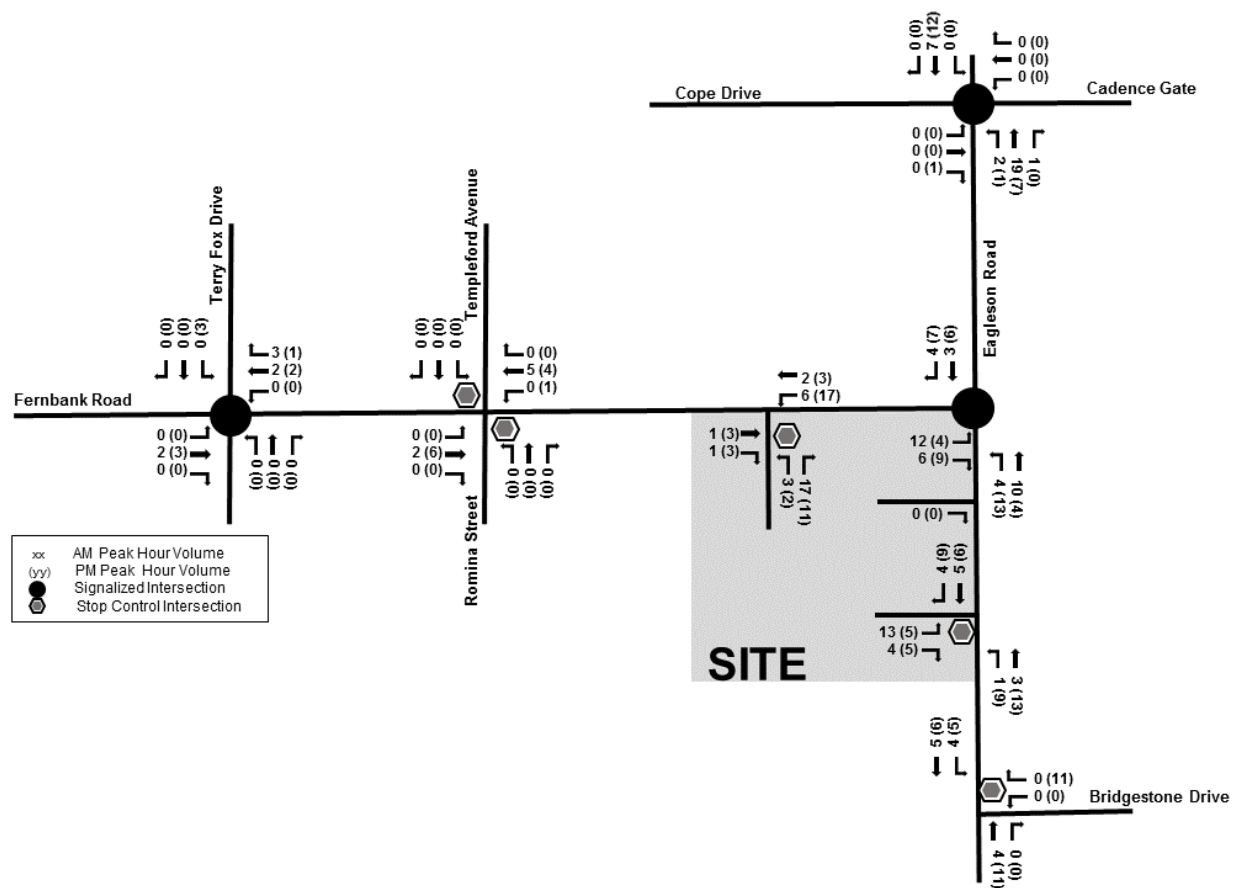


Figure 13. Trip Assignment

10 BACKGROUND NETWORK TRAFFIC

10.1 CHANGES TO THE BACKGROUND TRANSPORTATION NETWORK

The City of Ottawa's Transportation Master Plan (2013) identifies a future road widening of Eagleson Road within our study area as part of the Affordable Network Phase 2 (2020-2025). However, the Environmental Assessment process for these road improvements have not been initiated and are considered to be beyond the future planning horizon of this TIA (2024).

There are no other road projects identified along the border streets in our study area. Furthermore, neither the Ottawa Pedestrian Plan (2013) nor the Ottawa Cycling Plan (2013) identify connectivity or infrastructure improvements along Fernbank Road or Eagleson Road in our study area.

10.2 GENERAL BACKGROUND GROWTH RATES

We have selected a 1.0% annual growth rate to account for future development not currently within the development application process (**Section 10.3**). However, it is noted that the background growth rate identified as part of our review and assessment of peak hour traffic counts was an approximate -0.5% per annum for the Fernbank Road and Eagleson Road intersection (2009, 2010, 2011, and 2017). Our growth rate calculations are provided in **Appendix E**.

The existing conditions (2018) and projected future background (2019 and 2024) traffic volumes are shown in the following three figures.

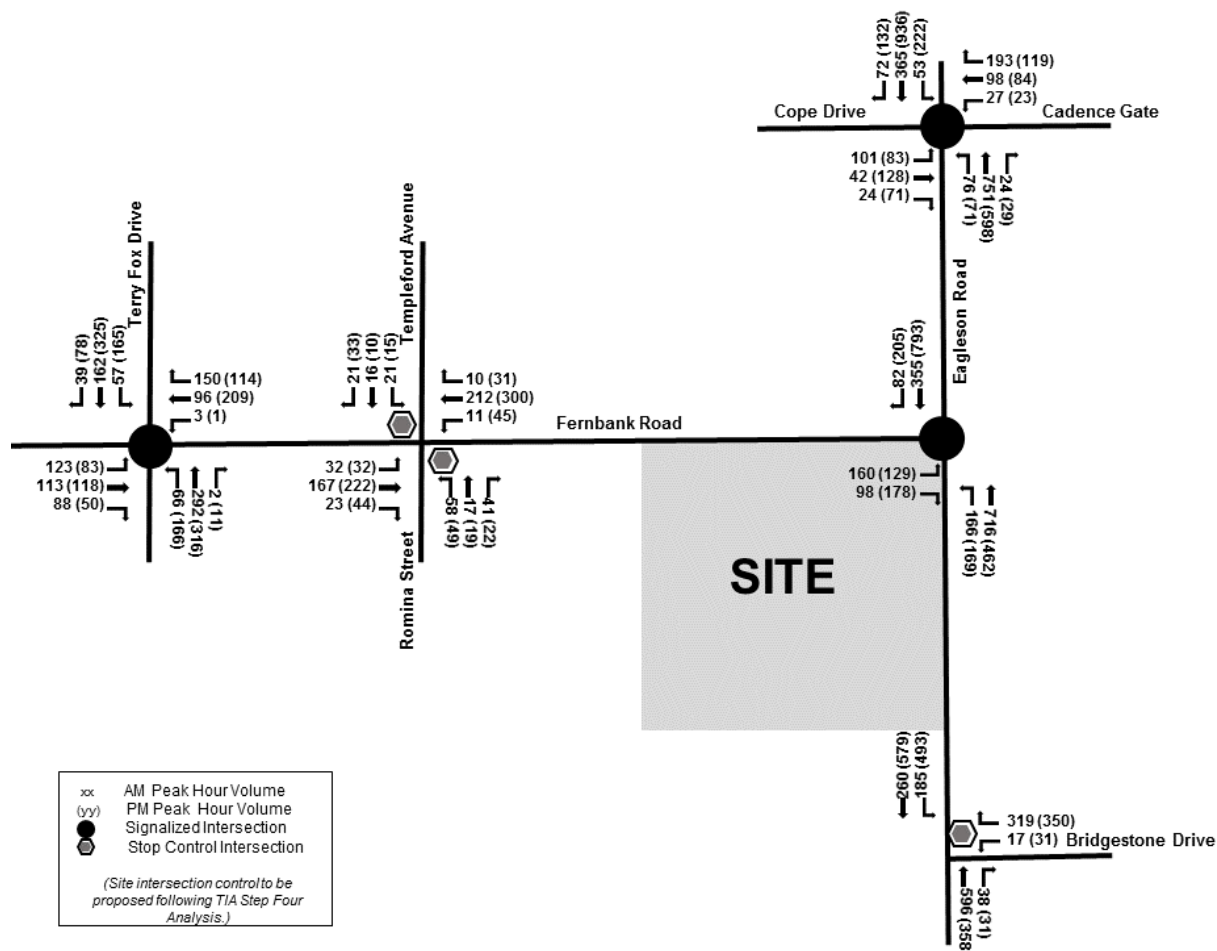


Figure 14. Existing Traffic Volumes (2018)

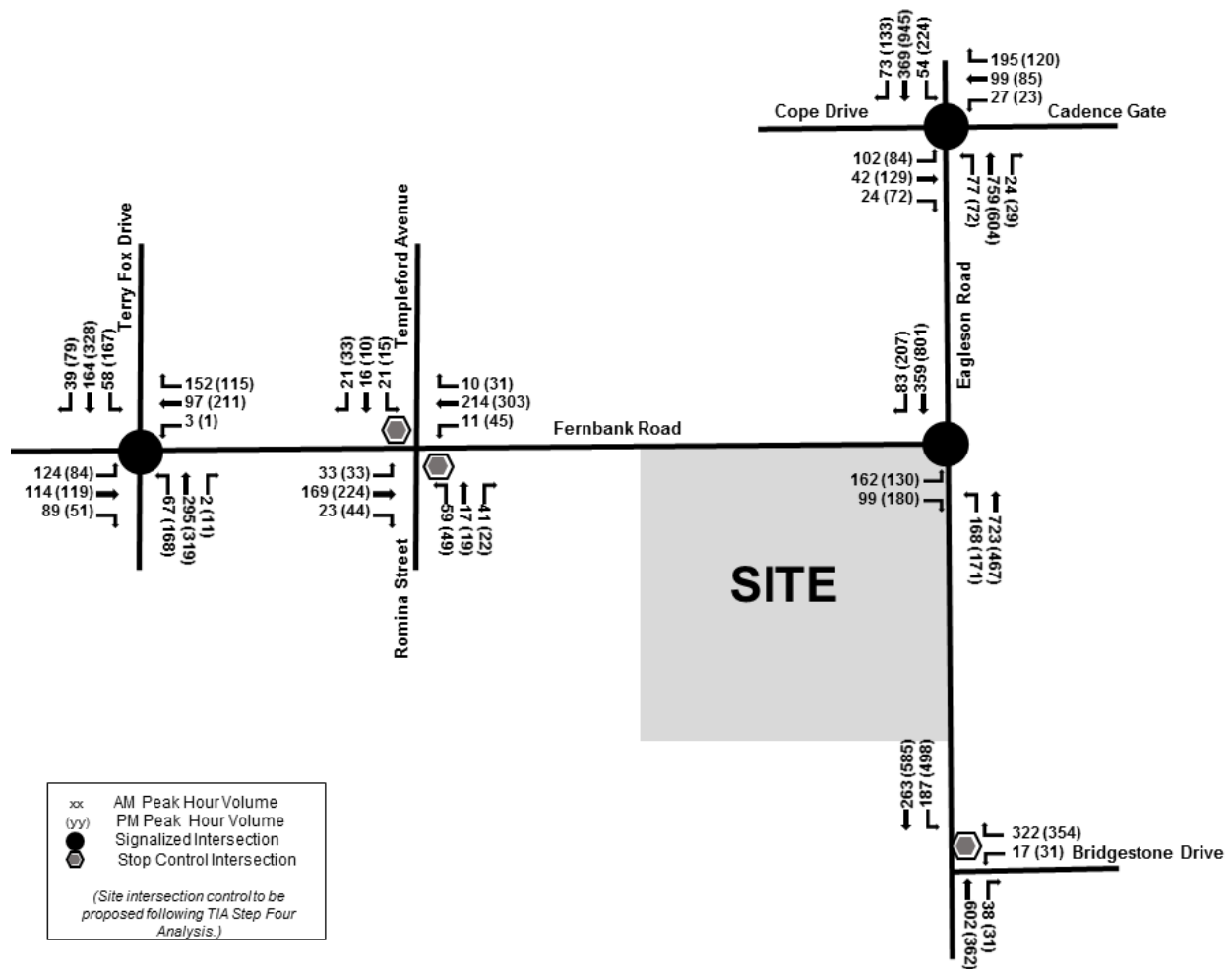


Figure 15. Background Traffic Volumes (2019)

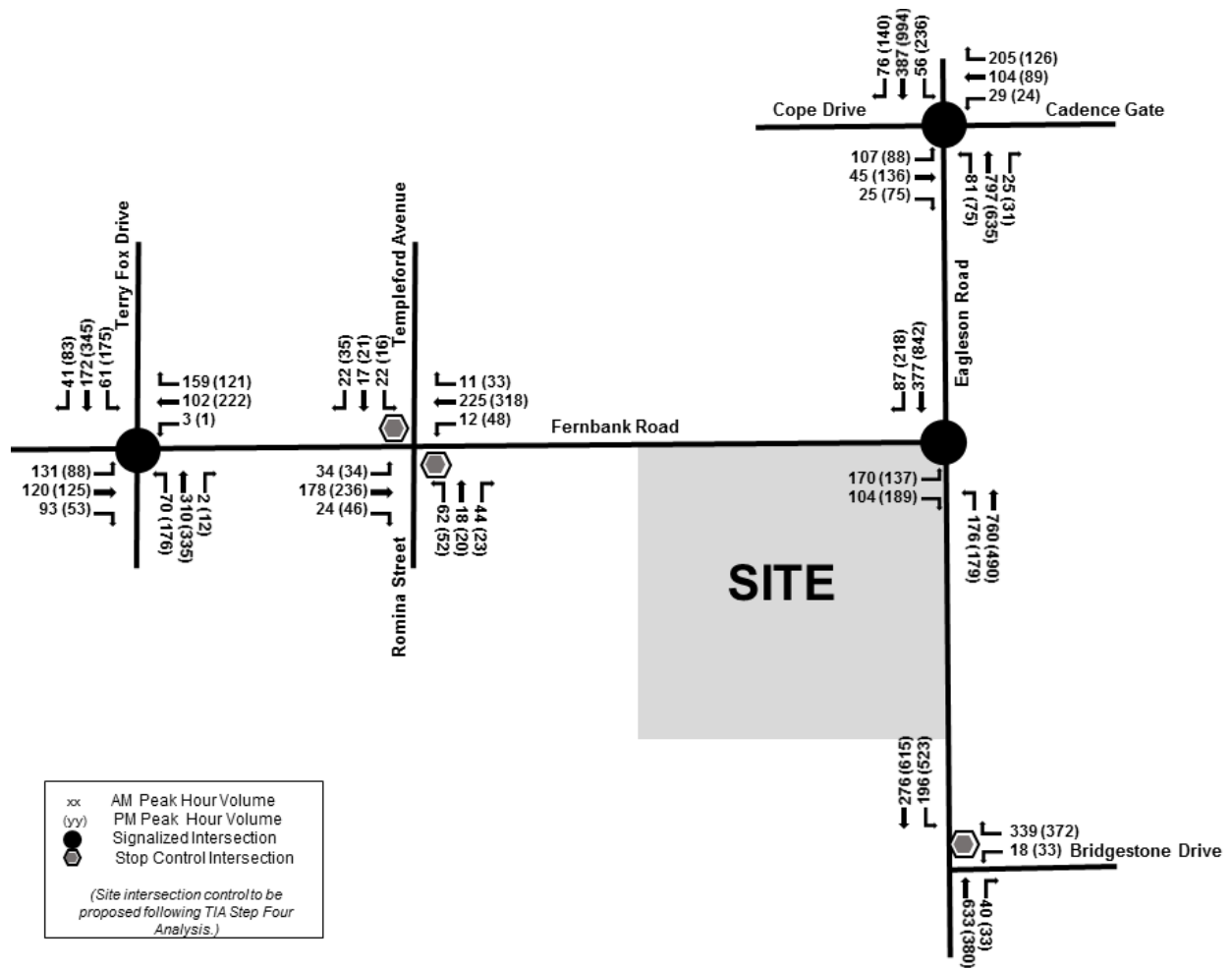


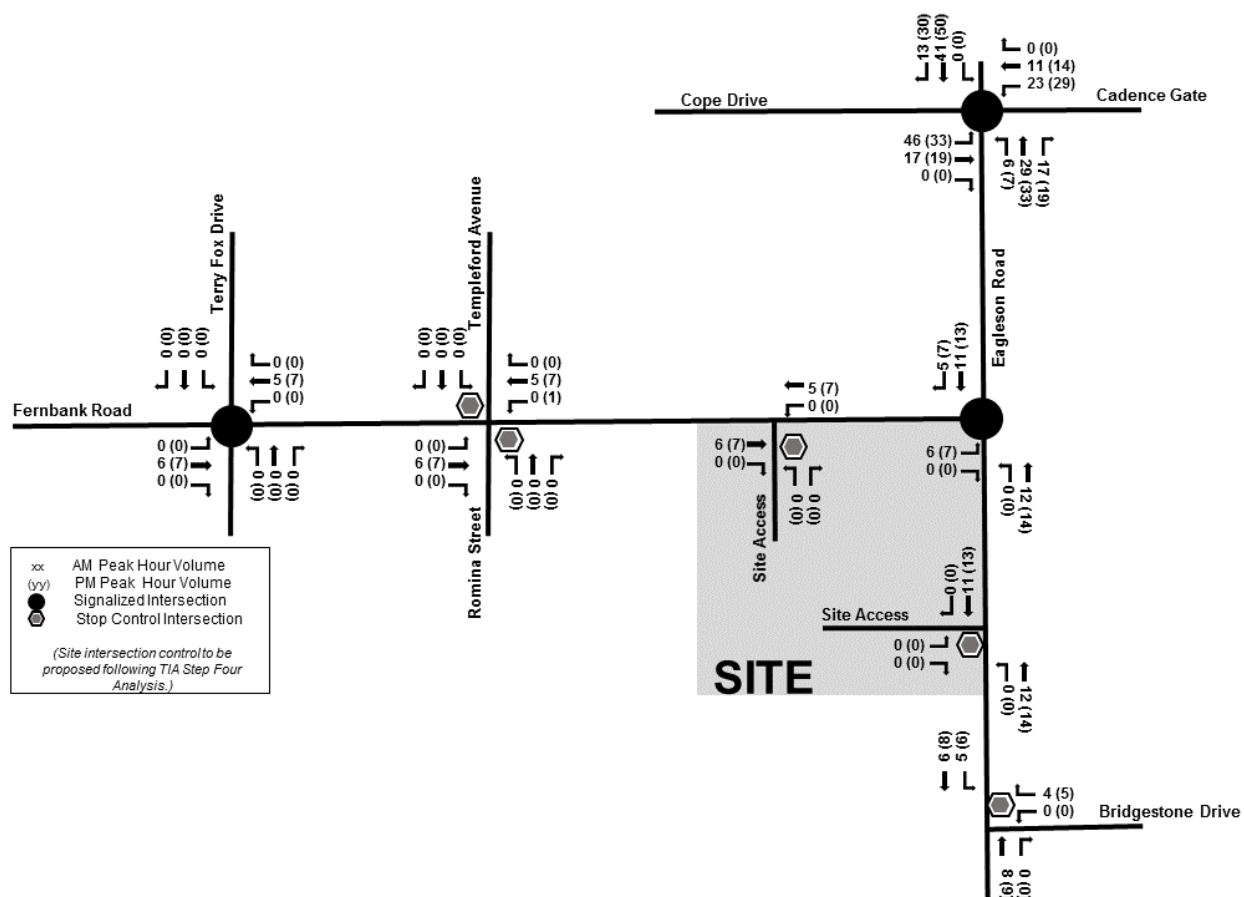
Figure 16. Background Traffic Volumes (2024)

10.3 OTHER AREA DEVELOPMENTS

In **Section 4** we identified two developments that could impact our Transportation Impact Assessment:

- **Cope Lands** (DC2-02-15-0061) for 260 residential units between Terry Fox Dr. and Eagleson Rd that is expected to be built out by 2020.
- **10 Cope Drive** (D07-12-18-0074) for a 5,602m² retail area with an anchor grocery store which is expected to be built by 2019.

Estimated trips for the developments were taken from their respective Transportation Impact Study. Trips from these developments were added to the 2024 planning horizon as shown in **Figure 17**.



11 DEMAND RATIONALIZATION

11.1 DESCRIPTION OF CAPACITY ISSUES(S)

Total traffic volumes for the 2019 and 2024 planning horizons were estimated by:

- Applying a 1% background growth rate to the existing traffic volumes (**Section 10.2**)
- Adding trips generated by other area developments (**Section 10.3**)
- Adding trips generated by the proposed development (**Section 9.3**)

The estimated total traffic volumes are presented in the following two figures.

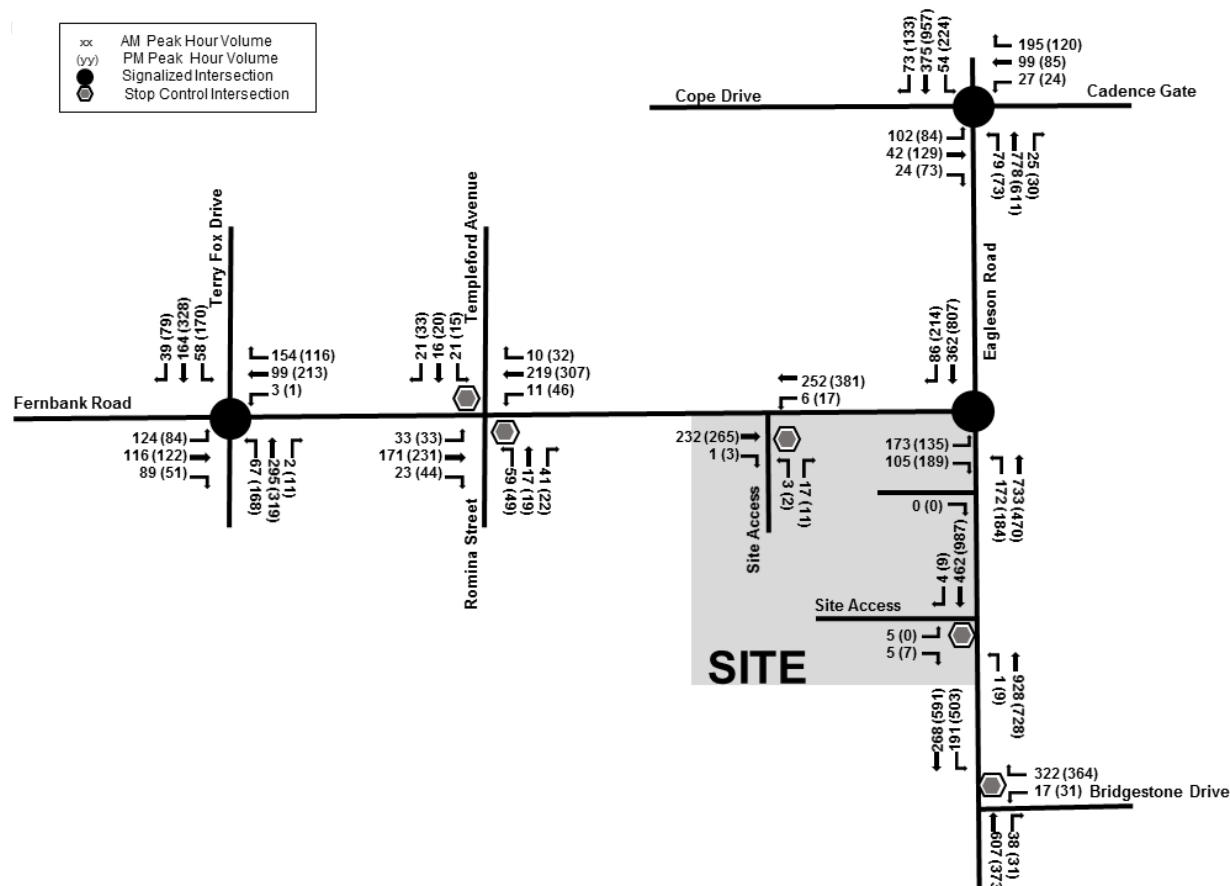


Figure 18. Total Traffic (2019)

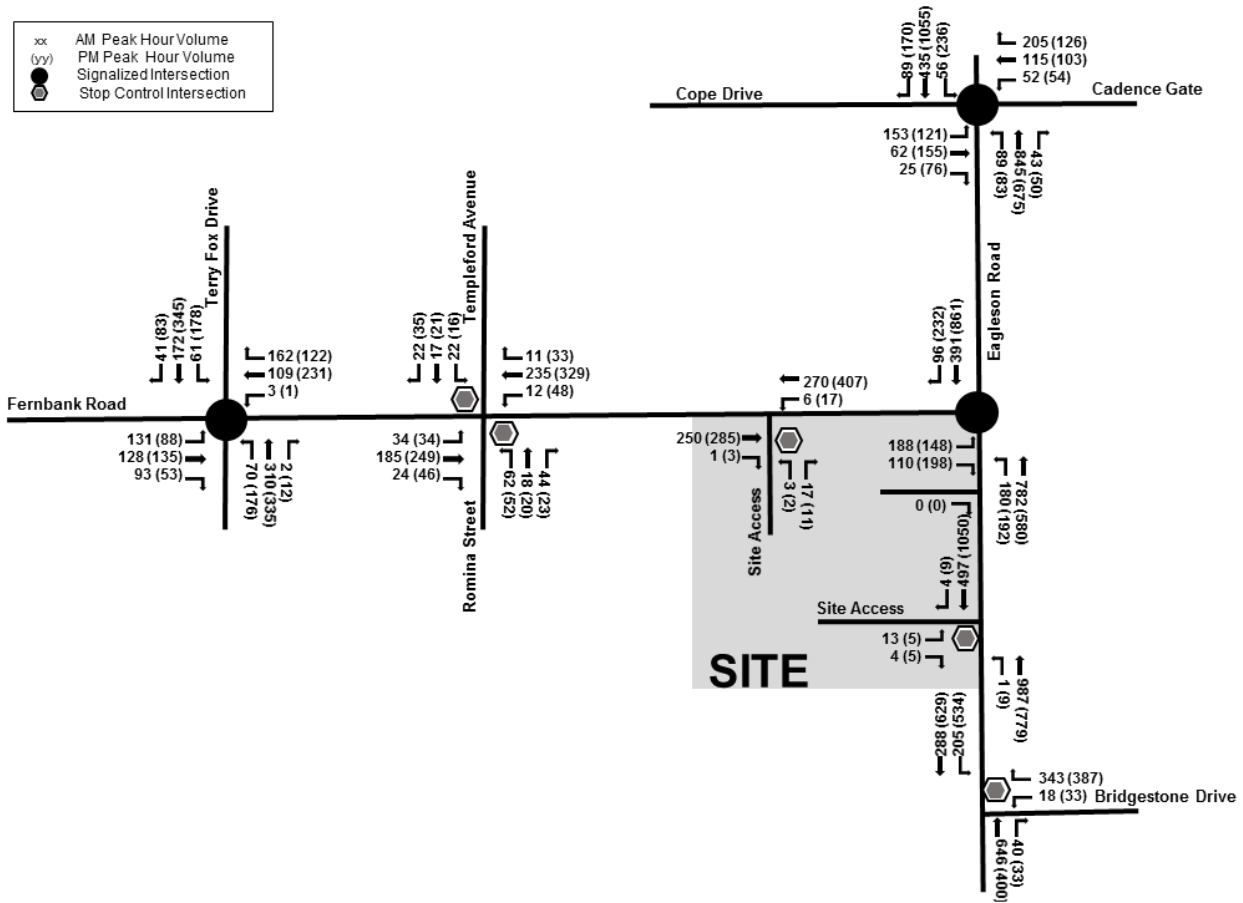


Figure 19. Total Traffic (2024)

A cursory review of the results obtained from Synchro (version 9) for the 2024 total traffic volumes suggest that the future auto demands will not exceed capacity within our study area. A review of the assumed lane capacities at screenline count stations in the area also support this preliminary finding. Eagleson Road (one lane) at the Fallowfield West Screenline has an approximate capacity of 1,050 vehicles per hour and Fernbank Road (one lane) at the Terry Fox Screenline has an approximate capacity of 900 vph. Future estimated total traffic volumes along Eagleson Road and Fernbank Road are below these established volume thresholds.

11.2 ADJUSTMENT TO DEVELOPMENT GENERATED TRAVEL DEMANDS

We have not proposed adjustments to development generated demands since the trips generated by the development are not expected to adversely impact the adjacent transportation network.

11.3 ADJUSTMENTS TO BACKGROUND NETWORK TRAVEL DEMANDS

We have not proposed adjustments to background network demands since as preliminary indications are that the existing transportation roadway network will offer an acceptable Level of Service. Furthermore,

we have adopted a traffic growth rate (**Section 10.2**) of approximately 1% per annum despite having identified an approximate -0.5% reduction in area traffic based on a review of historical traffic counts and with the understanding that a limited number of new developments have been identified for this area (**Section 10.3**) that would be responsible for generating additional traffic during our study planning horizons.

12 DEVELOPMENT DESIGN

12.1 DESIGN FOR SUSTAINABLE MODES

In accordance with the TIA Guidelines, the TDM-supportive Development Design and Infrastructure Checklist was completed to assess the opportunity to implement facilities that are supportive of sustainable modes. The completed checklist is attached as **Appendix F**.

Sustainable modes include cycling, walking, and transit. As indicated in the TDM checklist and shown on the site plan (**Appendix B**), the proposed site accommodates these modes in the following ways:

- Provision of internal sidewalks connecting the main entrance to the existing bus stops
- Walking distance less than 50m between the main entrance for all 143 units to the existing bus stop
- Eighty-two dedicated bicycle parking spaces (interior for residents and exterior for visitors)

No relocation of bus stop #9081 is required to accommodate the proposed site accesses.

12.2 CIRCULATION AND ACCESS

The proposed site plan (**Appendix B**) was developed in consultation with City of Ottawa staff. Consideration was given to providing a continuous drive aisle through the property between Fernbank Road and Eagleson Road. However, the proposed site plan provides a number of additional benefits over a continuous drive aisle, such as:

- Preventing non-residents from cutting through the site to avoid the signalized intersection at Fernbank Road and Eagleson Road
- Improving pedestrian connectivity to the rear of the site and access to the proposed pedestrian pathway along the south side of the property
- Increasing the amount of outdoor amenity space which was a comment from the Urban Design Review Panel

We assessed the site circulation using AutoTURN 10.2 to confirm suitability of the layout for a variety of design vehicles. The results are provided in the following table and the AutoTURN swept paths are provided in **Appendix G**.

Table 8. Swept Path Assessment

DESIGN VEHICLE	VEHICLE REPRESENTING	FINDINGS
MSU (TAC 2017)	Delivery Vehicle Moving Truck	The proposed entrance configuration accommodates the one-way movements of an MSU design vehicle without impacting any built features or parking spaces.
HSU (TAC 2017)	Municipal Services / Waste Removal	Circulation: The proposed entrance configuration on Eagleson Road can accommodate the movements of an HSU design vehicle without impacting any built features or parking spaces. Access to Waste Containers: An HSU will be able to maneuver to and from the waste containers without conflicting with curbs.
Pumper Fire Truck (NCHRP Report 659)	Fire Truck	The proposed entrance and parking configuration can accommodate the movements of a Pumper Fire Truck.
Passenger Vehicle (TAC 2017)	Resident's vehicle	Fernbank Entrance: The proposed entrance configuration can accommodate the movements of passenger vehicles. Eagleson Entrance: The propose entrance configurations can accommodate the movements of passenger vehicles.

12.3 NEW STREET NETWORKS

This module was exempted in the approved Transportation Impact Assessment Scoping Report submitted June 12, 2018.

13 PARKING

13.1 PARKING SUPPLY

The proposed development parking requirements, based on its location will be assessed in accordance with the Suburban Area (Area 'C') for minimum parking requirements as part of Schedule 1A to the City of Ottawa's Zoning By-Law 2008-250. The Zoning By-Law requires that a mid-rise apartment in Area 'C' provide a minimum parking rate of 1.2 spaces per dwelling (*Table 101, Row R12, Column IV*) for all dwelling units in excess of 12 (*Section 101.3.(a)*). The Zoning By-Law further requires a minimum visitor parking rate of 0.2 spaces per dwelling unit (*Table 102, Apartment Dwelling, Column III*) and a minimum bicycle parking rate of 0.5 spaces per dwelling (*Table 111A, I, b*).

The minimum parking supply requirements for this development compared with the proposed parking supply are highlighted in the following table.

Table 9. Minimum Bylaw Requirements for Parking and Proposed Parking Supply

TYPE	REQUIRED	CALCULATION	SITE PLAN	COMPLIANCE WITH BY-LAW
Resident	158	(143 units – 12 units) * 1.2 spaces per dwelling	144	Proposed parking is 14 spaces below minimum required by the Zoning By-Law.
Visitor	29	143 units * 0.2 spaces per dwelling	29	Proposed parking meets the minimum requirements of the Zoning By-Law.
Bicycle	72	143 units * 0.5 spaces per dwelling	82	Exceeds Minimum Requirements
Total	259		255	

The Institute of Transportation Engineers (ITE) publication Parking Generation (3rd edition) indicates that the peak period parking demand for a low/mid-rise apartment in a suburban area can be estimated using the following fitted curve equation:

$$Parked\ Vehicles = 1.43 \times Dwelling\ Units - 46$$

This results in a peak period parking demand of 159 vehicles. This demand rate does not distinguish between resident and visitor parking. The current site plan has 173 total parking spaces which exceeds the estimated peak demand by 14 parking spaces. There may occasionally be non-recurrent spillover parking which could be accommodated on Brigatta Street.

13.2 SPILLOVER PARKING

This module was exempted in the approved Transportation Impact Assessment Scoping Report submitted June 12, 2018.

14 BOUNDARY STREETS

14.1 FERNBANK ROAD

Fernbank Road is an arterial road with a variable right-of-way of 31.5m to 34.0m between Eagleson Road and Terry Fox Drive. The existing cross-section (**Figure 20**) includes separated sidewalks, dedicated bike lanes, and vehicle lanes. On the approach to intersections, left and right turn lanes are provided. The Fernbank Road cross-section in this area is consistent with the City's complete streets philosophy and the urban design objectives for the area by following the general format of the Current Cross-Section Standard (Bike Lanes) developed as part of the *Building Better and Smarter Suburbs* initiatives (**Appendix H**).

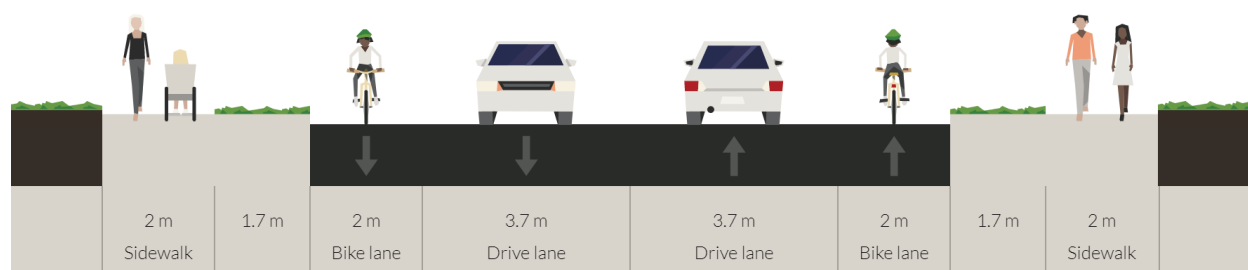


Figure 20. Existing Fernbank Road Cross-Section

14.1.1 MOBILITY

The City's Multi-Modal Level of Service (MMLOS) targets consider road classification, adjacent land-use designation, and special policy areas. The segment of Fernbank Road within the study area is identified as an Arterial Mainstreet in the City of Ottawa's Official Plan (2013), Annex 1 (Road Classification and Rights-of-Way). However, the section of the roadway adjacent to the development is located within 300m of a school. Therefore, the applicable MMLOS targets are related to the policy area instead of the specific land use designation. The current targets and segment scores are shown below.

Table 10. Segment MMLOS (2024)

	PLOS	BLOS	TLOS	TKLOS	VLOS
Target	A	C	D	D	VLOS Not Reported for Segments
Status Quo	E	D	D	D	

The **Status Quo** option is based on the existing conditions remaining in place along Fernbank Road. The MMLOS was assessed as:

- High pedestrian exposure to a large amount of traffic = PLOS 'E'
- Shoulder bike lane with a speed limit $\geq 60\text{km/h}$; and a large unsignalized intersection = BLOS 'C'
- Transit operating in mixed traffic with limited to no parking = TLOS 'D'
- Bi-directional traffic with travel lanes of 3.3m = TKLOS 'D'

14.2 EAGLESON ROAD

Eagleson Road is an arterial road with a protected right-of-way of 44.5m within the study area. The Site Plan (**Appendix B**) allows for a 44.5m right of way along Eagleson Road. This allowance would provide sufficient space for the City to implement any of the Arterial Road Cross-Sections developed as part of the *Building Better and Smarter Suburbs* initiative.

The existing cross-section (**Figure 21**) includes gravel shoulders and paved vehicle lanes. On the approach to intersections left turn lanes are provided. The existing Eagleson Road cross-section is therefore not consistent with the City's complete streets philosophy or the urban design objectives for the area. In accordance with the TIA guidelines, we have developed a complete street concept for this section of Eagleson Road that considers both mobility and road safety. This complete street concept could be considered as part of a larger study which would consider the feasibility of an overall widening of Eagleson Road to provide additional arterial roadway capacity serving Kanata South.

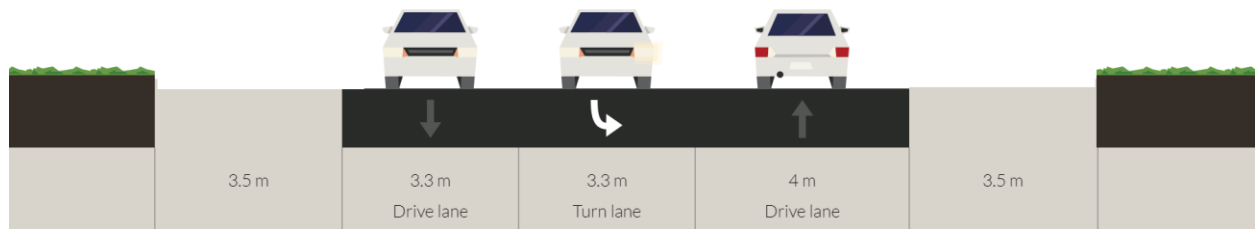


Figure 21. Existing Eagleson Road Cross-Section

14.2.1 MOBILITY

The segment of Eagleson Road within the study area is identified as an Arterial Mainstreet in the City of Ottawa's Official Plan (2013), Schedule B (Urban Policy Plan). However, it is noted that roadway is located within 300m of a school and the applicable MMLOS targets utilized are related to the policy area instead of the specific land use designation. The resulting MMLOS targets and segment scores for the two scenarios are indicated in the table below.

Table 11. Segment MMLOS (2024)

	PLOS	BLOS	TLOS	TKLOS	VLOS
Target	A	C	D	D	VLOS Not Reported for Segments
Status Quo	F	F	D	D	
Conceptual Complete Street	C	A	D	A	

The **Status Quo** option is based on the existing conditions remaining in place along Eagleson Road. The MMLOS was assessed as:

- No sidewalk = PLOS ‘F’
- Mixed traffic for bicycles with a speed limit $\geq 60\text{km/h}$ = BLOS ‘F’
- Transit operating in mixed traffic with limited to no parking = TLOS ‘D’
- Bi-directional traffic with travel lanes of 3.3m = TKLOS ‘D’

The **Conceptual Complete Street** considers the City’s Official Plan (which protects a 44.5m right-of-way) and the City’s Transportation Master Plan (which indicates that this section of Eagleson Road is planned to be widened from two to four lanes by 2025). A complete street concept could be considered as part of a larger road widening project. Such a project might consider a road design similar to Cross-Section 2 proposed in the City of Ottawa’s Arterial Road Cross-Sections. This cross-section was the basis for our assessment of the Conceptual Complete Street option and the MMLOS targets.

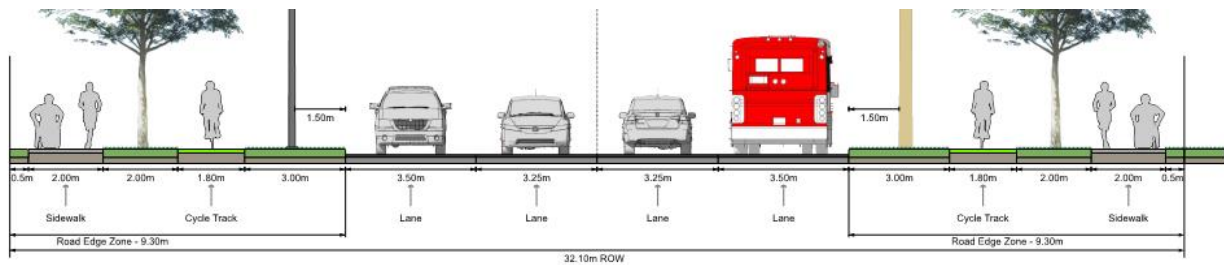


Figure 22. City of Ottawa Arterial Road Concept 2 - Separated Cycle Tracks/Sidewalks

14.2.2 ROAD SAFETY

Historical crash records for the study area were obtained from the City of Ottawa for the 5-years between January 2012 through December 2016. The TIA Guidelines indicate that patterns with six or more crashes should be identified. In this timeframe there were three crashes along Eagleson Road between Fernbank Road and Bridgestone Drive. Therefore, no crash reduction measures have been identified for this section of roadway.

15 ACCESS INTERSECTION

15.1 LOCATION AND DESIGN OF ACCESS

There are three access points proposed for this development and are indicated on the Site Plan (**Appendix B**); one from Fernbank Road and two from Eagleson Road.

The Fernbank Road access is proposed as a two-way, full movement access to the underground parking garage. Signage will be adopted to provide positive guidance for both residents and non-residents directing them to the appropriate access; the Eagleson Road access for the main entrance and surface parking supply and the Fernbank Road access for the underground resident parking supply.

The proposed two access points on Eagleson Road provide access to the buildings main entrance and the surface parking lot. The north access provides a one-way right-out only movement. The south access offers two-way access with full turning movements. The two access are intended to serve passenger drop off /pickup passengers while offering larger vehicles a one-way circulation through the development that does not require reversing maneuvers. As such, vehicles will enter the south access from Eagleson Road, circulate through the site, serving the front entrance, and then exit at the north right-out only access to Eagleson Road.

A design compliance check was carried out for each of the three accesses following guidelines prepared by the City of Ottawa and the Transportation Association of Canada's Geometric Design Guidelines for Canadian Roads (2017). The design compliance check is summarized in **Table 12**.

Table 12. Access Intersection Design Elements

DESIGN ELEMENTS	MINIMUM REQUIRED	FERNBANK ACCESS	EAGLESON NORTH ACCESS	EAGLESON SOUTH ACCESS
Access Type	-	Full Movement	Right-Out Only	Full Movement
One-way vs. Two-way	<25 vpd = one-way driveway <750 vpd = two-way driveway	>100 peak hour trips Two-way	>100 peak hour trips One-way	>100 peak hour trips Two-way
Entrance Width	2.0m-7.3m (TAC 2017) 6.7m for a parking lot (Ottawa) 6.0m for parking garage (Ottawa)	8.0m	8.15m	7.15m
Right Turn Radius	3.0m – 4.5m (TAC 2017)	4.5m	10.0m	6.1m

DESIGN ELEMENTS	MINIMUM REQUIRED	FERNBANK ACCESS	EAGLESON NORTH ACCESS	EAGLESON SOUTH ACCESS
Corner Clearance	70m to traffic signals (TAC 2017)	130m from Eagleson Road	30m from Fernbank Road	90m from Fernbank Road
Site Distance (Right turn from Minor)	105m (TAC 2017)	No obstructions	No obstructions; placement of transit shelter or relocation of traffic signal poles could impact stopping sight distance	No obstructions
Throat Length	25m (TAC 2017) 15m (Ottawa, pre-consultation meeting)	15m from west curb radii to conflict point with vehicle exiting parking structure	Exit only	11.7m from north curb radii to conflict point with vehicle reversing from stall #91
Angle of Intersection	At or near 90°	Access intersects Fernbank Road at 90°	Access intersects Eagleson Road near 90°	Access intersects Eagleson Road at 90°
Proximity to Adjacent Driveways	Restrict accesses	No private driveways along Fernbank Road between Eagleson Road and Templeford Avenue / Romina Street	No private driveways along Eagleson Road between Fernbank Road and Bridgestone Drive	No private driveways along Eagleson Road between Fernbank Road and Bridgestone Drive
Pedestrian + Cycling Crossing Considerations	Large curb return radii with narrow driveway to minimize crossing distance	10m pedestrian crossing 14m bicycle lane crossing	No existing pedestrian facilities 13.5m shoulder bicycle crossing	No existing pedestrian facilities 13.5m shoulder bicycle crossing

Generally, the proposed accesses meet the current best practices and accepted design guidance. However, there are specific areas where specific conditions limit design opportunities, as follows:

- 1 The Eagleson Road north access exceeds the maximum suggested right turn radius of 4.5m and is in closer proximity to the signalized intersection than 70m. However, a large right turn radius was provided to allow large vehicles to complete the 180° turn required to exit the right-out only access.
- 2 The distance from the nearest signalized intersection to the right-out only entrance is approximately 30m which is less than a 70m that was identified during the pre-consultation meeting with the City of Ottawa. However, given the existing and forecasted traffic volumes (**Section 9**), and the supporting traffic analysis did not identify impacts to traffic operations at the Eagleson Road / Fernbank Road intersection.
- 3 The Eagleson Road north access provides 18m between the north curb radii to the intersection of the surface drive aisles which exceeds the minimum required throat length of 15m. However, the distance from the north curb radii to a vehicle reversing from parking stall #28 is 13m; the distance to the next parking stall is 15m. Given the forecasted number of vehicles entering (<20 in the peak hour, **Section 9**) the access configuration is considered acceptable.

15.2 INTERSECTION CONTROL

Traffic control signal warrants were carried out in accordance with the Ontario Traffic Manual (OTM) Book 12 (2012) for both proposed accesses under the future total planning horizon. Justification 7 (future volumes) were applied and traffic signal warrants were not met. The signal warrant worksheets are provided in **Appendix I**.

15.3 INTERSECTION DESIGN

The City of Ottawa's MMLOS Guidelines (2015) are to be applied at signalised intersections and as such they have not been applied to the proposed site accesses.

Our assessment of the future planning horizon identified estimates for left turn movements into the development at each of the access points are represent less than 5% of the total advancing traffic volumes. The left-turn warrant charts in the MTO Design Supplement for the TAC Geometric Design Guide for Canadian Roads (June 2017, Appendix 9A) are provided for locations where the percent left-turn volume is 5% or higher. Therefore, the left-turn lanes are not required to serve either of the two site development accesses.

16 TRANSPORTATION DEMAND MANAGEMENT

16.1 CONTEXT FOR TDM

The 2011 TRANS Origin-Destination Survey estimates the percentage of trips by trip purpose (work, school, shopping, etc...) for each Traffic Assessment Zone. The 24-hour trips by trip purpose are shown in the following table. The percentages estimated for the development (rightmost column) were estimated based on existing amenities and the forecasted mode share targets (**Section 9**).

Table 13. Twenty-Four Hour Trips by Trip Purpose

TRIP PURPOSE	FROM DISTRICT	TO DISTRICT	WITHIN DISTRICT	DEVELOPMENT
Work or related	29%	18%	9%	25%
School	7%	3%	9%	10%
Shopping	6%	10%	14%	5%
Leisure	9%	11%	11%	10%
Medical	3%	1%	2%	2%
Pick-up / Drive Passenger	7%	6%	9%	5%
Return Home	35%	48%	41%	40%
Other	4%	4%	5%	3%
Total	100%	100%	100%	100%

16.2 NEED AND OPPORTUNITY

The existing road network has available capacity should the mode share targets not be met. The anticipated Vehicle Level of Service (VLOS) in the area is provided in the Multi-Modal Level of Service (MMLOS) analysis (**Section 20.2.1**).

16.3 TDM PROGRAM

The TDM-supportive Development Design and Infrastructure Checklist was completed to assess the opportunity to implement facilities that are supportive of sustainable modes. The completed checklist is attached to this report as **Appendix F**.

The proposed development will include the following TDM measures and amenities that will help achieve maximum benefits from a wider use of sustainable transportation modes:

- Direct connection between existing sidewalks (Fernbank Road and Eagleson Road) and interior pedestrian pathways
- Direct connection (<50m) between main entrance and existing transit stop #9081 (Route #168)
- On-site pedestrian facilities easily differentiated from vehicle areas (sidewalks and raised crosswalks)

- Lighting, landscaping, and benches along on-site pedestrian facilities
- Exterior bicycle rack under cover near main entrance for visitors
- Interior secure bicycle storage room (82 bikes) for residents

In addition to the planned TDM measures, there is an opportunity to provide a 1.8m asphalt pathway along Monahan Drain between Fernbank Road and Eagleson Road to improve the City of Ottawa's pedestrian and cyclist network connectivity within the broader area.

17 NEIGHBOURHOOD TRAFFIC MANAGEMENT

This module was exempted in the approved Transportation Impact Assessment Scoping Report submitted June 12, 2018.

18 TRANSIT

18.1 ROUTE CAPACITY

The City of Ottawa provided transit passenger data (September 2017) for Route #168 which services the two transit stops located in close proximity of the proposed development. The transit passenger data included average boarding, alighting, and departure load and is provided in **Table 14**. The City indicated that a 40-foot bus is the main bus type serving this route. A 40-foot bus, such as the Invero D40i, has 41 seats with standing room available.

Route #168 provides a connection between Terry Fox and Bridlewood with 30-minute service in each direction during the peak periods. The development trips by mode (**Table 7**) forecasts 14-person trips in the AM Peak Hour and 18-person trips in the PM Peak Hour. There is currently capacity to accommodate the peak hour transit trips generated by the development.

Table 14. Existing Transit Demand (Route #168)

STOP	AM PEAK PERIOD (6AM-9AM)			PM PEAK PERIOD (3PM-6PM)		
	Average Boarding	Average Alighting	Average Load at Departure	Average Boarding	Average Alighting	Average Load at Departure
9081 (Eagleson)	0	0	1	0	0	2
1888 (Fernbank)	0	0	1	0	4	1

18.2 TRANSIT PRIORITY

The existing Transit Level of Service (TLOS) is assessed in Section 20.2.1. The results indicate that transit service is operating below the targeted TLOS based on transit delay at intersections. Changes to the signal timing plans in the area could improve the TLOS, however consideration must also be given to the number of daily transit trips through the study area.

- Eagleson Road / Cope Drive, 92 transit trips per day
- Eagleson Road / Fernbank Road, 64 transit trips per day
- Eagleson Road / Bridgestone Drive, 114 transit trips per day
- Fernbank Road / Templeford / Romina, 158 transit trips per day
- Fernbak Road / Terry Fox Drive, 142 transit trips per day

The total transit trips (i.e. buses traversing the intersection) for the intersection locations have reported fewer than 160 daily transit trips. Therefore, even with some transit delay at the traffic signals in the peak periods, this area is not considered a candidate for the introduction of transit priority measures.

19 REVIEW OF NETWORK CONCEPT

This module was exempted in the approved Transportation Impact Assessment Scoping Report submitted June 12, 2018.

20 INTERSECTION DESIGN

20.1 INTERSECTION CONTROL

The identification of appropriate intersection controls to serve future background and future total travel demands included a roundabout screening for unsignalized intersections, a traffic signal warrant assessment, and a cursory review of transit priority measures. For this assessment we reviewed the 2024 total traffic volumes which would provide the worst-case scenario in terms of area traffic demands. If warrants were met for this planning horizon, further analysis would be undertaken for earlier planning horizons / traffic scenarios to identify specific needs. However, assuming no warrant was met for the 2024 planning horizon no further assessment of scenarios would be required. A summary of the intersection control assessment is provided in **Table 15**.

The **roundabout screening** followed the siting considerations provided in the TAC Canadian Roundabout Design Guide. The roundabout screening was completed for the unsignalized intersections with consideration given to frequency and type of vehicle crashes, left turn volumes, frequency of U-turn movements, and minor road delay. Based on these criteria, none of the intersections warrant a roundabout in the future total traffic scenario.

The **traffic signal warrant** was carried out in accordance with the Ontario Traffic Manual Book 12 (2012) methodology for future projected traffic volumes (Justification 7). Based on 2024 total traffic volumes, signal warrants were not met for the unsignalized intersections analysed. The traffic signal warrant sheets are provided in **Appendix I**.

The cursory review of **transit priority measures** is provided in **Section 18.2**. The review indicated that this area is not a candidate for transit priority measures.

Table 15. Intersection Control Summary (2024 Total)

INTERSECTION	EXISTING CONTROL	ROUNDAABOUT SCREENING	TAC SIGNAL WARRANT	ISOLATED TRANSIT PRIORITY	FUTURE CONTROL
Fernbank / Terry Fox	Traffic Signal	-	-	Not Warranted	No change
Fernbank / Templeford / Romina	Two-way Stop	Not Warranted	Not Warranted	Not Warranted	No change
Eagleson / Fernbank	Traffic Signal	-	-	Not Warranted	No change
Eagleson / Cope	Traffic Signal	-	-	Not Warranted	No change
Eagleson / Bridgestone	Two-way Stop	Not Warranted	Not Warranted	Not Warranted	No change
Site Access – Fernbank	-	Not Warranted	Not Warranted	Not Warranted	Two-way Stop
Site Access – Eagleson north	-	Not Warranted	Not Warranted	Not Warranted	Right-Out Only
Site Access – Eagleson south	-	Not Warranted	Not Warranted	Not Warranted	Two-way Stop

20.2 INTERSECTION DESIGN

20.2.1 MULTI-MODAL LEVEL OF SERVICE ANALYSIS

A Multi-Modal Level of Service (MMLOS) analysis was carried out in accordance with the methodology outlined in the City of Ottawa's MMLOS Guidelines (2015). The Guidelines state that intersection LOS measures are to be evaluated at signalized intersections. We have prepared a MMLOS analysis for the existing conditions (2018) and future total (2024) time horizon to provide a comparison between the baseline and future condition (beyond the development period).

The intersection of Eagleson / Fernbank was evaluated as an *Arterial within 300m of a school* (Maurice-Lapointe Public Elementary School) while the remaining intersections were evaluated as an *Arterial Main Street*. The corresponding LOS targets were taken from Exhibit 22 of the MMLOS Guidelines.

The MMLOS results for the existing conditions and future total conditions (**Table 16**) indicate that the pedestrian, bicycle, transit, and truck modes do not meet their target LOS. There is no change in the forecasted MMLOS between time horizons.

Table 16. Intersection MMLOS – Existing Conditions

		PLOS	BLOS	TLOS	TKLOS	VLOS
Time Horizon	Target	C / A*	C	D	D	D / E*
Existing (2018)	Terry Fox / Fernbank	D	F	F	F	A
	Eagleson / Fernbank	E	F	F	E	B
	Eagleson / Cope	E	F	F	E	A
Future Total (2024)	Terry Fox / Fernbank	D	F	F	F	A
	Eagleson / Fernbank	E	F	F	E	B
	Eagleson / Cope	E	F	F	E	A
* First target for Eagleson / Fernbank (Arterial within 300m of a school), second target for remaining intersections (Arterial Main Street)						

The **Pedestrian Level of Service** (PLOS) target of 'C' could be met if the signal timing was altered to reduce the average pedestrian delay from 48s to 30s or less. This could be achieved by increasing the effective walk time and/or reducing the cycle length. However, given the low pedestrian volume (observed 44 total in an 8-hour count at Eagleson / Fernbank), the current LOS is considered acceptable. Note that the PE

The **Bicycle Level of Service** (BLOS) target of ‘C’ could be met if separated bicycle facilities were provided on Eagleson Road and Terry Fox Drive. Arterial operating speeds and current lane configuration provide minimal opportunity BLOS improvements.

The **Transit Level of Service** (TLOS) target of ‘D’ could be met with adjustments to signal timing to reduce east / west delay by 10s. However, given the current transit service provided in this area and the general flow of traffic (north / south), the current LOS is acceptable.

The **Truck Level of Service** (TkLOS) target of ‘D’ was met for the City of Ottawa’s north/south Full Load Truck Route along Eagleson Road at Cope Road. However, the TkLOS target was not met at Eagleson Road and Fernbank Road due to the single receiving lane on the north and south departures. Improving the TkLOS could be considered as part of a broader transportation study in this area.

The **Vehicle Level of Service** (VLOS) targets of ‘D’ and ‘E’ were met.

20.2.2 DETAILED INTERSECTION PERFORMANCE ANALYSIS

METHODOLOGY

The existing and future conditions were analyzed based upon the weekday peak hour traffic volumes presented in **Section 9**. The City of Ottawa’s MMLOS Guidelines assigns the vehicle level of service (VLOS) based on ranges of volume to capacity ratio, as indicated in **Table 17**.

Table 17. Highway Capacity Manual 2010, LOS Criteria

VLOS	VOLUME TO CAPACITY RATIO
A	0 – 0.60
B	0.61 – 0.70
C	0.71 – 0.80
D	0.80 – 0.90
E	0.91 – 1.00
F	> 1.00

The City’s MMLOS Guidelines recommend a target VLOS of ‘E’ for the City’s Central Area, areas within 600m of a rapid transit station, or areas within 300m of a school. The Guidelines recommend a target VLOS of ‘D’ for locations that are not located in the aforementioned policy areas. Maurice-Lapointe Public Elementary School is 300m from the intersections on Eagleson Road with Fernbank Road and Bridgestone Drive. Therefore, we have assumed a target VLOS of ‘E’ for these two intersections and the Eagleson Road site access. The remaining intersections and accesses were assessed against a VLOS ‘D’.

The following sections present the results of the intersection capacity analysis. All intersections were analyzed using Synchro 9 following the analysis parameters in the TIA Guidelines. **Appendix J** contains the detailed Synchro analysis sheets.

EXISTING CONDITIONS

The existing (2018) intersection capacity analysis results are summarized in **Table 18**. The intersections in our study area currently operate with an acceptable VLOS; with the exception of the Eagleson / Bridgestone intersection that has VLOS of 'F' during the PM peak hour.

At the Eagleson / Bridgestone intersection, the westbound left has a v/c ratio greater than 1.00 and the 31 vehicles making this turn experience high levels of delay (> 500s) resulting in a movement LOS of 'F'. The other movements at this intersection operate well below capacity.

Table 18. Intersection Capacity Summary for Existing Conditions (2018)

INTERSECTION	AM PEAK HOUR			PM PEAK HOUR		
	V/C RATIO	VLOS	CRITICAL MOVEMENT	V/C RATIO	VLOS	CRITICAL MOVEMENT
Fernbank / Terry Fox (signalized)	0.39	A	-	0.55	A	-
Fernbank / Templeford / Romina (stop control)	0.26	A	-	0.33	A	-
Eagleson / Fernbank (signalized)	0.62	B	-	0.72	C	-
Eagleson / Cope (signalized)	0.62	B	EBL = F	0.58	A	EBL = E
Eagleson / Bridgestone (stop control)	0.77	C	-	1.33	F	WBL = F

FUTURE BACKGROUND CONDITIONS

The intersection VLOS and critical movements remain unchanged when compared to the existing conditions. With the exception of the Eagleson / Bridgefield intersection, background traffic operations during the 2019 planning horizon continue to operate at or below the target VLOS. The intersection capacity results are summarized in **Table 19**.

Table 19. Intersection Capacity Summary for Future Background Conditions (2019)

INTERSECTION	AM PEAK HOUR			PM PEAK HOUR		
	V/C RATIO	VLOS	CRITICAL MOVEMENT	V/C RATIO	VLOS	CRITICAL MOVEMENT
Fernbank / Terry Fox (signalized)	0.39	A	-	0.56	A	-
Fernbank / Templeford / Romina (stop control)	0.27	A	-	0.33	A	-
Egleson / Fernbank (signalized)	0.63	B	-	0.73	C	-
Egleson / Cope (signalized)	0.63	B	EBL = F	0.59	A	EBL = E
Egleson / Bridgestone (stop control)	0.78	C	-	1.39	F	WBL = F

Background traffic operations during the 2024 planning horizon operate at or below the target VLOS; with the exception of the Eagleson / Bridgestone intersection that continues to operate with a VLOS 'F'. Incremental changes from the 2019 background scenario include:

- Eagleson / Fernbank intersection VLOS increases from 'C' to 'D' in the PM peak hour
- Eagleson / Cope intersection VLOS increase from 'B' to 'C' during the AM peak hour and from 'A' to 'F' in the PM peak hour as a result of other area development (**Section 10.3**)
- Eagleson / Bridgestone intersection VLOS increase from 'C' to 'D' during the AM peak hour with a continued increase in v/c ratio in the PM peak hour (1.39 to 2.05)
- EBL movement at Eagleson and Cope increases from an 'E' to an 'F' as a result of other area development

The intersection capacity results are summarized in **Table 20**.

Table 20. Intersection Capacity Summary for Future Background Conditions (2024)

INTERSECTION	AM PEAK HOUR			PM PEAK HOUR		
	V/C RATIO	VLOS	CRITICAL MOVEMENT	V/C RATIO	VLOS	CRITICAL MOVEMENT
Fernbank / Terry Fox (signalized)	0.42	A	-	0.59	A	-
Fernbank / Templeford / Romina (stop control)	0.30	A	-	0.39	A	-
Eagleson / Fernbank (signalized)	0.67	B	-	0.81	D	-
Eagleson / Cope (signalized)	0.72	C	EBL = E	0.71	C	EBL = F
Eagleson / Bridgestone (stop control)	0.88	D	-	2.05	F	WBL = F

FUTURE TOTAL CONDITIONS

The critical movements remain unchanged when compared to the 2019 background scenario. Total traffic operations during the 2019 planning horizon continue to operate at or below the target VLOS; with the exception of the Eagleson / Bridgestone intersection that continues to operate with a VLOS 'F'.

The addition of the development accesses does not appear to impact traffic operations; all accesses operate with a VLOS 'A'. The intersection capacity results are summarized in **Table 21**.

Table 21. Intersection Capacity Summary for Future Total Conditions (2019)

INTERSECTION	AM PEAK HOUR			PM PEAK HOUR		
	V/C RATIO	VLOS	CRITICAL MOVEMENT	V/C RATIO	VLOS	CRITICAL MOVEMENT
Fernbank / Terry Fox (signalized)	0.39	A	-	0.56	A	-
Fernbank / Templeford / Romina (stop control)	0.27	A	-	0.34	A	-
Eagleson / Fernbank (signalized)	0.64	B	-	0.75	C	-
Eagleson / Cope (signalized)	0.63	B	EBL = F	0.59	A	EBL = E
Eagleson / Bridgestone (stop control)	0.79	C	-	1.48	F	WBL = F
Site Access 1 - Fernbank (stop control)	0.10	A	-	0.12	A	-
Site Access 2 - Eagleson (stop control)	0.30	A	-	0.65	B	-

There was minimal increase in the intersection v/c ratios from the 2024 background scenario with no changes to the VLOS experienced by drivers or to the critical movements.

The site accesses continue to operate with a VLOS 'A' and do not appear to impact traffic operations. The intersection capacity results are summarized in **Table 22**.

Table 22. Intersection Capacity Summary for Future Total Conditions (2024)

INTERSECTION	AM PEAK HOUR			PM PEAK HOUR		
	V/C RATIO	VLOS	CRITICAL MOVEMENT	V/C RATIO	VLOS	CRITICAL MOVEMENT
Fernbank / Terry Fox (signalized)	0.42	A	-	0.59	A	-
Fernbank / Templeford / Romina (stop control)	0.30	A	-	0.39	A	-
Eagleson / Fernbank (signalized)	0.69	B	-	0.83	D	-
Eagleson / Cope (signalized)	0.72	C	EBL = E	0.71	C	EBL = F
Eagleson / Bridgestone (stop control)	0.89	D	-	2.19	F	WBL = F
Site Access 1 - Fernbank (stop control)	0.11	A	-	0.12	A	-
Site Access 2 - Eagleson (stop control)	0.33	A	-	0.69	B	-

20.2.3 DESIGN ELEMENTS

The intersection capacity analysis indicates that the addition of trips generated by the proposed development at 800 Eagleson Road does not impact intersection operations in either planning horizon. Therefore, no modifications are required at the existing intersections to accommodate the development.

21 SUMMARY OF IMPROVEMENTS INDICATED AND MODIFICATION OPTIONS

A summary of transportation improvements proposed as part of this Transportation Impact Assessment carried out and the proposed modifications are presented as follows:

1. Development Design

- a) Provision for sustainable modes has been provided on-site through the provision of internal sidewalks, provision for secure (inside) and surface bicycle parking, and direct connections and access to an existing adjacent transit stop.
- b) Design vehicles were assessed for the Site Plan and indicate that accesses accommodate these movements site without impacting on built features.
- c) The parking spaces west of the main building are best suited for mid-sized to small vehicles when considering ability to drive or reverse into the stalls.

Reference: Section 12

2. Parking

- d) Peak period parking demand is estimated to be 159 vehicles (ITE Parking Generation). The proposed parking of 78 below grade and 66 above grade resident parking spaces and 29 visitor parking spaces will meet the anticipated demand. Parking proposed for residents is 14 spaces below bylaw requirements and parking proposed for visitors meets the bylaw requirements.

Reference: Section 13

3. Boundary Street Design

- e) The Fernbank Road cross-section adjacent to the proposed development is consistent with the City's complete streets philosophy and urban design objectives for the area.
- f) The Eagleson Road cross-section adjacent to the proposed development is not currently consistent with the City's complete streets philosophy. The future widening of Eagleson Road in this area is part of the City's 2031 Affordable Network Concept and improvements to the cross-section will be considered as part of a larger Environmental Assessment Study to determine the feasibility of providing additional arterial capacity in South Kanata.

Reference: Section 14

4. Intersection Design

- g) Fernbank Road Access: No modifications are proposed to this two-way full movement access. Signage will be installed to provide positive wayfinding guidance to residents and non-residents when accessing the main entrance / surface parking lot from the Fernbank Road access.
- h) Egleson Road South Access: No modifications are proposed to this two-way full movement access.
- i) Egleson Road North Access: No modifications are proposed to this one-way right-out only access.
- j) Fernbank Road and Terry Fox Drive: No modifications are proposed. The MMLOS assessment indicates that pedestrian, bicycle, transit, and truck LOS targets are not met at this intersection. Arterial operating speeds and vehicle lane configurations provide minimal opportunity for improvements for pedestrians and cyclists. Signal timing could be adjusted to improve the TLOS as part of a larger transit study in this area.
- k) Fernbank Road and Templeford Avenue / Romina Street: No modifications are proposed.
- l) Egleson Road and Cope Drive / Cadence Gate: No modifications are proposed. The MMLOS assessment indicates that pedestrian, bicycle, transit, and truck LOS targets are not met at this intersection. Arterial operating speeds and vehicle lane configurations provide minimal opportunity for improvements for pedestrians and cyclists. Signal timing could be adjusted to improve the TLOS as part of a larger transit study in this area.
- m) Egleson Road and Fernbank Road: No modifications are proposed. The MMLOS assessment indicates that pedestrian, bicycle, transit, and truck LOS targets are not met at this intersection. Arterial operating speeds and vehicle lane configurations provide minimal opportunity for improvements for pedestrians and cyclists. Signal timing could be adjusted to improve the TLOS as part of a larger transit study in this area.
- n) Egleson Road and Bridgestone Drive: No modifications are proposed. The Synchro analysis indicates that the intersection operates with a VLOS 'F' as a result of the westbound left movement. Intersection improvements could be considered as part of a larger study determining the feasibility of widening Egleson Road to provide additional arterial capacity in South Kanata.

Reference: Section 14 and Section 20

5. Transportation Demand Management

- o) The site plan has included facilities that are supportive of sustainable modes (pedestrian pathways, bicycle parking, direct connection to transit, lighting, landscaping, and benches) to encourage residents to shift from vehicle trips to walking, cycling, and transit trips.
- p) The existing road network has available capacity should the mode share targets not be met.

Reference: Section 16

6. Transit

- q) The maximum average passenger load on route #168 at the existing bus stop adjacent to the development is 5 passengers in the peak periods. The #168 provides 30-minute service and can accommodate the addition of 14- and 18-person trips generated by the development in the peak hours.

Reference: Section 18

7. Summary

Based on the results of this Transportation Impact Assessment, the proposed development by Ironclad Developments Inc. located at 800 Eagleson Road:

- a) Is appropriately designed for sustainable modes,
- b) Is aligned with the City of Ottawa's broader city-building objectives, and
- c) Can be accommodated without adverse impacts to planned transportation network and services associated with the future 2024 planning horizon.

APPENDIX

A SCREENING FORM



City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	800 Eagleson Road
Description of Location	Southwest corner of Eagleson / Fernbank intersection
Land Use Classification	Arterial Main Street
Development Size (units)	143 rental apartments
Development Size (m ²)	Site Area: 7,284 sq.m
Number of Accesses and Locations	1 on Fernbank and 1 on Eagleson
Phase of Development	Single phase
Buildout Year	2019

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

2. Trip Generation Trigger

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

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m ²
Industrial	5,000 m ²
Fast-food restaurant or coffee shop	100 m ²
Destination retail	1,000 m ²
Gas station or convenience market	75 m ²

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

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

3. Location Triggers

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

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

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

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

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

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

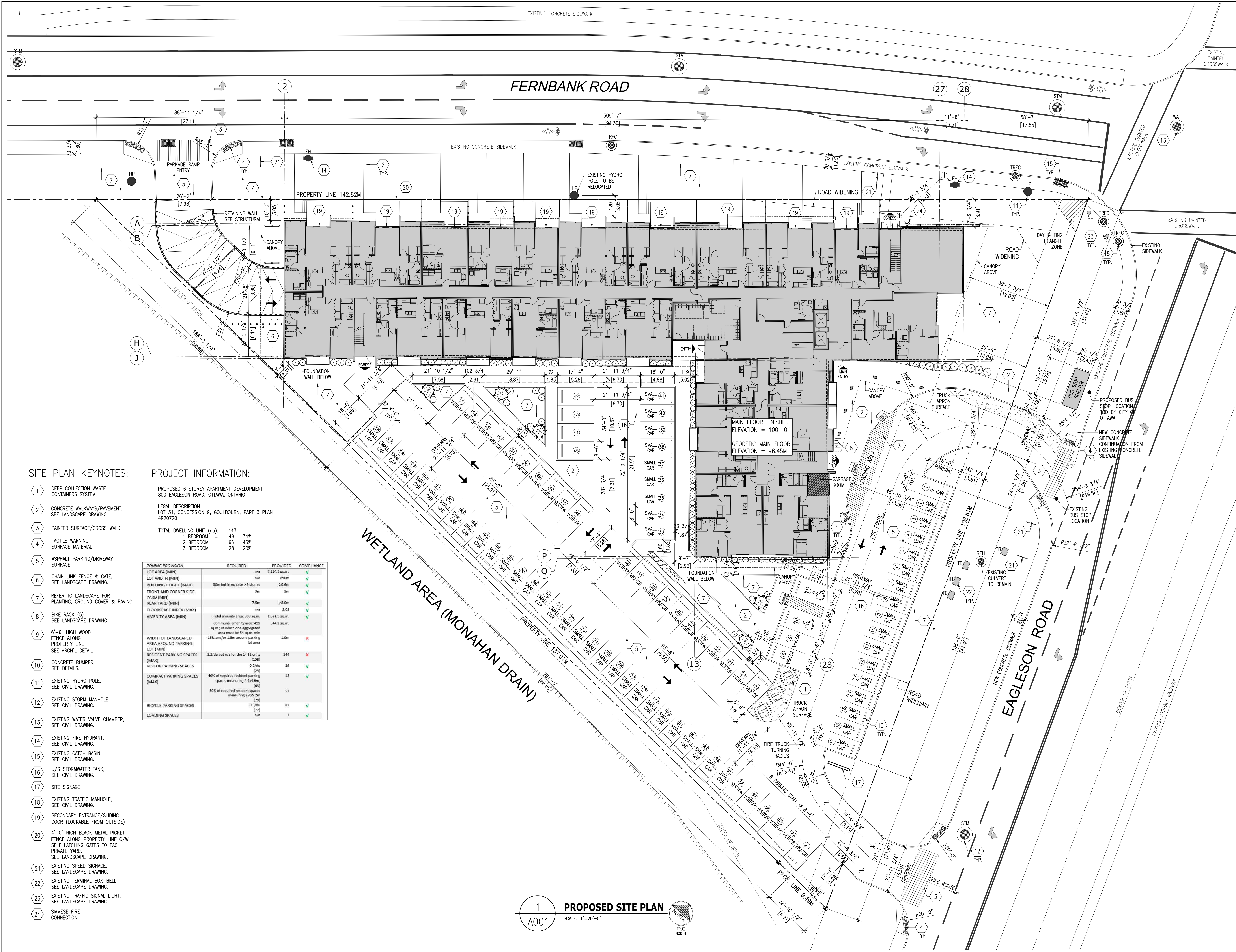
If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

APPENDIX

B

DRAFT SITE
PLAN

S:\Design\Projects\1802 - Eagleson [Ottawa] V04 Design & Drawings\4.1_Architectural\4.1.1_CAD\1802-Egleson-A001_Site Plan.dwg



SITE PLAN KEYNOTES:

- 1 DEEP COLLECTION WASTE CONTAINERS SYSTEM
- 2 CONCRETE WALKWAYS/PAVEMENT, SEE LANDSCAPE DRAWING.
- 3 PAINTED SURFACE/CROSS WALK
- 4 TACTILE WARNING SURFACE MATERIAL
- 5 ASPHALT PARKING/DRIVEWAY SURFACE
- 6 CHAIN LINK FENCE & GATE, SEE LANDSCAPE DRAWING.
- 7 REFER TO LANDSCAPE FOR PLANTING, GROUND COVER & PAVING
- 8 BIKE RACK (5) SEE LANDSCAPE DRAWING.
- 9 6'-6" HIGH WOOD FENCE ALONG PROPERTY LINE, SEE ARCH'L DETAIL.
- 10 CONCRETE BUMPER, SEE DETAILS.
- 11 EXISTING HYDRO POLE, SEE CIVIL DRAWING.
- 12 EXISTING STORM MANHOLE, SEE CIVIL DRAWING.
- 13 EXISTING WATER VALVE CHAMBER, SEE CIVIL DRAWING.
- 14 EXISTING FIRE HYDRANT, SEE CIVIL DRAWING.
- 15 EXISTING CATCH BASIN, SEE CIVIL DRAWING.
- 16 U/G STORMWATER TANK, SEE CIVIL DRAWING.
- 17 SITE SIGNAGE
- 18 EXISTING TRAFFIC MANHOLE, SEE CIVIL DRAWING.
- 19 SECONDARY ENTRANCE/SLIDING DOOR (LOCKABLE FROM OUTSIDE)
- 20 4'-0" HIGH BLACK METAL PICKET FENCE ALONG PROPERTY LINE C/W SELF LATCHING GATES TO EACH PRIVATE YARD, SEE LANDSCAPE DRAWING.
- 21 EXISTING SPEED SIGNAGE, SEE LANDSCAPE DRAWING.
- 22 EXISTING TERMINAL BOX-BELL, SEE LANDSCAPE DRAWING.
- 23 EXISTING TRAFFIC SIGNAL LIGHT, SEE LANDSCAPE DRAWING.
- 24 SIAMSE FIRE CONNECTION

PROJECT INFORMATION:

PROPOSED 6 STOREY APARTMENT DEVELOPMENT
800 EAGLESON ROAD, OTTAWA, ONTARIO

LEGAL DESCRIPTION:
LOT 31, CONCESSION 9, GOULBOURN, PART 3 PLAN
4R20720

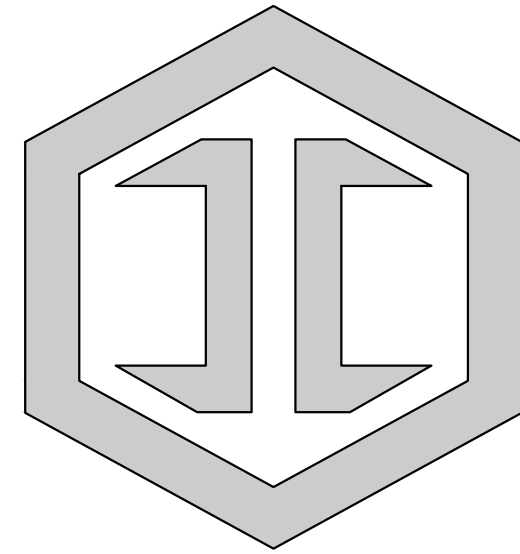
TOTAL DWELLING UNIT (du): 143

1 BEDROOM	=	49	34%
2 BEDROOM	=	66	46%
3 BEDROOM	=	28	20%

ZONING PROVISION	REQUIRED	PROVIDED	COMPLIANCE
LOT AREA (MIN)	n/a	7,284.3 sq.m.	✓
LOT WIDTH (MIN)	n/a	>50m	✓
BUILDING HEIGHT (MAX)	30m but in no case > 9 stories	20.6m	✓
FRONT AND CORNER SIDE YARD (MIN)	3m	3m	✓
REAR YARD (MIN)	7.5m	>8.0m	✓
FLOORS/SPACE INDEX (MAX)	n/a	2.02	✓
AMENITY AREA (MIN)	Total amenity area: 858 sq.m. Communal amenity area: 429 sq.m., of which one aggregated area must be 24 sq.m. min. 15% and/or 1.5m apron parking lot area	1,623.3 sq.m. 544.2 sq.m.	✓
WIDTH OF LANDSCAPED AREA AROUND PARKING LOT (MIN)	1.2/du but n/a for the 1st 12 units (158)	144	✗
RESIDENT PARKING SPACES (MAX)	0.2/du	29	✓
VISITOR PARKING SPACES (MAX)	40% of required resident parking spaces measuring 2.4x4.8m	13	✓
COMPACT PARKING SPACES (MAX)	50% of required resident spaces measuring 2.4x5.2m	51	✓
BICYCLE PARKING SPACES	0.5/du	82	✓
LOADING SPACES	n/a	1	✓

1
A001
PROPOSED SITE PLAN
SCALE: 1"=20'-0"

IRONCLAD DEVELOPMENTS INC.



Project Management
General Contracting
Design/ Build

101-57158
Symington Rd.
Springfield, MB.
R2J 4L6

Ph: 204-777-1972

info@icdev.ca

IRONCLAD
DEVELOPMENTS INC.

GENERAL NOTES:

- THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH CIVIL, LANDSCAPE STRUCTURAL, MECHANICAL AND ELECTRICAL ENGINEERING DRAWINGS AND SPECIFICATION AS REQUIRED.
- THE SURVEY AND PLAN ARE CORRECT IN ACCORDANCE WITH THE SURVEY ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
- THE SURVEY WAS COMPLETED ON THE 7TH DAY OF MARCH, 2018, SIGNED AND CERTIFIED BY BRIAN J. WEBSTER ON 4TH DAY OF APRIL, 2018.
- SLOPE PARKING LOT 2% DOWN TO DRAIN TO CATCH BASINS.
- REFER TO CIVIL DRAWING FOR GRADING OF PARKING AREA.
- ALL SIGNAGES TO BE IN COMPLIANCE WITH THE LATEST EDITION OF ONTARIO TRAFFIC MANUAL AND OTHER APPLICABLE CODES.

1	ISSUED FOR ESTIMATES	2018/09/17
REV#	REVISION DESCRIPTION	DATE

THIS DRAWING IS THE PROPERTY OF IRONCLAD DEVELOPMENTS INC. AND CANNOT BE REPRODUCED OR USED WITHOUT THE CONSENT OF THE DESIGN MANAGER. THE CONTRACTOR IS RESPONSIBLE FOR CHECKING AND VERIFYING ALL LEVELS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO IRONCLAD DEVELOPMENTS INC. AND OBTAIN CLARIFICATION PRIOR TO COMMENCING WORK.

Ottawa, Ontario

800 Eagleson Road

Egleson Apartments

Proposed Site Plan

Project Number		1802
Date	OCT 31, 2018	Rev Date
Drawn By	TT	
Checked By	RG	
Sheet No.	A001	
Scale	AS NOTED	

APPENDIX

C

TRANS O-D
SURVEY
REPORT 2011
(KANATA /
STITSVILLE)

Kanata - Stittsville

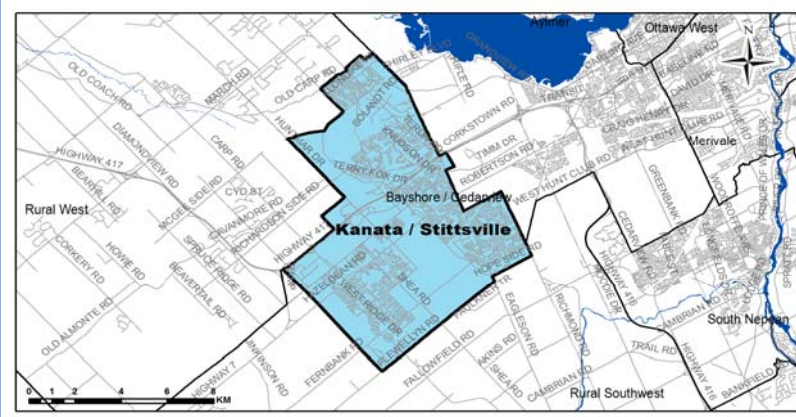
Demographic Characteristics

Population	105,210	Actively Travelled	83,460
Employed Population	49,640	Number of Vehicles	64,540
Households	38,010	Area (km ²)	82.6

Occupation Status (age 5+)	Male	Female	Total
Full Time Employed	24,670	19,590	44,260
Part Time Employed	1,540	3,840	5,380
Student	13,630	13,410	27,040
Retiree	6,480	8,350	14,820
Unemployed	850	940	1,790
Homemaker	160	3,310	3,470
Other	350	1,010	1,360
Total:	47,690	50,440	98,120

Traveller Characteristics	Male	Female	Total
Transit Pass Holders	5,940	6,920	12,860
Licensed Drivers	36,280	36,790	73,070
Telecommuters	200	380	580
Trips made by residents	135,300	143,330	278,630

Selected Indicators	
Daily Trips per Person (age 5+)	2.84
Vehicles per Person	0.61
Number of Persons per Household	2.77
Daily Trips per Household	7.33
Vehicles per Household	1.70
Workers per Household	1.31
Population Density (Pop/km ²)	1270

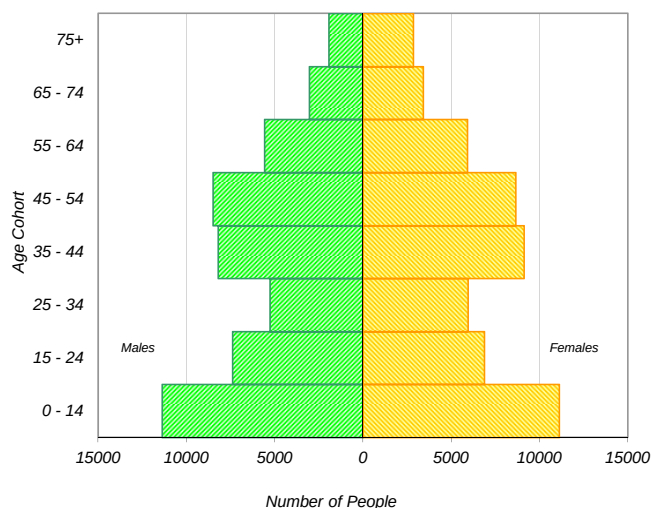


Household Size		
1 person	5,810	15%
2 persons	11,660	31%
3 persons	7,490	20%
4 persons	8,890	23%
5+ persons	4,160	11%
Total:	38,010	100%

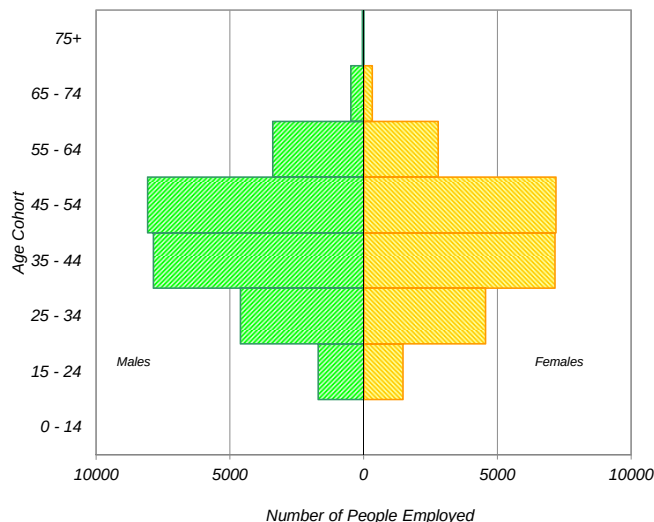
Households by Vehicle Availability		
0 vehicles	1,050	3%
1 vehicle	14,090	37%
2 vehicles	19,110	50%
3 vehicles	3,000	8%
4+ vehicles	770	2%
Total:	38,010	100%

Households by Dwelling Type		
Single-detached	21,610	57%
Semi-detached	3,890	10%
Townhouse	10,550	28%
Apartment/Condo	1,960	5%
Total:	38,010	100%

Population



Employed Population

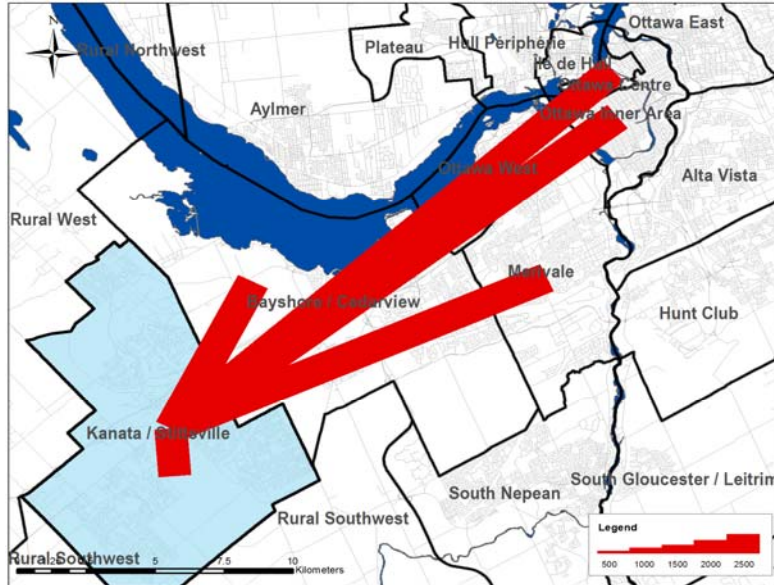


* In 2005 data was only collected for household members aged 11+ therefore these results cannot be compared to the 2011 data.

Travel Patterns

Top Five Destinations of Trips from Kanata - Stittsville

AM Peak Period



Summary of Trips to and from Kanata - Stittsville

AM Peak Period (6:30 - 8:59)

Districts	Destinations of Trips From		Origins of Trips To	
	District	% Total	District	% Total
Ottawa Centre	4,560	8%	140	0%
Ottawa Inner Area	3,350	6%	970	2%
Ottawa East	660	1%	260	1%
Beacon Hill	280	0%	170	0%
Alta Vista	1,810	3%	660	1%
Hunt Club	490	1%	420	1%
Merivale	3,410	6%	1,200	3%
Ottawa West	2,020	4%	840	2%
Bayshore / Cedarview	5,010	9%	2,420	5%
Orléans	290	1%	500	1%
Rural East	100	0%	30	0%
Rural Southeast	50	0%	260	1%
South Gloucester / Leitrim	60	0%	140	0%
South Nepean	690	1%	1,800	4%
Rural Southwest	1,130	2%	1,850	4%
Kanata / Stittsville	30,360	54%	30,360	66%
Rural West	1,050	2%	3,250	7%
Île de Hull	670	1%	30	0%
Hull Périphérie	160	0%	30	0%
Plateau	100	0%	230	0%
Aylmer	0	0%	190	0%
Rural Northwest	20	0%	60	0%
Pointe Gatineau	20	0%	80	0%
Gatineau Est	0	0%	60	0%
Rural Northeast	30	0%	50	0%
Buckingham / Masson-Angers	30	0%	10	0%
Ontario Sub-Total:	55,320	98%	45,270	98%
Québec Sub-Total:	1,030	2%	740	2%
Total:	56,350	100%	46,010	100%

Trips by Trip Purpose

24 Hours	From District		To District		Within District	
Work or related	27,180	29%	17,020	18%	14,550	9%
School	7,070	7%	2,500	3%	15,110	9%
Shopping	6,070	6%	9,150	10%	22,480	14%
Leisure	8,450	9%	10,590	11%	17,090	11%
Medical	2,520	3%	1,170	1%	2,660	2%
Pick-up / drive passenger	6,570	7%	5,470	6%	15,190	9%
Return Home	33,610	35%	45,620	48%	65,770	41%
Other	3,560	4%	3,590	4%	8,440	5%
Total:	95,030	100%	95,110	100%	161,290	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Work or related	18,030	69%	11,020	70%	7,430	24%
School	4,890	19%	2,280	15%	11,740	39%
Shopping	170	1%	320	2%	760	3%
Leisure	340	1%	400	3%	780	3%
Medical	330	1%	230	1%	350	1%
Pick-up / drive passenger	1,260	5%	580	4%	4,760	16%
Return Home	290	1%	380	2%	1,980	7%
Other	670	3%	430	3%	2,560	8%
Total:	25,980	100%	15,640	100%	30,360	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Work or related	390	2%	350	1%	930	2%
School	370	2%	0	0%	90	0%
Shopping	1,030	5%	1,910	7%	5,100	14%
Leisure	2,140	11%	3,080	11%	4,130	11%
Medical	230	1%	180	1%	400	1%
Pick-up / drive passenger	1,980	10%	1,980	7%	3,410	9%
Return Home	12,130	64%	20,550	71%	21,560	58%
Other	680	4%	860	3%	1,850	5%
Total:	18,950	100%	28,910	100%	37,470	100%

Peak Period (%)	Total:	% of 24 Hours	Within District (%)
24 Hours	351,430		46%
AM Peak Period	71,980	20%	42%
PM Peak Period	85,330	24%	44%

Trips by Primary Travel Mode

24 Hours	From District		To District		Within District	
Auto Driver	63,470	67%	63,830	67%	92,190	57%
Auto Passenger	15,220	16%	14,920	16%	31,880	20%
Transit	12,200	13%	12,270	13%	4,050	3%
Bicycle	360	0%	410	0%	960	1%
Walk	40	0%	50	0%	21,080	13%
Other	3,730	4%	3,660	4%	11,130	7%
Total:	95,020	100%	95,140	100%	161,290	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Auto Driver	15,360	59%	11,530	74%	13,630	45%
Auto Passenger	2,450	9%	1,160	7%	5,050	17%
Transit	6,230	24%	1,290	8%	1,210	4%
Bicycle	30	0%	80	1%	220	1%
Walk	0	0%	40	0%	5,730	19%
Other	1,900	7%	1,560	10%	4,510	15%
Total:	25,970	100%	15,660	100%	30,350	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Auto Driver	13,850	73%	17,660	61%	21,240	57%
Auto Passenger	3,240	17%	4,270	15%	8,570	23%
Transit	1,270	7%	5,980	21%	670	2%
Bicycle	40	0%	100	0%	260	1%
Walk	40	0%	0	0%	4,570	12%
Other	520	3%	910	3%	2,160	6%
Total:	18,960	100%	28,920	100%	37,470	100%

Avg Vehicle Occupancy	From District		To District		Within District	
24 Hours	1.24		1.23		1.35	
AM Peak Period	1.16		1.10		1.37	
PM Peak Period	1.23		1.24		1.40	

Transit Modal Split	From District		To District		Within District	
24 Hours	13%		13%		3%	
AM Peak Period	26%		9%		6%	
PM Peak Period	7%		21%		2%	

APPENDIX



D

CITY OF
OTTAWA
CRASH DATA

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

BRIDGESTONE DR & EAGLESON RD

Former Municipality: Kanata

Traffic Control: Stop sign

Number of Collisions: 4

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
1	2012-06-15	Fri	19:59	Clear	Daylight	Turning	P.D. only	V1 S V2 N	Dry Dry	Turning left Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
2	2012-08-08	We	16:40	Rain	Daylight	Rear end	P.D. only	V1 W V2 W	Wet Wet	Slowing or Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
3	2013-02-06	We	16:40	Clear	Dusk	Rear end	P.D. only	V1 W V2 W	Dry Dry	Slowing or Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
4	2013-09-06	Fri	09:26	Clear	Daylight	Angle	P.D. only	V1 W V2 N	Dry Dry	Going ahead Going ahead	Truck - open Bicycle	Cyclist Other motor vehicle	0

CADENCE GT & COPE DR

Former Municipality: Kanata

Traffic Control: Traffic signal

Number of Collisions: 10

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
5	2012-01-18	We	07:35	Clear	Dawn	Other	P.D. only	V1 E V2 W	Ice Ice	Reversing Turning left	Snow plow Automobile, station	Other motor vehicle Other motor vehicle	0
6	2012-06-01	Fri	21:17	Rain	Dark	Angle	P.D. only	V1 N V2 E	Wet Wet	Going ahead Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
7	2012-06-08	Fri	21:12	Clear	Dusk	Turning	P.D. only	V1 S V2 N	Dry Dry	Turning left Going ahead	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
8	2012-10-14	Sun	18:30	Clear	Dark	Rear end	P.D. only	V1 N V2 N V3 N	Wet Wet Wet	Slowing or Slowing or Slowing or	Automobile, station Automobile, station Automobile, station	Other motor vehicle Other motor vehicle Other motor vehicle	0
9	2012-12-10	Mo	06:24	Freezin	Dark	Angle	P.D. only	V1 S V2 W	Ice Slush	Slowing or Going ahead	Pick-up truck Pick-up truck	Other motor vehicle Other motor vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Wednesday, February 21,

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

10	2013-05-12	Sun	16:45	Rain	Daylight	Angle	P.D. only	V1 E V2 S	Wet Wet	Turning right Unknown	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
11	2013-08-07	We	17:00	Rain	Daylight	Rear end	P.D. only	V1 S V2 S	Wet Wet	Going ahead Going ahead	Passenger van Pick-up truck	Other motor vehicle Other motor vehicle	0
12	2013-09-06	Fri	03:35	Clear	Dark	Single vehicle	P.D. only	V1 S	Dry	Turning right	Automobile, station	Ran off road	0
13	2013-09-22	Sun	19:03	Clear	Daylight	Angle	Non-fatal	V1 S V2 W	Dry Dry	Going ahead Going ahead	Automobile, station Passenger van	Other motor vehicle Other motor vehicle	0
14	2013-10-11	Fri	01:06	Clear	Dark	Single vehicle	P.D. only	V1 S	Dry	Turning left	Automobile, station	Curb	0

(Note: Time of Day = "00:00" represents unknown collision time)

Wednesday, February 21,

Page 2 of 2

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

EAGLESON RD, BRIDGESTONE DR to FERNBANK RD

Former Municipality: Kanata

Traffic Control: No control

Number of Collisions: 1

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
1	2012-01-31	Tue	20:26	Clear	Dark	Approaching	P.D. only	V1 N V2 S	Loose snow Loose snow	Going ahead Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0

FERNBANK RD, EAGLESON RD to TERRY FOX RD

Former Municipality: Kanata

Traffic Control: No control

Number of Collisions: 2

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
2	2012-09-24	Mo	11:02	Clear	Daylight	Single vehicle	P.D. only	V1 W	Dry	Reversing	Automobile, station	Unattended vehicle	0
3	2013-01-30	We	16:39	Rain	Dusk	Single vehicle	Non-fatal	V1 W	Wet	Going ahead	Automobile, station	Ran off road	0

(Note: Time of Day = "00:00" represents unknown collision time)

Wednesday, February 21,

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

EAGLESON RD & FERNBANK RD

Former Municipality: Kanata

Traffic Control: Traffic signal

Number of Collisions: 10

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
1	2012-02-25	Sat	14:11	Drifting	Daylight	Rear end	P.D. only	V1 S	Wet	Slowing or	Passenger van	Other motor vehicle	0
2	2012-06-25	Mo	15:35	Rain	Daylight	Rear end	P.D. only	V2 S	Wet	Slowing or	Passenger van	Other motor vehicle	0
								V1 S	Wet	Going ahead	Automobile, station	Other motor vehicle	0
								V2 S	Wet	Slowing or	Automobile, station	Other motor vehicle	
								V3 S	Wet	Stopped	Pick-up truck	Other motor vehicle	
3	2012-07-13	Fri	12:51	Clear	Daylight	Single vehicle	P.D. only	V1 N	Dry	Going ahead	Truck - closed	Pole (utility, tower)	0
4	2012-10-23	Tue	16:53	Clear	Daylight	Turning	Non-fatal	V1 N	Dry	Turning left	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Going ahead	Automobile, station	Other motor vehicle	
5	2013-01-05	Sat	18:28	Clear	Dark	Single vehicle	P.D. only	V1 E	Dry	Going ahead	Passenger van	Ran off road	0
6	2013-03-13	We	15:48	Clear	Daylight	Angle	P.D. only	V1 E	Dry	Turning right	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Going ahead	Automobile, station	Other motor vehicle	
								V3 N	Dry	Turning left	Pick-up truck	Other motor vehicle	
7	2013-06-16	Sun	14:30	Rain	Daylight	Rear end	P.D. only	V1 E	Wet	Slowing or	Pick-up truck	Other motor vehicle	0
								V2 E	Wet	Turning right	Passenger van	Other motor vehicle	
8	2013-07-06	Sat	12:33	Clear	Daylight	Turning	Non-fatal	V1 N	Dry	Turning left	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Going ahead	Automobile, station	Other motor vehicle	
9	2013-08-26	Mo	19:39	Clear	Dusk	Rear end	P.D. only	V1 S	Wet	Going ahead	Automobile, station	Other motor vehicle	0
								V2 S	Wet	Stopped	Automobile, station	Other motor vehicle	
10	2013-12-18	We	17:18	Clear	Dark	Rear end	P.D. only	V1 S	Wet	Going ahead	Automobile, station	Other motor vehicle	0
								V2 S	Wet	Slowing or	Automobile, station	Other motor vehicle	

FERNBANK RD & TERRY FOX DR

Former Municipality: Goulbourn

Traffic Control: Traffic signal

Number of Collisions: 19

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
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(Note: Time of Day = "00:00" represents unknown collision time)

Wednesday, February 21,

Page 1 of 3

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01

TO: 2014-01-01

11	2012-05-01	Tue	17:10	Clear	Daylight	Rear end	Non-fatal	V1 W V2 W	Dry Dry	Slowing or Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
12	2012-09-19	We	18:30	Clear	Daylight	Rear end	P.D. only	V1 N V2 N	Dry Dry	Going ahead Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
13	2012-09-29	Sat	17:42	Clear	Daylight	Turning	P.D. only	V1 S V2 N	Dry Dry	Turning left Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
14	2012-10-06	Sat	10:22	Clear	Daylight	Rear end	P.D. only	V1 S V2 S V3 S	Dry Dry Dry	Going ahead Stopped Stopped	Pick-up truck Automobile, station Automobile, station	Other motor vehicle Other motor vehicle Other motor vehicle	0
15	2012-10-18	Thu	07:45	Clear	Daylight	Rear end	P.D. only	V1 E V2 E	Dry Dry	Going ahead Turning right	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
16	2012-11-11	Sun	08:50	Rain	Daylight	Turning	P.D. only	V1 E V2 W	Wet Wet	Turning left Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
17	2012-11-18	Sun	12:13	Clear	Daylight	Angle	Non-fatal	V1 E V2 N	Dry Dry	Going ahead Going ahead	Pick-up truck Pick-up truck	Other motor vehicle Other motor vehicle	0
18	2012-11-26	Mo	18:45	Clear	Dark	Rear end	Non-fatal	V1 S V2 S	Ice Ice	Slowing or Slowing or	Passenger van Automobile, station	Other motor vehicle Other motor vehicle	0
19	2012-12-02	Sun	23:45	Rain	Dark	Single vehicle	P.D. only	V1 S	Wet	Turning left	Automobile, station	Curb	0
20	2012-12-06	Thu	07:42	Clear	Dawn	Rear end	P.D. only	V1 W V2 W	Dry Dry	Slowing or Stopped	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
21	2013-01-23	We	08:15	Clear	Daylight	Rear end	P.D. only	V1 E V2 E	Dry Dry	Turning right Turning right	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
22	2013-05-30	Thu	17:15	Clear	Daylight	Rear end	P.D. only	V1 N V2 N	Dry Dry	Slowing or Stopped	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
23	2013-06-02	Sun	12:45	Clear	Daylight	Turning	P.D. only	V1 S V2 N	Dry Dry	Turning left Going ahead	Passenger van Passenger van	Other motor vehicle Other motor vehicle	0
24	2013-07-21	Sun	16:40	Clear	Daylight	Angle	Non-fatal	V1 S V2 E	Dry Dry	Going ahead Going ahead	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Wednesday, February 21,

Page 2 of 3

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

25	2013-09-14	Sat	18:04	Clear	Daylight	Rear end	P.D. only	V1 N V2 N	Dry Dry	Going ahead Stopped	Pick-up truck Automobile, station	Other motor vehicle Other motor vehicle	0
26	2013-09-16	Mo	10:23	Clear	Daylight	Angle	Non-fatal	V1 S V2 E	Dry Dry	Going ahead Going ahead	Pick-up truck Automobile, station	Other motor vehicle Other motor vehicle	0
27	2013-10-25	Fri	18:10	Clear	Dark	Turning	P.D. only	V1 E V2 W	Dry Dry	Turning left Going ahead	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
28	2013-11-29	Fri	15:26	Clear	Daylight	Angle	P.D. only	V1 N V2 E	Dry Dry	Going ahead Going ahead	Pick-up truck Automobile, station	Other motor vehicle Other motor vehicle	0
29	2013-12-05	Thu	13:16	Clear	Daylight	Sideswipe	P.D. only	V1 S V2 S	Wet Wet	Overtaking Going ahead	Unknown Pick-up truck	Other motor vehicle Other motor vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Wednesday, February 21,

Page 3 of 3

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

FERNBANK RD & TEMPLEFORD AVE

Former Municipality: Goulbourn

Traffic Control: Stop sign

Number of Collisions: 1

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
1	2013-11-15	Fri	16:04	Clear	Daylight	Angle	P.D. only	V1 N V2 W	Dry Dry	Going ahead Going ahead	School bus Automobile, station	Other motor vehicle Other motor vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Wednesday, February 21,

Page 1 of 1



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2016

Location: EAGLESON RD btwn Continuation of EAGLESON RD & FERNBANK RD

Traffic Control: No control

Total Collisions: 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-15, Wed,05:50	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Curb	



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2016

Location: EAGLESON RD btwn FERNBANK RD & BRIDGESTONE DR

Traffic Control: No control

Total Collisions: 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2015-Jul-09, Thu,08:59	Clear	Turning movement	P.D. only	Dry	South	Making "U" turn	Passenger van	Other motor vehicle	
					South	Overtaking	Pick-up truck	Other motor vehicle	
2016-May-25, Wed,16:03	Clear	Rear end	Non-fatal injury	Dry	North	Slowing or stopping	Pick-up truck	Other motor vehicle	
					North	Stopped	Pick-up truck	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2016

Location: EAGLESON RD @ FERNBANK RD

Traffic Control: Traffic signal

Total Collisions: 14

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-25, Sat,09:43	Drifting Snow	Angle	Non-fatal injury	Loose snow	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Jan-24, Fri,17:15	Clear	Rear end	P.D. only	Ice	South	Slowing or stopping	Pick-up truck	Other motor vehicle	
					South	Stopped	Passenger van	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Apr-01, Tue,07:44	Clear	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Truck - open	Other motor vehicle	
2014-Jul-21, Mon,15:15	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Pick-up truck	Other motor vehicle	

2014-Jul-16, Wed,02:25	Clear	SMV other	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Ran off road
2014-Jul-07, Mon,07:24	Rain	Turning movement	P.D. only	Wet	North	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Jun-24, Wed,11:32	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2015-Feb-14, Sat,13:40	Clear	Angle	P.D. only	Wet	South	Turning right	Snow plow	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Jan-14, Wed,17:24	Clear	Turning movement	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Feb-14, Sat,11:04	Snow	Rear end	P.D. only	Slush	East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Passenger van	Other motor vehicle
2016-Feb-19, Fri,10:21	Snow	Angle	P.D. only	Loose snow	East	Turning right	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Oct-30, Sun,17:35	Clear	Turning movement	Fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle

					South	Going ahead	Motorcycle	Other motor vehicle
2015-Nov-20, Fri,16:53	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2016-Jul-30, Sat,14:41	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle

Location: TERRY FOX DR @ FERNBANK RD

Traffic Control: Traffic signal

Total Collisions: 15

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-04, Sat,10:16	Clear	Angle	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Jun-18, Wed,07:09	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Truck - dump	Other motor vehicle	
2014-Nov-13, Thu,10:30	Clear	Other	P.D. only	Dry	North	Reversing	Truck - closed	Other motor vehicle	
					South	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Oct-28, Tue,10:45	Clear	Angle	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	

2014-Dec-18, Thu,13:46	Clear	Rear end	Non-fatal injury	Dry	West	Turning right	Pick-up truck	Other motor vehicle	
					West	Turning right	Pick-up truck	Other motor vehicle	
2015-Mar-03, Tue,18:31	Snow	Rear end	P.D. only	Loose snow	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Slowing or stopping	Pick-up truck	Other motor vehicle	
2015-May-06, Wed,19:38	Clear	Angle	Non-fatal injury	Dry	East	Going ahead	Bicycle	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Cyclist	
2015-Sep-13, Sun,16:48	Clear	Angle	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Pick-up truck	Other motor vehicle	
2015-Aug-26, Wed,17:32	Rain	Rear end	P.D. only	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2016-May-23, Mon,18:34	Clear	SMV other	Non-fatal injury	Dry	North	Pulling onto shoulder or toward curb	Automobile, station wagon	Curb	1
2015-Nov-25, Wed,13:51	Clear	Sideswipe	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	
					East	Turning right	Truck and trailer	Other motor vehicle	
2015-Nov-19, Thu,19:52	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Automobile, station wagon	Other motor vehicle	

					South	Overtaking	Automobile, station wagon	Other motor vehicle
2016-Aug-07, Sun,20:15	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Stopped	Passenger van	Other motor vehicle
2016-Jul-14, Thu,11:00	Rain	Angle	P.D. only	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2016-Jul-28, Thu,19:10	Clear	Turning movement	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Pick-up truck	Other motor vehicle



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2016

Location: FERNBANK RD @ ROMINA ST

Traffic Control: Stop sign

Total Collisions: 4

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-11, Sat,13:54	Freezing Rain	Rear end	P.D. only	Ice	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Jan-23, Thu,10:51	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Passenger van	Other motor vehicle	
2015-Jun-30, Tue,15:02	Clear	Angle	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Feb-16, Tue,13:00	Snow	Angle	P.D. only	Packed snow	South	Stopped	Automobile, station wagon	Other motor vehicle	
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2016

Location: FERNBANK RD btwn TERRY FOX DR & Continuation of FERNBANK RD

Traffic Control: No control

Total Collisions: 3

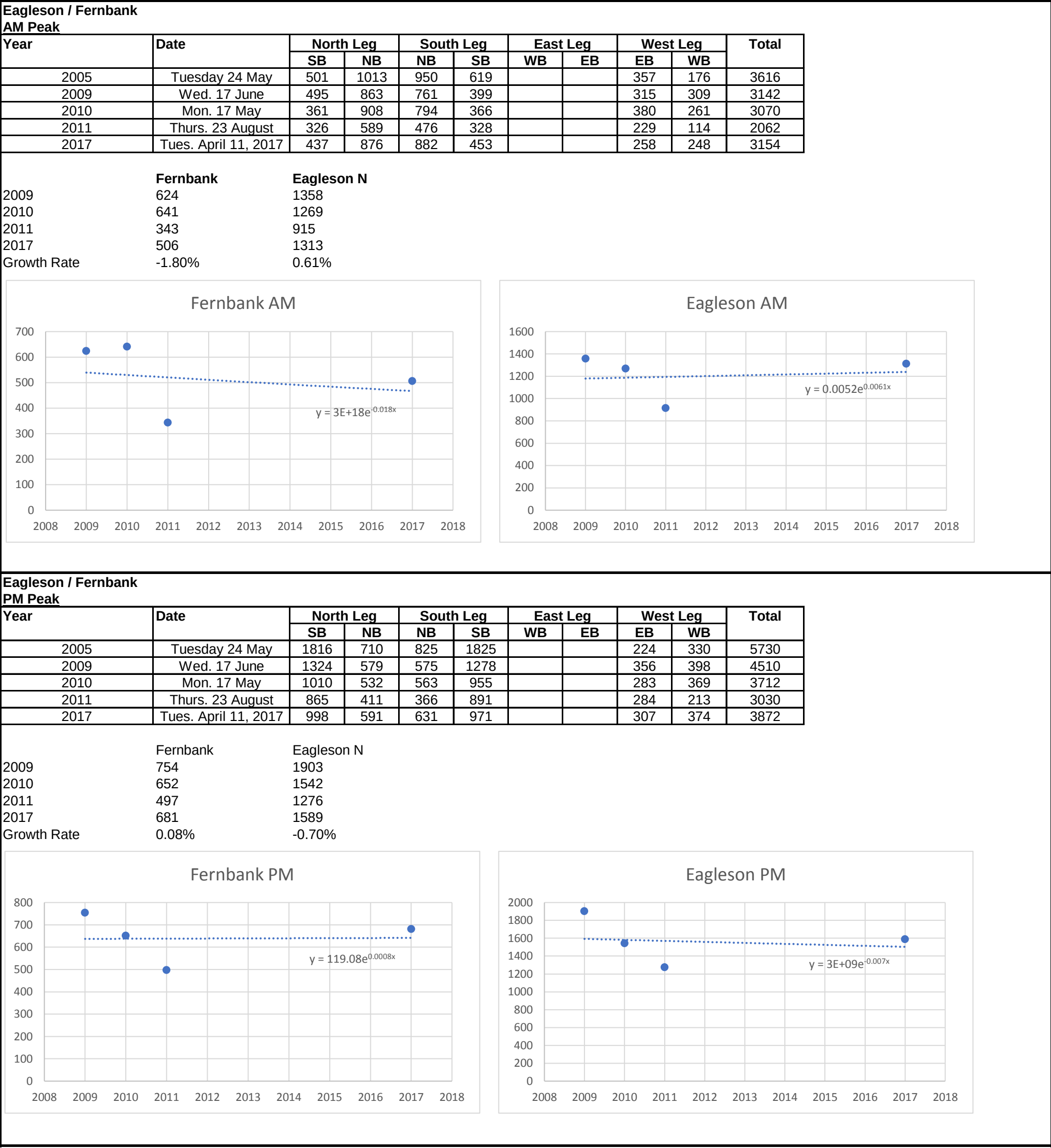
Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jul-21, Mon, 17:44	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Pick-up truck	Other motor vehicle	
					East	Stopped	Passenger van	Other motor vehicle	
					East	Stopped	Pick-up truck	Other motor vehicle	
2016-Apr-22, Fri, 20:11	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Animal - wild	
2016-Aug-09, Tue, 11:50	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Animal - wild	

APPENDIX



E

GROWTH
RATE
CALCULATION



APPENDIX

F

TDM
CHECKLIST

800 Eagleson Road

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

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

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
1. WALKING & CYCLING: ROUTES		
1.1 Building location & access points		
BASIC	1.1.1 Locate building close to the street, and do not locate parking areas between the street and building entrances	☒ Some parking spaces are located adjacent to Eagleson Road. There is a dedicated pedestrian connection from existing concrete sidewalk to building entrance.
BASIC	1.1.2 Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☒ Direct connections between Eagleson Road sidewalk and main building entrance and transit stop #9081.
BASIC	1.1.3 Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☒ Mid-rise apartment with windows on all faces.
1.2 Facilities for walking & cycling		
REQUIRED	1.2.1 Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations (<i>see Official Plan policy 4.3.3</i>)	☒ Main entrance less than 50m to transit stop #9081. Route #168 provides hourly service to the Eagleson and Terry Fox transit stations.
REQUIRED	1.2.2 Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing	☒ Direct connections (<50m) between main building entrance and sidewalk on Eagleson Road.

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
	weather protection through canopies, colonnades, and other design elements wherever possible (<i>see Official Plan policy 4.3.12</i>)	
REQUIRED	1.2.3 Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks (<i>see Official Plan policy 4.3.10</i>)	☒ Sidewalks to be constructed of concrete to differentiate pedestrian areas from vehicle areas. Marked pedestrian crossing provided at Eagleson access. Depressed sidewalk provided at Fernbank access. Potential to provide a 1.8m asphalt pathway along Monahan Drain.
REQUIRED	1.2.4 Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps (<i>see Official Plan policy 4.3.10</i>)	☒ Accessible access from accessible parking spaces to sidewalk going to main building access.
REQUIRED	1.2.5 Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians (<i>see Official Plan policy 4.3.11</i>)	☒ Internal sidewalks.
BASIC	1.2.6 Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☒ On-site pedestrian sidewalks connect directly to transit stop #9081.
BASIC	1.2.7 Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☒ Transit stop #9081 is within 50m from the main entrance.
BASIC	1.2.8 Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☒ Internal sidewalks.
1.3 Amenities for walking & cycling		
BASIC	1.3.1 Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☒ Amenity spaces provided; including small seating spaces, bench seating under cover, trees, trellis archway features, etc...
BASIC	1.3.2 Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	N/A

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
2. WALKING & CYCLING: END-OF-TRIP FACILITIES		
2.1 Bicycle parking		
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see <i>Official Plan policy 4.3.6</i>)	☒ Exterior bike rack under cover (11 bikes) near main entrance and interior bike storage (82 bikes).
REQUIRED	2.1.2 Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas (see <i>Zoning By-law Section 111</i>)	☒
REQUIRED	2.1.3 Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored (see <i>Zoning By-law Section 111</i>)	
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	
2.2 Secure bicycle parking		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see <i>Zoning By-law Section 111</i>)	☒ Site can accommodate 82 bicycles within the main building.
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☒
2.3 Bicycle repair station		
BETTER	2.3.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☒
3. TRANSIT		
3.1 Customer amenities		
BASIC	3.1.1 Provide shelters, lighting and benches at any on-site transit stops	There are no on-site transit stops proposed
BASIC	3.1.2 Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	Sufficient space in public ROW for shelter.
BETTER	3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	There are no on-site transit stops proposed

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
4. RIDESHARING		
4.1 Pick-up & drop-off facilities		
BASIC	4.1.1 Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☒
5. CARSHARING & BIKESHARING		
5.1 Carshare parking spaces		
BETTER	5.1.1 Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses (see <i>Zoning By-law Section 94</i>)	AM Zone
5.2 Bikeshare station location		
BETTER	5.2.1 Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☒
6. PARKING		
6.1 Number of parking spaces		
REQUIRED	6.1.1 Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☒ The proposed number of parking spaces will meet the anticipated demand; however, a parking variance is required.
BASIC	6.1.2 Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☒ 29 visitor spaces available. No off-site parking available in area.
BASIC	6.1.3 Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly (see <i>Zoning By-law Section 104</i>)	Single use.
BETTER	6.1.4 Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking (see <i>Zoning By-law Section 111</i>)	
6.2 Separate long-term & short-term parking areas		
BETTER	6.2.1 Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	

APPENDIX

G SWEPT PATH FIGURES



800 EAGLESON ROAD TRANSPORTATION IMPACT ASSESSMENT

APPENDIX G: SWEEP PATH FIGURES

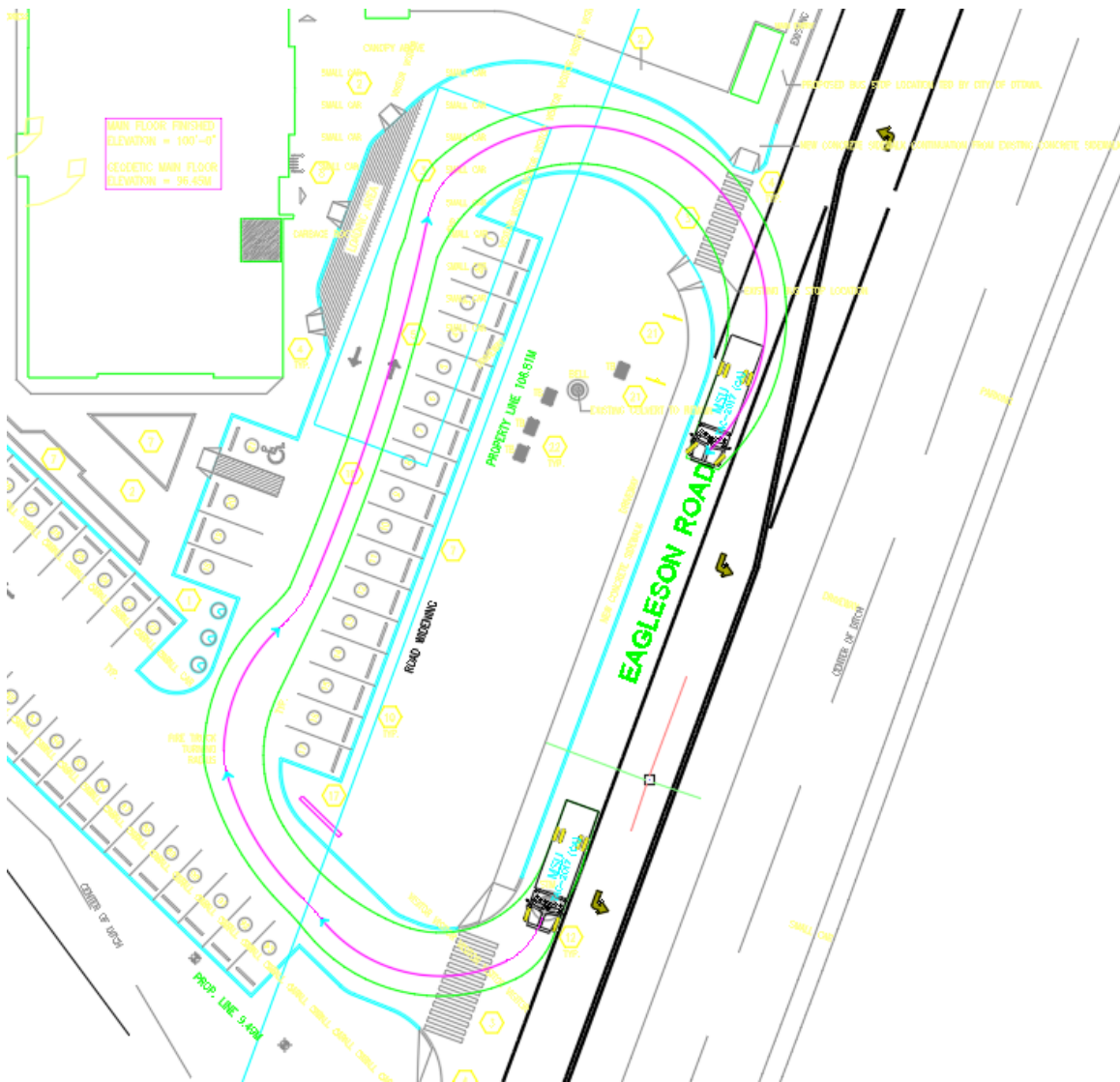


Figure 1. MSU Circulating Through Site

Suite 300
2611 Queensview Drive
Ottawa, ON, Canada K2B 8K2

T: +1 613 829-2800
F: +1 613 829-8299
wsp.com

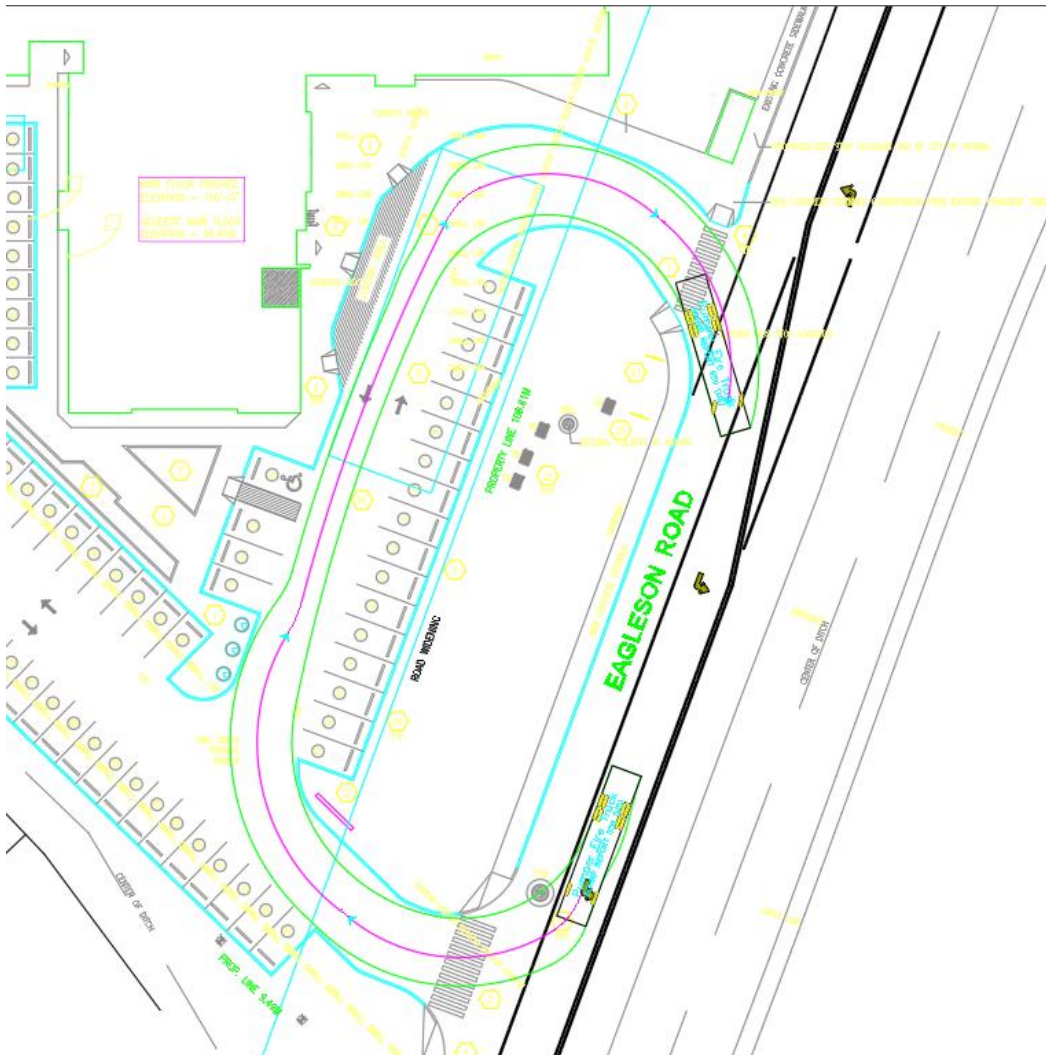


Figure 3. Fire Pumper Truck Circulating Through Site

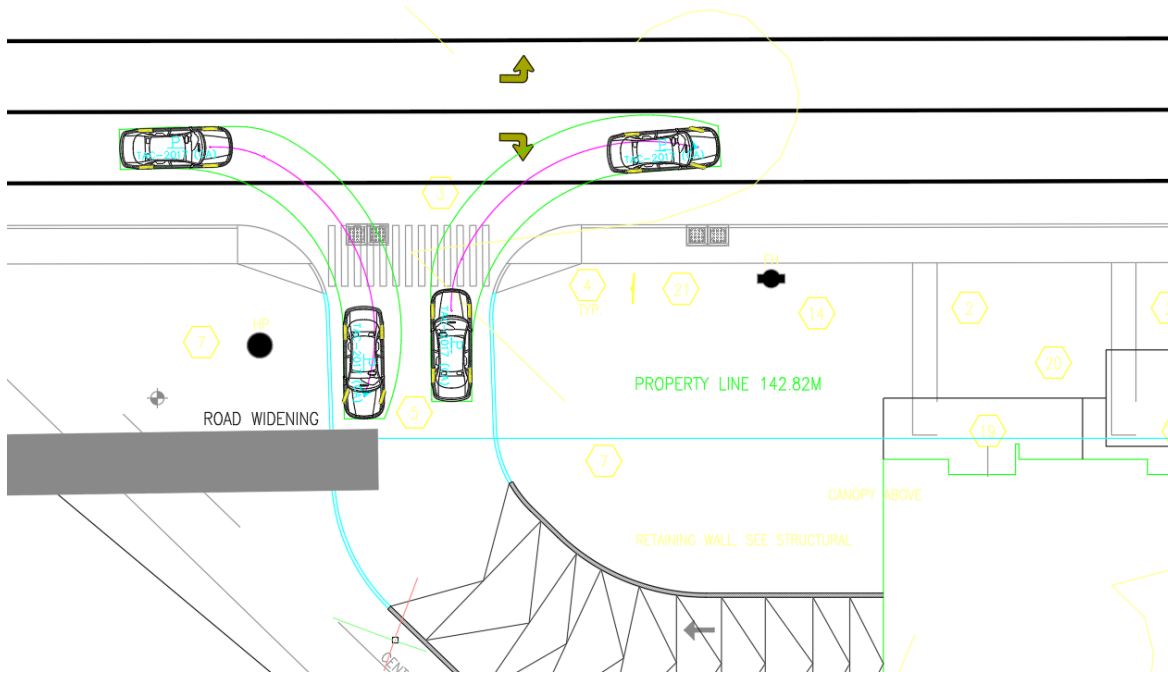


Figure 4. Full Size Passenger Vehicle (5.6m length) Entering and Exiting from / onto Fernbank Road

APPENDIX

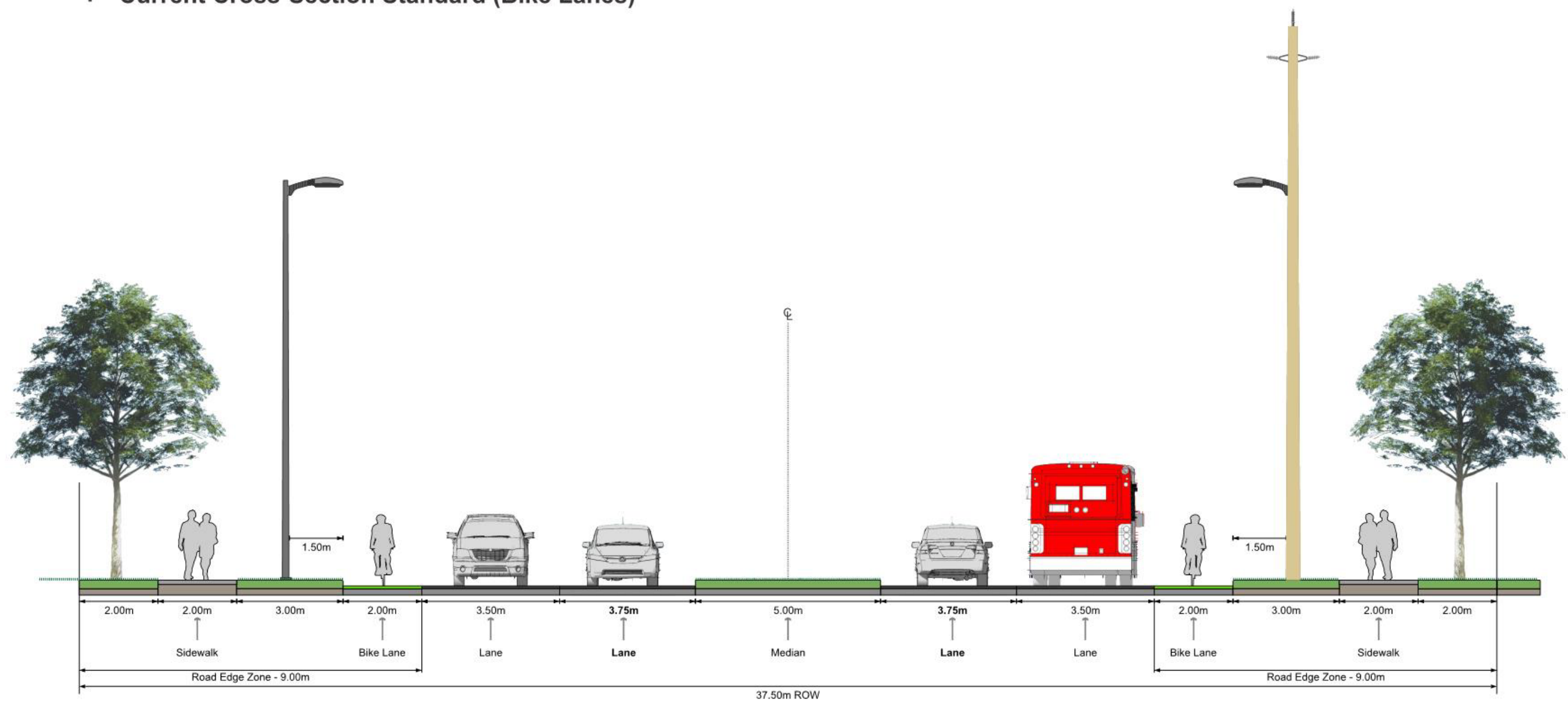


H

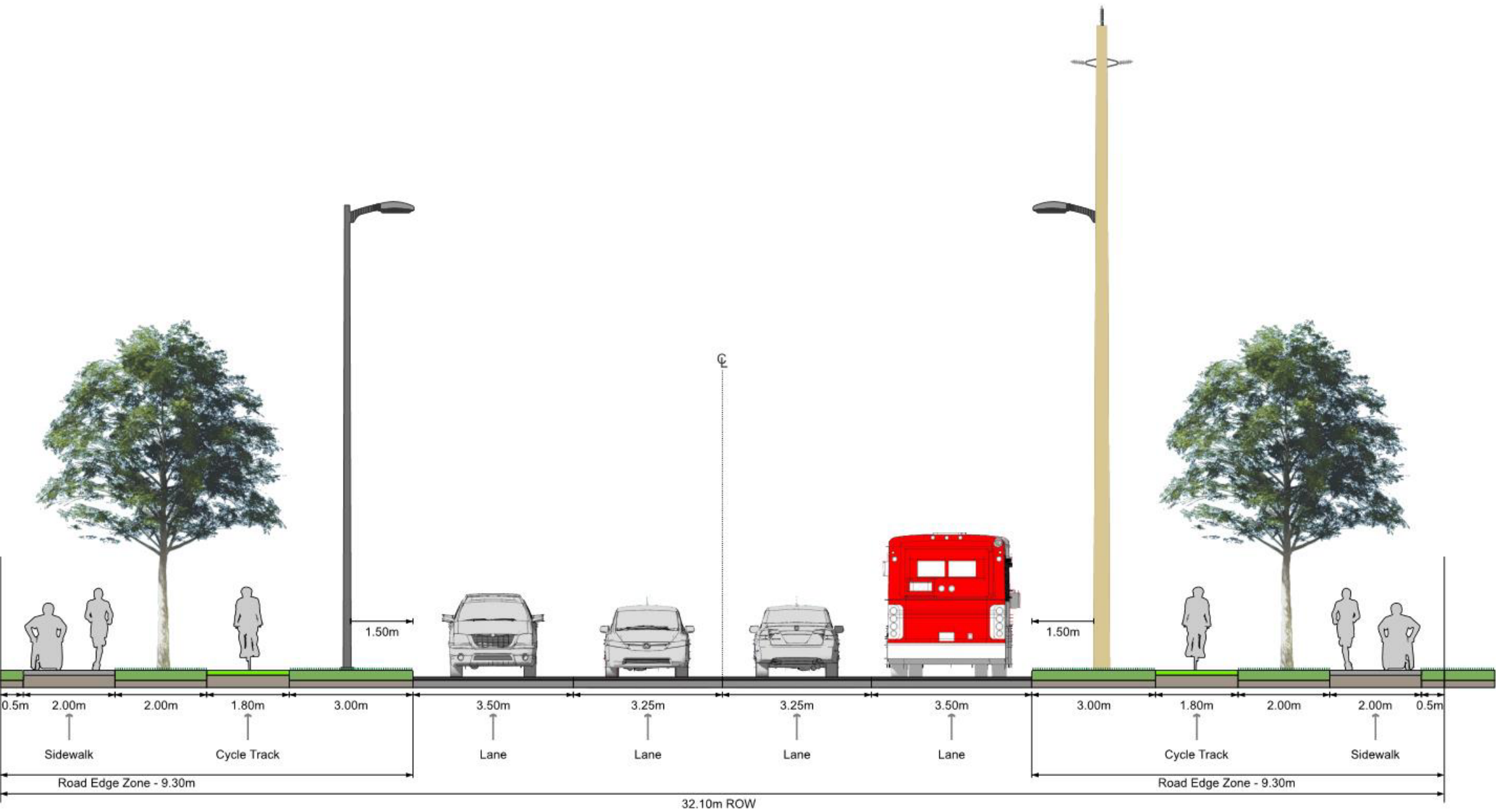
CURRENT
CROSS-
SECTION
STANDARD

Document 1: Arterial Road Cross-Sections

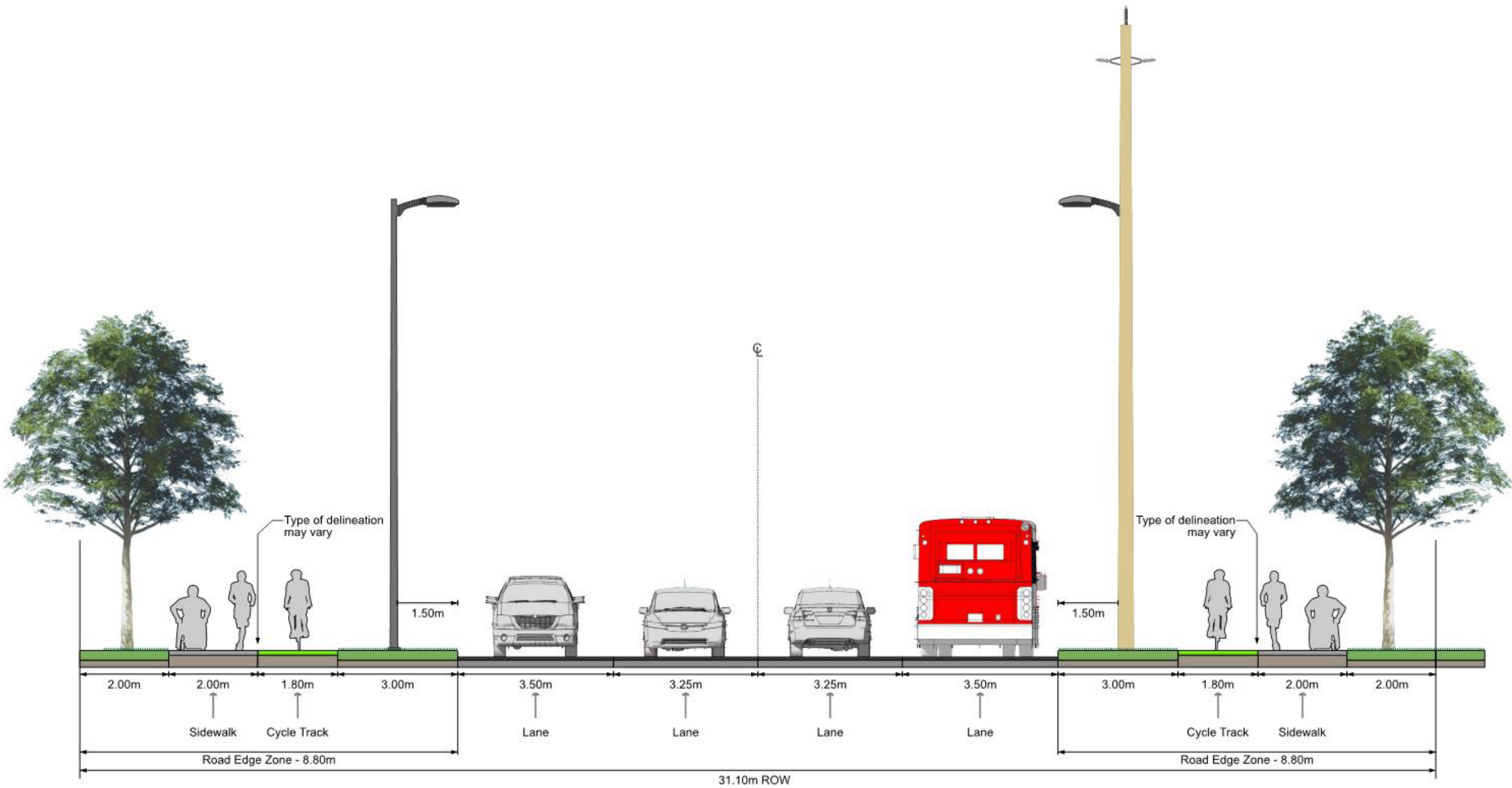
1 - Current Cross-Section Standard (Bike Lanes)



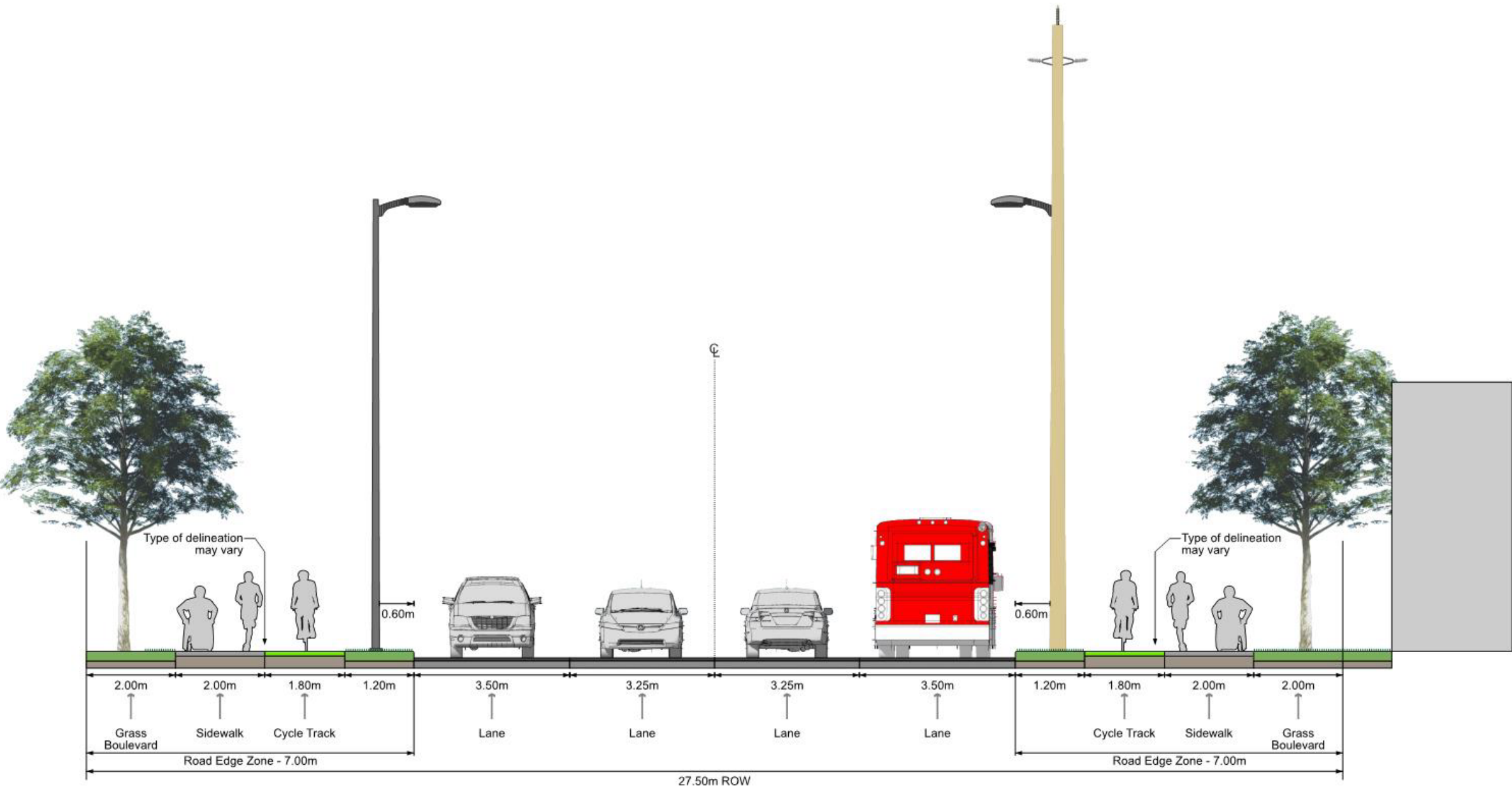
2 - Separated Cycle Tracks/Sidewalks



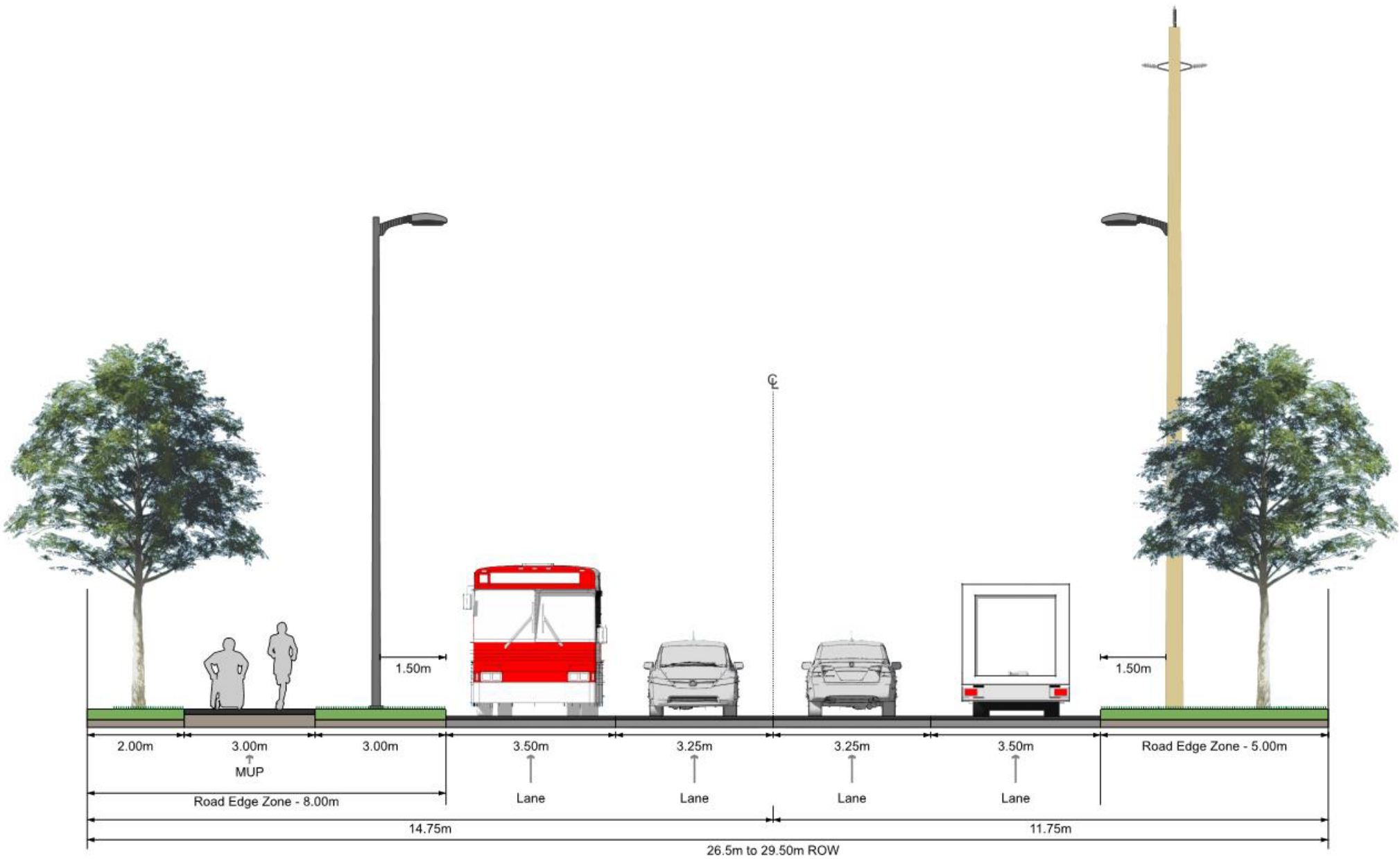
3 - Combined Cycle Tracks/Sidewalks



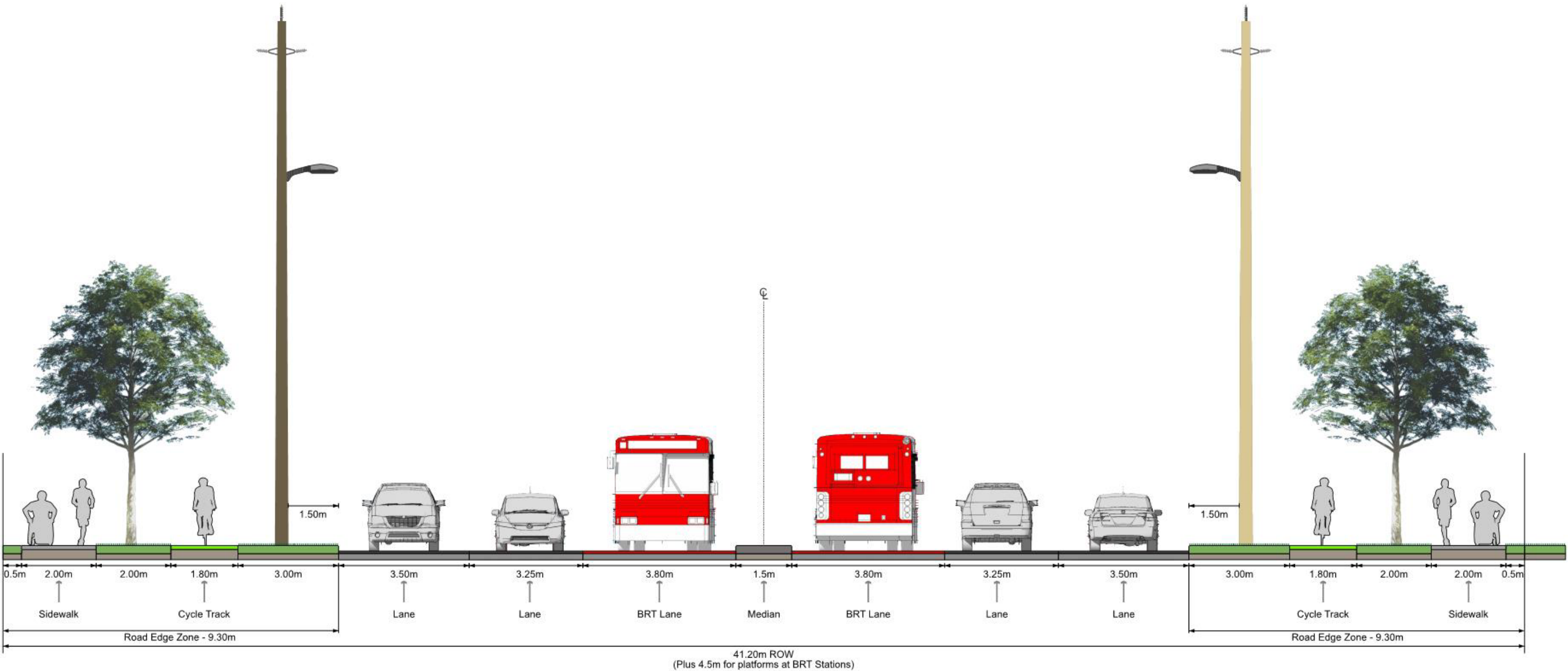
4 - Cycle Tracks, Narrow Boulevard



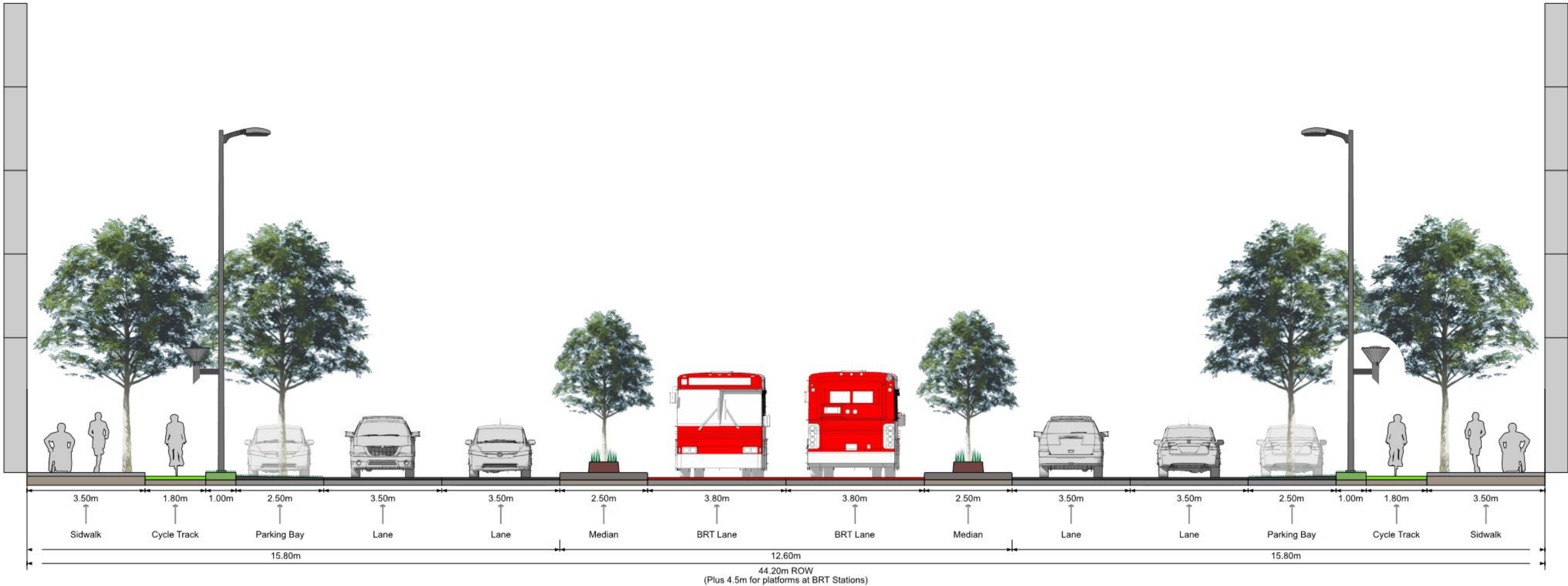
5 - Multi-Use Pathway



6 - BRT Lanes, Single Median, Combined Cycle Tracks/Sidewalks



7 - BRT Lanes, Double Medians, Separated Cycle Track, On-street Parking



APPENDIX



SIGNAL WARRANTS

SCENARIO	Future Total	YEAR	2024
MAJOR ROAD	Fernbank Road	MINOR ROAD	Templeford / Romina
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	No	"T" INT.	No

JUSTIFICATION 7	MINIMUM REQUIREMENT		AHV	COMPLIANCE	
	FLOW	ADJ. FLOW		%	OVERALL %
1A - All Approaches	470	565	398	71%	61%
1B - Minor Road	120	145	88	61%	
2A - Major Road	480	575	310	54%	54%
2B - Crossing Major Road	50	60	48	79%	

SCENARIO	Future Total	YEAR	2024
MAJOR ROAD	Eagleson Road	MINOR ROAD	Bridgestone Drive
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	No	"T" INT.	Yes

JUSTIFICATION 7	MINIMUM REQUIREMENT		AHV	COMPLIANCE	
	FLOW	ADJ. FLOW		%	OVERALL %
1A - All Approaches	470	565	889	157%	91%
1B - Minor Road	120	215	195	91%	
2A - Major Road	480	575	694	121%	21%
2B - Crossing Major Road	50	60	13	21%	

SCENARIO	Future Total	YEAR	2024
MAJOR ROAD	Fernbank Road	MINOR ROAD	Site Access 1
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	Yes	"T" INT.	Yes

JUSTIFICATION	MINIMUM REQUIREMENT		AHV	COMPLIANCE	
	FLOW	ADJ. FLOW		%	OVERALL %
1A - All Approaches	470	705	318	45%	3%
1B - Minor Road	120	270	8	3%	
2A - Major Road	480	720	310	43%	2%
2B - Crossing Major Road	50	75	1	2%	

SCENARIO	Future Total	YEAR	2024
MAJOR ROAD	Eagleson Road	MINOR ROAD	Site Access 2
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	Yes	"T" INT.	Yes

JUSTIFICATION	MINIMUM REQUIREMENT		AHV	COMPLIANCE	
	FLOW	ADJ. FLOW		%	OVERALL %
1A - All Approaches	470	705	841	119%	3%
1B - Minor Road	120	270	7	3%	
2A - Major Road	480	720	834	116%	6%
2B - Crossing Major Road	50	75	5	6%	

APPENDIX

J

SYNCHRO
RESULTS

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

06/15/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	57	162	39	66	292	2	123	113	88	3	96	150
Future Volume (veh/h)	57	162	39	66	292	2	123	113	88	3	96	150
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1698	1636	1698	1683	1800	1748	1782	1748	1800	1748	1800
Adj Flow Rate, veh/h	63	180	43	73	324	2	137	126	98	3	107	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	6	10	6	7	7	3	1	3	0	3	0
Cap, veh/h	613	1011	826	687	995	6	294	476	394	207	190	167
Arrive On Green	0.60	0.60	0.60	0.60	0.60	0.60	0.09	0.27	0.27	0.11	0.11	0.00
Sat Flow, veh/h	1071	1698	1387	1108	1671	10	1664	1782	1477	1163	1748	1530
Grp Volume(v), veh/h	63	180	43	73	0	326	137	126	98	3	107	0
Grp Sat Flow(s),veh/h/ln	1071	1698	1387	1108	0	1681	1664	1782	1477	1163	1748	1530
Q Serve(g_s), s	2.8	4.3	1.2	2.9	0.0	8.8	6.3	5.0	4.7	0.2	5.2	0.0
Cycle Q Clear(g_c), s	11.6	4.3	1.2	7.2	0.0	8.8	6.3	5.0	4.7	0.2	5.2	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	613	1011	826	687	0	1001	294	476	394	207	190	167
V/C Ratio(X)	0.10	0.18	0.05	0.11	0.00	0.33	0.47	0.26	0.25	0.01	0.56	0.00
Avail Cap(c_a), veh/h	613	1011	826	687	0	1001	346	907	752	452	559	490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.1	8.2	7.6	9.9	0.0	9.1	30.1	26.0	25.9	35.8	38.1	0.0
Incr Delay (d2), s/veh	0.3	0.4	0.1	0.3	0.0	0.9	1.1	0.3	0.3	0.0	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.1	0.5	0.9	0.0	4.3	3.0	2.5	1.9	0.1	2.7	0.0
LnGrp Delay(d),s/veh	12.4	8.6	7.7	10.2	0.0	10.0	31.2	26.3	26.2	35.9	40.7	0.0
LnGrp LOS	B	A	A	B		B	C	C	C	D	D	
Approach Vol, veh/h		286			399			361			110	
Approach Delay, s/veh		9.3			10.0			28.1			40.5	
Approach LOS		A			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		59.8		30.2		59.8	14.2	16.0				
Change Period (Y+Rc), s		* 6.2		* 6.2		* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 32		* 46		* 32	* 11	* 29				
Max Q Clear Time (g_c+I1), s		10.8		7.0		13.6	8.3	7.2				
Green Ext Time (p_c), s		4.5		2.2		4.2	0.1	1.9				
Intersection Summary												
HCM 2010 Ctrl Delay				18.4								
HCM 2010 LOS				B								
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road & Eagleson Road

800 Eagleson Road TIA

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	166	716	355	82	160	98
Future Volume (vph)	166	716	355	82	160	98
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1689	1748	1698	1500	1710	1430
Flt Permitted	0.44	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	784	1748	1698	1500	1800	1430
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	184	796	394	91	178	109
RTOR Reduction (vph)	0	0	0	36	0	93
Lane Group Flow (vph)	184	796	394	55	178	16
Confl. Peds. (#/hr)	6					
Heavy Vehicles (%)	1%	3%	6%	2%	0%	7%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	81.9	81.9	66.8	66.8	16.1	16.1
Effective Green, g (s)	81.9	81.9	66.8	66.8	16.1	16.1
Actuated g/C Ratio	0.74	0.74	0.61	0.61	0.15	0.15
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	658	1301	1031	910	263	209
v/s Ratio Prot	0.02	c0.46	0.23			
v/s Ratio Perm	0.18			0.04	c0.10	0.01
v/c Ratio	0.28	0.61	0.38	0.06	0.68	0.08
Uniform Delay, d1	4.9	6.6	11.0	8.8	44.5	40.5
Progression Factor	1.00	1.00	0.73	1.04	1.00	1.00
Incremental Delay, d2	0.2	2.2	1.1	0.1	6.7	0.2
Delay (s)	5.1	8.7	9.1	9.3	51.2	40.7
Level of Service	A	A	A	A	D	D
Approach Delay (s)		8.1	9.1		47.2	
Approach LOS		A	A		D	
Intersection Summary						
HCM 2000 Control Delay		14.8		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.66				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		59.1%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

HCM 2010 Signalized Intersection Summary
13: Eagleson Road & Cope Drive/Cadence Gate

800 Eagleson Road TIA

06/15/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	42	24	27	98	193	76	751	24	53	365	72
Future Volume (veh/h)	101	42	24	27	98	193	76	751	24	53	365	72
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1682	1675	1800	1800	1759	1800	1748	1778	1800	1731	1731	1698
Adj Flow Rate, veh/h	112	47	0	30	109	0	84	834	27	59	406	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	2	2	0	1	1	3	1	1	4	4	6
Cap, veh/h	212	293	0	274	308	0	676	2067	67	380	2021	887
Arrive On Green	0.18	0.18	0.00	0.18	0.18	0.00	0.01	0.20	0.20	0.04	0.61	0.00
Sat Flow, veh/h	1216	1675	0	1376	1759	0	1664	3340	108	1648	3288	1443
Grp Volume(v), veh/h	112	47	0	30	109	0	84	422	439	59	406	0
Grp Sat Flow(s),veh/h/ln	1216	1675	0	1376	1759	0	1664	1689	1759	1648	1644	1443
Q Serve(g_s), s	9.8	2.6	0.0	2.1	6.0	0.0	2.0	23.8	23.8	1.4	6.0	0.0
Cycle Q Clear(g_c), s	15.8	2.6	0.0	4.7	6.0	0.0	2.0	23.8	23.8	1.4	6.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	212	293	0	274	308	0	676	1045	1088	380	2021	887
V/C Ratio(X)	0.53	0.16	0.00	0.11	0.35	0.00	0.12	0.40	0.40	0.16	0.20	0.00
Avail Cap(c_a), veh/h	370	510	0	452	536	0	712	1045	1088	423	2021	887
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	46.8	38.5	0.0	40.5	39.9	0.0	7.2	26.2	26.2	9.6	9.3	0.0
Incr Delay (d2), s/veh	2.0	0.3	0.0	0.2	0.7	0.0	0.1	1.2	1.1	0.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	1.2	0.0	0.8	3.0	0.0	0.9	11.5	12.0	0.7	2.8	0.0
LnGrp Delay(d),s/veh	48.9	38.8	0.0	40.7	40.6	0.0	7.3	27.3	27.3	9.8	9.5	0.0
LnGrp LOS	D	D		D	D		A	C	C	A	A	
Approach Vol, veh/h		159			139			945			465	
Approach Delay, s/veh		45.9			40.6			25.5			9.6	
Approach LOS		D			D			C			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	74.1		25.8	10.6	73.6		25.8				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	7.0	51.0		33.5	7.0	51.0		33.5				
Max Q Clear Time (g_c+I1), s	3.4	25.8		17.8	4.0	8.0		8.0				
Green Ext Time (p_c), s	0.0	10.6		1.5	0.1	12.7		1.7				
Intersection Summary												
HCM 2010 Ctrl Delay				24.3								
HCM 2010 LOS				C								

Intersection												
Int Delay, s/veh	4.5											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	21	16	21	58	17	41	32	167	23	11	212	10
Future Vol, veh/h	21	16	21	58	17	41	32	167	23	11	212	10
Conflicting Peds, #/hr	1	0	0	2	0	0	1	0	0	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	19	25	0	10	24	2	9	5	27	0	3	10
Mvmt Flow	23	18	23	64	19	46	36	186	26	12	236	11
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	551	519	239	541	519	188	237	0	0	187	0	0
Stage 1	261	261	-	258	258	-	-	-	-	-	-	-
Stage 2	290	258	-	283	261	-	-	-	-	-	-	-
Critical Hdwy	7.29	6.75	6.2	7.2	6.74	6.22	4.19	-	-	4.1	-	-
Critical Hdwy Stg 1	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Follow-up Hdwy	3.671	4.225	3.3	3.59	4.216	3.318	2.281	-	-	2.2	-	-
Pot Cap-1 Maneuver	420	430	805	440	431	854	1290	-	-	1399	-	-
Stage 1	708	652	-	729	656	-	-	-	-	-	-	-
Stage 2	682	654	-	707	654	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	373	414	803	401	415	853	1288	-	-	1398	-	-
Mov Cap-2 Maneuver	373	414	-	401	415	-	-	-	-	-	-	-
Stage 1	688	646	-	708	637	-	-	-	-	-	-	-
Stage 2	608	635	-	661	648	-	-	-	-	-	-	-
Approach	SE		NW		NE		SW					
HCM Control Delay, s	13.7		14.8		1.1		0.4					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR					
Capacity (veh/h)	1288	-	-	496	479	1398	-	-				
HCM Lane V/C Ratio	0.028	-	-	0.26	0.135	0.009	-	-				
HCM Control Delay (s)	7.9	-	-	14.8	13.7	7.6	-	-				
HCM Lane LOS	A	-	-	B	B	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	1	0.5	0	-	-				

Intersection						
Int Delay, s/veh	9.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	319	596	38	185	260
Future Vol, veh/h	17	319	596	38	185	260
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	29	2	2	13	7	6
Mvmt Flow	19	354	662	42	206	289
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1362	662	0	0	662	0
Stage 1	662	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Critical Hdwy	6.69	6.22	-	-	4.17	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.318	-	-	2.263	-
Pot Cap-1 Maneuver	143	462	-	-	903	-
Stage 1	466	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	110	462	-	-	903	-
Mov Cap-2 Maneuver	110	-	-	-	-	-
Stage 1	466	-	-	-	-	-
Stage 2	344	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	34.6	0	4.2			
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 110 462	903	-		
HCM Lane V/C Ratio	-	- 0.172 0.767	0.228	-		
HCM Control Delay (s)	-	- 44.4 34.1	10.2	-		
HCM Lane LOS	-	- E D	B	-		
HCM 95th %tile Q(veh)	-	- 0.6 6.6	0.9	-		

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

06/15/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	165	325	78	166	316	11	83	118	50	1	209	114
Future Volume (veh/h)	165	325	78	166	316	11	83	118	50	1	209	114
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1731	1782	1782	1728	1800	1698	1765	1731	1800	1800	1782
Adj Flow Rate, veh/h	183	361	87	184	351	12	92	131	56	1	232	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	4	1	1	4	4	6	2	4	0	0	1
Cap, veh/h	537	777	678	488	979	33	215	505	421	274	300	252
Arrive On Green	0.45	0.45	0.45	0.08	0.59	0.59	0.06	0.29	0.29	0.17	0.17	0.00
Sat Flow, veh/h	1035	1731	1510	1697	1661	57	1617	1765	1471	1215	1800	1515
Grp Volume(v), veh/h	183	361	87	184	0	363	92	131	56	1	232	0
Grp Sat Flow(s),veh/h/ln	1035	1731	1510	1697	0	1718	1617	1765	1471	1215	1800	1515
Q Serve(g_s), s	11.8	14.5	3.4	5.5	0.0	11.0	4.6	5.7	2.8	0.1	12.3	0.0
Cycle Q Clear(g_c), s	11.8	14.5	3.4	5.5	0.0	11.0	4.6	5.7	2.8	0.1	12.3	0.0
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	537	777	678	488	0	1013	215	505	421	274	300	252
V/C Ratio(X)	0.34	0.46	0.13	0.38	0.00	0.36	0.43	0.26	0.13	0.00	0.77	0.00
Avail Cap(c_a), veh/h	537	777	678	504	0	1013	215	702	586	410	500	421
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.4	19.2	16.1	13.3	0.0	10.7	31.3	27.5	26.5	34.8	39.9	0.0
Incr Delay (d2), s/veh	1.7	2.0	0.4	0.5	0.0	1.0	1.4	0.3	0.1	0.0	4.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	7.3	1.5	2.6	0.0	5.4	2.1	2.8	1.2	0.0	6.5	0.0
LnGrp Delay(d),s/veh	20.2	21.2	16.5	13.8	0.0	11.7	32.7	27.8	26.6	34.8	44.2	0.0
LnGrp LOS	C	C	B	B		B	C	C	C	C	D	
Approach Vol, veh/h		631			547			279			233	
Approach Delay, s/veh		20.2			12.4			29.1			44.1	
Approach LOS		C			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s		65.2		34.8	14.1	51.1	12.0	22.8				
Change Period (Y+Rc), s		* 6.2		* 6.2	* 6.5	* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 48		* 40	* 8.5	* 33	* 5.9	* 28				
Max Q Clear Time (g_c+I1), s		13.0		7.7	7.5	16.5	6.6	14.3				
Green Ext Time (p_c), s		8.0		2.9	0.1	6.1	0.0	2.2				
Intersection Summary												
HCM 2010 Ctrl Delay				22.5								
HCM 2010 LOS				C								
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road

800 Eagleson Road TIA

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	169	462	793	205	129	178
Future Volume (vph)	169	462	793	205	129	178
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1782	1765	1515	1673	1500
Flt Permitted	0.18	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	307	1782	1765	1515	1761	1500
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	188	513	881	228	143	198
RTOR Reduction (vph)	0	0	0	74	0	173
Lane Group Flow (vph)	188	513	881	154	143	25
Confl. Peds. (#/hr)	2				1	
Heavy Vehicles (%)	4%	1%	2%	1%	2%	2%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	93.0	93.0	78.3	78.3	15.0	15.0
Effective Green, g (s)	93.0	93.0	78.3	78.3	15.0	15.0
Actuated g/C Ratio	0.78	0.78	0.65	0.65	0.12	0.12
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	334	1381	1151	988	220	187
v/s Ratio Prot	c0.04	0.29	c0.50			
v/s Ratio Perm	0.39			0.10	c0.08	0.02
v/c Ratio	0.56	0.37	0.77	0.16	0.65	0.13
Uniform Delay, d1	13.3	4.3	14.5	8.1	50.0	46.7
Progression Factor	1.00	1.00	0.79	0.17	1.00	1.00
Incremental Delay, d2	2.2	0.8	4.4	0.3	6.7	0.3
Delay (s)	15.4	5.0	15.8	1.7	56.7	47.0
Level of Service	B	A	B	A	E	D
Approach Delay (s)		7.8	12.9		51.1	
Approach LOS		A	B		D	
Intersection Summary						
HCM 2000 Control Delay		17.3		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.73				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		76.5%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	128	71	23	84	119	71	598	29	222	936	132
Future Volume (veh/h)	83	128	71	23	84	119	71	598	29	222	936	132
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	0.99		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1714	1800	1800	1800	1742	1800	1782	1783	1800	1800	1782	1731
Adj Flow Rate, veh/h	92	142	0	26	93	0	79	664	32	247	1040	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	0	0	0	1	1	1	1	1	0	1	4
Cap, veh/h	190	274	0	160	265	0	399	2037	98	657	2217	963
Arrive On Green	0.15	0.15	0.00	0.15	0.15	0.00	0.08	1.00	1.00	0.07	0.65	0.00
Sat Flow, veh/h	1248	1800	0	1259	1742	0	1697	3289	158	1714	3386	1471
Grp Volume(v), veh/h	92	142	0	26	93	0	79	342	354	247	1040	0
Grp Sat Flow(s),veh/h/ln	1248	1800	0	1259	1742	0	1697	1694	1754	1714	1693	1471
Q Serve(g_s), s	8.6	8.7	0.0	2.3	5.7	0.0	2.0	0.0	0.0	6.1	18.4	0.0
Cycle Q Clear(g_c), s	14.3	8.7	0.0	11.0	5.7	0.0	2.0	0.0	0.0	6.1	18.4	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	190	274	0	160	265	0	399	1049	1086	657	2217	963
V/C Ratio(X)	0.48	0.52	0.00	0.16	0.35	0.00	0.20	0.33	0.33	0.38	0.47	0.00
Avail Cap(c_a), veh/h	359	518	0	330	501	0	419	1049	1086	801	2217	963
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	51.9	46.8	0.0	51.9	45.5	0.0	8.0	0.0	0.0	6.5	10.3	0.0
Incr Delay (d2), s/veh	1.9	1.5	0.0	0.5	0.8	0.0	0.2	0.8	0.8	0.4	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	4.5	0.0	0.8	2.8	0.0	0.9	0.2	0.2	2.9	8.7	0.0
LnGrp Delay(d),s/veh	53.8	48.3	0.0	52.4	46.3	0.0	8.2	0.8	0.8	6.9	11.0	0.0
LnGrp LOS	D	D		D	D		A	A	A	A	B	
Approach Vol, veh/h		234			119			775			1287	
Approach Delay, s/veh		50.5			47.7			1.6			10.2	
Approach LOS		D			D			A			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.9	80.3		24.8	10.6	84.6		24.8				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	19.0	48.0		34.5	6.0	61.0		34.5				
Max Q Clear Time (g_c+I1), s	8.1	2.0		16.3	4.0	20.4		13.0				
Green Ext Time (p_c), s	0.7	21.2		2.0	0.0	20.1		2.1				
Intersection Summary												
HCM 2010 Ctrl Delay				13.2								
HCM 2010 LOS				B								

Intersection												
Int Delay, s/veh	4.4											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	15	20	33	49	19	22	32	222	44	45	300	31
Future Vol, veh/h	15	20	33	49	19	22	32	222	44	45	300	31
Conflicting Peds, #/hr	2	0	0	2	0	0	3	0	0	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	13	10	0	8	26	5	0	2	7	2	1	0
Mvmt Flow	17	22	37	54	21	24	36	247	49	50	333	34
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	779	756	338	785	756	251	336	0	0	249	0	0
Stage 1	436	436	-	320	320	-	-	-	-	-	-	-
Stage 2	343	320	-	465	436	-	-	-	-	-	-	-
Critical Hdwy	7.23	6.6	6.2	7.18	6.76	6.25	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Follow-up Hdwy	3.617	4.09	3.3	3.572	4.234	3.345	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	300	328	709	303	310	780	1235	-	-	1317	-	-
Stage 1	578	566	-	679	611	-	-	-	-	-	-	-
Stage 2	650	638	-	566	541	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	259	305	706	257	288	777	1233	-	-	1315	-	-
Mov Cap-2 Maneuver	259	305	-	257	288	-	-	-	-	-	-	-
Stage 1	560	543	-	658	592	-	-	-	-	-	-	-
Stage 2	588	618	-	494	519	-	-	-	-	-	-	-
Approach	SE		NW		NE		SW					
HCM Control Delay, s	16.1		21.6		0.9		0.9					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR					
Capacity (veh/h)	1233	-	-	316	399	1315	-	-				
HCM Lane V/C Ratio	0.029	-	-	0.316	0.189	0.038	-	-				
HCM Control Delay (s)	8	-	-	21.6	16.1	7.8	-	-				
HCM Lane LOS	A	-	-	C	C	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	1.3	0.7	0.1	-	-				

Intersection						
Int Delay, s/veh	14.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	31	350	358	31	493	579
Future Vol, veh/h	31	350	358	31	493	579
Conflicting Peds, #/hr	0	0	0	0	8	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	10	1	1	10	1	1
Mvmt Flow	34	389	398	34	548	643
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	2145	406	0	0	406	0
Stage 1	406	-	-	-	-	-
Stage 2	1739	-	-	-	-	-
Critical Hdwy	6.5	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	51	647	-	-	1158	-
Stage 1	656	-	-	-	-	-
Stage 2	148	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 27	643	-	-	1158	-
Mov Cap-2 Maneuver	~ 27	-	-	-	-	-
Stage 1	652	-	-	-	-	-
Stage 2	78	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	56.6	0		5		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	27	643	1158	-
HCM Lane V/C Ratio	-	-	1.276	0.605	0.473	-
HCM Control Delay (s)	-	-	\$ 483.9	18.8	10.9	-
HCM Lane LOS	-	-	F	C	B	-
HCM 95th %tile Q(veh)	-	-	4.1	4.1	2.6	-
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

08/16/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	58	164	39	67	295	2	124	114	89	3	97	152
Future Volume (veh/h)	58	164	39	67	295	2	124	114	89	3	97	152
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1698	1636	1698	1683	1800	1748	1782	1748	1800	1748	1800
Adj Flow Rate, veh/h	64	182	43	74	328	2	138	127	99	3	108	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	6	10	6	7	7	3	1	3	0	3	0
Cap, veh/h	608	1009	824	683	993	6	295	478	396	207	191	168
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.09	0.27	0.27	0.11	0.11	0.00
Sat Flow, veh/h	1067	1698	1387	1106	1671	10	1664	1782	1477	1161	1748	1530
Grp Volume(v), veh/h	64	182	43	74	0	330	138	127	99	3	108	0
Grp Sat Flow(s),veh/h/ln	1067	1698	1387	1106	0	1681	1664	1782	1477	1161	1748	1530
Q Serve(g_s), s	2.9	4.4	1.2	2.9	0.0	8.9	6.3	5.1	4.7	0.2	5.3	0.0
Cycle Q Clear(g_c), s	11.8	4.4	1.2	7.3	0.0	8.9	6.3	5.1	4.7	0.2	5.3	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	608	1009	824	683	0	999	295	478	396	207	191	168
V/C Ratio(X)	0.11	0.18	0.05	0.11	0.00	0.33	0.47	0.27	0.25	0.01	0.56	0.00
Avail Cap(c_a), veh/h	608	1009	824	683	0	999	346	907	752	452	559	490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.2	8.3	7.6	10.0	0.0	9.2	30.0	26.0	25.8	35.8	38.0	0.0
Incr Delay (d2), s/veh	0.3	0.4	0.1	0.3	0.0	0.9	1.2	0.3	0.3	0.0	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.1	0.5	0.9	0.0	4.4	3.0	2.5	2.0	0.1	2.7	0.0
LnGrp Delay(d),s/veh	12.6	8.7	7.8	10.3	0.0	10.1	31.1	26.3	26.2	35.8	40.6	0.0
LnGrp LOS	B	A	A	B		B	C	C	C	D	D	
Approach Vol, veh/h		289			404			364			111	
Approach Delay, s/veh		9.4			10.1			28.1			40.5	
Approach LOS		A			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		59.7		30.3		59.7	14.3	16.1				
Change Period (Y+Rc), s		* 6.2		* 6.2		* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 32		* 46		* 32	* 11	* 29				
Max Q Clear Time (g_c+I1), s		10.9		7.1		13.8	8.3	7.3				
Green Ext Time (p_c), s		4.5		2.2		4.3	0.1	1.9				
Intersection Summary												
HCM 2010 Ctrl Delay				18.4								
HCM 2010 LOS				B								
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road & Eagleson Road

800 Eagleson Road TIA

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	168	723	359	83	162	99
Future Volume (vph)	168	723	359	83	162	99
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1689	1748	1698	1500	1710	1430
Flt Permitted	0.44	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	777	1748	1698	1500	1800	1430
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	187	803	399	92	180	110
RTOR Reduction (vph)	0	0	0	36	0	94
Lane Group Flow (vph)	187	803	399	56	180	16
Confl. Peds. (#/hr)	6					
Heavy Vehicles (%)	1%	3%	6%	2%	0%	7%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	81.7	81.7	66.5	66.5	16.3	16.3
Effective Green, g (s)	81.7	81.7	66.5	66.5	16.3	16.3
Actuated g/C Ratio	0.74	0.74	0.60	0.60	0.15	0.15
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	653	1298	1026	906	266	211
v/s Ratio Prot	0.02	c0.46	0.23			
v/s Ratio Perm	0.19			0.04	c0.10	0.01
v/c Ratio	0.29	0.62	0.39	0.06	0.68	0.08
Uniform Delay, d1	5.0	6.7	11.2	8.9	44.4	40.4
Progression Factor	1.00	1.00	0.72	1.03	1.00	1.00
Incremental Delay, d2	0.2	2.2	1.1	0.1	6.7	0.2
Delay (s)	5.2	9.0	9.2	9.3	51.0	40.5
Level of Service	A	A	A	A	D	D
Approach Delay (s)		8.2	9.2		47.0	
Approach LOS		A	A		D	
Intersection Summary						
HCM 2000 Control Delay		14.9		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.67				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		59.6%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

HCM 2010 Signalized Intersection Summary
13: Eagleson Road & Cope Drive/Cadence Gate

800 Eagleson Road TIA

08/16/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	102	42	24	27	99	195	77	759	24	54	369	73
Future Volume (veh/h)	102	42	24	27	99	195	77	759	24	54	369	73
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1682	1675	1800	1800	1759	1800	1748	1778	1800	1731	1731	1698
Adj Flow Rate, veh/h	113	47	0	30	110	0	86	843	27	60	410	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	2	2	0	1	1	3	1	1	4	4	6
Cap, veh/h	213	296	0	276	311	0	672	2062	66	376	2016	885
Arrive On Green	0.18	0.18	0.00	0.18	0.18	0.00	0.01	0.20	0.20	0.04	0.61	0.00
Sat Flow, veh/h	1215	1675	0	1376	1759	0	1664	3342	107	1648	3288	1443
Grp Volume(v), veh/h	113	47	0	30	110	0	86	426	444	60	410	0
Grp Sat Flow(s),veh/h/ln	1215	1675	0	1376	1759	0	1664	1689	1759	1648	1644	1443
Q Serve(g_s), s	9.9	2.6	0.0	2.1	6.0	0.0	2.1	24.1	24.1	1.4	6.1	0.0
Cycle Q Clear(g_c), s	15.9	2.6	0.0	4.7	6.0	0.0	2.1	24.1	24.1	1.4	6.1	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	213	296	0	276	311	0	672	1043	1086	376	2016	885
V/C Ratio(X)	0.53	0.16	0.00	0.11	0.35	0.00	0.13	0.41	0.41	0.16	0.20	0.00
Avail Cap(c_a), veh/h	369	510	0	452	536	0	708	1043	1086	418	2016	885
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	46.8	38.4	0.0	40.4	39.8	0.0	7.3	26.4	26.4	9.8	9.4	0.0
Incr Delay (d2), s/veh	2.0	0.2	0.0	0.2	0.7	0.0	0.1	1.2	1.1	0.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	1.2	0.0	0.8	3.0	0.0	0.9	11.7	12.1	0.7	2.8	0.0
LnGrp Delay(d),s/veh	48.8	38.6	0.0	40.5	40.5	0.0	7.4	27.6	27.5	10.0	9.6	0.0
LnGrp LOS	D	D		D	D		A	C	C	A	A	
Approach Vol, veh/h		160			140			956			470	
Approach Delay, s/veh		45.8			40.5			25.7			9.7	
Approach LOS		D			D			C			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	73.9		25.9	10.6	73.4		25.9				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	7.0	51.0		33.5	7.0	51.0		33.5				
Max Q Clear Time (g_c+I1), s	3.4	26.1		17.9	4.1	8.1		8.0				
Green Ext Time (p_c), s	0.0	10.7		1.5	0.1	12.9		1.7				
Intersection Summary												
HCM 2010 Ctrl Delay				24.4								
HCM 2010 LOS				C								

Intersection												
Int Delay, s/veh	4.6											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	21	16	21	59	17	41	33	169	23	11	214	10
Future Vol, veh/h	21	16	21	59	17	41	33	169	23	11	214	10
Conflicting Peds, #/hr	1	0	0	2	0	0	1	0	0	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	19	25	0	10	24	2	9	5	27	0	3	10
Mvmt Flow	23	18	23	66	19	46	37	188	26	12	238	11
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	557	525	241	547	525	190	239	0	0	189	0	0
Stage 1	263	263	-	262	262	-	-	-	-	-	-	-
Stage 2	294	262	-	285	263	-	-	-	-	-	-	-
Critical Hdwy	7.29	6.75	6.2	7.2	6.74	6.22	4.19	-	-	4.1	-	-
Critical Hdwy Stg 1	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Follow-up Hdwy	3.671	4.225	3.3	3.59	4.216	3.318	2.281	-	-	2.2	-	-
Pot Cap-1 Maneuver	416	426	803	436	428	852	1288	-	-	1397	-	-
Stage 1	706	651	-	726	653	-	-	-	-	-	-	-
Stage 2	679	651	-	705	652	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	369	409	801	397	411	851	1286	-	-	1396	-	-
Mov Cap-2 Maneuver	369	409	-	397	411	-	-	-	-	-	-	-
Stage 1	685	645	-	705	634	-	-	-	-	-	-	-
Stage 2	605	632	-	659	646	-	-	-	-	-	-	-
Approach	SE		NW		NE		SW					
HCM Control Delay, s	13.8		15		1.2		0.4					
HCM LOS	B		C									
Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR					
Capacity (veh/h)	1286	-	-	491	474	1396	-	-				
HCM Lane V/C Ratio	0.029	-	-	0.265	0.136	0.009	-	-				
HCM Control Delay (s)	7.9	-	-	15	13.8	7.6	-	-				
HCM Lane LOS	A	-	-	C	B	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	1.1	0.5	0	-	-				

Intersection						
Int Delay, s/veh	9.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	322	602	38	187	263
Future Vol, veh/h	17	322	602	38	187	263
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	29	2	2	13	7	6
Mvmt Flow	19	358	669	42	208	292
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1377	669	0	0	669	0
Stage 1	669	-	-	-	-	-
Stage 2	708	-	-	-	-	-
Critical Hdwy	6.69	6.22	-	-	4.17	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.318	-	-	2.263	-
Pot Cap-1 Maneuver	140	458	-	-	898	-
Stage 1	462	-	-	-	-	-
Stage 2	442	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	108	458	-	-	898	-
Mov Cap-2 Maneuver	108	-	-	-	-	-
Stage 1	462	-	-	-	-	-
Stage 2	340	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	36.1	0	4.2			
HCM LOS	E					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 108 458	898	-		
HCM Lane V/C Ratio	-	- 0.175 0.781	0.231	-		
HCM Control Delay (s)	-	- 45.3 35.6	10.2	-		
HCM Lane LOS	-	- E E	B	-		
HCM 95th %tile Q(veh)	-	- 0.6 6.9	0.9	-		

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

08/15/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	58	164	39	67	295	2	124	116	89	3	99	154
Future Volume (veh/h)	58	164	39	67	295	2	124	116	89	3	99	154
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1698	1636	1698	1683	1800	1748	1782	1748	1800	1748	1800
Adj Flow Rate, veh/h	64	182	43	74	328	2	138	129	99	3	110	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	6	10	6	7	7	3	1	3	0	3	0
Cap, veh/h	606	1007	823	682	991	6	295	480	398	208	194	170
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.09	0.27	0.27	0.11	0.11	0.00
Sat Flow, veh/h	1067	1698	1387	1106	1671	10	1664	1782	1477	1159	1748	1530
Grp Volume(v), veh/h	64	182	43	74	0	330	138	129	99	3	110	0
Grp Sat Flow(s),veh/h/ln	1067	1698	1387	1106	0	1681	1664	1782	1477	1159	1748	1530
Q Serve(g_s), s	2.9	4.4	1.2	2.9	0.0	8.9	6.3	5.1	4.7	0.2	5.4	0.0
Cycle Q Clear(g_c), s	11.9	4.4	1.2	7.3	0.0	8.9	6.3	5.1	4.7	0.2	5.4	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	606	1007	823	682	0	997	295	480	398	208	194	170
V/C Ratio(X)	0.11	0.18	0.05	0.11	0.00	0.33	0.47	0.27	0.25	0.01	0.57	0.00
Avail Cap(c_a), veh/h	606	1007	823	682	0	997	346	907	752	451	559	490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.3	8.3	7.7	10.0	0.0	9.3	29.9	25.9	25.8	35.7	38.0	0.0
Incr Delay (d2), s/veh	0.3	0.4	0.1	0.3	0.0	0.9	1.2	0.3	0.3	0.0	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.1	0.5	0.9	0.0	4.4	3.0	2.5	2.0	0.1	2.7	0.0
LnGrp Delay(d),s/veh	12.6	8.7	7.8	10.3	0.0	10.2	31.1	26.2	26.1	35.7	40.6	0.0
LnGrp LOS	B	A	A	B		B	C	C	C	D	D	
Approach Vol, veh/h		289			404			366			113	
Approach Delay, s/veh		9.5			10.2			28.0			40.4	
Approach LOS		A			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		59.6		30.4		59.6	14.3	16.2				
Change Period (Y+Rc), s		* 6.2		* 6.2		* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 32		* 46		* 32	* 11	* 29				
Max Q Clear Time (g_c+I1), s		10.9		7.1		13.9	8.3	7.4				
Green Ext Time (p_c), s		4.5		2.2		4.3	0.1	2.0				
Intersection Summary												
HCM 2010 Ctrl Delay				18.5								
HCM 2010 LOS				B								
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road & Eagleson Road

800 Eagleson Road TIA

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	172	733	362	86	173	105
Future Volume (vph)	172	733	362	86	173	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1689	1748	1698	1500	1710	1430
Flt Permitted	0.43	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	768	1748	1698	1500	1800	1430
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	191	814	402	96	192	117
RTOR Reduction (vph)	0	0	0	39	0	99
Lane Group Flow (vph)	191	814	402	57	192	18
Confl. Peds. (#/hr)	6					
Heavy Vehicles (%)	1%	3%	6%	2%	0%	7%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	81.0	81.0	65.6	65.6	17.0	17.0
Effective Green, g (s)	81.0	81.0	65.6	65.6	17.0	17.0
Actuated g/C Ratio	0.74	0.74	0.60	0.60	0.15	0.15
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	644	1287	1012	894	278	221
v/s Ratio Prot	0.03	c0.47	0.24			
v/s Ratio Perm	0.19			0.04	c0.11	0.01
v/c Ratio	0.30	0.63	0.40	0.06	0.69	0.08
Uniform Delay, d1	5.2	7.2	11.7	9.3	44.0	39.8
Progression Factor	1.00	1.00	0.74	1.17	1.00	1.00
Incremental Delay, d2	0.3	2.4	1.2	0.1	7.2	0.2
Delay (s)	5.5	9.5	9.9	11.1	51.2	40.0
Level of Service	A	A	A	B	D	D
Approach Delay (s)		8.8	10.1		47.0	
Approach LOS		A	B		D	
Intersection Summary						
HCM 2000 Control Delay		15.6		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.68				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		60.8%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

HCM 2010 Signalized Intersection Summary
13: Eagleson Road & Cope Drive/Cadence Gate

800 Eagleson Road TIA

08/15/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	102	42	24	27	99	195	79	778	25	54	375	73
Future Volume (veh/h)	102	42	24	27	99	195	79	778	25	54	375	73
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1682	1675	1800	1800	1759	1800	1748	1778	1800	1731	1731	1698
Adj Flow Rate, veh/h	113	47	0	30	110	0	88	864	28	60	417	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	2	2	0	1	1	3	1	1	4	4	6
Cap, veh/h	213	296	0	276	311	0	668	2061	67	367	2016	885
Arrive On Green	0.18	0.18	0.00	0.18	0.18	0.00	0.01	0.20	0.20	0.04	0.61	0.00
Sat Flow, veh/h	1215	1675	0	1376	1759	0	1664	3340	108	1648	3288	1443
Grp Volume(v), veh/h	113	47	0	30	110	0	88	437	455	60	417	0
Grp Sat Flow(s),veh/h/ln	1215	1675	0	1376	1759	0	1664	1689	1759	1648	1644	1443
Q Serve(g_s), s	9.9	2.6	0.0	2.1	6.0	0.0	2.1	24.8	24.8	1.4	6.2	0.0
Cycle Q Clear(g_c), s	15.9	2.6	0.0	4.7	6.0	0.0	2.1	24.8	24.8	1.4	6.2	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	213	296	0	276	311	0	668	1043	1085	367	2016	885
V/C Ratio(X)	0.53	0.16	0.00	0.11	0.35	0.00	0.13	0.42	0.42	0.16	0.21	0.00
Avail Cap(c_a), veh/h	369	510	0	452	536	0	703	1043	1085	409	2016	885
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	46.8	38.4	0.0	40.4	39.8	0.0	7.3	26.6	26.6	9.9	9.4	0.0
Incr Delay (d2), s/veh	2.0	0.2	0.0	0.2	0.7	0.0	0.1	1.2	1.2	0.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	1.2	0.0	0.8	3.0	0.0	1.0	12.0	12.4	0.7	2.8	0.0
LnGrp Delay(d),s/veh	48.8	38.6	0.0	40.5	40.5	0.0	7.4	27.9	27.8	10.1	9.7	0.0
LnGrp LOS	D	D		D	D		A	C	C	B	A	
Approach Vol, veh/h		160			140			980			477	
Approach Delay, s/veh		45.8			40.5			26.0			9.7	
Approach LOS		D			D			C			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	73.9		25.9	10.7	73.4		25.9				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	7.0	51.0		33.5	7.0	51.0		33.5				
Max Q Clear Time (g_c+I1), s	3.4	26.8		17.9	4.1	8.2		8.0				
Green Ext Time (p_c), s	0.0	10.8		1.5	0.1	13.4		1.7				
Intersection Summary												
HCM 2010 Ctrl Delay				24.5								
HCM 2010 LOS				C								

Intersection												
Int Delay, s/veh	4.5											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	21	16	21	59	17	41	33	171	23	11	219	10
Future Vol, veh/h	21	16	21	59	17	41	33	171	23	11	219	10
Conflicting Peds, #/hr	1	0	0	2	0	0	1	0	0	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	19	25	0	10	24	2	9	5	27	0	3	10
Mvmt Flow	23	18	23	66	19	46	37	190	26	12	243	11
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	566	533	246	554	533	192	244	0	0	191	0	0
Stage 1	269	269	-	264	264	-	-	-	-	-	-	-
Stage 2	297	264	-	290	269	-	-	-	-	-	-	-
Critical Hdwy	7.29	6.75	6.2	7.2	6.74	6.22	4.19	-	-	4.1	-	-
Critical Hdwy Stg 1	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Follow-up Hdwy	3.671	4.225	3.3	3.59	4.216	3.318	2.281	-	-	2.2	-	-
Pot Cap-1 Maneuver	410	422	798	431	423	850	1282	-	-	1395	-	-
Stage 1	701	647	-	724	652	-	-	-	-	-	-	-
Stage 2	676	650	-	701	648	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	363	406	796	392	407	849	1280	-	-	1394	-	-
Mov Cap-2 Maneuver	363	406	-	392	407	-	-	-	-	-	-	-
Stage 1	680	641	-	702	633	-	-	-	-	-	-	-
Stage 2	602	631	-	655	642	-	-	-	-	-	-	-
Approach	SE		NW		NE		SW					
HCM Control Delay, s	13.9		15.1		1.1		0.3					
HCM LOS	B		C									
Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR					
Capacity (veh/h)	1280	-	-	486	469	1394	-	-				
HCM Lane V/C Ratio	0.029	-	-	0.267	0.137	0.009	-	-				
HCM Control Delay (s)	7.9	-	-	15.1	13.9	7.6	-	-				
HCM Lane LOS	A	-	-	C	B	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	1.1	0.5	0	-	-				

Intersection

Int Delay, s/veh 10

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	322	607	38	191	268
Future Vol, veh/h	17	322	607	38	191	268
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	29	2	2	13	7	6
Mvmt Flow	19	358	674	42	212	298

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1396	674	0
Stage 1	674	-	-
Stage 2	722	-	-
Critical Hdwy	6.69	6.22	-
Critical Hdwy Stg 1	5.69	-	-
Critical Hdwy Stg 2	5.69	-	-
Follow-up Hdwy	3.761	3.318	-
Pot Cap-1 Maneuver	136	455	-
Stage 1	460	-	-
Stage 2	435	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	104	455	-
Mov Cap-2 Maneuver	104	-	-
Stage 1	460	-	-
Stage 2	332	-	-

Approach	WB	NB	SB
HCM Control Delay, s	36.8	0	4.3
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 104 455 894	-	-
HCM Lane V/C Ratio	-	- 0.182 0.786 0.237	-	-
HCM Control Delay (s)	-	- 47.1 36.3 10.3	-	-
HCM Lane LOS	-	- E E B	-	-
HCM 95th %tile Q(veh)	-	- 0.6 7 0.9	-	-

Intersection						
Int Delay, s/veh	0.5					
Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	3	17	232	1	6	252
Future Vol, veh/h	3	17	232	1	6	252
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	-	-	800	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	19	258	1	7	280

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	551	129	0
Stage 1	258	-	-
Stage 2	293	-	-
Critical Hdwy	6.63	6.93	-
Critical Hdwy Stg 1	5.83	-	-
Critical Hdwy Stg 2	5.43	-	-
Follow-up Hdwy	3.519	3.319	-
Pot Cap-1 Maneuver	480	897	-
Stage 1	762	-	-
Stage 2	756	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	477	897	-
Mov Cap-2 Maneuver	477	-	-
Stage 1	762	-	-
Stage 2	751	-	-

Approach	NW	NE	SW
HCM Control Delay, s	9.7	0	0.2
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NERNWLn1	SWL	SWT
Capacity (veh/h)	-	-	792	1304
HCM Lane V/C Ratio	-	-	0.028	0.005
HCM Control Delay (s)	-	-	9.7	7.8
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	4	1	928	462	4
Future Vol, veh/h	13	4	1	928	462	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	4	1	1031	513	4

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1549	516	518	0	-	0
Stage 1	516	-	-	-	-	-
Stage 2	1033	-	-	-	-	-
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	125	559	1048	-	-	-
Stage 1	599	-	-	-	-	-
Stage 2	343	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	125	559	1048	-	-	-
Mov Cap-2 Maneuver	125	-	-	-	-	-
Stage 1	599	-	-	-	-	-
Stage 2	342	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	31.8	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1048	-	153	-	-
HCM Lane V/C Ratio	0.001	-	0.123	-	-
HCM Control Delay (s)	8.4	0	31.8	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

08/16/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	167	328	79	168	319	11	84	119	51	1	211	115
Future Volume (veh/h)	167	328	79	168	319	11	84	119	51	1	211	115
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1731	1782	1782	1728	1800	1698	1765	1731	1800	1800	1782
Adj Flow Rate, veh/h	186	364	88	187	354	12	93	132	57	1	234	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	4	1	1	4	4	6	2	4	0	0	1
Cap, veh/h	533	773	674	485	978	33	215	507	423	275	302	254
Arrive On Green	0.45	0.45	0.45	0.08	0.59	0.59	0.06	0.29	0.29	0.17	0.17	0.00
Sat Flow, veh/h	1032	1731	1510	1697	1662	56	1617	1765	1471	1213	1800	1515
Grp Volume(v), veh/h	186	364	88	187	0	366	93	132	57	1	234	0
Grp Sat Flow(s),veh/h/ln	1032	1731	1510	1697	0	1718	1617	1765	1471	1213	1800	1515
Q Serve(g_s), s	12.2	14.7	3.4	5.7	0.0	11.1	4.6	5.8	2.9	0.1	12.4	0.0
Cycle Q Clear(g_c), s	12.2	14.7	3.4	5.7	0.0	11.1	4.6	5.8	2.9	0.1	12.4	0.0
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	533	773	674	485	0	1011	215	507	423	275	302	254
V/C Ratio(X)	0.35	0.47	0.13	0.39	0.00	0.36	0.43	0.26	0.13	0.00	0.78	0.00
Avail Cap(c_a), veh/h	533	773	674	499	0	1011	215	702	586	409	500	421
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.7	19.4	16.3	13.5	0.0	10.8	31.3	27.4	26.4	34.7	39.8	0.0
Incr Delay (d2), s/veh	1.8	2.1	0.4	0.5	0.0	1.0	1.4	0.3	0.1	0.0	4.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	7.4	1.5	2.7	0.0	5.6	2.1	2.8	1.2	0.0	6.5	0.0
LnGrp Delay(d),s/veh	20.5	21.4	16.7	14.0	0.0	11.8	32.6	27.7	26.5	34.7	44.1	0.0
LnGrp LOS	C	C	B	B		B	C	C	C	C	D	
Approach Vol, veh/h		638			553			282			235	
Approach Delay, s/veh		20.5			12.5			29.1			44.1	
Approach LOS		C			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s		65.0		35.0	14.2	50.9	12.0	23.0				
Change Period (Y+Rc), s		* 6.2		* 6.2	* 6.5	* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 48		* 40	* 8.5	* 33	* 5.9	* 28				
Max Q Clear Time (g_c+I1), s		13.1		7.8	7.7	16.7	6.6	14.4				
Green Ext Time (p_c), s		8.1		2.9	0.1	6.2	0.0	2.2				
Intersection Summary												
HCM 2010 Ctrl Delay				22.6								
HCM 2010 LOS				C								
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road & Eagleson Road

800 Eagleson Road TIA

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	171	467	801	207	130	180
Future Volume (vph)	171	467	801	207	130	180
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1782	1765	1515	1673	1500
Flt Permitted	0.17	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	295	1782	1765	1515	1761	1500
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	190	519	890	230	144	200
RTOR Reduction (vph)	0	0	0	75	0	175
Lane Group Flow (vph)	190	519	890	155	144	25
Confl. Peds. (#/hr)	2				1	
Heavy Vehicles (%)	4%	1%	2%	1%	2%	2%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	92.9	92.9	78.0	78.0	15.1	15.1
Effective Green, g (s)	92.9	92.9	78.0	78.0	15.1	15.1
Actuated g/C Ratio	0.77	0.77	0.65	0.65	0.13	0.13
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	328	1379	1147	984	221	188
v/s Ratio Prot	c0.04	0.29	c0.50			
v/s Ratio Perm	0.40			0.10	c0.08	0.02
v/c Ratio	0.58	0.38	0.78	0.16	0.65	0.13
Uniform Delay, d1	13.9	4.3	14.8	8.2	49.9	46.6
Progression Factor	1.00	1.00	0.79	0.17	1.00	1.00
Incremental Delay, d2	2.5	0.8	4.7	0.3	6.7	0.3
Delay (s)	16.4	5.1	16.4	1.7	56.7	47.0
Level of Service	B	A	B	A	E	D
Approach Delay (s)		8.1	13.4		51.0	
Approach LOS		A	B		D	
Intersection Summary						
HCM 2000 Control Delay		17.6		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.74				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		77.1%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

HCM 2010 Signalized Intersection Summary
13: Eagleson Road & Cope Drive/Cadence Gate

800 Eagleson Road TIA

08/16/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	129	72	23	85	120	72	604	29	224	945	133
Future Volume (veh/h)	84	129	72	23	85	120	72	604	29	224	945	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	0.99		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1714	1800	1800	1800	1742	1800	1782	1783	1800	1800	1782	1731
Adj Flow Rate, veh/h	93	143	0	26	94	0	80	671	32	249	1050	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	0	0	0	1	1	1	1	1	0	1	4
Cap, veh/h	191	277	0	161	268	0	395	2032	97	654	2212	961
Arrive On Green	0.15	0.15	0.00	0.15	0.15	0.00	0.08	1.00	1.00	0.07	0.65	0.00
Sat Flow, veh/h	1247	1800	0	1258	1742	0	1697	3291	157	1714	3386	1471
Grp Volume(v), veh/h	93	143	0	26	94	0	80	345	358	249	1050	0
Grp Sat Flow(s),veh/h/ln	1247	1800	0	1258	1742	0	1697	1694	1754	1714	1693	1471
Q Serve(g_s), s	8.7	8.8	0.0	2.3	5.8	0.0	2.1	0.0	0.0	6.2	18.7	0.0
Cycle Q Clear(g_c), s	14.4	8.8	0.0	11.1	5.8	0.0	2.1	0.0	0.0	6.2	18.7	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	191	277	0	161	268	0	395	1046	1083	654	2212	961
V/C Ratio(X)	0.49	0.52	0.00	0.16	0.35	0.00	0.20	0.33	0.33	0.38	0.47	0.00
Avail Cap(c_a), veh/h	358	518	0	330	501	0	414	1046	1083	797	2212	961
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	51.9	46.7	0.0	51.8	45.4	0.0	8.1	0.0	0.0	6.5	10.4	0.0
Incr Delay (d2), s/veh	1.9	1.5	0.0	0.5	0.8	0.0	0.3	0.8	0.8	0.4	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	4.5	0.0	0.8	2.9	0.0	1.0	0.2	0.2	3.0	8.8	0.0
LnGrp Delay(d),s/veh	53.8	48.2	0.0	52.2	46.2	0.0	8.4	0.8	0.8	6.9	11.2	0.0
LnGrp LOS	D	D		D	D		A	A	A	A	B	
Approach Vol, veh/h		236			120			783			1299	
Approach Delay, s/veh		50.4			47.5			1.6			10.4	
Approach LOS		D			D			A			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.0	80.1		24.9	10.7	84.4		24.9				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	19.0	48.0		34.5	6.0	61.0		34.5				
Max Q Clear Time (g_c+I1), s	8.2	2.0		16.4	4.1	20.7		13.1				
Green Ext Time (p_c), s	0.8	21.5		2.0	0.0	20.3		2.1				
Intersection Summary												
HCM 2010 Ctrl Delay				13.3								
HCM 2010 LOS				B								

Intersection												
Int Delay, s/veh	4.5											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↙	↑	↗	↙	↑	↗
Traffic Vol, veh/h	15	20	33	49	19	22	33	224	44	46	303	31
Future Vol, veh/h	15	20	33	49	19	22	33	224	44	46	303	31
Conflicting Peds, #/hr	2	0	0	2	0	0	3	0	0	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	13	10	0	8	26	5	0	2	7	2	1	0
Mvmt Flow	17	22	37	54	21	24	37	249	49	51	337	34
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	789	766	342	794	766	253	340	0	0	251	0	0
Stage 1	442	442	-	324	324	-	-	-	-	-	-	-
Stage 2	347	324	-	470	442	-	-	-	-	-	-	-
Critical Hdwy	7.23	6.6	6.2	7.18	6.76	6.25	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Follow-up Hdwy	3.617	4.09	3.3	3.572	4.234	3.345	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	296	324	705	299	306	778	1230	-	-	1314	-	-
Stage 1	574	563	-	676	609	-	-	-	-	-	-	-
Stage 2	647	636	-	563	538	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	255	301	702	253	284	775	1228	-	-	1312	-	-
Mov Cap-2 Maneuver	255	301	-	253	284	-	-	-	-	-	-	-
Stage 1	555	540	-	655	590	-	-	-	-	-	-	-
Stage 2	585	616	-	491	516	-	-	-	-	-	-	-
Approach	SE		NW		NE		SW					
HCM Control Delay, s	16.3		22		0.9		1					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR					
Capacity (veh/h)	1228	-	-	311	395	1312	-	-				
HCM Lane V/C Ratio	0.03	-	-	0.322	0.191	0.039	-	-				
HCM Control Delay (s)	8	-	-	22	16.3	7.9	-	-				
HCM Lane LOS	A	-	-	C	C	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	1.4	0.7	0.1	-	-				

Intersection						
Int Delay, s/veh	15.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	31	354	362	31	498	585
Future Vol, veh/h	31	354	362	31	498	585
Conflicting Peds, #/hr	0	0	0	0	8	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	10	1	1	10	1	1
Mvmt Flow	34	393	402	34	553	650

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	2167	410	0
Stage 1	410	-	-
Stage 2	1757	-	-
Critical Hdwy	6.5	6.21	-
Critical Hdwy Stg 1	5.5	-	-
Critical Hdwy Stg 2	5.5	-	-
Follow-up Hdwy	3.59	3.309	-
Pot Cap-1 Maneuver	49	644	-
Stage 1	653	-	-
Stage 2	145	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	~ 25	640	-
Mov Cap-2 Maneuver	~ 25	-	-
Stage 1	649	-	-
Stage 2	76	-	-

Approach	WB	NB	SB
HCM Control Delay, s	61.5	0	5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 25 640 1154	-	-
HCM Lane V/C Ratio	-	- 1.378 0.615 0.479	-	-
HCM Control Delay (s)	-	- \$ 544.7 19.2 11	-	-
HCM Lane LOS	-	- F C B	-	-
HCM 95th %tile Q(veh)	-	- 4.2 4.2 2.7	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

08/15/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	170	328	79	167	319	11	84	122	51	1	213	116
Future Volume (veh/h)	170	328	79	167	319	11	84	122	51	1	213	116
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1731	1782	1782	1728	1800	1698	1765	1731	1800	1800	1782
Adj Flow Rate, veh/h	189	364	88	186	354	12	93	136	57	1	237	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	4	1	1	4	4	6	2	4	0	0	1
Cap, veh/h	531	770	672	483	975	33	215	510	426	277	305	256
Arrive On Green	0.45	0.45	0.45	0.08	0.59	0.59	0.06	0.29	0.29	0.17	0.17	0.00
Sat Flow, veh/h	1032	1731	1510	1697	1662	56	1617	1765	1471	1209	1800	1515
Grp Volume(v), veh/h	189	364	88	186	0	366	93	136	57	1	237	0
Grp Sat Flow(s),veh/h/ln	1032	1731	1510	1697	0	1718	1617	1765	1471	1209	1800	1515
Q Serve(g_s), s	12.4	14.8	3.4	5.6	0.0	11.2	4.6	5.9	2.9	0.1	12.6	0.0
Cycle Q Clear(g_c), s	12.4	14.8	3.4	5.6	0.0	11.2	4.6	5.9	2.9	0.1	12.6	0.0
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	531	770	672	483	0	1008	215	510	426	277	305	256
V/C Ratio(X)	0.36	0.47	0.13	0.39	0.00	0.36	0.43	0.27	0.13	0.00	0.78	0.00
Avail Cap(c_a), veh/h	531	770	672	497	0	1008	215	702	586	408	500	421
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.8	19.5	16.3	13.5	0.0	10.9	31.1	27.4	26.3	34.5	39.7	0.0
Incr Delay (d2), s/veh	1.9	2.1	0.4	0.5	0.0	1.0	1.4	0.3	0.1	0.0	4.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	7.5	1.5	2.7	0.0	5.6	2.1	2.9	1.2	0.0	6.6	0.0
LnGrp Delay(d),s/veh	20.7	21.6	16.7	14.0	0.0	11.9	32.5	27.6	26.4	34.5	44.0	0.0
LnGrp LOS	C	C	B	B		B	C	C	C	C	D	
Approach Vol, veh/h		641			552			286			238	
Approach Delay, s/veh		20.6			12.6			29.0			44.0	
Approach LOS		C			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s		64.9		35.1	14.2	50.7	12.0	23.1				
Change Period (Y+Rc), s		* 6.2		* 6.2	* 6.5	* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 48		* 40	* 8.5	* 33	* 5.9	* 28				
Max Q Clear Time (g_c+I1), s		13.2		7.9	7.6	16.8	6.6	14.6				
Green Ext Time (p_c), s		8.2		3.0	0.1	6.2	0.0	2.2				
Intersection Summary												
HCM 2010 Ctrl Delay				22.7								
HCM 2010 LOS				C								
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road & Eagleson Road

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	184	470	807	214	135	189
Future Volume (vph)	184	470	807	214	135	189
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1782	1765	1515	1673	1500
Flt Permitted	0.16	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	279	1782	1765	1515	1761	1500
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	204	522	897	238	150	210
RTOR Reduction (vph)	0	0	0	78	0	183
Lane Group Flow (vph)	204	522	897	160	150	27
Confl. Peds. (#/hr)	2				1	
Heavy Vehicles (%)	4%	1%	2%	1%	2%	2%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	92.6	92.6	77.0	77.0	15.4	15.4
Effective Green, g (s)	92.6	92.6	77.0	77.0	15.4	15.4
Actuated g/C Ratio	0.77	0.77	0.64	0.64	0.13	0.13
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	324	1375	1132	972	225	192
v/s Ratio Prot	c0.05	0.29	c0.51			
v/s Ratio Perm	0.44			0.11	c0.09	0.02
v/c Ratio	0.63	0.38	0.79	0.16	0.67	0.14
Uniform Delay, d1	15.4	4.4	15.7	8.6	49.9	46.4
Progression Factor	1.00	1.00	0.77	0.17	1.00	1.00
Incremental Delay, d2	3.8	0.8	5.1	0.3	7.3	0.3
Delay (s)	19.2	5.2	17.2	1.8	57.1	46.8
Level of Service	B	A	B	A	E	D
Approach Delay (s)		9.1	13.9		51.1	
Approach LOS		A	B		D	
Intersection Summary						
HCM 2000 Control Delay			18.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.76			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	18.0
Intersection Capacity Utilization			78.5%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 Signalized Intersection Summary
13: Eagleson Road & Cope Drive/Cadence Gate

800 Eagleson Road TIA

08/15/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	129	73	24	85	120	73	611	30	224	957	133
Future Volume (veh/h)	84	129	73	24	85	120	73	611	30	224	957	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	0.99		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1714	1800	1800	1800	1742	1800	1782	1783	1800	1800	1782	1731
Adj Flow Rate, veh/h	93	143	0	27	94	0	81	679	33	249	1063	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	0	0	0	1	1	1	1	1	0	1	4
Cap, veh/h	192	277	0	161	268	0	390	2029	99	650	2212	961
Arrive On Green	0.15	0.15	0.00	0.15	0.15	0.00	0.08	1.00	1.00	0.07	0.65	0.00
Sat Flow, veh/h	1247	1800	0	1258	1742	0	1697	3288	160	1714	3386	1471
Grp Volume(v), veh/h	93	143	0	27	94	0	81	350	362	249	1063	0
Grp Sat Flow(s),veh/h/ln	1247	1800	0	1258	1742	0	1697	1694	1753	1714	1693	1471
Q Serve(g_s), s	8.7	8.8	0.0	2.4	5.8	0.0	2.1	0.0	0.0	6.2	19.0	0.0
Cycle Q Clear(g_c), s	14.4	8.8	0.0	11.2	5.8	0.0	2.1	0.0	0.0	6.2	19.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	192	277	0	161	268	0	390	1046	1082	650	2212	961
V/C Ratio(X)	0.49	0.52	0.00	0.17	0.35	0.00	0.21	0.33	0.33	0.38	0.48	0.00
Avail Cap(c_a), veh/h	358	518	0	330	501	0	409	1046	1082	793	2212	961
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	51.9	46.7	0.0	51.8	45.4	0.0	8.2	0.0	0.0	6.5	10.5	0.0
Incr Delay (d2), s/veh	1.9	1.5	0.0	0.5	0.8	0.0	0.3	0.9	0.8	0.4	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	4.5	0.0	0.9	2.9	0.0	1.0	0.3	0.3	3.0	9.1	0.0
LnGrp Delay(d),s/veh	53.8	48.2	0.0	52.3	46.2	0.0	8.4	0.9	0.8	6.9	11.3	0.0
LnGrp LOS	D	D		D	D		A	A	A	A	B	
Approach Vol, veh/h		236			121			793			1312	
Approach Delay, s/veh		50.4			47.6			1.6			10.4	
Approach LOS		D			D			A			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.0	80.1		24.9	10.7	84.4		24.9				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	19.0	48.0		34.5	6.0	61.0		34.5				
Max Q Clear Time (g_c+I1), s	8.2	2.0		16.4	4.1	21.0		13.2				
Green Ext Time (p_c), s	0.8	21.9		2.0	0.0	20.5		2.1				
Intersection Summary												
HCM 2010 Ctrl Delay				13.3								
HCM 2010 LOS				B								

Intersection												
Int Delay, s/veh	4.4											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	15	20	33	49	19	22	33	231	44	46	307	32
Future Vol, veh/h	15	20	33	49	19	22	33	231	44	46	307	32
Conflicting Peds, #/hr	2	0	0	2	0	0	3	0	0	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	13	10	0	8	26	5	0	2	7	2	1	0
Mvmt Flow	17	22	37	54	21	24	37	257	49	51	341	36
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	801	778	346	807	778	261	344	0	0	259	0	0
Stage 1	446	446	-	332	332	-	-	-	-	-	-	-
Stage 2	355	332	-	475	446	-	-	-	-	-	-	-
Critical Hdwy	7.23	6.6	6.2	7.18	6.76	6.25	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Follow-up Hdwy	3.617	4.09	3.3	3.572	4.234	3.345	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	290	318	702	293	301	770	1226	-	-	1306	-	-
Stage 1	571	561	-	669	604	-	-	-	-	-	-	-
Stage 2	640	630	-	559	535	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	250	295	699	247	279	767	1224	-	-	1304	-	-
Mov Cap-2 Maneuver	250	295	-	247	279	-	-	-	-	-	-	-
Stage 1	552	538	-	648	585	-	-	-	-	-	-	-
Stage 2	578	610	-	487	513	-	-	-	-	-	-	-
Approach	SE		NW		NE		SW					
HCM Control Delay, s	16.5		22.5		0.9		0.9					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR					
Capacity (veh/h)	1224	-	-	305	389	1304	-	-				
HCM Lane V/C Ratio	0.03	-	-	0.328	0.194	0.039	-	-				
HCM Control Delay (s)	8	-	-	22.5	16.5	7.9	-	-				
HCM Lane LOS	A	-	-	C	C	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	1.4	0.7	0.1	-	-				

Intersection						
Int Delay, s/veh	16.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	31	364	373	31	503	591
Future Vol, veh/h	31	364	373	31	503	591
Conflicting Peds, #/hr	0	0	0	0	8	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	10	1	1	10	1	1
Mvmt Flow	34	404	414	34	559	657
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	2196	422	0	0	422	0
Stage 1	422	-	-	-	-	-
Stage 2	1774	-	-	-	-	-
Critical Hdwy	6.5	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	47	634	-	-	1143	-
Stage 1	645	-	-	-	-	-
Stage 2	142	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 24	630	-	-	1143	-
Mov Cap-2 Maneuver	~ 24	-	-	-	-	-
Stage 1	641	-	-	-	-	-
Stage 2	73	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	64.3	0		5.1		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	24	630	1143	-
HCM Lane V/C Ratio	-	-	1.435	0.642	0.489	-
HCM Control Delay (s)	-	-	\$ 579.2	20.4	11.1	-
HCM Lane LOS	-	-	F	C	B	-
HCM 95th %tile Q(veh)	-	-	4.3	4.6	2.8	-
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection

Int Delay, s/veh 0.4

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	2	11	265	3	17	381
Future Vol, veh/h	2	11	265	3	17	381
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	-	-	800	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	12	294	3	19	423

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	757	149	0
Stage 1	296	-	-
Stage 2	461	-	-
Critical Hdwy	6.63	6.93	-
Critical Hdwy Stg 1	5.83	-	-
Critical Hdwy Stg 2	5.43	-	-
Follow-up Hdwy	3.519	3.319	-
Pot Cap-1 Maneuver	359	871	-
Stage 1	729	-	-
Stage 2	634	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	352	871	-
Mov Cap-2 Maneuver	352	-	-
Stage 1	729	-	-
Stage 2	621	-	-

Approach	NW	NE	SW
HCM Control Delay, s	10.2	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NWL	SWL	SWT
Capacity (veh/h)	-	-	710	1262	-
HCM Lane V/C Ratio	-	-	0.02	0.015	-
HCM Control Delay (s)	-	-	10.2	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	9	728	987	9
Future Vol, veh/h	5	5	9	728	987	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	6	10	809	1097	10
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1931	1102	1107	0	-	0
Stage 1	1102	-	-	-	-	-
Stage 2	829	-	-	-	-	-
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	73	257	631	-	-	-
Stage 1	318	-	-	-	-	-
Stage 2	429	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	71	257	631	-	-	-
Mov Cap-2 Maneuver	71	-	-	-	-	-
Stage 1	318	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	41	0.1		0		
HCM LOS	E					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	631	-	111	-	-	
HCM Lane V/C Ratio	0.016	-	0.1	-	-	
HCM Control Delay (s)	10.8	0	41	-	-	
HCM Lane LOS	B	A	E	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

08/16/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	61	172	41	70	310	2	131	126	93	3	107	162
Future Volume (veh/h)	61	172	41	70	310	2	131	126	93	3	107	162
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1698	1636	1698	1683	1800	1748	1782	1748	1800	1748	1800
Adj Flow Rate, veh/h	68	191	46	78	344	2	146	140	103	3	119	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	6	10	6	7	7	3	1	3	0	3	0
Cap, veh/h	579	990	809	660	975	6	303	498	412	214	204	179
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.09	0.28	0.28	0.12	0.12	0.00
Sat Flow, veh/h	1051	1698	1387	1094	1671	10	1664	1782	1477	1144	1748	1530
Grp Volume(v), veh/h	68	191	46	78	0	346	146	140	103	3	119	0
Grp Sat Flow(s),veh/h/ln	1051	1698	1387	1094	0	1681	1664	1782	1477	1144	1748	1530
Q Serve(g_s), s	3.3	4.8	1.3	3.2	0.0	9.7	6.6	5.5	4.9	0.2	5.8	0.0
Cycle Q Clear(g_c), s	13.0	4.8	1.3	8.0	0.0	9.7	6.6	5.5	4.9	0.2	5.8	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	579	990	809	660	0	980	303	498	412	214	204	179
V/C Ratio(X)	0.12	0.19	0.06	0.12	0.00	0.35	0.48	0.28	0.25	0.01	0.58	0.00
Avail Cap(c_a), veh/h	579	990	809	660	0	980	347	907	752	446	559	490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	13.3	8.8	8.1	10.7	0.0	9.8	29.4	25.4	25.1	35.2	37.7	0.0
Incr Delay (d2), s/veh	0.4	0.4	0.1	0.4	0.0	1.0	1.2	0.3	0.3	0.0	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	2.3	0.5	1.0	0.0	4.8	3.1	2.8	2.0	0.1	3.0	0.0
LnGrp Delay(d),s/veh	13.7	9.2	8.2	11.1	0.0	10.8	30.5	25.7	25.4	35.2	40.3	0.0
LnGrp LOS	B	A	A	B		B	C	C	C	D	D	
Approach Vol, veh/h		305			424			389			122	
Approach Delay, s/veh		10.1			10.9			27.4			40.2	
Approach LOS		B			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		58.7		31.3		58.7	14.6	16.7				
Change Period (Y+Rc), s		* 6.2		* 6.2		* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 32		* 46		* 32	* 11	* 29				
Max Q Clear Time (g_c+I1), s		11.7		7.5		15.0	8.6	7.8				
Green Ext Time (p_c), s		4.7		2.4		4.4	0.1	2.1				
Intersection Summary												
HCM 2010 Ctrl Delay			18.8									
HCM 2010 LOS			B									
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road & Eagleson Road

800 Eagleson Road TIA

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	176	772	388	92	176	104
Future Volume (vph)	176	772	388	92	176	104
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1689	1748	1698	1500	1710	1430
Flt Permitted	0.41	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	730	1748	1698	1500	1800	1430
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	196	858	431	102	196	116
RTOR Reduction (vph)	0	0	0	42	0	98
Lane Group Flow (vph)	196	858	431	60	196	18
Confl. Peds. (#/hr)	6					
Heavy Vehicles (%)	1%	3%	6%	2%	0%	7%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	80.8	80.8	65.2	65.2	17.2	17.2
Effective Green, g (s)	80.8	80.8	65.2	65.2	17.2	17.2
Actuated g/C Ratio	0.73	0.73	0.59	0.59	0.16	0.16
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	619	1283	1006	889	281	223
v/s Ratio Prot	0.03	c0.49	0.25			
v/s Ratio Perm	0.20			0.04	c0.11	0.01
v/c Ratio	0.32	0.67	0.43	0.07	0.70	0.08
Uniform Delay, d1	5.5	7.6	12.2	9.5	43.9	39.6
Progression Factor	1.00	1.00	0.49	0.66	1.00	1.00
Incremental Delay, d2	0.3	2.8	1.3	0.1	7.3	0.2
Delay (s)	5.8	10.4	7.2	6.4	51.3	39.8
Level of Service	A	B	A	A	D	D
Approach Delay (s)		9.5	7.1		47.0	
Approach LOS		A	A		D	
Intersection Summary						
HCM 2000 Control Delay		15.0		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.72				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		63.2%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

HCM 2010 Signalized Intersection Summary
13: Eagleson Road & Cope Drive/Cadence Gate

800 Eagleson Road TIA

08/16/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	62	25	52	115	205	87	826	42	56	428	89
Future Volume (veh/h)	153	62	25	52	115	205	87	826	42	56	428	89
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1682	1693	1800	1800	1760	1800	1748	1776	1800	1731	1731	1698
Adj Flow Rate, veh/h	170	69	0	58	128	0	97	918	47	62	476	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	2	2	0	1	1	3	1	1	4	4	6
Cap, veh/h	270	392	0	334	407	0	574	1835	94	326	1833	805
Arrive On Green	0.23	0.23	0.00	0.23	0.23	0.00	0.03	0.38	0.38	0.04	0.56	0.00
Sat Flow, veh/h	1197	1693	0	1350	1760	0	1664	3266	167	1648	3288	1443
Grp Volume(v), veh/h	170	69	0	58	128	0	97	474	491	62	476	0
Grp Sat Flow(s),veh/h/ln	1197	1693	0	1350	1760	0	1664	1687	1746	1648	1644	1443
Q Serve(g_s), s	15.1	3.6	0.0	4.0	6.6	0.0	2.7	23.7	23.7	1.7	8.2	0.0
Cycle Q Clear(g_c), s	21.7	3.6	0.0	7.5	6.6	0.0	2.7	23.7	23.7	1.7	8.2	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	270	392	0	334	407	0	574	948	981	326	1833	805
V/C Ratio(X)	0.63	0.18	0.00	0.17	0.31	0.00	0.17	0.50	0.50	0.19	0.26	0.00
Avail Cap(c_a), veh/h	358	516	0	433	536	0	608	948	981	367	1833	805
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	44.1	33.9	0.0	36.9	35.0	0.0	9.8	22.4	22.4	12.1	12.6	0.0
Incr Delay (d2), s/veh	2.4	0.2	0.0	0.2	0.4	0.0	0.1	1.9	1.8	0.3	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	1.7	0.0	1.5	3.3	0.0	1.2	11.5	11.9	0.8	3.8	0.0
LnGrp Delay(d),s/veh	46.5	34.1	0.0	37.1	35.5	0.0	9.9	24.3	24.3	12.4	12.9	0.0
LnGrp LOS	D	C		D	D		A	C	C	B	B	
Approach Vol, veh/h		239			186			1062			538	
Approach Delay, s/veh		42.9			36.0			23.0			12.9	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	67.8		31.9	10.7	67.3		31.9				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	7.0	51.0		33.5	7.0	51.0		33.5				
Max Q Clear Time (g_c+I1), s	3.7	25.7		23.7	4.7	10.2		9.5				
Green Ext Time (p_c), s	0.0	12.4		1.7	0.1	15.2		2.5				
Intersection Summary												
HCM 2010 Ctrl Delay				23.8								
HCM 2010 LOS				C								

Intersection												
Int Delay, s/veh	4.8											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕	↕	↕	↕	↕
Traffic Vol, veh/h	22	17	22	62	18	44	34	184	24	12	230	11
Future Vol, veh/h	22	17	22	62	18	44	34	184	24	12	230	11
Conflicting Peds, #/hr	1	0	0	2	0	0	1	0	0	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	19	25	0	10	24	2	9	5	27	0	3	10
Mvmt Flow	24	19	24	69	20	49	38	204	27	13	256	12

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	598	564	259	587	564	206	257	0	0	205	0	0
Stage 1	283	283	-	281	281	-	-	-	-	-	-	-
Stage 2	315	281	-	306	283	-	-	-	-	-	-	-
Critical Hdwy	7.29	6.75	6.2	7.2	6.74	6.22	4.19	-	-	4.1	-	-
Critical Hdwy Stg 1	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Follow-up Hdwy	3.671	4.225	3.3	3.59	4.216	3.318	2.281	-	-	2.2	-	-
Pot Cap-1 Maneuver	390	405	785	410	406	835	1268	-	-	1378	-	-
Stage 1	689	637	-	709	640	-	-	-	-	-	-	-
Stage 2	661	639	-	687	639	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	342	388	783	370	389	834	1266	-	-	1377	-	-
Mov Cap-2 Maneuver	342	388	-	370	389	-	-	-	-	-	-	-
Stage 1	668	630	-	687	620	-	-	-	-	-	-	-
Stage 2	584	619	-	638	632	-	-	-	-	-	-	-

Approach	SE		NW		NE		SW	
HCM Control Delay, s	14.5		16		1.1		0.4	
HCM LOS	B		C					

Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1266	-	-	465	448	1377	-
HCM Lane V/C Ratio	0.03	-	-	0.296	0.151	0.01	-
HCM Control Delay (s)	7.9	-	-	16	14.5	7.6	-
HCM Lane LOS	A	-	-	C	B	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.2	0.5	0	-

Intersection						
Int Delay, s/veh	13.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	343	641	40	201	282
Future Vol, veh/h	18	343	641	40	201	282
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	29	2	2	13	7	6
Mvmt Flow	20	381	712	44	223	313
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1472	712	0	0	712	0
Stage 1	712	-	-	-	-	-
Stage 2	760	-	-	-	-	-
Critical Hdwy	6.69	6.22	-	-	4.17	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.318	-	-	2.263	-
Pot Cap-1 Maneuver	122	432	-	-	865	-
Stage 1	440	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	91	432	-	-	865	-
Mov Cap-2 Maneuver	91	-	-	-	-	-
Stage 1	440	-	-	-	-	-
Stage 2	309	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	50.5	0	4.4			
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 91 432	865	-		
HCM Lane V/C Ratio	-	- 0.22 0.882	0.258	-		
HCM Control Delay (s)	-	- 55.4 50.2	10.6	-		
HCM Lane LOS	-	- F F	B	-		
HCM 95th %tile Q(veh)	-	- 0.8 9.2	1	-		

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

08/15/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	61	172	41	70	310	2	131	128	93	3	109	162
Future Volume (veh/h)	61	172	41	70	310	2	131	128	93	3	109	162
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1698	1636	1698	1683	1800	1748	1782	1748	1800	1748	1800
Adj Flow Rate, veh/h	68	191	46	78	344	2	146	142	103	3	121	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	6	10	6	7	7	3	1	3	0	3	0
Cap, veh/h	578	988	807	659	973	6	303	500	414	215	206	181
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.09	0.28	0.28	0.12	0.12	0.00
Sat Flow, veh/h	1051	1698	1387	1094	1671	10	1664	1782	1477	1142	1748	1530
Grp Volume(v), veh/h	68	191	46	78	0	346	146	142	103	3	121	0
Grp Sat Flow(s),veh/h/ln	1051	1698	1387	1094	0	1681	1664	1782	1477	1142	1748	1530
Q Serve(g_s), s	3.3	4.8	1.3	3.3	0.0	9.8	6.6	5.6	4.9	0.2	5.9	0.0
Cycle Q Clear(g_c), s	13.0	4.8	1.3	8.0	0.0	9.8	6.6	5.6	4.9	0.2	5.9	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	578	988	807	659	0	978	303	500	414	215	206	181
V/C Ratio(X)	0.12	0.19	0.06	0.12	0.00	0.35	0.48	0.28	0.25	0.01	0.59	0.00
Avail Cap(c_a), veh/h	578	988	807	659	0	978	347	907	752	446	559	490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	13.3	8.9	8.1	10.8	0.0	9.9	29.3	25.3	25.1	35.1	37.6	0.0
Incr Delay (d2), s/veh	0.4	0.4	0.1	0.4	0.0	1.0	1.2	0.3	0.3	0.0	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	2.3	0.5	1.0	0.0	4.8	3.1	2.8	2.0	0.1	3.0	0.0
LnGrp Delay(d),s/veh	13.7	9.3	8.3	11.1	0.0	10.9	30.5	25.6	25.4	35.1	40.2	0.0
LnGrp LOS	B	A	A	B		B	C	C	C	D	D	
Approach Vol, veh/h		305			424			391			124	
Approach Delay, s/veh		10.1			10.9			27.4			40.1	
Approach LOS		B			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		58.6		31.4		58.6	14.6	16.8				
Change Period (Y+Rc), s		* 6.2		* 6.2		* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 32		* 46		* 32	* 11	* 29				
Max Q Clear Time (g_c+I1), s		11.8		7.6		15.0	8.6	7.9				
Green Ext Time (p_c), s		4.7		2.4		4.4	0.1	2.1				
Intersection Summary												
HCM 2010 Ctrl Delay				18.8								
HCM 2010 LOS				B								
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road & Eagleson Road

800 Eagleson Road TIA

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	180	782	391	96	188	110
Future Volume (vph)	180	782	391	96	188	110
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1690	1748	1698	1500	1710	1430
Flt Permitted	0.40	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	719	1748	1698	1500	1800	1430
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	200	869	434	107	209	122
RTOR Reduction (vph)	0	0	0	45	0	102
Lane Group Flow (vph)	200	869	434	62	209	20
Confl. Peds. (#/hr)	6					
Heavy Vehicles (%)	1%	3%	6%	2%	0%	7%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	80.0	80.0	64.2	64.2	18.0	18.0
Effective Green, g (s)	80.0	80.0	64.2	64.2	18.0	18.0
Actuated g/C Ratio	0.73	0.73	0.58	0.58	0.16	0.16
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	609	1271	991	875	294	234
v/s Ratio Prot	0.03	c0.50	0.26			
v/s Ratio Perm	0.21			0.04	c0.12	0.01
v/c Ratio	0.33	0.68	0.44	0.07	0.71	0.09
Uniform Delay, d1	5.9	8.1	12.8	9.9	43.5	39.0
Progression Factor	1.00	1.00	0.51	0.79	1.00	1.00
Incremental Delay, d2	0.3	3.0	1.4	0.2	7.9	0.2
Delay (s)	6.2	11.1	7.9	8.0	51.4	39.2
Level of Service	A	B	A	A	D	D
Approach Delay (s)		10.2	7.9		46.9	
Approach LOS		B	A		D	
Intersection Summary						
HCM 2000 Control Delay		15.8		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.73				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		64.4%		ICU Level of Service		C
Analysis Period (min)		15				
c Critical Lane Group						

HCM 2010 Signalized Intersection Summary
13: Eagleson Road & Cope Drive/Cadence Gate

800 Eagleson Road TIA

08/15/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	62	25	52	115	205	89	845	43	56	435	89
Future Volume (veh/h)	153	62	25	52	115	205	89	845	43	56	435	89
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1682	1693	1800	1800	1760	1800	1748	1776	1800	1731	1731	1698
Adj Flow Rate, veh/h	170	69	0	58	128	0	99	939	48	62	483	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	2	2	0	1	1	3	1	1	4	4	6
Cap, veh/h	270	392	0	334	407	0	570	1835	94	318	1832	804
Arrive On Green	0.23	0.23	0.00	0.23	0.23	0.00	0.03	0.38	0.38	0.04	0.56	0.00
Sat Flow, veh/h	1197	1693	0	1350	1760	0	1664	3267	167	1648	3288	1443
Grp Volume(v), veh/h	170	69	0	58	128	0	99	485	502	62	483	0
Grp Sat Flow(s),veh/h/ln	1197	1693	0	1350	1760	0	1664	1687	1746	1648	1644	1443
Q Serve(g_s), s	15.1	3.6	0.0	4.0	6.6	0.0	2.8	24.4	24.4	1.7	8.4	0.0
Cycle Q Clear(g_c), s	21.7	3.6	0.0	7.5	6.6	0.0	2.8	24.4	24.4	1.7	8.4	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	270	392	0	334	407	0	570	948	981	318	1832	804
V/C Ratio(X)	0.63	0.18	0.00	0.17	0.31	0.00	0.17	0.51	0.51	0.19	0.26	0.00
Avail Cap(c_a), veh/h	358	516	0	433	536	0	604	948	981	360	1832	804
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	44.1	33.9	0.0	36.9	35.0	0.0	9.8	22.6	22.6	12.3	12.6	0.0
Incr Delay (d2), s/veh	2.4	0.2	0.0	0.2	0.4	0.0	0.1	2.0	1.9	0.3	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	1.7	0.0	1.5	3.3	0.0	1.3	11.9	12.3	0.8	3.9	0.0
LnGrp Delay(d),s/veh	46.5	34.1	0.0	37.1	35.5	0.0	10.0	24.6	24.5	12.6	13.0	0.0
LnGrp LOS	D	C		D	D		A	C	C	B	B	
Approach Vol, veh/h		239			186			1086			545	
Approach Delay, s/veh		42.9			36.0			23.2			12.9	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	67.8		31.9	10.8	67.3		31.9				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	7.0	51.0		33.5	7.0	51.0		33.5				
Max Q Clear Time (g_c+I1), s	3.7	26.4		23.7	4.8	10.4		9.5				
Green Ext Time (p_c), s	0.0	12.5		1.7	0.1	15.6		2.5				
Intersection Summary												
HCM 2010 Ctrl Delay				24.0								
HCM 2010 LOS				C								

Intersection												
Int Delay, s/veh	4.7											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	22	17	22	62	18	44	34	185	24	12	235	11
Future Vol, veh/h	22	17	22	62	18	44	34	185	24	12	235	11
Conflicting Peds, #/hr	1	0	0	2	0	0	1	0	0	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	19	25	0	10	24	2	9	5	27	0	3	10
Mvmt Flow	24	19	24	69	20	49	38	206	27	13	261	12
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	606	571	264	593	571	208	262	0	0	207	0	0
Stage 1	289	289	-	282	282	-	-	-	-	-	-	-
Stage 2	317	282	-	311	289	-	-	-	-	-	-	-
Critical Hdwy	7.29	6.75	6.2	7.2	6.74	6.22	4.19	-	-	4.1	-	-
Critical Hdwy Stg 1	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.29	5.75	-	6.2	5.74	-	-	-	-	-	-	-
Follow-up Hdwy	3.671	4.225	3.3	3.59	4.216	3.318	2.281	-	-	2.2	-	-
Pot Cap-1 Maneuver	385	401	780	406	402	832	1263	-	-	1376	-	-
Stage 1	683	633	-	708	640	-	-	-	-	-	-	-
Stage 2	660	638	-	683	635	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	337	385	778	366	386	831	1261	-	-	1375	-	-
Mov Cap-2 Maneuver	337	385	-	366	386	-	-	-	-	-	-	-
Stage 1	662	626	-	686	620	-	-	-	-	-	-	-
Stage 2	583	618	-	634	628	-	-	-	-	-	-	-
Approach	SE		NW		NE		SW					
HCM Control Delay, s	14.6		16.1		1.1		0.4					
HCM LOS	B		C									
Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR					
Capacity (veh/h)	1261	-	-	461	443	1375	-	-				
HCM Lane V/C Ratio	0.03	-	-	0.299	0.153	0.01	-	-				
HCM Control Delay (s)	7.9	-	-	16.1	14.6	7.6	-	-				
HCM Lane LOS	A	-	-	C	B	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	1.2	0.5	0	-	-				

Intersection						
Int Delay, s/veh	13.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	343	646	40	205	288
Future Vol, veh/h	18	343	646	40	205	288
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	29	2	2	13	7	6
Mvmt Flow	20	381	718	44	228	320
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1494	718	0	0	718	0
Stage 1	718	-	-	-	-	-
Stage 2	776	-	-	-	-	-
Critical Hdwy	6.69	6.22	-	-	4.17	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.318	-	-	2.263	-
Pot Cap-1 Maneuver	118	429	-	-	860	-
Stage 1	437	-	-	-	-	-
Stage 2	410	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	87	429	-	-	860	-
Mov Cap-2 Maneuver	87	-	-	-	-	-
Stage 1	437	-	-	-	-	-
Stage 2	301	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	51.7	0	4.4			
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 87 429	860	-		
HCM Lane V/C Ratio	-	- 0.23 0.888	0.265	-		
HCM Control Delay (s)	-	- 58.3 51.4	10.7	-		
HCM Lane LOS	-	- F F	B	-		
HCM 95th %tile Q(veh)	-	- 0.8 9.3	1.1	-		

Intersection

Int Delay, s/veh 0.5

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	3	17	250	1	6	270
Future Vol, veh/h	3	17	250	1	6	270
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	-	-	800	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	19	278	1	7	300

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	591	139	0
Stage 1	278	-	-
Stage 2	313	-	-
Critical Hdwy	6.63	6.93	-
Critical Hdwy Stg 1	5.83	-	-
Critical Hdwy Stg 2	5.43	-	-
Follow-up Hdwy	3.519	3.319	-
Pot Cap-1 Maneuver	454	884	-
Stage 1	745	-	-
Stage 2	741	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	451	884	-
Mov Cap-2 Maneuver	451	-	-
Stage 1	745	-	-
Stage 2	736	-	-

Approach	NW	NE	SW
HCM Control Delay, s	9.8	0	0.2
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NERNWLn1	SWL	SWT
Capacity (veh/h)	-	-	773	1282
HCM Lane V/C Ratio	-	-	0.029	0.005
HCM Control Delay (s)	-	-	9.8	7.8
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	4	1	987	497	4
Future Vol, veh/h	13	4	1	987	497	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	4	1	1097	552	4

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1653	554	557	0	-	0
Stage 1	554	-	-	-	-	-
Stage 2	1099	-	-	-	-	-
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	108	532	1014	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	319	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	108	532	1014	-	-	-
Mov Cap-2 Maneuver	108	-	-	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	318	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	36.5	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1014	-	133	-	-
HCM Lane V/C Ratio	0.001	-	0.142	-	-
HCM Control Delay (s)	8.6	0	36.5	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

08/16/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	176	335	12	175	345	12	88	132	53	1	229	121
Future Volume (veh/h)	176	335	12	175	345	12	88	132	53	1	229	121
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1731	1782	1782	1728	1800	1698	1765	1731	1800	1800	1782
Adj Flow Rate, veh/h	196	372	13	194	383	13	98	147	59	1	254	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	4	1	1	4	4	6	2	4	0	0	1
Cap, veh/h	506	748	653	486	960	33	214	527	439	285	321	270
Arrive On Green	0.43	0.43	0.43	0.08	0.58	0.58	0.06	0.30	0.30	0.18	0.18	0.00
Sat Flow, veh/h	1004	1731	1510	1697	1662	56	1617	1765	1471	1195	1800	1515
Grp Volume(v), veh/h	196	372	13	194	0	396	98	147	59	1	254	0
Grp Sat Flow(s),veh/h/ln	1004	1731	1510	1697	0	1718	1617	1765	1471	1195	1800	1515
Q Serve(g_s), s	13.8	15.5	0.5	6.0	0.0	12.7	4.8	6.4	2.9	0.1	13.5	0.0
Cycle Q Clear(g_c), s	13.8	15.5	0.5	6.0	0.0	12.7	4.8	6.4	2.9	0.1	13.5	0.0
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	506	748	653	486	0	992	214	527	439	285	321	270
V/C Ratio(X)	0.39	0.50	0.02	0.40	0.00	0.40	0.46	0.28	0.13	0.00	0.79	0.00
Avail Cap(c_a), veh/h	506	748	653	494	0	992	214	702	586	404	500	421
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.0	20.5	16.3	14.2	0.0	11.6	30.7	26.8	25.6	33.8	39.3	0.0
Incr Delay (d2), s/veh	2.2	2.4	0.1	0.5	0.0	1.2	1.5	0.3	0.1	0.0	4.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	7.9	0.2	2.8	0.0	6.3	2.2	3.1	1.2	0.0	7.1	0.0
LnGrp Delay(d),s/veh	22.3	22.9	16.3	14.8	0.0	12.8	32.2	27.1	25.8	33.8	43.9	0.0
LnGrp LOS	C	C	B	B		B	C	C	C	C	D	
Approach Vol, veh/h		581			590			304			255	
Approach Delay, s/veh		22.5			13.4			28.5			43.9	
Approach LOS		C			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s		64.0		36.0	14.5	49.4	12.0	24.0				
Change Period (Y+Rc), s		* 6.2		* 6.2	* 6.5	* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 48		* 40	* 8.5	* 33	* 5.9	* 28				
Max Q Clear Time (g_c+I1), s		14.7		8.4	8.0	17.5	6.8	15.5				
Green Ext Time (p_c), s		8.1		3.2	0.0	6.0	0.0	2.3				
Intersection Summary												
HCM 2010 Ctrl Delay			23.6									
HCM 2010 LOS			C									
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road & Eagleson Road

800 Eagleson Road TIA

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	179	504	855	225	144	189
Future Volume (vph)	179	504	855	225	144	189
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1782	1765	1515	1673	1500
Flt Permitted	0.12	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	215	1782	1765	1515	1761	1500
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	199	560	950	250	160	210
RTOR Reduction (vph)	0	0	0	80	0	182
Lane Group Flow (vph)	199	560	950	170	160	28
Confl. Peds. (#/hr)	2				1	
Heavy Vehicles (%)	4%	1%	2%	1%	2%	2%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	92.1	92.1	75.7	75.7	15.9	15.9
Effective Green, g (s)	92.1	92.1	75.7	75.7	15.9	15.9
Actuated g/C Ratio	0.77	0.77	0.63	0.63	0.13	0.13
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	288	1367	1113	955	233	198
v/s Ratio Prot	c0.06	0.31	c0.54			
v/s Ratio Perm	0.47			0.11	c0.09	0.02
v/c Ratio	0.69	0.41	0.85	0.18	0.69	0.14
Uniform Delay, d1	19.8	4.7	17.7	9.2	49.7	46.0
Progression Factor	1.00	1.00	0.88	0.18	1.00	1.00
Incremental Delay, d2	7.0	0.9	7.0	0.3	8.1	0.3
Delay (s)	26.7	5.6	22.6	2.0	57.8	46.3
Level of Service	C	A	C	A	E	D
Approach Delay (s)		11.2	18.3		51.3	
Approach LOS		B	B		D	
Intersection Summary						
HCM 2000 Control Delay		21.2		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.81				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		81.4%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

HCM 2010 Signalized Intersection Summary
13: Eagleson Road & Cope Drive/Cadence Gate

800 Eagleson Road TIA

08/16/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	155	75	53	103	126	82	668	50	236	1044	170
Future Volume (veh/h)	121	155	75	53	103	126	82	668	50	236	1044	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1714	1800	1800	1800	1744	1800	1782	1783	1800	1800	1782	1731
Adj Flow Rate, veh/h	134	172	0	59	114	0	91	742	56	262	1160	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	0	0	0	1	1	1	1	1	0	1	4
Cap, veh/h	234	356	0	199	345	0	324	1799	136	594	2060	895
Arrive On Green	0.20	0.20	0.00	0.20	0.20	0.00	0.08	1.00	1.00	0.08	0.61	0.00
Sat Flow, veh/h	1229	1800	0	1228	1744	0	1697	3192	241	1714	3386	1471
Grp Volume(v), veh/h	134	172	0	59	114	0	91	394	404	262	1160	0
Grp Sat Flow(s),veh/h/ln	1229	1800	0	1228	1744	0	1697	1694	1739	1714	1693	1471
Q Serve(g_s), s	12.6	10.2	0.0	5.4	6.7	0.0	2.7	0.0	0.0	7.4	24.5	0.0
Cycle Q Clear(g_c), s	19.3	10.2	0.0	15.5	6.7	0.0	2.7	0.0	0.0	7.4	24.5	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	234	356	0	199	345	0	324	955	980	594	2060	895
V/C Ratio(X)	0.57	0.48	0.00	0.30	0.33	0.00	0.28	0.41	0.41	0.44	0.56	0.00
Avail Cap(c_a), veh/h	344	518	0	309	501	0	342	955	980	720	2060	895
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.6	42.7	0.0	49.6	41.3	0.0	11.4	0.0	0.0	8.2	14.0	0.0
Incr Delay (d2), s/veh	2.2	1.0	0.0	0.8	0.6	0.0	0.5	1.3	1.3	0.5	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	5.2	0.0	1.9	3.3	0.0	1.3	0.3	0.3	3.5	11.6	0.0
LnGrp Delay(d),s/veh	51.8	43.7	0.0	50.4	41.9	0.0	11.8	1.3	1.3	8.7	15.1	0.0
LnGrp LOS	D	D		D	D		B	A	A	A	B	
Approach Vol, veh/h		306			173			889			1422	
Approach Delay, s/veh		47.3			44.8			2.4			13.9	
Approach LOS		D			D			A			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	16.1	73.6		30.2	10.8	79.0		30.2				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	19.0	48.0		34.5	6.0	61.0		34.5				
Max Q Clear Time (g_c+I1), s	9.4	2.0		21.3	4.7	26.5		17.5				
Green Ext Time (p_c), s	0.8	25.3		2.4	0.0	21.4		2.7				
Intersection Summary												
HCM 2010 Ctrl Delay				15.8								
HCM 2010 LOS				B								

Intersection												
Int Delay, s/veh	4.8											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕	↕	↕	↕	↕
Traffic Vol, veh/h	16	21	35	52	20	23	34	243	46	48	325	33
Future Vol, veh/h	16	21	35	52	20	23	34	243	46	48	325	33
Conflicting Peds, #/hr	2	0	0	2	0	0	3	0	0	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	13	10	0	8	26	5	0	2	7	2	1	0
Mvmt Flow	18	23	39	58	22	26	38	270	51	53	361	37

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	842	819	366	849	819	274	364	0	0	272	0	0
Stage 1	471	471	-	348	348	-	-	-	-	-	-	-
Stage 2	371	348	-	501	471	-	-	-	-	-	-	-
Critical Hdwy	7.23	6.6	6.2	7.18	6.76	6.25	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Follow-up Hdwy	3.617	4.09	3.3	3.572	4.234	3.345	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	272	301	684	274	285	758	1206	-	-	1291	-	-
Stage 1	553	546	-	656	594	-	-	-	-	-	-	-
Stage 2	627	620	-	541	521	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	232	278	681	228	264	755	1204	-	-	1289	-	-
Mov Cap-2 Maneuver	232	278	-	228	264	-	-	-	-	-	-	-
Stage 1	534	522	-	634	574	-	-	-	-	-	-	-
Stage 2	563	599	-	466	498	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	17.5	25	0.9	0.9
HCM LOS	C	D		

Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1204	-	-	284	368	1289	-
HCM Lane V/C Ratio	0.031	-	-	0.372	0.217	0.041	-
HCM Control Delay (s)	8.1	-	-	25	17.5	7.9	-
HCM Lane LOS	A	-	-	D	C	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.7	0.8	0.1	-

Intersection						
Int Delay, s/veh	21.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	377	389	33	529	623
Future Vol, veh/h	33	377	389	33	529	623
Conflicting Peds, #/hr	0	0	0	0	8	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	10	1	1	10	1	1
Mvmt Flow	37	419	432	37	588	692
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	2308	440	0	0	440	0
Stage 1	440	-	-	-	-	-
Stage 2	1868	-	-	-	-	-
Critical Hdwy	6.5	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	40	619	-	-	1125	-
Stage 1	633	-	-	-	-	-
Stage 2	127	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 19	615	-	-	1125	-
Mov Cap-2 Maneuver	~ 19	-	-	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	61	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	89.8	0		5.3		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	19	615	1125	-
HCM Lane V/C Ratio	-	-	1.93	0.681	0.522	-
HCM Control Delay (s)	-	-	\$ 860.1	22.4	11.6	-
HCM Lane LOS	-	-	F	C	B	-
HCM 95th %tile Q(veh)	-	-	5	5.3	3.1	-
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 2010 Signalized Intersection Summary

4: Fernbank Road & Terry Fox Drive

800 Eagleson Road TIA

08/15/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	176	335	12	178	345	12	88	135	53	1	231	122
Future Volume (veh/h)	176	335	12	178	345	12	88	135	53	1	231	122
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1731	1782	1782	1728	1800	1698	1765	1731	1800	1800	1782
Adj Flow Rate, veh/h	196	372	13	198	383	13	98	150	59	1	257	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	4	1	1	4	4	6	2	4	0	0	1
Cap, veh/h	503	743	648	485	957	32	214	530	441	287	324	273
Arrive On Green	0.43	0.43	0.43	0.08	0.58	0.58	0.06	0.30	0.30	0.18	0.18	0.00
Sat Flow, veh/h	1004	1731	1510	1697	1662	56	1617	1765	1471	1191	1800	1515
Grp Volume(v), veh/h	196	372	13	198	0	396	98	150	59	1	257	0
Grp Sat Flow(s),veh/h/ln	1004	1731	1510	1697	0	1718	1617	1765	1471	1191	1800	1515
Q Serve(g_s), s	13.8	15.6	0.5	6.2	0.0	12.7	4.8	6.5	2.9	0.1	13.7	0.0
Cycle Q Clear(g_c), s	13.8	15.6	0.5	6.2	0.0	12.7	4.8	6.5	2.9	0.1	13.7	0.0
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	503	743	648	485	0	989	214	530	441	287	324	273
V/C Ratio(X)	0.39	0.50	0.02	0.41	0.00	0.40	0.46	0.28	0.13	0.00	0.79	0.00
Avail Cap(c_a), veh/h	503	743	648	490	0	989	214	702	586	403	500	421
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.3	20.8	16.4	14.4	0.0	11.7	30.6	26.8	25.5	33.6	39.2	0.0
Incr Delay (d2), s/veh	2.3	2.4	0.1	0.6	0.0	1.2	1.5	0.3	0.1	0.0	4.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	7.9	0.2	2.9	0.0	6.3	2.2	3.2	1.2	0.0	7.2	0.0
LnGrp Delay(d),s/veh	22.5	23.2	16.5	14.9	0.0	12.9	32.1	27.1	25.7	33.6	44.0	0.0
LnGrp LOS	C	C	B	B		B	C	C	C	C	D	
Approach Vol, veh/h		581			594			307			258	
Approach Delay, s/veh		22.8			13.6			28.4			44.0	
Approach LOS		C			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s		63.8		36.2	14.7	49.1	12.0	24.2				
Change Period (Y+Rc), s		* 6.2		* 6.2	* 6.5	* 6.2	* 6.1	* 6.2				
Max Green Setting (Gmax), s		* 48		* 40	* 8.5	* 33	* 5.9	* 28				
Max Q Clear Time (g_c+I1), s		14.7		8.5	8.2	17.6	6.8	15.7				
Green Ext Time (p_c), s		8.1		3.3	0.0	6.0	0.0	2.4				
Intersection Summary												
HCM 2010 Ctrl Delay			23.8									
HCM 2010 LOS			C									
Notes												

HCM Signalized Intersection Capacity Analysis

8: Fernbank Road & Eagleson Road

800 Eagleson Road TIA

11/19/2018

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	192	508	861	232	148	198
Future Volume (vph)	192	508	861	232	148	198
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1782	1765	1515	1673	1500
Flt Permitted	0.11	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	193	1782	1765	1515	1761	1500
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	213	564	957	258	164	220
RTOR Reduction (vph)	0	0	0	84	0	190
Lane Group Flow (vph)	213	564	957	174	164	30
Confl. Peds. (#/hr)	2				1	
Heavy Vehicles (%)	4%	1%	2%	1%	2%	2%
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	91.9	91.9	74.4	74.4	16.1	16.1
Effective Green, g (s)	91.9	91.9	74.4	74.4	16.1	16.1
Actuated g/C Ratio	0.77	0.77	0.62	0.62	0.13	0.13
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	286	1364	1094	939	236	201
v/s Ratio Prot	c0.07	0.32	c0.54			
v/s Ratio Perm	0.50			0.11	c0.09	0.02
v/c Ratio	0.74	0.41	0.87	0.18	0.69	0.15
Uniform Delay, d1	24.0	4.8	18.9	9.8	49.6	45.9
Progression Factor	1.00	1.00	0.86	0.22	1.00	1.00
Incremental Delay, d2	10.1	0.9	8.2	0.4	8.6	0.3
Delay (s)	34.1	5.7	24.5	2.5	58.2	46.2
Level of Service	C	A	C	A	E	D
Approach Delay (s)		13.5	19.8		51.3	
Approach LOS		B	B		D	
Intersection Summary						
HCM 2000 Control Delay		22.8		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.83				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		82.7%		ICU Level of Service		E
Analysis Period (min)		15				
c Critical Lane Group						

HCM 2010 Signalized Intersection Summary
13: Eagleson Road & Cope Drive/Cadence Gate

800 Eagleson Road TIA

08/15/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	155	76	54	103	126	83	675	50	236	1055	170
Future Volume (veh/h)	121	155	76	54	103	126	83	675	50	236	1055	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1714	1800	1800	1800	1744	1800	1782	1783	1800	1800	1782	1731
Adj Flow Rate, veh/h	134	172	0	60	114	0	92	750	56	262	1172	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	0	0	0	1	1	1	1	1	0	1	4
Cap, veh/h	234	356	0	199	345	0	320	1801	134	591	2060	895
Arrive On Green	0.20	0.20	0.00	0.20	0.20	0.00	0.08	1.00	1.00	0.08	0.61	0.00
Sat Flow, veh/h	1229	1800	0	1228	1744	0	1697	3195	238	1714	3386	1471
Grp Volume(v), veh/h	134	172	0	60	114	0	92	398	408	262	1172	0
Grp Sat Flow(s),veh/h/ln	1229	1800	0	1228	1744	0	1697	1694	1739	1714	1693	1471
Q Serve(g_s), s	12.6	10.2	0.0	5.5	6.7	0.0	2.8	0.0	0.0	7.4	24.9	0.0
Cycle Q Clear(g_c), s	19.3	10.2	0.0	15.6	6.7	0.0	2.8	0.0	0.0	7.4	24.9	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	234	356	0	199	345	0	320	955	980	591	2060	895
V/C Ratio(X)	0.57	0.48	0.00	0.30	0.33	0.00	0.29	0.42	0.42	0.44	0.57	0.00
Avail Cap(c_a), veh/h	344	518	0	309	501	0	338	955	980	718	2060	895
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.6	42.7	0.0	49.6	41.3	0.0	11.4	0.0	0.0	8.2	14.1	0.0
Incr Delay (d2), s/veh	2.2	1.0	0.0	0.8	0.6	0.0	0.5	1.3	1.3	0.5	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	5.2	0.0	1.9	3.3	0.0	1.3	0.4	0.4	3.5	11.9	0.0
LnGrp Delay(d),s/veh	51.8	43.7	0.0	50.5	41.9	0.0	11.9	1.3	1.3	8.8	15.2	0.0
LnGrp LOS	D	D		D	D		B	A	A	A	B	
Approach Vol, veh/h		306			174			898			1434	
Approach Delay, s/veh		47.2			44.8			2.4			14.0	
Approach LOS		D			D			A			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	16.1	73.6		30.2	10.8	79.0		30.2				
Change Period (Y+Rc), s	6.0	6.0		6.5	6.0	6.0		6.5				
Max Green Setting (Gmax), s	19.0	48.0		34.5	6.0	61.0		34.5				
Max Q Clear Time (g_c+I1), s	9.4	2.0		21.3	4.8	26.9		17.6				
Green Ext Time (p_c), s	0.8	25.6		2.4	0.0	21.5		2.7				
Intersection Summary												
HCM 2010 Ctrl Delay				15.8								
HCM 2010 LOS				B								

Intersection												
Int Delay, s/veh	4.8											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	16	21	35	52	20	23	34	249	46	48	329	33
Future Vol, veh/h	16	21	35	52	20	23	34	249	46	48	329	33
Conflicting Peds, #/hr	2	0	0	2	0	0	3	0	0	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	1200	-	600	1250	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	13	10	0	8	26	5	0	2	7	2	1	0
Mvmt Flow	18	23	39	58	22	26	38	277	51	53	366	37
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	853	829	371	859	829	281	369	0	0	279	0	0
Stage 1	475	475	-	354	354	-	-	-	-	-	-	-
Stage 2	378	354	-	505	475	-	-	-	-	-	-	-
Critical Hdwy	7.23	6.6	6.2	7.18	6.76	6.25	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.23	5.6	-	6.18	5.76	-	-	-	-	-	-	-
Follow-up Hdwy	3.617	4.09	3.3	3.572	4.234	3.345	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	267	297	679	270	281	751	1201	-	-	1284	-	-
Stage 1	550	544	-	651	590	-	-	-	-	-	-	-
Stage 2	622	616	-	538	519	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	227	275	676	224	260	748	1199	-	-	1282	-	-
Mov Cap-2 Maneuver	227	275	-	224	260	-	-	-	-	-	-	-
Stage 1	531	520	-	629	570	-	-	-	-	-	-	-
Stage 2	558	595	-	463	496	-	-	-	-	-	-	-
Approach	SE		NW		NE		SW					
HCM Control Delay, s	17.7		25.4		0.8		0.9					
HCM LOS	C		D									
Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR					
Capacity (veh/h)	1199	-	-	280	362	1282	-	-				
HCM Lane V/C Ratio	0.032	-	-	0.377	0.221	0.042	-	-				
HCM Control Delay (s)	8.1	-	-	25.4	17.7	7.9	-	-				
HCM Lane LOS	A	-	-	D	C	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	1.7	0.8	0.1	-	-				

Intersection						
Int Delay, s/veh	22.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	387	400	33	534	629
Future Vol, veh/h	33	387	400	33	534	629
Conflicting Peds, #/hr	0	0	0	0	8	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	720	0	-	460	1300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	10	1	1	10	1	1
Mvmt Flow	37	430	444	37	593	699
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	2338	452	0	0	452	0
Stage 1	452	-	-	-	-	-
Stage 2	1886	-	-	-	-	-
Critical Hdwy	6.5	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	38	610	-	-	1114	-
Stage 1	624	-	-	-	-	-
Stage 2	125	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 18	606	-	-	1114	-
Mov Cap-2 Maneuver	~ 18	-	-	-	-	-
Stage 1	620	-	-	-	-	-
Stage 2	58	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	95	0		5.4		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	18	606	1114	-
HCM Lane V/C Ratio	-	-	2.037	0.71	0.533	-
HCM Control Delay (s)	-	-	\$ 926	24.1	11.9	-
HCM Lane LOS	-	-	F	C	B	-
HCM 95th %tile Q(veh)	-	-	5.1	5.8	3.3	-
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	0.4					
Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	2	11	285	3	17	407
Future Vol, veh/h	2	11	285	3	17	407
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	-	-	800	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	12	317	3	19	452

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	808	160	0
Stage 1	318	-	-
Stage 2	490	-	-
Critical Hdwy	6.63	6.93	-
Critical Hdwy Stg 1	5.83	-	-
Critical Hdwy Stg 2	5.43	-	-
Follow-up Hdwy	3.519	3.319	-
Pot Cap-1 Maneuver	334	857	-
Stage 1	711	-	-
Stage 2	615	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	327	857	-
Mov Cap-2 Maneuver	327	-	-
Stage 1	711	-	-
Stage 2	603	-	-

Approach	NW	NE	SW
HCM Control Delay, s	10.4	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NERNWLn1	SWL	SWT
Capacity (veh/h)	-	-	686	1238
HCM Lane V/C Ratio	-	-	0.021	0.015
HCM Control Delay (s)	-	-	10.4	8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	9	779	1050	9
Future Vol, veh/h	5	5	9	779	1050	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	6	10	866	1167	10
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	2058	1172	1177	0	-	0
Stage 1	1172	-	-	-	-	-
Stage 2	886	-	-	-	-	-
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	61	234	593	-	-	-
Stage 1	294	-	-	-	-	-
Stage 2	403	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	59	234	593	-	-	-
Mov Cap-2 Maneuver	59	-	-	-	-	-
Stage 1	294	-	-	-	-	-
Stage 2	390	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	48.4	0.1		0		
HCM LOS	E					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	593	-	94	-	-	
HCM Lane V/C Ratio	0.017	-	0.118	-	-	
HCM Control Delay (s)	11.2	0	48.4	-	-	
HCM Lane LOS	B	A	E	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-	

APPENDIX

K

MMLOS
SHEETS

Multi-Modal Level of Service - Intersections Form

Consultant
Scenario
Comments

WSP Canada Group Ltd.

PM - 2018 Existing

Project
Date

800 Eagleson Road TIA

Jun-18

Unlocked Rows for Replicating

INTERSECTIONS		Terry Fox / Fernbank				Fernbank / Eagleson				Eagleson / Cope								
Crossing Side		NORTH		SOUTH		EAST		WEST		NORTH		SOUTH		EAST		WEST		
Pedestrian	Lanes	3		0 - 2		3		3		0 - 2		0 - 2		4		3		
	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		Protected/ Permissive		Permissive		Protected/ 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		Conventional with Receiving Lane		No Channel		No Channel		No Channel		Conv'tl without Receiving Lane		Conv'tl without Receiving Lane		
	Corner Radius	10-15m		5-10m		15-25m		10-15m		5-10m		No Right Turn		10-15m		15-25m		
	Crosswalk Type	Std transverse markings		Std transverse markings		Std transverse markings		Std transverse markings		Std transverse markings		Std transverse markings		Std transverse markings		Std transverse markings		
	PETSI Score		70		86		69		70		86		103		85		57	
	Ped. Exposure to Traffic LoS		C		B		C		C		B		A		-		B	
	Cycle Length		90		90		90		90		110		110		110		110	
	Effective Walk Time		7		7		7		7		7		7		7		7	
	Average Pedestrian Delay		38		38		38		38		48		48		48		48	
Pedestrian Delay LoS		D		D		D		D		E		E		-		E		
Level of Service		D		D		D		D		E		E		-		E		
		D				E				E								
Approach From		NORTH		SOUTH		EAST		WEST		NORTH		SOUTH		EAST		WEST		
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic		Mixed Traffic		Curb Bike Lane, Cycletrack or MUP		Mixed Traffic		Mixed Traffic		Curb Bike Lane, Cycletrack or MUP		Curb Bike Lane, Cycletrack or MUP		Mixed Traffic		
	Right Turn Lane Configuration	> 50 m		≤ 50 m		Not Applicable		> 50 m		> 50 m		≤ 50 m		Not Applicable		Not Applicable		
	Right Turning Speed	≤ 25 km/h		≤ 25 km/h		Not Applicable		≤ 25 km/h		≤ 25 km/h		≤ 25 km/h		Not Applicable		Not Applicable		
	Cyclist relative to RT motorists	F		D		Not Applicable		F		F		D		-		Not Applicable		
	Separated or Mixed Traffic	Mixed Traffic		Mixed Traffic		Separated		Mixed Traffic		Mixed Traffic		Mixed Traffic		-		Separated		
	Left Turn Approach	One lane crossed		One lane crossed		1 lane crossed		One lane crossed		One lane crossed		One lane crossed		1 lane crossed		≥ 2 lanes crossed		
	Operating Speed	≥ 60 km/h		≥ 60 km/h		> 50 to < 60 km/h		> 50 to < 60 km/h		> 50 to < 60 km/h		> 50 to < 60 km/h		> 50 to < 60 km/h		> 50 to < 60 km/h		
	Left Turning Cyclist	F		F		D		E		E		E		-		D		
Level of Service	F		F		D		F		F		E		-		D			
	F				F				F									
Transit	Average Signal Delay	≤ 30 sec		≤ 20 sec		> 40 sec		≤ 30 sec		≤ 10 sec		≤ 10 sec		> 40 sec		≤ 20 sec		
	Level of Service	D		C		F		D		B		B		-		F		
		F				F				F								
Truck	Effective Corner Radius	10 - 15 m		< 10 m		> 15 m		10 - 15 m		10 - 15 m		10 - 15 m		10 - 15 m		> 15 m		
	Number of Receiving Lanes on Departure from Intersection	1		1		1		1		1		1		1		≥ 2		
	Level of Service	E		F		C		E		E		E		-		E		
		F				E				E								
Auto	Volume to Capacity Ratio	0.0 - 0.60								0.61 - 0.70								
	Level of Service	A								B								

Multi-Modal Level of Service - Intersections Form

Consultant
Scenario
Comments

WSP Canada Group Ltd.

PM - 2024 Total

Project
Date

800 Eagleson Road TIA

Jun-18

Unlocked Rows for Replicating

INTERSECTIONS													
Crossing Side		Terry Fox / Fernbank				Fernbank / Eagleson				Eagleson / Cope			
		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	0 - 2	3	3	0 - 2	0 - 2		0 - 2	4	3	0 - 2	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Protected/ Permissive	Permissive	Protected/ Permissive	Permissive	Protected/ Permissive		Permissive	Protected/ Permissive	Protected/ Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	No right turn		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 prohibited		RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No		No	No	No	No	No
	Right Turn Channel	No Channel	No Channel	Conventional with Receiving Lane	No Channel	No Channel	No Right Turn		No Channel	Conv'tl without Receiving Lane	No Channel	Conv'tl without Receiving Lane	Conventional with Receiving Lane
	Corner Radius	10-15m	5-10m	15-25m	10-15m	5-10m	No Right Turn		10-15m	10-15m	15-25m	10-15m	15-25m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	70	86	69	70	86	103		85	57	68	89	69
	Ped. Exposure to Traffic LoS	C	B	C	C	B	A	-	B	D	C	B	C
	Cycle Length	90	90	90	90	110	110		110	110	110	110	110
	Effective Walk Time	7	7	7	7	7	7		7	7	7	7	7
Bicycle	Average Pedestrian Delay	38	38	38	38	48	48		48	48	48	48	48
	Pedestrian Delay LoS	D	D	D	D	E	E	-	E	E	E	E	E
	Level of Service	D	D	D	D	E	E	-	E	E	E	E	E
		D				E				E			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Mixed Traffic		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	≤ 50 m	Not Applicable	> 50 m	> 50 m	≤ 50 m		Not Applicable	Not Applicable	> 50 m	≤ 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	Not Applicable	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h		Not Applicable	Not Applicable	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	D	Not Applicable	F	F	D	-	Not Applicable	Not Applicable	F	D	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated	Mixed Traffic	Mixed Traffic	Mixed Traffic	-	Separated	Separated	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	One lane crossed	One lane crossed	1 lane crossed	One lane crossed	One lane crossed	One lane crossed		1 lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	One lane crossed	One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h		> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	F	F	D	E	E	E	-	D	F	F	D	D
Transit	Level of Service	F	F	D	F	F	E	-	D	F	F	D	F
		F				F				F			
	Average Signal Delay	≤ 30 sec	≤ 20 sec	> 40 sec	≤ 30 sec	≤ 20 sec	≤ 20 sec		> 40 sec	≤ 20 sec	≤ 10 sec	> 40 sec	> 40 sec
Truck	Level of Service	D	C	F	D	C	C	-	F	C	B	F	F
		F				F				F			
	Effective Corner Radius	10 - 15 m	< 10 m	> 15 m	10 - 15 m	10 - 15 m	10 - 15 m		10 - 15 m	10 - 15 m	> 15 m	10 - 15 m	> 15 m
Auto	Number of Receiving Lanes on Departure from Intersection	1	1	1	1	1	1		1	≥ 2	≥ 2	1	1
	Level of Service	E	F	C	E	E	E	-	E	B	A	E	C
		F				E				E			
Auto	Volume to Capacity Ratio	0.0 - 0.60				0.61 - 0.70				0.0 - 0.60			
	Level of Service	A				B				A			